Operator manual

Simrad ITI
Trawl instrumentation system

Simrad ITI

Trawl Instrumentation System

Base version

850-043814 / AA000

Note

Simrad AS makes every effort to ensure that the information contained within this document is correct. However, our equipment is continuously being improved and updated, so we cannot assume liability for any errors which may occur.

Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.

Simrad AS disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

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Sections

Remarks

References

Further information about the ITI system may be found in the following manual:

- ITI Installation Manual, P2257.

The reader

This operator manual is intended to be used by the system operator. He/she should be experienced in the operation of positioning systems, or should have attended a Simrad training course.

Note

This manual includes sections that may be revised individually. In the event of a revision to any part of this manual, this “Cover and Contents” section will be replaced.

Document revisions

Rev	Written by		Checked by		Approved by	
	Date	**Sign**	**Date**	**Sign**	**Date**	**Sign**
A	.		.		.	
B						
C	02.04.93	NB	02.04.93	KEG	02.04.93	TAL
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Simrad References

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Documents

Sect	Title	Loc.	File	P.no/Rev
0	Cover and contents	AA000	850-043814	P2212D
1	System familiarization	4AA024	850-130062	P3054/A
2	Operational procedures	4A0024	850-130661	P3053/A
3	Screen presentation modes	4A0024	850-130663	P3055/A
4	Command references	4A0024	850-130660	P3052/A
5	ITI sensors	4A0024	850-130665	P3057/A
6	On-board maintenance	4A0024	850-160664	P3056/A
7	ITI Ethernet	4A0024	850-160071	P3454/A
8	Technical specifications	4A0024	850-130666	P3058/A

Revisions

Rev. A First edition

Rev. B Second edition

Rev. C New software version 2.12

Rev. D Manual updated to reflect new software version 3.10. At the same time Simrad's new documentation standard has been implemented.

To assist us in making improvements to the product and to this manual, we would welcome comments and constructive criticism. Please send all such - in writing or by Email - to:

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System familiarization

This document presents a general introduction to the ITI system and its main units. It also explains the basic theory of operation.

Document revisons

Rev	Documentation Department		Hardware/Software Design		Product/Project Management	
	Date	Sign	Date	Sign	Date	Sign
A	16.01.97	CL	16.01.97	EPB	16.01.97	KEG
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Contents

Document revisions

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Rev. A Based on P2212

1 INTRODUCTION

1.1 Purpose

The Simrad Integrated Trawl Instrumentation (ITI) system is a wireless trawl positioning and monitoring system designed for single and dual (two boats) pelagic and bottom trawling. It is based on hydro-acoustic communication between a transducer mounted on the fishing vessel and sensors mounted on the net.

The sensors send back information to the ship only on request, and you are in control of the the interrogation rate for each sensor. This makes it possible to give priority to important information, and prolong the lives of the sensor batteries.

1.2 Operation

The system is easily operated using a menu of commands displayed on a colour video screen. A joystick is used to control the menu. The information received from the trawl and collected from other equipment installed in the vessel is presented to the operator as five different pictures. These presentation modes are described in this manual. All measurements are given relative to the system transducer mounted in the vessel.

1.3 Special features

A special feature of the ITI system is its ability to measure the exact position of the trawl relative to the vessel. The system provides you with the direct distance between the vessel and the trawl, and also the lateral deviation of the trawl from the course of the vessel.

The ITI system can be expanded at your request. From a relatively simple system with one sensor, it can be enlarged to a very advanced system. However, regardless of which type of sensors are mounted on the trawl, the exact position of the trawl relative to the vessel will always be displayed.

1.4 Sensors

The ITI system operates with up to nine sensors of various types simultaneously.

The system is designed in such a way that no vessel code is necessary. A sophisticated windowing system based on angle and distance prevents interference by other vessels with similar equipment. In addition, the principle of sensor interrogation from the ship allows the receiver onboard to close down when it is not actually asking for information. This also helps to remove outside interference.

1.5 Interfaces

The system has the capacity to exchange information with other equipment onboard the vessel. Information from the ship's navigation system, gyro-compass, log, fishery sonar and echo sounder can all be accepted by the ITI. The log information is used to calculate the time delay between the vessel and the trawl passing over a point on the sea bed. The ITI system can also send information to various other systems, such as a track plotter, a winch control unit, a sonar system or an echo sounder.

2 SYSTEM UNITS

2.1 The standard system

The standard ITI system comprises the following main units and peripherals:

- ITI Control and display unit
- ITI Transceiver unit
- Transducer
- Net mounted sensors
  - Temperature Sensor or Grid Sensor
  - Depth Sensor
  - Combined temperature and depth sensor
  - Height Sensor
  - Height 2 Sensor
  - Catch Sensor I
  - Catch Sensor II
  - Catch Sensor III
  - Spread 1 Sensors (Communication & Remote)
  - Spread 2 Sensors (Communication & Remote)
- Sensor battery charger

The figure on the next page illustrates the main system components and three alternative arrangements for the vessel's ITI transducer(s).

Note !

The ITI system may be supplied without the Simrad CF 140 display. Such installations must then include a keypad to control the system, and a minor modification is required. Further information is found the the ITI Instruction Manual.

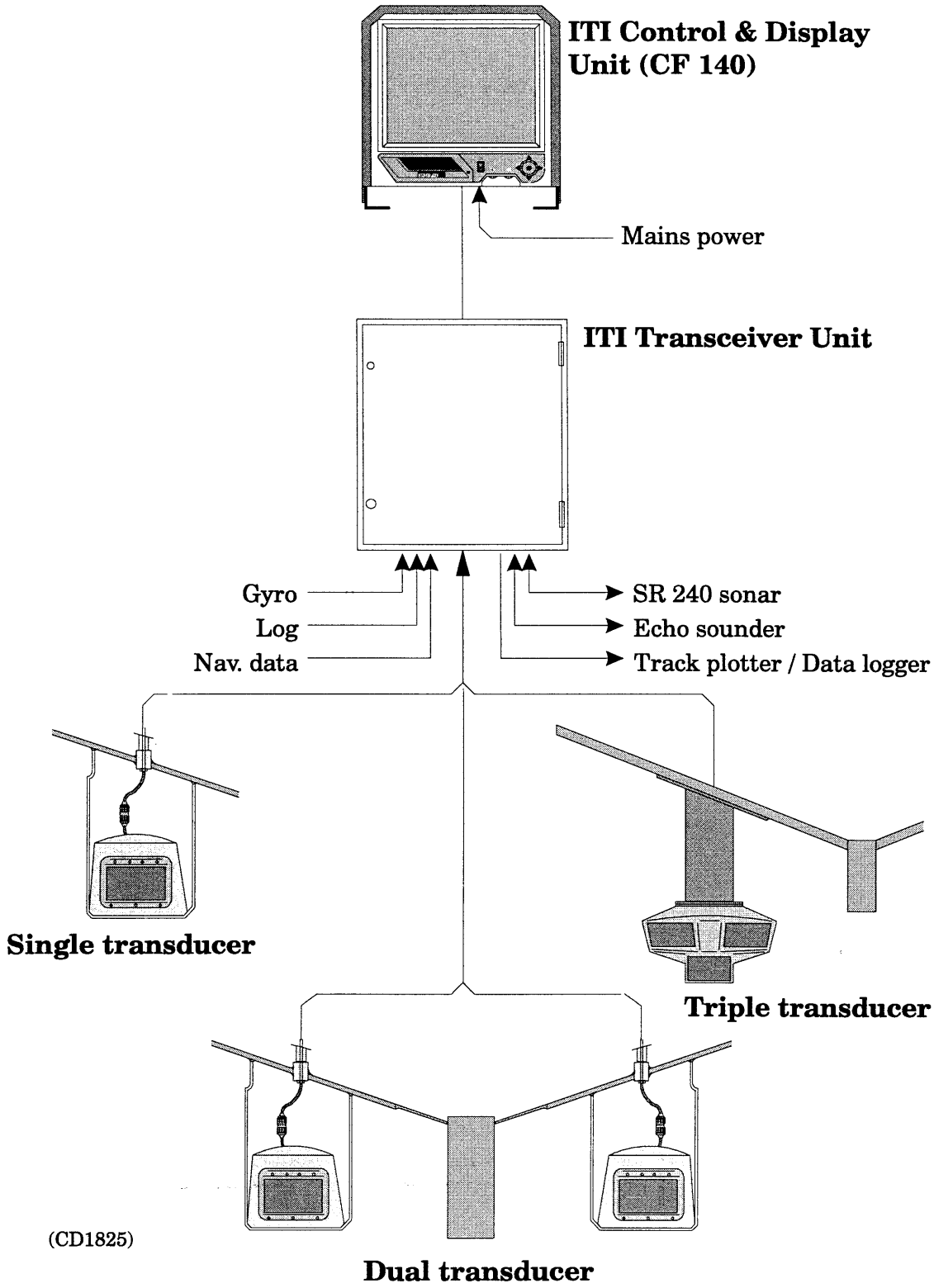

Figure 1 The ITI system showing three fixed–transducer alternatives

2.2 System options

2.2.1 Slave display

A "Slave" display monitor may be connected in parallel with the principle display. This allows the ITI system to be controlled from a position remote from the normal operator's position.

2.2.2 Transducer configurations

The ITI system may be used with a choice of several transducer and hull unit configurations. The standard configuration is the fixed transducer installation, where the transducer mounting flange is secured directly to the vessel's hull.

The *fixed transducer* installation can have one of three different arrangements; triple split-beam, dual split-beam or single split-beam. Each of these arrangements, shown on the previous page, will give a different horizontal coverage angle. In most cases improved performance will be obtained if the transducer is lowered to a position below the vessel's hull, and a transducer lowering system is available to accomplish this.

The *Vertical Shaft hull unit* is a mechanical device which will lower the transducer down to a position 1.2 meters below the vessel's hull. It will raise the transducer up into the hull for protection when it is not required for use. The hull unit is powered by an electric motor, and is delivered with the transducer already fitted.

2.2.3 Towed transducer

The ITI can also be used with a towed transducer instead of a transducer fixed to the vessel. The towed transducer will not give the trawl's bearing information because it is not a split-beam unit. The towed transducer is only recommended as a temporary solution, to be used while the vessel is waiting to go into dry-dock to have a split-beam transducer fitted, or for test.

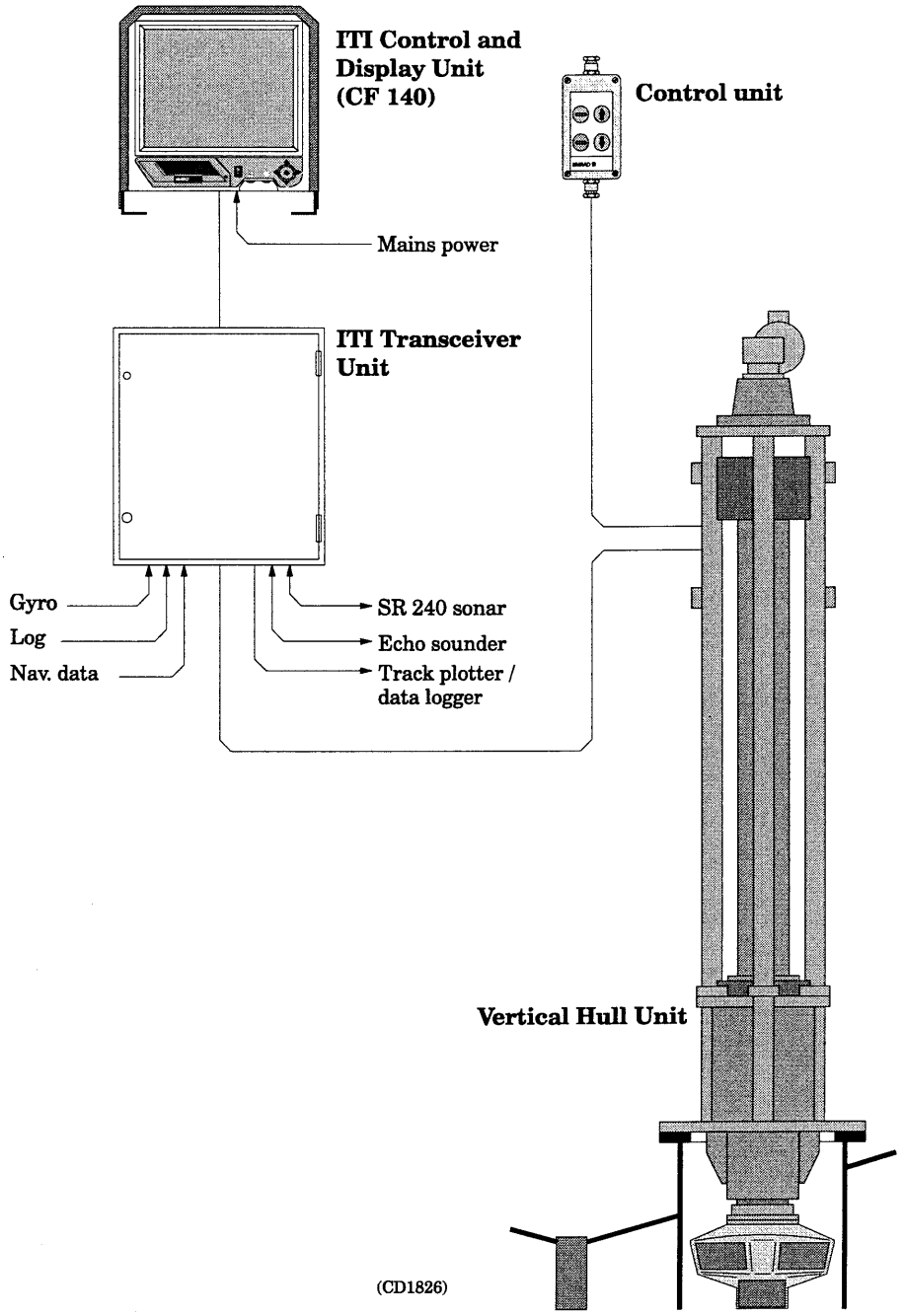

Figure 2 The ITI system with the optional vertical shaft unit

2.2.4 Summary

The following parts are available on request:

- Slave monitor
- Vertical shaft hull unit with triple split-beam transducer
- Remote hoist control unit for the hull unit
- Triple, dual or single split-beam fixed transducer
- Towed transducer unit

Refer to the previous two illustrations.

2.3 The Control and Display Unit

The CF 140 Control and Display Unit consists of a 14" high-resolution display screen, below which is a control panel and a joystick. The controls and switch positions are fully described in the *Operational procedures* section of this manual.

The ITI menu system is operated using the joystick.

Several versions of the CF 140 are currently in use, though only the latest version is being sold. Therefore only this version is described in the ITI manuals.

2.4 The Transceiver Unit

The Transceiver Unit contains all of the electronic circuitry for the ITI system. It controls the timing of the interrogation signals and the frequencies for the transmissions. It also processes the reply signals, forms the video signals and presents the information to the display.

2.5 The transducer

The ITI system can be delivered with one of four different transducer arrangements. These are:

- Single split-beam - fixed installation
- Dual split-beam - fixed installation
- Triple split-beam - fixed installation
- Triple split-beam - vertical shaft hull unit

The triple transducer array is composed of six separate transducer elements, arranged in pairs. Each pair forms one beam, these three beams being denoted Port, Centre and Starboard beams. The left and right element of each pair forms a "Split-beam" transducer. This enables the system to measure the angle in the horizontal plane between the vessel's centre-line and the direction of the replying sensor. The three pairs of elements are mounted in a tin-bronze housing, forming one transducer unit.

The dual split–beam transducer installation is actually two single split–beam transducers mounted one each side of the keel.

The single split–beam unit can be mounted on either the port or starboard side of the keel.

The beamwidth of one split–beam transducer is 40°, with a circular beam. The triple transducer has three of these 40° beams in the horizontal plane, overlapping by 10° giving a total coverage of 100° (± 50°). The dual transducer arrangement has two of the 40° beams, also with a 10° overlap, thereby giving a coverage of 70°. The single transducer has just one beam, giving 40° coverage.

All transducer arrangements cover an angle of 40° in the vertical plane, and the single and dual transducers can be mounted with one of two tilt angles. These angles are –10° or –20° . With the –10° tilt angle the coverage is from the surface down to –30° , and with the –20° tilt angle the coverage is from horizontal (from the transducer depth) down to –40°. The triple transducer has no tilt possibilities.

Note !

The tilt angle can be changed after the installation is complete. If necessary this operation can be performed under water by a diver. Each transducer pair is mounted in a removable frame which can be rotated through 180° to change the tilt angle.

Each split–beam transducer can be replaced, and again the operation can be performed under water if necessary. The transducer can be unscrewed from the mounting frame and disconnected from the cable at the water–proof plug.

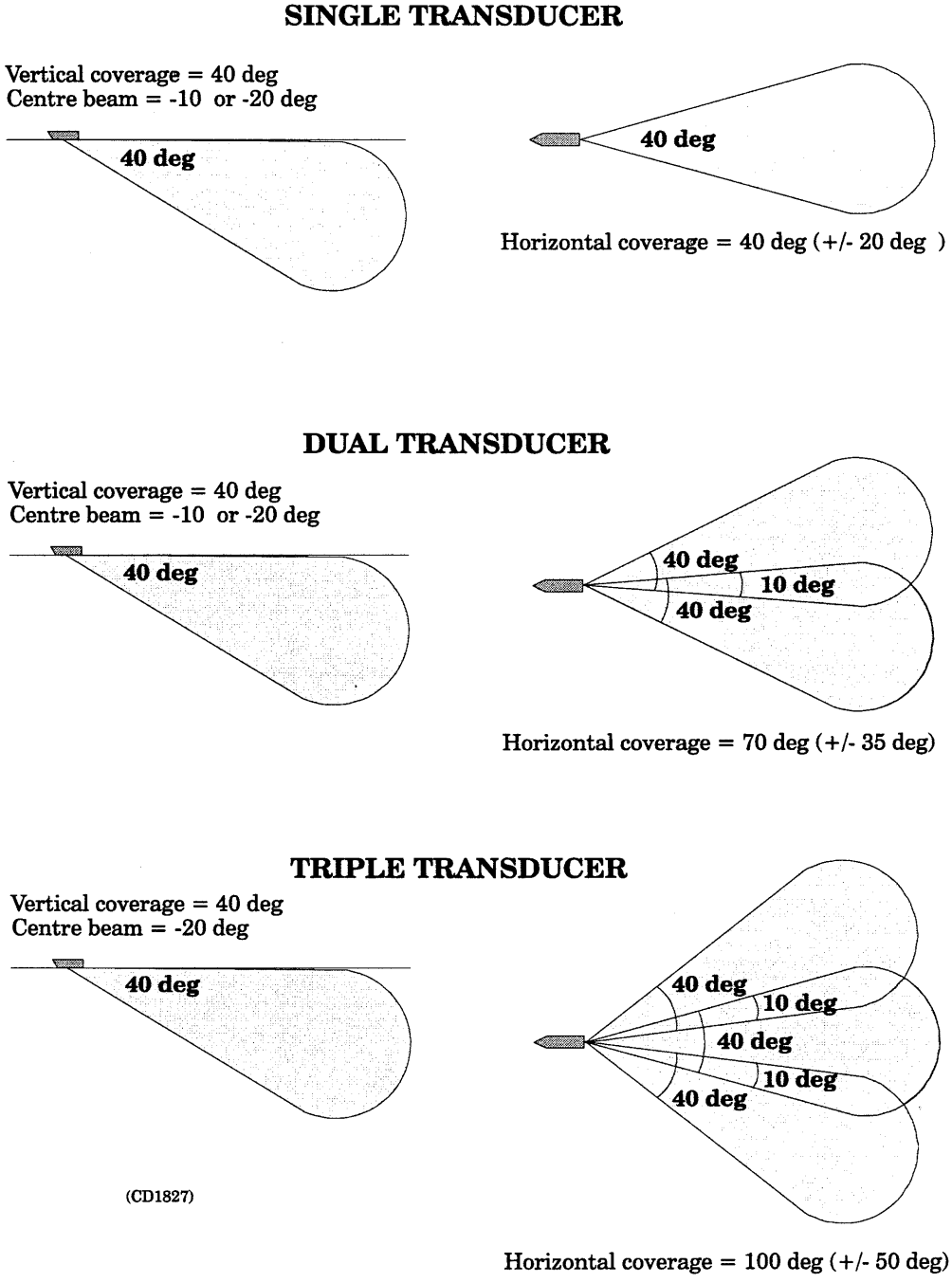

Figure 3 The vertical and horizontal beam coverage diagrams

2.6 The sensors

The purpose of the trawl sensors is to monitor the state of the trawl and the surrounding water. The types of trawl sensor unit available are as follows:

- Temperature
- Depth
- Temp/depth
- Grid
- Height
- Height 2
- Spread 1
- Spread 2
- Catch I
- Catch II
- Catch III

Refer to the *Sensors* section for further information about the sensor types, the batteries used to power them, and the recharging and maintenance procedures.

3 THEORY OF OPERATION

3.1 Propagation of sound in water

The sea forms a remarkably complex medium for the propagation of sound. Sound is transmitted through the water in the form of a series of pressure waves, and these are effected in many ways during their passage through the medium. The main problems are:

- Spreading
- Absorption
- Noise and reflections
- Refraction

3.1.1 Spreading

The sound energy is radiated spherically by the signal source. At a distance R away from the signal source the radiated sound energy will be reduced by the factor $1/R^2$.

3.1.2 Absorption

Although negligible compared to spreading, the sound waves are also to some extent absorbed in the form of heat while passing through the water.

3.1.3 Noise and reflections

Noise generated by propellers and thrusters will distort the acoustic signal and will affect the accuracy of distance and angle measurements. The transducer must therefore be located as far away from such units as possible. Reflections of the sound waves by the surface, the seabed and underwater structures also create distortions.

Before the ITI system is installed in a vessel, an investigation must be conducted to check if any other equipment, eg. sonar or echo-sounders, are operating on the same frequencies as the ITI system. Refer to the *Technical specifications* section for the operating frequencies.

3.1.4 Refraction

The velocity of sound in water varies with the water temperature, salinity and density (pressure). In the horizontal plane these variations occur gradually or not at all over very long distances (hundreds of kilometres), whilst in the vertical plane significant changes may occur over very short distances (a few meters). It can therefore be assumed that the ocean comprises a series of thin homogeneous layers, each one giving a slightly different sound velocity from the layers above and below it.

When a sound pulse travelling through the water encounters a boundary between two such water layers, the pulse's direction of propagation will be altered. This is because when the front of a sound pulse comes to a boundary and starts to pass from one layer to another, the first part of the wave front to encounter the boundary will have its velocity altered first. The rest of the front will continue at its original velocity till it too crosses the boundary and has its velocity altered to match that of the rest of the front. The amplitude of the alteration will depend on both the angle at which the pulse hits the boundary and the differences between the transmission properties of the water on either side of the boundary. The thinner the layers are assumed to be, the smaller will be the differences between the layers, and so the smaller will be the refraction angle as the pulse moves from one layer to the next. If the water is assumed to be composed of very thin layers, the small angular changes occurring at each layer boundary can be combined over a distance to form a gradual curve.

The velocity of sound in water is affected most by the water's temperature – a 1°C rise in temperature will cause an increase of approximately 3 m/s in the sound velocity. This temperature/velocity relationship will always result in a sound pulse being tilted towards the cooler water.

