

Tallinn Radio NAVTEX transmitter field strength measurements in Undva and Kihelkonna, island of Saaremaa

Test report nr. 102014



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Frequency Management Department

October 2014

DEKLARATSIOON

This report provides an overview of the field strength of Suurupi NAVTEX transmitters at the westernmost points of Estonia, in the island of Saaremaa. The measurements were prompted by the observations by the NAVTEX regional coordinator of the Swedish Maritime Administration, that the signal of Tallinn Radio is weak at night time. Field strength measurements provide an accurate picture of the actual situation regarding the ground wave receiving conditions for 518 KHz NAVTEX messages.

The report reflects the planning for measurements, the methodology of the implementation and the measurement results. The report provides comments on the circumstances at the measuring points, as well as a description of the problems identified during the testing and recommendations.

The preparation time of the measurement procedures was rather short, and the tight time schedule did not allow to collect the data necessary for the statistical analysis of the measurements from the results of repeated measurements, but nevertheless a fairly thorough overview of the observed disturbances and their characteristics can be provided.

The report is a working document aimed at providing information on the conditions for the distribution of messages in the navigation area of the "U" area allocated to Tallinn Radio and the factors interfering with it to the authorities that use or are responsible for transmitting MSI (Maritime Safety Information) messages.

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Authors

TABLE OF CONTENTS

1. STATEMENT OF THE TASK	4
1.1. PURPOSE OF THE TEST	4
1.2. SOCIAL BACKGROUND	4
1.3. MEASUREMENT PLAN	4
1.3.1. FIELD STRENGTH MEASUREMENT PLAN IN SAAREMAA	5
1.3.2. THREE NIGHT PROGRAMS WILL BE BROADCAST ON DIFFERENT TRANSMITTERS:	5
1.4 ACCOMPANYING OBJECTIVES	6
2. TEST PARTICIPANTS	6
2.1. TESTING PROJECT TEAM	6
2.2. BODIES INVOLVED IN TESTING	7
2.2.1. SJÖFARTSVERKET (INITIATOR, MSI COORDINATOR FOR THE BALTIC SEA REGION)	7
2.2.2. THE CONSUMER PROTECTION AND TECHNICAL REGULATORY AUTHORITY	7
2.2.3. STATE INFOCOMMUNICATION FOUNDATION (TEST, ANALYSIS AND CONCLUSIONS)	7
3. TECHNICAL POSSIBILITIES TO SUPPORT THE TASK	7
3.1. TEST EQUIPMENT TO OPERATE THE TEST	7
3.2. DETERMINATION OF ANTENNA FACTOR AND CALCULATION METHODOLOGY	7
4. TEST PREPARATION	8
4.1. AREA OF OPERATION DESIGNATION	8
4.1.1. PHASE I - MONITORING OCTOBER 16 - OCTOBER 21, 2014	8
5. MEASUREMENT I (OCTOBER 22, 2014 AT 18: 20-18: 30)	15
6. MEASUREMENT II (OCTOBER 22, 2014 AT 21: 40-22: 32)	20
7. MEASUREMENT III TALLINN RADIO TEST, 2 MINUTES BEFORE THE NORMAL "U" TIME	23
8. MEASUREMENT IV (OCTOBER 23, 2014 AT 02: 18-02: 32)	34
9. MEASUREMENT V (OCTOBER 23, 2014 AT 06: 17-06: 19)	41
10. CONCLUSION	49
ADDENDUM	52
ADJUSTING THE COUNTERWEIGHT OF THE RIKS NAVAL COMMUNICATION CENTER NAVTEX ANTENNA	56

1. STATEMENT OF THE TASK

1.1. Purpose of the test

1. The main purpose of the test was to perform field strength measurements in order to clarify the conditions for receiving Tallinn Radio NAVTEX broadcasts and to clarify possible disturbances in the far zone.
2. The second objective was to ensure that the capacity of the Suurupi NAVTEX transmitters was sufficient to cover the NavArea I area "U" in accordance with the requirements of the NAVTEX Manual.

Also:

- a. to evaluate the coverage of the projected coverage area and compare it with the test results obtained in real conditions.
- b. Saada võrdlev hinnang erinevate testvastuvõtjatega saadud side kvaliteedi kohta. to evaluate the coverage of the projected coverage area and compare it with the test results obtained in real conditions.

1.2. Social background

Due to the requirements of the SOLAS (Safety of Life at Sea) Convention, to which Estonia has acceded on 16.03.1992 and the transition on 01.02.1999. In accordance with the new international GMDSS (Maritime Distress and Safety System) requirements, Estonia is the only NAVTEX transmitting station on the eastern coast of the Baltic Sea to transmit MSI information every 4 hours in the central Baltic Sea and the Gulf of Finland. On the basis of regular measurements and analyzes of the results, the quality of the MSI (Maritime Safety Information) service is constantly monitored. Such controls provide maritime passengers with a secure assurance of the availability of information.

1.3. Measurement plan

A test plan was developed to assess the coverage of NAVTEX transmitters in Suurupi (59°27'N; 024°21'E). Before starting the measurements in the far zone, the air was monitored in the mid-wave range at 518 kHz with control receivers for two days. Of interest was the "U" area timeslot with a duration of 10 minutes in every 4 hours (03:20, 07:20, 11:20, 15:20, 19:20, 23:20 UTC) to explain the presence of disturbances or interferences. For this purpose, 2 RIKS-owned NAVTEX receivers were used, one located at Hõbekuuse tee 8 (59°29'N; 024°50'E) and the other in Undva, Saaremaa (58°31'N; 021°55'E). Also, a public receiver for use over the Internet near Riga www.navtex.lv (57°03'N; 024°01E), was used.

The plan of the first stage was to understand and describe exactly what the cause and nature of the interference was.

The first stage - monitoring of the "U" area - was carried out in the period from October 17 to 22, in 2014.

The second stage - field strength measurements in Saaremaa - was performed in cooperation with TTJA (*The Consumer Protection and Technical Regulatory Authority*) and RIKS (*State Infocommunication Foundation*) in the period from October 22 at 18:20 to October 23 at 06:20 in 2014 (LT local time).

1.3.1. Field strength measurement plan in Saaremaa

On October 22-23rd at night, the NAVTEX signal strength is measured in cooperation with TTJA as far away from the transmitter as possible and certainly so that the trajectory is above the water as the crow flies. In parallel, the real-time reception progress of the intra / navtex log via Undva and Hõbekuuse receivers must be monitored in order for the signal to be detectable.

To synchronize the activities, either a mobile phone or a VHF connection with the measuring car is opened for 4 minutes before the start of the NAVTEX standard broadcast. In agreement with the Swedish Maritime Administration, a test message 2 minutes before the main broadcast will be given as Estonia does not provide a sender identification characteristics other than the NavArea timeslot identifier "U" in front of its messages:

ZCZC UZ14
221920 UTC OKT
TALLINNRADIO
THIS IS TALLINNRADIO TEST MESSAGE
THIS IS TALLINNRADIO TEST MESSAGE
THIS IS TALLINNRADIO TEST MESSAGE
NNNN

The correct NAVTEX message will then be sent at the correct airtime. The field strengths of both messages are measured and reported.

1.3.2. Three night programs will be broadcast on different transmitters:

22:20 via TUBE TRANSMITTER

02:20 via Danphone

06:20 Through Futronic at full power.

When using a Danphone, the "Force to transmit" button must be used when sending a test message outside of timeslot.

P.S. during testing, all transmitters are operating at full output power, this meaning near of 1kW.

1.4 Accompanying objectives

To compare measured results, if possible, against the measurement results obtained in 2004.

Tallinn Radio broadcast times, operating frequencies and capacities:

	UTC	LT	Tx (kHz)	P (W)*
1.	03:20	06:20	518	305/550
2.	07:20	10:20	518	622/845/900
3.	11:20	14:20	518	622/845/900
4.	15:20	18:20	518	622/845/900
5.	19:20	22:20	518	305/550
6.	23:20	02:20	518	305/550

Transmitters used and corresponding output powers:

Futronic	622W/305W
Danphone	845/5 W /550W
TUBE TRANSMITTER – P653	900W used only at day time

*the operator selects the power according to the broadcast conditions.

2. TEST PARTICIPANTS

2.1. Testing project team

Peter Joala,	<i>The Consumer Protection and Technical Regulatory Authority</i> Chief Specialist of the Frequency Management Department
Aleksandr Laur,	State Information Communication Foundation Maritime Senior Specialist
Christjan Kaasik,	State Information Communication Foundation Maritime Senior Specialist
Andu Vanatoa,	State Information Communication Foundation Head of the Control Center Group
Heikki Sibul,	State Information Communication Foundation Chief Maritime Network Specialist
Jüri Grigorjev,	State Information Communication Foundation Technical Director
RIKS operators on duty	

2.2. Bodies involved in testing

2.2.1. Sjöfartsverket (Initiator, MSI Coordinator for the Baltic Sea Region)

2.2.2. The Consumer Protection and Technical Regulatory Authority

2.2.3. State Infocommunication Foundation (test, analysis and conclusions)

3. TECHNICAL POSSIBILITIES TO SUPPORT THE TASK

3.1. Test equipment to operate the test

- a) 2 NAVTEX control receivers FURUNO owned by RIKS
- b) The measurements were performed by the Consumer Protection and Technical Regulatory Authority and their equipment.
- c) The control communication with the operators took place with the hand-held IC-M23 ULL maritime communication network.
- d) The equipment was installed on board the Toyota Land Cruiser SUV, the SUV is equipped with a telescopic antenna holder.

Measurements Equipment's used to determine the field strength:

- a) Spectral analyzer ROHDE & SCHWARZ FSV 7 (ser. 101692; calibration doc. No. 10-300285081, 18.09.2013)
- b) Measuring antenna HE010 with a height above sea level of min. 4m
- c) Calibrated measuring cable

3.2. Determination of antenna factor and calculation methodology

Determination of antenna factor:

- a) Determination of the average signal level with a precision antenna:
- b) With average signal level antenna HE010:

Calculations: $AF_x = AF_D + (V_{iD} - V_{iX})$

HE010 antenna factor is 17 dB/m throughout the frequency band

HE010 antenna factor: $AF_x = 19,94 + (77,43 - 79,97) = 17,4 \text{ dB/m}$

The antenna factor of the reference antenna (R&S) from the calibration table $f = 0.518 \text{ MHz}$ is 19.94 dB / m.

The field strengths, measured with antenna HE010, are therefore:

$E_x = V_x + AF_x + a_c + a_s$, where, V_x is at the signal level input of the measuring receiver

a_c is the attenuation of the test lead (0,5 dB),

a_s is the splitter attenuation (3.5 dB)

Therefore $E_x = V_x + 21,0$ (dB μ V/m)

4. TEST PREPARATION

4.1. Area of operation designation

4.1.1. Phase I - Monitoring October 16 - October 21, 2014

The Swedish Maritime Administration's memorandum to define the geographical area of measurement was:

From: msi@Sjofartsverket.se [<mailto:msi@Sjofartsverket.se>]

Sent: Friday, October 17, 2014 5:44 PM

To: Jüri Grigorjev

Cc: Svante.Hakansson@Sjofartsverket.se; arne.blomkvist@eltelnetworks.se; msi@Sjofartsverket.se

Subject: Navtex transmissions

Dear Jüri,

I will try to summarize below what we talked about over the phone.

I noticed that we do not receive the transmissions from Tallinn during nighttime at 23:20 and 03:20 UTC on either of our receiving stations, during daytime (07:20, 11:20: 15:20, 19:20) we get full reception on four stations: Tingstäde (Gotland), Svenska Högarna (Stockholm) and Sundsvall and Härnösand (Bay of Bothnia).

As you said over the phone, you turn down the effect during night to 400W which is the probable cause to the poor reception.

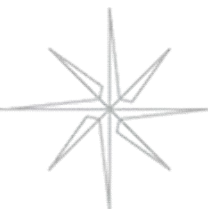
Let us know as soon as you have more information about this and how we can assist you. By cooperating I am sure we will resolve this matter easily and ensure our Navtex users the best service possible.

Best regards,

Erica Voldi

MSI-Sweden

SWEDISH MARITIME ADMINISTRATION
Slussgatan 11, 151 71 Södertälje, Sweden
Tel +46 (0)771-63 06 85 (24H)
msi@sjofartsverket.se



Based on the e-mail we received from Sweden, we started real-time NAVTEX monitoring and also searched the archive materials regarding the reception we monitored in Undva, as well as the recorded materials about the "U" area in Latvia from a test receiver near Riga.

19.Oct.

19.10.2014 10:22:57 (LV)

TOR 900W

19.10.2014 10:21:07 (LV)

TOR 900W

19.10.2014 10:21:07 (LV)

TOR 900W

19.10.2014 06:29:19 (LV)

TOR 900W 06:25:31

19.10.2014 06:24:57 (LV)

TOR 900W 06:25:31

19.10.2014 06:22:43 (LV)

Futronic 622W

06:21:41

19.10.2014 06:21:39 (LV)

Futronic 622W

06:21:41

19.10.2014 06:21:12 (LV)

Futronic 622W

06:21:41

19.10.2014 02:41:51 (LV)

Futronic 305/0

02:41:58

19.10.2014 02:29:18 (LV)

Futronic 305/0

02:34:01

19.10.2014 02:24:56 (LV)

Futronic 305/0

02:31:41

19.10.2014 02:22:42 (LV)

Futronic 305/0

02:21:43

18. Oct.

C

TOR,Futronic 622/5w

18.10.2014 18:21:12 (LV)

Futronic

18.10.2014 14:24:20 (LV)

Futronic

18.10.2014 10:26:22 (LV)

TOR 900W

18.10.2014 10:21:24 (LV)

TOR 900W

18.10.2014 06:26:16 (LV)

Danphone 555/5

06:20:34

18.10.2014 06:24:44 (LV)

Danphone 555/5

06:20:34

18.10.2014 06:21:07 (LV)

Danphone 555/5

06:20:34

18.10.2014 02:26:15 (LV)

Danphone 02:20:33

18.10.2014 02:24:43 (LV)

Danphone 02:20:33

18.10.2014 02:22:30 (LV)

Danphone 02:20:33

18.10.2014 02:21:06 (LV)

Danphone 02:20:33

18.10.2014 02:24:43 (LV)

Danphone 02:20:33

18.10.2014 02:22:30 (LV)

Danphone 02:20:33

18.10.2014 02:21:06 (LV)

Danphone 02:20:33

17. Oct.

17.10.2014 22:23:16 (LV)

TOR 900W

17.10.2014 22:21:05 (LV)

TOR 900W

17.10.2014 18:23:24 (LV)

Danphone;TOR 900w

17.10.2014 18:21:16 (LV)

Danphone;TOR 900w

17.10.2014 14:21:14 (LV)

Danphone

17.10.2014 10:25:34 (LV)

TOR

17.10.2014 06:29:21 (LV)

Danphone 845/5 W

17.10.2014 06:24:59 (LV)

Danphone 845/5 W

17.10.2014 06:23:28 (LV)

Danphone 845/5 W

17.10.2014 06:21:46 (LV)

Danphone 845/5 W

17.10.2014 02:20

TOR 900W

16. Oct.

16.10.2014 22:25:43 (LV)

TOR 900W

16.10.2014 22:21:18 (LV)

TOR 900W

16.10.2014 18:21:10 (LV)

Futronic

16.10.2014 14:22:19 (LV)

Danphone

16.10.2014 14:21:28 (LV)

Danphone

16.10.2014 10:24:58 (LV)

TOR 900W

16.10.2014 10:21:05 (LV)

TOR 900W

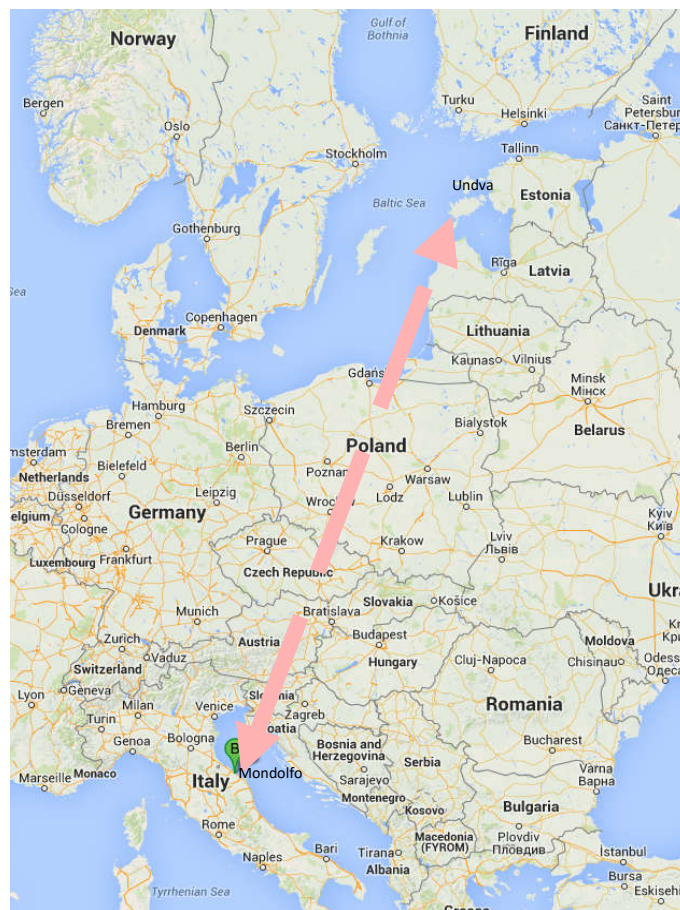
I

Tallinn Radio's NAVTEX messages which was received by Riga monitoring. The reception times of the "U" area of the Riga control receiver (eg 18.10.2014 14:24:20 (LV) and 19.10.2014 06:21:12 (LV)) respectively green recording is Tallinn Radio, red is an interfering transmitter - while the Tallinn Radio broadcast was not received.

It is clear from the table that Tallinn Radio's NAVTEX broadcasts are muted at night (reception times marked in red) with another NAVTEX transmitter operating in the same timeslot, which turned out to be a NavArea III "U" transmitter in Mondolfo,

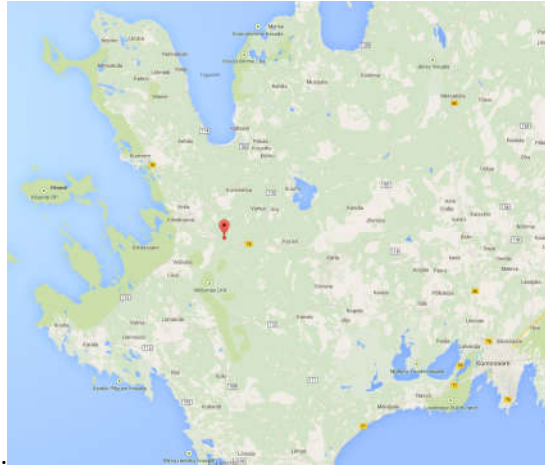


The distance between the two "U" areas is ~ 1500 km, reception as a surface wave is not possible, because there is no propagation to such a distance. But as a space wave, it is possible! It is at night when the broadcast conditions are better and the noise level is lower and there are no direct sources of interference.



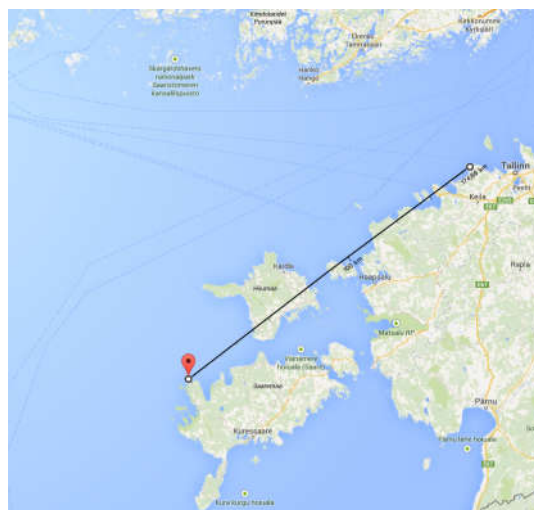
4.1.2. Phase II NAVTEX field strength measurements in real time

The measurements were planned to be performed in Saaremaa, Undva village, where the RIKS control receiver is located and in Kihelkonna village and its vicinity. Time of planned measurements October 22-23.2014 at 18:20 to 06:30 local time. The expected measurement results must show that the NAVTEX transmitters in Suurupi are capable of generating field strengths that exceed the sensitivity of the NAVTEX receivers. In order to identify the transmitter during the measurements, a test broadcast was performed as described in the task set-up section - 1.3.1 Field strength measurement plan in

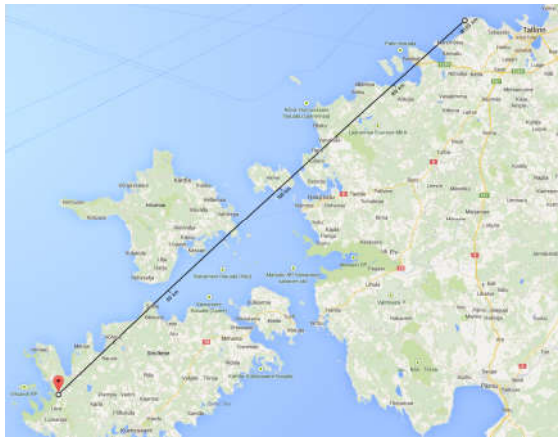


Saaremaa.

