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Tadeusz STUPAK[1]

# DATA TRANSMISSION IN VTS ZATOKA GDAŃSKA

The Vessel Traffic Services are built for increasing safety of marine transport in place, where high traffic, high risk of collision or hazardous goods are being carried. That system works on the Gulf of Gdansk. In this paper system VTS Zatoka , its components and data transmitted here is presented.

# TRANSMISJA DANYCH W SYSTEMIE VTS ZATOKA GDAŃSKA

Systemy Kontroli Ruchu Statków (VTS) są budowane dla podniesienia bezpieczeństwa transportu morskiego w miejscach gdzie jest duże natężenie ruchu, występuje wysokie ryzyko kolizji lub gdzie przewożone są ładunki niebezpieczne. Taki system pracuje na Zatoce Gdańskiej. W referacie przedstawiono system VIS Zatoka, jego części składowe i transmisję danych.

## 1. INTRODUCTION

Ships carry cargo which can pollute natural environment on a very large area and removing the results of such a catastrophe is over financial possibilities of every country. That's why for inceasing transport safety, ships are not only equipped in more & more modern observation and steering systems, but also land system of ships traffic service is built. They help to avoid dangerous situations becouse they plan traffic on their working area (a few hundred square kilometers or more). Such a system needs active cooperation with ships. It is necessary to collect information, process and send to the user. Without the correct data transmission system it can't function and it is usually one of the most expensive parts.

[1] Navigation Departament, Gdynia Maritime University, Al. Zjednoczenia, 81-345 Gdynia, Poland, 48 58 6901127, stupak@klif.am.gdynia.pl

## 2. VESSEL TRAFFIC SERVICE

Two Vessel Traffic Services - VTS are working in Poland: one on Pomerania Bay which was built by the German company STN and the second on the Gulf of Gdańsk which was installed by the Dutch company HITT.

VTS Zatoka Gdańska gives possibilities:

- movement monitoring of passengers ships and cargo ships 150 T and more and all ships with dangerous goods;
- counting a vector of ships;
- ship identification;
- calculation of a ship route planning;
- counting time of way point destination;
- presentation of navigation bouyage;
- vocie communication (VHF);
- radio bearing finding (RDF/VHF);
- system DSC (digital Select Call) usage;
- making and using data base about ship movement, cargoes and passengers.

Data transmission between Gdansk and Gdynia takes place by light guide dug at the button of the sea. Radio micro links and light guide are used also for communication with ships by radio telephone, getting hydrometeorological information, ship location information from RDF and communication beween users. System VTS consists of the center and two subcenteres located in Harbour Master Office in Gdańsk and Gdynia.

In Fig.1 area of system VTS Zatoka Gdańska is presented.

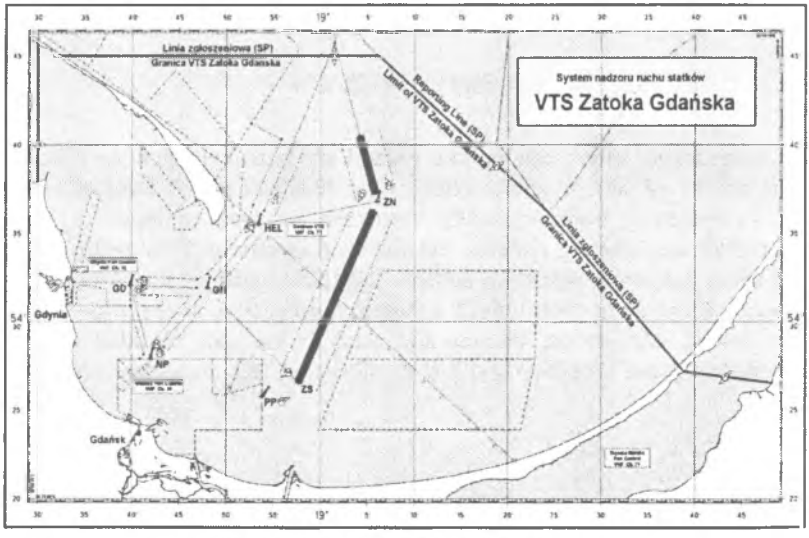


Fig.1. System VTS Zatoka Gdańska area[2]

[2] Materials of Centrum VTS.