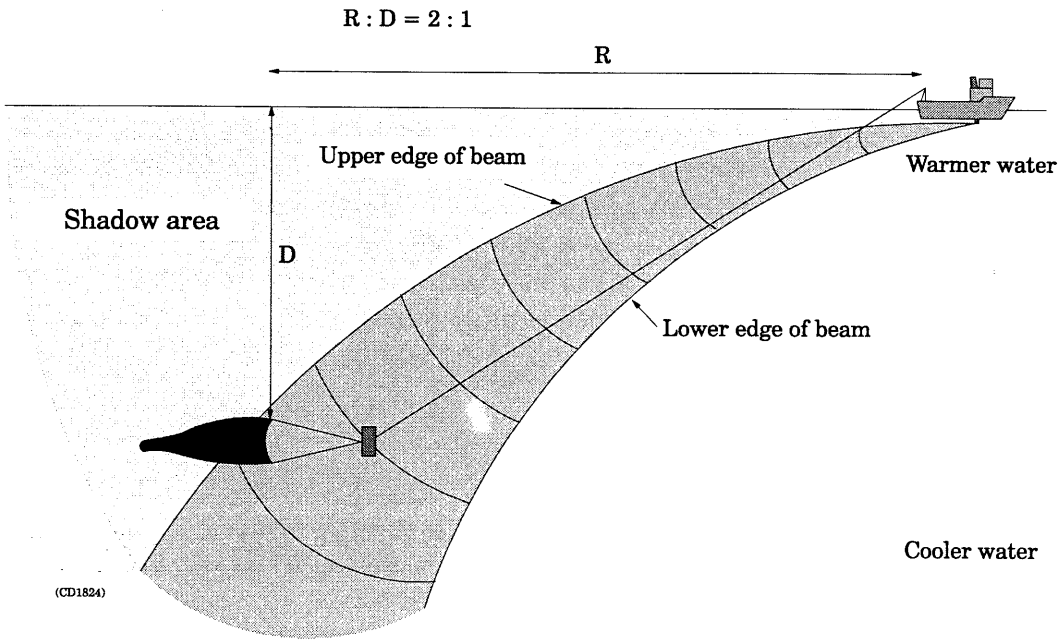

Figure 4 Refraction of the acoustic beam

The water temperature will vary with depth, season, geographical location and time of day. These factors, combined with the velocity variations caused by salinity and pressure, mean that the acoustic pulse's path through the water is rarely if ever straight and is also very difficult to predict.

The above reasons mean that the theoretical maximum range of the ITI system will often be drastically reduced, and the best communication between the vessel transducer and the sensors may well occur when the net is some distance away from the theoretical centre of the transducer beam.

3.2 Communication theory

The ITI Transceiver Unit transmits acoustic pulses at specific frequencies into the water using the transducer array. These pulses act as "Requests for information", and when a sensor on the trawl detects a transmission and recognizes its own unique frequency, it will transmit a reply. This will be in the form of two or three acoustic pulses of different frequencies. The information data transmitted by a sensor is encoded as the delay interval between consecutive pulses.

> Example: The ITI system has transmitted an interrogation signal at a frequency of 27.49 kHz. The *Depth* sensor recognizes this frequency as referring to it. It waits for a set delay period of 0.5 seconds, then replies with a signal of 27.306 kHz, followed shortly afterwards by a signal of 27.675 kHz. The time interval between the two reply signals will be 1.0 msec. for each meter the sensor is beneath the surface. This time interval will be detected by the Transceiver Unit, processed, and the appropriate depth information presented on the Control and Display Unit .

The reply signals are detected by the vessel's transducer array and are relayed to the preamplifiers in the Transceiver Unit. The Transceiver Unit amplifies and filters the signals, and converts them to digital format. It then performs the signal processing required to present the data on the display.

Although in total there can be up to six transducer elements or channels that the system can listen to, it will only listen to two channels (i.e. one beam) at a time. The receiver will be connected to both elements in one of the three beams, depending on which direction the sensor replies are expected to come from. The selection of the beam is achieved physically by relay switching controlled by the Control Processor Board within the Transceiver Unit.

When the system is first switched on and the sensors activated, it will search for the trawl by transmitting one interrogation pulse from each transducer pair in turn. From the replies it will then calculate the trawl's position and distance from the vessel.

If the system loses contact with the sensors, or if it receives false information three times in a row, the system will again begin searching for the trawl using the start-up procedure.

You control the system with the joystick located on the display unit. The joystick's movements are detected by the computer, which in turn controls the menu system. By using this joystick you can change parameters and select options. The sensor interrogation time interval can be set, and the system can also be set to interrogate a specific sensor only once every two or three interrogation intervals. In this way, you can reduce the battery usage in individual sensors to make them last longer between recharges.

3.3 Communication range

In most cases the communication range will not be a limiting factor for you. Communication may however be poor because the range between the vessel transducer and the sensors is getting close to the maximum.

A specific value for the maximum communication range cannot be given because the range will depend on the water conditions, and these can vary considerably from area to area, from season to season, and even from day to day.

The vessel's self-made noise (propeller noise) may also be a limiting factor for obtaining very long communication ranges. The best cure against propeller noise is to ensure the transducer is as far away as possible from the propeller, though this must be taken care of during the system installation.

Range calculations based on ideal conditions will be interesting from a theoretical point of view. When the range of a sonar or a communication system such as the ITI is specified, the calculations will always assume that the water is homogeneous throughout, (i.e. The water's parameters (salinity, temperature, pressure etc.) remain constant). It is also assumed that there is no noise from the ship (eg. the propeller) to disturb the communication. With such conditions the sound pulses will propagate along a straight line path, making maximum range predictions relatively simple.

However, such conditions almost never occur in practice. The acoustic pulses will normally take a curved path through the water as variations in the water parameters, especially the temperature, cause the pulses to be refracted. Accurate prediction of the pulses' path is therefore rather difficult, though a rough prediction is by no means impossible.

Assuming that the vessel has the necessary sensors, it is possible to measure the temperature profile of the water. This profile is then displayed graphically on the ITI screen, and will help the operator to predict the ITI system's communication range.

Note ! *With the variable parameters held constant or removed, it should theoretically be possible to obtain a communication range of more than 3000 m.*

3.4 Optimum towing depth

The best communication and the longest range will always occur when the sensors are in the middle of the transducer beam. If the vertical tilt of the beam (middle of the beam) is known, the optimum trawling depth with respect to horizontal range can be calculated. Note the difference between horizontal range and slant range. Both values are calculated by the ITI system, and are presented on the *Normal* display.

Example 1:

Beam tilt (fixed transducer) = −20°

Horizontal range measured by ITI = 850 m

The optimum depth is given by: tan 20° x 850 = 309 m

Example 2:

The depth of the trawl is usually the known value, therefore:

Beam tilt = −20°

Trawl depth measured by ITI = 426 m

The optimum horizontal range = 426/tan 20° = 1170 m

In these examples, we find that the ratio of Range to Depth equals R : D = 2.7 : 1

In these examples, refraction of the sound pulses was not considered. In a real trawling situation the temperature profile will have to be examined to take refraction into account. The Range:Depth ratio for best communication can then be adjusted up or down to suit the local conditions. Consider two cases:

a) The water temperature reduces as the depth increases. Sound signals will bend towards the colder water, i.e. downwards. For the best communication, the ration of R : D must therefore be less than 2.7 : 1.

R : D = < 2.7 : 1

b) The water temperature increases as the depth increases. Sound signals will bend away from the warmer water, i.e. upwards. For the best communication in this case, the ration R : D must therefore be greater that 2.7 : 1.

R : D = > 2.7 : 1

The ITI system will of course operate without you calculating the optimum ratio of range to depth. You will however achieve longer communication ranges if these aspects are considered. At shorter ranges, the ratio is not of any real importance.

3.5 Tracking the trawl

This chapter describes the trawl tracking, and gives some information on how it is affected by the external equipment connected to the ITI system.

The *Tactical* display mode presents the vessel and trawl symbols with tails to indicate their tracks. The tails can only be drawn if the ITI system has information about the vessel's speed. The speed information can be set manually in the *Manual input* menu, or it can be sent automatically from the vessel's speed log or navigation equipment.

The tail behind the trawl is drawn using course information provided by the vessel's navigation equipment. The course information will not be used by the ITI system if the speed is calculated as being less than 1.5 knots. This minimum value is implemented because the course calculations in the navigation equipment are based on the system being updated with a new position at a set frequency. If the change in position between one update and the next is too small, the course resulting from the calculations will be very inconsistent and uncertain. Unless the ship's speed is very low, the tail behind the vessel will always be a smooth line if the ITI system receives its course information from a navigation system such as GPS. This is because the course information is based on positions relative to satellites, so is not affected by the vessel's roll and pitch movements.

The *Tactical* display can only operate correctly if information about the vessel's course and speed is updated continuously. Simrad recommend that a navigation system (e.g. GPS) is always connected to the ITI system. In addition, a gyro-compass or a Fluxgate compass will increase the tracking performance. It should be emphasized that a navigation system combined with a gyro-compass will provide the best performance concerning trawl tracking and steady communication in bad weather, and also when turning. A Fluxgate compass will not give the same results as a gyro-compass because the Fluxgate unit does not have the same accuracy and speed of response when updating the instantaneous heading of the vessel.

When the ITI system calculates the bearing from the vessel to the trawl, the measurement is relative to the vessel's heading. To determine the exact position of the trawl, the system must know the vessel's instantaneous heading at the same moment as the reply pulse from the sensor reaches the vessel transducer. Currently, only a gyro-compass can provide this heading information accurately.

Note !

Without a gyro-compass (or other accurate information on the vessel's heading), the calculated bearing to the trawl will vary due to the influence of roll and pitch changes.

A gyro-compass can inform the ITI system about sudden changes in the ship's heading due to roll and pitch. The ITI system then uses this information to enable it to track the trawl more accurately, which makes the system's communication with the trawl more reliable (i.e. a greater percentage of successful interrogations). The result is displayed on the *Tactical* display mode as a smooth tail line behind the trawl symbol.

To achieve the best possible communication with the trawl, the ITI program will use the heading information to predict the trawl's position relative to the vessel prior to transmitting the next interrogation signals. Without accurate heading information this prediction may be wrong, and if the vessel's heading alters by more than 10° between consecutive interrogations of a sensor, the trawl's actual position may be outside the ITI system's tracking window.

3.6 Four examples

Four examples have been devised to show the types of tails displayed by the *Tactical* display mode under different conditions.

- In the first example the vessel's course and position are being updated only by GPS, no gyro-compass is connected. The tail behind the vessel is therefore smooth and steady as roll and pitch have no influence on it. The trawl's tail is not smooth however, because there is no gyro-compass to compensate for the vessel's roll and pitch. Due to sudden changes in the ship's heading, the calculated bearing to the trawl will vary for each interrogation.

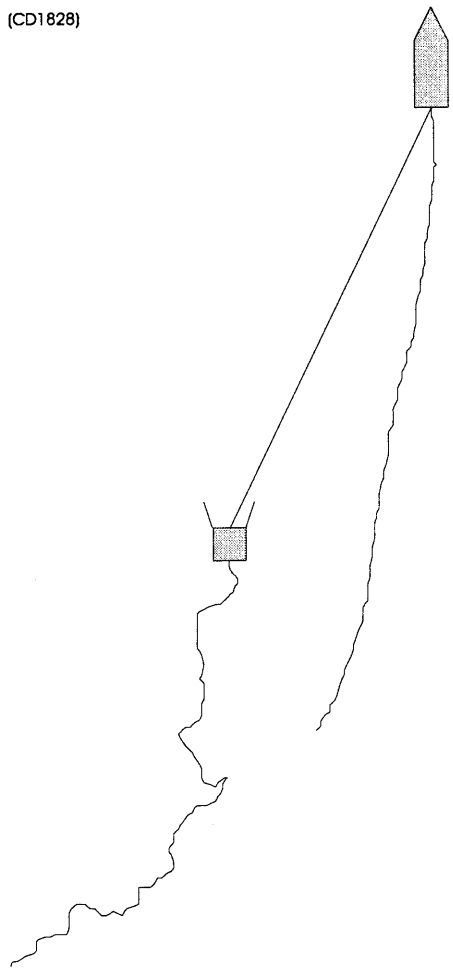

Figure 5 Example 1

- In the second example the vessel's course and position are being updated by both a GPS and a gyro–compass. The tails behind the vessel and the trawl are therefore smooth and steady as roll and pitch are taken into account in the calculations.

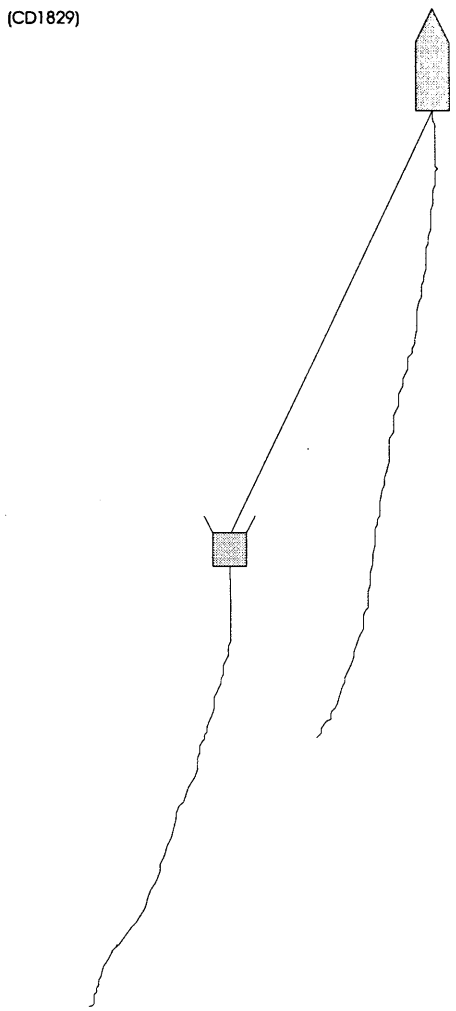

Figure 6 Example 2

- Example three shows the effects during a turn of not having a gyro–compass connected. The ITI system may lose contact with the trawl. After the vessel loses contact, the trawl's tail will be drawn relative to the vessel from the trawl's last known position. As the trawl's relative position will change considerably during a turn, the picture displayed on the screen will bear no resemblance to its actual position and it may even appear to be ahead of the vessel. Large steps will then occur in the line when the system finally regains contact with the trawl on completion of the turn.

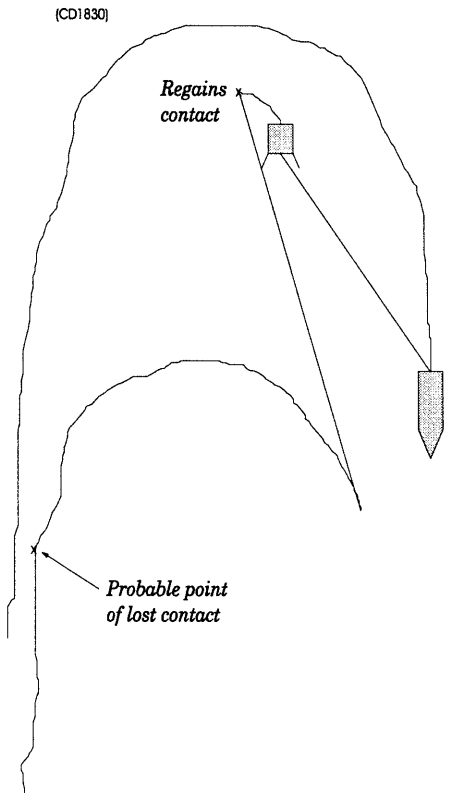

Figure 7 Example 3

- Example four shows that with a gyro-compass connected, the ITI system will be able to predict the position of the trawl much more accurately. It will then be able to change beam to keep contact with the trawl for longer during a turn. If the trawl does move outside the communications window and the system loses contact, it will also have a rough idea of where the trawl is likely to be so will be able to regain contact much earlier. If the vessel has dual transducers fitted, the window will extend to 35–40 either side of the vessel's stern, therefore reducing even further the risk of losing contact with the trawl.

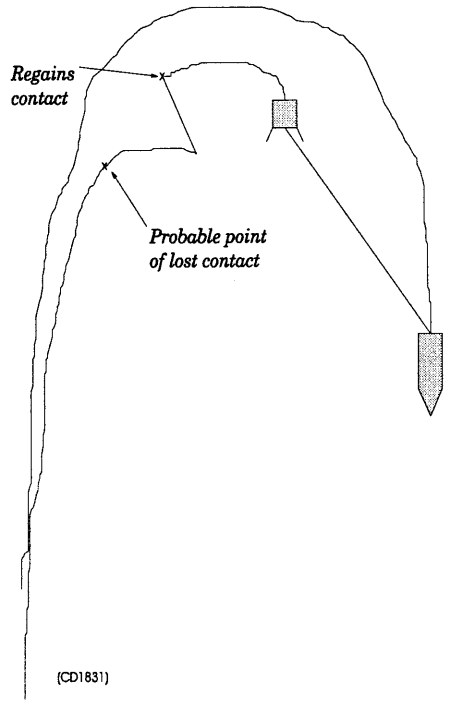

Figure 8 Example 4

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Operational procedures

This document describes the day-to-day operation of the Simrad ITI system.

Document revisons

Rev	Documentation Department		Hardware/Software Design		Product/Project Management	
	Date	Sign	Date	Sign	Date	Sign
A	16.01.97	CL	16.01.97	EPB	16.01.97	KEG
B						
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Contents

Document revisions

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Rev. A Based on P2212.

1 INTRODUCTION

Operating the ITI system is relatively simple, but due to the number of external sensors and interfaces, **it is important to set up the system properly prior to use.** It is also vital that you have a general understanding of how the system works. If you are in doubt, refer to the *System familiarization* section, or consult your dealer.

This document describes the menu system and the most common everydays tasks.

2 THE MENU SYSTEM

2.1 General information

A number of menus and sub–menus are used to control the operation of the ITI system, to enter the parameters and to initialize the various special applications. The menus are accessed using the joystick on the CF 140 display unit, the control movements of which are explained on page 16.

2.1.1 The menu window

While the system is in operation, the menu window on the right side of the display screen is used to present the menu information related to the operational mode currently in use. By using the joystick, you may move the cursor (inverse video) to access the sub–menus, select commands and make adjustments to the values of the parameters within those commands.

Detailed descriptions of the menu commands and parameters may be found in the *Command references* section in this manual.

2.1.2 The date/time block

The top line of the menu window will always display the date and time as shown below:

`year/month/day  hour:minute:second`

These will be set by the installation engineer and kept updated by an internal battery when the system is shut down, but may be changed by accessing the *System setup* sub–menu.

2.1.3 The alarm window

Any alarms sounded by the system will cause the appropriate warning message to be displayed, written in red, below the date/time block. These messages will appear on all presentation mode displays, and will remain on the screen for approximately 30 seconds. If the alarm sounds, it may be reset by any movement of the joystick.

2.2 To select operational mode

When the ITI system is first switched on, it will always be in the *Normal* mode. The display presents the following main menu:

```
MODE                    NORMAL
RATE                       OFF
ACTIVE SENSORS
MANUAL INPUT
AUDIO ALARM
SYSTEM SETUP
```

To access the *Mode* menu:

1 Press the joystick towards the right.

- This will cause the inverse video on *Mode* to move to *Normal*, and the *Mode* submenu will be displayed below the main menu as shown:

Main menu:

```
MODE                    NORMAL
RATE                       OFF
ACTIVE SENSORS
MANUAL INPUT
AUDIO ALARM
SYSTEM SETUP
```

Submenu:

```
MODE


NORMAL
TACTICAL
TEMP-DEPTH
GRID
TRAWL DATA LOG
STATUS
TEST
```

2 Press the joystick up or down to select the required mode.

- As the cursor is moved through the menu, the picture on the screen will change to that of the mode which is highlighted at the time.

3 Push the joystick towards right (or left) when the desired mode is displayed.

- This will enter it into the system. The mode submenu will then disappear from the screen.

When the desired mode has been entered into the system, the main menu shown on the previous page will remain on the screen, but will contain additional text depending on the presentation mode selected. This text will show the commands and information given in that particular mode, and their current values. The cursor will also move automatically back to its start position on *Mode*.

2.3 To select menu parameters

1. Press the joystick up or down to move the cursor on the main menu.
2. Select the menu option by pressing the joystick to the right.
   - On selection, a box will appear below the current menu containing either a list of parameters or a new sub-menu.
3. Press the joystick up or down to highlight the required parameter on the new menu.
4. Push the joystick to the right to select the parameter.
   - The box will then change and present the range of possible values for that parameter, with the current value highlighted.
5. Press the joystick up or down to set the required value for that parameter
6. Press the joystick towards right to enter the new parameter into the system.

Note !

Pressing the joystick repeatedly to the left will return the status back through the chain of sub-menus to the menu defined by the mode currently in use.

3 ON/OFF PROCEDURE

3.1 How to switch on

The ITI system's ON/OFF switch is located in the centre of the CF 140 Control and Display Unit's control panel, below the display screen. A green lamp above the switch indicates if power is switched on or off. The power switch turns on the power to both the Control and Display Unit and the Transceiver Unit. To power up the ITI system, follow the steps outlined below:

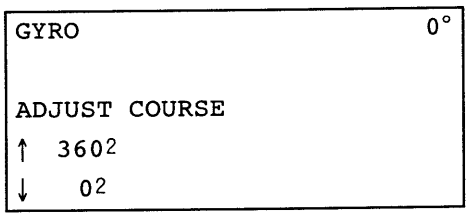
1 Press the power switch on the front of the Control and Display Unit. Check that the lamp above the switch comes on.

- Wait and observe the screen. After a few seconds, the *Normal* mode picture should be displayed.

If a course gyro is connected to your ITI system:

2 Enter the current course.

- The system will automatically display the appropriate submenu, and you need to enter the course as displayed by the gyro. When the course is changed, the ITI is automatically updated.



If a vertical shaft hull unit is installed in the vessel:

3 Refer to the procedure on the next page on lowering the transducer.

The system can now be operated using the joystick.

3.2 How to lower the transducer

This procedure is only applicable if your vessel is equipped with a vertical hull unit.

1 Check to ensure it is safe to lower the transducer.

- There must be at least 3 meters of water under the vessel's keel.

2 Observe that the green "IN" lamp on the Remote Control Unit is burning.

3 Press and **hold** the *Down* button (bottom right) on the remote or local control units.

- Observe that both the green *In* and red *Out* lamps burn.
- When the hull unit is fully lowered, the green In light will extinguish, while the red Out lamp will remain burning.

Note !

In case of emergency, release the control button. This will immediately stop the hull unit.

If the hull unit is stopped at any position other than fully raised or fully lowered, i.e. while both the red and the green lamps are burning, it may be restarted by pressing and holding the appropriate button on the control unit.

3.3 How to switch off

The power switch on the CF 140 Control and Display Unit is used to power down the ITI system.

1 Press the power switch on the display to power down both the Transceiver Unit and the display.

If a vertical shaft hull unit is installed in the vessel:

2 Refer to the procedure below on hoisting the transducer.

3.4 How to hoist the transducer

This procedure is only applicable if your vessel is equipped with a vertical hull unit.

1 Press the *Up* button on the remote or local control unit (top right button).

Observe that both the red *Out* lamp and the green *In* lamp burn. When the red *Out* lamp extinguishes, the transducer is fully retracted.

2 Check that the green *In* lamp remains burning.

Note !

The only indications of the position of the hull unit are the red and green lights on the hoist control units. These units must not be switched off while the hull unit is in the lowered position.

There is no communication between the transceiver unit and the hull unit, and no visual or audible warnings will be given if the ITI system is deactivated without first retracting the transducer array. A proper power down procedure should therefore always be used.

4 SYSTEM RESET

The ITI system may be reset using two methods:

- Switch the system off and back on again using the power on/off button on the CF 140 Control and Display Unit.
- Press the Reset button on the CPU286 circuit board in the Transceiver Unit.

All the settings made will be saved in the battery backupmemory when the system is reset, with the following exceptions:

- The *Rate* in the main menu will be set to *Off*.
- All alarms will be disabled, though the alarm settings will be saved.
- The *Range* setting in the *Tactical* mode will be set to *Auto range*.

5 STANDARD OPERATION

5.1 How to select operational mode

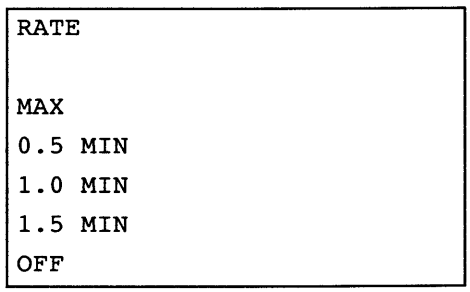
This procedure is described on page 3.

5.2 How to select the interrogation rate

The interrogation rate defines how often you wish to extract data from the active sensors.

1 Select *Rate* on the main menu.
This option is available on all the operational modes.

2 Press the joystick towards right to access the submenu.



3 Select the desired value by moving the joystick up/down and right to select.

Selecting *Max* will allow your system to interrogate the sensors as often as possible. This is useful when the system is started, in order to check that all the sensors are operational, and to ensure that the graphical presentation are established as soon as possible. After some time you may wish to lower the interrogation rate to save sensor batteries.

