

SOIL MACHINE DYNAMICS LIMITED



**DISTRIBUTED VEHICLE & EQUIPMENT
CONTROL SYSTEM**

SYSTEMS SUPPORT MODULE

SURVEY NAVIGATION & POSITIONING

SMD Reference: snpd_doc

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1 SURVEY NAVIGATION AND POSITIONING SYSTEM

1.1 Overview

For any offshore operation involving surface vessels and underwater vehicle / equipment, Navigation and Positioning is a vital component, required for the effective and successful completion of the operation. SMD's vehicle and equipment control system (DVECS) can provide this capability with its integrated Survey Navigation and Positioning System (SNiPS) that supplies a comprehensive range of tools and functions, supporting the navigation and positioning requirements of an offshore project.

SNiPS is an optional feature of the DVECS control package and when installed is fully integrated into the vehicle control system. It has been designed to be simple and easy to use, requiring only basic survey knowledge to operate. SNiPS can be used to navigate both the vehicle and its support vessel in real-time.

All positioning is based on the widely available and now standard Global Positioning System (GPS), using appropriate/available I/O hardware and interfaces. If a third party navigation package is available onboard the support vessel, this can be used to provide the necessary positioning data. SNiPS can also provide its own survey data interface, if required, to gather data directly from navigation and measurement devices onboard, see section 1.2 below for details.

The following diagram shows the general layout of the SNiPS in relation to the DVECS. A more detailed description of DVECS can be found in its supporting documentation.

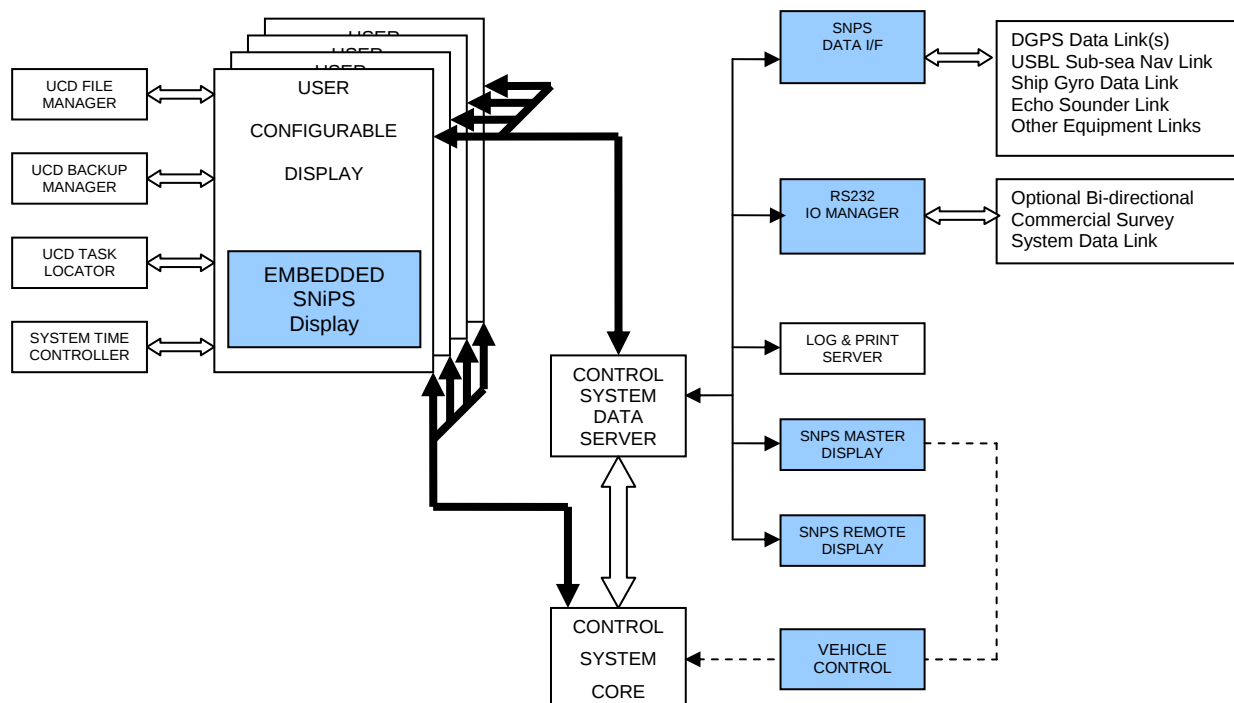


Figure 1 Block Diagram showing the general layout of SNiPS

1.2 SNIIPS Survey Data Interface

The SNIIPS includes an optional survey data interface, which can if required be used to gather and process navigation data for use with the SNIIPS. The diagram above shows a block diagram of the DVECS / SNIIPS layout and its general interaction with the rest of the control system.

When using the SNIIPS survey data interface, navigation data is gathered from specific navigation and measurement devices, which is used to calculate a range of survey related data parameters for use by the control system.

Supported devices of various types include:

- DGPS
- Gyro Compasses
- USBL Systems
- Echo Sounders

Note that interfaces for unsupported equipment can be quickly developed if required.

Specific data gathered by the survey data interface include:

- Vessel position (Latitude/Longitude)
- Vessel position (Easting and Northing - in selectable reference system)
- Vessel heading, speed and course
- Vessel KP and offset from pre-defined route
- Vehicle position (Latitude/Longitude)
- Vehicle position (Easting and Northing - in selectable reference system)
- Vehicle speed and course
- Vehicle KP and offset from pre-defined route
- Navigation Status and quality
- Satellite tracking information

GPS position data is initially received as Latitude and Longitude (spherical co-ordinates in degrees) based on the WGS84 spheroid (spheroid: mathematical representation of the shape of the earth). The SNIIPS will automatically convert position information into a user defined rectangular co-ordinate system for project use, e.g. this may be Universal Transverse Mercator (UTM) or OSGB 1936, as used by the Ordnance Survey in Great Britain, (other systems are available to suit customer requirements).