## 3. COMPONENTS OF VTS GULF OF GDAŃSK

The task of subsystems is getting in real time ship movement information, weather conditions raports and sending it to the centre where it is processed and presented on the operator stand.

Ship control system consists of four parts:

- Radar subsystem;
- Weather subsystem;
- Communication subsystem;
- Automatic Identification System.

## 4. RADAR SUBSYSTEM

Radar subsystem is a part of monitoring system of Gulf of Gdańsk ships movement. The task of the subsystem in real time is delivering information about ship movement from radar station.

The system uses 5 radars which are located in:

- Tower Harbour Master Office Gdynia;
- Tower Harbour Master Office Gdańsk;
- Lighhouse Hel;
- Lighhouse Krynica Morska;
- Radar Tower Górki Zachodnie.

Data from the above mentiomed radars after preliminary processing is sent to Sea Safety Centre, where after final processing in ARAMIS programme is presented on the operator screen in VTS Centre and in Harbour Master Office in Gdańsk and Gdynia & in Krynica Morska.

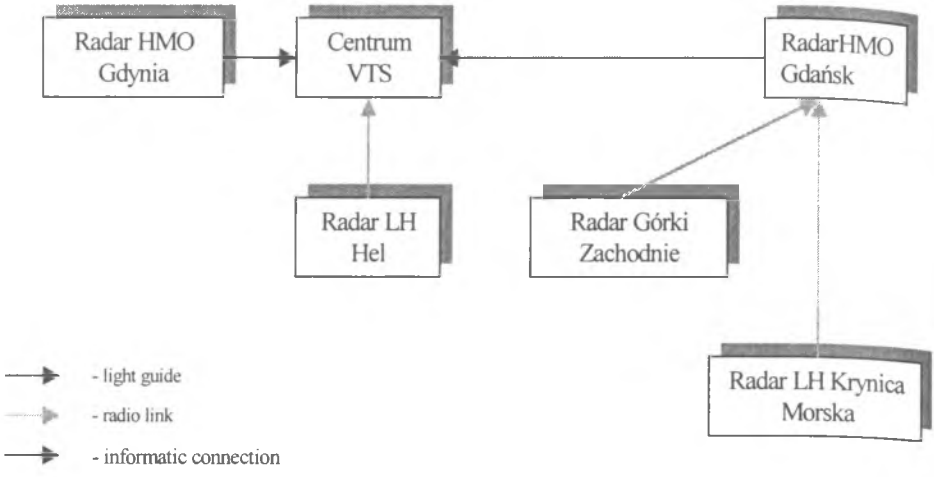


Fig.2. Radar subsystem schemat diagram [3]

Radars work continuously covering the whole area of the system with its range. The large part of this area is covered by two or three radars. It is important in case of some radar demage. In picture 2 the radar connection diagram is shown.

### 4.1. TECHNICAL RADAR PARAMETERES.

Radar consists of an aerial which sends & receives signals, transmitter & receiver unit and a display. Received signals from targets are amplified and processed in radar processor which is called RDS (Radar Service Display) and presented in analogical form on the station monitor. On this processor remove control of radar parameters and checks actual working conditions is possible (for exemple elements temperature).

On the radar station RDP (Radar data Processor) is installed which changes analogical impulses into digital and using a Video Processor Card sent them to the Centre by radiolink or light guide.

## 5. HYDRO – METEOROLOGICAL SUBSYSTEM

This subsystem is to give information abort weather condition in measurement stations. It consists of speed and direction of the wind, speed and direction of drift, heigh & direction of waves and water level sensor which are in following points:

1. Gdynia Harbour Master's Office
   - Harbour Master's Office tower
   - Corner of Francuski quay
2. Gdańsk Port Północny Harbour Master's Office

[3] Materials from Centrum VTS.

- Harbour Master's Office tower
- buoy P-9
- North water bracker North Port

3. Light House Hel
   - mast near the light house
4. Light House Krynica Morska
   - Light House Tower

Data from the above mentioned sensors are sent to the Safety Centra, where after correcting are presented on the operator screen (see Fig.3).