5.3 How to select active sensors

You can use maximum eleven sensors on your ITI system, but normally not all at the same time. When you have fastened the sensors to the trawl, you must tell the ITI system which sensors you wish to use.

Refer to the *Sensors* section for further information about the sensor types.

1 Select *Active sensors* on the main menu.

This option is available on all the operational modes.

2 Press the joystick towards right to access the submenu.

ACTIVE SENSORS	
TEMPERATURE	OFF
DEPTH	OFF
TEMP-DEPTH	OFF
GRID	OFF
HEIGHT1	OFF
HEIGHT2	OFF
SPREAD1	OFF
SPREAD2	OFF
CATCH	OFF
CATCH AVAIL	1

3 Select the desired sensors.

Each sensor can be switched off, or supply information to the system every time you interrogate, every second time or every third time. This setting is made on the submenu for each sensor.

DEPTH
1:1
1:2
1:3
OFF

4 Select *Catch avail* to define which of the three catch sensors you wish to use.

5.4 How to enter manual speed and course

If your ITI system is diconnected from the ship's speed log and course gyro you need to enter this information manually.

1 Select *Manual input* on the main menu.

This option is available on all the operational modes.

2 Press the joystick towards right to access the submenu.

MANUAL INPUT	
LOG	0.0Kn
GYRO	1°
SENSOR DEPTH	0m
SURFACE TMP	-10°C

3 Select the desired function, *Log* or *Gyro*

4 Select the new value by moving the joystick up or down on the appropriate submenu.

5 Press the joystick towards right to select.

5.5 How to enter manual sensor depth and temperature

If your ITI system does not include depth and temperature sensor(s), you need to enter this information manually.

1 Select *Manual input* on the main menu.

This option is available on all the operational modes.

2 Press the joystick towards right to access the submenu.

MANUAL INPUT	
LOG	0.0Kn
GYRO	1°
SENSOR DEPTH	0m
SURFACE TMP	-10°C

3 Select the desired function, *Sensor depth* or *Surface temperature*.

4 Select the new value by moving the joystick up or down on the appropriate submenu.

5 Press the joystick towards right to select.

5.6 How to define alarm conditions

You may define a number of alarm conditions to monitor the depth, temperature, catch etc. An audible alarm is sounded if the limits you define are exceeded.

1 Select *Audio alarm* on the main menu.

This option is available on all the operational modes.

2 Press the joystick towards right to access the submenu.

AUDIO ALARM	
ALARMS	OFF
DEPTH	
CLEAR1	
CLEAR2	
SPREAD1	
SPREAD2	
GRIDANGLE	
TEMPERATURE	
CATCH1	OFF
CATHC2	OFF
CATCH3	OFF
CMP ES-DEPTH	OFF

3 Select the *Alarms* option, and switch the alarm function *On* (or *Off*).

4 Select the desired sensor(s), and define the limits for each of them.

5 Select which *Catch* sensor alarms to be set *On* or *Off*.

6 Select the *CMP ES-Depth* option to enable the ITI system to compare the measured depth to the depth from the echo sounder.

5.7 How to define the trawl type

Before you start your trawl operation, you must identify the trawl type.

1 Select *System setup* on the main menu.

This option is available on all the operational modes.

2 Press the joystick towards right to access the submenu.

SYSTEM SETUP	
LANGUAGE	ENGLISH
TRAWL SETUP	
VERT SCALE	AUTO
ECHO BEAM	20°
POSITION	AUTO
UNIT TYPE	
DATE INPUT	
SERIAL OUT	
SENSOR FILTER	ON
DEPTH OFFSET	0m

3 Select the *Trawl setup* option.

TRAWL SETUP	
TRAWL WIDTH	30m
TRAWL HEIGHT	8m
TRAWL TYPE	BOTTOM
TRAWL GEAR	SINGLE

4 Set the *trawl width* in meters.

5 Set the *trawl height* in meters.

6 Select *trawl type*; *bottom* or *pelagic*.

7 Select the *trawl gear*; *single* or *dual*.

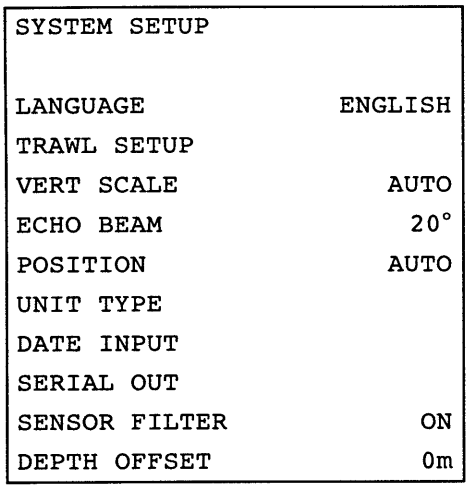
5.8 How to enable the sensor filter

Certain weather conditions may make it difficult to retrieve accurate data from the sensors. It is therefore possible to switch off the measurement filtering on the temperature, depth, height and spread sensors. This allows a faster updating, since each received information from these sensors will be presented.

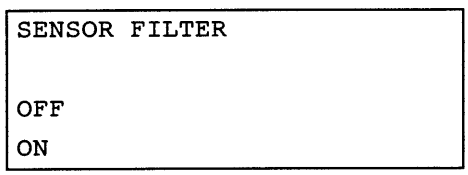
1 Select *System setup* on the main menu.

This option is available on all the operational modes.

2 Press the joystick towards right to access the submenu.



3 Select the *Sensor filter* option.



4 Select *On*, and press the joystick towards right to enter.

The System setup menu shown above is a reduced menu. The full menu is described in section "Command references" under "System setup".

6 TACTICAL OPERATION

6.1 How to select tactical range

The tactical mode gives you a "bird's eye" of the current situation, and you may define the outer range limit of the displayed circle.

1 Select *Range* on the main menu.

This option is only available in the tactical mode.

2 Select the desired range by moving the joystick up or down on the submenu.

3 Press the joystick towards right to enter.

Selecting *Auto* will allow the system to select range depending on the distance to the position sensor.

6.2 How to mark a moving target

If you wish to mark a moving "target" on the display, you can use this function to place a red circle on the desired item.

1 Select *Target marker* on the main menu.

This option is only available in the tactical mode.

2 Press the joystick towards right to access the submenu.

TARGET MARKER	
BEARING	0°
RANGE	0m
DEPTH	0m
SET MARKER	OFF

3 Identify the bearing, range and depth of the target by entering the appropriate data.

4 Select *Set marker* and switch on *On* to see the marker on the display.

If your ITI system is connected to a Simrad SR 240 sonar (or similar), markers defined on the sonar will be exported to the ITI display. These will be displayed as white or red circles.

6.3 How to mark a fixed position

If you wish to mark a fixed position on the display, you can use this function to place a red triangle on the desired item. You can define maximum five different markers.

1 Select *Position markers* on the main menu.

This option is only available in the tactical mode.

2 Press the joystick towards right to access the submenu.

```
POSITION MARKERS

MARKER 1
MARKER 2
MARKER 3
MARKER 4
MARKER 5
```

3 Select the marker you wish to use, and press the joystick towards right.

```
MARKER 1

            N 00   02 . 23
            E003   01 . 12
```

4 Enter the geographical position for the marker:

Press the joystick towards right to place the cursor on the *N 00* field. Press it up/down to increase/decrease the value. Press it towards the right again to enter a value in the next field. Repeat until all the fields have valid values. The last press towards right will enter the georgraphical position into the system.

The marker positions will remain in the system until the ITI is fully reset. If you wish to use any of the five markers to identify a different position, simply alter the geographical position for it.

7 THE DISPLAY CONTROLS

7.1 General information

This chapter describes how to use the control functions on the standard CF 140 display unit supplied with the Simrad ITI system. If an other display type is used, refer to the applicable documentation.

The CF 140 has a control panel located below the screen. The panel holds a total of eight controls, four of which are protected by a cover plate during normal operations. Only one control is used to operate the ITI system in normal operation; The joystick. The other controls are used to adjust the picture displayed on the screen.

7.2 Display image controls

Note !

The controls described here will be set by the engineer when the system is installed, and will not normally be changed. They are therefore protected by a cover-plate to prevent accidental alteration during normal use of the unit.

7.2.1 Vertical position

The Vertical position control enables the picture displayed on the CF140 to be centered in the screen along the vertical axis. Rotate the pot clockwise to raise the picture, or anticlockwise to lower it.

7.2.2 Vertical size

The *Vertical size* control enables the picture to be reduced in size, in the vertical plane. Rotate the pot clockwise to increase the size of the picture, and anticlockwise to reduce it.

7.2.3 Horizontal position

The *Horizontal position* control enables the picture displayed on the screen to be centered along the horizontal axis. Rotate the pot clockwise to move the picture to the right, and anticlockwise to move the picture to the left.

7.2.4 Horizontal size

The *Horizontal size* control enables the picture to be enlarged or reduced in size, in the horizontal plane. Rotate the pot clockwise to increase the size of the picture, and anticlockwise to reduce it.

7.3 Normal controls

The following controls are those used in the normal use of the system.

7.3.1 On/off

The *On / off* switch controls the supply of electricity to the Control and Display Unit, and to any other units which are powered from the display unit. It is a simple rocker switch, with an LED to indicate when power is switched on.

7.3.2 Contrast

The *Contrast* control allows you to adjust the display to the screen contrast preferred. It is located in the cut-away depression between and, below the on/off switch and the joystick.

7.3.3 Brightness

The *Brightness* control enables the operator to adjust the brightness of the picture on the screen. It is located beside the contrast control.

7.3.4 Joystick

The joystick, located in the lower right corner of the Control and Display Unit below the screen, enables you to control the ITI system. The joystick moves a cursor (inverse video, with dark letters on a green background) through list of commands in the menu.

- Each press up or down on the joystick will move the cursor one line up or down in the menu.
- A push to the right on the joystick will select the highlighted command or parameter, or enter the set value into the system and return the system to the sub-menu.
- Pushing it to the left will enter the value set on that parameter and move the system back to the previous level in the menu system.

If the joystick is pressed and held in the up or down positions when a menu or list of parameters is displayed, the cursor will move quickly through the menu and will stop when it reaches the end of the list of options. If the joystick is then released and pressed again in the same direction, the cursor will jump to the other end of the list and continue moving in the same direction as before. This allows you to move more easily to a particular parameter within the menu if he should go past it the first time.

This Turn Around facility is included in all the menus, in all parameter lists where the options are written in text, and in parameters where the values are compass bearings. It is not included in the parameters where the options are numerical values.

The joystick commands are summarized below:

Joystick up Moves the cursor upwards on the menu or increases value of parameter

Joystick down Moves the cursor downwards on the menu or decreases value of parameter

Joystick right Selects parameter/enters value, and returns system to submenu

Joystick left Moves the cursor upwards on the menu or increases value of parameter

7.4 The switches

The signal connection panel on the rear of the unit holds five 2–position switches and a DIP switch block containing four switches. The switches will be set by the installation engineer and should not be altered. If you suspect that one or more of the switches has been altered, or in the event of a malfunction of the display, refer to the maintenance manual to check the switch positions.

8 THE REMOTE CONTROL UNIT

The Remote Control Unit is an option for the vertical shaft hull unit. If the hull unit is fitted in the vessel, this unit is used to control the raising and lowering operations.

The Remote Control Unit is designed to be located close to the Control and Display Unit. It is intended to enable you to lower and raise the hull unit without requiring him to go down to the hull unit compartment to operate the control buttons.

The unit holds the following control buttons and indication lamps:

IN lamp This lamp burns when the system is switched on and the hull unit is fully raised.

UP button You press this button to raise the hull unit.

OUT lamp This lamp burns when the hull unit is fully lowered.

DOWN button You press this button to lower the hull unit.

If both the *In* and the *Out* lamps are burning, the hull unit is between the fully raised and fully lowered positions.

9 BATTERY BACKUP

9.1 Introduction

To reduce the time required to set up the system for use, most of the parameter settings are stored by the system when it is shut down.

9.2 Settings that are stored

The settings which will be remembered are those which are likely to remain the same most of the time. They are as follows:

- All the parameters within the ACTIVE SENSORS sub-menu.
- All the parameters within the MANUAL INPUT sub-menu.
- All the settings within the AUDIO ALARM sub-menu. (The alarms will always be turned off when the system is powered up).
- All the settings within the SYSTEM SETUP sub-menu.
- The latitude and longitude settings of any POSITION MARKERS you have defined.
- The settings within the LOG INTERV. sub-menu.

The parameter settings may be altered at any time. When the system is shut down, it will remember the last settings input to the system, and these will be set into the system automatically when it is next switched on.

9.3 Settings that are NOT stored

The settings **not** saved by the system will have to be reset every time the system is switched on. These are:

- The RATE parameter in the main menu will be set to OFF.
- All alarms will be disabled, though the alarm settings will be saved.
- The RANGE setting in the TACTICAL mode will be set to AUTO RANGE.
- The data displayed on the DATA LOG page will not be saved. This will be built up afresh for each operation.
- The tracking tails behind the vessel and trawl are removed. These will be drawn during the operation.

850-130663/4AA024

Screen presentation modes

This document describes the various operational modes implemented on the Simrad ITI system.

Document revisons

Rev	Documentation Department		Hardware/Software Design		Product/Project Management	
	Date	Sign	Date	Sign	Date	Sign
A	16.01.97	CL	16.01.97	EPB	16.01.97	KEG
B						
C						
D						
E						
F						
G						
H						

(The original signatures are recorded in the company's logistic database)

Contents

Document revisions

(The information on this page is for Simrad's internal use)

Rev. A Based on P2212.

1 INTRODUCTION

The display is divided into two main sections. The left 3/4 of the screen is used for the graphical presentation of the information gathered from the system, while the right 1/4 is used for the interactive menus.

When you first switch the system on, the menu window will display text as shown:

MODE	NORMAL
RATE	OFF
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	

You are now in the Normal mode.

With the cursor on Mode, push the joystick towards right. You may then select between the following operational modes:

- **Normal**

This shows plan, side and end elevations of the position of the trawl in relation to the vessel.

- **Tactical**

This shows the Tactical Plot, a plan view of the vessel and surrounding water, with north to the top of the screen. Ship s course and speed, position markers, range and bearing to those position markers, net position and condition are given.

- **Temp Depth**

This is a graphic presentation of the water temperature with respect to depth, as measured by the temperature sensor attached to the trawl.

- **Trawl Data Log**

This is a graphic display of all the data received from the trawl, with respect to time. The information is presented as lines on a grid, so passed events may be checked.

- **Grid**

This is a graphic presentation of the angle of the diving grid in the cod end of the trawl, and the signal strength from the grid sensor.

- **Status**

This is a tabular display of sensor information, parameter settings, sensor conditions and alarm states so you may check the state of the ITI system without having to read through several different menu pages. The program version is shown on the top line of this page.

- **Test**

This mode allows you to read and check the received information from the sensors each time they interrogate.

Note !

Measurements will only be produced by the system if it is in contact with the necessary sensors. These sensors may need to be switched on in the Active sensors sub-menu.

Distance and temperature units may be altered by accessing the Unit type parameters in the System setup sub-menu. The units stated in these descriptions are the default units (those which the system will automatically display unless other units have already been selected).

The following chapters describe in detail the ITI presentation modes, and the display layout associated with each mode.

2 THE NORMAL MODE

2.1 General

This shows a plan view, a side elevation (seen from the starboard side) and an end elevation (seen from behind) of the position of the trawl relative to the vessel. The vessel will always remain stationary on the screen, with the net, and the sea bed if shown, moving in relation to the vessel.

Measurements derived by the system from the sensors are written in green, while the measurements you define are written in red.

The vessel's current course and speed are written in green in the top left corner of the screen. If the vessel's navigation equipment is connected to the ITI system, the vessel's position in latitude and longitude will be displayed in the top centre of the screen.

2.2 The plan view

The plan view in the upper half of the screen shows a diagram of the vessel (white) towing the trawl (violet), moving from left to right on the screen. One of two trawl diagrams may be presented in this view, depending on the type of trawl currently employed; Single or Double.

2.2.1 Single trawl

The centre-line of the vessel is shown as a horizontal red dotted line, and a solid red dimension line is drawn from the vessel to the sensor selected to provide the position information. If you do not specify a sensor, the system will automatically select one of the sensors according to a priority list. If the Spread1 sensor is selected to be the position sensor, the red line will go to the starboard trawl door. If the Spread2 sensor is selected, the line will point to the port trawl wing.

Note !

To have the red line pointing to the right sensor, the Spread1 communication sensor should always be mounted on the starboard door, and the Spread2 communication sensor should always be mounted on the port trawl wing.

A vertical red dotted line is drawn between the trawl doors, and another is drawn across the trawl opening. These are dimension lines for the Spread1 and Spread2 sensors.

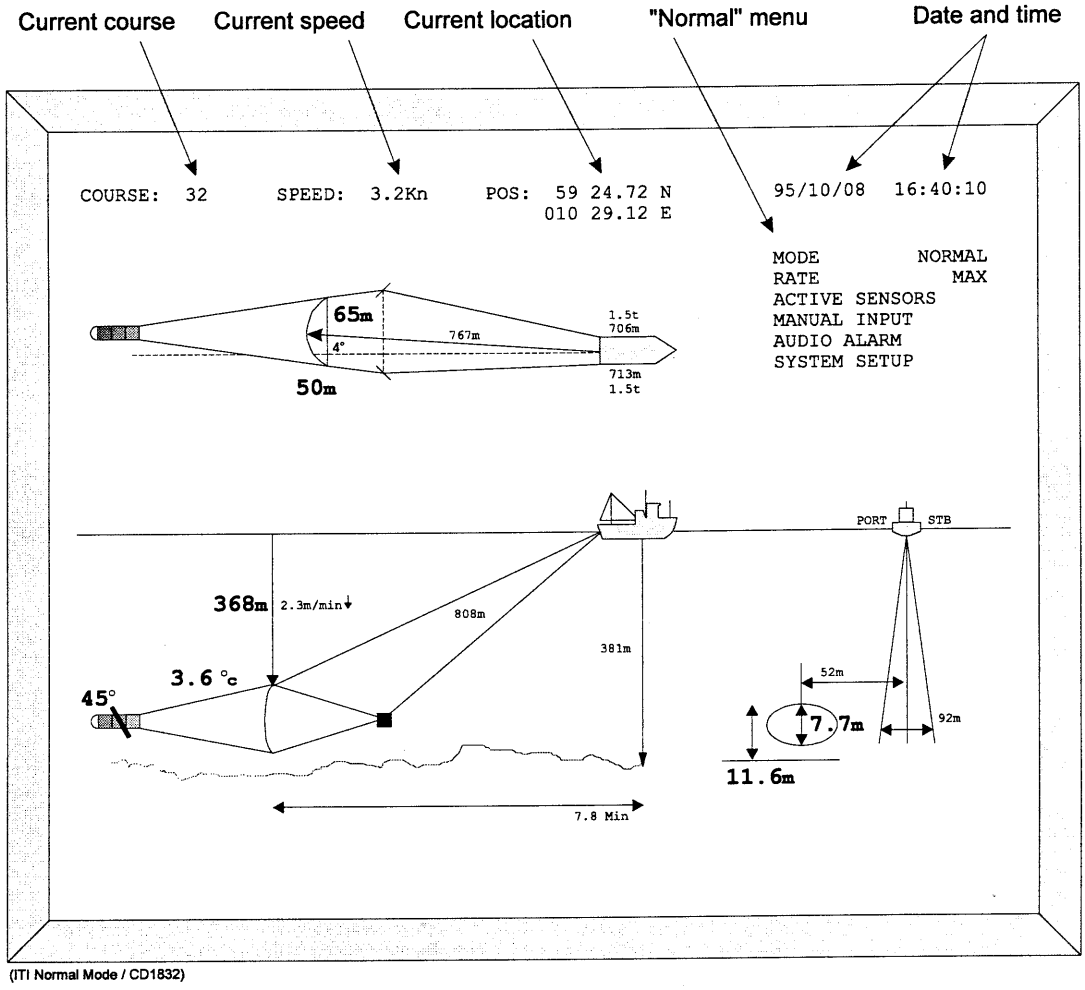


Figure 1 The ITI Normal mode

The catch sensors are shown as green squares, positioned within the trawl cod-end. These squares will turn red as the net fills and the sensors are activated. The catch sensors are named Catch1 through Catch3. Where these sensors are mounted on the trawl is up to the user, who must keep track of which sensor is Catch1, Catch2 or Catch3. If the ITI system should loose communication with one of the catch sensors, the green/red square representing that sensor will turn black.

As the vessel turns, the trawl will move out to one side or the other of the vessel's centre line. This movement is reproduced on the screen by the diagram of the trawl moving to a position above or below the vessel's centre line. The angle between the vessel's centre line and the trawl is shown on the screen. If the trawl is to port of the vessel, it will be shown above the centre line and if to starboard, then it will be shown below the centre line.

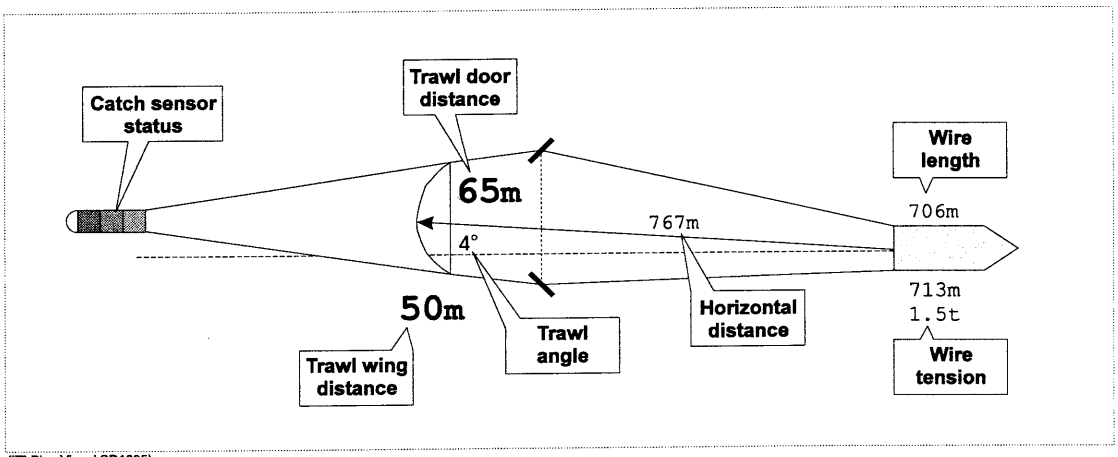


Figure 2 Normal mode, Plan view

In this view measurements are given for:

- The horizontal distance between the vessel transducer face and the sensor selected to supply the position information. The value is written as meters, brazzia, fathoms or yards.
- The distance between the trawl doors. Shown in large figures just to the left of the vertical red dotted line between the trawl doors. The value is written as meters, brazzia, fathoms or yards.
- The distance across the trawl opening. Shown in large figures just below the trawl. The value is written as meters, brazzia, fathoms or yards.
- The angle between the vessel's centre-line (horizontal red dotted line) and the dimension line from the vessel to the position sensor (solid red line). The value is written as "XX".

- If the required equipment is fitted on the vessel, the length of trawl wires out, and the tension in those wires, will be displayed above and below the diagram of the vessel using small figures.

2.2.2 Dual trawl

A special graphical presentation is available if you use a twin trawl.

The upper part of the screen in the Normal mode display can been changed to represent the geometry of a double trawl. By selecting Dual trawl, the diagram shown below will be displayed in the upper part of the screen. The presentation uses only information provided by the Spread1 and Spread2 sensors. As indicated in the figure, only four distances or numbers are presented.

Note !

