

# Test Report From NEMKO EMC-Lab.

## EMC Test Report For

**Product**.....: *Emergency Transmitter*  
**Manufacturer**.....: *Jotron Electronics AS*  
**Model**.....: *Tron 40s*  
**NEMKO Reference**.....: *199626200*  
**Regulations**.....: *See below*

Standards	Results (Pass/Fail)
EN 50081-2:1993	Pass
EN 50082-2:1995	Pass

Tested by : *Arne Holhjem*

*Arne Holhjem*

Verified by : *Kjell Bergh*

*Kjell Bergh*

Test dates :

*96-06-26*

Issue date :

*96-07-03*

Test House :

*NEMKO /EMC-Lab.  
P.O.Box 73, Blindern,  
N-0314 OSLO 3  
Phone : (+47) 22 96 03 30  
Fax : (+47) 22 96 05 50*

*This report may be reproduced in full. Partial reproduction may only be made with the written consent of the laboratory.*

*The results in this report apply only to the sample(s) tested.*

**EQUIPMENT UNDER TEST (EuT)**

**1 Client Information**

Company Name *Jotron Electronics AS*

Company Address *P.O. Box 85  
3280 Tjodalving  
NORWAY*

Phone/Fax

Contact Name *Leif Hansen*

**2 Identification of EuT**

Equipment *Emergency Transmitter*

Manufacturer *Jotron Electronics AS*

Model Name/Number *Tron 40s*

Serial Number *Unnumbered*

Country of Manufacture *Norway*

Date of Receipt *96-06-26*

**3 Technical data of EuT**

Voltage *14.4 V DC*

Power

Class *I*

**4 Remarks**

*N/A means: This apparatus is operated with build in battery.*

## OPERATION OF EuT DURING TEST

### 1 Operating Environment

Power supplied to the testobject during test : 14.4 V DC lithiumbattery  
EuT was grounded during test

All tests and measurements were performed in a shielded enclosure.

### 2 Operating Modes

EuT was tested according to the specifications given by the manufacturer, and exercised in the most unfavourable manner.

### 3 Support Equipment

No support equipment necessary.

**Test Report according to EN 50081-2**

## SECTION 1 REPORT SUMMARY

### 1.1 Test specifications

Basic Standard	Comment	Results (Pass/Fail)
EN 55011 Class A	Conducted Emission 0,15-30 MHz	N/A
EN 55011 Class A	Radiated Emission 30-1000 MHz	Pass

### 1.2 Result

EuT complies with the requirements of EN 55011 and EN 60945. Emergency transmitter is tested in A position. Transmitter is not activated: No Radiated Emission was obtained 30...1000mhz, and in the mobil maritime frequency band 156-162MHz.

### 1.3 Measurement Uncertainties

For Conducted Emission measurement : 1.9 dB

For Radiated Emission measurement : 3.0 dB

### 1.4 Test Equipment Used

Full details of test equipment used, can be found in Appendix 1.

**SECTION 2 RADIATED EMISSION**

**2.1 Radiated Emission Measurement**

**Port** : *Enclosure*  
**Basic Standard** : *EN 55011 : 1991*  
**Limits** : *Class A*  
**Distance** : *30 m*

Freq. [MHz]	Meter [dBuV]	Correct. [dB]	Field [dBuV/m]	Margin [dBuV/m]	Polarity [H/V]	Height [cm]	Azimuth [Deg]	Result (Pass / Fail)
<b>30-230 Mhz (Limit = 30 dBuV/m)</b>								
122.6	68.0	7.7	75.7	45.7	H	139	127	Pass
122.6	97.1	7.7	104.8	74.8	V	110	1	Pass
<b>230-1000 Mhz (Limit=37 dBuV/m)</b>								
245.1	54.4	12.9	67.3	30.3	V	101	82	Pass
367.6	30.8	17.7	48.5	11.5	V	103	47	Pass
490.2	31.0	20.4	51.4	14.4	V	308	4	Pass
612.8	32.8	22.8	55.6	18.6	V	186	73	Pass
735.3	27.9	25.2	53.1	16.1	V	201	47	Pass
857.8	37.4	28.3	65.7	28.7	V	128	198	Pass
980.4	25.7	29.1	54.8	17.8	V	263	262	Pass

**Comment**

If no frequencies are specified in the above table, no measureable frequencies were found. Emergency transmitter is tested in position transmit. In standby mode no frequency was observed.

