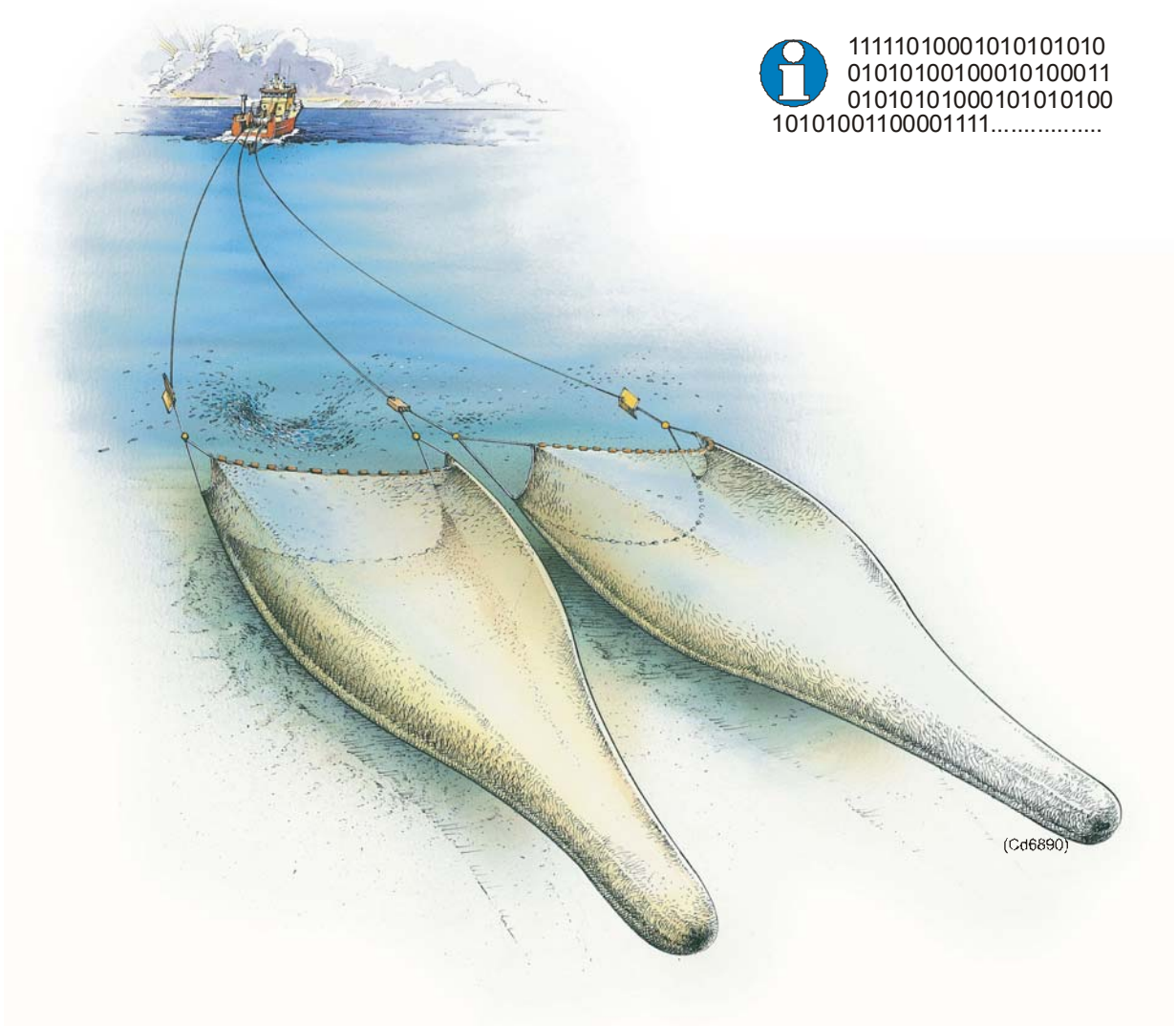
Instruction manual

Simrad ITI Trawl System

Serial data communication and NMEA 0183 message description



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Instruction manual

857-164777 / Rev.A

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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Support

For support on your Simrad equipment, consult your local dealer, visit www.simrad.com, or contact us directly at support.fish@simrad.com.

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Sections

This book is the Instruction manual manual for the ITI system.

M/S simrad Echo, our research and demonstration vessel

Remarks

References

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

- ITI Installation manual
- ITI Trawl Eye Instruction manual

Contents

Document logistics

Rev	Date	Written	Checked	Approved
A	23.09.03	GM	KRA	KRA
B				
C				
D				

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

Rev	Comments
A	Original issue.
B	
C	
D	

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 e-mail - to:

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1 INTRODUCTION

Note

This document is intended for software engeneers. It is to be used for writing codes in order to communicate with the ITI system.

With the rapid development of marine electronic devices, it has become necessary to develop a standardised interface protocol for exchanging data between devices regardless of the device manufacturer. The NMEA 0183 standard protocol for interfacing electronic marine devices has been implemented in the ITI system.

The most common way of connecting electronic equipment is to use serial lines.

A more powerful way of integrating, is the Ethernet standard with higher signalling capacity. The software required to communicate over the Ethernet is included in the ITI system, however a standard ITI does not include the hardware required.

A dedicated interface/display board containing the Ethernet hardware must be installed.