This presentation is only possible if two sets of spread sensors (Spread1 and Spread2) are in use. It is vitally important that the Spread1 Communication sensor is mounted on the port trawl wing, while the Spread2 Communication sensor must be mounted on the starboard side trawl wing. This is opposite to their positions when mounted on a single trawl.

a = slant range 1 (spread 1) c = opening 1 (spread 1)

b = slant range 2 (spread 2) d = opening 2 (spread 2)

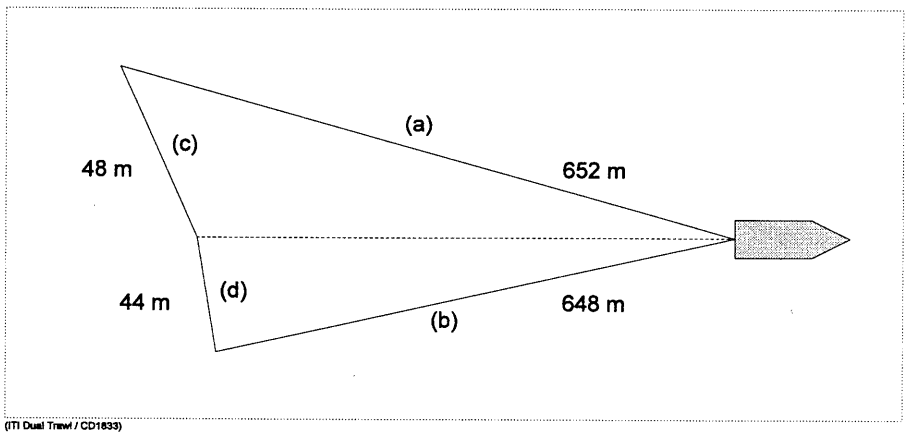


Figure 3 The dual trawl diagram

When a dual trawl is correctly deployed, distances (c) and (d) (representing the two trawl openings) should be equal or very similar. Distances (a) and (b) should also be similar. However, small differences between distances (a) and (b) are normal due to sideways drift of the trawl relative to the ships course. Small differences between (c) and (d) or (a and b) will be graphically exaggerated on the display to clarify them.

It is intended that you should be able to tell whether everything is normal or not just by looking at the symmetry of the figure.

The dotted line will always go through the centre-line of the vessel. Line (a) will be longer than line (b) if the slant range from Spread1 is greater than the slant range from Spread2.

All three catch sensors can be used with the dual trawl, but the indicator squares will only be displayed in the side elevation diagram in the lower part of the screen. The system will not indicate where on the trawl the various catch sensors are mounted, so you must make a note of their positions before the trawl is used.

Note that there is no angle presentation in this picture.

2.3 The side view

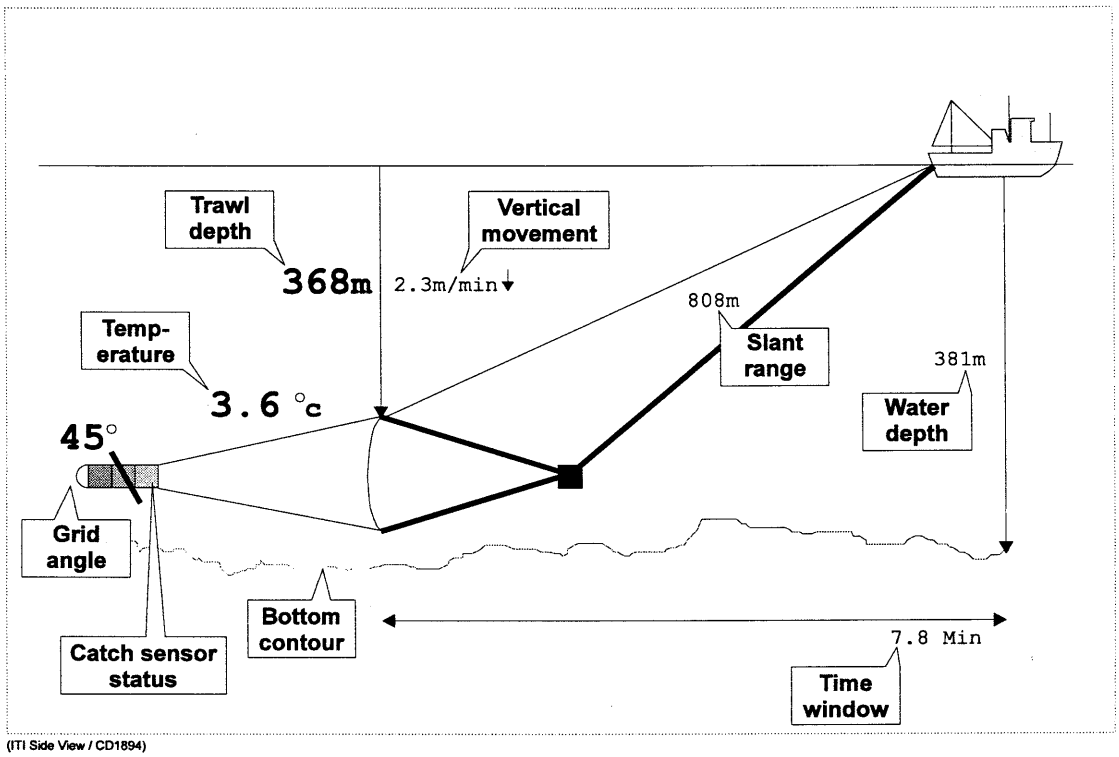


Figure 4 Normal mode, Side view

The side view in the lower left part of the screen shows a diagram of the vessel (white) on a water line (pale blue) towing the trawl (violet). If the vessel's echo sounder is connected to the ITI system via the serial port, and the sea bed is within the selected depth scale, then the sea bed will be shown on the ITI screen under the vessel as a blue line. If the vessel is fitted with Simrad's EQ 100 echo sounder, the seabed will be displayed in various colours depending on its hardness. The colours vary from pale blue, denoting soft, to red, denoting hard.

The depth of water below the vessel is shown by a vertical solid red dimension line below the vessel, while the depth of the trawl head–rope is shown by a vertical red dimension line between the water line and the head–rope.

The angular distance (slant range) between the sensor selected to provide the position information and the ITI vessel transducer is shown as a red dimension line joining the sensor to the stern of the vessel. Below the diagram is a horizontal red dimension line with an arrow head on both ends. This shows the time which will elapse between the vessel and the trawl passing over the same point on the sea bed, at the current speed.

Note !

In the Vertical scale sub–menu, you can select automatic scaling or a fixed scale from 50 to 2000 meters. When Phase is selected, the lower part of the side elevation picture (1 / 4 of the picture) will always represent 25 meters of the vertical scale, seen from the bottom upwards.

When a fixed vertical scale is selected, the seabed will not be displayed if the selected scale is smaller than the actual water depth. The diagram of the trawl will also disappear from the side elevation picture if the trawl depth is greater than the selected scale. In this case, the error message Vertical scale too small will be displayed in red text in the upper right corner of the screen. The error message will also be shown on the status page. When Auto or Phase is selected in the Vertical scale sub–menu, the bottom contour will always be displayed (assuming that the bottom is within the range of the height sensor or that the vessel's echo sounder is connected to the ITI system.

In the side elevation, measurements are given for the following parameters:

- The depth from the echo sounder transducer to the sea bed. Shown below the boat, to the left of the vertical depth line. The value is written as meters, brazzia, fathoms or feet.
- The angular distance (slant range) between the ITI vessel transducer and the trawl head–rope. Shown to the left of the violet trawl wire, between the vessel and the net. The value is written as meters, brazzia, fathoms or yards.
- The vertical movement of the trawl head–rope. Shown to the right of the head–rope depth line.
  Written as "x.x m/min ↑ or ↓".
- The depth of the trawl head–rope. Shown to the left of the head–rope depth line. The value is written as meters, brazzia, fathoms or feet.
- The temperature of the water around the net, as measured by the temperature sensor mounted on the trawl head–rope. Shown above the net to the left of the head–rope depth line. Written as "x.x°C or °F".

- The time which will elapse between the vessel and the net passing over the same point on the sea bed at the present speed. Shown below the right end of the time elapse line. Written as "x.x Min".
- 3 squares present the Catch sensor status.
  - Green square = communication, but not activated
  - Red square = communication and activated
  - Black square = no communication

2.4 The end view

The end view in the lower right part of the screen shows the vessel (white), on a water line (pale blue), and the trawl (violet), over the sea bed (pale blue). The vessel has a centre line extending vertically below it, (dark blue), and the trawl has a short centre line drawn through its vertical axis (dark blue). If the trawl is not directly behind the vessel, then the two centre lines will be connected by a dimension line, shown as a horizontal red line with arrow heads on both ends, and the distance between the two centre lines will be given. Two green lines extend down at an angle from the vessel. These show the beam coverage of the echo sounder. (The correct echo sounder beam width should be entered into the System setup menu). They are connected by a red dimension line at the depth of the head-rope, and give an indication of the width of the beam coverage at that depth. This therefore shows the width of the sea bed picture, and shows whether the trawl is actually within the area of the sea bed surveyed by the echo sounder.

In this view, measurements are given for the following parameters:

- The horizontal distance (sideways) between the vessel's centre line, (long vertical blue line), and the centre line of the trawl, (short vertical blue line). Shown in above the outer-most end of the upper horizontal dimension line. The value is written as meters, brazzia, fathoms or feet.
- The horizontal coverage of the echo sounder beam at the depth of the trawl head-rope. Shown above one end of the lower horizontal dimension line. The value is written as meters, brazzia, fathoms or feet.
- Bottom trawling - The vertical distance between the trawl's head-rope and foot-rope, shown inside the trawl opening. The vertical distance from the foot-rope to the bottom, shown as a red line. The values are written as meters, brazzia, fathoms or feet.

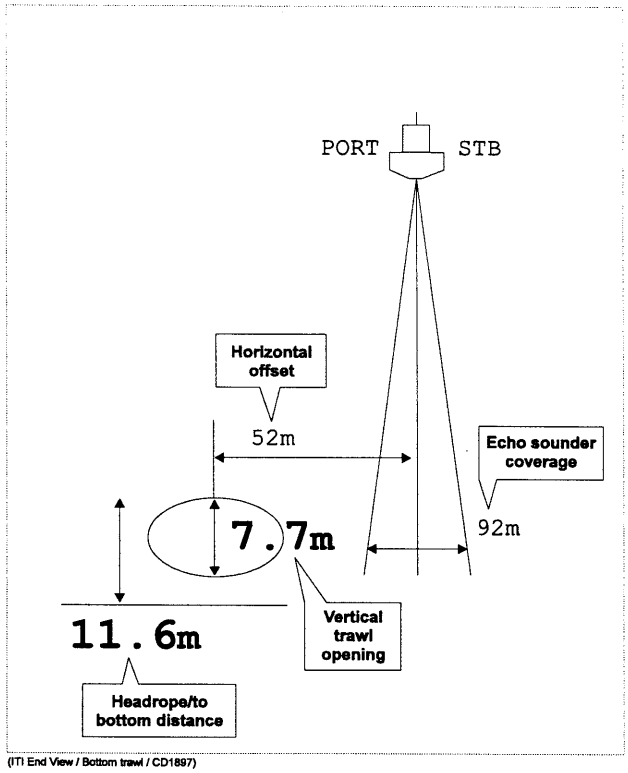


Figure 5 End view, bottom trawl

- Pelagic trawling – The vertical distance between the head–rope and the foot–rope, shown inside the trawl opening. The height of the head–rope above the bottom, shown to the left of the trawl centre line, under the pale blue bottom line. The values are written as meters, brazzia, fathoms or feet.

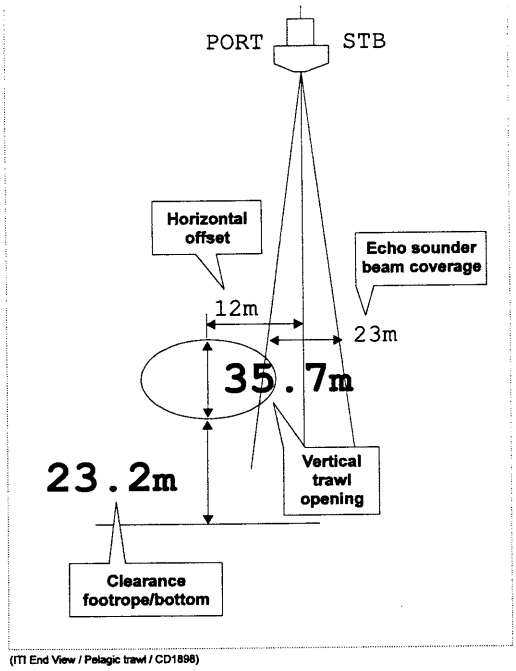


Figure 6 End view, pelagic trawl

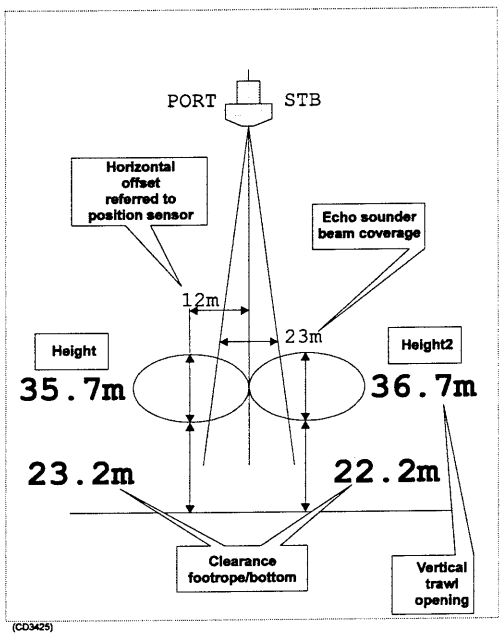


Figure 7 End view, pelagic trawl, two height sensors

2.5 The main menu

In the *Normal* mode, the menu window will display the following parameters:

MODE	NORMAL
RATE	X.X MIN
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	

The various parameters adjustable in the *Normal* mode are described in the Command references section of this manual.

3 THE TACTICAL MODE

3.1 General

This mode shows the Tactical Plot. This is a plan view of the vessel and surrounding water. The range of the plot (the outer radius of the circle) may be set to a maximum of 4000 m.

3.2 Screen layout

The extremity of the plot is marked by a white circle. North is to the top of the screen, and the cardinal points are marked around the circle, which is graduated in 10 steps. The vessel appears as a small white shape at the centre of the plot.

Within the plot are four range rings. These appear as concentric blue dotted circles centred on the vessel. The maximum range of the plot, and therefore the distance between the rings, may be set automatically, or by you, to give the best view of the surrounding area.

The vessel's course appears as a white dotted line extending in front of the vessel, and its track is shown as a solid white line extending behind it. The trawl is shown in violet, with a violet dotted line extending between the trawl and the vessel. The trawl's track appears as a solid violet line extending behind the symbol.

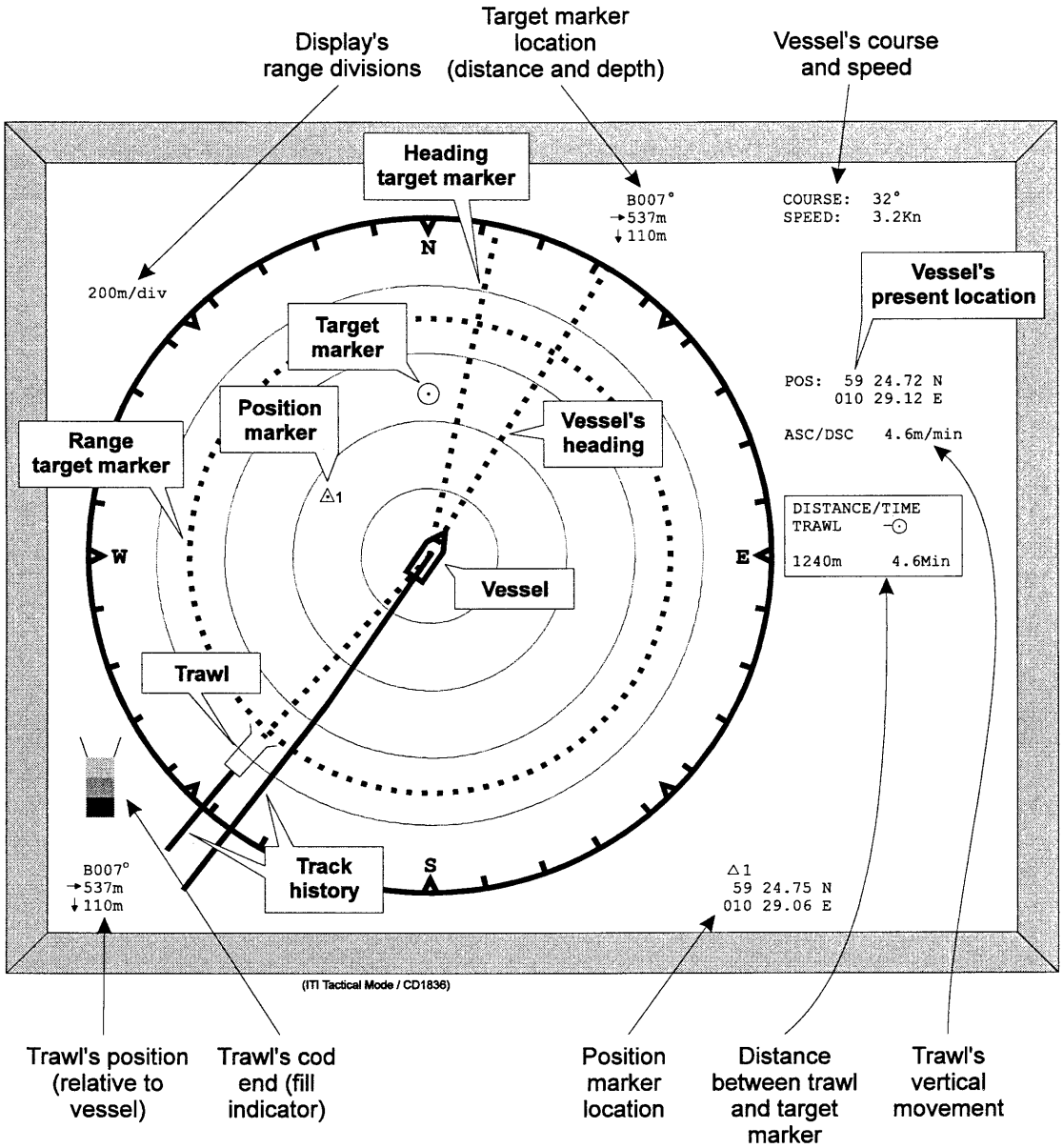


Figure 8 The tactical mode display layout

3.3 Markers

A target marker, if displayed, will appear as a red or white circle. It is red if it is manually entered into the system, and white if it is automatically entered by an interconnected sonar system

The target marker bearing is shown as a yellow dotted line extending from the vessel to the edge of the plot, and the target marker range is shown as a yellow dotted circle centred on the vessel. Before a target marker has been manually entered, the bearing line will be set on 0/360 , while the range circle will set on 0m, and therefore will not be visible. Position markers, if entered, are displayed as red triangles with associated designation numbers. The procedure for setting a marker is described in the Operational procedures section of this manual.

3.4 Text information

Course and speed

The vessel's course and speed are written in green in the upper right corner of the screen.

The information is laid out as shown below:

```
COURSE: XX_
SPEED: XX.XKn
```

The distance between the range rings is written in blue in the upper left corner of the screen.

The information is laid out as shown below:

```
XXXm/div
```

Trawl cod-end and fill indication

In the lower left corner of the screen is a diagram of the trawl cod-end. This is to indicate when the net is full. On shooting the net and setting the parameter in the Active sensors sub-menu, the diagram will contain a number of green squares. These correspond to the number of catch sensors on the net. As the net fills and a catch sensor is activated, its corresponding square will turn to red. If for some reason the system loses communication with a sensor, then the corresponding green square will turn to black.

Net position

Below this diagram, written in violet, is the position of the net in relation to the vessel. Note that Catch1 should be located closest to the cod-end, with Catch3 closest to the head-rope. The information is laid out as shown below:

```
□□□
□□□
□□□
  □□
B 000°
→ XXXXm
↓ XXX.Xm
```

Target marker

Above and to the right of the tactical plot may be seen the bearing, range and depth of the Target marker if set. This will be written in white if the input is from the Simrad SR 240 or SD 570 sonars, or red if it is input manually.

The position of the target marker will be displayed on the screen as a small circle.

The information is laid out as shown below with units dependent on unit setting:

```
B 000°
→  XXXm
↓  XXXm
```

Position markers

If position markers have been set, the position of the designated marker will be displayed below and to the right of the plot as latitude and longitude. The information is laid out as shown below:

```
Δ1
xx xx.xx N
xxx xx.xx E
```

3.5 The main window

In the Tactical mode, the menu window will be displayed when pushing the joystick to the left or to the right. The following parameters will be displayed:

```
MODE                    TACTICAL
RATE                     0.5 MIN
ACTIVE SENSORS
MANUAL INPUT
AUDIO ALARM
SYSTEM SETUP
RANGE              XXXX OR AUTO
TARGET MARKER
POSITION MARKERS
ERASE TAILS OFF
```

If the system is connected to the vessel's navigation equipment, the present position of the vessel will be displayed in the menu.

```
POS:      XX XX.XX N
         XXX XX.XX E
```

The display also presents the current vertical movement of the trawl as follows. Units will be in, meters, feet, fathoms or brazzia, dependent on unit setting.

```
ASC/DSC    X.Xm/min ↕
```

Displayed in the box in the lower part of the menu is the distance between the trawl and the target marker (if set), and the time at the present speed which the trawl will take to arrive at the position of the target marker.

```
DISTANCE/TIME
TRAWL -  0
XXX m  X.X Min
```

The various parameters adjustable in the Tactical mode are described in the Command references section of this manual.

4 THE TEMP DEPTH MODE

4.1 General

This is a graphic presentation of the water temperature with respect to depth, as measured by using a temperature sensor and a deph sensor or the combination (temp/depth) sensor attached to the trawl.

4.2 Screen layout

Axes of Temperature against Depth are shown, in white, with a red grid between them. The Temperature axis is drawn horizontally, and is graduated from –5 °C on the left of the grid, to +25 °C on the right. The depth axis is drawn vertically, and is graduated from 0 meters at the top of the grid, down to 400 meters at the bottom. The depth graduation will change automatically if the trawl goes below 400 meters.

The temperature reading is shown as a green line on the grid.

The main menu

In the Temp depth mode, the menu window will display the following parameters:

MODE	TEMP DEPTH
RATE	OFF
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	
ERASE DATA	OFF
DEPTH SCALE	XX m

The depth scale units are dependent on the unit setting.

The parameters which are adjustable in the Temp depth are described in the Command references section of this manual.

5 THE TRAWL DATA LOG MODE

5.1 General

The *Trawl data log* mode is a graphic display of all the data the system has received from the trawl during this operation, with respect to time. Presented on the display are five graphs. In all five the horizontal axis is elapsed time, while the vertical axis is the sensor variables. Axes of Time against Depth, head–rope/foot–rope and head–rope height above sea bed, trawl door Spread, water Temperature, and Catch sensor input are shown. The axis are coloured white, with a red grid between them.

Note !

Distance and temperature units may be altered as desired by you, by accessing the Unit type parameters within the System setup sub–menu. Those stated in these descriptions are the default units.

5.2 The time axis

The Time axis is graduated in either 15 or 30 minute intervals, and displays the values provided by the sensors as they were up to either 3.5 hours or 7 hours before the present. The time interval may be set to the desired range by accessing Log interv in the menu. The other axes are drawn vertically, and are graduated appropriately for the parameters displayed.

5.3 Text information

If the vessel is fitted with navigation equipment, and this is connected into the ITI system, then the current position of the trawl will be displayed, written in pale blue, in the top left corner of the screen.

In the top centre of the screen are displayed, again written in pale blue, the vessels current course and speed, and a date/time block for the Time marker. The facility is described later in this chapter.

5.4 The graphs

From the top, the graphs displayed are:

DEPTH against TIME

This shows the depth of the trawl head–rope The depth axis extends to a maximum of 2000 m depending on the range set in the *Depth scale* parameter. The reading is accurate to the nearest 0.1m.

The depth measurement made by an external echo sounder (if available) is shown in the same graph.

HEIGHT/HEIGHT2 against TIME

This shows the height of the trawl opening (head–rope to foot–rope), and the height of the head–rope above the bottom. The Height axis is scaled to a maximum of 100 m, depending on the range set in the *Height scale* parameter. The reading is accurate to the nearest 0.1 m.

SPREAD against TIME

This shows the distance between the trawl doors (information supplied by the Spread 1 sensor) in the upper field, and the distance between the trawl wings (information supplied by the Spread 2 sensor) in the lower field. The Spread axis is graduated to a maximum of 300 m, depending on the range set in the *Spread scale* parameter. The reading is accurate to the nearest 0.1 m.

