Tritech International Limited

SeaKing Remote Communications

Operator Manual

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Warranty Statement

Tritech International Limited herein after referred to as **TIL**

TIL warrants that at the time of shipment all products shall be free from defects in material and workmanship and suitable for the purpose specified in the product literature.

The unit/system warranty commences immediately from the date of customer acceptance and runs for a period of 365 days. Customer acceptance will always be deemed to have occurred within 72 hours of delivery.

Note: Any customer acceptance testing (if applicable) must be performed at either TIL premises or at one of their approved distributors unless mutually agreed in writing prior to despatch.

Conditions:

These include, but are not limited to, the following:

1 The warranty is only deemed to be valid if the equipment was sold through TIL or one of its approved distributors.

2 The equipment must have been installed and commissioned in strict accordance with approved technical standards and specifications and for the purpose that the system was designed.

3 The warranty is not transferable, except or as applies to Purchaser first then to client.

4 TIL must be notified immediately (in writing) of any suspected defect and if advised by TIL, the equipment subject to the defect shall be returned by the customer to TIL, via a suitable mode of transportation and shall be freight paid.

5 The warranty does not apply to defects that have been caused by failure to follow the recommended installation or maintenance procedures. Or defects resulting from normal wear & tear, incorrect operation, fire, water ingress, lightning damage or fluctuations in vehicles supply voltages, or from any other circumstances that may arise after delivery that is out with the control of TIL.
(**Note:** The warranty does not apply in the event where a defect has been caused by isolation incompatibilities.)

6 The warranty does not cover the transportation of personnel and per diem allowances relating to any repair or replacement.

7 The warranty does not cover any direct, indirect, punitive, special consequential damages or any damages whatsoever arising out of or connected with misuse of this product.

8 Any equipment or parts returned under warranty provisions will be returned to the customer freight prepaid by TIL

9 The warranty shall become invalid if the customer attempts to repair or modify the equipment without appropriate written authority being first received from TIL.

10 TIL retains the sole right to accept or reject any warranty claim.

11 Each product is carefully examined and checked before it is shipped. It should therefore be visually and operationally checked as soon as it is received. If it is damaged in anyway, a claim should be filed with the courier and TIL notified of the damage.

Note: TIL reserve the right to change specifications at any time without notice and without any obligation to incorporate new features in instruments previously sold.

Note: If the instrument is not covered by warranty, or if it is determined that the fault is caused by misuse, repair will be billed to the customer, and an estimate submitted for customer approval before the commencement of repairs.

F167.1

Safety Statements

Throughout the manual certain safety or operational related comments and requirements will be highlighted to the operator by indications identified by the adjacent symbol and text.

Technical Support

Contact your local agent or Tritech International Ltd

	**Mail**	***Tritech International Ltd.*** Peregrine Road, Westhill Business Park, Westhill, Aberdeen, AB32 6JL, UK
	**Telephone**	++44 (0)1224 744111
	Fax	++44 (0)1224 741771
	**Email**	support@tritech.co.uk
	Web	www.tritech.co.uk