The first measuring point at 18:20 - 18:30 was at location $58^{\circ}20.746\text{ N } 22^{\circ}06.042\text{ E}$, 4 km from Kihelkonna towards Kuressaare on on the plateau of the Kuressaare-Kihelkonna-Veere road. The measuring point is 179 km from the transmitter.

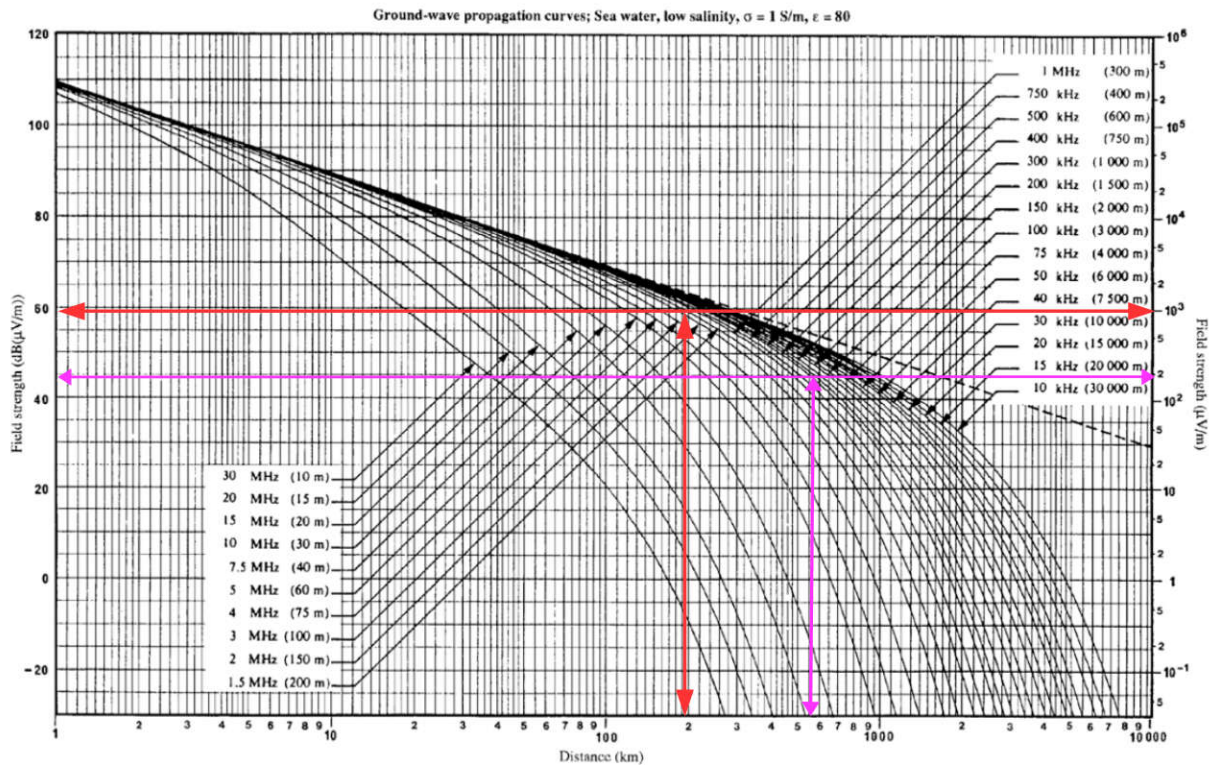


The second measurement location from 22:18 to 22:30 was at location $58^{\circ}30.874\text{ N } 21^{\circ}55.635\text{ E}$, in the immediate vicinity of the NAVTEX control receiver in Undva. The measuring point is 174.66 km from the transmitter.



The third measurement location at 02:18 - 02:30 and 06:18 - 06:30 was at location $58^{\circ}21.596$ N $22^{\circ}2.325$ E, in Kihelkonna. The measuring point is 181.03 km from the transmitter

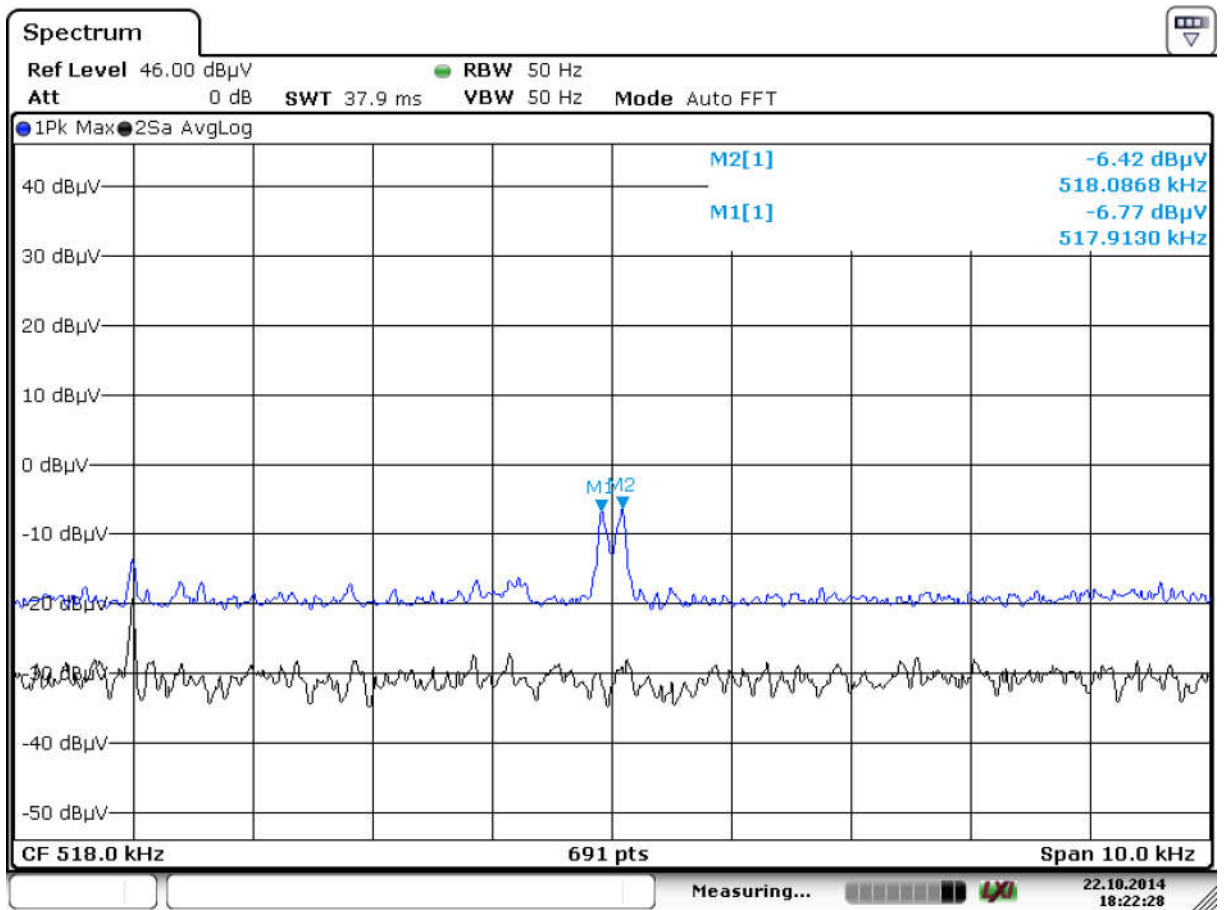
According to the tables: Rec. ITU-R P.368-9 (0368-01) it is possible to interpolate the field strength even at 580 km if the measured result is 180 km from the transmitter



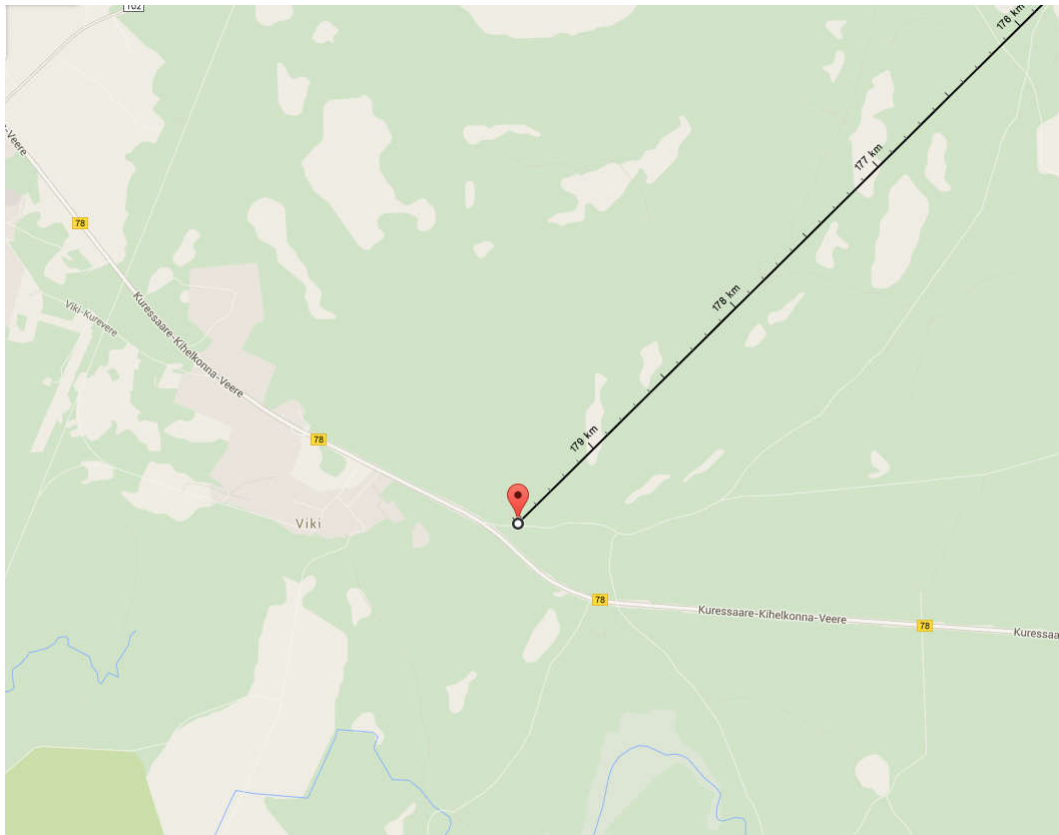
Joonis 1 *ITU-R P.368-9 (0368-01)*
 Corrections are approximately 14 dBuV/m

5. Measurement I (October 22, 2014 at 18: 20-18: 30)

Tehnilise Järelevalve Amet										
SAGEDUSHALDUSE OSAKOND					Sõle 23a, 10614 Tallinn Tel: 667 2100, Faks: 667 2001 E-mail: info@tja.ee					
Suurupi NAVTEX SAATJA										
väljatugevuse mõõteprotokoll nr 19-2/14-0730-16										
Mõõdetud NAVTEX saatja valdaja				programmi nimi:		TOR eetriteated				
				kanali kesksagedus:		518 kHz				
				saatja asukoht:		Suurupi				
nimi		RIKS								
aadress		Ädala 4F, Tallinn								
Mõõtekoha koordinaadid				22°06'02.6"E			58°20'44.8"N			
Mõõtmise kuupäev 22.10.2014						kellaaeg		18:22		
Mõõtetulemus			Laiendmääramatus		Kattetegur		Usaldusnivoo			
14		dB μ V/m		±		2,2		k=2		95%
Mõõteseade (tüüp)		Tehase number			Kalibr. dok.nr			Kalibr. kuupäev		
R&S FSV7		Ser.101692			10-300285081			18.09.2013		
Mõõteriistade seaded										
mõõterežiim	detektor	spektri jälg	SPAN kHz	IF BW kHz	ATT dB	ATT mode	REF dB	RBW kHz	VBW kHz	meas time
	PK	MaxHold	10			manual	46	0.05	0.05	38ms
Mõõteantenni tüüp ja polarisatsioon					Kaablisüsteemi kogusumbuvus					
HE010		vertikaalne								
tehase number		Ser.100065								
Antennitegur R&S andmetel		17 dB/m			Mõõdetud sagedusel 518 kHz			4 dB		
Mõõtekeskkond		(Soovitav kasutada EMHI andmeid)								
temperatuur					õhuniiskus		sademed		pilvisus	
2° C (väljas)							ei ole			
Mõõtekeskkonna lühikirjeldus										
Mõõteprotokolli lisad:Spektripildid_1										
Kontrolli teostanud ametnikud (nimi, amet, allkiri):										
P.Joala, SHO peaspetsialist										

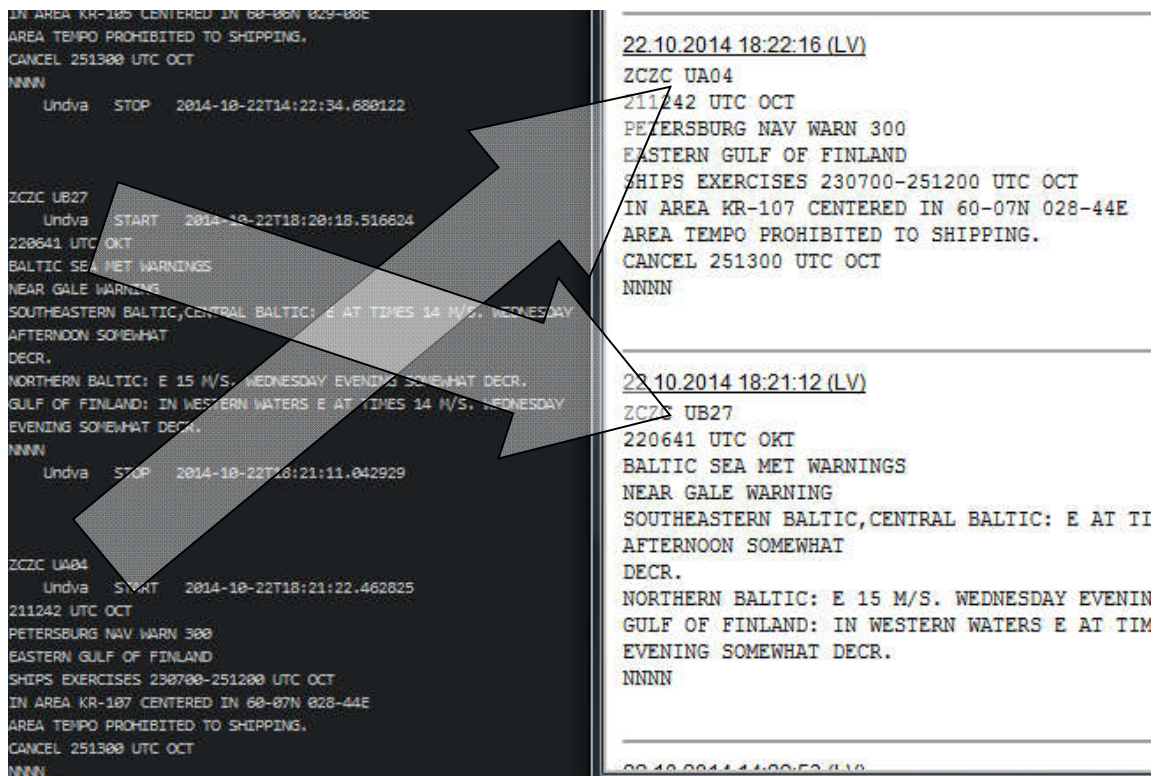
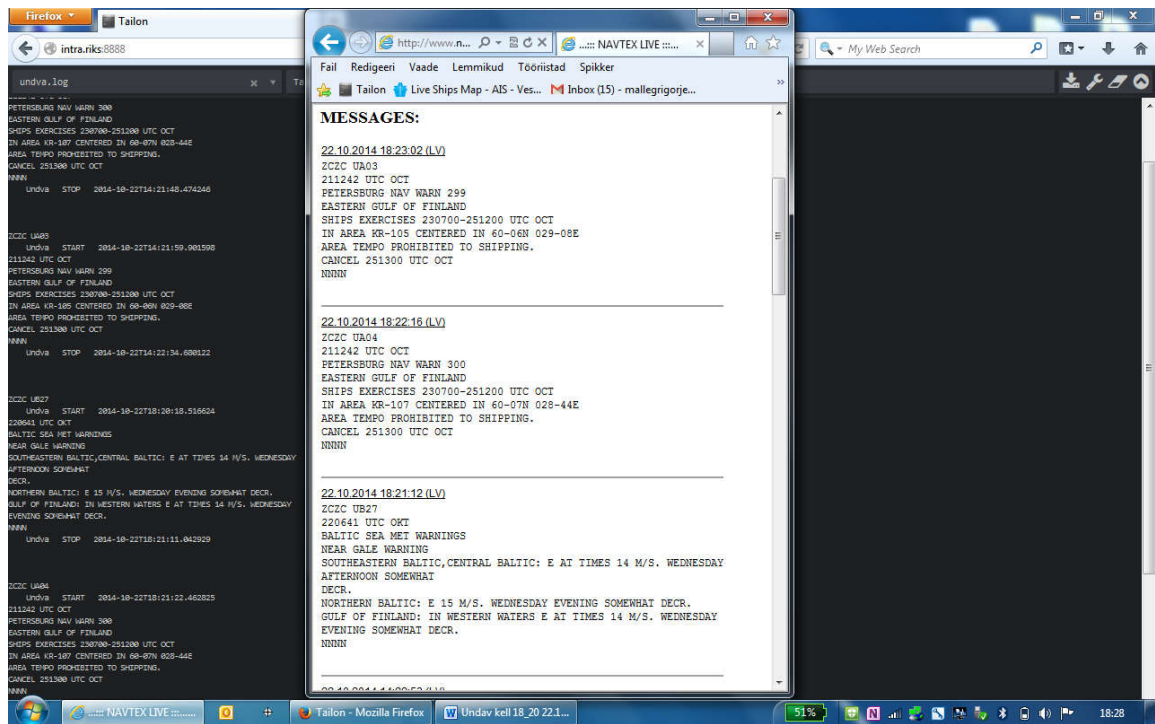


Date: 22.OCT.2014 18:22:28



Coordinates of the measuring point: 58⁰20.746 N; 22⁰ 6.042 E; 179.53 km from the transmitter; TUBE TRANSMITTER 900W

Extracts from the log of Undva and Riga control receivers



Tallinn Radio regular reception without errors, fixed messages UB27, UA04 and UA03