TEMP against TIME

This shows the temperature of the water around the trawl. The axis is graduated from 0 to 25°C, in five intervals. The reading is accurate to the nearest 0.1°C.

CATCH against TIME

This shows the times at which the catch sensors are activated. The graph will display a horizontal bar for each catch sensor installed and operating on the trawl cod–end. Before the sensors are activated, the bars will be coloured green, while after activation they will be coloured red.

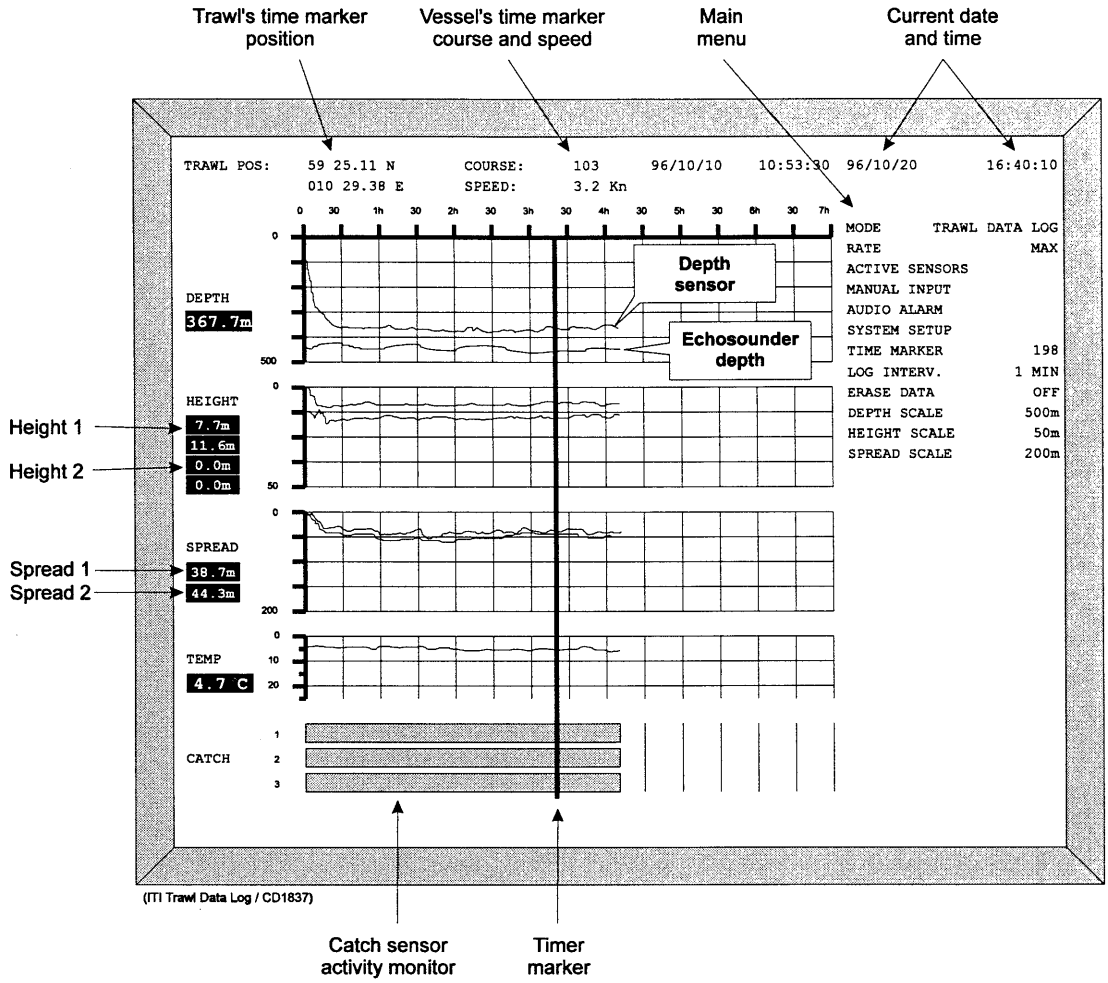


Figure 9 The Trawl Data Log display presentation

5.5 The time marker

The ITI system generates a time marker to assist you with assessing the displayed information. The marker is displayed as a narrow vertical blue line, and it may be used to find and display the exact values of the information provided by the sensors at any given time up to the maximum of seven hours before the present. The marker will move in 30 sec. or 1 min. steps, depending on the time scale you define.

Readings of the sensor values at the time marker are displayed, written in black on a white background, just below the appropriate sensor name.

Note ! *All the values displayed in the white boxes beside the vertical axes, and the vessel's position, course and speed displayed at the top of the screen, are related to the position of the time marker.*

5.6 The main menu

In the Trawl data log mode, the menu window displays the following parameters:

MODE	TRAWL DATA LOG
RATE	X.X MIN
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	
TIME MARKER	XXX
LOG INTERV.	XX XXX
ERASE DATA	OFF
DEPTH SCALE	100M
HEIGHT SCALE	50M
SPREAD SCALE	100M

The parameters adjustable in the Trawl data log mode are described in the Command references section of this manual.

6 THE GRID MODE

6.1 General

The Grid mode is similar to the Trawl Data Log mode, but only contains two graphs: Grid angle and signal strength versus time.

6.2 The graphs

ANGLE versus TIME

The top graph shows the grid angle history , ie how it has moved for the past three hours. 90° means that is in vertical position, while 0° is horizontal.

SIGNAL strength versus TIME

The bottom graph shows the signal strength from the grid sensor versus time.

Refer to the display example on the next page.

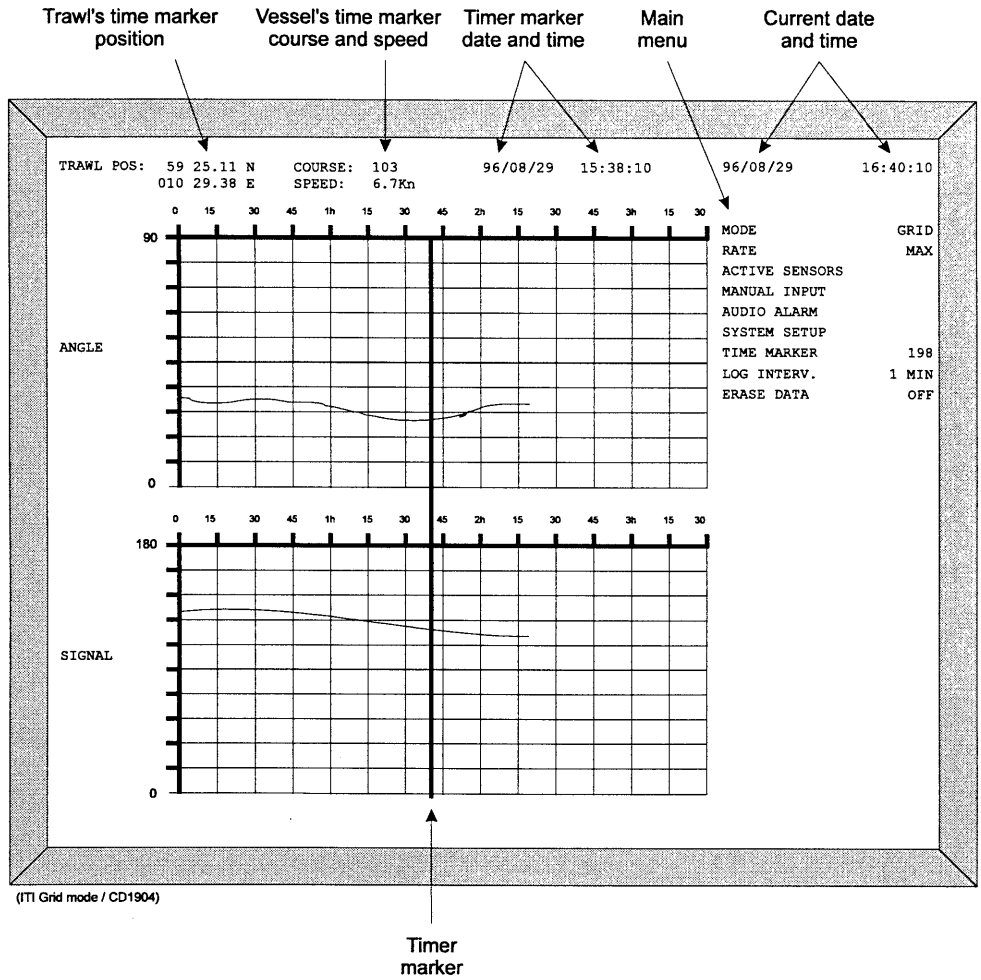


Figure 10 Grid mode display presentation

7 THE STATUS MODE

7.1 General

This is a tabular display of the important system parameter settings, sensor data and alarm conditions. The top line of the screen is used as a title line, while the rest of the screen is divided horizontally into three main sections.

7.2 The title line

On the top left of the screen, written in white, is the title of the mode, STATUS ITI. Next to this in the centre of the top line, also written in white, is the software version and the date the software was registered. The menu and the Date/Time block appear on the right of the screen as usual.

The rest of the information presented is written in green.

7.3 The top section

The upper third of the display area presents a list of which of his sensors are activated. For each of those sensors, the interrogation interval, slant range, bearing, the current sensor data which is being sent, and the limits of the alarm settings are given.

7.4 The centre section

The centre line informs you of any alarms which may have been sounded by the system, the reasons for those alarms, and the times at which those alarms were first sounded. A list of the alarm messages can be found in the Command references section of this manual.

7.5 The lower section

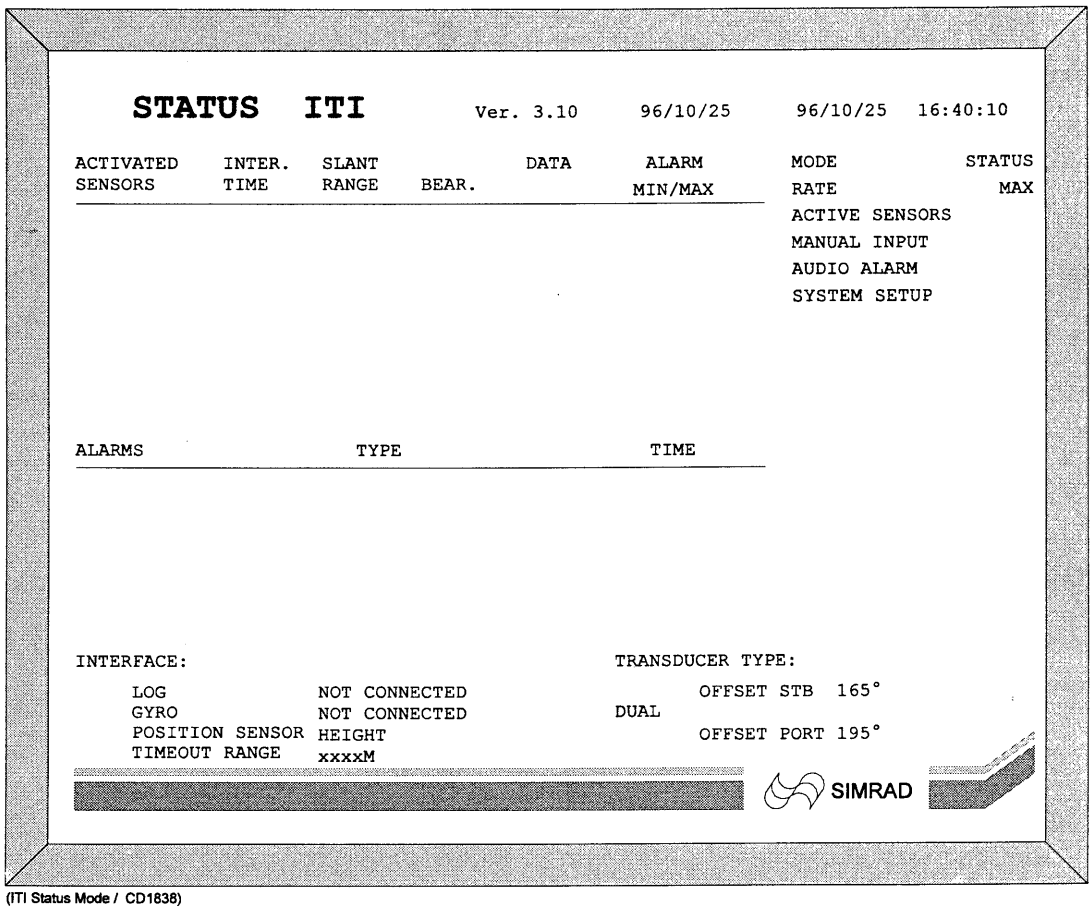
The lower line informs you which types of log and gyro-compass equipment are currently connected into the ITI system, which sensor is currently being used as the reference sensor to provide the trawl position information, transducer setting and timeout range setting.

7.6 The main menu

In this mode, the menu will display the following parameters:

MODE	STATUS
RATE	OFF
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	

The parameters which are adjustable in the Status mode are described in the Command references section of this manual.



(ITI Status Mode / CD1838)

Figure 11 Status mode display presentation

8 TEST MODE

The *Test mode* is also called the Test page. In this mode the replies and data from the sensors will be displayed on the screen in nine columns as shown below. In this example the *Temperature, Height, Catch, Spread* and *Depth* sensors have been activated, and it is assumed that a dual transducer is used.

SEN-SOR	TIME	SR	B	TD	ENV.	DATA	COMMENTS
Temp.	21.57.48	1152	196	P	3.3	11.0	
Height	21.57.58	1150	196	P	3.5	16.2 78.0	
Catch	21.58.08	1225	194	P	3.4	ON	
Spread	21.58.19	1060	190	P	3.5	126.8	
Temp.	21.58.28						Timeout pulse 1
Height	21.58.38	1151	195	P	3.4	16.0 79.1	
Catch	21.58.48	1225	193	P	3.5	ON	
Spread	21.58.58	1062	190	P	3.5	125.7	
Temp.	21.59.08	1150	195	P	3.6	11.1	
Depth	21.59.18			S	3.0	-38 13 62	Start shot
Depth	21.59.27			P	3.4	-64 -16 35	Searching
Depth	21.59.37			S	2.9	-34 17 65	Searching
Height	21.59.47	1151	194	P	3.5	16.3 80.2	
Catch	21.59.37	1224	191	P	3.5	ON	
Spread	21.59.47	1062	189	P	3.4	125.0	
Temp.	21.59.57	1149	194	P	3.5	11.0	
Depth	22.00.07	1150	194	P	3.4	354.6	

- The SENSOR column states which sensor has been interrogated.
- TIME gives the time of interrogation.
- SR indicates the Slant range or distance to the sensor in meters.
- The *B* column gives the bearing to the sensor, measured relative to the vessel's bow.
- ENV is the envelope of the received signal. When *Autogain* is on, the gain will automatically adjust until the envelope is stable at 3.5. In shallow water (in harbour) *Autogain* should be set to *Off* because the signal level will vary considerably. The envelope can vary between 0.0 and 5.0.
- DATA is the actual information received from the sensor. In the example the temperature is 11.0°C. The Height sensor will display two values; the first being the distance to the foot-rope, the second being the distance to the sea bed.

- Comments will contain any messages generated by the system. These may be as follows:
  - No message = Reply from sensor accepted
  - Timeout pulse 1 = Pulse 1 from sensor missing
  - Timeout pulse 2 = Pulse 2 from sensor missing
  - Timeout pulse 3 = Pulse 3 from sensor missing (only *Height* sensor and *Temp / Depth* combination sensor).
  - Start shot = First interrogation after a new sensor is activated.
  - Searching = Searching through the beams. (Only when *Beam* is set to *Auto* in the Test menu).
  - Rejected pulse = A reply pulse was received from the sensor, but the pulse quality was too bad for the system to accept it. Could be caused by noise.
  - Outside window = Sensor reply is found outside tracking window.

850-130660/4AA024

Command references

This document describes the commands available for your operation of the Simrad ITI system. The information is only intended for reference purposes, and it is not necessary to read this section to perform the day-to-day operation of the system.

This document describes the commands and options available with a specific software version.

Document revisons

Rev	Documentation Department		Hardware/Software Design		Product/Project Management	
	Date	Sign	Date	Sign	Date	Sign
A	16.01.97	CL	16.01.97	EPB	16.01.97	KEG
B						
C						
D						
E						
F						
G						
H						

(The original signatures are recorded in the company's logistic database)

Contents

Document revisions

(The information on this page is for Simrad's internal use)

Rev. A Based on P2212

1 INTRODUCTION

This document contains a detailed description of the menus, commands and parameters available in the ITI system. Since the main menu differs between the main modes, the document is organized with these modes as main chapters. A command appearing in more than one mode is only explained the first time it appears.

Note !

This document is based on software version 3.10. In Simrad, software development is an on-going process to improve our products. A change in the software may often result in new and improved facilities, and these may not be covered by this document. If the software version on your system differs from 3.10, refer to the Software updates section in this manual.

2 NORMAL MODE

The *Normal mode* is the default mode, and the ITI system will always start on this menu when switched on.

Note !

If a gyro is connected to the ITI, the system will initially display a command sequence to obtain the vessel s current heading. Refer to the Operational procedures section for further information.

The *Normal* menu is shown below:

MODE	NORMAL
RATE	OFF
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	

The commands listed above are regarded as the standard command set. Other modes will add various commands to this list.

Note !

A bottom command Sim.bearing is visible on the main menu if the system's built–in simulator is activated. Refer to page 35 for further information.

2.1 Mode

Purpose The *Mode* command controls the presentation of the data on your display

Options
Normal
Tactical
Temp depth
Trawl data log
Grid
Status
Test

Default Normal

Description The various presentation modes in the ITI system are described in the *Screen presentation modes* section this manual.

This command allows you to select which operational mode to use.

2.2 Rate

Purpose This command is used to select the speed of the sensor interrogation sequence.

Options
Max
0.5 min
1.0 min
1.5 min
Off

Default Off

Description The ITI system transmit acoustic messages on different frequencies to each sensor, and this message initiates a data re-transmission from the sensor. Each sensor has a different frequency.

This command defines how often the ITI system interrogates all the active sensors; every 30 seconds, every 60 seconds, every 90 seconds or not at all. If you select *Max* rate, the system will interrogate as often as possible.

Each active sensor may not be interrogated every time. That will only be the case if the ratios in the *Active sensor* sub-menu are all set to 1:1. The interrogation rate for an individual sensor will depend on both the overall Rate setting made here and the individual ratio set within the *Active sensor* submenu.

Refer to the *System familiarization* section for a brief explanation on the theory of operation.

2.3 Active sensors

Purpose This command allows you to decide which sensors to use.

Options
Temp
Depth
Temp-depth
Grid
Height
Height2
Spread1
Spread2
Catch
Catch avail

Default Off

Description This command controls the individual interrogation rates of the sensors. The interrogation rate of each sensor will depend on how often information is required from it. The individual interrogation rates are set as a ratio to the trigger signal *Rate* (see previous command description).

This method of setting the interrogation intervals enables you to have different settings for different sensors. You can then reduce the number of reply pulses to be transmitted by the sensors, thus extending the sensor s battery life.

For further information about the options, refer to the following paragraphs

Additional info. Example:

If the *Rate* is set to 1 minute, the system will complete one interrogation sequence every 60 seconds. If the Height sensor's ratio is set to 1:2, the system will interrogate this specific sensor only on every second sequence, ie. once every 120 seconds

2.3.1 Temp

Purpose This parameter allows you to activate and set the interrogation rate of the temperature sensor.

Options
1:1
1:2
1:3
Off

Default Off

2.3.2 Depth

Purpose This parameter allows you to activate and set the interrogation rate of the depth sensor.

Options
1:1
1:2
1:3
Off

Default Off

2.3.3 Temp–depth

Purpose This parameter allows you to activate and set the interrogation rate of the combination sensor. This sensor combines the functions of the Temperature and Depth sensors

Options
1:1
1:2
1:3
Off

Default Off

Description If the Temp–Depth sensor is activated, it will not be possible to set the Temperature and Depth sensors separately.

2.3.4 Grid

Purpose This command allows you to activate and set the interrogation rate for the Grid sensor.

Options
1:1
1:2
1:3
Off

Default Off

Description The Grid sensor is mounted on the angled grid mounted at the rear end of the trawl. If the Temperature sensor is activated, it will not be possible to set the Grid sensor.

2.3.5 Height

Purpose This parameter allows you to activate and set the interrogation rate of the Height sensors.

Options
1:1
1:2
1:3
Off

Default Off

Description You can control two height sensors. These are identified as *Height* and *Height2*, and are controlled individually with the two command options. Two different frequencies are used for interrogation.

2.3.6 Spread

Purpose This command allows you to activate and set the interrogation rate of the Spread sensors.

Options
1:1
1:2
1:3
Off

Default Off

Description You can control two spread sensors. These are identified as *Spread1* and *Spread2*, and are controlled individually with the two command options. Two different frequencies are used for interrogation.

2.3.7 Catch

Purpose This command allows you to activate and set the interrogation rate for all the Catch sensors simultaneously.

Options
1:1
1:2
1:3
Off

Default Off

Description The three available catch sensors are interrogated by the same pulse frequency, and they must have the same interrogation rate. However, you can select which of them to display by using the *Catch avail* command.

2.3.8 Catch avail

Purpose This command allows you to select which of the three catch sensors to be presented on the display.

Options
1
2
3
1&2
1&3
2&3
1&2&3

Default 1

Description All the catch sensors are interrogated at the same time. By means of these options, you can decide which of them are to be used.

Additional info. Each catch sensor has a label indicating the sensor number. If you are not sure which catch sensor is mounted on the trawl, set *Catch avail* to 1&2&3 and enter *Status mode* to see which sensors reply to the interrogation.

2.4 Manual input

For the ITI system to be able to perform the necessary calculations to build up the screen pictures, certain basic information is required. This information will normally be supplied from external equipment connected to the ITI system. However, if the source equipment is not operational, or is not fitted in the vessel, this *Manual input* command allows you to set it into the system manually.

Purpose This command allows you to enter basic operational information manually.

Options
Log
Gyro
Sensor depth
Surface temp

Default None

Description
Log allows you to enter the vessel s current speed

Gyro allows you to enter the vessel s current heading

Sensor depth allows you to enter the current trawl depth

Surface temp allows you to enter the current surface temperature

Additional info. Each command is described in more detail in the following paragraphs

2.4.1 Log

Purpose The purpose of this command is to allow you to enter the vessel s current speed manually..

Options *0.0 to 30.0 kn in step of 0.1 kn*

Default 0.0 kn

Description If no external input is available from a speed log or Global Positioning System (GPS), this parameter must be set manually to enable the ITI system to dimension the *Mode* pictures correctly and to produce the correct picture of the sea bed in the *Normal* mode. The parameter must be set to 0 if an external input is available, otherwise the external input will be overridden.

2.4.2 Gyro

Purpose The purpose of this command is to allow you to enter the vessel's current heading manually. This is required when you switch on the system

Options *0° to 359° in 1 steps*

Default 359°

Description This is a manual input of the vessel's course. Normally the ITI system will be connected to an incremental gyroscope which will require the initial value to be set manually when the ITI system is switched on.

Note ! *If a GPS is connected to the ITI system, do not enter this menu. In all other cases, the gyro course must be set at the beginning of each mission. If a gyro is connected and identified to the system, it will always start up with this command, and force you to enter the vessel s course.*

Refer to the on/off procedure in the *Operational procedures* section for further information.

2.4.3 Sensor depth

Purpose This command allows you to define the current water depth of the trawl.

Options *0 m to 1999 m in 1 m steps*

Default 0 m

Description The *Sensor depth* supplies information used during calculation of the graphical pictures. You are given the facility to set this parameter manually should the Depth sensor not be available. If this parameter is set to 0m (default) and the system does not include a depth sensor, the graphical presentation will place the trawl symbol close to the surface.

2.4.4 Surface temp

Purpose This command allows you to enter the current water surface temperature

Options *-10°C to +30°C in 1° steps*

Default -10°C

Description This value must be entered before a Temp-depth plot can be made.

2.5 Audio alarm

The Audio alarm command allows you to set limits on the position and condition of the trawl. If any of those limits are exceeded, or if the system detects a fault, it will sound an alarm, and display the appropriate messages on the *Status* page.

Purpose This command allows you to define the alarm limits.