When installed, the SNIIPS survey data interface appears as a data source on the control system network. The control system **data server** collects and stores survey information, which can then be used by other tasks running in the control system e.g. Data Logger, Video Overlay, Operator displays, SNIIPS display etc.

1.3 SNiPS General Operation

The SNiPS updates automatically in real-time, providing graphical chart displays of the working area, indicating the support vessel and vehicle position. Displays can include coastlines, local features, targets and navigable routes. The SNiPS includes a comprehensive range of options to configure and modify the system and displays to suit operator requirements.

As part of a vehicle control system the SNiPS can be configured to run on its own computer or as a back-ground task on either the pilot or co-pilot display PC. In this case the SNiPS is shown by pressing the appropriate key on the display selection options of a touch screen controller.

The SNiPS can run in 'Master Mode', with full control of data file selection, system configuration and optional vehicle control etc. or as a 'Remote Display', typically as a repeater on the bridge of the support vessel, where operators can observe the chart display but can only change display characteristics to suit personal preference, zoom, centre reference, orientation etc.

Figure 2 shows the general layout of the SNiPS display, which has three main areas of interest:

- Chart Display (right side)
- Control functions (lower right)
- Navigation Data and Configuration (left side)

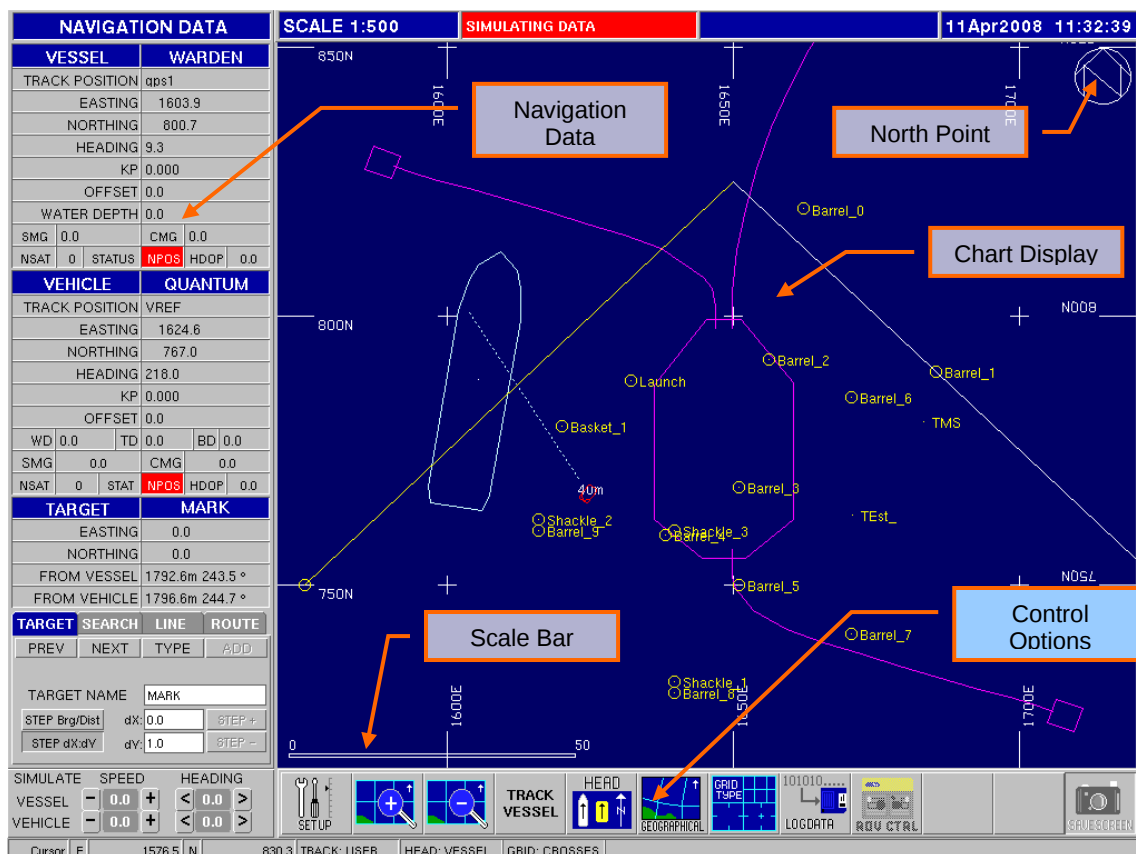


Figure 2 SNiPS Chart Display

1.3.1 Chart Display

The chart display is an animated image of vehicle and vessel position, in relation to surrounding features, including cable or pipeline routes, coastlines and targets etc. The chart display is updated in real-time and can be extensively configured to suit operator requirements, changing colours, rotation and tracking modes etc. see 'Control Options' below for more details.