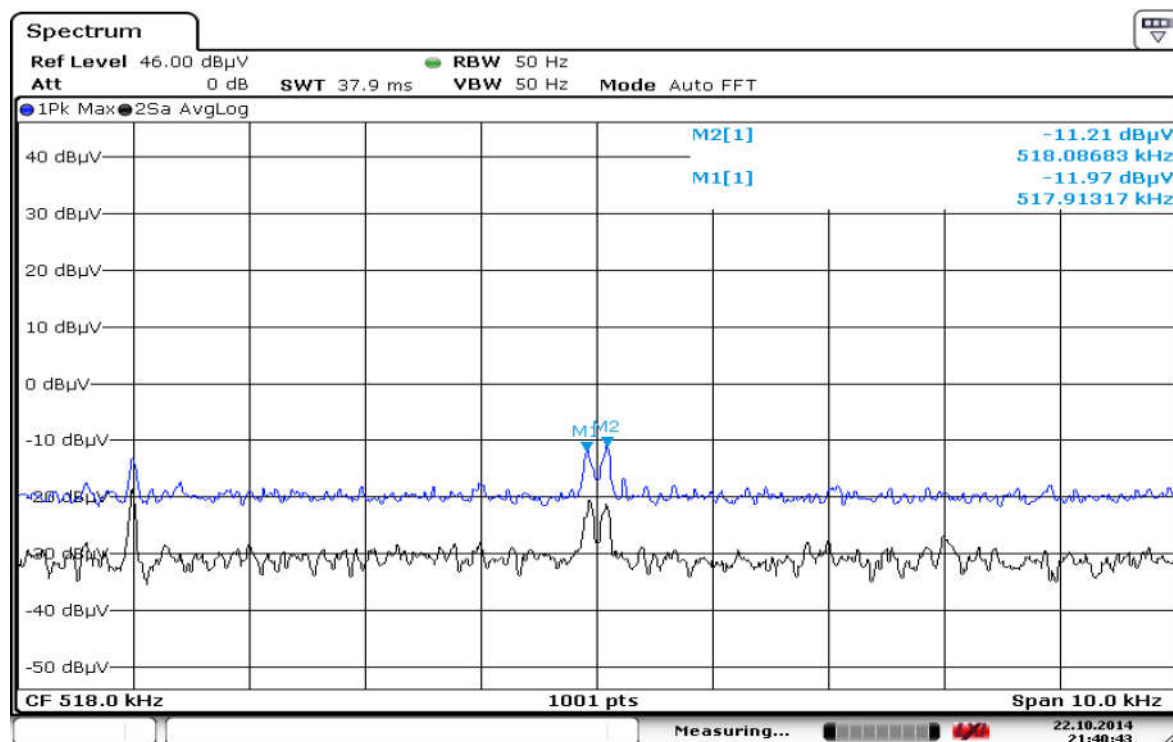
No interference was observed

<p>Undva START 2014-10-22T18:20:18.516624</p> <p>ZCZC UB27</p> <p>220641 UTC OKT</p> <p>BALTIC SEA MET WARNINGS</p> <p>NEAR GALE WARNING</p> <p>SOUTHEASTERN BALTIC,CENTRAL BALTIC: E AT TIMES 14 M/S. WEDNESDAY</p> <p>AFTERNOON SOMEWHAT DECR.</p> <p>NORTHERN BALTIC: E 15 M/S. WEDNESDAY EVENING SOMEWHAT DECR.</p> <p>GULF OF FINLAND: IN WESTERN WATERS E AT TIMES 14 M/S. WEDNESDAY</p> <p>EVENING SOMEWHAT DECR.</p> <p>NNNN Undva STOP 2014-10-22T18:21:11.042929</p>	<p>Merivälja START 2014-10-22T18:20:18.501059</p> <p>ZCZC UB27</p> <p>220641 UTC OKT</p> <p>BALTIC SEA MET WARNINGS</p> <p>NEAR GALE WARNING</p> <p>SOUTHEASTERN BALTIC,CENTRAL BALTIC: E AT TIMES 14 M/S. WEDNESDAY</p> <p>AFTERNOON SOMEWHAT DECR.</p> <p>NORTHERN BALTIC: E 15 M/S. WEDNESDAY EVENING SOMEWHAT DECR.</p> <p>GULF OF FINLAND: IN WESTERN WATERS E AT TIMES 14 M/S. WEDNESDAY</p> <p>EVENING SOMEWHAT DECR.</p> <p>NNNN Merivälja STOP 2014-10-22T18:21:11.037938</p>	<p>22.10.2014 18:21:12 (LV)</p> <p>ZCZC UB27</p> <p>220641 UTC OKT</p> <p>BALTIC SEA MET WARNINGS</p> <p>NEAR GALE WARNING</p> <p>SOUTHEASTERN BALTIC,CENTRAL BALTIC: E AT TIMES 14 M/S. WEDNESDAY</p> <p>AFTERNOON SOMEWHAT DECR.</p> <p>NORTHERN BALTIC: E 15 M/S. WEDNESDAY EVENING SOMEWHAT DECR.</p> <p>GULF OF FINLAND: IN WESTERN WATERS E AT TIMES 14 M/S. WEDNESDAY</p> <p>EVENING SOMEWHAT DECR.</p>
<p>Undva START 2014-10-22T18:21:22.462825</p> <p>ZCZC UA04</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 300</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-107 CENTERED IN 60-07N 028-44E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN Undva STOP 2014-10-22T18:21:57.240213</p> <p>Undva START 2014-10-22T18:22:08.659746</p>	<p>Merivälja START 2014-10-22T18:21:22.451830</p> <p>ZCZC UA04</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 300</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-107 CENTERED IN 60-07N 028-44E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN Merivälja STOP 2014-10-22T18:21:57.234631</p> <p>Merivälja START 2014-10-22T18:22:08.652698</p>	<p>22.10.2014 18:22:16 (LV)</p> <p>ZCZC UA04</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 300</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-107 CENTERED IN 60-07N 028-44E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN</p>

<p>ZCZC UA03</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 299</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-105 CENTERED IN 60-06N 029-08E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN Undva STOP 2014-10-22T18:22:43.438020</p>	<p>ZCZC UA03</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 299</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-105 CENTERED IN 60-06N 029-08E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN Merivälja STOP 2014-10-22T18:22:43.435664</p>	<p>22.10.2014 18:23:02 (LV)</p> <p>ZCZC UA03</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 299</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-105 CENTERED IN 60-06N 029-08E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN</p>
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6. Measurement II (October 22, 2014 at 21: 40-22: 32)

Before the start transmission of Tallinn Radio "U", the radio broadcast was monitored to get an overview of the noise level and signal strengths of other NAVTEX stations. The exact transmitter ID could not be determined because no separate NAVTEX receiver was used at the measurement point.

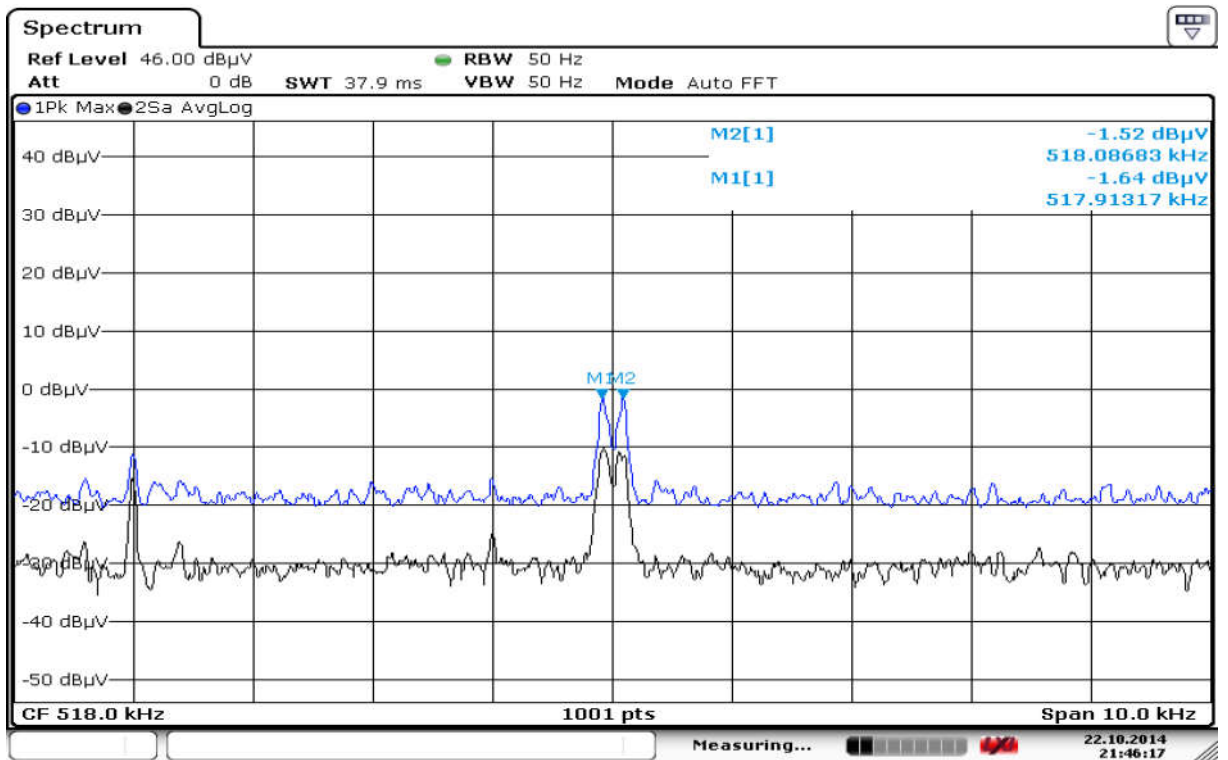


Date: 22.OCT.2014 21:40:43

Expected senders:

"Q" Ireland Malin Head 55 ° 22'N 07 ° 21'W transmitter, field strength 9 dBμV / m

"Q" Heraklion (Crete) 35 ° 20'N 25 ° 07'E

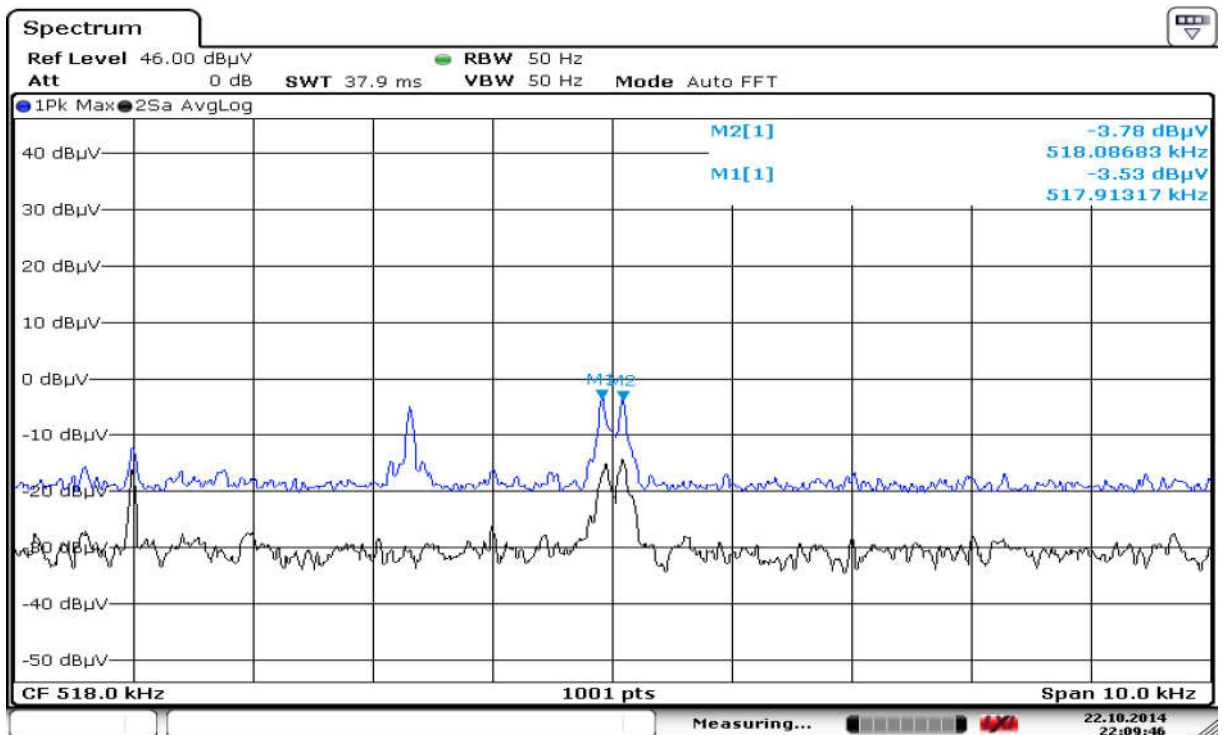


Date: 22.OCT.2014 21:46:17

Expected senders:

“Q” Ireland Malin Head 55 ° 22'N 07 ° 21'W transmitter, field strength 19 dBµV / m

"Q" Heraklion (Crete) 35 ° 20'N 25 ° 07'E

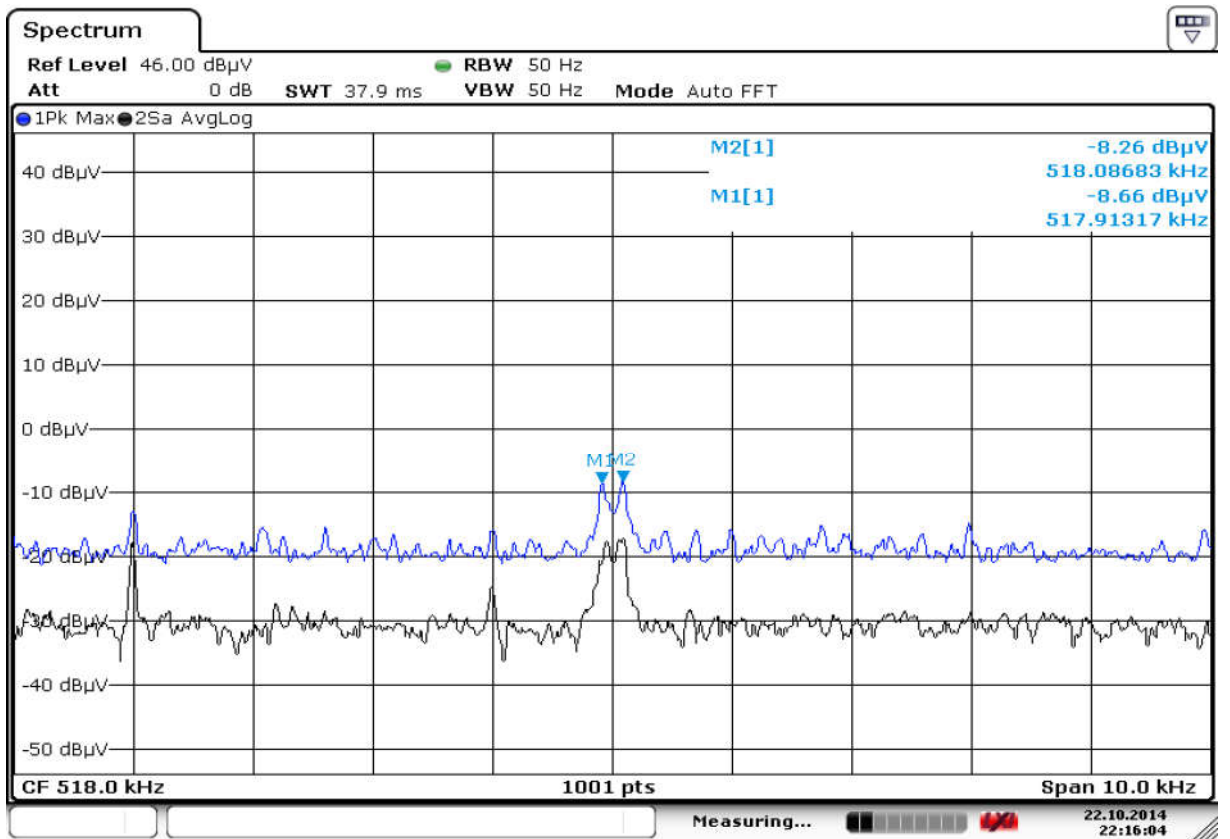


Date: 22.OCT.2014 22:09:46

Expected senders:

"S" La Garde (CROSS) 43 ° 06'N 005 ° 59'E transmitter, field strength 17 dBµV / m

„S“ Pinneberg 53 ° 40'N 009 ° 48'E



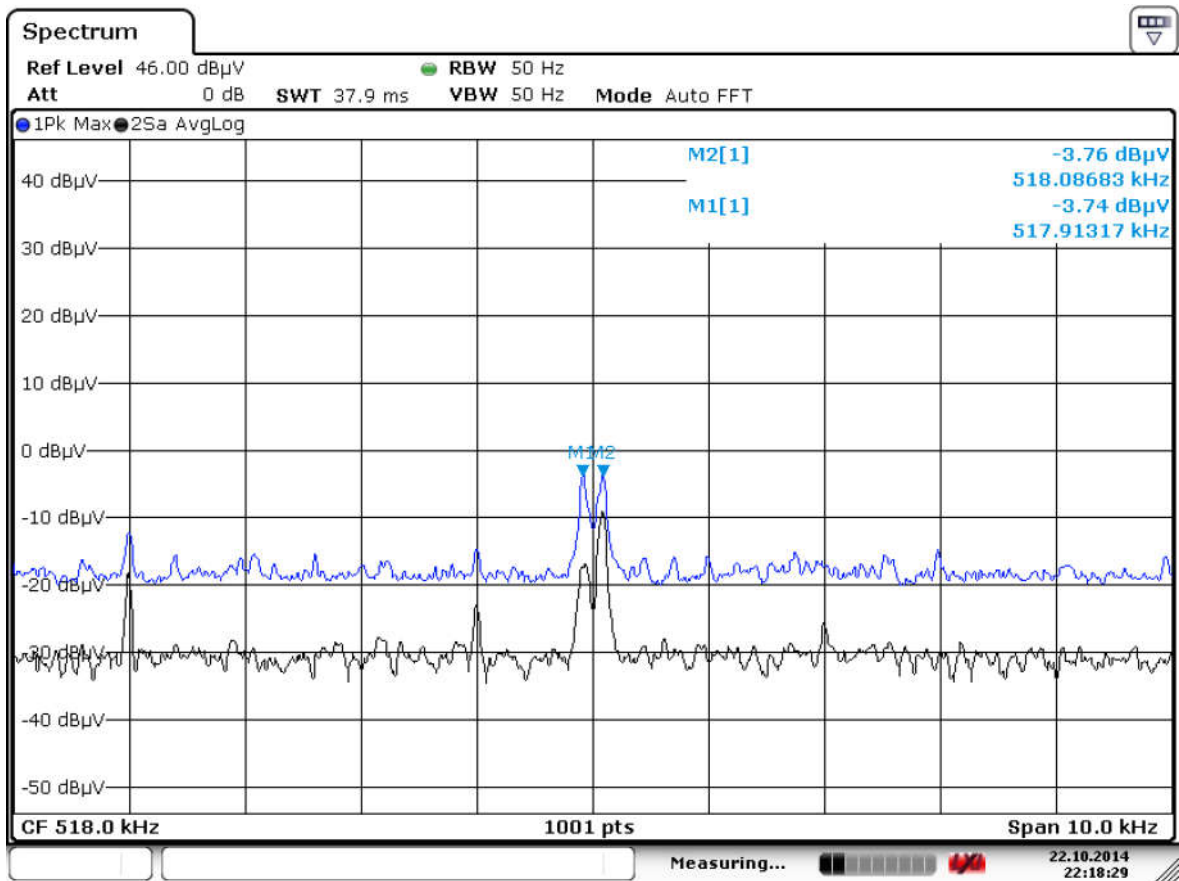
Date: 22.OCT.2014 22:16:04

Expected sender:

"T" OOSTENDERADIO 51 ° 11'N 002 ° 48'E transmitter, field strength 12 dBµV / m .

7. Measurement III Tallinn Radio test, 2 minutes before the normal "U" time.

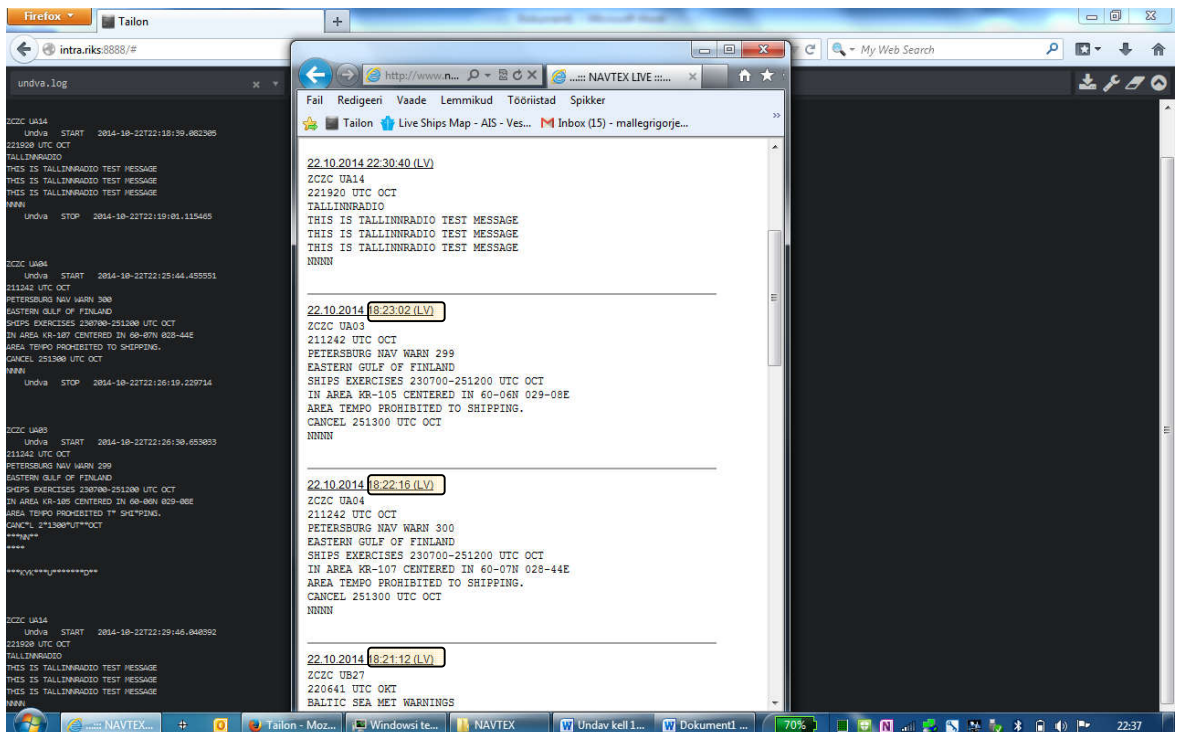
Tehnilise Järelevalve Amet													
SAGEDUSHALDUSE OSAKOND						Sõle 23a, 10614 Tallinn Tel: 667 2100, Faks: 667 2001 E-mail: info@tja.ee							
Suurupi NAVTEX SAATJA													
väljatugevuse mõõteprotokoll nr 19-2/14-0730-16													
Mõõdetud NAVTEX saatja valdaja				programmi nimi:		TOR test							
				kanali kesksagedus:		518 kHz							
				saatja asukoht:		Suurupi							
nimi		RIKS											
aadress		Ädala 4F, Tallinn											
Mõõtekoha koordinaadid				21°55'38.1"E				58°30'52.5"N					
Mõõtmise kuupäev 22.10.2014						kellaeg		22:18					
Mõõtetulemus			Laiendmääramatus			Kattetegur			Usaldusnivoo				
17		dBµV/m		±		2,2		k=2		95%			
Mõõteseade (ti)				Tehase number				Kalibr. dok.nr		Kalibr. kuupäev			
R&S FSV7				Ser.101692				10-300285081		18.09.2013			
Mõõteriistade seaded													
mõõterežiim	detektor	spektri jälg	SPAN kHz	IF BW kHz	ATT dB	ATT mode	REF dB	RBW kHz	VBW kHz	meas time			
	PK	MaxHold	10			manual	46	0.05	0.05	38ms			
Mõõteantenni tüüp ja polarisatsioon						Kaablisüsteemi kogusumbuvus							
HE010						vertikaalne							
tehase number						Ser.100065							
Antennitegur R&S andmetel						17 dB/m			Mõõdetud sagedusel 518 kHz			4 dB	
Mõõtekeskkond (Soovitav kasutada EMHI andmeid)													
temperatuur						õhuniiskus		sademed		pilvisus			
2° C(väljas)								ei ole					
Mõõtekeskkonna lühikirjeldus													
Mõõteprotokolli lisad:Spektripildid_2													
Kontrolli teostanud ametnikud (nimi, amet, allkiri):													
P.Joala, SHO peaspetsialist													