Options
Alarms
Depth
Clear
Clear2
Spread1
Spread2
Grid angle
Temp
Catch1
Catch2
Catch3
CMP ES–Depth

Description The various options are explained in detail in the following paragraphs

Once an alarm has been triggered, it can be switched off again by moving the joystick in any direction.

2.5.1 Alarms

Purpose This command allows you to switch the alarms on and off.

Options
On
Off

Default Off

Description Note that this command controls all the alarms

2.5.2 Depth

Purpose This command enables you to define alarm limits on the trawl depth.

Options
Min: 0 m to 2000 m in 1m steps
Max: 0 m to 2000 m in 1m steps

Default
Min: 0 m
Max: 0 m

Description If the trawl moves outside the alarm limits defined, the audible alarm will be activated.

2.5.3 Clear & Clear 2

Purpose This command allows you to set the minimum and maximum clearance between the footrope and the sea bed

Options *0 m to 100 m in 1 m steps*

Default 0 m

Description If the trawl moves outside the predefined limits, the audible alarm will initiated.

2.5.4 Spread 1

Purpose This command allows you to monitor if the distance between the trawl doors drops below the minimum limit, or increases beyond the maximum limit

Options *Min: 0 m to 300 m in 1 m steps*
Max: 0 m to 300 m in 1 m steps

Default Min: 0 m
Max: 0 m

Description If the trawl doors move outside the predefined limits, the audible alarm will initiated.

2.5.5 Spread 2

Purpose This command allows you to monitor if the distance between the trawl wings drops below the minimum limit, or increases beyond the maximum limit

Options *Min: 0 m to 300 m in 1 m steps*
Max: 0 m to 300 m in 1 m steps

Default Min: 0 m
Max: 0 m

Description If the trawl wings move outside the predefined limits, the audible alarm will initiated.

2.5.6 Grid angle

Purpose This command allows you to monitor the angle of the grid sensor.

Options *Min: 0° to 90° in 1° steps*
Max: 0° to 90° in 1° steps

Default Min: 0°
Max: 0°

Description The grid is normally mounted approximately 45[2] inside the trawl. If the grid angle exceeds the predefined limits, the audible alarm will be initiated.

2.5.7 Temperature

Purpose This command allows you to monitor the water temperature with an audible alarm.

Options *Min: -10°C to +30°C in 1°steps*
Max: -10°C to +30°C in 1°steps

Default Min: -10°C
Max: -10°C

Description If the water temperature exceeds the limits defined, an audible alarm will be initiated.

2.5.8 Catch

Purpose This command allows you to monitor the three Catch sensor with audible alarms. There is one command option for each Catch sensor.

Options *Off*
On

Default OFF

Description When the sensor is activated, the audible alarm will be initiated

2.5.9 CMP ES-depth

Purpose This command allows you to monitor the difference between the depth given by an external echo sounder and the ITI system.

Options *Off*
On

Default Off

Description This facility compares the depth given by the ship's echo sounder to the sum of the head-rope height above the foot-rope, and the head-rope depth below the surface. It then initiates the alarm if the depth registered by the echo sounder becomes less than this sum. As the echo sounder scans the sea bed some distance ahead of the trawl, you then have a short time in which to raise the trawl to prevent it touching the sea bed.

2.6 System setup

Purpose This command enables you to set the basic operating conditions of the ITI system.

Options
Language
Trawl setup
Vertical scale
Echo beam
Pos
Unit type
Date input
Serial out
Sensor filter
Depth offset

Description The individual commands are explained in the following paragraphs.

An Ethernet connection is available as an option. The *Ethernet* menu required to set up the interface will appear here, but only when the hardware installation has been performed.

Note ! *The commands Transducer, Analog log range and Timeout range are only available if switch 6 on the Interface pcb in the Transceiver Unit is set to ON. These commands are described at the end of this chapter.*

2.6.1 Language

Purpose The purpose of this command is to select menu language.

Options
English
Norsk
Islenska
Deutsch
Francaise
Espanol
Russian
Nederlands

Default English

Select the language you wish to use. Note that operator manuals are not available for all the languages listed.

2.6.2 Trawl setup

Purpose This command allows you to define type and dimensions of your trawl.

Options
Trawl width
Trawl height
Trawl type
Trawl gear

Default -

Description See the next paragraphs for descriptions of the command options.

2.6.2.1 Trawl width

Purpose This command allows you to manually enter the distance between the trawl doors/wings.

Options *1 m to 200 m in 1 m steps*

Default 30 m

Description If the Spread2 sensors are not available for use, you may insert the normal distance between the trawl doors/wings. Setting the correct trawl width into the system will give a more correct screen presentation in the *Normal* mode. You can then see from the "end elevation" diagram just how much of the trawl opening is covered by the ship's echo-sounder beam.

2.6.2.2 Trawl height

Purpose This command allows you to enter the height of the trawl opening manually.

Options *1 m to 100 m in 1 m steps*

Default 8 m

Description If the Height sensor is not available for use, this facility enables you to set the normal height of the trawl opening into the system. The manually set trawl height will also be presented on the screen (in red text) if the system has difficulty in detecting the foot–rope.

2.6.2.3 Trawl type

Purpose This command allows you to tell the system which trawl type your are using.

Options *Bottom*
Pelagic

Default Bottom

Description There are two basic types of trawling: *Bottom* and *Pelagic*. If the vessel performs pelagic trawling, the sea bed may be too deep for the system to display it while keeping the trawl in a reasonable scale. This parameter allows you to set the type of trawling being performed so that the optimum view of the trawl net is obtained. This will also allow the system to push the sea bed off the bottom of the screen if necessary.

2.6.2.4 Trawl gear

Purpose The purpose of this command is to tell the system which kind of trawl gear your are using.

Options *Single*
Dual

Default Single

Description A modern innovation in trawl gear incorporates two trawl nets in one. This type of net is termed a *Dual Trawl*. This parameter enables you to set the type of net used. This parameter effects the screen diagram displayed in the *Normal* mode.

2.6.3 Vertical scale

Purpose This command allows you to select the depth scale on the ITI display.

Options
Auto
50 m
100 m
150 m
200 m
300 m
400 m
500 m
750 m
1000 m
2000 m
Phase

Note ! *Units are according to the Unit setting in System setup.*

Default Auto

Description If the vessel is pelagic trawling, the sea bed may be too deep for the system to display it while keeping the trawl to the same scale. The *Vertical scale* parameter enables you to choose the depth scale which best displays the trawl net. If the trawl symbol is outside the selected vertical scale, the error message *"Vertical scale too small"* will be displayed in red text in the upper right corner of the screen.

When *Phase* is selected, the lower part of the side elevation picture in *Normal* mode (1/4 of the picture) will always represent 25 m of the vertical scale, seen from the sea bed upwards.

2.6.4 Echo beam

Purpose This command allows you to select the width of the ITI s coverage.

Options *1° to 90° in steps of 1°*

Default 20°

Description You should set the *Echo beam* parameter to the width of the beam transmitted by the vessel's echo sounder. This will then enable the ITI system to produce the coverage diagram displayed in the *Normal* mode end elevation. This diagram shows you the echo sounder beam coverage at the depth where the trawl is.

2.6.5 Pos.

Purpose This command allows you to select which of the sensors that will be used to provide the ITI system with trawl position data.

Options
Temperature
Depth
Temp-depth
Grid
Height
Height2
Spread1
Spread2
Catch
Auto

Default Auto

Description The bearing, range and slant range presented on the screen will be corrected by the sensor selected.

Additional info. In *Auto*, the system will choose the first active sensor available in the following order:

1. Height
2. Depth
3. Temp-depth
4. Temperature
5. Catch 1, 2, 3,
6. Spread1
7. Spread2

2.6.6 Unit type

Purpose This command allows you to use either meters, fathoms, feet or brazzia on the display presentations.

Options
Horizontal distance
Vertical distance
Temperature

Description **Horizontal distance**: Select between meters, fathoms, yards and brazzia. Default value is *meters*.

Vertical distance: Select between meters, feet, fathoms and brazzia. Default value is *meters*.

Temperature: Select between °C (Celsius) and °F (Fahrenheit). Default value is *°C*.

Additional info. This command enables you to use the units of measurement with which you are most familiar. The system will then perform the necessary conversion calculations. The depth and range units are set independently to enable you to copy the depth units on the chart currently in use, while keeping familiar units of range.

2.6.7 Date input

Purpose This command allows you to set the system s internal calendar and clock

Options

YEAR	*0 to 99*
MONTH	*1 to 12*
DATE	*1 to 31*
HOUR	*0 to 23*
MINUTE	*0 to 59*
SECOND	*0 to 59*
SET	*NO or YES*

Description The ITI system will always display date and time in the top right corner of the display screen. This information will need to be set on initial installation, and may need to be adjusted if the vessel passes into a different time zone.

Additional info. Setting and alteration of the date and time is achieved through this command. The last option in this command – *Set* – enables you to set the new date and time to a time in the near future, for example on the hour, and then install the new time into the ITI system exactly on a signal, for example a time signal on a radio. When the *Set* parameter is accessed, the two sub–parameters *No* and *Yes* appear. To set the new date and time, *Yes* must be highlighted, and then selected at the exact time.

2.6.8 Serial out

Purpose This command allows you to specify the information transmitted out of the ITI system on the serial ports.

Options
Echo sounder
Sonar
Auxiliary
Dump

Description The ITI system is equipped with three serial lines outputs:

Port A : Echo sounder

Port B : Auxiliary output, also used for Dump

Port C : Sonar

The information sent to the echo sounder and sonar system is predefined, and you can only enable or disable the data flow.

Refer to the next three paragraphs for further information.

2.6.8.1 Echo sounder

Purpose This command allows you to switch on or off the serial line information transmitted on Port A. This port is normally connected to an external echo sounder.

Options *On*
Off

Default Off

Description The following information is transmitted:

- Trawl depth below the surface (information from the depth sensor).

Further information about the serial lines are found on page 37 and onwards.

2.6.8.2 Sonar

Purpose This command allows you to switch on or off the serial line information transmitted on Port C. This port is normally connected to an external sonar system.

Options *On*
Off

Default Off

Description The following information is transmitted:

- All sensor data
- Trawl position

Further information about the serial lines are found on page 37 and onwards.

- Current bearing and distance to the trawl

2.6.8.3 Auxiliary

Purpose This command allows you to switch on or off the serial line information transmitted on Port B . This port is available for user applications, e.g. a personal computer.

Options *On*
Off

Default Off

Description Each individual information element as specified by the NMEA0183 standard may be switched on or off individually;

IIGLL	IITFI
IITPT	IITPC
IIMTW	IITTS
IIHFB	IIVTG

IIHB2	IIDBS
IITDS	IIDAD
IITS2	SDDBS

Further information is found on page 37 and onwards.

2.6.8.4 Dump

Purpose This command allows you to output selected information on Port B.

Options
ZDA(7)
GLL(16)
VTG(9)
DBS(7)
BT(7)
MTW(4)
HFB(12)
HB2(12)
TDS(6)
TS2(6)
TFI(6)
Dump

Default Off

Description Each individual information element as specified by the NMEA0183 standard may be switched on or off individually.

The number in brackets identify the length of each data group.

Note that the NMEA standard defines a message data length limited to 75 characters.

Refer to page 37 for further information about the serial lines and the transmitted data.

The final option Dump gives you three alternatives:

Off: No data transfer takes place.

Continuous: Each selected measurement is transmitted every 30 seconds or 1 minute depending on the chosen parameter in *Log interv.*

Up to marker: All the data from the start of the buffer and up to the position selected with the blue timer marker is transmitted. In this case a line with date and the name of each selected item is transmitted first to help the identification when imported into, for example, Microsoft Excel.

2.6.9 Sensor filter

Purpose This command allows you to disable the software filtering on some of the sensors.

Options *Off*
On

Default Off

Description Certain weather conditions may cause problems with the data transfer. In order to achieve a faster updating of the data, the measurement filtering on the following sensors may be disabled:

- Temperature
- Depth
- Spread
- Height

2.6.10 Depth offset

Purpose This command enables you to make any compensatory depth adjustments

Options *-100 m to +100 m*

Default 0 m

Description If the current depth sensor is malfunctioning, or performing bad, you may adjust the reading from it.

To set this command, follow the procedure outlined below:

- Lower the depth sensor to a known depth behind the vessel.
- Start to interrogate the sensor in the normal manner, and note the depth readout presented on the screen.
- If the displayed figure differs from the known correct depth, adjustments should be made using this command.
  - If the displayed depth is greater than the correct depth, the compensatory value to be entered must be positive.
  - If the displayed depth is less than the correct depth, the compensatory value to be entered must be negative.
- Once the compensatory value has been entered into the system, check to ensure the displayed figure is the same as the known depth of the sensor.

2.7 Transducer

Purpose This command enables you to set transducer *Type* and *Offset*.

Options
Type
Offset

Additional info. This command is only available if S10, switch 6 on the Interface pcb in the Transceiver Unit is set to *ON*.

2.7.1 Type

Purpose This command enables you to set the type of transducer being used.

Options
Single
Dual
Triple
Towed
Purse seine

Default Dual

2.7.2 Offset

Purpose This command enables you to set the offset angle of the transducer.

Options
Offset stb. XXX°
Offset port XXX°

Default
Offset stb. 165°
Offset port 195°

Description The *Offset* parameter is used to correct for offset if the transducer head is not pointing straight aft (180°).

2.8 Analog log range

Purpose This command enables you to set the log's maximum speed range if an analog log is connected..

Options
Max speed X Kn
Min speed X Kn

Additional info. This command is only available if S10, switch 6 on the Interface pcb in the Transceiver Unit is set to *ON*.

2.9 Timeout range

Purpose This command is used to reduce the waiting for timeout and new interrogation when the reply pulses are not accepted.

Options
800 M
1200 M
1800 M
2500 M
4000 M

Description If the *Timeout range* is set too short, no communication will be achieved.

Additional info. This command is only available if S10, switch 6 on the Interface pcb in the Transceiver Unit is set to *ON*.

3 TACTICAL MODE

In the *Tactical* mode, more commands become available. The menu window will display the following commands:

```
MODE                    TACTICAL
RATE                         OFF
ACTIVE SENSORS
MANUAL INPUT
AUDIO ALARM
SYSTEM SETUP
RANGE
TARGET MARKER
POSITION MARKER
ERASE TAILS
```

When the menu is disabled, the following additional information is displayed:

```
COURSE     X°
SPEED      X.XKn

POS: XXX.XX.XX N
     XXX.XX.XX E

ASC/DSC  X.Xm/min

DISTANCE/TIME
TRAWL
-XXX m  X.X Min
```

For a description of the *Tactical* mode display, refer to the *"Screen Presentation Modes"* section of this manual.

In this mode, the *Mode, Rate, Active sensors, Manual input, Audio alarm* and *System setup* commands are the same as those in the *Normal* menu. The other commands are described in this chapter.

3.1 Range

Purpose This command allows you to set the maximum range of the *Tactical* plot.

Options
500
1000
1500
2000
3000
4000
Auto

Default Auto

Description Note that the units used are not displayed in the menu as they will depend on those selected by the *Unit type* parameter. The units-per-division which has been selected will be displayed in the upper left corner of the screen, in pale blue text.

Selecting *Auto* will allow the system to select the most suitable range according to the distance to the position sensor.

3.2 Target marker

Purpose This command enables you to mark a target on the display with a red circle.

Options
Bearing
Range
Depth
Set marker

Description A marker can be placed on specific echoes detected by an echo sounder or sonar system, and may then be used to monitor the location and/or movement of the selected echo.

Additional info. The marker is defined by entering data into the parameters shown above, and then setting *Set marker* to *On*. The marker is then switched off by setting *Set marker* to *Off*.

If a Simrad SR 240 sonar (or a similar type) is connected to the ITI system, this function may be remotely controlled from the sonar using the sonar's *Target track* function. The marker on the ITI display will then be white.

The parameters are explained in the next four paragraphs.

3.2.1 Bearing

Purpose This parameter sets the direction from the vessel's current position to the target.

Options 0 to 359 in 1 steps

Default 0

Description Note that the value can be adjusted either way (+ or –), and will go through the 360 position.

3.2.2 Range

Purpose This parameter sets the range of the target from the vessel's current position.

Options 0 m to 4000 m in 1m steps

Default 0 m

Description N/A

3.2.3 Depth

Purpose This parameter sets the depth of the target beneath the sea surface.

Options 0 m to 1999 m in 1m steps

Default 0 m

Description N/A

3.2.4 Set marker

Purpose This command allows you to set the marker on or off.

Options *Off*
On

Default Off

Description Once the other three parameters have been set to the desired values, the target marker can be placed by setting this parameter to *On*. The marker (a red circle) will then be located at the desired range, bearing and depth from the vessel's position when the *Set marker* parameter was set *On*.

3.3 Position marker

Purpose This command enables you to input the positions of up to five "Points of interest", (e.g. wrecks on the sea bed, rock outcrops, way points etc.) into the system.

Options
Marker 1
Marker 2
Marker 3
Marker 4
Marker 5

Description Each marker is defined by entering latitude and longitude parameters.

Additional info. Refer to the description in the Operational procedures section.

3.4 Erase tails

Purpose This command allows you to remove the track lines of the vessel and the trawl from the *Tactical* plot.

Options
Off
On

Default Off

Description The track lines create visual presentations of the vessel s and trawl s track histories.

4 TEMP DEPTH MODE

In this mode, two new commands are implemented. All the others have been described in previous paragraphs.

MODE	TEMP-DEPTH
RATE	OFF
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	
ERASE DATA	
DEPTH SCALE	

For a complete description of the *Temp depth* mode and screen layout, refer to the *"Screen presentation modes"* section of this manual.

4.1 Erase data

Purpose This command enables you to erase all the current data from the grid.

Options *Off*
On

Default Off

Description This command acts like a clear screen command, and it is useful to allow new data to be displayed.

4.2 Depth scale

Purpose This command allows you to define the vertical scale on the display presentation.

Options *100 M*
250 M
500 M
1000 M
2000 M

Default 100 M

Description This option defines the vertical resolution of the diagram.

5 TRAWL DATA LOG MODE

In this mode, three new commands are introduced. Note that the *Erase data* command used here is different from the Erase data command in the Temp–depth menu.

MODE	TRAWL DATA LOG
RATE	OFF
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	
TIME MARKER	xxx
LOG INTERV.	xx xxx
ERASE DATA	OFF
DEPTH SCALE	xxxM
HEIGHT SCALE	xxxM
SPREAD SCALE	xxxM

Refer to the *"Screen presentation modes"* section for a description of the screen layout.

5.1 Time marker

Purpose This command allows you to define a vertical blue line on the display, and use this to mark time

Options *1 to maximum of 420*

Default 1

Description In the *Trawl data log* mode, the ITI system generates a time marker. This marker is displayed as a thin vertical blue line, extending the full height of the graphic display. This marker may be used to find and display the exact values of the five parameters at any given time up to the maximum of seven hours before present time.

The marker is automatically positioned by the system to mark the latest readings, but may be moved if required.

To move the marker, you must use the joystick as instructed by the system. The marker moves in 30 seconds or 1 minute steps, depending on the time scale defined by the *Log interv.* command. Readings of the parameter values at the time marker are displayed beside the vertical axes of the appropriate graphs. The text is black on a white background.

5.2 Log interv.

Purpose With this command, you may alter the time axis of the five parameters displayed.

Options *30 sec*
1 min

Default 30 sec

Description By increasing the time interval between the plotted values, the time period plotted by the display may be increased. Together with the *Time marker* described above, this facility allows you to recall the exact values of any of the five parameters for up to seven hours after the event.

Additional info. Selecting 30 seconds gives you 3.5 hours maximum time plotted. Selecting 1 minute gives you 7 hours maximum time plotted.

5.3 Erase data

Purpose This command enables you to erase the data from the grids, and reset the Time marker to zero.

Options *Off*
On

Default Off

Description There may come a time, for example at the end of one haul and before commencing another, when you wish to reset the graphs on the *Trawl Data Log* display presentation to zero without completely resetting the whole system. This command will erase the data from the display grid, reset the time marker , and then allow the ITI to start to building up the plots again from the beginning.

5.4 Depth scale

Purpose This command enables you to select the optimum scale for the vertical axis of the *Depth* graph.

Options *100 m*
250 m
500 m
1000 m
2000 m

Default 100 m

Description If the vessel is operating in shallower waters, a smaller maximum will give better definition to the results.

Additional info. Note that old settings are kept until new ones are inserted.

5.5 Height scale

Purpose This command enables you to select the scale which best displays the results.

Options
10 m
20 m
50 m
100 m

Default 20 m

Description The height scale depends on the size of the net, and, if bottom trawling, the height of the head–rope above the bottom.

Additional info. Note that old settings are kept until new ones are inserted.

5.6 Spread scale

Purpose This command allows you to select the optimum scale to best display the spread of the trawl doors.

Options
100 m
200 m
300 m

Default 100 m

Additional info. The scale required will depend on the size of the trawl.
Note that old settings are kept until new ones are inserted.

6 GRID MODE

No new commands or parameters become available in this mode. For a complete description of the *Grid* mode and display layout, refer to the *"Screen presentation modes"* section of this manual.

The following commands are displayed on the main menu.

MODE	GRID
RATE	OFF
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	
TIME MARKER	
LOG INTERV	
ERASE DATA	

All these commands have been previously explained.

7 STATUS MODE

No new commands or parameters become available in this mode. For a complete description of the *Status* mode and display layout, refer to the *"Screen presentation modes"* section of this manual.

The following commands are displayed on the main menu.

MODE	STATUS
RATE	OFF
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	

All these commands have been previously explained.

8 TEST MODE

The Test mode is also called the Test page. In this mode the replies and data from the sensors are displayed on the screen in nine columns. Refer to section "Screen presentation modes" for description of the Test page.

The following commands are displayed on the main menu.

MODE	TEST
RATE	OFF
ACTIVE SENSORS	
MANUAL INPUT	
AUDIO ALARM	
SYSTEM SETUP	
TEST	
SIMULATE	OFF

In this mode, two new commands are introduced. These are both used to perform tests and/or configure the ITI system. Apart from the *Test* and *Simulate* options, all these commands have been previously explained.

8.1 Test

Purpose This command allows you to set up the system's logging, printer and serial lines.

Options *Logging*
Printer
Serial

Default -

Description This command allows you to define the settings for the three devices listed above. Refer to the next three paragraphs.

Note ! *This menu may contain more settings if switch 6 on the SIO pcb = On.*

8.1.1 Logging

Purpose This command allows you to enable or disable the printing of data from the sensors.

Options *Off*
On

Default OFF

8.1.2 Printer

Purpose This command allows you to select which kind of printer you wish to use on the system.

Options
HP Paint
IBM / Epson
Serial

Default HP Paint

8.1.3 Serial

Purpose This command allows you to see what type of serial information the system is receiving on the various serial lines.

Options
None
Navig (D)
Echo (A)
Aux (B)
Sonar (C)

Description The information is displayed at the lower part of the screen.

8.2 Simulate

Purpose The purpose of this command is to enable the ITI system to run by itself on a simulated mission.

Options
Off
On

Default ON

Description The simulation can simply be switched on or off. When active, all information from the sensors are disconnected, and the system only presents information from the internal database. This function should therefore not be used in conjunction with operational use.

Additional info. When the simulator is enabled, an extra command is added to the main menu for *Normal* mode. This is the *Sim.bearing* command, which is explained in the next paragraph. Also note that the sensor settings have to be inserted in the *Active sensors* menu.

8.3 Sim.bearing

Purpose This command allows you to select a simulated bearing, i.e. the direction of the simulated trawl behind the vesse

Options *-50° to + 50° relative to the ship's heading*

Default 0°

Description Selecting a value will move the trawl display sideways behind the vessel.

Additional info. This command is only available on the main menu for *Normal* mode when the simulator is enabled.

9 ALARM MESSAGES

9.1 Introduction

If the system detects a fault, or the trawl moves out of the limits set within the Audio alarm menu, an alarm will sound. At the same time, the system will display an alarm message, in red, at the top of the menu section. The messages take the form shown below:

Unit associated with alarm - Type of alarm

Example:

Depth sensor - No reply

9.2 List of messages

The list of messages is as follows:

No reply
The system has failed to receive a reply from the stated sensor for the last six consecutive interrogations.