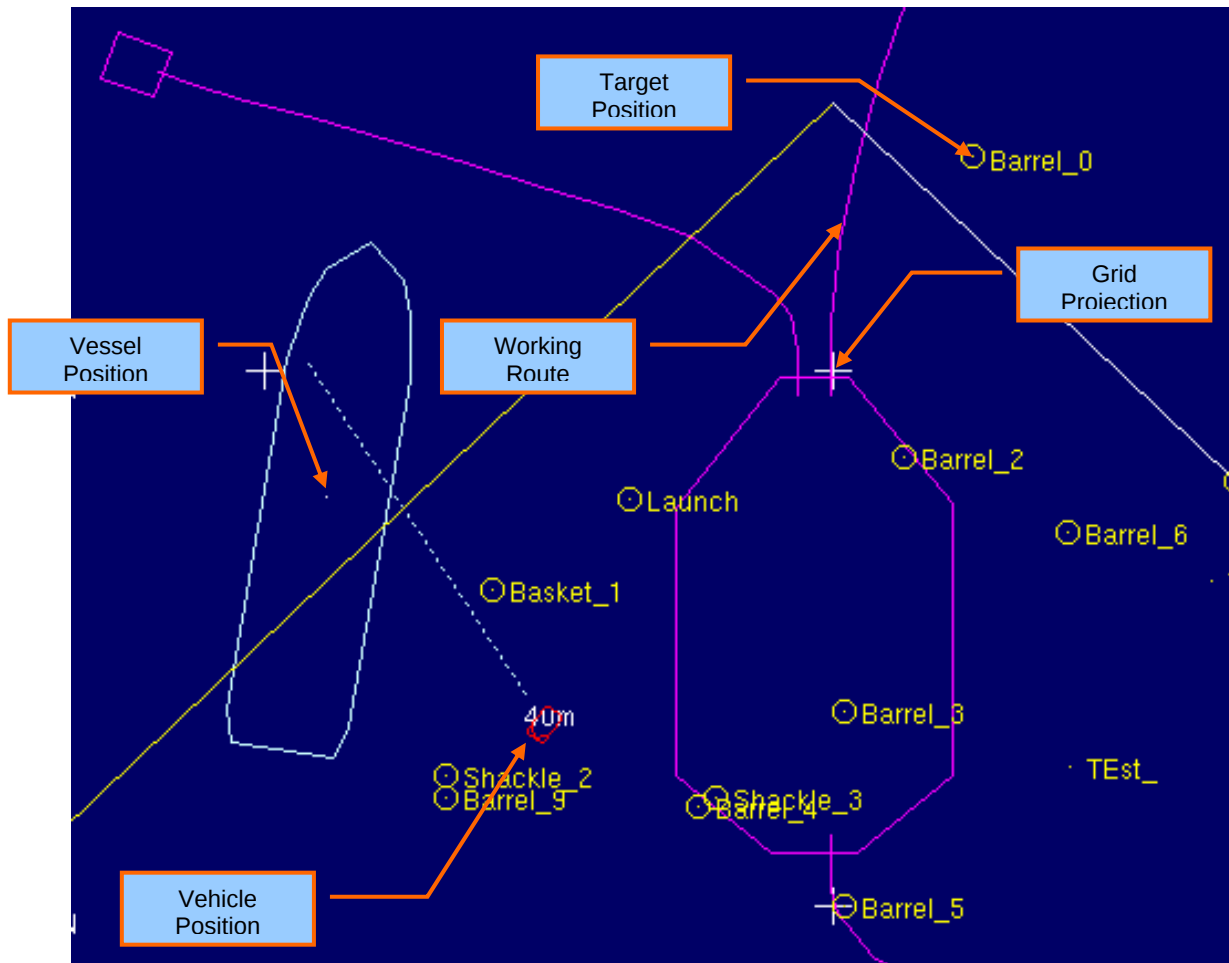


Figure 3 Chart Features

When moving the mouse pointer across the chart display, the current position of the cursor is indicated in the information block at the bottom of the display.

The information block shows specific details, with displayed positions shown in the current selected format, which can be either Rectangular or Geographical co-ordinates. The current display configuration mode settings are also shown.

Cursor	E	1572.3	N	731.5	TRACK: USER	HEAD: VESSEL	GRID: CROSSES
--------	---	--------	---	-------	-------------	--------------	---------------

Figure 4 Information Block

1.3.2 Control Options

A block of control option buttons, placed along the bottom of the display, are used to adjust the SNPS display and access support functions. Figure 5 shows the Control Options available.



Figure 5 Control Options

SETUP

The SETUP button is pressed to switch to the display to Configuration mode. When pressed the survey information display area will change to show the various configuration options available.

The process of SNPS configuration and setup is described in more detail below (REF#).

ZOOM IN / ZOOM OUT

The Zoom IN (+) and Zoom OUT (-) buttons are used to adjust the chart display. Zoom IN will move towards the chart display, showing a smaller area but more detail. Zoom OUT will move away from the chart display, showing a larger area but less detail. The current chart scale is shown in the top left hand corner of the chart display.

TRACK [VEHICLE/VESSEL/AUTO/USER]

The TRACK button is used to control where the centre of the chart display is linked. Pressing the button will switch the centre of the display position to follow the vehicle, vessel or a point half-way between them, in an attempt to keep both vessel and vehicle visible in the display. When in TRACK USER mode, the chart is centred at a point selected by the user, by clicking the left mouse button at the required position in the chart display area.

HEAD [VEHICLE/VESSEL/NORTH]

The HEAD button is user to control the heading of the chart display, which refers to the direction towards the top of the chart. Pressing this button will switch the heading of the chart to the Vehicle, Vessel or North up.

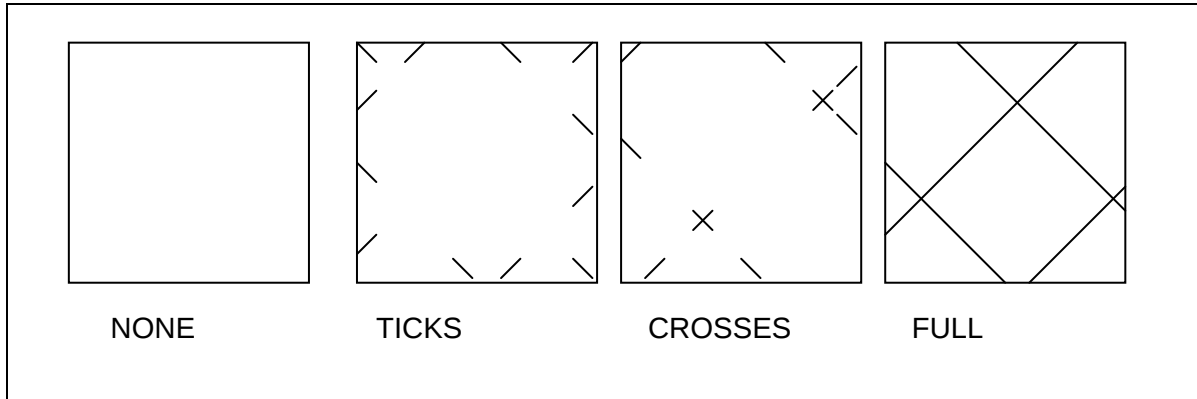
GRID [RECT/GEOG]