Date: 22.OCT.2014 22:18:29

Tallinn Radio control broadcast field strength 17 dBµV / m

P = 900W



The only broadcast from Tallinn Radio that was received and fixed by the Riga receiver was at 22:30 ': 40' ; lost was UB28, UE33, UA04, UA03

Undva receiver:

Höbekuuse receiver:

Riia receiver:

<p>ZCZC UA14 Undva START 2014-10-22T22:18:39.082305 221920 UTC OCT TALLINNRADIO THIS IS TALLINNRADIO TEST MESSAGE THIS IS TALLINNRADIO TEST MESSAGE THIS IS TALLINNRADIO TEST MESSAGE NNNN Undva STOP 2014- 10-22T22:19:01.115465</p>	<p>ZCZC UA14 Merivälja START 2014-10- 22T22:18:39.064253 221920 UTC OCT TALLINNRADIO THIS IS TALLINNRADIO TEST MESSAGE THIS IS TALLINNRADIO TEST MESSAGE THIS IS TALLINNRADIO TEST MESSAGE THIS IS TALLINNRADIO TEST MESSAGE NNNN Merivälja STOP 2014- 10-22T22:19:01.101890 ZCZC UB28 Merivälja START 2014-10- 22T22:20:20.216042 221632 UTC OKT BALTIC SEA MET WARNINGS NEAR GALE WARNING SKAGERRAK: FROM THURSDAY MORNING S AT TIMES 15 M/S. NORTHERN BALTIC: E 15 M/S. WEDNESDAY EVENING SOMEWHAT DECR. GULF OF FINLAND: IN WESTERN WATERS E AT TIMES 14 M/S. WEDNESDAY EVENING SOMEWHAT DECR. SEA OF BOTHNIA: FROM THURSDAY MORNING SE-S 15 M/S. THE QUARK,BAY OF BOTHNIA: FROM THURSDAY MORNING S 15 M/S. NNNN Merivälja STOP 2014- 10-22T22:21:25.049118</p>	
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	<p>ZCZC UE33 Merivälja START 2014-10- 22T22:21:36.517242</p> <p>221630 UTC OKT</p> <p>BALTIC SEA WEATHERFORECAST</p> <p>NEAR GALE WARNING:</p> <p>SKAGERRAK, NORTHERN BALTIC, GULF OF FINLAND, SEA OF BOTHNIA, THE QUARK AND BAY OF BOTHNIA.</p> <p>WEATHER SUMMARY:</p> <p>HIGH OVER KOLA PENINSULA EXTENDING</p> <p>IN OVER CENTRAL SCANDINAVIA. A DEEPER LOW MOV</p> <p>NORTHEASTWARDS OVER NORWEGIAN SEA.</p> <p>FORECAST VALID 24 HOURS (WIND SCALE IN METERS PER SECOND)</p> <p>SKAGERRAK AND KATTEGAT</p> <p>E 7-12. OVERNIGHT AROUND S. EARLY</p> <p>TOMORROW MORNING, ON SKAGERRAK, TEMPO 15. TEMPO</p> <p>RAIN WITH MOD-POOR VIS.</p> <p>LAKE VAENERN</p> <p>E, 5-10 OVERNIGHT SE. TEMPO MOD VIS IN RAIN.</p> <p>THE SOUND AND WESTERN BALTIC</p> <p>E 5-9, OVERNIGHT SE . TEMPO SHWRS WITH MOD VIS.</p> <p>THE BELTS</p> <p>IN WESTERN WATERS VRB 1-5. IN EASTERN</p> <p>WATERS SE INCR 5-9. TEMPO SHWRS WITH MOD VIS.</p> <p>SOUTHERN BALTIC</p> <p>AROUND E 5-10. EAST OF BORNHOLM AT FIRST 12. MAINLY</p>	
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<p>ZCZC UA04 Undva START 2014-10-22T22:25:44.455551 211242 UTC OCT PETERSBURG NAV WARN 300 EASTERN GULF OF FINLAND SHIPS EXERCISES 230700- 251200 UTC OCT IN AREA KR-107 CENTERED IN 60-07N 028-44E AREA TEMPO PROHIBITED TO SHIPPING. CANCEL 251300 UTC OCT NNNN Undva STOP 2014- 10-22T22:26:19.229714</p> <p>ZCZC UA03 Undva START 2014-10-22T22:26:30.653033 211242 UTC OCT PETERSBURG NAV WARN 299 EASTERN GULF OF FINLAND SHIPS EXERCISES 230700- 251200 UTC OCT IN AREA KR-105 CENTERED IN 60-06N 029-08E AREA TEMPO PROHIBITED T* SHI*PING. CANC*L 2*1300*UT**OCT ***NN** **** ***KYK***U*****D**</p> <p>ZCZC UA14 Undva START 2014-10-22T22:29:46.040392</p>	<p>GOOD VIS. SOUTHEASTERN BALTIC E 7-12. TOMORROW LATE MORNING SE AND TEMPO DECR. MAINLY GOOD VIS. CENTRAL BALTIC E 7-12, OVERNIGHT SE. MAINLY GOOD VIS. NORTHERN BALTIC E 10-15, DECR. OVERNIGHT SE 7- 12. MAINLY GOOD VIS. GULF OF RIGA E 7-12. TOMORROW SE AND SOMEWHAT DECR. MAINLY GOOD VIS. GULF OF FINLAND NE 8-13. IN WESTERN WATERS AT FIRST 14. LATE EVENING E-SE AND DECR 5-10. LOC SHWRS OF RAIN OR SNOW WITH MOD VIS, ELSE GOOD. SEA OF AALAND AND ARCHIPELAGO SEA E, OVERNIGHT SE 7-13. LOC SHWRS WITH MOD VIS OTHERWISE GOOD. SEA OF BOTHNIA, THE QUARK AND BAY OF BOTHNIA SE 7-12. TOMORROW MORNING 11-16. MAILNY GOOD VIS. NNNN Merivälja STOP 2014- 10-22T22:25:33.008114</p> <p>ZCZC UA04 Merivälja START 2014-10- 22T22:25:44.421498 211242 UTC OCT PETERSBURG NAV WARN 300 EASTERN GULF OF FINLAND SHIPS EXERCISES 230700-251200</p>	<p>ZCZC UA14 22.10.2014 22:30:40 (LV) 221920 UTC OCT TALLINNRADIO THIS IS TALLINNRADIO TEST MESSAGE THIS IS TALLINNRADIO TEST MESSAGE THIS IS TALLINNRADIO TEST MESSAGE</p>
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<p>221920 UTC OCT</p> <p>TALLINNRADIO</p> <p>THIS IS TALLINNRADIO TEST MESSAGE</p> <p>THIS IS TALLINNRADIO TEST MESSAGE</p> <p>THIS IS TALLINNRADIO TEST MESSAGE</p> <p>NNNN Undva STOP 2014-10-22T22:30:05.771199</p>	<p>UTC OCT</p> <p>IN AREA KR-107 CENTERED IN 60-07N 028-44E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN Merivälja STOP 2014-10-22T22:26:19.200323</p> <p>ZCZC UA03 Merivälja START 2014-10-22T22:26:30.622388</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 299</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-105 CENTERED IN 60-06N 029-08E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN Merivälja STOP 2014-10-22T22:27:05.407695</p> <p>ZCZC UA14 Merivälja START 2014-10-22T22:29:45.975578</p> <p>221920 UTC OCT</p> <p>TALLINNRADIO</p> <p>THIS IS TALLINNRADIO TEST MESSAGE</p> <p>THIS IS TALLINNRADIO TEST MESSAGE</p> <p>THIS IS TALLINNRADIO TEST MESSAGE</p> <p>NNNN Merivälja STOP 2014-10-22T22:30:05.760172</p>	<p>NNNN</p>
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Tehnilise Järelevalve Amet

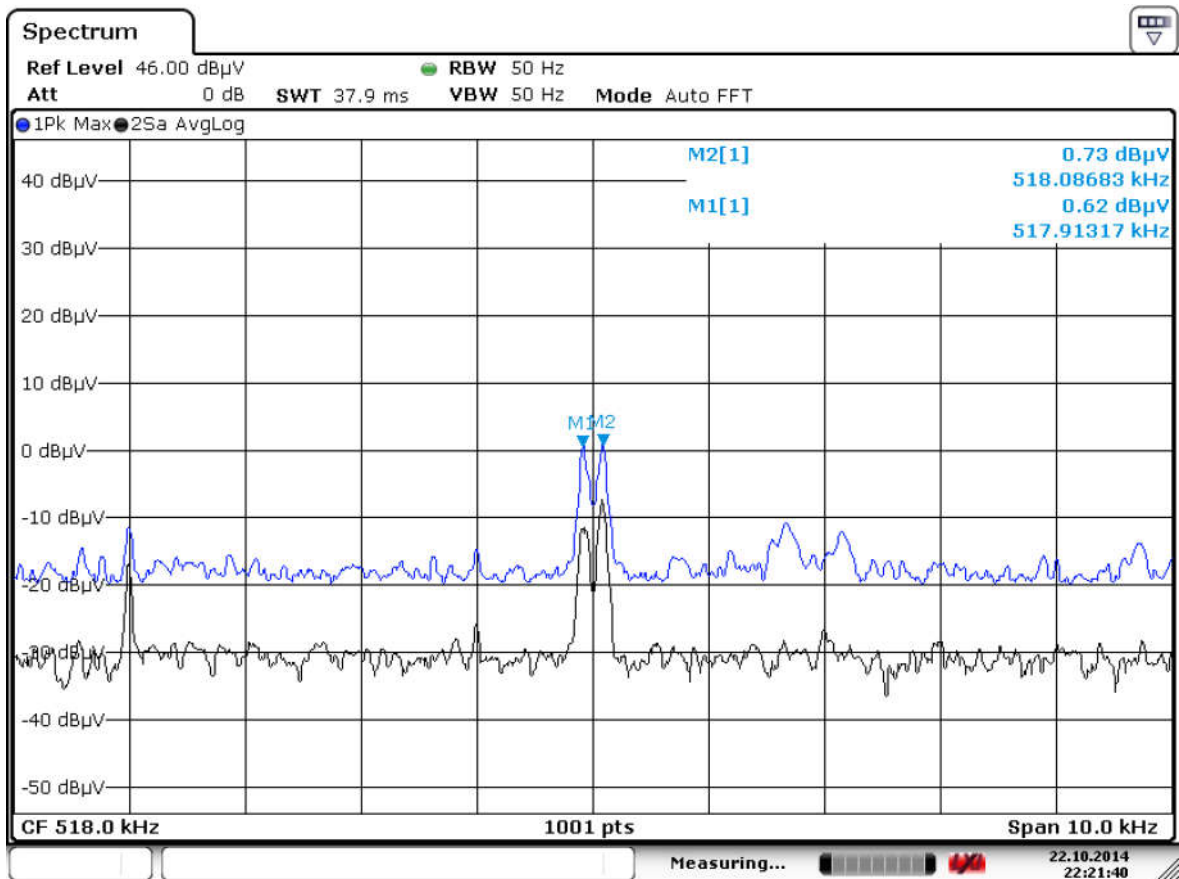
**SAGEDUSHALDUSE
OSAKOND**

Sõle 23a, 10614 Tallinn
Tel: 667 2100, Faks: 667 2001
E-mail: info@tja.ee

Suurupi NAVTEX SAATJA

väljatugevuse mõõteprotokoll nr 19-2/14-0730-16

Mõõdetud NAVTEX saatja valdaja		programmi nimi:		TOR eetriteated							
		kanali kesksagedus:		518 kHz							
		saatja asukoht:		Suurupi							
nimi		RIKS									
aadress		Ädala 4F, Tallinn									
Mõõtekoha koordinaadid		21°55'38.1"E		58°30'52.5"N							
Mõõtmise kuupäev		22.10.2014		kellaeg 22:21							
Mõõtetulemus		Laiendmääramatus		Kattetegur		Usaldusnivoo					
21		dBµV/m		±		2,2		k=2		95%	
Mõõteseade (ti)		Tehase number		Kalibr. dok.nr		Kalibr. kuupäev					
R&S FSV7		Ser.101692		10-300285081		18.09.2013					
Mõõteriistade seaded											
mõõterežiim	detektor	spektri jälg	SPAN kHz	IF BW kHz	ATT dB	ATT mode	REF dB	RBW kHz	VBW kHz	meas time	
	PK	MaxHold	10			manual	46	0.05	0.05	38ms	
Mõõteantenni tüüp ja polarisatsioon						Kaablisüsteemi kogusummuvus					
HE010		vertikaalne									
tehase number		Ser.100065									
Antennitegur R&S andmetel		17 dB/m				Mõõdetud sagedusel 518 kHz		4 dB			
Mõõtekeskkond (Soovitav kasutada EMHI andmeid)											
temperatuur				õhuniiskus		sademed		pilvisus			
2° C(väljas)						ei ole					
Mõõtekeskkonna lühikirjeldus											
Mõõteprotokolli lisad:Spektripildid_3											
Kontrolli teostanud ametnikud (nimi, amet, allkiri):											
P.Joala, SHO peaspetsialist											



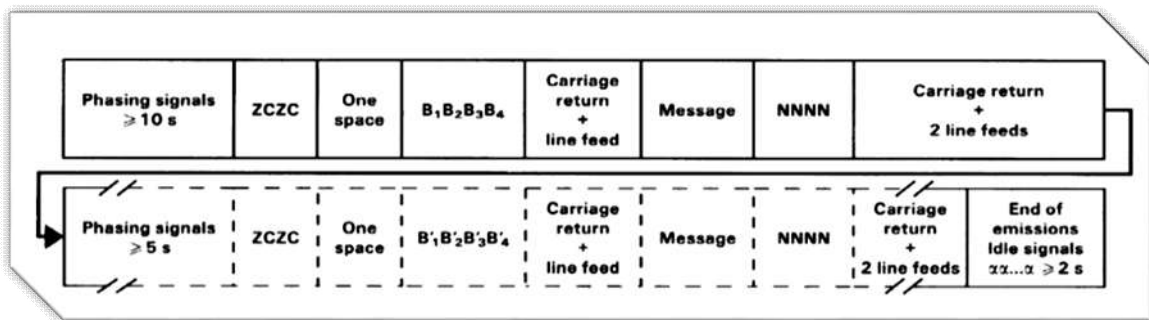
Date: 22.OCT.2014 22:21:40

Neither Undva nor the Riga receivers did not receive the broadcast.

In the air START was 2014-10-22 Tue 22: 21: 36.517242 and STOP 2014-10-22 Tue 22: 25: 33.008114

The power of the Suurupi transmitter was: TUBE TRANSMITTER 900W Tallinn (measured 22:21:36 21 dBµV / m), which makes the field strength at the measuring point > 10 µV / m .

This can only be explained by strong frequency interference, as a result of which NAVTEX receivers



are unable to distinguish the start signal of the program:

If transmitters with two strong signals cause interference, the result is that neither signal is received.

While one transmitter's phasing signal does not interfere during the reception, the receiver does not stop receiving it until it has received the end of emission idle signals.

Tehnilise Järelevalve Amet

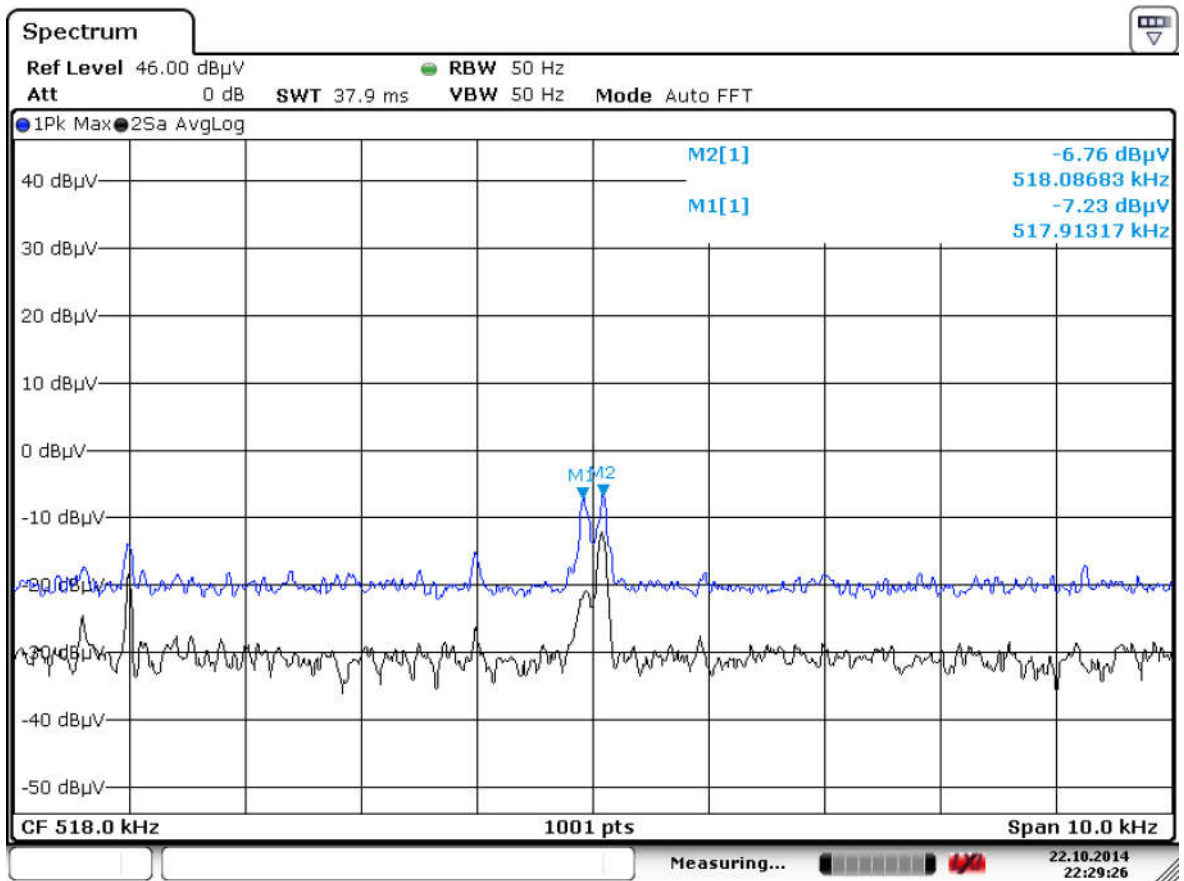
**SAGEDUSHALDUSE
OSAKOND**

Sõle 23a, 10614 Tallinn
Tel: 667 2100, Faks: 667 2001
E-mail: info@tja.ee

Suurupi NAVTEX SAATJA

väljatugevuse mõõteprotokoll nr 19-2/14-0730-16

Mõõdetud NAVTEX saatja valdaja		programmi nimi:		Futronic test täisvõimsusel						
		kanali kesksagedus:		518 kHz						
		saatja asukoht:		Suurupi						
nimi		RIKS								
aadress		Ädala 4F, Tallinn								
Mõõtekoha koordinaadid		21°55'38.1"E			58°30'52.5"N					
Mõõtmise kuupäev 22.10.2014				kellaeg		22:29				
Mõõtetulemus		Laiendmääramatus		Kattetegur		Usaldusnivoo				
14	dBµV/m	±	2,2		k=2	95%				
Mõõteseade (ti)		Tehase number		Kalibr. dok.nr		Kalibr. kuupäev				
R&S FSV7		Ser.101692		10-300285081		18.09.2013				
Mõõteriistade seaded										
mõõterežiim	detektor	spektri jälg	SPAN kHz	IF BW kHz	ATT dB	ATT mode	REF dB	RBW kHz	VBW kHz	meas time
	PK	MaxHold	10			manual	46	0.05	0.05	38ms
Mõõteantenni tüüp ja polarisatsioon				Kaablisüsteemi kogusumбуvus						
HE010		vertikaalne								
tehase number		Ser.100065								
Antennitegur R&S andmetel		17 dB/m		Mõõdetud sagedusel 518 kHz		4 dB				
Mõõtekeskkond (Soovitav kasutada EMHI andmeid)										
temperatuur				õhuniiskus		sademed		pilvisus		
2° C(väljas)						ei ole				
Mõõtekeskkonna lühikirjeldus										
Mõõteprotokolli lisad:Spektripildid_4										
Kontrolli teostanud ametnikud (nimi, amet, allkiri):										
P.Joala, SHO peaspetsialist										