**Test equipment used**

N.B. See Appendix 1 for full details of test equipment

**Result**

**Measurements complies with the given specifications.**

**Test Report according to EN 50082-2 : 1995**

## SECTION 1 REPORT SUMMARY

### 1.1 Test specifications

Basic Standard	Comment	Port	Results (Pass/Fail)
ENV 50140	RF EM Field 80-1000 MHz AM	Enclosure	Pass
	RF EM Field 900±5 MHz PM	Enclosure	Pass
ENV 50141	RF Voltage 0.15-80 MHz AM	Signal lines/Data busses	N/A
		Process control lines	N/A
		DC lines	N/A
		AC lines	N/A
		Earth	N/A
IEC 61000-4-4	Fast Transients/Burst	Signal lines/Data busses	N/A
		Process control lines	N/A
		DC lines	N/A
		AC lines	N/A
EN 61000-4-2	ElectroStatic Discharge	Enclosure	Pass
EN 61000-4-8	50 Hz Magnetic Field	Enclosure	N/A

### 1.2 Result

EuT complies with the requirements of EN 50082-2

### 1.3 Level Uncertainties

For ESD Test (Voltage)	: 5 %
For ESD Test (Rise Time)	: 6 %
For Radiated EM Field test	: # V/m
For RF Voltage test	: # V
For 50 Hz Magnetic Field test	: # A/m
For Transient/Burst test (Voltage)	: 10 %
For Transient/Burst test (Rise Time)	: 30 %
For Transient/Burst test (Frequency)	: 10 %

### 1.4 Test Equipment Used

Full details of test equipment used, can be found in Appendix 1 and 2.



## SECTION 2 ELECTROSTATIC DISCHARGE

### 2.1 Electrostatic Discharge (ESD) Immunity Test

**Port** : *Enclosure*  
**Basic Standard** : *EN 61000-4-2*  
**Requirements** : *4/8 kV*  
**Performance Criteria** : *B*

**Temperature/Humidity**: *22 °C/45%*

#### Test Procedure

The electrostatic discharges were applied as follows :

Point	Voltage	Coupling	Result (Pass/Fail)
Topp,-side-buton	± 8 kV	Air Discharge	Pass
<>	± 4 kV	Contact	Pass

#### Performance

No operation errors were detected during or after the discharges.

#### Test equipment used

N.B. See Appendix 2 for full details of test equipment

#### Result

**Performance of EuT complies with the manufacturer specifications.**

## SECTION 3 RADIATED EM FIELD 80-1000 MHZ

### 3.1 Radiated Electromagnetic Field Immunity Test

**Port** : *Enclosure*  
**Basic Standard** : *ENV 50140*  
**Requirements** : *10 V/m + 80% AM, 1 kHz*  
**Performance Criteria** : *A*

#### Test Procedure

Frequency range : 80 MHz - 1000 MHz.  
 Step : 800 kHz  
 Step time : 2 Sec.

Range	Field	Modulation	Pol.	Pos	Result (Pass/Fail)
80-200 MHz	>10 V/m	80% AM, 1kHz	H	0°	Pass
<>	<>	<>	V	0°	Pass
<>	<>	<>	H	180°	Pass
<>	<>	<>	V	180°	Pass
200-1000 MHz	<>	<>	H	0°	Pass
<>	<>	<>	V	0°	Pass
<>	<>	<>	H	180°	Pass
<>	<>	<>	V	180°	Pass

Tested in transmit and standby mode.

#### Performance

No operation errors were detected during or after the exposure.

#### Test equipment used

N.B. See Appendix 2 for full details of test equipment

#### Result

Performance of EuT complies with the manufacturer specifications.