Uncertain read
The system has failed to receive a reply from the stated sensor for the last three consecutive interrogations.

Failed
The system has detected a failure or breakdown in the battery RAM unit.

Error
The system has detected a failure or breakdown in the stated unit.

Minimum limit
The trawl has moved out of the limits set within the Audio alarm menu.

Maximum limit
The trawl has moved out of the limits set within the Audio alarm menu.

Filled
The stated catch sensor has indicated to the system that it is activated, ie the trawl is filled to that point.

No detection
The reply pulses from the stated spread sensor indicate that there is no contact between the spread communication and remote sensors.

Vertical scale too small
The vertical scale is too small for the depths given by the echo sounder and/or the depth sounder on the trawl.

Illegal setting, xxx already active
If you try to activate two sensors of the same kind, you will receive this message.

10 SERIAL LINES AND MESSAGES

10.1 Introduction

With the rapid development of marine electronic devices, it has become necassary to develop a standardized interface protocol for exchanging data between devices regardless of the device manufacturer. The NMEA0183 is such a standard protocol for interfacing electronic marine devices, and it has been implemented in the ITI system.

Four serial lines and an optional Ethernet interface are available for connection to external equipment. The most common way of connecting together electronic equipment has, up to today, been by use of serial lines. A serial line is a point to point connection from one unit to another, and requires a lot of cabling as the number of systems interconnected increases.

A much more powerful way of integration is the Ethernet standard. Ethernet is a high speed serial line interface based on a single 50 ohm coax cable that can be extended up to 500 meters. There is no limit to the number of systems that can be hooked up to this one cable, and once they are connected to the Ethernet cable all systems are able to communicate with each other over the same cable.

Ethernet is a LAN (Local Area Network) standard of the CSMA/CD (Carrier Sense Multiple Access with Collision Detection) type, with 10 Mbits/s signalling capacity. The software required to communicate over Ethernet is included in the standard ITI system.

Note !

A standard ITI system does not include the hardware required to support an Ethernet interface. A dedicated interface / display board containing the Ethernet hardware must be installed.

The Ethernet interface incorporated in the ITI system has a UDP/IP/ETHERNET protocol, which is a subset of the TCP/IP family of protocols. Equipment connected to the cable is individually addressed, and multiple connections can coexist on the cable by the use of time-sharing.

Much of today's engineering effort is spent on system integration. It is Simrad's philosophy that in order to reduce integration costs each individual instrument should have certain key elements built into it. Ethernet is a communication standard suitable for the integration of ships electronics. It also has high speed, high functionallity and world wide acceptance.

All messages (telegrams), transmitted or received on either serial lines or Ethernet are based on the NMEA0183 standard protocol. The NMEA0183 standard actually defines both the telegram format (protocol) and the electrical interface. However, the electrical connection between systems is not so important as long as "talker" and "listeners" have the same electrical interface configuration. For serial line connections, the RS232C electrical standard is the most used.

10.2 Serial line messages

10.2.1 Ports

The ITI system has four serial lines that can be connected simultaneously to external equipment. All messages transferred over these serial lines are based on the NMEA0183 standard.

The four serial lines named port A, B, C and D each have a dedicated function in the ITI system. Ports A, B and C have two-way communication (data in/out), while port D only supports input data. All four serial lines can receive telegrams without being activated from the menu.

Ports A, B and C must be activated from the menu before any messages can be transmitted out on these three lines. Each serial line has different telegrams (messages) associated with it. Tables 1 and 2 below give an overview of all the input and output telegrams associated with the various serial ports.

10.2.2 Transmitted messages

Messages started with "$" are standard NMEA0183 parameters, and messages started with "@" are Simrad defined parameters.

A message (NMEA0183 telegram) will be transmitted when its data has been updated. Each individual parameter available on serial line B (Aux) can be turned ON or OFF from the menu.

For example: The message @IITDS will be sent out after an update of the Spread1 sensor data.

Individual parameters can not be set ON or OFF on serial lines A and C. These two serial lines have been allocated for echo sounder and sonar interfacing respectively, and all parameters on any of these two lines are either activated or not activated.

No parameters are transmitted out on serial line D.

Table 1 shows the different parameters that can be transmitted by the ITI when activated in the menu.

In addition, all messages received on serial line B can be transferred out on Ethernet. This transfer facility is activated from the command NMEA transfer[1]. The same command will also send all messages received on Ethernet to serial line B.

10.2.3 Received messages

All messages listed in table 2 can be received at any time without activating them from the menu. As described above, by setting the NMEA transfer command to On, all messages received on Ethernet will be transmitted out on serial port B, and visa versa. ("??" means - any character accepted)

Port:	**Port D**	**Port A**	**Port B**	**Port C**	**Ethernet**
Connect to:	**Navigator**	**Echo sounder**	**Auxiliary**	**Sonar**	**Auxiliary**
Data:			@IITDS @IITS2 @IIHFB$II MTW @IITFI @IITPT @IITPC @IITTS $IIGLL $$IIVTG $SDDBS $IIDBS	@IITDS @IITS2 @IIHFB $IIMTW @IITFI @IITPT @IITPR	@IITDS @IITS2 @IIHFB $IIMTW @IITFI @IITPT $IIGLL$ $IIDBS

Table 1 Transmitted messages

This command is not described in this document.

Port:	**Port D**	**Port A**	**Port B**	**Port C**	**Ethernet**
Connect to:	**Navigator**	**Echo sounder**	**Auxiliary**	**Sonar**	**Auxiliary**
Data:	$??GLL		$??GLL		
	$??VTG		$??VTG		$??VTG
		$SDDBS	$SDDBS		$SDDBS
		$??DBT	$??DBT		$??DBT
			$??HDT	$??HDT	$??HDT
			$??HDM	$??HDM	$??HDM
			$??ZDA	$??ZDA	
			@SSTPP	@SSTPP	@SSTPP
			@TAWWL		@TAWWL
			@TAWWT		@TAWWT

Table 2 Received messages

10.3 Ethernet messages

Refer to table 1 for the messages transmitted on Ethernet.

Refer to table 2 for the messages received on Ethernet.

The messages that are to be transmitted out on serial port B or the Ethernet cable must be activated specifically in the System setup menu. For port A or C, (the echo–sounder and sonar ports), all messages listed in tables 1 and 2 will be activated when that port is set active from the menu.

However, nothing need to be set in the menu in order to receive the messages that are listed in table 2 for serial ports A, B, C and D. Also, all messages listed in table 2 under Ethernet can be received without activating them from the menu.

10.4 Message descriptions

Messages transmitted and received on serial lines or Ethernet are all based on the NMEA 0183 standard.

- All messages start with either "$" or "@".
- The next two letters indicate who is transmitting the messages. ITI uses II = Integrated Instrumentation.
- The next three letters indicate type of messages
- Each message ends with <cr> and <lf>.

Below are descriptions of all the parameters (messages) listed in tables 1 and 2:

Vessel course and speed:

$IIVTG,,,x,M,y.y,N,,<cr><lf>

VTG is abbreviation for vessel track ground

.x,M is the Track deg.,Mag.

y.y,N is the speed in knots.

Trawl Position Relative vessel:

@IITPR,x,M,y,P,z.z,M<cr><lf>

TPR Trawl Position Relative vessel.

x,M Horizontal range to the target (0 – 4000m).

y,P Bearing to the target relative to the vessel heading. The resolution is 1 degree.

z.z,M Depth of trawl below the surface (0 – 2000m).

The ITI measures the depth differently from the range and the bearing. If ITI only knows the range and the bearing, the depth field is empty.

Trawl Position True vessel:

@IITPT,x,M,y,P,z.z,M<cr><lf>

TPT Trawl Position True vessel.

x,M Horizontal range to the target (0 – 4000m).

y,P True bearing to the target (i.e. relativ north). The resolution is 1 degree.

z.z,M Depth of trawl below the surface (0 – 2000m).

As with the TPR message, the difference is the bearing to the trawl.

Trawl Position in Cartesian coordinates:

@IITPC,x,M,y,M,z,M<cr><lf>

TPC Trawl Position Cartesian coordinates.

x Horizontal distance from vessel center line. Value is positive if trawl is on starboard side, negative on port side.

y Horizontal distance from transducer to trawl in center line direction. Value is normally positive.

z Depth from surface to trawl. Value is normally positive.

Trawl Position in Latitude and Longitude:

$IIGLL,ddmm.hh,N,dddmm.hh,W<cr><lf>

GLL Trawl's Geographical Latitude and Longitude

ddmm.hh,N Latitude: Deg.Min.Hundredths N=North, S=South latitude

dddmm.hh,W Longitude: Deg.Min.Hundredths,W=West, E=East longitude

Depth of trawl Below Surface:

$IIDBS,,,x.x,M,,<cr><lf>

DBS Depth Below Surface

x.x Depth in meter (0 – 2000)

The fields for depth in feets and fathoms are empty.

Water temperature at the trawl:

$IIMTW,-xx.x,C<cr><lf>

MTW Meteorological Temperature in Water.

xx.x Water temperature (°C) measured at the trawl. (Sign prefix only if minus)

Range from –5°C to +30°C.

C Celsius degrees.

Trawl Headrope to Footrope and Bottom:

@IIHFB,x.x,M,y.y,M<cr><lf>

HFB Headrope to Footrope and Bottom.

x.x,M Distance from headrope to footrope (0 – 100 m).

y.y,M Distance from headrope to bottom (0 – 100 m).

Trawl Door Spread:

@IITDS,x.x,M<cr><lf>

TDS Trawl Door Spread.

x.x,M Spread distance in meter (0–300 m).

Trawl Spread 2:

@IITS2,x.x,M<cr><lf>

TS2 Trawl Door Spread 2.

Trawl Filling:

@IITFI,x,y,z<cr><lf>

TFI Trawl Filling.

x,y,z Catch 1, 2, 3 (off= 0, on= 1, no answer= 2).

Fish Shoal Position relative vessel:

@IIFSP,x,M,y,P,z,M<cr><lf>

FSP Fish Shoal Position.

x,M Horizontal range resolution 1 m.

y,P Bearing relative vessel heading.

z,M Depth resolution 1 m.

Trawl To Shoal distance:

@IITTS,x,M,y,P,z,M<cr><lf>

TTS Trawl To Shoal

x,M Horizontal distance from trawl to shoal in direction normal to vessel center line. Value is positive if shoal is on starboard side of trawl, negative otherwise.

y,M Horizontal distance from trawl to shoal in direction of vessel centreline. Value is positive if shoal is ahead of trawl, negative if shoal is behind trawl.

z,M Vertical depth from trawl to shoal. Value is positive if trawl is above shoal, negative if trawl is below shoal. Sign is shown only if negative value.

Sounder Depth Below Surface:

$SDDBS,x.x,f,y.y,M,z.z,F<cr><lf>

SD Sounder Depth.

DBS Depth of water Below Surface.

x.x Depth in foot.

y.y Depth in meter.

z.z Depth in fathoms.

Only one of the depth values are necessary

???:

$??DBT,,,y.y,M,,<cr><lf>

?? Accept every combination.

DBT Depth of water Below Transducer.

x.x Depth in meter.

Position of target or marker:

@SSTPP,x,M,y,P,z,M,nn<cr><lf>

SS Receive from Scanning Sonar.

TPP Target Position in Polar coordinates.

x,M Horizontal range to the target.

y,P Tearing to target relative vessel heading.

z,M Target depth below surface.

nn Target identification: 0 means echo target tracked, 10 means position tracked.

Geographical position:

$??GLL,ddmm.hh,N,dddmm.hh,W<cr><lf>

?? Is OM if Omega, LC if Loran-C etc.

GLL Geographical Latitude, Longitude.

ddmm.hh,N	Latitude Deg.Min.Hundredths N=North, S=South latitude
dddmm.hh,W	Longitude Deg.Min.Hundredths,W=West, E=East longitude

Vessel course and speed:

$??VTG,,,x.x,M,y.y,N,,<cr><lf>

??	Is OM if Omega, LC if Loran-C etc.
VTG	Is abbreviation for vessel track ground.
x.x,M	Is the Track deg. Mag.
y.y,N	Is the speed with resolution 0.1 knots

Winch Wire Length:

@TAWWL,x,M,y,M<cr><lf>

TA	Identification.
WWL	Winch Wire Length.
x,M	Wire length to starboard trawldoor, resolution 1 m.
y,M	Wire length to port trawldoor, resolution 1 m.

Winch Wire Tension:

@TAWWT,x.x,T,y.y,T<cr><lf>

TA	Identification
WWT	Winch Wire Tension
x.x,T	Starboard wire tension, resolution 0.1 ton
y.y,T	Port wire tension, resolution 0.1 ton

Time & Date:

$??ZDA,hhmmss.ss,dd,MM,yyyy,xx,xx*xx<cr><lf>

hh	hour
mm	minutes
ss	seconds and parts of seconds
dd	date
MM	month
yyyy	year
xx	local zone etc. not used by ITI

Heading, Magnetic:

$??HDM,x.x,M*hh<cre><lf>

x.x	Heading, degrees Magnetic

Heading, True:

$??HDT,x.x,T*hh<cr><lf>

x.x Heading, degrees True

Heading, Deviation & Variation:

$??HDG,x.x,,,,<cr><lf>

References

1) National Marine Electronic Association NMEA 0183. Standard for interfacing marine electronic devices. Version 2.0, January 1, 1992.

850-130665/4AA024

ITI sensors

This document describes the sensors used by the Simrad ITI system.

Document revisons

Rev	Documentation Department		Hardware/Software Design		Product/Project Management	
	Date	Sign	Date	Sign	Date	Sign
A	16.01.97	CL	16.01.97	EPB	16.01.97	KEG
B						
C						
D						
E						
F						
G						
H						

(The original signatures are recorded in the company's logistic database)

Contents

Document revisions

(The information on this page is for Simrad's internal use)

Rev. A Based on P2212.

1 INTRODUCTION

The Simrad ITI system can operate with nine sensors. The purpose of these trawl sensors is to monitor the state of the trawl and the surrounding water. The types of trawl sensor unit available are as follows:

- Temperature
- Depth
- Temp/depth
- Grid
- Height
- Height 2
- Spread 1
- Spread 2
- Catch I
- Catch II
- Catch III

2 SAFETY

Potential hazards may arise from improper use of nickel-cadmium rechargeable batteries. To avoid these hazards, these instructions must be read, understood and followed by all personnel involved with the ITI system.

The ITI fast chargers have been specially designed to recharge "**blue label**" ITI sensors. These sensors are powered by sealed nickel-cadmium rechargeable battery cells. Special precautions must be taken by the user when fast charging such batteries. The charger itself has built-in controls to end fast charging and switch to maintenance charging when the battery is at full capacity.

The ITI fast battery charger must **never** be connected to any equipment other than ITI "blue label" sensors, because the battery will probably not have the specifications required to enable it to be charged by the ITI charger. ITI sensors with **red labels** must **never** be connected to a **fast charger**. The sensors are not prepared for fast charging, and may be damaged.

Safe and correct charging of the sensor batteries also requires that the ambient temperature and the temperature of the units is within the specified limits. Charging at low temperature causes hydrogen gas to be generated within the sealed battery cases, resulting in a build up of pressure. An increase of pressure inside a sealed battery case, where a mixture of oxygen and hydrogen is present may lead to an explosion.

3 SENSOR TYPES

3.1 Functions

Temperature The temperature sensor is basically a thermometer connected to a transmitter. When interrogated, this unit sends the temperature of the water surrounding the trawl back to the vessel, accurate to within 0.2°C. This enables you to position the trawl within water of a certain temperature, so increasing the probability of catching the type of fish which prefer water of that temperature.

Depth The depth sensor is a pressure sensor coupled with a transmit/receive unit. This unit transmits the current depth of the trawl. (For accuracy, refer to the technical specifications chapter). This enables the ITI system to calculate the dimensions displayed on the *Normal* mode diagrams.

Temp / Depth The temp/depth sensor combines the functions of the temperature and the depth sensors. Note that if the combined temp/depth sensor is used the separate depth sensor cannot be, as both sensors use the same interrogation frequency.

Height The height sensors are echo sounders mounted on the trawl head–rope. They measure the distance from the head–rope to the foot–rope and to the sea bed and transmit this information up to the vessel. These measurements give the vertical size of the trawl opening and the clearance between the net and the sea bed. On receiving an interrogation pulse from the ITI system, the height sensors will reply with three signals of different frequencies. The time interval between the first and the second reply signals will be the distance from the head–rope to the foot–rope, and the interval between the first and the third reply signals will be the distance from the head–rope to the sea bed.

Grid The grid sensor measures the angle of the separator grid used for reducing by–catch of fish in shrimp trawls.

Spread 1 The spread 1 sensors measure the horizontal distance between the trawl doors. The doors will each have a spread sensor unit fitted into special adapters. One unit will be a transmitter/receiver unit in communication with both the vessel and the other unit, the second unit will be a responder only in communication with the first. When the transmitter/receiver unit receives an interrogation pulse from the vessel transducer, it will transmit a pulse to the responder. This unit will then reply to give a measurement of the distance between the trawl doors. The transmitter/receiver unit will then reply to the vessel, giving the measurement.

Spread 2 The Spread 2 sensors measure the horizontal distance across the trawl wings. They operate in the same way as the spread 1 sensors, and are fitted onto the net or the trawl wires.

Catch The catch sensors are on/off switches, which when interrogated, transmit a reply to the ITI system to say whether or not they have been activated. The reply is sent in the same way as with the other sensors, though because only an on or an off reply is required, the information transmitted is much simpler. Therefore all the catch sensors can be interrogated at the same time. This means that you are only required to set one ratio.

3.2 Housing

The *temperature*, *depth*, *grid*, *height* and *catch* sensors are all housed in units of similar shape, and of a bright orange colour. The only exception is the height sensor which has an additional transducer mounted under the housing. The units all have a registration number and unit type written on the electronics cover plate. The *spread* sensors are moulded in tubular units of bright orange plastic. The units have attachment/battery–recharging lugs set such that the units can only be fitted to the trawl in the correct positions.

The sensor housings each have a serial number moulded into them. All sensors with serial numbers greater than 2000 are rated for a maximum water depth of 2000 m. Sensors with serial numbers less than 2000 are rated for a maximum depth of 1000 m.

WARNING ! **All sensors have a type label on the electronics cover plate. This label is either RED or BLUE. Sensors with BLUE labels are prepared for fast charging, and are delivered with a special fast charging unit. Sensors with RED labels are NOT prepared for fast charging. Do not attempt to charge a RED labelled sensor using a fast charger – a hazardous situation may arise.**

All ITI system users should read the instructions for using fast charger units.

3.3 Water switch

All the sensor units include a water switch. This will only allow the units to be active while they are in water. In air, the sensors go into a dormant state, and effectively use no power.

The water switch plate on top of the sensor charger should be cleaned once a week or so.

3.4 Dormant in water

When a unit is in the water, it must be interrogated at regular intervals if it is to remain in the active state. The unit will go dormant after five minutes if it is not interrogated within this time. The operator may take advantage of this feature if he wishes to save the battery life of a specific sensor. He must merely deactivate that particular sensor in the ACTIVE SENSORS menu, which will then prevent it being interrogated. Later, when the operator wishes to receive information from that sensor, he may reactivate it using the same menu. The sensor will then "wake up" on receiving its next interrogation pulse, and recommence normal operations.

4 SENSOR POWER

4.1 Battery life

The term "Battery life" normally refers to the time a battery will last between recharges. An ITI sensor's battery life will depend on how often the unit is interrogated. This rate is set in the system menu. If the interrogation rate is set to 15 seconds, the various sensors' battery lives will be (for new batteries) :

Temp, Depth, Catch ..... Approximately 80 hours

Spread, Temp/Depth ..... Approximately 80 hours

Height ..... Approximately 40 hours

Battery life can also refer to the number of years or recharging cycles the battery will last before becoming worn out. Nickel–cadmium batteries wear out very slowly, and when properly used will typically operate for several years and/or hundreds of recharging cycles.

Note !

As the battery ages, its capacity to accept and hold a charge will decrease. The result of this is that the operating time between recharges reduces. The end of the sensor battery's life occurs when the battery no longer meets the operating time expected by the user.

The battery's useful life can be greatly affected by the user. If the battery is misused it can fail much earlier than expected. Mechanical shock and vibration can cause damage to both battery components and cells, and under such conditions a battery can fail suddenly at any time, probably due to electrical shorts within the cells. The most important environmental factor affecting battery life is temperature. High temperatures cause the materials in the battery to degrade, therefore the sensor should not be stored or recharged in an area where the temperature is higher than 23 °C (73 °F). Generally, the battery life is reduced by half for each 10 °C increase in temperature above 23 °C.

If a sensor's battery pack is defective due to aging or mechanical failure, it can be replaced quickly and relatively cheaply.

WARNING !

The sensors must not be stored with flat batteries. Nickel Cadmium batteries must be recharged at least once every two months, whether they are used or not. The battery life will be reduced if a unit is stored for an extended period without charging the battery.

4.2 The sensor battery chargers

The *ITI Fast charger* has been specially designed to recharge ITI sensors which have BLUE labels.

Caution ! ***Be aware that ITI sensors with Red labels are not prepared for fast charging, and will be severely damaged if connected to a fast charger unit.***

Caution ! ***You MUST read the sensor charging instructions before attempting to use the battery charger !***

Special precautions must be taken when fast-charging nickel-cadmium batteries. The charger has a built-in controller to switch the unit from the fast charging current to the trickle-charge current when the battery is at full capacity.

The charger has a lamp to indicate the status of the charging operation. The lamp colours indicate the following:

Off ..... No charging (charger switched off / battery not connected)

Red ..... Fast charging in progress

Green ..... Battery fully charged, trickle-charging only

Simrad recommends that the charger(s) is permanently mounted in an area where the temperature remains close to 20°C (68°F).

Caution ! ***Charging must not be attempted when the temperature is less than 15°C (59°F) or more than 45°C (113°F).***

Both the charge acceptance and the actual capacity of the battery cells will be reduced at temperatures higher than 20°C (68°F). At low temperatures hydrogen gas may be generated in the cells resulting in a dangerous increase in internal pressure.

The standard charger unit is powered by a normal 230 Vac mains supply. A unit powered a by 115 Vac supply can be delivered on request. Check the charger's identification label before plugging the unit into the supply.

The charger will fully charge a sensor battery in approximately three hours. After this time, the lamp will change to green to indicate the battery is fully charged. (The charging time will normally be less than this as the batteries will rarely be completely discharged).

Note ! *The fast charger is designed for recharging sensors with Blue labels, which contain a particular type of high-capacity battery. Do not attempt to use the fast charger to recharge any other type of sensor or equipment - a hazardous situation may arise.*

5 SENSOR BATTERY RECHARGING

5.1 Introduction

The sensors each contain one Nickel–Cadmium rechargeable battery pack. The batteries can be recharged without removing them from the sensors.

No indication will be given by the system when a sensors battery requires recharging, the system will merely lose contact with the sensor. The operator must keep track of the amount of time each sensor is in use, and recharge the batteries as required.

The batteries will accept the best charge at room temperature, and low temperatures will actually reduce the battery capacity. Charging at room temperature will therefore extend the battery life to a maximum.

Caution !

All personnel who may be involved with recharging sensor batteries must read and understand the battery charging procedure in chapter . A charging procedure comes with every charger unit delivered, and at least one copy should be left available and visible at the charging station.

5.2 Charger installation

For safety reasons the charger should always be installed in a position where it will not be subjected to temperatures below 15°C (59°F) or above 45°C (113°F).

The charger has four holes to enable it to be screwed to a bulkhead.

The charger contains short–circuit protection, which will prevent damage to the electronics if the clamps inadvertently touch.

Mains supply: ..... 230 Vac or 115 Vac, 50/60 Hz.

Check that the correct mains supply is available for the charger. Details of the supply required are printed on the label on the front of the unit.

5.3 Charging time

The ITI fast charger will fully charge an empty sensor battery in approximately three hours. After three hours the charger will always switch to maintenance charging and the lamp will change from green to red, though the charger will usually switch to maintenance charging before the time limit because the sensor battery will rarely be completely empty. The charger can remain connected for an unlimited time when the lamp is green.