Date: 22.OCT.2014 22:29:26

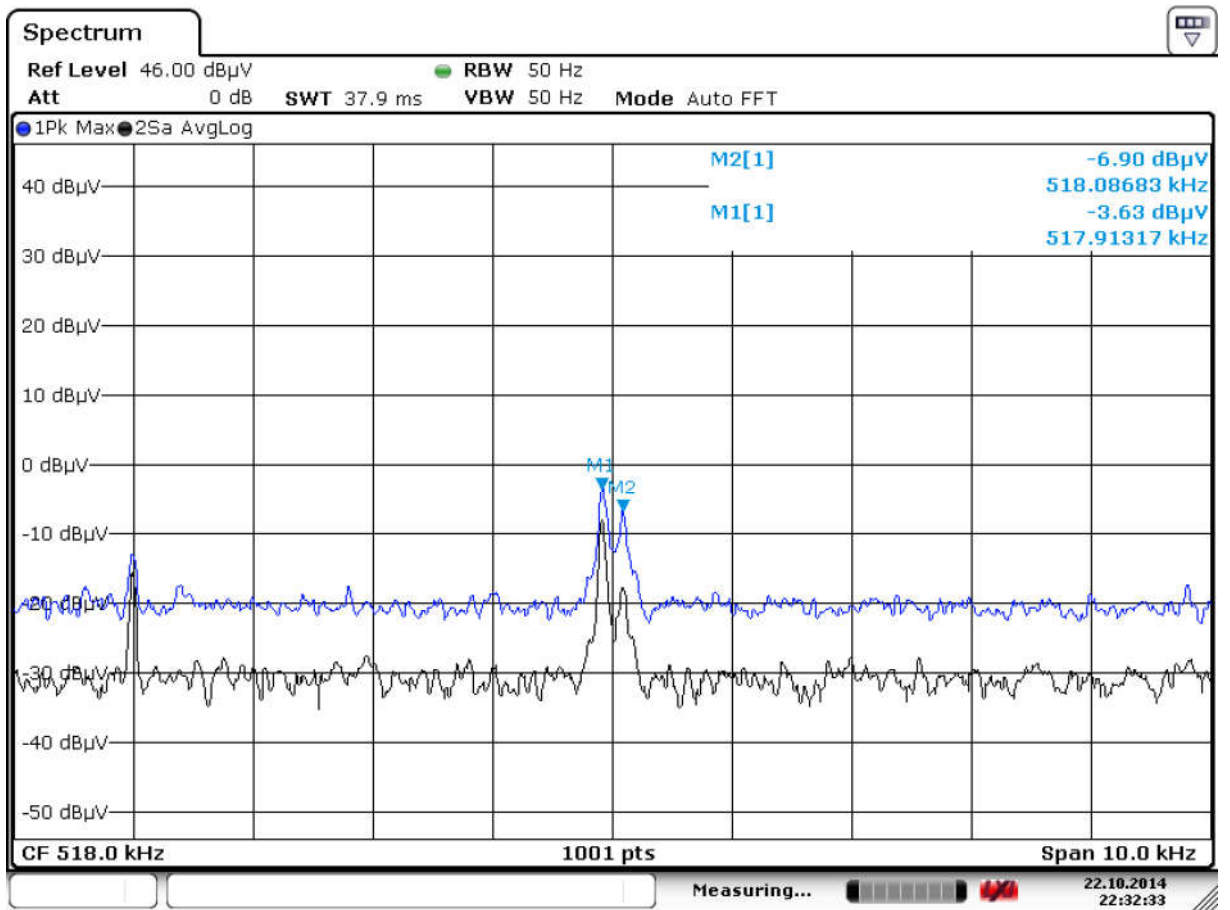
The reception took place by both Undva and Riga receivers.

The power of the Suurupi transmitter was: Tallinn Radio Futronic P = 622W; 14dBµV / m

At that time, Tallinn Radio TEST was broadcast

Undva START 2014-10-22T22: 29: 46.040392;

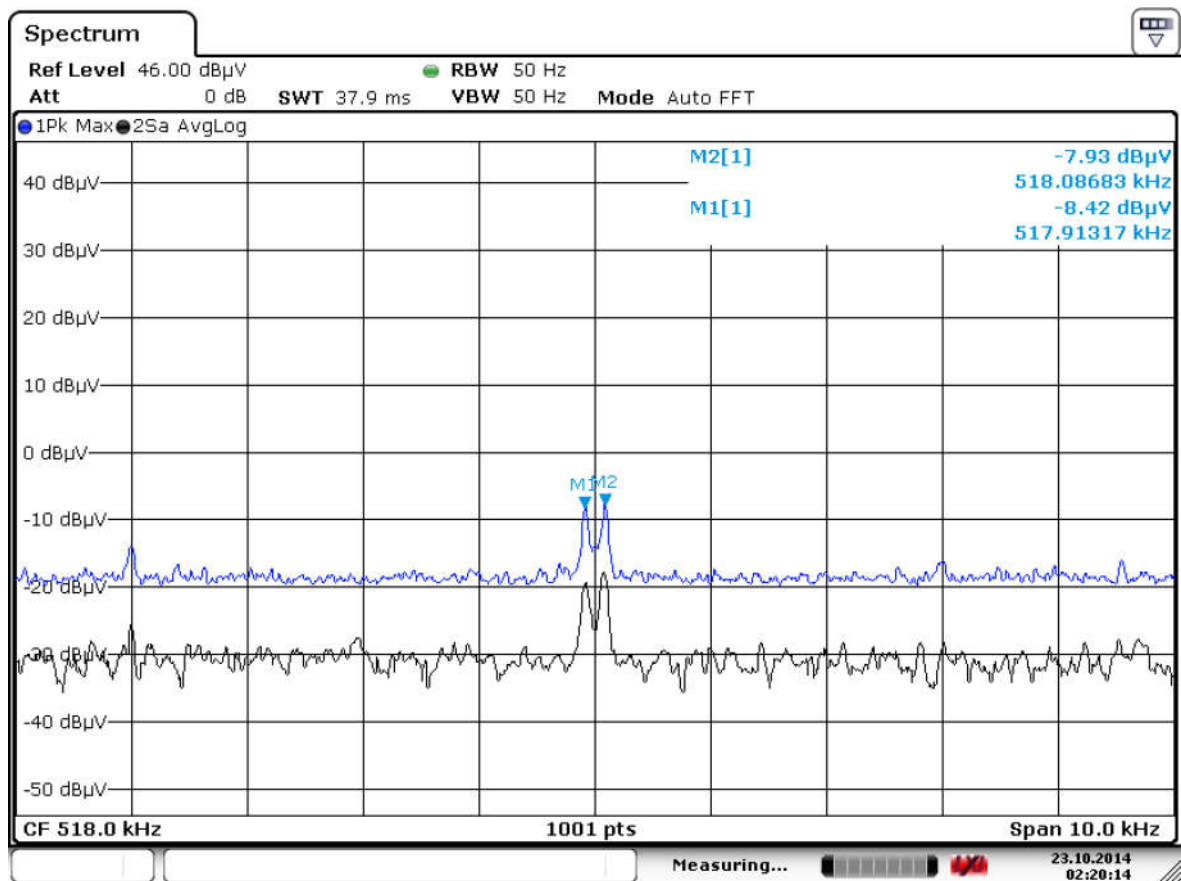
Undva STOP 2014-10-22T22: 30: 05.771199



Date: 22.OCT.2014 22:32:34

8. Measurement IV (October 23, 2014 at 02: 18-02: 32)

Tehnilise Järelevalve Amet										
SAGEDUSHALDUSE OSAKOND					Sõle 23a, 10614 Tallinn Tel: 667 2100, Faks: 667 2001 E-mail: info@tja.ee					
Suurupi NAVTEX SAATJA										
väljatugevuse mõõteprotokoll nr 19-2/14-0730-16										
Mõõdetud NAVTEX saatja valdaja				programmi nimi:			Danphone test			
				kanali kesksagedus:			518 kHz			
				saatja asukoht:			Suurupi			
nimi		RIKS								
aadress		Ädala 4F, Tallinn								
Mõõtekoha koordinaadid				22°02'19.5"E				58°21'35.8"N		
Mõõtmise kuupäev 23.10.2014						kellaeg		2:20		
Mõõtetulemus			Laiendmääramatus		Kattetegur		Usaldusnivoo			
13		dBµV/m		±		2,2		k=2		95%
Mõõteseade (tü)		Tehase number			Kalibr. dok.nr			Kalibr. kuupäev		
R&S FSV7		Ser.101692			10-300285081			18.09.2013		
Mõõteriistade seaded										
mõõterežiim	detektor	spektri jälg	SPAN kHz	IF BW kHz	ATT dB	ATT mode	REF dB	RBW kHz	VBW kHz	meas time
	PK	MaxHold	10			manual	46	0.05	0.05	38ms
Mõõteantenni tüüp ja polarisatsioon					Kaablisüsteemi kogusumbuvus					
HL010		vertikaalne								
tehase number		Ser.100065								
Antennitegur R&S andmetel		17 dB/m			Mõõdetud sagedusel 518 kHz			4 dB		
Mõõtekeskkond (Soovitav kasutada EMHI andmeid)										
temperatuur					õhuniiskus		sademed		pilvisus	
2° C(väljas)							ei ole			
Mõõtekeskkonna lühikirjeldus										
Mõõteprotokolli lisad:Spektripildid_6										
Kontrolli teostanud ametnikud (nimi, amet, allkiri):										
P.Joala, SHO peaspetsialist										



Date: 23.OCT.2014 02:20:13

The reception took place by both Undva and Riga receivers.
 The power of the Suurupi transmitter was: Tallinn Radio Futronic P = 622W;
 14dBµV / m At that time, Tallinn Radio TEST was on the air at 02:20
 At the same time

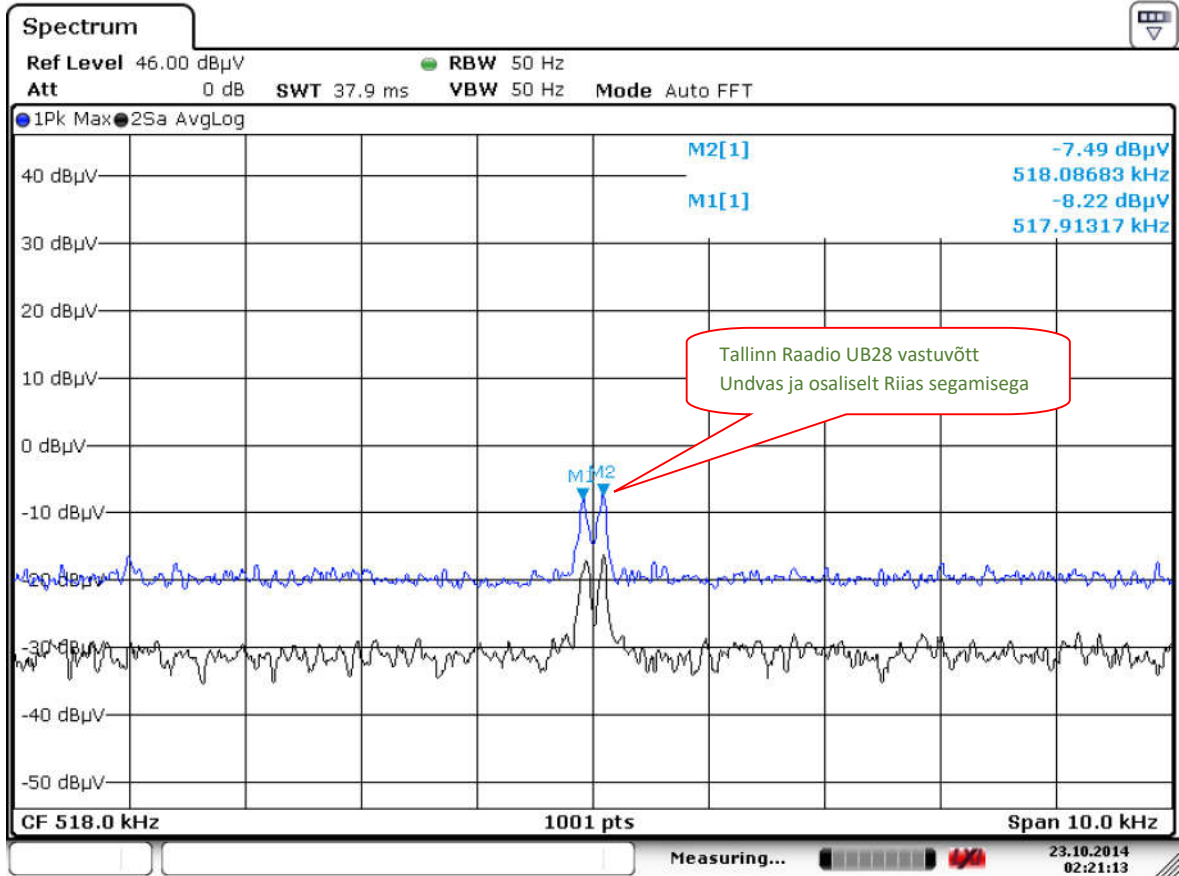
Undva receiver:	Hõbekuuse receiver:	Riga receiver:
Undva START 2014-10-23T02:20:39.780032	Merivälja START 2014-10-23T02:20:39.724613	23.10.2014 02:21:34 (LV)
ZCZC UA14	ZCZC UA14	ZCZC UA14
221920 UTC OCT	221920 UTC OCT	221920 UTC OCT
TALLINNRADIO	TALLINNRADIO	_TALLINNR_DIO
THIS IS TALLINNRADIO TEST MESSAGE	THIS IS TALLINNRADIO TEST MESSAGE	THIS_IS TALLINNRADIO TEST MESSAGE
THIS IS TALLINNRADIO TEST MESSAGE	THIS IS TALLINNRADIO TEST MESSAGE	THIS IS TALLINNR_DIO TKF
THIS IS TALLINNRADIO TEST MESSAGE	THIS IS TALLINNRADIO TEST MESSAGE	___6__88__5: 9_5
NNNN Undva STOP 2014-10-23T02:20:59.566722	NNNN Merivälja STOP 2014-10-23T02:20:59.528438	_-)58: '3- .35 2-4,8,_'
Undva START 2014-10-23T02:21:08.327571	Merivälja START 2014-10-23T02:21:08.324996	,3-__-)3 2-4,8,_'
ZCZC UB28	ZCZC UB28	'(-_344-(: FROM THURSDAY MORNING S AT TIMES 15