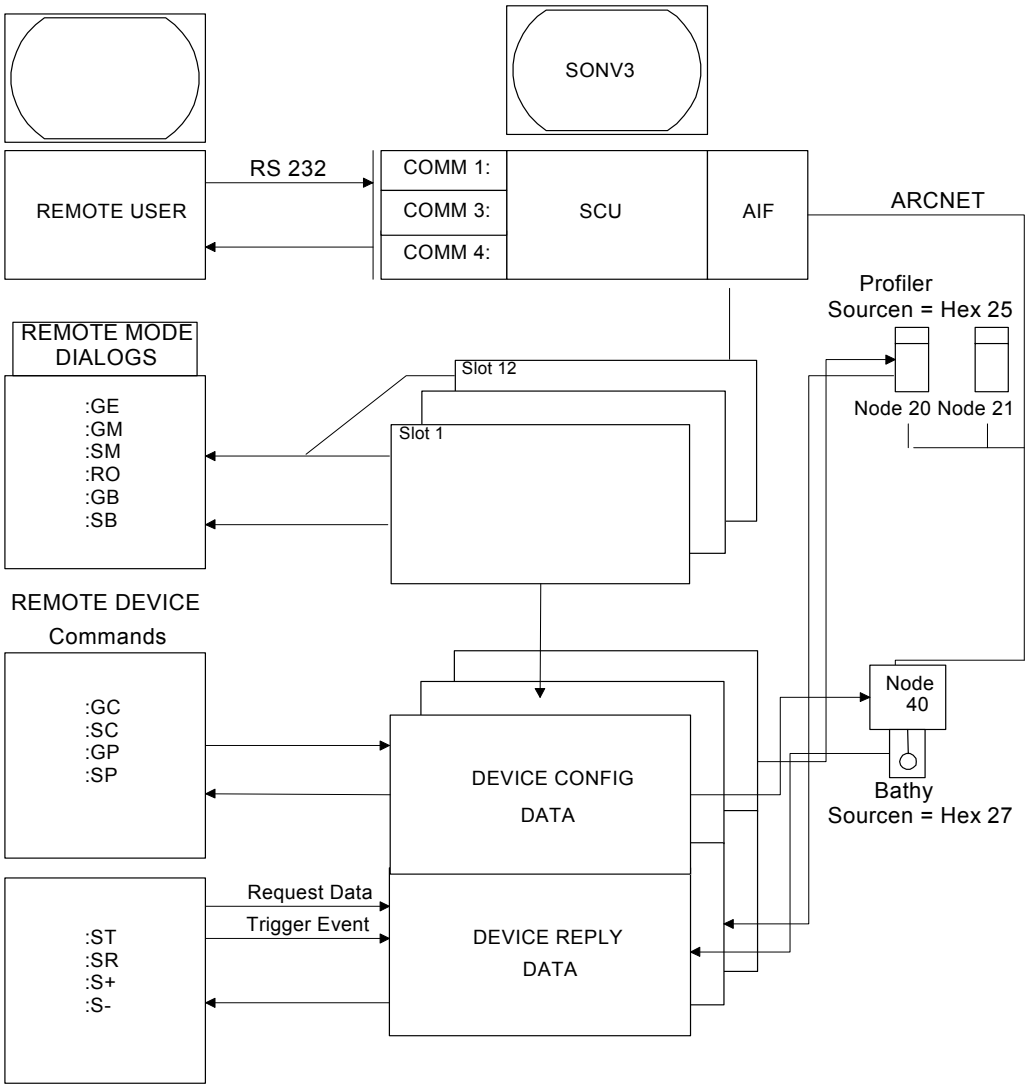
An out-of-hours emergency number is available by calling the above telephone number

If you have cause to use our Technical Support service, please ensure that you have the following details at hand **prior** to calling:

- System Serial Number (if applicable)
- Fault Description
- Any remedial action implemented

Due to the expansion of equipment capabilities and the fact that new sub-modules are continually being introduced, this manual cannot detail every aspect of the operation.

REMOTE COMMUNICATIONS OVERVIEW



NOTE: ***COM 2*** *serial port available on SeaNet SCU*

INTRODUCTION TO SEAKING VERSION 4 REMOTE COMMUNICATIONS

Caution!

The user is strongly recommended to thoroughly check configuration settings to ensure that they are collecting precisely the data they want. e.g. pay particular attention to the differences between raw and processed data, system parameters, profiler scan directions and step sizes, time synchronisation etc.

SeaKing SKV4 remote communications is largely based around the V4 Protocol that was first introduced to Series-2 heads as part of the WINSON Sonar software.

Past users of V4 will quickly become familiar with the commands and will find that operation and common control procedures have not changed. There have been a few changes to the WINSON V4 protocol release which have been necessary due to functional differences between the Series-2 and SeaKing heads. For instance, SeaKing heads are dual frequency devices and therefore, for example, the facility for a remote real-time switching of operating frequency was necessary to be introduced.

WINSON V4 users should note that where the SeaKing features have been introduced, they have taken the place of Series-2 WINSON features which have been removed. This has enabled string layouts and lengths to remain very similar and will enable existing Series-2 Survey software to be adapted quite easily for SeaKing use.

The SEAKING SKV4 protocol main features are as follows:

1) Remote Interrogation of SeaKing SCU to determine device availability, configuration and communications modes/ports.

2) Capability of remotely setting device configuration and communications modes and ports.