→ *Please refer to the Simrad ITI Installation Manual, Appendix 1 page 3 – 17 for more details.*

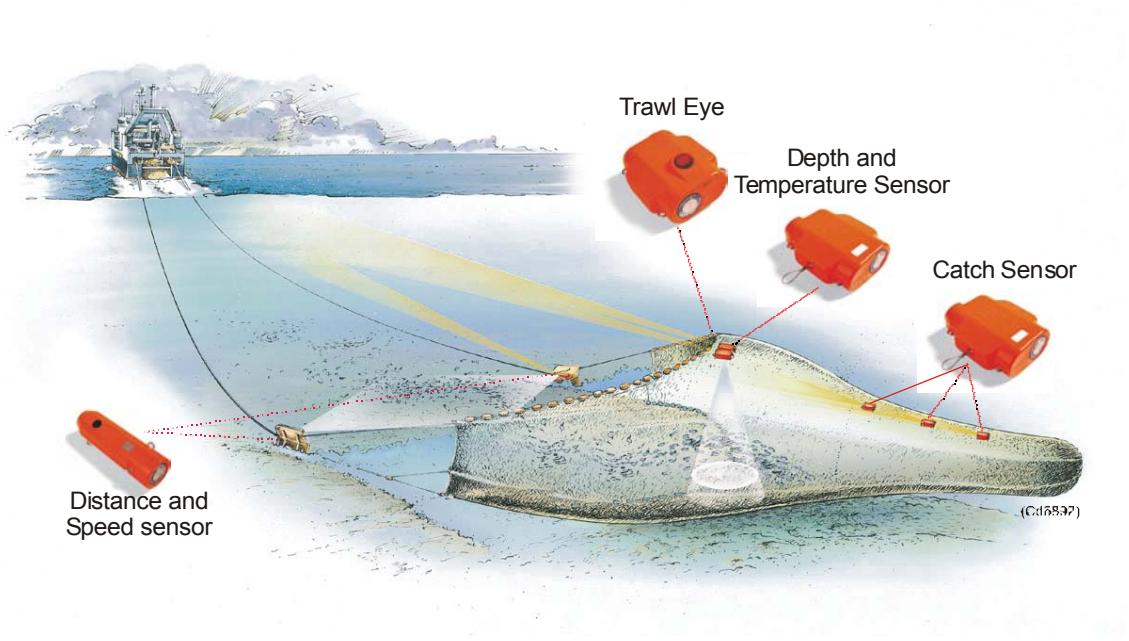
The ITI system has four serial lines available for external equipment connection.

→ *Please refer to page 6 for more details.*

2 ITI TRAWL SYSTEM, BASIC PRINCIPLE

The Simrad ITI wireless trawl positioning and monitoring system is designed to improve control and efficiency in pelagic and bottom trawling. Small robust battery powered sensors mounted on the trawl, transmit important information to the vessel on request.

- The ITI provides the skipper with exact position of the gear and what is happening in and around the trawl. It also provides all crucial information for an effective, profitable and responsible fishing.
- The ITI is a modular system. From a basic unit of one sensor, the ITI system can be extended to a complete and advanced instrument package according to the customers requirements.



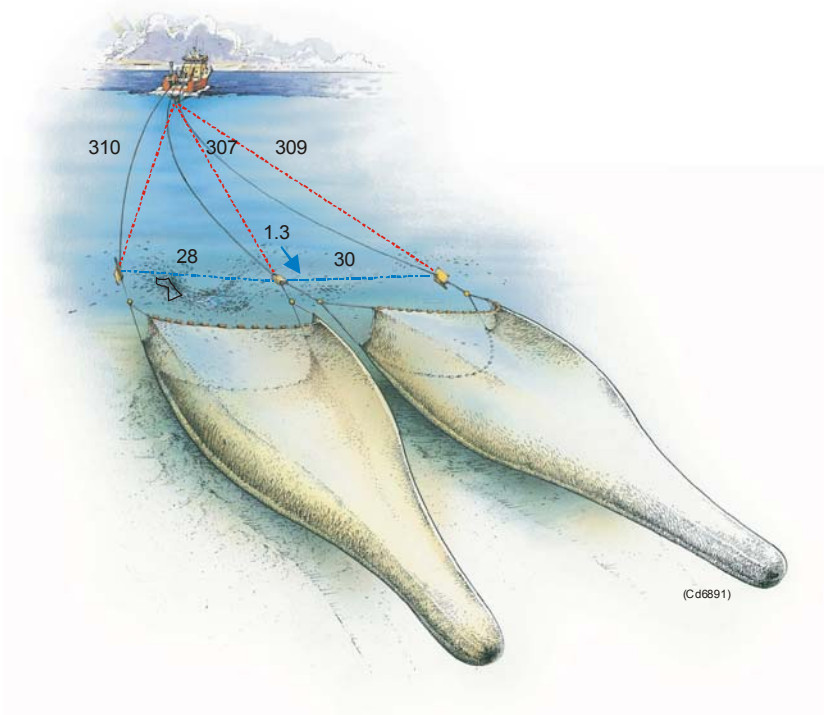
Simrad's philosophy is to reduce integration costs and increase the benefit of our products to let data from the ITI be available for integration with external equipment like chart plotters, winch control systems etc.

3 ITI GEOMETRY FOR TWIN RIG

Setting up a three wire Twin Rig system is a question of finding the balance point between a number of forces. The adjustment of the centre warp is very critical. This is one of the reason for the positioning of the clump, and hence the balance of forces between the doors and the warp and sweeps being so critical to get a square tow.

- The ITI Geometry System provides the skipper with crucial information to adjust the Twin Rig correctly and hence optimise the efficiency of both trawls during the tow.

The ITI Geometry System is based on measurements of the distance from the vessel to both trawl doors and to the clump. In addition, the distances between each door and the clump are measured based on transponders attached to the clump. Based on these range measurements, the geometry of the Twin Rig is calculated with high accuracy since all measurements are relative to each other.



The clump position relative to a straight line between the doors will affect the geometry of the trawl. To get a square tow, the deviation from the straight line position should be close to zero.