The chart can display a reference grid either in Rectangular (X,Y) or Geographical (Latitude / Longitude) co-ordinates. Pressing this button will switch between modes to suit operator preference.

GRID [TICK/CROSS/FULL/NONE]

The GRID button is pressed to select the grid projection style required. Press this button to switch the chart grid between:

Grid Types



LOG DATA

Press this button to start or stop SURVEY data logging. Survey log files contain selected system data for use in the preparation of charts, graphs and reports.

ROV CONTROL

The ROV CONTROL button is only available when the operator has first enabled 'Auto-Control' from the vehicle control system. If available this button will activate a range of auto-control functions that allow the operator to control the selection of targets, lines and routes, and also command the vehicle to move to/along the selected feature directly from the SNiPS display. The 'Auto-Control' features are described in more detail below (REF#).

REDUCE/INCREASE SHIP HEAD

For systems that do not have vessel heading (gyro) information directly linked to the system, SNiPS provides a means of allowing the operator to manually adjust the vessel heading. If this is required, the feature must first be enabled in the TOOLS section of the configuration display. When the feature has been enabled the control buttons will include, 'SHIP HEAD INCREASE / DECREASE', press these buttons to adjust the vessel heading as required. The vessel's heading will be adjusted by one degree for each press of the button.

SNAPSHOT

Function not currently supported (future development)

1.3.3 Navigation Data

The survey information area, to the left of the display, is visible when the system is not in configuration mode. It shows in real-time the various navigation information calculated by the SNIIPS.

Divided into four sections, the information displayed relates to the vessel and vehicle navigation, details of the currently selected target, and information about the selected vehicle guidance and control mode. Guidance and control is described in more detail below.

For both the Vessel and the Vehicle, the display shows the following information:

- Vessel/Vehicle name
- Selected tracking reference point
- Position in Lat/Lon or east and north
- Vessel/Vehicle Heading
- KP: distance along selected route from start
- Offset in metres from the selected route
- Vessel/Vehicle speed and course
- Water depth, trench depth and burial depth
- Navigation status from the GPS system

Navigation status if available includes:

- Number of satellites tracked
- Position status (GPS, DGPS or Almanac)
- HDOP - an indication of position quality and should be less than 3.0 for normal operation.

At the bottom of the Navigation Data display, information relating to the currently selected guidance mode is shown. Information relating to the current target includes name, position, distance and direction from vessel and vehicle, to assist in guidance to its location. This display also includes vehicle auto-control options and settings, which when enabled, allow a free-swimming vehicle to be controlled directly from the SNIIPS interface (see below for details).

NAVIGATION DATA					
VESSEL			WARDEN		
TRACK POSITION			gps1		
EASTING			0.0		
NORTHING			0.0		
HEADING			0.0		
KP			0.000		
OFFSET			0.0		
WATER DEPTH			0.0		
SMG	0.0		CMG	0.0	
NSAT	0	STATUS	NPOS	HDOP	0.0
VEHICLE			QUANTUM		
TRACK POSITION			VREF		
EASTING			0.0		
NORTHING			0.0		
HEADING			0.0		
KP			0.000		
OFFSET			0.0		
WD	0.0		TD	0.0	BD 0.0
SMG	0.0		CMG	0.0	
NSAT	0	STAT	NPOS	HDOP	0.0
TARGET					
EASTING			1608.1		
NORTHING			767.5		
FROM VESSEL			1781.8m 64.5 °		
FROM VEHICLE			1781.8m 64.5 °		
TARGET	SEARCH	LINE	ROUTE		
PREV	NEXT	TYPE	ADD		
TARGET NAME			MARK		
STEP Brg/Dist		dX: 0.0	STEP +		
STEP dX:dY		dY: 1.0	STEP -		

Figure 6 Navigation Data Display

Available guidance modes include targets, lines and pre-planned routes, each with a range of options and settings applicable to the guidance type.

TARGETS

In SNIIPS, targets are single points of interest to a project, e.g. cable ends, seabed features such as wrecks or well heads etc. When in TARGET mode, a target can be selected from a list of available targets, by pressing the PREV/NEXT buttons. The Navigation Data display

shows target position, and the range and bearing from both the vessel and vehicle. A line links the vehicle position to the selected target to assist in navigation.

Moving the mouse pointer over the chart display and pressing the 'Right' mouse button will mark a user defined target point which can be used immediately for guidance. If required, the selected point can be added to the target database with a user defined name using the 'ADD' function in the guidance mode options. Additionally, for each target in the database, a target type indicator can be attached to assist in differentiating between categories of target. To do this, press the TYPE button to display the available types, and select from the list.

SEARCH

The SEARCH guidance mode is intended to assist when a vehicle is required to cover a defined area in search of some contact or feature. When selected, SNIIPS will generate a line database centred on the current target position. The line database is generated using the defined parameters for box size in metres, rotation in degrees and the number of lines required (from 1 thro' 11, odd numbers only). The user can set these parameters in real-time to adjust the search pattern to suit requirements. *Note that to set the target position SNIIPS must be in TARGET mode.*

The current line is shown high-lighted, with the start of line indicated with a small circle. To reverse the direction of the line press the INVERT button, note that the start of line indicator moves to the other end of the line.