**SECTION 4 RADIATED EM FIELD 900 ± 5 MHz**

**4.1 Radiated Electromagnetic Field Immunity Test**

Port : *Enclosure*  
Basic Standard : *ENV 50140*  
Requirements : *10 V/m*  
Performance Criteria : *A*

Test Procedure

Frequency range : 900 ± 5 MHz  
Step : 10  
Step time : 3 Sec.

Range	Field	Modulation	Pol.	Pos	Result (Pass/Fail)
900 ± 5 MHz	>10 V/m	PM (50% d.c., 200 Hz)	H	0°	Pass
<>	<>	<>	V	0°	Pass
<>	<>	<>	II	180°	Pass
<>	<>	<>	V	180°	Pass

Performance

No operation errors were detected during or after the exposure.

Test equipment used

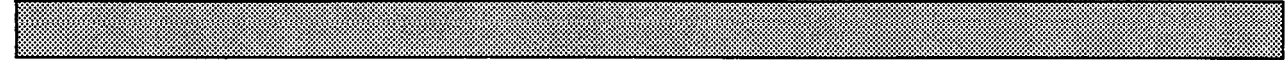
N.B. See Appendix 2 for full details of test equipment

Result

Performance of EuT complies with the manufacturer specifications.

**APPENDIX 1 TEST EQUIPMENT USED (Emission)**

	Instruments	Manufacturer	Model	N-No.
	<b>Conducted Emission</b>			
	Test Receiver 9 kHz-30 MHz	Rohde&Schwarz	ESHS 30	N-3529
	Test Receiver 9 kHz-30 MHz	Rhode&Schwarz	ESH-3	N-2337
	Artificial Mains Network (LISN)	Rhode&Schwarz	ESH-2 Z5	N-3558
	Artificial Mains Network (LISN)	Rohde&Schwarz	ESH-3 Z5	N-2337.2
	Pulse Limiter	Rohde&Schwarz	ESH 3-Z2	N-2337.3
	Pulse Limiter	Rhode&Schwarz	ESH 3-Z2	N-3493
	<b>Antenna Terminal Emission</b>			
	RF Generator 0.1 MHz - 1 GHz	Philips	PM 5390S	N-3447
	Color TV Pattern Generator	Philips	PM 5415 TN	N-3455
	<b>Radiated Emission 3-30 m (&lt;1 GHz)</b>			
	EMI Test Receiver 20-1300 MHz	Rohde&Schwarz	ESVP	N-3457
	Spectrum Monitor	Rohde&Schwarz	EZM	N-3441
	Spectrum Analyzer 9 kHz-2.6 GHz	Advantest	R3261A	N-3458
	BiConical Antenna 20-300 MHz	Rhode&Schwarz	HUF-Z2	N-3467
	LogPeriodic Antenna 200-1000 MHz	EMCO	3146	N-3468
	BiConiLog Antenna 26-1100 MHz	EMCO	3143	N-3448
	<b>Radiated Emission 3-30m (1-22 GHz)</b>			
x	Quasi-Peak Adapter	Hewlett-Packard	35650A	N-3443
x	RF Preselector	Hewlett-Packard	85685A	N-3444
x	Spectrum Analyzer 1-22 GHz	Hewlett-Packard	8566B	N-3442
x	Synthesized CW Generator 1-20 GHz	Hewlett-Packard	83711A	N-3451
	Horn Antenna	EMCO		
	Horn Antenna	EMCO		
	<b>Disturbance Power</b>			
	Test Receiver 20 MHz-1.0 GHz	Rohde&Schwarz	ESVS 20	N-2886
	Absorbing Clamp 30 MHz-1 GHz	Rohde&Schwarz	MDS 21	N-2179.2
	Clamp Positioning Controller	Rohde&Schwarz	HCC	N-3321.2
	Automatic Clamp Slideway	Rohde&Schwarz	HCA	N-3321.1
	<b>Harmonics/Flicker</b>			
	Universal Power Analyzer	Voltech	PM 3000A	N-2881
	1 $\phi$ Impedance Stabilizing Network	Voltech		N-3166
	<b>Discontinuous Conducted Emission</b>			
	Test Receiver	Chase	DIA 1512	N-3548
	Test Receiver	Chase	DIA 1512	N-2270
	Artificial Mains Network (LISN)	Rhode&Schwarz	ESH-2 Z5	N-2099.2
	Artificial Mains Network (LISN)	Schwarzbeck	NNLA 8120	N-2168
	<b>Conducted Emission On Output Line</b>			
	High Voltage Probe	Rohde&Schwarz	ESH2-Z3	N-2337.3
	High Voltage Probe	Schwarzbeck	TK 9420	N-3368
	<b>Magnetic Field</b>			
	Test Receiver 9 kHz-30 MHz	Rohde&Schwarz	ESHS 10	N-3528
	Trippel-loop Antenna (2 meter loop)	Rohde&Schwarz	HM 020	N-3320
	Artificial Mains Network (LISN)	Rohde&Schwarz	ESH-3 Z5	N-3402