This is a focus point for the ITI Geometry System. In addition, the angle between the true course over ground (VTG) and the straight line between the doors are calculated and displayed.

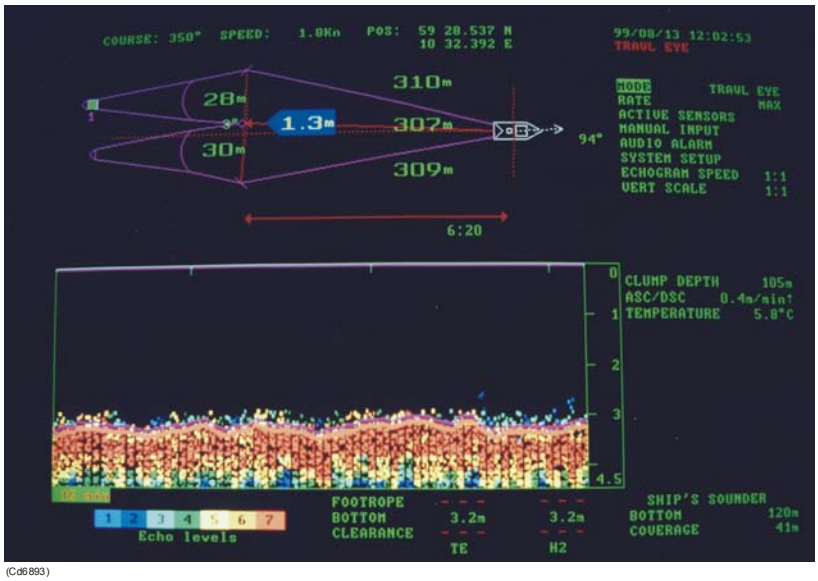
The figure above shows that the trawl is 3° off port side. The doors and the clump are not lined up correctly with door/clump distances of 28 and 30 meter. The distances to the trawl doors are 310 and 309 meter and distance to the clump is 307 meters. In order to obtain maximum door spread and a square tow, the middle wire should be paid out 1.3 meter.

Note

The trawl geometry is compared to the course over ground showing 94 ° with 90 ° being optimum.

Both trawl heights are 3,2 meter and the Trawl Eye echogram shows that the port trawl has good bottom contact but for the moment, with a few fishes in the opening. One Catch Sensor is mounted on the port cod end. The trawl is 6:20 min. behind the vessel, the clump has a light bottom contact ascending 0,4 m/min. Depth below the vessel is 120 meter and the temperature at the trawl is 5,8° C. In addition, heading, speed and Lat./Long. are displayed.

The ITI Geometry for Twin Rig will be implemented in the ITI topside software, version 5.20 or above.



(Cd6893)

The picture shows a Twin Rig trawl with the Trawl Eye echogram showing the trawl opening.

4 RESPONSIBILITY

Simrad's philosophy is to let data from our ITI Trawl System be available for integration with external equipment like chart plotters, winch control systems etc. We are convinced that this will increase the benefit of the product and lead to reduced integration costs.

The quality of the **transmission** data depends on:

- sea condition
- depth
- temperature layers
- multipath
- most important - the noise level from the propeller because you are receiving the signals from astern.

Compared to serial line data communication channel, the hydroacoustic transmission channel is far more unstable with data errors and intermittent interruption of the data transmission as a result.

The appropriate filtering and display algorithm used by Simrad for displaying the data on a CRT, might not be the optimum for applications, which are using the data as part of input parameters for controlling or regulating winches etc.

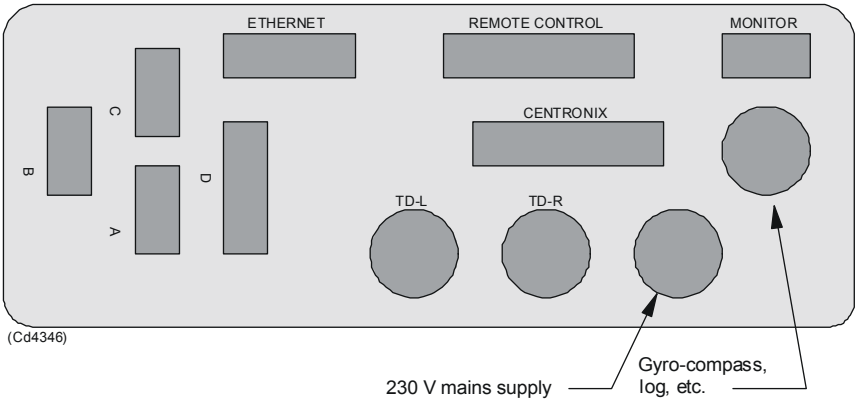
Simrad will therefore emphasise, to any one who are using the ITI data, to design an application specific filtering and adding "artificial intelligence" to the use of- and interpreting the data received.

We will not involve ourselves in applications using our data but any user will have access to the data from the ITI as described in this manual. If special agreements are made, Simrad can supply log files recorded during actual towings for test and simulation purposes. Beyond that, Simrad have limited capacity to assist users of the ITI data in their application.

The use of the ITI data is the users responsibility and Simrad disclaim responsibility for any consequences of using data from the ITI.

5 SERIAL LINES

The ITI system has four (female) serial ports, A, B C and D. All message transferred via these serial lines are based on the **NMEA 0183 format protocol**.



Port A, C and D have the following dedicated functions:

- Port A for connection to an echo sounder
- Port C to a sonar
- Port D to a navigator.

Port B is dedicated for:

- Auxiliary equipment like Winch control system, Track plotter, data logger etc.

If port C is not used by the sonar the port might be used for optional output of the Trawl position (GLL) to an auxiliary plotter. Port A, B and C have two-way communication while port D only has 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 being transmitted.