3) Capability of directing any device output to any available communications port.

4) Capability of multiple continuous device data streams.

5) Better individual device controls.

SEAKING REMOTE SKV4 PROTOCOL - Changes from Series-2 WINSON V4

1. Default node numbers for SeaKing profiler heads are;

Master Profiler head = Node 20
Slave Profiler head = Node 21
Bathy Sensor = Node 40

2. Extended 'System Data Constants' table to include SeaKing Source Types,
HINT: The :GM / :GE commands can be used to identify devices on the network. The 'Source (Generic Device) Types' in the 'SlotModeHdr' reply are unique for SeaKing and Series-2 heads/devices. This can be used for system identification (SeaKing or Series-2) and enable dual-purpose WINSON / SEAKING V4 online software to be written.

SYSTEM DATA CONSTANTS

SourceType Data Constants	**DataType = SOURCEN**
Device Description	**ASCIIText Data Code (Decimal)**
Null Device (nothing in a slot) (sNUL)	"32"
Reserved	"33"
SeaKing Imaging Sonar Head (hSON)	"34"
Reserved	"35"
Reserved	"36"
SeaKing Profiler Head (hPRF)	"37"
Reserved	"38"
SeaKing Bathy	"39"
Reserved	"40" -> "52"
SeaKing Attitude Sensor	"53"

3. Device Number (3rd item) is unused for SeaKing in the SlotModeHdr

SlotModeHdr Data Structure		
Data Description (all in Hex)	**DataCodes**	**Data Types**
Slot Number (range "01" to "0C")	SlotN	SLOTN
Generic Device Type	SourceTypes	SOURCEN
Unused, Always 00	00	
Node Number	1 to 1F	NODEN

4. Various format changes to entries in the 'Profiler System Reply' Data Structure;

Entry	**SeaKing Revision**
Scan Start Angle	Now in 1/16 Gradian units.
Direction + Step Size	0.5 Grads (Ult Res.) - 2 Grads (Lo Res) step, in 1/16 Grads.

5. Format changes in the SeaKing version of the 'Profiler System Configuration' Data Structure;

Entry	**SeaKing Revision**
Range Scale	Now in decimetre units.
Scan Width	Now in 1/16 Gradian units.
Scan Centre	Now in 1/16 Gradian units.
Operating Freq. Switch	Added (in place of 'Compress Scan' flag)
Ping Sync Flag	Replaces Mirror Linked Flag
Scan duration	Now in 1 millisecond units

6. Field Resolution difference in 'Bathymetric System Reply' Data Structure, WINSON Raw and Processed data formats;

Entry	**SeaKing Revision**
Salinity	Resolution increased to parts per million

7. Slot Reply Header field extensions…

a) Field 4: **Data Reply Mode** – SeaKing includes a **C**omma **S**eparated **V**ariable ASCII output.
b) Field 5: **Output Message Format** – 2 x Output messages added for SeaKing Bathy ('SeaKing Long' and 'SeaKing Short').

SlotReplyHdr Data Structure		
Data Description (always Hex)	**DataCodes/Range**	**Data Types**
The following Data structure is sent in Hex Format		
Total Number of Bytes in Message in Hex (including Command and Reply codes)	NB	CARDINAL
Slot Number (range "01" to "0C")	SlotN	SLOTN
Generic Device Type	SourceTypes	SOURCEN
Data Reply Mode (0=ASCIIText, 1=Hex, 2=Binary, 3=CSV) **CSV = Comma Separated ASCII*	0 or 1 or 2 or 3	DIGIT
Send SeaKing Long = 3*****, Send SeaKing Short = 2*****, Send Raw data = 1, Send Processed Data = 0 ***** *Bathy Applicable Only*	0 or 1 or 2 or 3 *(Always 0 in :GV reply)*	DIGIT

REMOTE COMMUNICATIONS SETUP

Flow of data through the network and SeaKing SCU.

The SeaKing SCU system allows a number of subsea devices/sensors to be connected as a network and run on a single twisted pair (or RS232 modem) link controlled by the Tritech communications controller **(AIF)** card in the SeaKing SCU system. Each device is allocated a unique network address called a **"node"** number that is downloaded and embedded in the Flash-RAM in the respective devices.

Once data reaches the **AIF** card the devices are allocated to software data channels which are called **"slots"**.