<p>221632 UTC OKT</p> <p>BALTIC SEA MET WARNINGS</p> <p>NEAR GALE WARNING</p> <p>SKAGERRAK: FROM THURSDAY MORNING S AT TIMES 15 M/S.</p> <p>NORTHERN BALTIC: E 15 M/S. WEDNESDAY EVENING SOMEWHAT DECR.</p> <p>GULF OF FINLAND: IN WESTERN WATERS E</p> <p>AT TIMES 14 M/S. WEDNESDAY EVENING SOMEWHAT DECR.</p> <p>SEA OF BOTHNIA: FROM THURSDAY MORNING SE-S 15 M/S.</p> <p>THE QUARK,BAY OF BOTHNIA: FROM THURSDAY MORNING S 15 M/S.</p> <p>NNNN Undva STOP 2014-10-23T02:22:08.265297</p> <p>Undva START 2014-10-23T02:22:16.773621</p> <p>ZCZC UA04</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 300</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-107 CENTERED IN 60-07N 028-44E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN Undva STOP 2014-10-23T02:22:48.605817</p> <p>Undva START 2014-10-23T02:22:57.121049</p> <p>ZCZC UA03</p> <p>211242 UTC OCT</p>	<p>221632 UTC OKT</p> <p>BALTIC SEA MET WARNINGS</p> <p>NEAR GALE WARNING</p> <p>SKAGERRAK: FROM THURSDAY MORNING S AT TIMES 15 M/S.</p> <p>NORTHERN BALTIC: E 15 M/S. WEDNESDAY EVENING SOMEWHAT DECR.</p> <p>GULF OF FINLAND: IN WESTERN WATERS E</p> <p>AT TIMES 14 M/S. WEDNESDAY EVENING SOMEWHAT DECR.</p> <p>SEA OF BOTHNIA: FROM THURSDAY MORNING SE-S 15 M/S.</p> <p>THE QUARK,BAY OF BOTHNIA: FROM THURSDAY MORNING S 15 M/S.</p> <p>NNNN Merivälja STOP 2014-10-23T02:22:08.266062</p> <p>Merivälja START 2014-10-23T02:22:16.775797</p> <p>ZCZC UA04</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 300</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-107 CENTERED IN 60-07N 028-44E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN Merivälja STOP 2014-10-23T02:22:48.566749</p> <p>Merivälja START 2014-10-23T02:22:57.076777</p> <p>ZCZC UA03</p> <p>211242 UTC OCT</p>	<p>M/S.</p> <p>NORTHERN BALTIC: E 15 M/S. WEDNESDAY EVENING SOMEWHAT DECR.</p> <p>GULF OF FINLAND: IN WESTERN WATERS E</p> <p>AT TIMES 14 M/S. WEDNESDAY EVENING SOMEWHAT DECR.</p> <p>SEA OF BOTHNIA: FROM THURSDAY MORNING SE-S 15 M/S.</p> <p>THE QUARK,BAY OF BOTHNIA: FROM THURSDAY MORNING S 15 M/S.</p> <p>NNNN</p> <p><u>23.10.2014 02:23:11 (LV)</u></p> <p>ZCZC UA04</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 300</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-107 CENTERED IN 60-07N 028-44E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN</p> <p><u>23.10.2014 02:23:51 (LV)</u></p> <p>ZCZC UA03</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 299</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-105 CENTERED IN 60-06N 029-08E</p>
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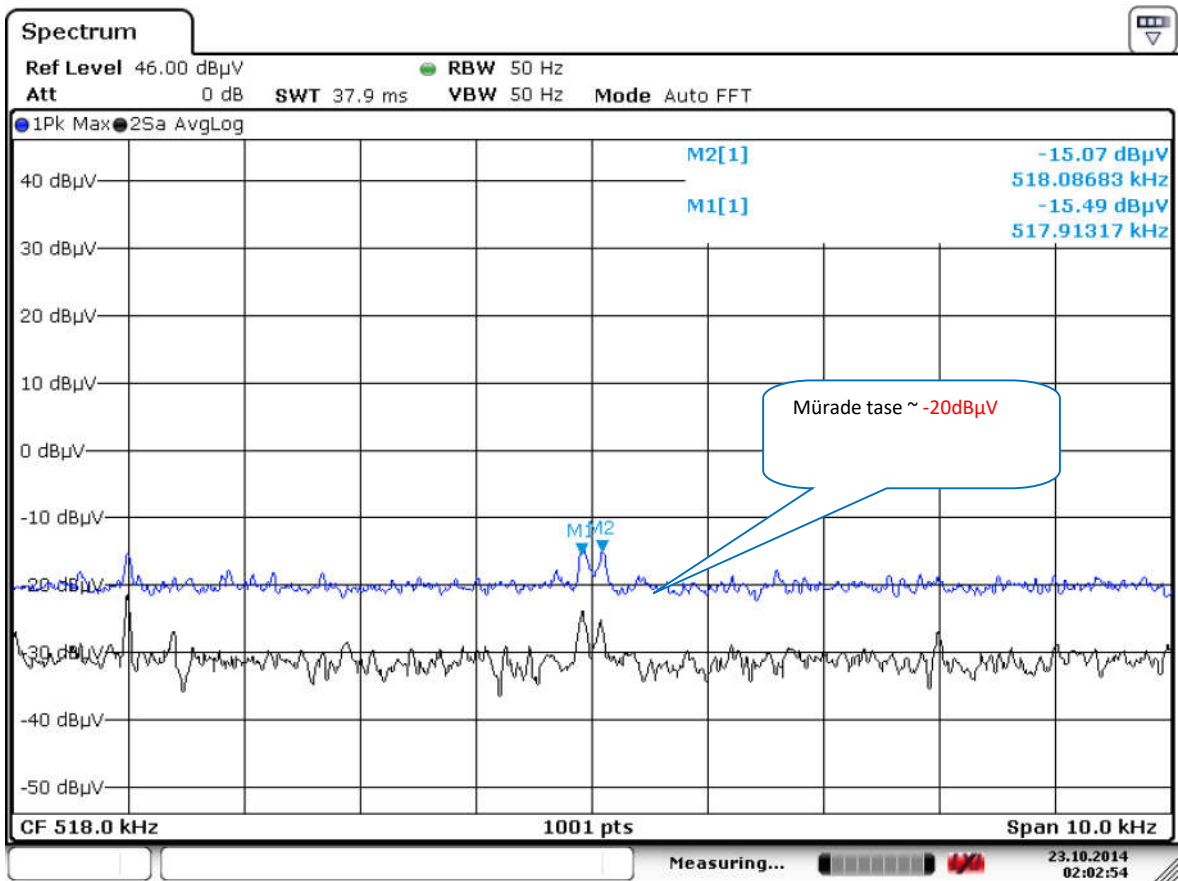
<p>PETERSBURG NAV WARN 299 EASTERN GULF OF FINLAND SHIPS EXERCISES 230700-251200 UTC OCT IN AREA KR-105 CENTERED IN 60- 06N 029-08E AREA TEMPO PROHIBITED TO SHIPPING. CANCEL 251300 UTC OCT NNNN Undva STOP 2014-10- 23T02:23:28.907335 Undva START 2014-10- 23T02:24:09.816364 ZCZC UA21 222320 UTC OCT 14 MONDOLFO RADIO COASTAL WARNING 592/14 OCT 21 CENTRAL ADRIATIC SEA - TERMOLI. SIGHTED YELLOW BUOY ADRIFT, DANGEROUS FOR NAVIGATION, IN POSITION: 42 03.8N - 014 47.4E. TRANSIT SHIPS BEWARE. NNNN Undva STOP 2014-10-23T02:24:43.851596 Undva START 2014-10- 23T02:24:51.113569 ZCZC UA22 222320 UTC OCT 14 MONDOLFO RADIO COASTAL WARNING 587/14 OCT 20 CENTRAL ADRIATIC SEA. FROM DAY 21 OCTOBER 2014 TO DAY 20 NOVEMBER 2014, M/V 'FRANKLIN', WILL CARRY OUT SURVEY</p>	<p>PETERSBURG NAV WARN 299 EASTERN GULF OF FINLAND SHIPS EXERCISES 230700-251200 UTC OCT IN AREA KR-105 CENTERED IN 60- 06N 029-08E AREA TEMPO PROHIBITED TO SHIPPING. CANCEL 251300 UTC OCT NNNN Merivälja STOP 2014-10- 23T02:23:28.918101</p>	<p>AREA TEMPO PROHIBITED TO SHIPPING. CANCEL 251300 UTC OCT NNNN <u>23.10.2014 02:25:04 (LV)</u> ZCZC UA21 222320 UTC OCT 14 MONDOLFO RADIO COASTAL WARNING 592/14 OCT 21 CENTRAL ADRIATIC SEA - TERMOLI. SIGHTED YELLOW BUOY ADRIFT, DANGEROUS FOR NAVIGATION, IN POSITION: 42 03.8N - 014 47.4E. TRANSIT SHIPS BEWARE. NNNN <u>23.10.2014 02:25:45 (LV)</u> ZCZC UA22 222320 UTC OCT 14 MONDOLFO RADIO COASTAL WARNING 587/14 OCT 20 CENTRAL ADRIATIC SEA. FROM DAY 21 OCTOBER 2014 TO DAY 20 NOVEMBER 2014, M/V 'FRANKLIN', WILL CARRY OUT SURVEY</p>
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<p>OFFSHORE ACTIVITY THE FOLLOWING ROUTE:</p> <p>42 11.6318N - 16 00.3605E, 42 07.0148N - 16 14.4134E, 42 06.9202N - 16 14.8364E, 41 56.0686N - 16 47.4930E, 41 55.5498N - 16 48.3697E, 41 54.9090N - 16 49.0723E, 41 54.2825N - 16 49.6081E, 41 53.7955N - 16 50.3194E, 41 53.3811N - 16 51.1984E, 41 52.9676N - 16 52.4311E, 41 52.7733N - 16 54.0790E, 41 52.6230N - 16 54.5243E, 41 52.4377N - 16 54.8481E, 41 52.2918N - 16 55.2962E, 41 52.1285N - 16 56.6629E, 41 52.1894N - 16 57.7012E, 41 52.0896N - 16 58.8037E, 41 51.7370N - 17 00.1097E, 41 51.1380N - 17 01.5756E, 41 50.5327N - 17 02.5326E, 41 48.1386N - 17 07.4850E, 41 42.0180N - 17 19.8223E, 41 39.6615N - 17 24.2626E, 41 37.3772N - 17 29.8416E, 41 34.3353N - 17 34.4623E, 41 33.5083N - 17 36.3465E, 41 31.4738N - 17 43.5703E, 41 30.9126N - 17 49.1211E, 41 30.9794N - 17 53.9424E, 41 31.8860N - 17 58.9654E, 41 32.9568N - 18 01.7158E, 41 34.1563N - 18 03.4866E, 41 35.5420N - 18 05.5344E, 41 38.0151N - 18 07.8041E.</p> <p>TRANSIT SHIPS BEWARE AND</p>		<p>OFFSHORE ACTIVITY THE FOLLOWING ROUTE:</p> <p>42 11.6318N - 16 00.3605E, 42 07.0148N - 16 14.4134E, 42 06.9202N - 16 14.8364E, 41 56.0686N - 16 47.4930E, 41 55.5498N - 16 48.3697E, 41 54.9090N - 16 49.0723E, 41 54.2825N - 16 49.6081E, 41 53.7955N - 16 50.3194E, 41 53.3811N - 16 51.1984E, 41 52.9676N - 16 52.4311E, 41 52.7733N - 16 54.0790E, 41 52.6230N - 16 54.5243E, 41 52.4377N - 16 54.8481E, 41 52.2918N - 16 55.2962E, 41 52.1285N - 16 56.6629E, 41 52.1894N - 16 57.7012E, 41 52.0896N - 16 58.8037E, 41 51.7370N - 17 00.1097E, 41 51.1380N - 17 01.5756E, 41 50.5327N - 17 02.5326E, 41 48.1386N - 17 07.4850E, 41 42.0180N - 17 19.8223E, 41 39.6615N - 17 24.2626E, 41 37.3772N - 17 29.8416E, 41 34.3353N - 17 34.4623E, 41 33.5083N - 17 36.3465E, 41 31.4738N - 17 43.5703E, 41 30.9126N - 17 49.1211E, 41 30.9794N - 17 53.9424E, 41 31.8860N - 17 58.9654E, 41 32.9568N - 18 01.7158E, 41 34.1563N - 18 03.4866E, 41 35.5420N - 18 05.5344E, 41 38.0151N - 18 07.8041E.</p> <p>TRANSIT SHIPS BEWARE AND</p>
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MANTAIN 1 (ONE) NM SAFETY DISTANCE FROM SHIP. NNNN Undva STOP 2014-10-23T02:28:09.658843		MANTAIN 1 (ONE) NM SAFETY DISTANCE FROM SHIP. NNNN
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Date: 23.OCT.2014 02:21:13

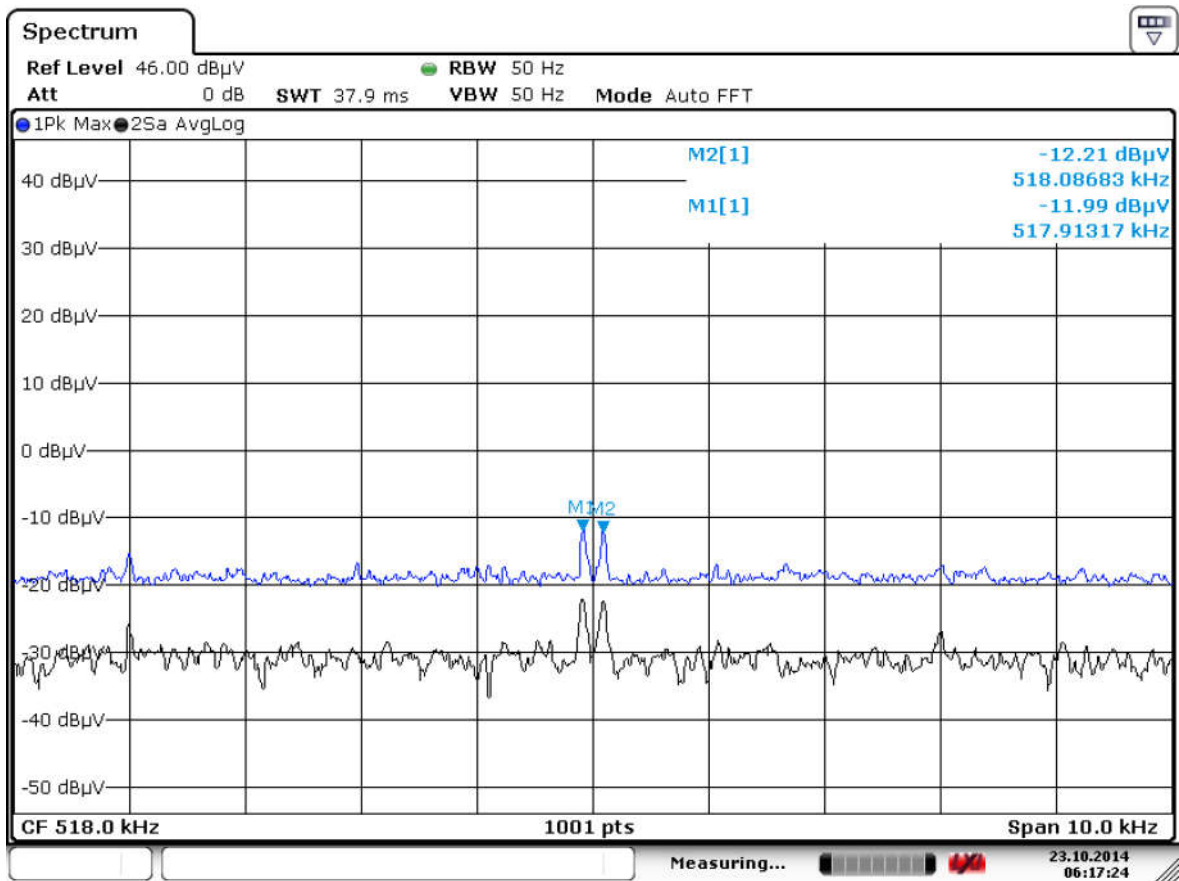


Date: 23.OCT.2014 02:02:54

9. Measurement V (October 23, 2014 at 06: 17-06: 19)

Tehnilise Järelevalve Amet													
SAGEDUSHALDUSE OSAKOND						Sõle 23a, 10614 Tallinn Tel: 667 2100, Faks: 667 2001 E-mail: info@tja.ee							
Suurupi NAVTEX SAATJA													
väljatugevuse mõõteprotokoll nr 19-2/14-0730-16													
Mõõdetud NAVTEX saatja valdaja				programmi nimi:				Futronic test täisvõimsusel					
				kanali kesksagedus:				518 kHz					
				saatja asukoht:				Suurupi					
nimi		RIKS											
aadress		Ädala 4F, Tallinn											
Mõõtekoha koordinaadid				21°55'38.1"E				58°30'52.5"N					
Mõõtmise kuupäev 23.10.2014						kellaeg		6:17					
Mõõtetulemus			Laiendmääramatus			Kattetegur			Usaldusnivoo				
9			dBµV/m			±			2,2				
						k=2			95%				
Mõõteseade (tü)		Tehase number				Kalibr. dok.nr				Kalibr. kuupäev			
R&S FSV7		Ser.101692				10-300285081				18.09.2013			
Mõõteriistade seaded													
mõõterežiim	detektor	spektri jälg	SPAN kHz	IF BW kHz	ATT dB	ATT mode	REF dB	RBW kHz	VBW kHz	meas time			
	PK	MaxHold	10			manual	46	0.05	0.05	38ms			
Mõõteantenni tüüp ja polarisatsioon						Kaablisüsteemi kogusumbuvus							
HL010						vertikaalne							
tehase number						Ser.100065							
Antennitegur R&S andmetel						17 dB/m			Mõõdetud sagedusel 518 kHz			4 dB	
Mõõtekeskkond (Soovitav kasutada EMHI andmeid)													
temperatuur						õhuniiskus		sademed		pilvisus			
2° C(väljas)								ei ole					
Mõõtekeskkonna lühikirjeldus													
Mõõteprotokolli lisad:Spektripildid_5													
Kontrolli teostanud ametnikud (nimi, amet, allkiri):													
P.Joala, SHO peaspetsialist													

At the same time



Date: 23.OCT.2014 06:17:24

At the same time

Undva receiver:

Höbekuuse receiver:

Riga reciever:

Undva START 2014-10-23T06:17:54.551444	Merivälja START 2014-10-23T06:17:54.533759	23.10.2014 06:18:49 (LV)
ZCZC UA14	ZCZC UA14	ZCZC UA14
221920 UTC OCT	221920 UTC OCT	221920 UTC OCT
TALLINNRADIO	TALLINNRADIO	TALLINNRADIO
THIS IS TALLINNRADIO TEST MESSAGE	THIS IS TALLINNRADIO TEST MESSAGE	THIS IS TALLINNRADIO TEST MESSAGE
THIS IS TALLINNRADIO TEST MESSAGE	THIS IS TALLINNRADIO TEST MESSAGE	THIS IS TALLINNRADIO TEST MESSAGE
THIS IS TALLINNRADIO TEST MESSAGE	THIS IS TALLINNRADIO TEST MESSAGE	THIS IS TALLINNRADIO TEST MESSAGE
NNNN	NNNN	NNNN
Undva STOP 2014-10-23T06:18:14.336397	Merivälja STOP 2014-10-23T06:18:14.330671	
Undva START 2014-10-23T06:20:31.991485	Merivälja START 2014-10-23T06:20:31.986852	
ZCZC UA04	ZCZC UA04	
211242 UTC OCT	211242 UTC OCT	

<p>PETERSBURG NAV WARN 300 EASTERN GULF OF FINLAND SHIPS EXERCISES 230700-251200 UTC OCT IN AREA KR-107 CENTERED IN 60- 07N 028-44E AREA TEMPO PROHIBITED TO SHIPPING. CANCEL 251300 UTC OCT NNNN Undva STOP 2014-10- 23T06:21:03.823941 Undva START 2014-10- 23T06:21:20.688250</p> <p>ZCZC UA03 211242 UTC OCT PETERSBURG NAV WARN 299 EASTERN GULF OF FINLAND SHIPS EXERCISES 230700-251200 UTC OCT IN AREA KR-105 CENTERED IN 60- 06N 029-08E AREA TEMPO PROHIBITED TO SHIPPING. CANCEL 251300 UTC OCT NNNN Undva STOP 2014-10- 23T06:21:52.520014 Undva START 2014-10- 23T06:23:15.681148</p> <p>ZCZC UA20 230320 UTC OCT 14 MONDOLFO RADIO OCT 23TH 2014 FROM 1200LT TO 1700LT (1000 UTC TO 1500 UTC) FIRING EXERCISE IN RADIUS 5 NM FROM POSITION: LAT 45 12,70' N LONG 012 52,70' E ALL VESSELS IN VICINITY ARE REQUESTED TO AVOID SAILING</p>	<p>PETERSBURG NAV WARN 300 EASTERN GULF OF FINLAND SHIPS EXERCISES 230700- 251200 UTC OCT IN AREA KR-107 CENTERED IN 60-07N 028-44E AREA TEMPO PROHIBITED TO SHIPPING. CANCEL 251300 UTC OCT NNNN Merivälja STOP 2014-10- 23T06:21:03.774651 Merivälja START 2014-10- 23T06:21:20.687495</p> <p>ZCZC UA03 211242 UTC OCT PETERSBURG NAV WARN 299 EASTERN GULF OF FINLAND SHIPS EXERCISES 230700- 251200 UTC OCT IN AREA KR-105 CENTERED IN 60-06N 029-08E AREA TEMPO PROHIBITED TO SHIPPING. CANCEL 251300 UTC OCT NNNN Merivälja STOP 2014-10- 23T06:21:52.473581</p>	<p>23.10.2014 06:24:10 (LV)</p> <p>ZCZC UA20 230320 UTC OCT 14 MONDOLFO RADIO OCT 23TH 2014 FROM 1200LT TO 1700LT (1000 UTC TO 1500 UTC) FIRING EXERCISE IN RADIUS 5 NM FROM POSITION: LAT 45 12,70' N LONG 012 52,70' E ALL VESSELS IN VICINITY ARE REQUESTED TO AVOID SAILING</p>
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<p>INSIDE</p> <p>DESIGNATED AREA DUE TO SLOVENIAN NAVY FIRING EXERCISE.</p> <p>NNNN</p> <p>Undva STOP 2014-10-23T06:24:02.764022</p> <p>Undva START 2014-10-23T06:24:09.977885</p> <p>230320 UTC OCT 14</p> <p>ZCZC UA21</p> <p>MONDOLFO RADIO</p> <p>COASTAL WARNING 592/14 OCT 21</p> <p>CENTRAL ADRIATIC SEA - TERMOLI.</p> <p>SIGHTED YELLOW BUOY ADRIFT, DANGEROUS FOR NAVIGATION, IN POSITION: 42 03.8N - 014 47.4E.</p> <p>TRANSIT SHIPS BEWARE.</p> <p>NNNN</p> <p>Undva STOP 2014-10-23T06:24:44.060720</p> <p>Undva START 2014-10-23T06:24:51.275392</p> <p>ZCZC UA22</p> <p>230320 UTC OCT 14</p> <p>MONDOLFO RADIO</p> <p>COASTAL WARNING 587/14 OCT 20</p> <p>CENTRAL ADRIATIC SEA.</p> <p>FROM DAY 21 OCTOBER 2014 TO DAY 20 NOVEMBER 2014, M/V 'FRANKLIN',</p> <p>WILL CARRY OUT SURVEY OFFSHORE ACTIVITY THE FOLLOWING ROUTE:</p> <p>42 11.6318N - 16 00.3605E,</p> <p>42 07.0148N - 16 14.4134E,</p> <p>42 06.9202N - 16 14.8364E,</p> <p>41 56.0686N - 16 47.4930E,</p> <p>41 55.5498N - 16 48.3697E,</p> <p>41 54.9090N - 16 49.0723E,</p>		<p>INSIDE</p> <p>DESIGNATED AREA DUE TO SLOVENIAN NAVY FIRING EXERCISE.</p> <p>NNNN</p>
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<p>41 54.2825N - 16 49.6081E, 41 53.7955N - 16 50.3194E, 41 53.3811N - 16 51.1984E, 41 52.9676N - 16 52.4311E, 41 52.7733N - 16 54.0790E, 41 52.6230N - 16 54.5243E, 41 52.4377N - 16 54.8481E, 41 52.2918N - 16 55.2962E, 41 52.1285N - 16 56.6629E, 41 52.1894N **Z</p> <p>Undva START 2014-10- 23T06:26:48.717999</p> <p>ZCZC UA04</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 300</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-107 CENTERED IN 60- 07N 028-44E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN</p> <p>Undva STOP 2014-10- 23T06:27:23.449537</p> <p>Undva START 2014-10- 23T06:27:34.915240</p> <p>ZCZC UA03</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 299</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700-251200 UTC OCT</p> <p>IN AREA KR-105 CENTERED IN 60- 06N 029-08E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p>	<p>Merivälja START 2014-10- 23T06:26:48.693648</p> <p>ZCZC UA04</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 300</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700- 251200 UTC OCT</p> <p>IN AREA KR-107 CENTERED IN 60-07N 028-44E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p> <p>NNNN</p> <p>Merivälja STOP 2014-10- 23T06:27:23.427727</p> <p>Merivälja START 2014-10- 23T06:27:34.894302</p> <p>ZCZC UA03</p> <p>211242 UTC OCT</p> <p>PETERSBURG NAV WARN 299</p> <p>EASTERN GULF OF FINLAND</p> <p>SHIPS EXERCISES 230700- 251200 UTC OCT</p> <p>IN AREA KR-105 CENTERED IN 60-06N 029-08E</p> <p>AREA TEMPO PROHIBITED TO SHIPPING.</p> <p>CANCEL 251300 UTC OCT</p>	
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NNNN Undva STOP 2014-10- 23T06:28:09.646026	NNNN Merivälja STOP 2014-10- 23T06:28:09.628363	
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Tehnilise Järelevalve Amet