Transmitted messages

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

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

No parameters are transmitted out on serial port D.

Serial line D Navigator	Serial line A Echosounder	Serial line B Aux	Serial line C Sonar	Ethernet Aux
	$IIDBS	@IITDS	@IITDS	@IITDS
		@IITS2	@IITS2	@IITS2
	@IIHFB	@IIHFB	@IIHFB	@IIHFB
	@IIHB2	$IIMTW	$IIMTW	$IIMTW
	$IIZDL	@IITFI	@IITFI	@IITFI
		@IITPT	@IITPT	@IITPT
		@IITPC	@IITPR	$IIGLL
		@IITTS	$IIDBS	@IIDAD
		$IIGLL	@IIDAD	@IIHB2
		$IIVTG	@IIHB2	@IITPC
		$SDDBS		
		$IIDBS		
		@IIHB2		
		@IIDAD		
		$PSIMT		
		$PSIMTH		
		$PSIMMW		
		$PSIMS1		
		$PSIMS2		
		$IIZDA		
		$PSIMH1		
		$PSIMH2		
		$PSIMG1		
		$PSIMG2		
		$PSIMCA		
		$PSIMDE		
		$PSIMTM		

Table 1 Transmitted messages

Table 1 shows the different parameters that can be transmitted by 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.

Optionally **$IIGLL** (trawl position) is available on Port C. This require the parameter **TEST2** to be set to 8 (**Menu / SYSTEMSETUP / TRAWL EYE**), and is then independent on whether **SONAR OUTPUT** has been activated.

Received message

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 vice versa. "--" means any character will be accepted.

Serial line D Navigator	Serial line A Echosounder	Serial line B Aux	Serial line C Sonar	Ethernet Aux
$--GLL		$--GLL		$--GLL
$--VTG		$--VTG		$--VTG
$--ZDA	$SDDBS	$SDDBS		$SDDBS
	$--DBT	$--DBT		$--DBT
		$--HDT	$--HDT	$--HDT
		$--HDM	$--HDM	$--HDM
		$--HDG	$--HDG	$--HDG
		$--ZDA		$--ZDA
		@SSTPP	@SSTPP	@SSTPP
		@TAWWL		@TAWWL
		@TAWWT		@TAWWT
		$WMSYN		$WMSYN

Table 2 Received messages

Serial line configuration and pin allocations

→ *Refer to drawing no. 824-108590, ITI Installation manual.*

The four serial port (female) connectors are found on the transceiver unit plug panel, located in the bottom of the cabinet. The serial lines can be configured electrically as follows:

- Port A can be configured as RS-232 or RS-422.
- Ports B and C are standard RS-232 serial lines only.
- Port D can be configured as RS-232, RS-422 or current loop.

Table 3 gives an overview of the different ways of configuring the serial lines electrically, and the dedicated use of each line.

Port	Possible configurations	ITI port allocation	Format
A	RS-232	Echo sounder	NMEA 0183
B	RS-422	- Winch control - Track plotter - Data logger	NMEA 0183
C	RS-232	Sonar	NMEA 0183
D	- RS-232 - RS-422 - 20 mA Current loop	Navigator	NMEA 0183

Table 3 Possible serial port configurations and allocations

→ *Refer to the ITI installation manual for further information regarding configuration port A and D.*

Serial port pin assignments

The ITI system is designed to communicate over serial interfaces where control signals are not required. The connectors in the cabinet are female and require a male connector for the serial cable.

Table 4 shows the pin assignments for port B (and C) available on the ITI transceiver cabinet.

Pin	Name	Description	
1			
2	RX DA2	Receive data	RS-232 NMEA RX A
3	TX DA2	Transmit data	RS-232 NMEA TX A
4			
5	GND	Signal ground	RS-232 NMEA RX/TX B
6			
7	RT SA2	Request to send	RS-232
8	CT SA2	Clear to send	RS-232
9			

Table 4 Pin assignments - ports B and C

Note

The RS-232 inputs of port A-D do not meet the optoisolation requirements of the NMEA standard and precautions should be taken thereafter.

→ *Refer to the ITI Installation manual for pin assignments of port A and D.*

6 NMEA 0183 MESSAGES, DEFINITIONS

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

The main characteristics are as follows:

- RS-422A asynchronous serial line
- 4800 baud
- 8 data bits
- No parity
- One or more stop bits
- All data coded in ASCII code
- Optional ”X-OR” checksum

All messages start with either; “$” or “@”.

Telegrams starting with “$” do fully comply with the NMEA 0183 data format protocol.

- All other telegrams are in accordance with an old proprietary “Simrad standard.” They start with @, but otherwise they follow the main characteristics listed below.
- The next two letters (Talker identifier) indicate which system is transmitting the messages. Simrad ITI System uses **II** as a talker identifier.
- The next three letters indicate the type of message. The telegram may consist of many data fields separated by commas. A field may be empty, and then only the separating commas are transmitted, also called nullfields.
- Each message ends with <cr> (Carriage Return) and <lf> (Line Feed). For all message starting with ”$” the checksum *hh is included in compliance with version 2.20 of the NMEA 0183 standard, - no checksum on ”@” sentences.

Throughout this document, all telegrams with **II** as the Talker identifier, and telegrams with the proprietary code **PSIM**, are originated by ITI and *transmitted* to other equipment. All telegrams with other Talker identifiers are *received* by ITI from external equipment.

Message description

Below you will find the message description for ITI topside software version 5.30 or above. The different types of telegrams are not listed in consecutive order.