LINE

The LINE guidance mode, similar to SEARCH above, is used to guide a vehicle along a pre-defined line, for transit between work areas or for inspection along some particular line of interest. Lines can be created directly on the chart display and added to the line database as required. To do this, move the mouse cursor to the start of line (SOL) position and press the RIGHT mouse button. This will tag the SOL position and then link to the mouse position which can then be moved to the required end of line (EOL) position. Press the RIGHT mouse button again to create the line, press ADD to include the newly defined line into the line database.

ROUTE

The ROUTE guidance mode is intended to assist when a vehicle is required to travel along a pre-defined line consisting of multiple way-points. This could be a pipeline or cable route or some other route of interest for inspection. The route database allows up to 100 way-points to be defined over any distance. As for the LINE and SEARCH modes, the direction of the route can be reversed by pressing the INVERT button.

1.3.4 Auto-Control Options

When vehicle auto-control is enabled in the vehicle control system, a range of additional options become available that will allow the operator to send commands directly to the vehicle to move to selected positions or run along lines and pre-defined routes automatically.

As a safety measure, all control functions that will cause the vehicle to move are protected by a GUARD button, which must first be pressed before a command button to prevent accidental activation of a function.

For each of the guidance modes, the following vehicle controls are available:

TARGET

SEARCH

LINE

ROUTE

1.4 SNiPS Configuration

The following sections explain in detail how to setup and configure the SNiPS.

When the user presses the SETUP button from control options (see above), the 'Survey Information' display will change to show the system configuration window shown in figure 7. To return to run mode, press the same button, now labelled CLOSE SETUP.

The configuration options available are shown as 'tabs' at the bottom of the configuration window which can be selected by clicking on the required option.

Setup and configuration options include:

- Display - chart display settings
- Files - data file management
- Logging - data logging (survey mode)
- Setup - SNiPS system setup
- Tools - utility functions
- Charts - charting (not currently available, for future improvement)
- Spare – Un-used

The screenshot shows the 'CONFIGURATION' window with the 'DISPLAY SETTINGS' tab selected. The window is organized into several sections:

- SHOW**: A list of items to be displayed with checkboxes and color selection buttons.

Item	Current File	Color	Visible
COAST	uk_utm.dig	Green	☐
ROUTE	pipe1.dbs	Cyan	☒
TARGET	debris.tgt	Yellow	☒
LINE	testline.lin	Yellow	☒
FEATURE	insp.dbs	Magenta	☒
VESSEL	warden.vol	Cyan	☒
VEHICLE	quantum.vol	Red	☒
LOGS	smd_4080803.0	White	☐
- HISTORY**: A section for tracking history.
- TRACKING POSITION**: Fields for VESSEL (gps1) and VEHICLE (VREF).
- PLAN VIEW**: Options for FOREGROUND (White) and BACKGROUND (Dark Blue).
- PROFILE VIEW**: Options for FOREGROUND (White) and BACKGROUND (Black), with a 'SHOW' checkbox.
- OFFSET INDICATOR**: Options for SHOW (Cyan) and L/R Calc (Dark Blue).
- GENERAL SETTINGS**: Includes GRID INTERVAL: SCALE / 10, SELECT LOGO (smd_s.bmp), CONTROL SYSTEM (/SMD/DMAN_RV_S0), and a SIMULATE checkbox.

At the bottom, there are two rows of tabs: DISPLAY (selected), FILES, LOGGING, TOOLS, and a second row with SETUP, CHARTS, and SPARE.

Figure 7 Configuration Options

1.4.1 Display Settings

When the system is first switched from run mode to configuration and setup mode, the chart display settings window is shown as in figure 7. The settings in this window are used to change the appearance of the chart display to suit user requirements.

The chart display updates in real-time and can show a several types of feature information that are used to assist in positioning of the vessel and vehicle during offshore operations.

The outline of the support vessel and vehicle are shown to provide a true representation of overall position and scale.

The following information can be shown on the chart display:

- coastlines or field boundaries etc.
- navigable routes – used to calculate KP & offset
- target points – single points of interest
- lines – single lines of interest
- seabed features – pipes & cables etc.
- vessel outline
- vehicle outline
- logged data files
- history – trail of vessel/vehicle over time

When reading the following sections please refer to the display layout in figure 7.

The **SHOW** section is used to enable/disable the display of selected feature information on the chart display screen. Press the button to enable or disable each item as required.

The **CURRENT FILE** section allows the selection of data files that define the position of each of the feature types. Available files are shown in a drop-down list; select the required file from the list to load it into the system.

The **COLOUR** of each feature can be changed as required, click on the colour box to activate the colour selection table then select the required colour.

The **LOGS** option allows the display of pre-recorded survey log file information to assist in areas where operational routes are close together or cross. To enable/disable this feature use the SHOW / LOGS button, select the required file from the list of available files.

A **HISTORY** plot is shown on the chart display as a sequence of points that follow the vessel and vehicle positions. When the vessel or vehicle are moving, the points form a trail which can be used as a trend to aid in accurate line following.

The **TRACKING POSITION** section is used to select the offset position on the vessel or vehicle, to which the measured position applies. All other offset position calculations are based on this link.

The **PLAN VIEW** section allows the user to set the BACKGROUND and FOREGROUND colour of the chart display. Foreground colour is used for grid, north point and scale bar display.

The **PROFILE VIEW** section allows the user to enable/disable and set the BACKGROUND and FOREGROUND colour of the profile display. The profile display uses the measured depths (1-3) to produce a longitudinal profile.

