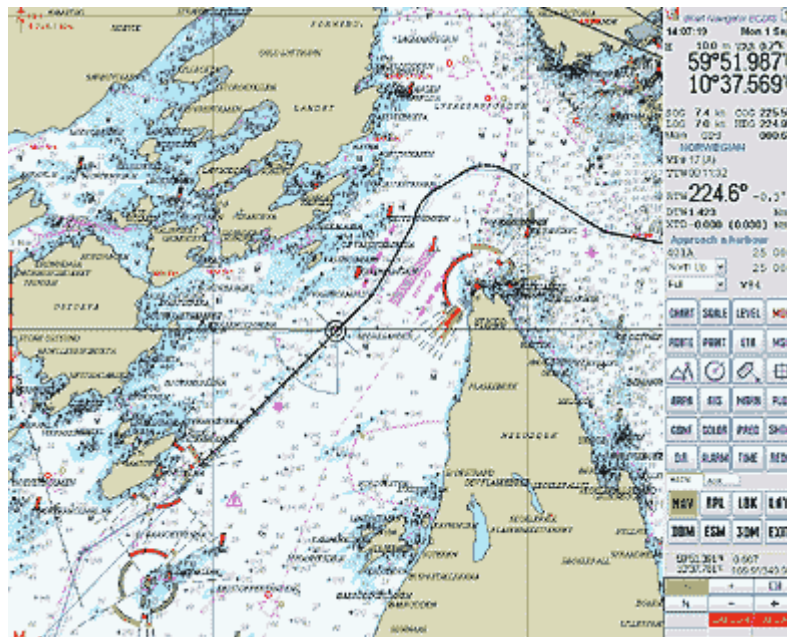


dKart Navigator - purpose



dKart Navigator is an electronic navigation chart system specially designed to facilitate all the navigational tasks of mariner's day-to-day practice. Along with displaying vector nautical charts (both S-57 official data and CM93 world coverage) it offers:

- continuous ship's position and course reckoning based on GPS receiver information;
- routes planning and navigating;
- AIS - transponder and ARPA targets tracking;
- real-time safety control with visual and audible notification;
- radar image overlay, interface to autopilot, log, compass and other NMEA-0183 compatible devices;
- navigation measurements and calculations.

Versions for everyone

dKart Navigator is a specialized software for marine navigation purpose. The system was designed to serve onboard commercial and leisure vessels in coastal and offshore traffic, for which the owner will prefer navigational equipment of professional standard.

Different versions cover all customer needs:

- 3.50** - Small Boats
- 4.50** - Big Yachts
- 5.50** - ECDIS-type
- 6.50** - ECDIS-type, Special

A wide range of available versions and optional modules makes it easy to select the required functionality for an optimal price. Ordering dKart Navigator you are free to select the required functions and their price will sum up the total product price

Version comparison

The table given below serves for visual comparison of different program versions. The table presents main versions features, the entire list of available functions is presented in the full specification.

Indications:

■- included as standard
 ■- optional

Version	3.50	4.50	5.50	6.50
EXTERNAL DEVICES				
<u>(D) GPS</u>	■	■	■	■
<u>LORAN-C, DECCA</u>	■	■	■	■
<u>Wind meter</u>	■	■	■	■
<u>Compass, Speed Log</u>	■	■	■	■
<u>GLONASS</u>	■	■	■	■
<u>ARPA</u>		■	■	■
<u>AIS-transponder</u>		■	■	■
<u>Autopilot</u>	■	■	■	■
<u>Echosounder</u>	■	■	■	■
CARTOGRAPHY				
<u>CM93/3</u>	■	■	■	■
<u>CM93/3 Updates</u>	■	■	■	■
<u>S-57 (available for ECDIS)</u>	■	■	■	■
CHART HANDLING				
<u>Relative motion</u>	■	■	■	■
<u>Head Up - North Up</u>		■	■	■
<u>Chart palettes</u>	■	■	■	■
<u>Selectable Datum</u>		■	■	■
<u>Center Ship</u>		■	■	■
NAVIGATION				
<u>Route monitoring</u>	■	■	■	■
<u>Route calculations</u>	■	■	■	■
<u>Automatic chart selection and loading</u>	■	■	■	■
<u>Main/emergency reckoning mode</u>	■	■	■	■
<u>Dual reckoning</u>			■	■
<u>Manual observation</u>			■	■
<u>Event marks</u>	■	■	■	■
ROUTES				
<u>Route planning</u>	■	■	■	■
<u>Rhumb line planning</u>	■	■	■	■
<u>Great Circle planning</u>			■	■
<u>Route safety testing</u>			■	■
<u>Route import/export to NMEA</u>	■	■	■	■
<u>Route import/export to Excel</u>	■	■	■	■
ELECTRONIC LOGBOOK				