Note

*The *hh check sum, <cr> carriage return and <lf> line feed are not described for each sentence.*

NMEA output from ITI

$IIVTG,,,xxx,M,yy.y,N,,*hh<cr><lf>Vessel course and speed

→ *requires input from a nav. Receiver.*

VTG	represents the Vessel Track over the Ground.
xxx,M	is the track bearing, in degrees magnetic.
yy.y,N	is the speed in knots relative to ground.

$IIZDA,hhmmss.ss,dd,MM,yyyy,xx,xx*hh<cr><lf> Time & Date of ITI

→ *equals UTC ±5 seconds if GPS connected.*

hh	is the hours
mm	is the minutes
ss.ss	is the seconds and parts of seconds
dd	is the day's date
MM	is the month
yyyy	is the year
xx,xx	is the local time zone (hh,mm) positive offset east of Greenwich.

@IITPT,xxxx,M,y,P,zzzz.z,M<cr><lf> Trawl Position True vessel

TPT	represents the True Trawl Position relative to the vessel.
xxxx,M	is the horizontal range in metres to the target (0 - 4000 m).
	- requires an active depth sensor on the trawl or manual set depth, if not the slant range will be presented.
yyy,P	Is the true bearing to the target (i.e. relative to north). (Resolution 1°.)
	- requires gyro input for reliable data.
zzzz.z,M	is the depth in metres of trawl below the surface (0 - 2000 m).
	- requires an active depth sensor on the trawl or manual set depth, if not the depth field will be empty.

@IITPC,x,M,y,M,z,M<cr><lf>Trawl Position in Cartesian co-ordinates

TPC	represents the Trawl Position in Cartesian co-ordinates.
x,M	is the horizontal distance in metres from vessel centre line. Value is positive if trawl is on starboard side, negative if on port side. - requires an active depth sensor on the trawl or manual set depth, if not the slant range will be presented.
y,M	is the horizontal distance in metres from the transducer to the trawl along the vessel's centre line. The value will normally be positive as the trawl is usually behind the vessel. - requires an active depth sensor on the trawl or manual set depth, if not the slant range will be presented.
z,M	is the depth of the trawl in metres below the surface. the value is normally positive. - requires an active depth sensor on the trawl or manual set depth, if not the depth field will be empty.

$IIGLL,ddmm.hhh,N,dddmm.hhh,W,hhmmss.ss,A*hh<cr><lf>
Trawl Position in Latitude and Longitude

GLL	represents the trawls Geographical Latitude and Longitude. - requires GLL input from a nav. Receiver.
ddmm.hhh,N	is the Latitude, Deg.Min.Hundredths, N=North, S=South.
dddmm.hhh,W	is the longitude, Deg.Min.Hundredths, W=West, E=East.
hhmmss.ss	UTC of position (time stamp, fraction of seconds void). - requires ZDA input from GPS for accurate timestamp.
A	valid - never invalid, terminates output after one minute without GLL input from a nav. Receiver.

$IIDBS,,,xxxx.x,M,,*hh<cr><lf>Depth of trawl Below Surface

DBS	represents Depth of the trawl Below the Surface.
xxxx.x,M	is the depth in metres (0 - 2000). The fields for depth in feet and fathoms are empty. - requires an active depth sensor on the trawl.

$IIMTW,-xx.x,C*hh<cr><lf> Water temperature at the trawl

MTW	represents the Meteorological Temperature in the Water.
xx.x	is the water temperature (° C) measured at the trawl. (Sign prefix only if minus.) Range from -5° C to +30° C.
C	means the value is in ° Celsius.
	- requires an active temperature sensor on the trawl.

@IIHFB,x.x,M,y.y,M<cr><lf>
Trawl Headrope to Footrope and Bottom (Trawl Eye/Height sensor 1)

HFB	represents the distances from the Headrope to the Footrope and Bottom.
x.x,M	is the distance in metres from headrope to footrope (0 - 100 m).
y.y,M	is the distance in metres from headrope to bottom (0 - 100 m).

@IIHB2,x.x,M,y.y,M<cr><lf>
Trawl Headrope to Footrope and Bottom (Height sensor 2)

HB2	represents the distances from the Headrope to the Footrope and Bottom.
x.x,M	is the distance in metres from headrope to footrope (0 – 100 m).
y.y,M	is the distance in metres from headrope to bottom (0 – 100 m).

@IITDS,x.x,M<cr><lf> Trawl Door Spread 1

TDS	represents the Trawl Door Spread 1 distance.
x.x,M	is the spread distance in metres (0 - 300 m)
	- if invalid, nullfields will be transmitted
	- filtered values if sensorfilter is on.

@IITS2,x.x,M<cr><lf> Trawl Door Spread 2

TS2	represents the Trawl Door Spread 2 distance.
x.x,M	is the spread distance in metres (0 -300 m)
	- if invalid, nullfields will be transmitted
	- filtered values if sensorfilter is on.

$PSIMTH,x.x,M,y.y,M*hh<cr><lf>
Trawl Headrope to Footrope and Bottom (Trawl Eye/Height sensor 1)

TH	represents the distances from the Headrope to the Footrope and Bottom.
x.x,M	is the distance in metres from headrope to footrope (0 - 100 m).
y.y,M	is the distance in metres from headrope to bottom (0 - 100 m).

$PSIMTE,xx%y,xx%y,xx%y,xx%y,xx%y,xx%y,xx%y,xx%y,xx%y,xx%y,a,x.x,M, Gx,gx,Vx.x *hh<cr><lf> Trawl Eye, Echo telegram, fish detection

TE	carries the echo readings from fish detection and the sensor set up parameters (type of trawl, range gain etc).
x.x%	per cent of samples above threshold for the 10 echo cells.
y	average level (1-7) of the xx %. Data skipped if cell is empty or not available.
a	B/P Bottom/Pelagic 10 cells. b/p: bottom/pelagic 5 cells.
x.x,M	total range, 2,5 – 50 m of fish detection range.
Gx	Gain setting, coarse.
gx	g1 – g7 gain setting fine.
Vx.x	Version of Trawl Eye Sensor software.