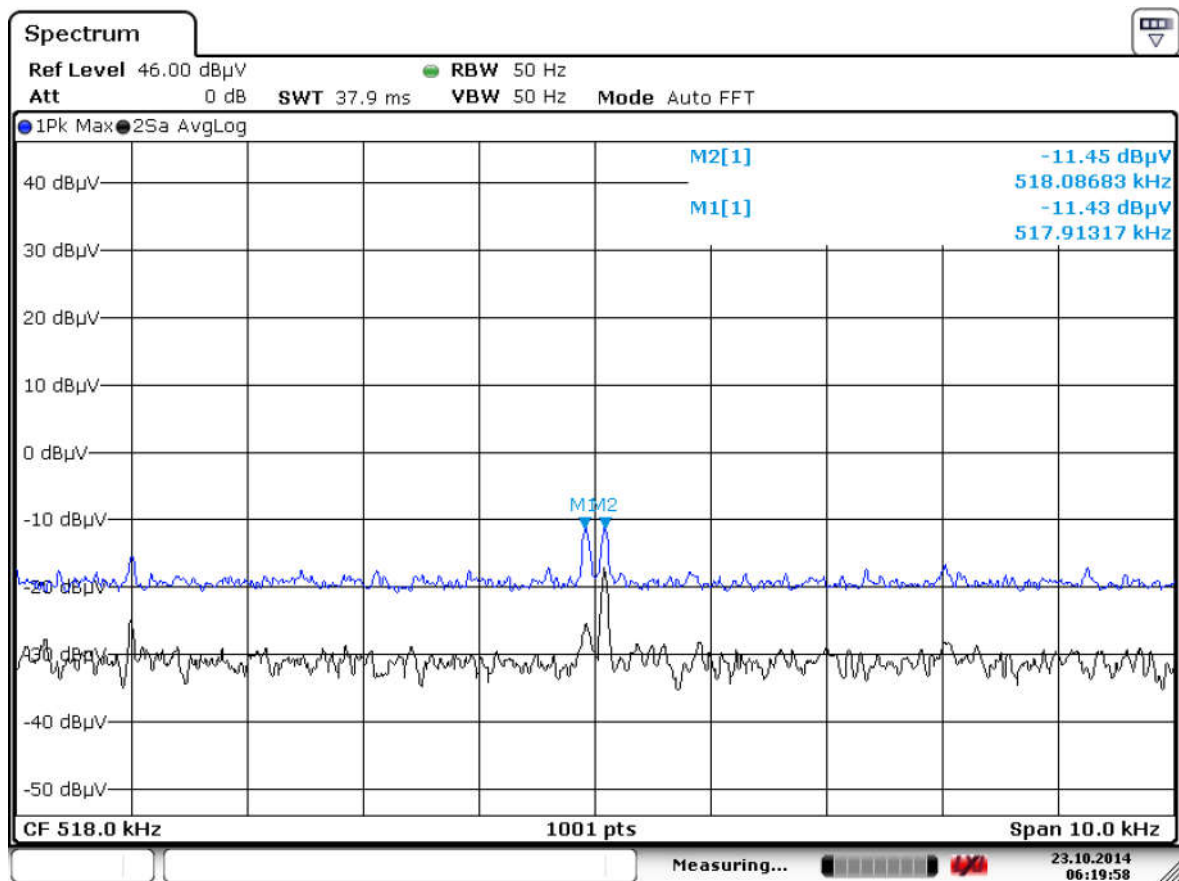
**SAGEDUSHALDUSE
OSAKOND**

Sõle 23a, 10614 Tallinn
Tel: 667 2100, Faks: 667 2001
E-mail: info@tja.ee

Suurupi NAVTEX SAATJA

väljatugevuse mõõteprotokoll nr 19-2/14-0730-16

Mõõdetud NAVTEX saatja valdaja		programmi nimi:		Futronic test täisvõimsusel						
		kanali kesksagedus:		518 kHz						
		saatja asukoht:		Suurupi						
nimi		RIKS								
aadress		Ädala 4F, Tallinn								
Mõõtekoha koordinaadid		21°55'38.1"E		58°30'52.5"N						
Mõõtmise kuupäev 23.10.2014			kellaeg		6:20					
Mõõtetulemus		Laiendmääramatus		Kattetegur		Usaldusnivoo				
9	dBµV/m	±	2,2		k=2	95%				
Mõõteseade (tü)		Tehase number		Kalibr. dok.nr		Kalibr. kuupäev				
R&S FSV7		Ser.101692		10-300285081		18.09.2013				
Mõõteriistade seaded										
mõõterežiim	detektor	spektri jälg	SPAN kHz	IF BW kHz	ATT dB	ATT mode	REF dB	RBW kHz	VBW kHz	meas time
	PK	MaxHold	10			manual	46	0.05	0.05	38ms
Mõõteantenni tüüp ja polarisatsioon				Kaablisüsteemi kogusumbuvus						
HL010		vertikaalne								
tehase number		Ser.100065								
Antennitegur R&S andmetel		17 dB/m		Mõõdetud sagedusel 518 kHz		4 dB				
Mõõtekeskkond (Soovitav kasutada EMHI andmeid)										
temperatuur				õhuniiskus		sademed		pilvisus		
2° C(väljas)						ei ole				
Mõõtekeskkonna lühikirjeldus										
Mõõteprotokolli lisad:Spektripildid_5										
Kontrolli teostanud ametnikud (nimi, amet, allkiri):										
P.Joala, SHO peaspetsialist										



Date: 23.OCT.2014 06:19:58

Control measurements were coordinated by:

Jüri Grigorjev
RIKS

Measurements were performed by:

Peter Joala,
The Consumer Protection and Technical Regulatory Authority
frequency management department

10. CONCLUSION

The measurements were performed as follows: in the period of October 17 to 21 October in 2014. Comparison observations (between the results) were obtained from different receivers, October 22-23 October, in 2014 in Undva and Kihelkonna villages in Saaremaa.

The Rohde Schwarz FSU spectrum analyzer of the The Consumer Protection and Technical Regulatory Authority was used to measure the field strength, and an antenna was installed on a Celwave CX4 SUV with a height of approx. 2 - 4 m above the ground. A certified cable CE2-12-03 was used to connect the antenna and the instrument. Both Undva and Hõbekuuse control receivers were used to check the measured signal, as well as the Riga control receiver, which' the antenna exceed significantly 5 meters above sea level (reference height for ships). The sensitivity of the NAVTEX receiver according to the technical passport is $2.0 \mu\text{V} / \text{m}$. A test signal during the measurements was agreed with the regional coordinator to be broadcast 2 minutes before the "U" transmission time to compare the signal strength before the interfering signals were broadcast and to make sure that the signal emitted by Tallinn Radio is still being measured. With RIKS operators, the clocks of the measuring equipment and coast radiostation were adjusted via open ULL maritime and telephone channels.

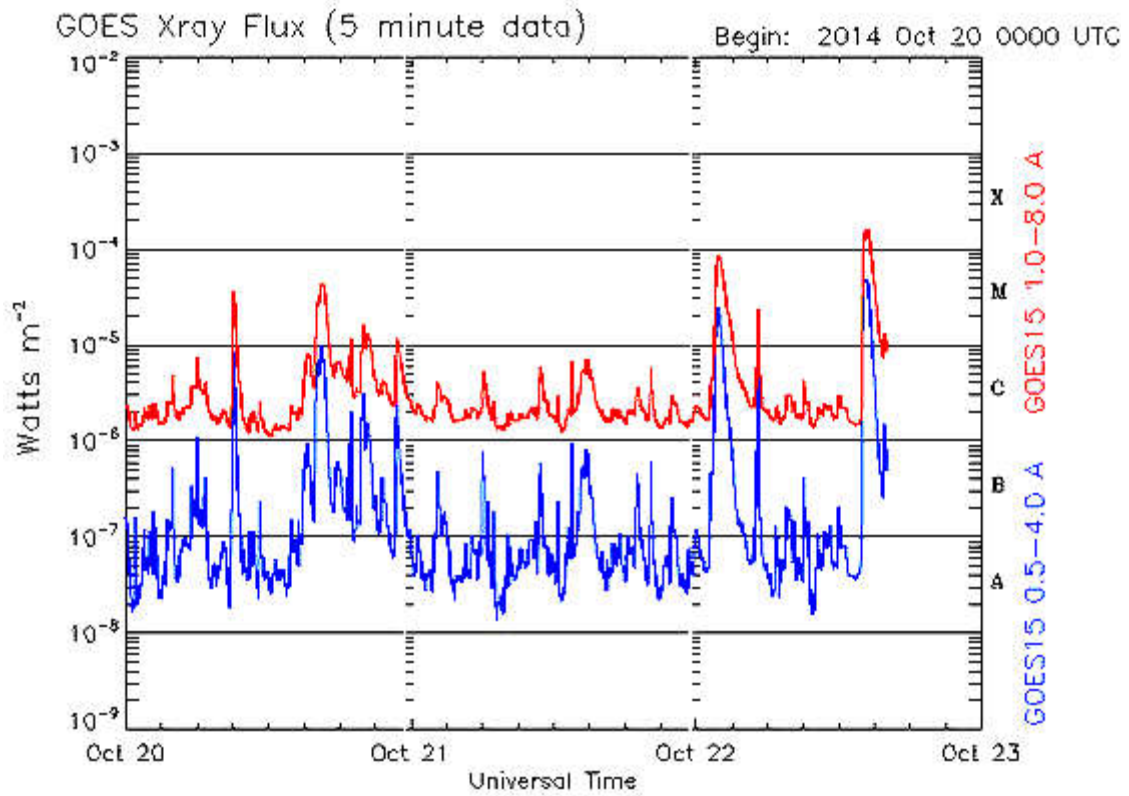
The measurements took place in approximately 10-minute timeslot which are set for the transmission of NAVTEX messages.

Based on the results of the NAVTEX control receivers, it can be seen that at night, when the reception conditions should be much better than during the day, the reception of Tallinn Radio is very much disturbed. This can only be explained by the appearance of more distant stations at night when reflection from the ionosphere layer F occurs.

The ionosphere is located about 50-400 km above the ground. The combination of solar energy (ultraviolet radiation) and cosmic gases produces ions in the gas around the Earth (mainly O₂ and N₂), the density of which changes unevenly with increasing altitude. Therefore, the ionosphere is generally divided into three layers: the F, E and D layers. These layers have a noticeable reflection effect on radio frequencies below 30 MHz.

The D and E layers are practically non-existent at night. Nor are they particularly important in radio broadcasting. The F-layer is located 140-300 km above the ground. As it is a very thick layer, it also plays an important role in radio transmission. The F-layer is further divided into two layers during the day - F1 and F2, but at night these layers combine. The F2 layer does not exist at all at night and only begins to form at sunrise. By the end of the day, the F2 layer is ionized much more strongly than F1, but as the sun sets, the layer begins to shrink again.

Since the ionosphere is created by solar energy, the properties of the ionosphere are strongly dependent on the Sun. This is how the properties of the ionosphere change with the seasons, days and even hours. During active Sun, the F-layer reaches a height of 320 km, while in the calm Sun its height is at 240 km. 2014 is the year with the active sun and at the same time it is the year out of recent decades with one of the largest bursts of charged particles on the surface of the Sun, which has caused complete unpredictable chaos in the ionosphere:

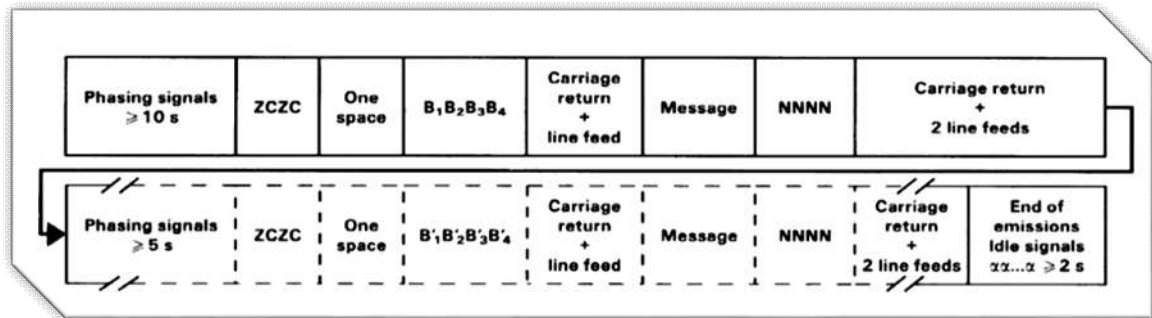


Updated 2014 Oct 22 16:15:12 UTC

NOAA/SWPC Boulder, CO USA

The NAVTEX international agreement provides a 10-minute timeslot for each sender, within which information is transmitted. All NAVTEX transmitters in the world work according to the same algorithm, where the message header is given according to the phasing signal, if this is not received, the message will not be received.

This can only be explained by strong frequency interference, as a result of which NAVTEX receivers are unable to distinguish the start signal of the program:



If transmitters with two strong signals cause interference, the result is that neither is received. While no interference occurred during the transmitter phasing signal of one transmitter, the receiver does not stop receiving it until it has received the end of emission Idle signals.

J.G.

11. RECOMMENDATIONS

Such interference caused by other NAVTEX stations cannot be avoided. Increasing the transmitter power creates problems for other "U" areas of Navarea and increases the confusion. Spatial wave attenuations are much smaller at thousands of kilometers than surface waves at a few hundred kilometers, so the field strengths of low-power transmitters can become comparable to those of surface waves at the receiving point and cause interference that makes it impossible to distinguish or recognize the signal length is slightly greater than 10 seconds.

The best solution for this type of interference would be to move the timeslot in the so-called anomalous area either forwards or backwards to find the best free "window" in this case in navigation area I, where the influence of transmitters working in the same timeslot in other areas would be minimal. To clarify this, the NAVTEX radio broadcasts should be monitored during at least three characteristic seasons by performing daily measurement cycles.

No less important is the right choice of antennas and the existence of a good grounding contour, the main page of the antenna direction diagram must be as horizontal as possible to the ground, which reduces ionospheric reflection and directs the useful signal flow into the groundwave. This approach allows higher power to be used at night, which provides significantly less reflected wave power while reducing interference to other receiver's in the far zone.

Addendum

MEASUREMENT REPORT

Antenna in Suurupi , 518kHz

Customer:

Riigi Infokommunikatsiooni Sihtasutus

Objective:

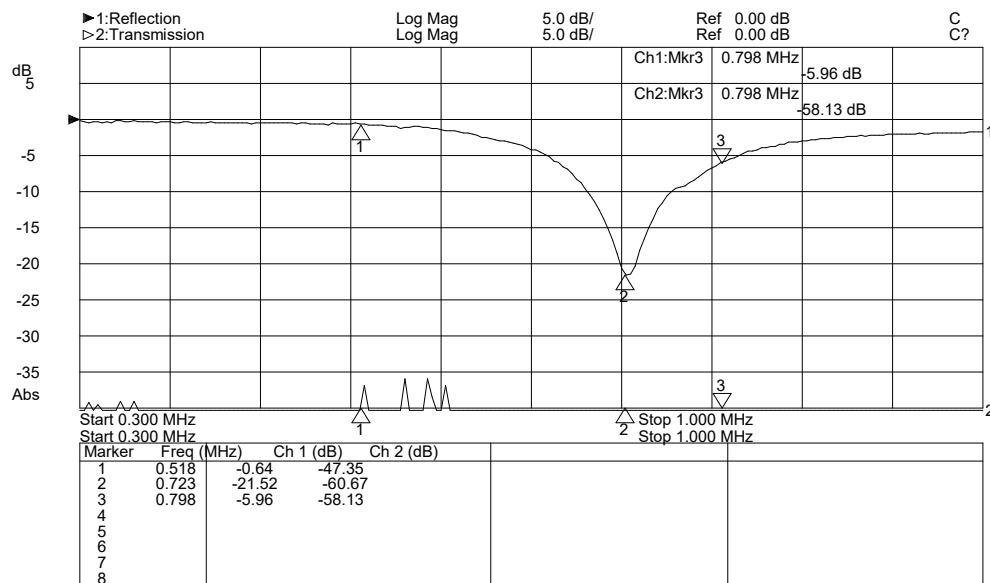
- To measure Antenna impedance @518kHz
- Improve Antenna matching network

Used instruments:

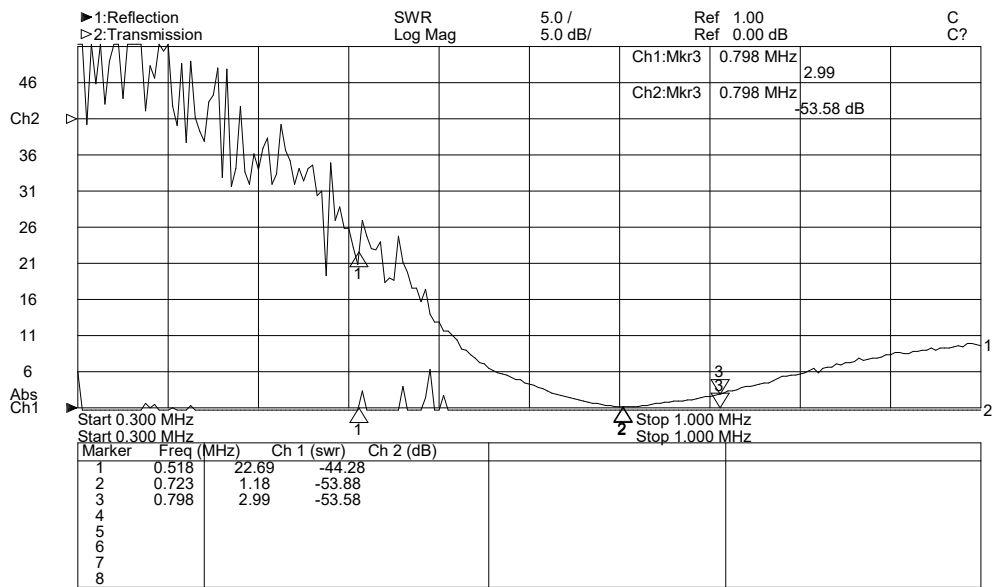
1. Hewlett Packardi Network analyzer **8711A**
2. Hewlett Packardi Network analyzer **8751A**

Measurement results:

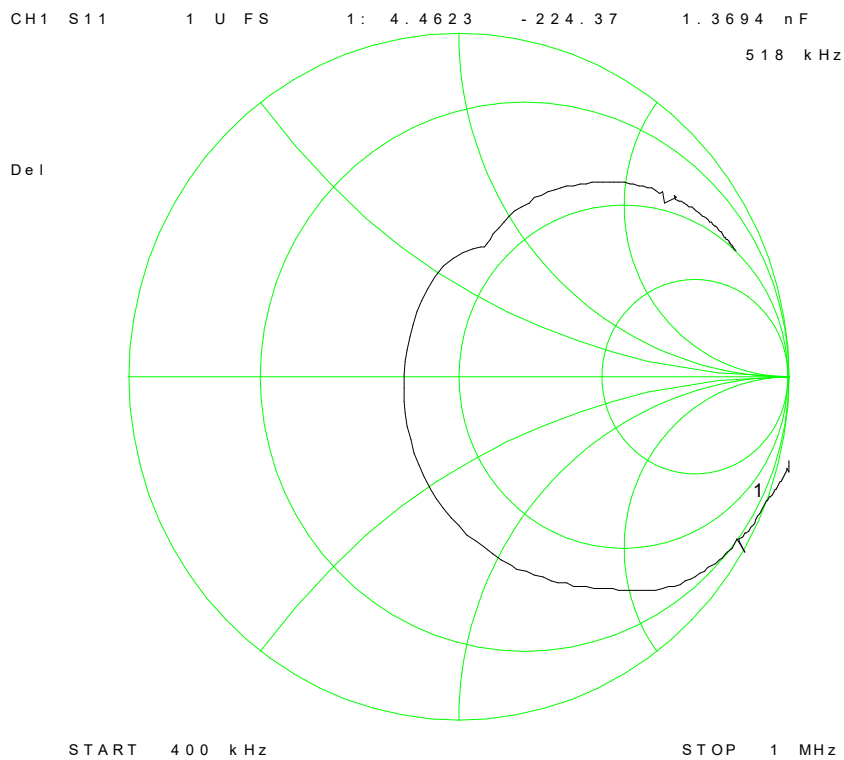
Return loss measured between Antenna and Ground connection point.



VSWR measured between Antenna and Ground connection point.



Antenna impedance measured between Antenna and Ground connection point.