<u>Automatic recording</u>	■	■	■	■
<u>On-chart replay mode</u>		■	■	■
<u>Create route from track</u>		■	■	■
SAFETY OF NAVIGATION				
<u>Safety depth and safety contour</u>	■	■	■	■
<u>Safety zone</u>			■	■
<u>Dangerous object in safety zone alarm</u>			■	■
<u>Dangerous depths alarm</u>			■	■
<u>Special conditions area alarm</u>	■	■	■	■
<u>Dangerous targets indication</u>		■	■	■
<u>Shallow water indication</u>	■	■	■	■
<u>Deviation from route indication</u>	■	■	■	■
<u>External devices malfunction indication</u>	■	■	■	■
CHART EDITORS				
<u>User Objects Editor</u>	■	■	■	■
<u>Chart manual updating</u>			■	■
SPECIAL MODULES AND OPTIONS				
<u>"Search and Rescue" function</u>			■	■
<u>Sea bottom 3D modeling</u>	■	■	■	■
<u>Tides database</u>		■	■	■
<u>Survey data displaying</u>				■
<u>Dual screen mode</u>		■	■	■
<u>Radar overlay</u>		■	■	■

All versions have a built-in context help that assists in finding more information about the function you need.

(D) GPS

dKart Navigator electronic navigation chart system may use a wide range of external navigation sensors as source of positioning information. One of the possible choices is the GPS (Global Positioning System) receiver. **dKart Navigator** is able to work with all NAVSTAR GPS receivers available on the market that use IEC 61162-1 (NMEA-0183) protocol of data transmission. The corresponding information is used for own ship's position, course and speed calculations and displaying. Also it is possible to use differential type of GPS-receiver (so called DGPS) that provides higher accuracy of positioning.

LORAN-C / DECCA

The positioning information can also be received from LORAN-C / DECCA land-based systems. **dKart Navigator** is able to work with all receivers available on the market that use IEC 61162-1 (NMEA-0183) protocol of data transmission. The corresponding information is used for own ship's position, course and speed calculations and displaying. It is also possible to use several positioning systems simultaneously that provides a simple way to check correctness of one positioning system functionality against the another as well as diagnose possible failures.

Speed Log & Compass

When a speed log & a compass are switched to **dKart Navigator** system, it will display incoming data on ship's speed and heading. If you operate a GPS-receiver (AIS-transponder, ARPA, DECCA or LORAN-C), then two vectors will be simultaneously displayed on the chart. One of them is the true motion vector, calculated relative to a seabed, the other one is the motion vector calculated according to the speed log& a compass data.

GLONASS

dKart Navigator system is able to work with the Global Navigation Satellite System's (GLONASS) receiver, which is used as a data source on ship's position and movement. This receiver provides information in accordance with the IEC 61162-1 (NMEA-0183) protocol.

NAVTEX

The NAVTEX is a system designed for navigation warnings dispatching. These warnings include Navigational, Meteorological and Ice ones, Search & Rescue (S&R) Data and Meteorological Forecast. The warnings are represented as alphanumeric data. These warnings are sent in 516 kHz medium frequency band. **dKart Navigator** system receives messages incoming from a NAVTEX receiver and displays them at a monitor screen.

ARPA

The 4.x, 5.x and 6.x versions of **dKart Navigator** system allow connecting of the ARPA and MINI-ARPA radars. The interaction is carried out on the basis of the IEC 61162-1 (NMEA-0183) protocol.

The auto-tracked targets are displayed on ENC. The system carries out continuous traffic safety control in reference to all the targets displayed by the ARPA radar by using on-chart color indication of the objects. While using the **dKart Navigator** system a navigator can get information on all the main elements of a track including a heading, speed, bearing distance, the shortest approach distance, etc.