5.4 Checking battery voltage

A voltmeter can be used to check the charge remaining in a sensor battery by connecting it across the positive and negative charging/securing lugs on the sensor in question. It is not easy to use the measured voltage to determine the exact charge though, because the cell's voltage response is very flat. The charger's built-in voltage sensing circuit will switch to maintenance charging (green light) when the voltage across the clamps reaches 14.1 V. (This voltage includes a 0.7 V drop across a diode). After the three-hour time limit, the battery should be charged to a minimum of 12.6 volts. If this level has not been reached, a problem exists. Check the following:

- If the ambient temperature is too high, the battery will not accept a full charge. Check the room temperature, and if necessary move the charger to a cooler area.
- The cables may be faulty or the clamps or lugs may be dirty, causing a volt drop outside the battery. The battery will not then receive the full charging voltage, resulting in a lower final charge. Check the charger cables, clamps and the sensor lugs, and clean as necessary.
- The battery pack may be faulty. It will then need to be changed.
- The charger may be faulty. It will then need to be changed.

5.5 Sensor and battery storage

Nickel-Cadmium batteries have a long life, and whether they are continually used or merely stored in a fully-charged condition, they should last for many years. The life of the battery is however influenced by use, the ambient temperature, the charging and discharging parameters. Also, all types of NiCad batteries degrade slowly with time, and this degradation rate increases with temperature. Proper use and storage conditions will slow the degradation and thus extend the life of the battery.

The batteries should be stored at a temperature between 0° and 30°C (32° and 86°F), the ideal being around 20°C (68°F). At this temperature the unit can be stored for long periods in either a charged or discharged state with virtually no degradation in capabilities. However, the batteries will slowly discharge over time, the discharge rate increasing with temperature, and damage may occur if the units are allowed to remain completely discharged over an extended period. Simrad recommends that the batteries are stored in a fully-charged condition, and that they are recharged at least once every two months when not in use.

5.6 Cleaning the charger clamps

When using the charger, it is important that the contact between the clamps and the sensor lugs is as good as possible. A resistive connection will cause a volt-drop across the contacts, and the battery will not receive a full charge. Clean the clamps and the lugs on the sensors at regular intervals using a piece of sand-paper to ensure a good electrical contact.

6 RECHARGING PROCEDURE

6.1 Warnings

- **DO NOT** connect the fast charging unit to ITI sensors with red labels.
- **DO NOT** start fast charging operation if the ambient temperature is less than 15° C (59° F) or higher than 45° C (113° F).
- **DO NOT** use the ITI fast charger to charge any equipment other than ITI sensors with blue labels. This is potentially dangerous.
- **DO NOT** attempt to charge more than one sensor battery at a time with the same charger unit. Parallel connection of the sensors is not allowed.
- **DO NOT** attempt to charge the ITI sensors with any other type of battery charger. A dangerous situation may occur if the charging current is too high.

6.2 Procedures

To recharge a sensor battery using an ITI fast charger, follow the procedure detailed below:

1 Check that the sensor to be charged has a **blue label** with the text "FAST CHARGING".

2 Clean the sensor unit if necessary, using fresh water if available, and remove any mud,weed or other debris which may have accumulated.

3 Dry the unit with a cloth, and inspect for damage to the casing and the rubber straps.

4 Ensure that the front of the unit around the communications transducer is clean and free from obstruction. Any amount of debris in this area may render the unit unable to communicate with the ITI system.

5 If the sensor is cold (at a temperature below 10°C), allow the unit to warm up for at least 30 minutes at room temperature before attempting to start the charging procedure.

6 Before starting the charging operation, ensure that the ambient temperature is at least 15°C (59°F) and not more than 45°C (113°F). Do not attempt to charge the batteries if the ambient temperature is below 15°C (59°F).

7 Ensure the mains supply is correct for the charging unit, then connect the charging unit to the mains supply before connecting the unit to the sensor. If the sensor is connected first, the green light will come on and the sensor will not be charged.

8 Connect the battery charger terminals to the sensor, ensuring that the terminals are attached to the correct lugs. (The lugs are molded into the unit in pairs, and each lug is marked with either + or –). Secure the red cable clamp to a lug marked +, and the black cable clamp to a lug marked –.

9 Leave for the required amount of time to ensure the battery is fully recharged. The fast charger has a red and a green lamp. The red lamp will light if the connections are correct. When the battery is fully charged, the red lamp will extinguish and the green lamp will light. When the sensor has finished charging, switch off the charger and disconnect the terminals from the sensor lugs.

To save time, it is recommended that one battery charger is available for each sensor used in the system.

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On-board maintenance

This document describes the preventive and corrective maintenance actions to be performed by the ITI operator on board the vessel.

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	Date	Sign	Date	Sign	Date	Sign
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1 INTRODUCTION

This document defines the preventive and corrective maintenance that you can perform on the ITI system on board the vessel. A very limited number of spares combined with the relatively complex circuitry of the system limits these actions. The maintenance philosophy defined on the next page calls for an authorized maintenance engineer if you suspect serious malfunctions on your system.

Note !

The largest part of the maintenance actions must be performed on the ITI sensors in order to keep these fully charged and operational. This is described in the ITI Sensors section in this operator manual.

2 MAINTENANCE PHILOSOPHY

As an operator, you are required to perform only a limited amount of maintenance on the ITI system. The daily maintenance required on the system comprises checking that the sensor batteries are charged, and ensuring that the sensors are secured correctly onto the net. The sensors must be mounted securely to reduce the risk of losing them and to ensure they are correctly aligned towards the vessel transducer.

The ITI system is designed as a modular system. This means that corrective maintenance is achieved by replacing modules and circuit boards. Trouble-shooting within the ITI system is described in the *ITI Instruction Manual*. That manual also contains the disassembly and reassembly procedures required for module replacement.

Note !

All corrective maintenance on the ITI system should be carried out by trained and experienced personnel.

If a fault should occur within the system, then you must contact the suppliers or the manufacturers.

Apart from charging the sensor batteries and ensuring the sensors are secured correctly to the net, very little preventative maintenance is required on the ITI system. The maintenance is limited to keeping the units clean, and checking that the cable connections are tight.

The corrective maintenance which you can perform onboard is also very limited. The limits are set by the amount of spare parts available, and the skill required. Corrective maintenance is required when you detect a system defect. Normally the only faults which you will be expected to correct will be blown fuses in the Transceiver Unit.

3 SENSOR MAINTENANCE

Refer to the *ITI Sensors* section in this manual for description of sensor maintenance, such as battery charging.

4 PREVENTIVE MAINTENANCE

4.1 Introduction

Very little preventive maintenance is required on the ITI system. This is limited to keeping the units clean, and checking the cable connections to ensure they are tight.

4.2 The Control and Display Unit

The following tasks must be performed:

When required:

Cleaning the display screenCleaning the cabinet exterior

Monthly:

Cable connection check

4.2.1 Cleaning the display screen

The display screen on the Control and Display Unit should be cleaned regularly to avoid excessive build up of dirt and dust. The cleaning may be performed without disturbing the system operation.

Tools required:

- Soft lint–free cloth.
- Chemical display cleaner.

Action:

- Spray on the chemical display cleaner and wipe off with the soft lint–free cloth.

4.2.2 Cleaning the cabinet exterior

The Control and Display Unit cabinet should be cleaned regularly to avoid excessive build up of dirt and dust. The cleaning may be performed without disturbing the system operation.

Tools required:

- Soft cloth.
- Warm water and mild detergent.

Action:

- Wipe the cabinet with a damp cloth. DO NOT allow water into the cabinet, this will destroy the unit.

4.2.3 Cable connection check

The cable connections on the back of the display unit should be checked regularly to ensure that they are not coming loose.

4.3 The Transceiver Unit

The following tasks must be performed:

When required:

Cleaning the cabinet exterior

Monthly:

Cable connection check
Fan filter inspection and cleaning

4.3.1 Cleaning the cabinet exterior

The Transceiver Unit cabinet should be cleaned regularly to avoid excessive build up of dirt and dust. The cleaning may be performed without disturbing the system operation.

Tools required:

- Soft cloth.
- Warm water and mild detergent.

Action:

- Wipe the cabinet with a damp cloth. DO NOT allow water into the cabinet, as this will destroy the unit.

4.3.2 Cable connection check

The cable connections on the base of the unit should be checked regularly to ensure that they are not coming loose.

4.3.3 Fan filter inspection and cleaning

There are two fans in the Transceiver Unit. These are located in the bottom of the cabinet, and have an air filter which is easily removable from outside the cabinet. Excessive build up of dust may block the filter, and may cause over-heating of the electronics within the unit. Expensive repairs and replacements may then become necessary.

Tools required:

- Flat bladed screw driver
- Bucket containing warm soapy water

Action:

- Remove the three securing screws from the anodized aluminium filter retainer underneath the Transceiver Unit.
- Remove the retainer and the air filter.
- Wash the filter in warm soapy water, and allow it to dry thoroughly before replacing it onto the Transceiver Unit.
- When the filter is completely dry, replace it into the retainer and replace the retainer onto the Transceiver Unit.

Note ! *Do not over tighten the three screws as this could bend the filter retainer.*

It may be necessary to open the Transceiver Unit door to correctly position the fan unit before the three screws can be replaced.

WARNING ! **Switch off the power before opening the cabinet door. High voltages used within the Transceiver Unit. When the door is open, care should be taken not to touch live appliances within the cabinet.**

4.4 The hull unit

If a vertical shaft hull unit is fitted, it will require periodic maintenance. The preventive maintenance on the hull unit must be performed by the system engineer. A full preventive maintenance routine will require the ship to be in a dry–dock. Refer to the appropriate hull unit manual.

4.5 The transducer

The transducer face(s) must be kept clean and free of weed and crustacea if the ITI system is to perform correctly. A diver should inspect the transducer(s) annually (as a minimum) and clean them as necessary using a brush or wooden scraper. Care must be excercised to ensure the transducer face is not damaged in any way. Whenever the vessel is in dry dock, the transducer faces should be thoroughly cleaned and repainted with anti–fouling paint. Refer to the installation manual for a list of approved paints.

5 CORRECTIVE MAINTENANCE

5.1 Introduction

The corrective maintenance to be performed on-board by the operating personnel is very limited. The limits are set by the amount of spare parts available and the skill level required.

Corrective maintenance is required when you detect any system defects.

You are allowed to correct the following faults:

- Replacement of fuses
- Recharging of sensor batteries.

Two fuses are positioned on the front panel of the power supply, in the Transceiver Unit. Any other faults will require corrective action by a service engineer.

5.2 Changing fuses

5.2.1 Description

The ITI system has two fuses which you may replace if they are defective. Both fuses are located in the front panel of the Power Supply unit, inside the Transceiver Unit

Replacement fuses are:

- 1A 250V, 20mm in length and 5mm in diameter.
- Simrad part number 251-022766

WARNING ! **Do not replace a blown fuse with a higher rated fuse. This may cause serous damage to your ITI system.**

5.2.2 Procedure

- Switch off the Control and Display Unit using the push button on the front panel.
- Open the door of the Transceiver Unit using a large screw driver or other suitable tool.
- Unscrew the fuse holders positioned in the front panel of the Power Unit.
- Carefully withdraw the fuses, and check the wire filaments within the glass tubes.
- If one of the fuses is blown then it is recommended to replace both, as the other will probably have been damaged before the first melted.

- Clip a new 1A 250V fuse into the fuse-holder, and carefully screw the holder back into the power unit. Only tighten it to "Finger tight".

WARNING ! **Do not over tighten the fuse-holder. Do not use any tools.**

- Restart the system.

Note ! *If the fuses blow again when the system is restarted, then a more serious fault exists. Do not attempt to replace the fuses again. Contact the maintenance personnel.*

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ITI Ethernet

This document describes how the optional Ethernet interfaces are implemented on the ITI system, and how it is operated.

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1 INTRODUCTION

The Simrad ITI system may be equipped with an Ethernet interface. This makes it easy to provide a fast and efficient communication with external devices such as databases on other computers.

The Ethernet option includes the installation of certain hardware devices in the Transceiver Unit. You also need to flick a specific switch on one of the Transceiver Unit circuit boards to enable the Ethernet menu to be displayed. For more information, refer to the ITI Installation Manual.

2 ETHERNET COMMANDS

2.1 Access

The Ethernet commands are placed on the *System setup* submenu. This submenu is available in all modes. The command is only visible if the installation of the Ethernet hardware has been performed properly, and the S10 switch 4 on the Interface PCB in the Transceiver Unit is *On*..

SYSTEM SETUP	
LANGUAGE	ENGLISH
TRAWL SETUP	
VERT SCALE	AUTO
ECHO BEAM	20°
POSITION	AUTO
UNIT TYPE	
DATE INPUT	
SERIAL OUT	
ETHERNET	
SENSOR FILTER	ON
DEPTH OFFSET	0m

Select the *Ethernet* option to access the submenu.

2.2 Ethernet submenu

The following submenu is available to set up the Ethernet interfaces.

ETHERNET
ETHERNET NO

2.3 Ethernet commands

2.3.1 Ethernet no.

Purpose This command allows you to identify this specific ITI system as one of maximum 10 identical systems.

Options *0 - 9*

Default 0

Description If more than one ITI system are connected to the ship's Ethernet, this parameter identifies the number of the system to which the following commands are to apply

Additional info. None

2.3.2 Local IP address

Purpose This command allows you to set the "computer address" of the ITI system if an external computer is to input information to the system.

Description These settings must not be altered without first consulting the manufacturers or the personnel responsible for the installation

Additional info. The correct setting is: 157.237.014.021

2.3.3 NMEA transfer

Purpose This command is used to activate a special message transfer facility

Description When the command "NMEA transf" is set to ON, all messages received on serial port B will automatically be transmitted out on Ethernet, and all messages received on Ethernet will automatically be transmitted out on serial port B.

Additional info. These settings must not be altered without first consulting the manufacturers or the personnel responsible for the installation.

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Technical specifications

This document lists the main technical specifications for the Simrad ITI system.

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1 INTRODUCTION

This document lists the main technical specifications for the Simrad ITI system. Since Simrad is continuously improving our products, we reserve the right to change the specifications without prior notice.

2 SYSTEM MAIN UNITS

2.1 Summary of units

- Control and Display Unit
- Transceiver Unit
- Vessel transducer
- Sensors
- Battery charger

Option:

- Vertical hull unit with triple transducer

2.2 System features

Trawl positioning:

Horizontal distance, slant range, bearing

Positional accuracy:

Horizontal range ..... typical ±5 m

Slant range ..... typical ±5 m

Bearing ..... typical ±1

Sensor information:

Height from head–rope to bottom

Height from head–rope to foot–rope

Temperature

Depth

Spread distance between trawl doors/trawl wings (two sets)

Catch indication (max three catch sensors)

Range scale:

Ranges up to 4000 m.

The range depends on transducer installation, ambientnoise level, temperature gradients and sensor alignment

Interrogation:

Selectable rate for each sensor

Frequency:

Unique frequency for each sensor

Coding:

No sensor code or vessel code necessary

Operation:

Joystick in conjunction with screen menu

3 PRESENTATION MODES

3.1 The normal mode

The Normal mode displays three pictures of the trawl situation that show the following:

Plan view

Distance and bearing to trawl, spread of trawl doors/trawl wings, amount of fish in the cod end, course, speed, geographical position. A special graphical presentation is also available for those using a double trawl net.

Side view

Ascent/descent rate, temperature at the trawl, bottom outline below the trawl and vessel, time lag between vessel and trawl, depth of trawl, slant range.

Trawl section

Height of trawl opening, distance between foot–rope and bottom, trawl's deviation from the ship's course line, echo–sounder beam coverage at the trawl depth.

3.2 The tactical mode

The Tactical mode displays a bird's eye view of area around vessel, marked registrations of fish, target tracking if interfaced to the Simrad SR 240 sonar, trawl symbol with tail for observing the path and trawl manoeuvre.

3.3 The trawl data log mode

The Trawl data log mode displays all the information received from the sensors, in real time, and coordinates the data from the other equipment such as the gyro–compass, log and the ship's navigation equipment.

3.4 The temperature/depth mode

The Temperature–Depth mode display shows the temperature versus depth gradient.

3.5 The grid mode

The Grid mode displays the information received from the grid sensor. This is grid angle data from the separation grid and the signal strength received from the sonar.

3.6 The status mode

This picture displays vital information about the system setup. It includes details such as the interfaces to external equipment, the interrogation rate for each sensor, alarm settings and the times alarms have occurred.

3.7 The test mode

The Test mode allows you to run tests on the system.

4 UNIT INFORMATION

4.1 The Control and Display Unit

Type (standard delivery) ..... Simrad CF 140

Dimensions:

- Height ..... 354.5 mm
- Width ..... 410 mm
- Depth ..... 455 mm

Weight ..... 27 kg

Display type, standard ..... 14" high resolution colour monitor (8 colours, active screen, 680 x 512 pixels)

Operation ..... Joystick

Power supply ..... 115/230 Vac ±15%, 50/60 Hz (115 Vac requires a step–up transformer)

Power consumption ..... 90 W

4.2 The Transceiver Unit

Dimensions:

- Height ..... 400 mm
- Width ..... 400 mm
- Depth ..... 300 mm

Weight ..... 26 kg

Power supply ..... 115/230 Vac ±15%, 50/60 Hz

Power consumption ..... 87 W

Data I/O:

- Gyro ..... Stepper/synchro types
- Log ..... Pulse, analogue or Simrad NL doppler log
- Serial lines ..... Four NMEA 0183 serial lines for: Simrad omni sonars (SR 240/SD 570/SE570/SP270) Echo sounders with NMEA 0183 format Track plotters/winch control systems/data logger Navigation equipment

Option ..... Ethernet

Circuit boards ..... CPB286 Control Processor Board
Interface and Display controller
Transceiver board
ITI Power supply

Note !

If a standard CF 140 display is installed, the power supply to the Transceiver Unit is taken from the display. In that case, one need only consider the supply to the display. If a different type of computer display is used, the transceiver must be powered directly from the vessel's supply system.

When the vessel's supply is 115 Vac, two methods exist for powering the Transceiver Unit:

1 A step–up transformer can be used to increase the supply voltage to 230 Vac.

2 The Power Supply board in the Transceiver Unit can be modified to accept 115 Vac. See ITI Installation manual, Installation procedures.

5 TRANSDUCER ALTERNATIVES

5.1 Triple transducer installation

Three single transducers mounted in one housing:

Weight ..... 35 kg. (including cables)
Depth rating ..... 20 m
Transducer type ..... Ceramic triple split beam transducer
Transducer housing ..... Tin-bronze, DIN 1705 G-CuSn10
Transducer element ..... Replaceable under water
Transducer cable ..... 2, each 12 mm, length 20 m
Beam tilt ..... Vertical -10° or -20°
Beam width ..... 40° (one beam)
Vertical coverage ..... 10° tilt - 30° (surface to -30°)
20^2 tilt - 40^2 ..... (surface to -40°)
Horizontal coverage ..... 100° (±50°)
Frequency ..... 27 to 33 kHz
Beam overlap ..... 10°
Transducer impedance ..... 60 ohms

5.2 Dual transducer installation

Weight ..... 2 x 4 kg (including 30 cm cable + connector)
Depth rating ..... 20 m
Transducer type ... 2 single ceramic split beam transducers
Transducer element ..... Replaceable under water
Transducer cable ..... 2 each 12 mm, length 20 m
Beam tilt ..... Vertical -10° or -20°
Beam width ..... 40° (one beam)
Vertical coverage ..... 10° tilt - 30° (surface to -30°)
20° tilt - 40° (surface to -40°)
Horizontal coverage ..... 70° (±35°)
Frequency ..... 27 to 33 kHz
Beam overlap ..... 10°
Transducer impedance ..... 60 ohms

5.3 Single transducer installation

Weight ..... 4 kg (including 30 cm cable + connector)

Depth rating	20 m
Transducer type	Ceramic split beam transducer
Transducer element	Replaceable under water
Transducer cable	12 mm, length 20 m
Beam tiltVertical	-10° or -20°
Beam width	40° (one beam)
Vertical coverage	10° tilt - 30° (surface to -30°) 20° tilt - 40° (surface to -40°)
Horizontal coverage	40° (±20°)
Frequency	27 to 33 kHz
Transducer impedance	60 ohms

6 SENSORS

6.1 Common data

Weight in air:

- Temp/Depth, Height, Temp, Depth, Grid, Catch 9.0 kg
- Spread ..... 5.5 kg

Weight in water:

- Temp/Depth, Height, Temp, Depth, Grid, Catch 3.0 kg
- Spread ..... 2.5 kg

Depth rating ..... 2000 m

Housing ..... Moulded durotong housing

Communication ..... Frequency: 27 to 33 kHz
Beam width: – Transducer at 30 kHz: approx. 50
Transmission power: – 20 W

Electronics ..... Changeable/repairable

Battery .... Fast charge: NiCad, 10.8 V, capacity 1700 mAh

Battery life (at 15 seconds interrogation rate):

- Temp/Depth, Temp, Depth, Grid, Catch, Spread: .....
Approx. 80 hrs
- Height ..... Approx. 40 hrs

Charging time ..... Approx. 3 hrs

Water switch ..... Seawater detector for automatic
ON/OFF switching

6.2 Height sensor and Height 2 sensor

Information ..... Distance from head–rope to foot–rope
Distance from head–rope to bottom

Range ..... 100 m – head–rope to foot–rope
100 m – head–rope to bottom

Accuracy ..... ± 10 cm

Display read–out ..... 0.1 unit

Units selectable ..... meters, fathoms, feet, brazzia

Position ..... Centre of head–rope

6.3 Depth sensor

Information ..... Depth below surface

Depth range ..... 0 - 2000 m
Accuracy ..... Approx. 1% of readout depth ± 3 m offset
Display readout ..... 0.1 unit
Units selectable ..... meters, fathoms, feet, brazzia
Position ..... Centre of head-rope

6.4 Temperature sensor

Information ..... Temperature at head-rope
Temp. range ..... -5°C to +30°C (23°F to 86°F)
Temp. accuracy ..... ± 0.2°C (± 0.4°F)
Display readout ..... 0.1°C/F
Units selectable ..... Celsius, Fahrenheit
Position ..... Centre of head-rope

6.5 Temp/depth combination sensor

Combination of Temperature and Depth sensors
Information ..... Temperature and depth at head-rope
Position ..... Centre of head-rope
Same specifications as the Temp. and Depth sensors.

6.6 Spread 1 sensor

Information ..... Spread distance between doors
Spread range ..... 0-300 m
Spread accuracy ..... ± 35 cm
Display readout ..... 0.1 unit
Units selectable ..... meters, fathoms, feet, brazzia
Position ..... Fitted in special trawl door adapters

6.7 Spread 2 sensor

Information ..... Distance across trawl wings
Spread range ..... 0-300 m
Spread accuracy ..... ± 35 cm
Display readout ..... 0.1 unit
Units selectable ..... meters, fathoms, feet, brazzia

Position ..... Fitted on inside of trawl net or onto wires

6.8 Catch sensor

Information ... Catch feeler strap activated or not activated

Number of sensors ..... Max 3 (Catch I,Catch II,Catch III)

Display readout ..... Activated → red square
Not activated → green square
No contact → black square

Position ..... Upper surface of cod–end

6.9 Grid sensor

Information ..... Indicating angle of the fish separator grid

Range ..... 0° to 90°

Display readout ..... 1°

Position .....
Fitted on inside the separator grid by special adapter

7 SENSOR CHARGER

Fast charger ..... 230 Vac ± 15% supply
115 Vac on request

Charging current (max. 3 hours) ..... 450 mA

Built in charging control ..... Switched down by voltage level sensor, or
timed voltage reduction after 3 hours

Maintenance current ..... 100 mA

Minimum charging temp. ..... +15 °C (59 °F)

Lamp codes: ..... Red LED ON = normal charging
Green LED ON = reduced charging
LED OFF = no power / not charging

Note !

The fast charger has a built-in regulator which reduces the charging current from the full current to the maintenance current when the battery voltage reaches a predefined level. The unit also contains a timer which will reduce the current to the maintenance level after 3 hours. These are safety precautions which are required for fast recharging of NiCad batteries.

The fast charger must not be used to recharge ITI sensors with a red label as this will damage the sensor's internal electronics. Do not use the fast charger to recharge any other type of sensor or equipment. Ensure the sensor has a blue label marked "FAST CHARGER" before attempting to recharge it using the fast charger. Read the charging instructions before attempting to use the battery charger.

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