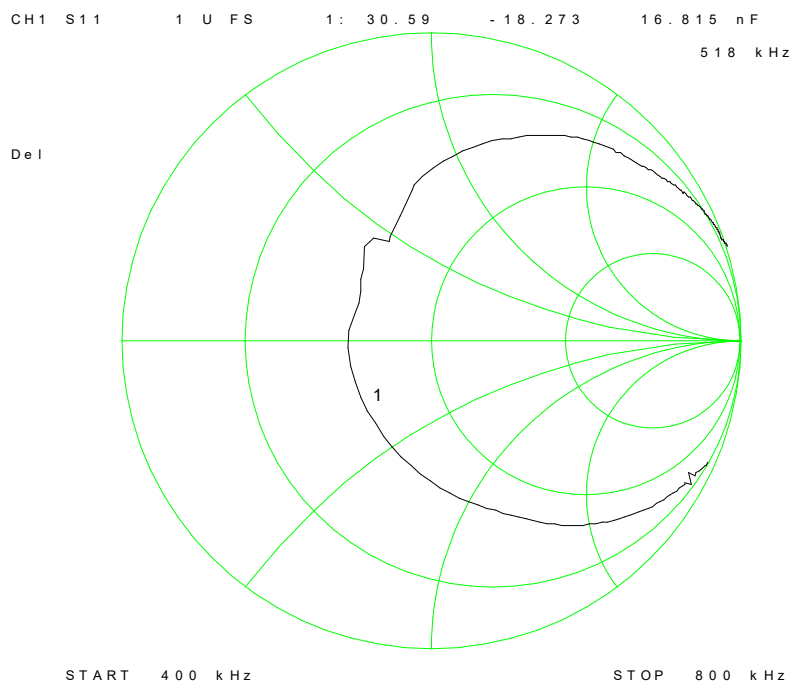


Measurement result Analyze

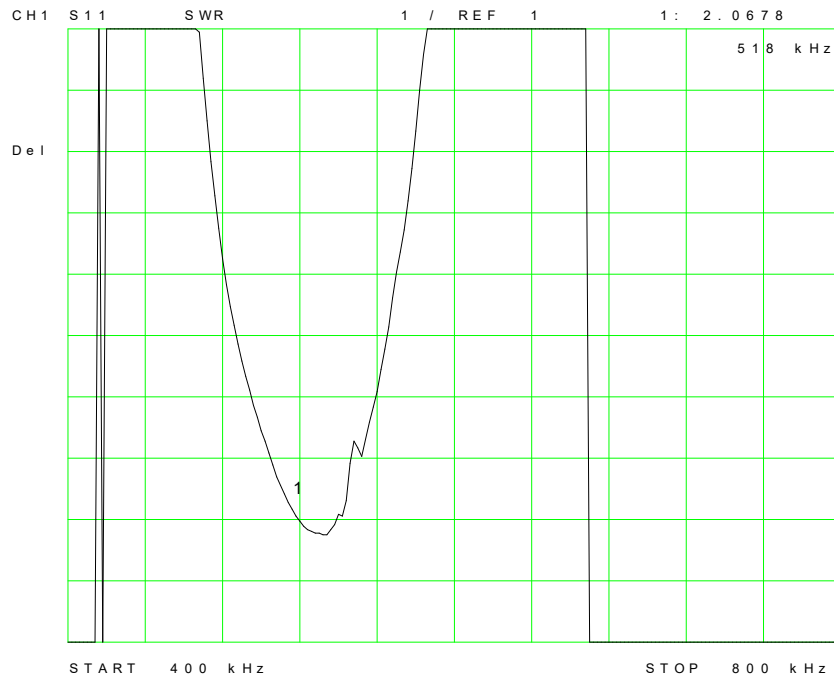
1. Antenna impedance : $Z = 4,5 - j224$

To improve Antenna matching there must be connected series inductance of $57 \mu\text{H}$ to antenna connection point.

Antenna impedance measured between Antenna and Ground connection point with series inductor $57 \mu\text{H}$.



Antenna VSWR measured between Antenna and Ground connection point with series inductor $57 \mu\text{H}$.



Final results of measurements @ 518kHz:

1. Antenna impedance with series inductor of 57 μH : $Z = 30,6 - j18$
2. Antenna VSWR with series inductor of 57 μH : 2.07

Date of measurements:

2008-09-29 and 2008-09-25

Measurements carried out by:

Mr. Rain Torn

OÜ Rantelon

Measurement report done:

2008-09-29

OÜ Rantelon

Adjusting the counterweight of the RIKS naval communication center Navtex antenna

1. Technical conditions

1.1. Radial network topology

The earth resistance of the regenerative counterweight system shall be between 4Ω and 8Ω , the best value being less than 4Ω .

The network of radials consists of radial ~~green conductors~~ uninsulated Cu wire (radials) 30 m long from the vertical part of the antenna and connecting them at a distance of 15 and 30 m from the center. The number of radial conductors shall be 12 and the angle between the two radials shall be 30 degrees. The radials must be oriented so that the two opposite radials are parallel to the wires of the horizontal part of the antenna, cf. Figure 1 .

There are a total of 16 earth piles at the end point of each radial and at the starting point of the four perpendicular radials. To achieve the desired grounding resistance, it is necessary to use at least of 3 m grounding rods.

A plan view of a simplified topology of the radial network is shown in Figure 1. The dimensions in millimeters are shown in the figure. The scale of the elements in the figure is incorrect.

2. Technical requirements for drawing up the construction drawing

2.1. The installation depth of the radial network in the ground must be 30...40 cm

2.2. The material of the radial mesh shall be a multi-fiber bare wire with a cross-section of at least 16 mm^2 . A suitable cable type is, for example, EL / HK16 (7 x 1.7 mm)

2.3. When installing the radials, it must be taken into account that the ground part of the counterweight will not be deformed or damaged by covering the ground.

2.4. All electrical connections between wires should be preferably soldered and sealed with a suitable sealant or other equivalent material to prevent corrosion. Alternatively, other types of mechanical connection methods are permitted, but in this case possible electrochemical contact and corrosion between different metals must be ruled out. Failure to do so may result in unwanted frequency components being emitted from the antenna and the antenna efficiency being significantly reduced.

2.5. The grounding rods used must be at least 1.5 m long, at least 15 mm in diameter and the surface of the rod must be covered with a layer of copper at least 0.25 mm in thickness. The upper end of the grounding rods must be at the same depth as the grounding wires.

2.6. The beginnings of all radials shall be welded to a circle of $\text{tr}2 \pm 0,3 \text{ m}$ of copper wire placed around the antenna foundation and connected by 4 grounding rods by the welding method. The same applies to connecting rays and circles in the network - the welding method. Extract from the circle with a wire / bar at least 5 m long, bring it to the antenna (*balun*), as well as leave the possibility to balance the potential of the ring in the future. A possible solution for the structure under the vertical part of the antenna is shown in a simplified form in Figure 2. The figure shows the approximate location of only four earth wires. Lawn-landscaping must be planned in the area of the grounding network, which makes it possible to keep the soil moisture to ensure its good electrical conductivity even in the dry season.

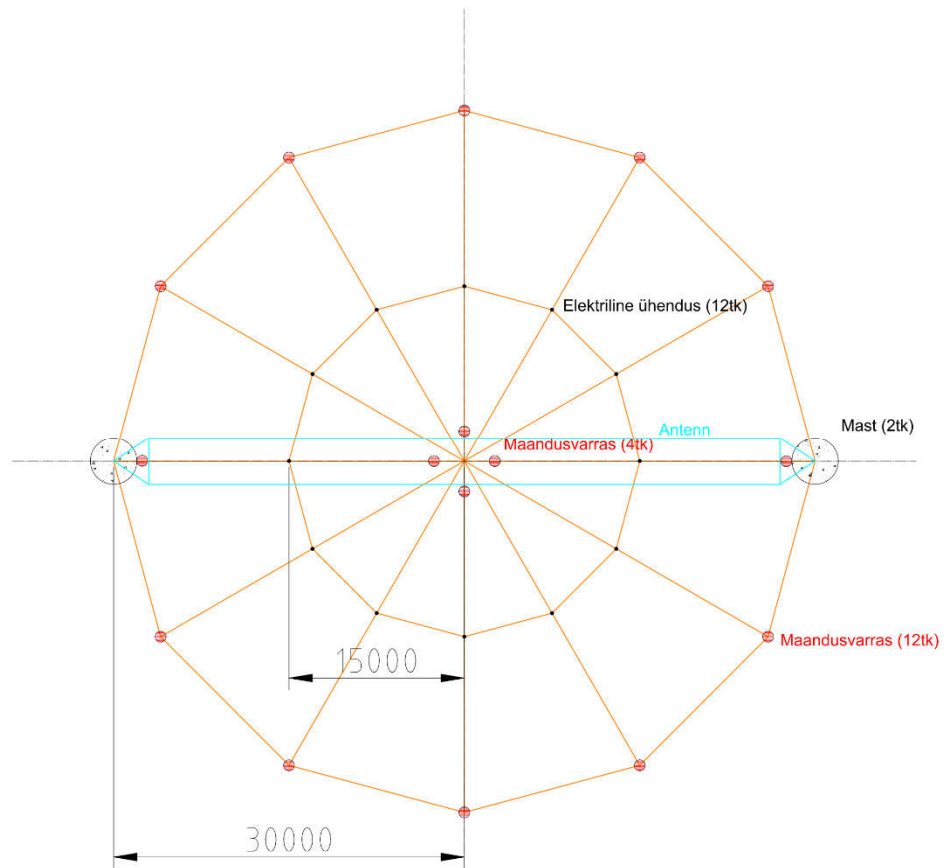


Figure 1. Simplified topology of Navtex antenna grounding system

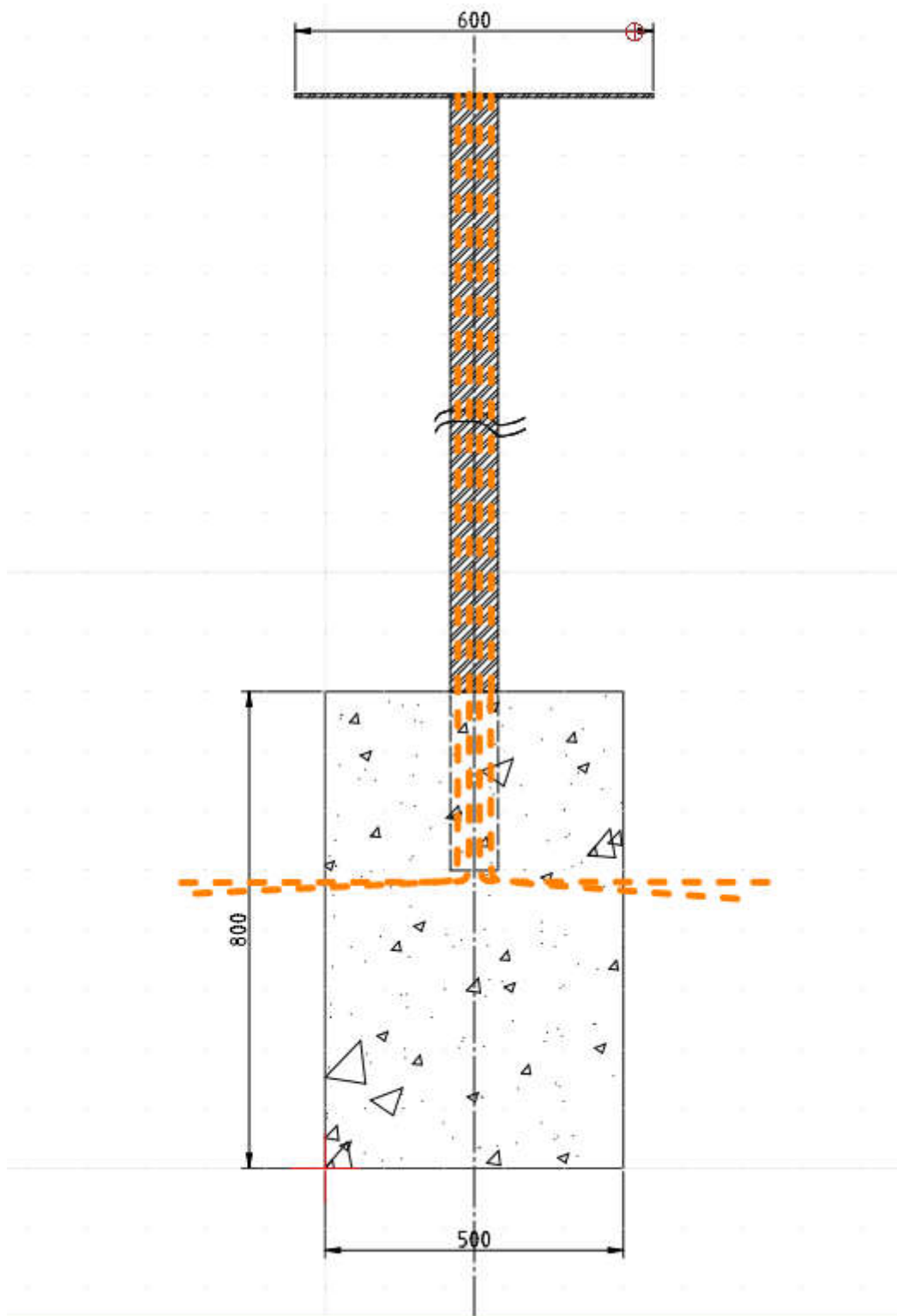


Figure 2. Simplified drawing of a possible construction of the central part of the grounding network
 Post height from the ground 4 m; height of the vertical part of the antenna ~ 27 m

Ground resistance in dry weather ~ 1600 Ω ; in case of moist soil less than 4 Ω , distance between measuring points ~ 5 m.



280 / 5000

Figure 3. Illustration of what grounding / counterweight might look like.

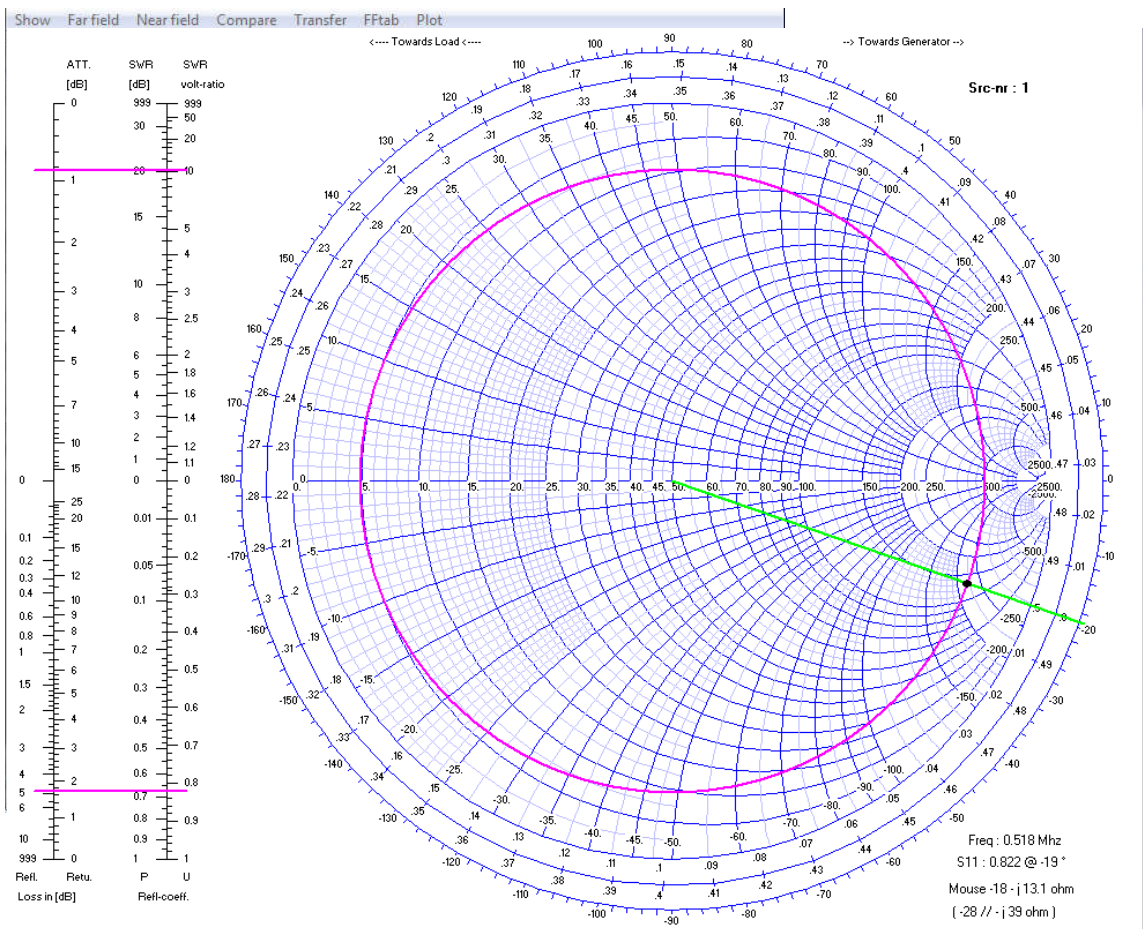
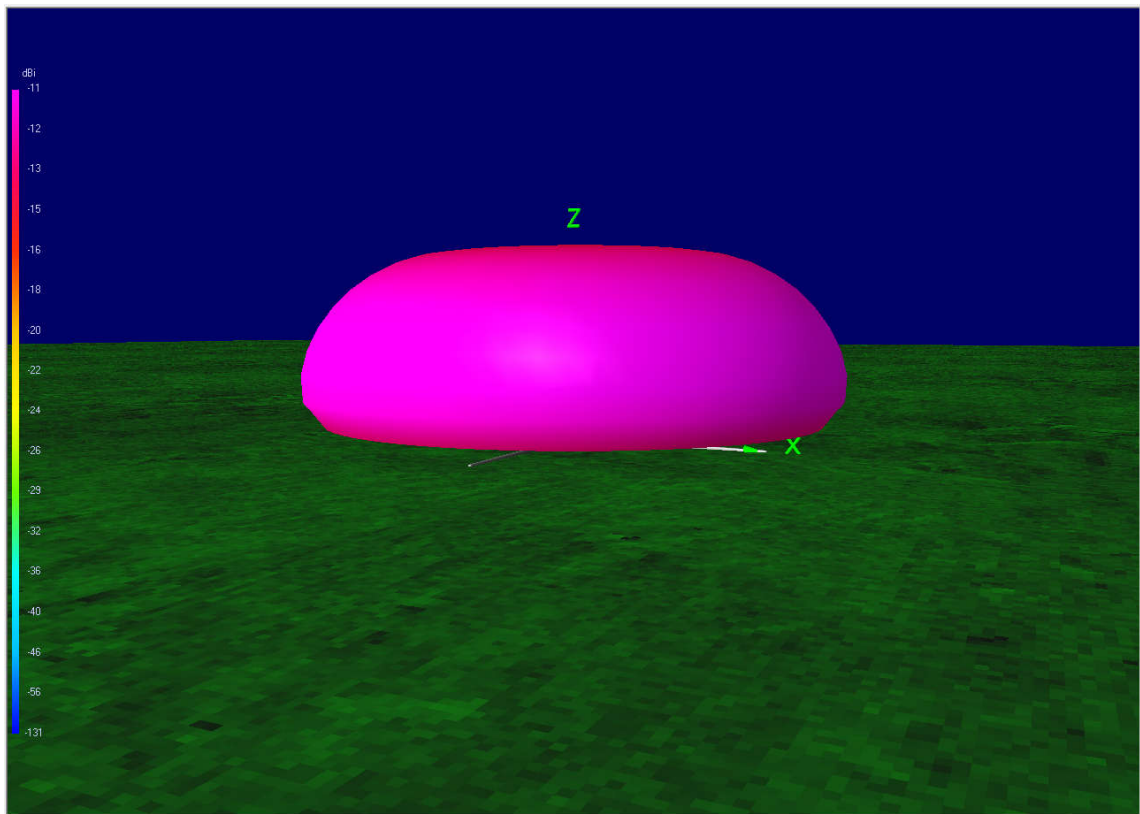
Outer circle = $2\pi r = 2 \times 3.14 \times 30 = 188.40$ m

Small circle = $15 \times 3.14 \times 2 = 94.20$ m

12 beams a '30 m = $12 \times 30 = 360$ m

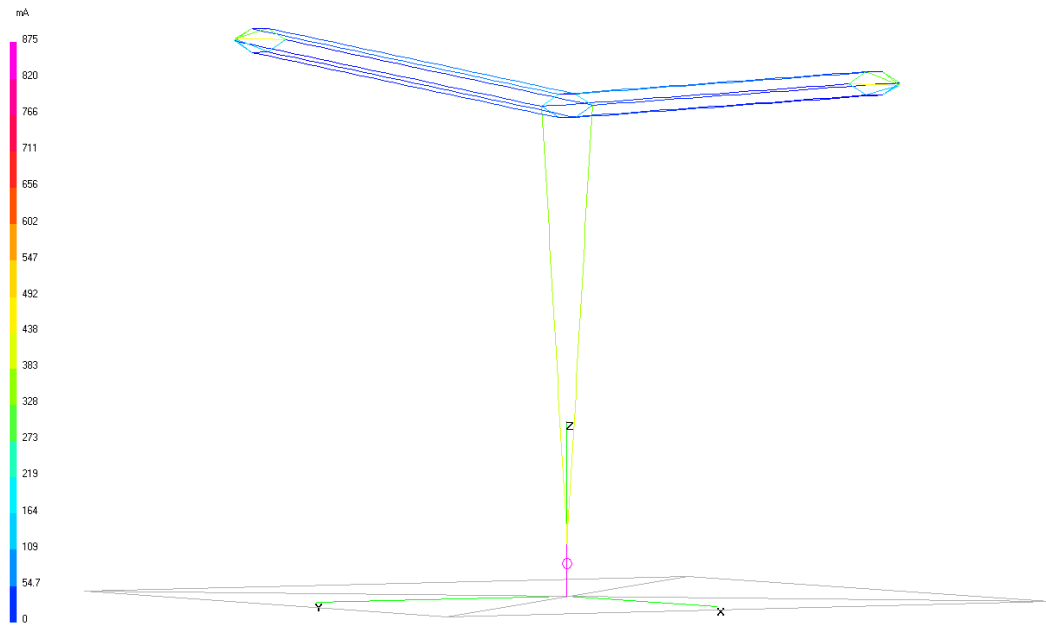
Copper cable needed: $188.40 + 94.20 + 360 = 642.60$ m

plus connections and losses of about 50 m; cable total ~ 700 m



suurupi_1_2_norad.out

0.518 MHz



Theta : 94

Axis : 10 mtr

Phi : 211