AIS Transponder

The "AIS-transponder" Automatic Targets Identification Systems are designed to provide navigators with the most precise and detailed data on all the targets that had been detected. Besides ship's absolutely precise heading and speed data due to the fact that they had been sent by the ship herself, the AIS information allows to obtain data on the ship's name, ship owner's name, ship's displacement and dimensions, the route and the type of transported cargo. Such information may be useful, e.g. for a route planning or for defining of radar invisible targets.

The 4.x, 5.x and 6.x options of the **dKart Navigator** system have been designed for connection of UAIS and SAAB transponders.

Autopilot

All versions of **dKart Navigator** system provide an autopilot connection. The autopilot is designed for automatic holding of a ship at a route line while navigating along the planned route or to a temporary waypoint.

The **dKart Navigator** system interacts with the autopilot on the basis of the IEC 61162-1 (NMEA-0183) protocol.

Echosounder

All versions of **dKart Navigator** system provide the possibility for an echosounder connection. **dKart Navigator** interacts with the echosounder on the basis of the IEC 61162-1 (NMEA-0183) protocol. The incoming data are used by the system to warn a navigator of hazardous depth. The echosounder data are saved by the system and can be displayed as a bottom relief curve.

The 6.x version of the system is capable of survey worksheets automatic formation basing on echosounder data. The collected data can be directly displayed on an ENC. If necessary you can update the data manually.

Jeppesen Professional+

dKart Navigator system can work with the CM93/3 vector electronic charts developed by the Jeppesen (ex. C-Map) company. Jeppesen's world-wide chart collection is a de-facto a standard for commercial applications in navigation all over the world.

The structure of the CM93/3 layout vector electronic charts data is the sheer equivalent of the S-57 ver. 3 (3.1) data but possess no official status. The CM93/3 charts are distributed on a CD-ROMs and updated on a regular basis.

S-57

The S-57 standard developed by the International Hydrographic Organization (IHO) is designed for the official cartographic data exchange between different hydrographic organizations. The transition from the S-57 standard version 2 (DX90) to the later S-57 standard edition 3 (3.1) is being implemented at present.

In accordance with the requirements made for electronic cartographic navigational systems to be certified as ECDIS, **dKart Navigator** system can use completely the data of both S-57 editions.

ARCS

ARCS (Admiralty Raster Chart Service) is a raster electronic charts layout of UK Hydrographic Service. The ARCS electronic charts are available practically for any region of the world ocean at present. The raster electronic charts are simple in production and are worked up to conventional paper ones to the most extent. The raster charts' main deficiency is the lack of objects database. It makes impossible a navigation situation automatic analyses.

Relative motion

This is a mode of ENC displaying in which a ship's movement is being shown by a way of the ENC relocation under the own ship's stationary mark disposed in the center of a screen.

Selection of chart orientation (Head-up/North-up)

According to a current navigational task a navigator can change the orientation of a chart and on-chart image scale, select a type of the displayed cartographic object, to look through the charts of adjoining areas. For example, you can select an orientation mode in which **dKart Navigator** will automatically rotate the chart keeping on-screen direction of the ship movement vector stationary.

Chart palettes

This function is designed for selection of a chart image color palette, most acceptable visual perception according to lightning conditions. For instance, you can select special "night" palettes for a chart handling at night. These palettes ensure a distinct navigation under the reduced light conditions.

Selectable datums

Working with **dKart Navigator** a navigator is able to select a horizontal datum for charts presentation. As a default a WGS-84 (World Geodetic Datum 1984) is used. A complete list of selectable datums of **dKart Navigator** includes more than 280 different ellipsoids.

Route monitoring

dKart Navigator system supplies a navigator with all information on ship's position and her movement elements, including ship's heading/true heading, speed/true speed, speed and heading increment/decrement values, current time, etc in the mode of route monitoring. The navigation data are updated every second and are displayed both as numerals and directly on a chart. The covered pathway and corresponding time stamps are displayed atop of the chart.

Route calculations

While a ship is moving along a route, **dKart Navigator** system provides a navigator with the all information on route transit, including route's name, distance, bearing and estimated time of movement to the nearest waypoint, amendment to the current heading necessary to arrive to the point, etc.

The continuous route calculations allow informing a navigator of hazardous deviations from the route and also open up an opportunity of preparing to maneuver on time.

Charts automatic selection and loading

During a ship's movement **dKart Navigator** automatically selects and displays on the screen the most detailed chart, covering the ship's position. When the ship leaves the chart's zone the next one is loaded.