The **OFFSET INDICATOR** section allows the user to enable/disable and set the BACKGROUND and FOREGROUND colour of the offset indicator display. When selected an animated indication bar appears at the bottom of the chart display, which shows the vehicle offset (left / right) from the selected route, as a useful aid to line keeping. If the offset is not available as an input channel, pressing the L/R Calc button will enable internal calculation of this parameter.

The **GENERAL SETTINGS** section provides access to a number of minor configuration items. Change the grid projection interval to increase or reduce the amount of grid information visible on the display. The number required is a divisor of the current chart scale i.e. typing a value of 10 will set a grid interval of 1/10 of the chart scale in metres, e.g. if the chart scale is 25000, the grid interval will be 2500.

LOGO - To enhance the display appearance, the user may select from a list of available logo files to be shown on the display.

CONTROL SYSTEM – For Auto-Control of a free-swimming vehicle it is necessary to specify a link to the vehicles control system by entering the control system ID (CSID) which is supplied by SMD.

SIMULATE DATA – For testing and training the SNiPS can be switched to simulate mode, which allows the user to control the position, orientation and speed of the vessel and vehicle. When in simulate mode the Logo will be replaced with control option buttons to increase/decrease speed/heading for both the vessel and the vehicle.

1.4.2 Data File Options

The Data File Options provide functions to create modify and delete SNIIPS data files. Details of file formats are given in Appendix A at the end of this document.

When working with data files, first select the required file type from the drop-down list provided. The name of the current active file will be shown in the box adjacent to the list.

A number of ACTIONS are available for working with data files. Press the required ACTION button to activate.

NEW – Press this button to prepare a NEW data file of the selected type. When the name entry window appears, enter an appropriate name for the new file and press RETURN. The editing window will be shown, for each data point, type the required values, according to file type selected.



Figure 8 SNIIPS Configuration - Data Files

The following control buttons are used to build the file.

- ADD – add a point to the file
- DELETE – remove current point from file
- INSERT – places current values after current record
- CHANGE – will modify current record values
- DIGITISE – use digitiser (if fitted) to set points
- RESET – clear file to restart

Use the PREV / NEXT buttons to move through the records of the file.

EDIT – Press this button to modify an existing data file of the selected type. After selecting the required file from the drop-down list, the editing window will appear. For each data point, enter the required values according to file type selected. The process of working on the data is the same as the NEW function, which is described above.

SAVE – when file preparation and editing is completed, press the SAVE button to store the revised information to disk.

DELETE – to remove the current selected file from the hard disk, press the DELETE button, confirmation will be requested to prevent accidental action.

IMPORT – In some cases new data files may be supplied to the system from a remote source. The IMPORT function will copy supported file type from the local floppy disc drive to the control system data file directory. Simply place the disk in the drive and press the IMPORT button.

1.4.3 Data Logging Settings

This configuration page is used to define the parameters required for survey data logging. Survey data logging is carried out in parallel to normal system data logging, to produce files that contain survey specific information that can be used for charting and reporting. The following parameters can be set:

MODE

Log mode can be by DISTANCE (in metres) or TIME (in seconds). If logging mode is set to distance, a record will be taken when the vehicle has moved the pre-set distance interval from the last recorded position.

INTERVAL

The setting of interval depends on logging mode, in metres or seconds (see above).

FORMAT

The survey logging format is currently fixed, future expansion will include selectable survey logging formats.

DIRECTORY

The destination of logged files can be set to the local hard disk or USB disk drive, if fitted.

FILE HEADER

This item is currently fixed to 's' to allow DOS file names (limited to a maximum of 8 characters) to be produced.

SOURCE

The source setting refers to whether the logged position is from the vehicle or the vessel.

POSITION

This setting allows the logged position to be different to the tracking position used on the chart display. Select the required offset position reference from the drop-down list that should be used for survey data logging.

DATA LOGGING

MODE: DISTANCE

INTERVAL: 2 m

FORMAT: XYZB CSV

DIRECTORY: HARD DISK //Nlogfiles

FILE HEADER: s

SOURCE: VEHICLE

POSITION: VREF

PROJECT: North Hoyle Wind Farm

LINE ID: td1

NAV DATUM: Airy

PROJECTION: OSGB 1936

DISPLAY FILES **LOGGING** UTILITY

SETUP CHARTS SPARE

Figure 9 SNIPS Configuration - Data Logging

PROJECT

This is a text entry that is included as a header to each log file, to describe the project on which the logged data was recorded.

LINE ID

This is a text entry included as a header in each log file, to provide details of the logged line.

NAV DATUM and PROJECTION

Text entries included as a header in each log file to specify the geodetic reference system on which the logged co-ordinates are based.

1.4.4 Utility Functions

The UTILITY functions page is for special function use and is not normally used during operations.

- Currently the Utility Functions include a means of converting co-ordinate positions between the GPS reference system (WGS84) and the selected local reference system (in both directions). Type the co-ordinates as required in the boxes provides, the result is displayed in real-time.
- A SYSTEM DATA FILE UTILITY is provided to assist in the generation of route data files. This function applies an offset (plus or minus) in both easting and northing, to the co-ordinates of the currently selected route database.

If a BASE route is prepared (reference centred on a position of 0, 0) and loaded into the system as a route, the user can apply a new start position to shift the route to where it is required. This is useful in situations where routes are repetitive, such as wind farms, where the turbine positions are based on a regular grid, and the 'shape' of each route is the same.

Enter the appropriate values and press RUN to execute the calculation process.