$PSIMSn,xxxx,M,xxxx,M,yyy.y,T,xxx.x,M,hhmmss*hh<cr><lf>

n	n=1 **Spread1 (port trawl door when Twin Rig)** n=2 **Spread2 (starboard trawl door when Twin Rig)**
xxx,M	slant range in metres to sensor - filtered values - decimals not used.
xxx,M	horizontal range in metres to sensor - unfiltered values - nullfields if depth-sensor not activated (will calculate horizontal range with manual set depth) - decimals not used.
yyy.y,T	true bearing (deg.rel.north) to sensor - requires gyro input for reliable data.
xxx.x,M	spread measurement in metres (door to door or door to middle weight) - if invalid values nullfields will be transmitted - filtered values if sensorfilter is on.
hhmmss	time of transmission (time of Spread interrogation) - requires ZDA input from GPS for accurate timestam.

$PSIMHn,xxxx,M,xxxx,M,yyy.y,T,zz.z,M,zz.z,M,hhmmss*hh<CR> <LF>

n	- n=1 **height 1 sensor or trawl eye** - n=2 **height 2 sensor**
xxxx,M	Slant range in meters to sensor - filtered values - decimals not used.
xxxx,M	horizontal range in metres to sensor - unfiltered values - nullfields if depth-sensor not activated (will calculate horizontal range with manual set depth - decimals not used.
yyy.y,T	true bearing (deg.rel.north) to sensor - requires gyro input for reliable data.
zz.z,M	height in metres from headrope to footrope, 0 - 50 m.
zz.z,M	height in metres from headrope to bottom, 0 - 100 m - if invalid values nullfields will be transmitted.

$PSIMGn,xxxx,M,xxxx,M,yyy.y,T,yz.z,D,hhmmss*hh<CR><LF>

n	n=1 **grid 1 sensor** n=2 **grid 2 sensor**
xxxx,M	slant range in metres to sensor - filtered values - decimals not used.
xxxx,M	horizontal range in metres to sensor - unfiltered values - nullfields if depth-sensor not activated (will calculate horizontal range with manual set depth - decimals not used.
yyy.y,T	true bearing (deg.rel.north) to sensor - requires gyro input for reliable data.
zz.z,D	angle of grid, 0-90 degrees - if invalid values nullfields will be transmitted.

$PSIMCA,xxxx,M,xxxx,M,yyy.y,T,x,y,z,hhmmss*hh<CR><LF>

CA	catch sensor (bearing and range only to activated sensor with lowest number).
xxxx,M	slant range in metres to sensor - filtered values - decimals not used.
xxxx,M	horizontal range in metres to sensor - unfiltered values - nullfields if depth-sensor not activated (will calculate horizontal range with manual set depth - decimals not used.
yyy.y,T	true bearing (deg.rel.north) to sensor - requires gyro input for reliable data.

x catch1 sensor: 0=off, 1=on, 2=not activated/no answer.

y catch2 sensor: 0=off, 1=on, 2=not activated/no answer.

z catch3 sensor: 0=off, 1=on, 2=not activated/no answer.

$PSIMDE,xxxx,M,xxxx,M,yyy.y,T,zzzz.z,M,a,hhmmss*hh<CR> <LF>

DE	depth sensor
x.x,M	slant range in metres to sensor - filtered values - decimals not used.
x.x,M	horizontal range in metres to sensor - unfiltered values - nullfields if depth-sensor not activated (will calculate horizontal range with manual set depth - decimals not used.
y.y,T	true bearing (deg.rel.north) to sensor - requires gyro input for reliable data.
zzzz.z,M	water depth in metres, 0-2000 metres - if invalid values nullfields will be transmitted.
a	Indicate the menu selected position of the sensor a=p port , a=c centre, a=s starboard.

$PSIMTM,xxxx,M,xxxx,M,yyy.y,T,zz.z,C,a,hhmmss*hh<CR><LF>

TM	temperature sensor
xxxx,M	slant range in metres to sensor - filtered values - decimals not used.
xxxx,M	horizontal range in metres to sensor - unfiltered values - nullfields if depthsensor not activated(will calculate horizontal range with manual set depth - decimals not used.
yyy.y,T	true bearing (deg.rel.north) to sensor - requires gyro input for reliable data.
zz.z,C	water temperature in -5 to 30 degrees Celsius - if invalid values nullfields will be transmitted.
a	Indicate the menu selected position of the sensor a=p port, a=c centre, a=s starboard.

A combi sensor (depth/temperature) will generate both the DE and TM sentences. The temperature, depth or combi sensor must be used to show the range to the remote spread sensor if the geometry of the trawl system shall be calculated.