Main / emergency reckoning mode

dKart Navigator can use the following positioning systems in the main reckoning mode:

- GPS, AIS-Transponder, ARPA, DECCA, LORAN-C automatic systems;
- Reckoning on the basis of heading and speed data, including a log, gyrocompass, data set by the operator.

In case of failure of the positioning system selected for the main reckoning mode, **dKart Navigator** system automatically changes over to the secondary (emergency) reckoning mode.

The same positioning systems can be used both for the primary and emergency modes.

Dual reckoning

In the Dual Reckoning Mode **dKart Navigator** uses simultaneously both positioning systems. It allows an operator to estimate devices accuracy visually as well as detect possible malfunction.

Manual observation by bearings/distances

This function is designed to determine position of the ship by bearings and distances to navigation landmarks being entered manually.

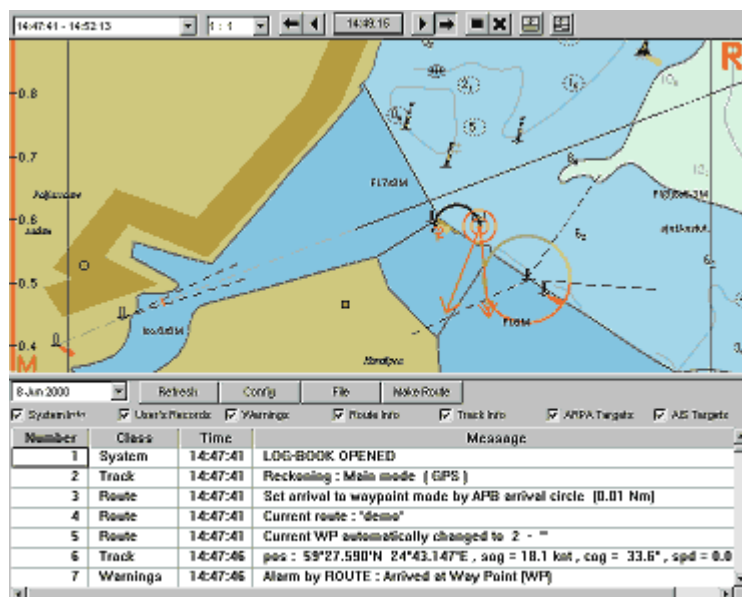
Event marks setting

This function is designed to control ship's position in reference to the chart point designated by a special marker. A navigator can select the following conditions of the ship and the marker mutual disposition:

- assigned bearing obtainment,
- assigned distance rendezvous,
- withdrawal (drift) to determined distance,
- traverse obtainment by the ship.

When the described event occurs **dKart Navigator** gives alarms and visual indication warnings.

Automatic recording of navigational situation



The principal navigational information that includes ship movement and radar targets data, an information on changes in operation mode of the navigational system and onboard devices, ship's motion settings, navigator's own narration, etc are being logged automatically in an electronic navigational logbook.

A navigator can use options of data export and import available from the electronic navigational logbook to relay this information to another ship, create data records archive, provide outside organizations with the ship movement information etc. You can organize a navigation logbook information in a table or output it to a printer.

An electronic navigational logbook can be considered as a "black box" that permits playback of the recorded situation. It should be stressed that the data records available at the navigational logbook have no legal effect at present

Logbook records on-chart playback

By using an electronic logbook a navigator can instantly playback navigation developments directly on the electronic chart. It is possible to select a time slice, direction of playback (forward / backward), set playback rate and so on.

Create route from track

In dKart Navigator and dKart Fishing electronic chart systems there has been stipulated an opportunity of automatic conversion of a target or a ship traffic that had been recorded in the logbook into a route.

Safety depth and safety contour selection

A navigator can use this function to mark out on a chart the hazardous depth areas that are less or equal to the draught of the ship.

Safety zone

A navigator can determine a safety zone (figure) for the ship. When a dangerous object or a bank are registered to be in the safety zone **dKart Navigator** system will give alarm signals accompanied by visual indication.

Dangerous object in safety zone alarm

This function warns you about a dangerous object emergence including a reef, a sunken vessel, etc. **dKart Navigator** will give alarm signals accompanied by visual indication.

Dangerous depth alarm

This function warns a navigator that the ship is entering a hazardous depth area. **dKart Navigator** will give alarm signals accompanied by visual indication.