CONFIGURATION

UTILITY FUNCTIONS

POSITION CALCULATION

Geog Format: DD.MMSSSS

GPS Latitude: []

GPS Longitude: []

Spheroid Height: []

[] []

Grid Easting: []

Grid Northing: []

Grid Height: []

Spheroid: WGS-84

Grid Projection: UTM Zone 31 3E

CREATE FILE FROM BASE

Base X: []

Base Y: []

File Name (incl. ext): []

RUN

MANUAL SHIP HEADING CONTROL

ENABLE DEC INC

MANUAL SHIP HEADING: 1.0

DISPLAY FILES LOGGING **TOOLS**

SETUP CHARTS SPARE

Figure 10 Utility Functions

1.4.5 System Setup

The system setup page is used to define key parameters used by the SNIIPS and in the calculation of survey data.

LOCAL GEODETIC SYSTEM

The local geodetic system defines a mathematical model of the shape of the earth, on which the calculation of co-ordinates is based. The setting of these parameters is usually defined for a project in a particular area of the world. Select the required system from the list.

WARNING: This setting will affect the conversion of GPS position to rectangular co-ordinates and should therefore be used with care.

PROJECTION

The grid projection defines how rectangular co-ordinates are calculated and is used in conjunction with the LOCAL GEODETIC SYSTEM described above. The grid projection is usually defined for a project in a particular area of the world. Select the required system from the list of available projections.

WARNING: This setting will affect the conversion of GPS position to rectangular co-ordinates and should therefore be used with care.

VESSEL/VEHICLE POSITION REFERENCE

This setting defines the location of the GPS antenna on the vessel or vehicle. This position is usually offset from the primary reference point (VREF) and is used to correctly position the vessel on the display.

Select the reference point from the drop-down list provided.

GENERAL SETTINGS

CHART SIZE

These parameters define the size of the chart display area in mm, which varies according to which model/type of display is in use (CRT, TFT etc). The correct setting of these parameters allows an accurate representation of **scale** on the chart display.

Figure 11 SNIIPS Configuration - System Set Up

DISPLAY REFRESH

Sets the update rate of the chart display in milliseconds (1000ms = 1second)

TIMEZONE

Set the appropriate time zone value to adjust the system clock to local time in the working area. The format of this setting is UTCoffset, where *offset* is the time difference in hours from UTC (GMT) e.g. To set time to C.E.T. use UTC-01.

1.4.6 Set External Data

The SNIIPS produces displays based on survey data from the control system data server. It is therefore necessary to define within the SNIIPS which data items should be used for the various parameters required. A control button on the System Setup page is provided to access this function.

When the EXTERNAL DATA LINKS button is pressed the configuration window is opened.

EXTERNAL DATA LINK SETTINGS

DATA CHANNEL LINKS

DATA SOURCE: NOT SET

Select the DATA SERVER source where the required data can be found, then select the appropriate data channel for each data item

REFRESH LINKS VIEW DATA

DATA CHANNEL SELECTION

Vessel Latitude	Ship Latitude	Vehicle Latitude	POD Spare DI
Vessel Longitude	Ship Longitude	Vehicle Longitude	POD Spare DI
Vessel Quality	Ship Quality	Vehicle Quality	Vehicle Quality
Vessel Satellites	Ship Nsat	Vehicle Satellites	Vehicle Nsat
Vessel HDOP	Ship HDOP	Vehicle HDOP	Vehicle HDOP
Vessel Altitude	Ship Altitude	Vehicle Altitude	Vehicle Altitude
Vessel Easting	Ship Easting	Vehicle Easting	AP DVL PosX
Vessel Northing	Ship Northing	Vehicle Northing	AP DVL PosY
Vessel Speed	Ship Speed	Vehicle Speed	Vehicle Speed
Vessel Course	Ship Course	Vehicle Course	Vehicle Course
Vessel KP	Ship KP	Vehicle KP	Vehicle KP
Vessel Offset	Ship Offset	Vehicle Offset	Vehicle Offset
Separation 1-2	Ship Separation	Vehicle Heading	IFG Heading Gyro AI
Vessel Heading		Depth 1	
Vessel WD		Depth 2	
Auto Positioning	CPU Auto NAV	Depth 3	
Spare		Spare	
Spare		ROV Tgt East	AP TargetX1
Spare		ROV Tgt North	AP TargetY1

Figure 12 SNIIPS Configuration - Set External Data

Data can be taken from any available source in the **system data server**. It is therefore necessary to select which **data source** the data will be taken from, select this from the drop-down box at the top of the external data items window.

For each listed parameter, select the appropriate control system data channel from the drop-down list, to which the parameter relates. The names of data channels are generally self-descriptive; however some do need further explanation.

- Auto-Positioning refers to the vehicle database channel that indicates that auto-positioning has been activated.
- Depth 1 can be the altitude of the vehicle above the seabed.
- Depth 2 can be the trench depth if available
- Depth 3 can be the burial depth if available
- ROV Tgt East is the vehicle database channel that holds the X value of the current target, allows the pilot to move the target from the control console.
- ROV Tgt North is the vehicle database channel that holds the Y value of the current target, allows the pilot to move the target from the control console.

When the data links have been set, press **REFRESH LINKS** to initialise the data server to supply the selected data items. Press **VIEW DATA** to see in real-time the data items updating.

When the selection process is completed, close the window by clicking the close icon (X) in the top right hand corner of the window.

1.4.7 Set Vessel Offsets

For both the vessel and the vehicle, a data file is prepared that defines the shape, size and important offset points, that are required during offshore operations. The system settings page contains a button that when pressed will activate the vessel offsets configuration page.

The configuration page shows the defined outline of the vessel or vehicle, together with the offset points defined for position calculation.

The primary offset point as nominated VREF, and refers to the centre (0, 0) of the outline definition in local co-ordinates.

The name of the vessel or vehicle is shown at the top of the display, taken from the file name.

Defined offset points are listed at the bottom of the display, click on the appropriate tab to view the defined co-ordinates of the offset point.

To modify the position of an offset point, simple change the values in the boxes provided (X, Y, Z, NAME). To add a new point, press the blank tab and update the values as required. The new settings are saved automatically when switching to run mode.