Instruments	Manufacturer	Model	N-No.
<b>Insertion Loss</b>			
Test Receiver 9 kHz-30 MHz	Rhode&Schwarz	ESH-3	N-2099.1
Artificial Mains Network (LISN) 150 Ω	Chase	MN 2016	N-3342
Ballun (Balance to unbalance transformer)	NEMKO	Ballun 1	N-3343

**APPENDIX 2 TEST EQUIPMENT USED (Immunity)**

	Instruments	Manufacturer	Model	N-No.
	<b>Electrostatic Discharge</b>			
	ESD Simulator 2-18 kV	Schaffner	NSG 433	N-2890
	<b>AC Mains Disturbances</b>			
	Interference Test System	Schaffner	NSG 600	N-2883
	Burst Generator	Schaffner	NSG 625	N-2883.1
	Combined Wave Generator	Schaffner	NSG 623	N-2883.2
	Dropout And Variation Simulator	Schaffner	NSG 603A	N-2883.3
	High Energy Puls Generator	Schaffner	NSG 651	N-2884
	Surge Pulse Coupling Network	Schaffner	CDN 110	N-2884.1
	Coupling Clamp	Schaffner	CDN 125	N-2891
	<b>Radiated Immunity</b>			
x	Anechoic Chamber	Euroshield		
x	Signal Generator	Rohde&Schwarz	SMT 03	
x	Power Meter	Boonton		
x	Power Amplifier	Amplifier Research	1000 L	N-3463
x	Power Amplifier	Amplifier Research	200W1000M7	N-3464
x	Biconical Antenna 20-300 MHz	EMCO	3109	
x	Logperiodic Antenna 200-1000 MHz	EMCO	3146	N-3468
x	Field Probes	Amplifier Research	FP 3000A	
x	System Interface	EMCAutomation	SI-200	
	<b>Radiated/Conducted Immunity</b>			
	Signal Generator	Rohde&Schwarz	SMG	N-2885
	Power Meter	Rohde&Schwarz	NRVD	N-3573
	Power Amplifier 10 kHz-100 MHz	Amplifier Research	25A100	N-2888
	Power Amplifier 100 MHz-1 GHz	Amplifier Research	25W1000M7	N-2889
	System Interface	EMC Automation	SI-100	N-2893
	Coupling/Decoupling Network	FCC	FCC-801-6-C1/75	N-3501
	Coupling/Decoupling Network	FCC	FCC-801-6-T2	N-3439
	Coupling/Decoupling Network	FCC	FCC-801-6-T4	N-3500
	Coupling/Decoupling Network	FCC	FCC-801-6-M4	N-3502
	Coupling/Decoupling Network	FCC	FCC-801-6-M3	N-3599
	Coupling/Decoupling Network	FCC	FCC-801-6-M2	N-3606
	Coupling/Decoupling Network	FCC	FCC-801-6-M1	N-3605
	EM Clamp	FCC	F-2031	N-3438
	GTEM! Cell	EMCO	5317	N-2892