Special conditions area approaching alarm

This function warns a navigator that the ship is entering an area prohibited for navigation or in area with the special conditions of navigation.

Dangerous targets indication

dKart Navigator system uses a color indication in order to attract navigator's attention to potentially dangerous ARPA and AIS targets. The dangerous targets are colored in red on the chart.

Shallow water indication

When a log registers depth less than a safe one the **dKart Navigator** system will immediately warn the navigator of the coming danger.

Deviation from route indication

Having registered a deviation from the assigned route by a value larger than had been designated by the navigator, **dKart Navigator** system will immediately indicate alarm warning.

Navigation device malfunction indication

Having detected a malfunction of any connected navigation device **dKart Navigator** will immediately warn the navigator by visual indication.

User Objects Editor

With the help of User Layer editor a navigator may add his own object and comments as an overlay to an ENC. This function may be used for adding specific information to a chart, textual notes or for temporary chart correction. It is possible to add the following types of objects:

- areas of any complexity;
- lines;
- symbols;
- texts.

The user may select color, footprint as well as orientation and size (for symbols and texts), fill color and pattern (for

areas and lines).

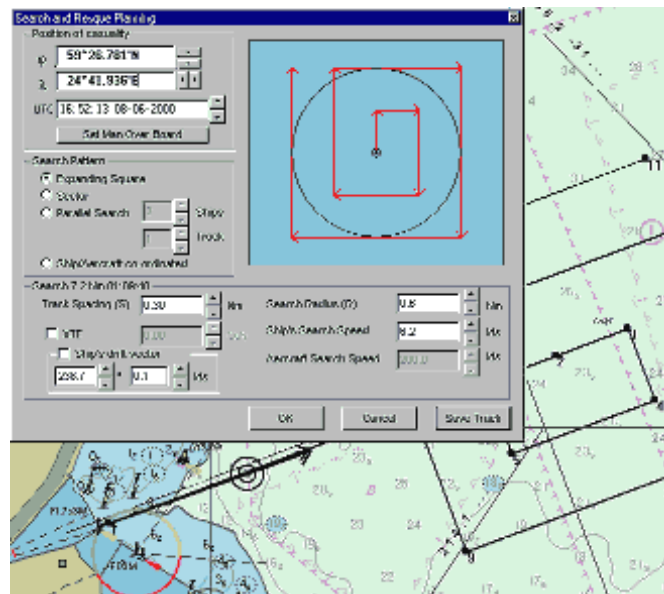
User objects are grouped into a number of User Layer's according to the operator choice. Initial cartographic data remains unchanged.

In contrast to manual chart updating, the information about user's objects is used only for information display - the system does not use this information in navigation safety tasks.

Manual chart updating

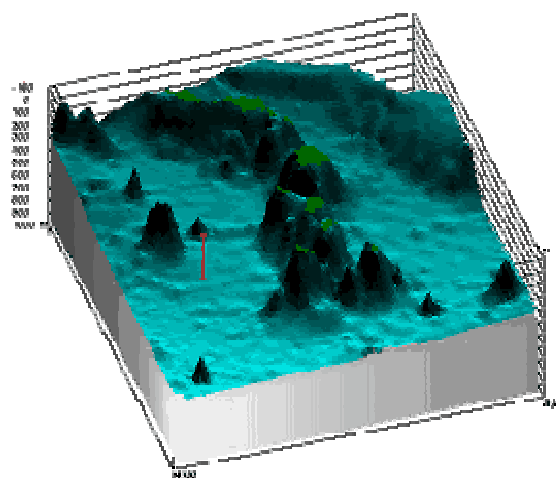
With the 'manual updating' facility a navigator is able to make its own chart corrections. Involved operations are quite simple and may be conducted directly at sea. Corrections made via the manual updating are treated by the program for navigation safety tasks.

Search & Rescue



This module provides all the necessary means for planning, monitoring and information support of Search and Rescue operations in full accordance with IMO MERSAR and IMOSAR recommendations. It is possible to plan one-ship, multiple-ship, ship/aircraft S&R operations in different modes basing on the ship's drift vector, visibility distance, Man over Board sensor data and so on.

3D sea bottom modeling



This function allows creation and viewing of 3-dimensional model of the sea bottom. As a source of information an ENC data and echosounder information are used. The possible applications of this function are: maneuvering in narrow waters and unfamiliar navigation areas; hydrographic activities, fishing, etc.