To return to System Settings page, press the SYSTEM SETUP button.

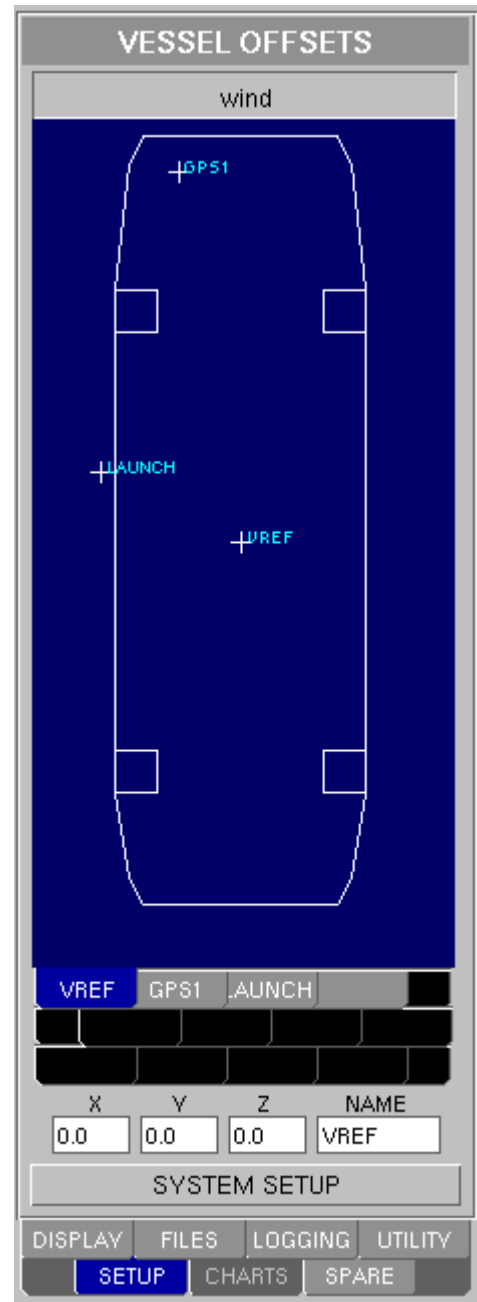


Figure 13 Vessel/Vehicle Outline Setup

1.4.8 Charting Functions

At time of writing, Charting functions are under development and are not currently available.

1.5 Survey Logging

Survey data logging is carried out in parallel to the standard system data logger. Survey log format is designed to provide information that can be used to quickly produce as-built charts and graphs, using generally available software tools such as MicroSoft Excel etc.

The format of survey log records includes the following data items:

Line Header Information, Project, Line ID, Field Names and Units

Date
Time
Vehicle Easting
Vehicle Northing
Vehicle Latitude
Vehicle Longitude
KP
Offset
Trench Depth
Burial Depth

At the start of operations, the operator must press the START LOGGING button on the survey system display. When an operation is completed, press STOP LOGGING to end the logging process.

Survey log file names are generated automatically as follows:

Header	s	-	fixed
File format	4	-	currently fixed
Day	dd	-	1-31
Month	mm	-	1-12
Year	yy	-	
Extension	.0	-	incremental number for multiple files on the same day starting at zero

e.g. s4190907.4 - fifth file recorded on 19 Sept 2007

APPENDIX A - SURVEY DATA FILE FORMAT

All SNIIPS data files are maintained as standard text files, the following formats are used.

Note that the first line of ANY data file must contain the **co-ordinate format identifier**. This is a text entry that describes the format of the data that follows (in most cases this will be RECTANGULAR).

- RECTANGULAR
- GEOG_DD.DDDDDD
- GEOG_DD.MMMMMM
- GEOG_DDMM.MMMM
- GEOG_DD.MMSSSS

Thereafter, for each file type the following entries describe individual data points depending on the type of file (ensure that items are separated by **commas**)

COASTLINE FILES (EXTENSION *.DIG)

RECTANGULAR

GridX1, GridY1

GridX2, GridY2

.

.

or

GEOG...

Lat1, Lon1

Lat2, Lon2

.

.

If co-ordinate values of 0, 0 are entered, the drawing pen will be lifted leaving a gap. This is useful for displaying islands etc.

ROUTES, PIPES OR CABLES (EXTENSION *.DBS)

RECTANGULAR

GridX1, GridY1, Depth1, KP2

GridX2, GridY2, Depth2, KP2

.

.

or

GEOG...

Lat1, Lon1, Depth1, KP1

Lat2, Lon2, Depth2, KP2

.

.

TARGETS OR FEATURES (EXTENSION *.TGT)

RECTANGULAR

GridX1, GridY1, symbol, Target_1_Name

GridX2, GridY2, symbol, Target_2_Name

.

.

or

GEOG...

Lat1, Lon1, symbol, Target_1_Name

Lat2, Lon2, symbol, Target_2_Name

.

.

LINE FILES (*.LIN)

RECTANGULAR

SX1, SY1, EX1, EY1

SX2, SY2, EX2, EY2

.

.

or

GEOG...

SLat1,SLon1, ELat1, ELon1

SLat2,SLon2, ELat2, ELon2

.

.

VESSEL/VEHICLE FILES (*.VOL)

X1, Y1, Z1, Point1Name

X2, Y2, Z2, Point2Name

X3, Y3, Z3, Point3Name

.

.

Note: **Co-ordinate format identifier** is NOT required in this file type.

Point name is used to specify the meaning of each data point in the file. Primary point types are 'o' (lowercase letter o) means outline point, 'm' (lowercase letter m) means move outline point, otherwise entries are interpreted as offset positions on the vessel/vehicle, i.e. GPS antenna, echo sounder, HPR transducer etc.