$PSIMMW,xxxx.x,M,xxxx.x,M,yyy.y,T,z.z,M,y.y,D,c,hhmmss*hh<cr><lf>

xxxx.x,M	slant range in metres to middle weight (clump) - filtered values.
xxxx.x,M	horizontal range in metres to middle weight - unfiltered values - nullfields if depth-sensor not activated (will calculate horizontal range with manual set depth).
yyy.y,T	true bearing (deg.rel.north) to middle weight - requires gyro input for reliable data.
z.z,M	signed deviation in metres (if deviation positive, then middle weight further out than door-door line) - an offset to the deviation may be set in the trawl setup in order to get the deviation near zero when the trawl geometry is ideal. A positive offset will shorten the mid weight wire - a mid weight filter, filtering the signed deviation, is found in the trawl setup. **About the mid weight filter:** - the mw filter calculates from unfiltered horizontal ranges for mw filter setting of 1 to 5 and if active depth sensor on trawl - the mw filter calculates from filtered horizontal ranges for mw filter setting of 6 to 10 and active depth sensor on trawl - the mw filter calculates from filtered slant ranges if no active depth sensor on trawl.
y.y,D	“starboard angle” between true GPS course (or heading if no GPS) and the “Door-Door Line” of the trawl ($0° < y.y < 180°$).
c	status of data, primarily middle weight deviation status A: OK B: OK but ambiguous (± on deviation, presented range complies with positive deviation, i.e. the larger range possibility) C: Uncertain (angle based calculations) D: Uncertain and ambiguous E: Invalid data, required sensors not active V: Invalid data, throw away W: Invalid and ambiguous.
hhmmss	time of transmission (time of Middle weight deviation calculations) - requires ZDA input from GPS for accurate timestamP.

Note *$PSIMMW will be sent when clump position undated, only. Update of the new angle parameter due only to change of course, is not supported!*

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

TFI	represents Trawl Filling.
x,y,z	are the catch 1, 2 and 3 messages (off = 0, on = 1, no answer = 2).

@IITTS,x,M,y,P,z,M<cr><lf> Trawl To Shoal distance

TTS	represents the Trawl To Shoal distance.
x,M	is the horizontal distance in metres from the trawl to the shoal in a direction normal to the vessel's centre line. The value will be positive if the shoal is on the starboard side of the trawl, otherwise negative.
y,M	is the horizontal distance in metres from the trawl to the shoal is the direction of the vessel's centre line. The value will be positive if the shoal is ahead of the trawl, negative if the shoal is behind the trawl.
z,M	is the vertical distance in metres from the trawl to the shoal. The value will be positive if the trawl is above the shoal, negative if the trawl is below the shoal. The sign will be shown only if the value is negative.

Note *This sentence requires the @SSTPP sentence from a scanning sonar, an active depth sensor on the trawl and gyro input on both sonar and ITI.*

$SDDBS,x.x,f,y.y,M,z.z,F*hh<cr><lf> Sounder Depth Below Surface

SD	represents Sounder Depth.
DBS	represents Depth of water Below Surface.
x.x,f	is the depth in feet.
y.y,M	is the depth in metres.
z.z,F	is the depth in fathoms - only depth in meters will be transmitted - this is a filtered copy of external echosounders depth.

@IIDAD,x.x,M,x.x,M<cr><lf> Depth of trawl Ascend/Descend

DAD	represents Depth Ascend Descend.
x.x,M	represents Depth of trawl in metres.
x.x,M	represents change of depth in metres per minute, negative number if ascending.

Note *This sentence requires an active depth sensor on the trawl.*

$IIZDL,hhmmss.ss,x.x,a*hh<cr><lf> Time and Distance to Variable Point

→ *The point is here the position sensor on the trawl which normally is the mid weight sensor on double trawl.*

hhmmss.ss	Time to point, 00 to 99 hours minutes and seconds.
x.x	distance to point in nautical miles.
a	type of point.
	C: Collision
	T: Turning point
	R: Reference/general - *used by ITI*
	W: Wheelover

An example of NMEA output from port B:

@IITPT,3089,M,175,P,0375.5,M

@IITPC,00162,M,3085,M,0375,M

@IIHFB,007.6,M,012.0,M

$PSIMTH,007.6,M,012.0,M*19

$IIGLL,5924.462,N,01030.048,E,062216,A*38

@IITTS,-0154,M,03256,M,-0121,M

$IIVTG,,,358,M,03.7,N,,*62

$IIZDA,062216.00,02,01,1999,01,00*7B

@IIHB2,008.7,M,008.8,M

@IITDS,105.5,M

$PSIMS1,3021,M,2998,M,177.0,T,105.5,M,062217*5A

@IITS2,118.9,M

$PSIMS2,3021,M,2998,M,172.6,T,118.9,M,062218*55

@IITFI,1,1,0

@IIDAD,0375.6,M,-001.9,M

$IIMTW,03.5,C*15

$PSIMMW,3018.3,M,2996.3,M,174.9,T,0000.8,M,A,062220*7C

$SDDBS,,,0187.5,M,,*1A

$IIDBS,,,0375.6,M,,*01

$PSIMTE,,29%4,60%3,98%7,97%7,,97%6,97%4,97%2,46%1,B,8.0,M,G1,g7,V3.08*52

$PSIMH1,1557,M,1512,M,189.9,T,008.1,M,015.0,M,143842*25

$PSIMH2,1557,M,1512,M,189.9,T,007.0,M,015.0,M,143843*29

$PSIMS1,1556,M,1511,M,193.1,T,090.2,M,143844*5C

$PSIMDE,1557,M,1512,M,189.9,T,0372.0,M,c,143847*4F

$PSIMTM,1558,M,1513,M,189.9,T,03.9,C,s,143849*45

NMEA Input to ITI

$SDDBS,x.x,f,y.y,M,z.z,F*hh<cr><lf> Sounder Depth Below Surface

SD	represents Sounder Depth.
DBS	represents Depth of water Below Surface.
x.x,f	is the depth in feet.
y.y,M	is the depth in metres.
z.z,F	is the depth in fathoms.

Note *Only one of the depth values is required.*

$--DBT,,,y.y,M,,*hh<cr><lf> Sounder Depth Below Transducer

--	Means: accept any combination.
DBT	represents the Depth of water Below the Transducer.
x.x,M	is the depth in metres.