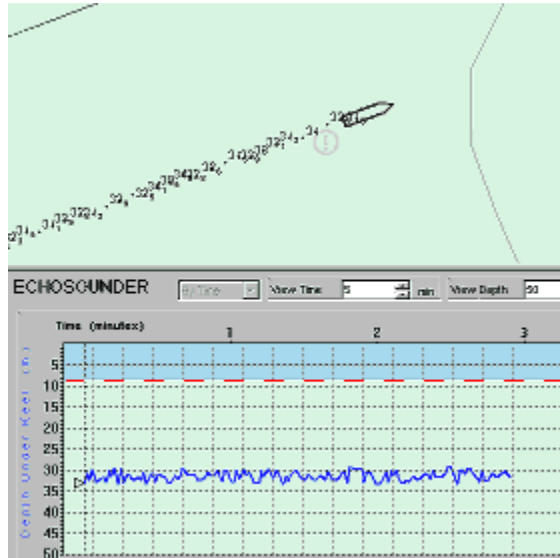
Tides database

The Tides database contains a number of tide gauges. The module enables calculation of the tide level at the specified point (gauge) and time.

Dual screen mode

This feature noticeably expands capabilities of dKart Navigator software in cartographic data presentation. By means of dual screen a mariner is capable of working with two different geographic locations being simultaneously displayed on different screens. For example this feature may be used to control navigation on one screen while making route planning on another,

Survey data displaying on ENC

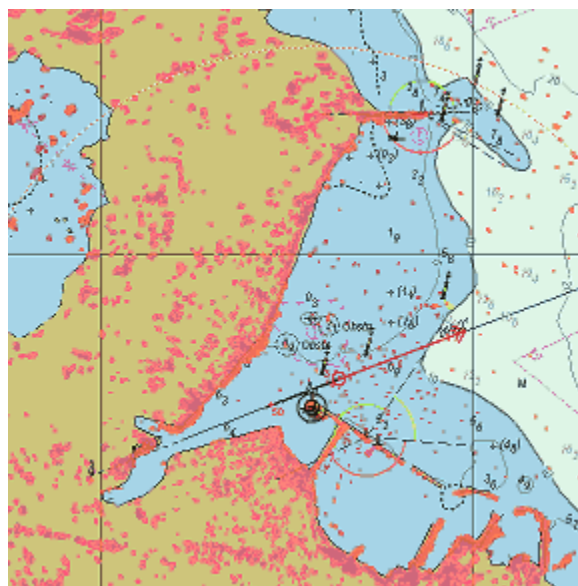


Data coming from the echosounder may be displayed on the ENC. This module may be of special use for survey sheets compiling.

Radar image overlay

The set of specialized tools (**Radar Navigation Module**) that enables provision of dKart Navigator electronic chart systems by real-time digitally processed raw radar information. Radar data may be displayed either separately or atop of the ENC.

Radar Navigation Module - purpose



The **Radar Navigation Module (RNM)** has been designed for solving of a wide range of navigational tasks. Together with the dKart Navigator electronic chart systems **RNM** provides means for displaying of a full radar image atop of an electronic chart. The possibility of simultaneous/separated monitoring of the ENC and radar image let a navigator take

bearings in narrow waters and unfamiliar navigation areas easily. Also an "overlying" of radar image over the ENC provides a handy tool for visual control of navigation systems thus increasing the reliability of the whole complex.

Radar Navigation Module has been designed for reception and real-time digital processing of transceiver analog signals incoming from different type radars. The **RNM** consists of a software and a hardware components.

The software package of this module is implemented as an independent application controlled by the Microsoft Windows operating system.

Radar Navigation Module - main features

- full compatibility with all range of **dKart** electronic chart systems and different types of radar transceivers of leading companies world wide (Furuno, JRC, Racal Decca, Raytheon, Norcontrol, Terma and the others).
- jam resistant, constant false-alarm rate (CFAR) video signal processing basing on the state-of-the-art algorithm.
- selection of a pin-point targets against the background of a cluster from a coastline or port facilities.
- reduction of the background and artificial interference effects on radar image by implementing of scan-to-scan and sweep-to-sweep correlation algorithms.
- selection of radar targets and their coordinate measuring.
- formation of a radar image with a size up to 2048 X 4096 pixels that is transferred to a dKart electronic cartographic system.