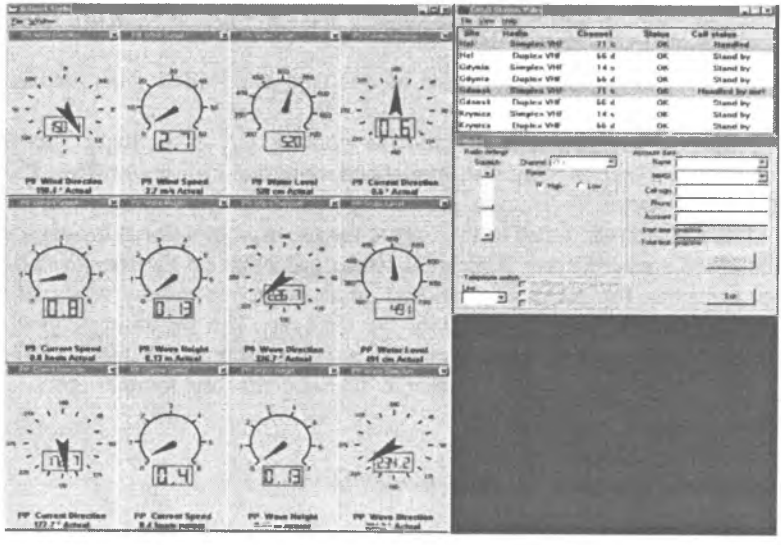

Fig.3. Hydrometeorological data screen

## 6. COMMUNICATION SUBSYSTEM

For communication with the chips in the VTS Zatoka following radio telephone channels are used:

- Centrum VTS Zatoka Gdańska
  VHF Channels: 71, 66, 16, 70
- Gdynia – Harbour Master's Office
  VHF Channels: 12, 16, 70
- Gdańsk – Harbour Master's Office
  VHF Channels: 14, 16, 70

Additionally in Krynica Morska and Hel Radio Direction Findings -RDF are installed which on the chosen channel plot the direction of the received signals. These bearings are sent to the centre and presented on the operator screen giving approximate position of the ship transmitting information.

## 7. AUTOMATIC IDENTIFICATION SYSTEM (AIS)

Nowadays AIS (Automatic Identification System) is installed on the ships. It uses ship sensors and information introduced by the crew and transmisses information about a ship name, position, movement vector and other additional information about voyage and cargo on two VHF channels (87 and 88) with the speed 9.6 kbps and SOTDMA modulation. Data is sent with frequency depending on ship velocity. When the ship doesn't move it sends above information every 3 minutes, if it moves it sends it more often and if its speed is over 23 knots it sends every 2 seconds. This equipment also receives information from the other ships which are nearby and presents this data on the alphanumeric screen or additionally on radar or ECDIS display (ECDIS – Electronic Chart Display and Information System). AIS gives more precise information than a radar.

Nowadays coastal registration system of this data is installed. This data is to be sent between the UE countries.

In VTS Gulf of Gdańsk one base station is working and on the Pomerania Bay – three stations are working. There is more station planned along the Polish coastline. This data will be collected in VTS Centre.

From all the information sent to the Centre the radar picture needs the biggest capacity. The radar picture is scanned every 3 seconds. Radar processor on the remote station changes it into digital form and for decreasing sending information preliminary sends all the picture (for a few minutes) and then it sends only the changes. The remaining signals have low transmission speed and are sent without problems. Big capacity of transmittion is necessary for sending ARAMIS picture from the Centre to the Subcentre and to other users.

## CONCLUSIONS

For securing marine transport it is necessary:

- To sent data about objects from radar system, RDF, and information from AIS, and warnings to the Centre;
- Assuring connection between the operator and ships;
- Sending steering & control signals to the remote stations;
- Sending the picture to the subcentre and the other users.

For sending our data light guide system and radio link are used.
Additionally for the time of emergency digital telephone system line will be used.

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Reviewer: Ph. D. Zbigniew Pietrzykowski