@SSTPP,x,M,y,P,z,M,nn*hh<cr><lf> Position of target or marker

SS	represents Receive from Scanning Sonar.
TPP	represents Target Position in Polar co-ordinates.
x,M	is the horizontal range in metres to the target.
y,P	is the bearing to the target relative to the vessel's heading - requires gyro input on both Sonar and ITI for reliable data.
z,M	is the target's depth in metres below the surface.
nn	is the target identification code: 0 means echo target tracked, 10 means position tracked.

$--GLL,ddmm.hh,N,dddmm.hh,W*hh<cr><lf> Geographical position

--	is the code for the type of system used. -- will be OM if Omega, LC if Loran-C, GP if GPS, DE if decca etc.
GLL	represents Geographical Latitude, Longitude.ddmm.hh,N is the latitude position in Deg.Min.Hundredths, N=North, S=South.
dddmm.hh,W	is the longitude position, Deg.Min.Hundredths, W=West, E=East.

Note *The ITI system will only use the ZDA sentence for time input.*

$--VTG,,,x.x,M,y.y,N,,*hh<cr><lf> Vessel course and speed

--	is the code for the type of system used. -- will be OM if Omega, LC if Loran-C etc.
VTG	is the abbreviation for Vessel Track Ground.
x.x,M	is the track bearing, in degrees magnetic.
y.y,N	is the speed, with resolution 0.1 knots.

@TAWWL,x,M,y,M<cr><lf> Winch Wire Length

TA	is the identification code.
WWL	represents Winch Wire Length.
x,M	is the wire length to starboard trawl door, resolution 1 m.
y,M	is the wire length to the port trawl door, resolution 1 m.

@TAWWT,x.x,T,y.y,T<cr><lf> Winch Wire Tension

TA	is the identification code.
WWT	represents Winch Wire Tension.
x.x,T	is the starboard wire tension, resolution 0.1 ton.
y.y,T	is the port wire tension, resolution 0.1 ton.

$--ZDA,hhmmss.ss,dd,MM,yyyy,xx,xx*hh<cr><lf>Time & Date

hh	is the hours.
mm	is the minutes.
ss	is the seconds and parts of seconds.
dd	is the day's date.
MM	is the month.
yyyy	is the year.
xx	is the local time zone etc. (not used by ITI).

Note *The ITI system will not use other sentences than the ZDA sentence for time input.*

$--HDM,x.x,M*hh<cr><lf> Heading, Magnetic

x.x,M	is the heading in degrees magnetic.

$--HDT,x.x,T*hh<cr><lf> Heading, True

x.x,T	is the heading in degrees relative to true north.

$--HDG,x.x,,,,*hh<cr><lf> Heading, Deviation & Variation

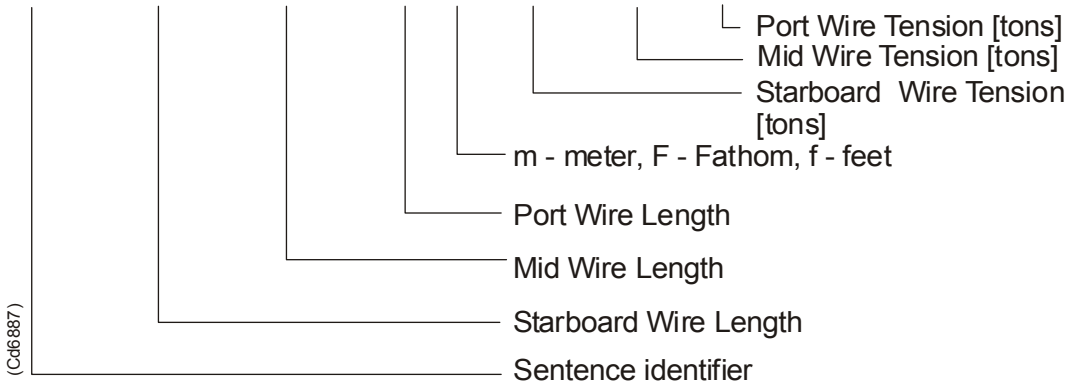
x.x	this is the magnetic sensor heading, in degrees.

Telegram from Winch Syncro 2020

This telegram carries the length of trawl wires as measured at the winches.

Though the sentence is not an approved NMEA 0183 sentence, its format complies with most of the "NMEA rules".

$WMSYN,xxx.x,c,xxx.x,c,xxx.x,c,xx.x,T,xx.x,T,xx.x,T*hh<cr><lf>



Note *The ITI will not present the mid wire tension and mid wire length*

References:

National Marine Electronic Association NMEA0183.

Standard for interfacing marine electronic devices.

Version 2.20, January 1, 1997.

7 NMEA – ABBREVIATIONS, ITI AUX MENU SELECTIONS

In the AUX menu selections only the NMEA start code are indicated.

The different codes with comments are as follows:

IIZDA	Time & date of ITI system
IIGLL	Geographical position of trawl
IITPT	Trawl position true vessel
IIMTV	Water temperature at the trawl
IIHFB	Distance trawl headrope to footrope and bottom, Height Sensor 2
PSIMTH	Distance trawl headrope to footrope and bottom, Trawl Eye, Height Sensor 1
IIHB2	Height 2
IITDS +IITS2	Trawl door spread Sensor1 and Sensor2
PSIMS1 + PSIMS2	Range, bearing and distance Spread 1 and Spread 2
IITFI	Trawl filling
IITPC	Trawl position in Cartesian coordinates
IITTS	Trawl to shoal distance
IIVTG	Vessel course over ground and speed
IIDBS	Depth of trawl below surface
IIDAD	Depth Ascend / Descend
SDDBS	Sounder depth below surface
PSIMTE	Trawl Eye, echo readings and sensor setup
PSIMMV	Range, bearing, signed deviation and status Middle weight

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