The allocation and set-up of the network depends on the devices which are connected and is controlled within a set-up files **"c:\windows\sonv3so.ini" and "c:\v3sonar\sonv3\sonv3.cfg"** on the SCU. These files are not normally accessible to the user.

Changing the application that is running by choosing a new application from the **"SONV3" Menu-AppSetup** will call out a different set of devices. Depending on the chosen Working Application, e.g. PRF, BP or SBP, the slot position of each application will be different in each case, e.g. Bathy may be set to Slot 4 in SBP and set to slot 1 in BP (Bathy and Profiler). The Working Application is preset under the **Menu-AppSetup** menu and if necessary can be altered by the user. When a new Working Application is selected and the slot positions for each application change the Remote SKV4 setup will retain all previous settings for each slot. Therefore, say the Bathy slot position has changed from Slot 4 to Slot 1 when selecting a new Working Application, all settings will have to be re-entered for the Bathy at the new Slot position.

When using the SKV4 protocol, the slot number is important as SKV4 commands use the slot number and receive the data which is present on that slot, whether that be Profiler, Bathy etc. This can be viewed by clicking on the 'Spanner' icon in the **Remote** menu bar to call out the **Remote SKV4 Setup** menu.

Using SeaKing SKV4 protocol to control and extract data from the SCU

Data from various devices on the SCU network can be controlled and sent to and from a remote survey or logging computer (or computers) using one, two or three RS232 serial ports which are designated **COM1, COM3 and COM4.**
NOTE: SeaNet SCUs have an additional **COM2** Port fitted which can be used for remote survey.

COM 3 and COM 4 are only available if the SCU is fitted with the auxiliary serial port card.

The serial ports can be configured using the **Remote** menus (accessible by clicking on the spanner icon).

This allows the user to select Baud rates and Handshaking to match their equipment and also set transfer parameters such as Parity checking.

The SeaKing SKV4 system is very flexible and allows the user to choose which **Channel** to direct data from individual devices, the form of that data and whether it should be continuous or triggered on demand. A full set of commands and formats is attached.

In order to use SKV4 successfully, the user must understand the **Slot Number** system, since data is always extracted by addressing the correct **Slot Number** for the device.

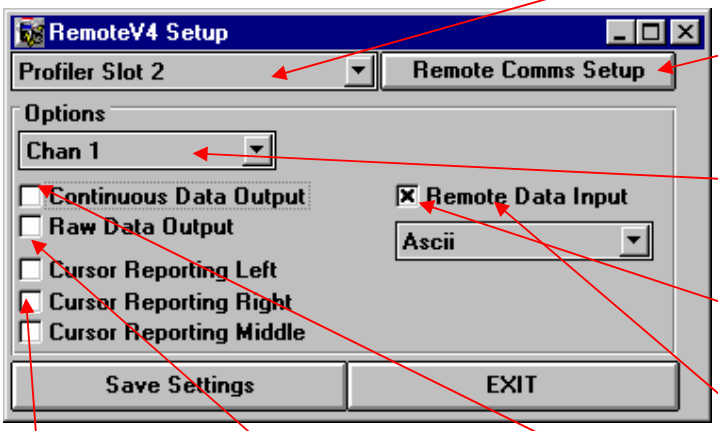
The **Slot Numbers** for a particular system setup can be obtained in 2 ways.

1) By locally viewing the **List of available devices** in the **Remote SKV4 Setup** menu as mentioned earlier.
2) Using the remote link and issuing a **:GE** command that returns information on the allocation of all **slots.**

Once this is understood it is quite simple to start extracting data.
The next command would normally be to allocate a particular **slot** to a selected **channel** using a specific send slot (**:SM**) which also sets how data should be returned.

Note: Commands are sent on all available, connected COM ports, data from devices is only received on ports defined by the **:SM** command.

REMOTE SKV4 SETUP MENU



List of available devices (Application dependent) and their associated slot numbers.

Remote Comms Setup Bar. Clicking here will call out a setup menu for configuration of each Channel

Channel selection. Any 1 of 3 channels can be allocated against a Slot. Channels can be configured in the Remote Comms Setup.

Remote Data input. Enable to accept messages from a remote channel (i.e. via serial port).

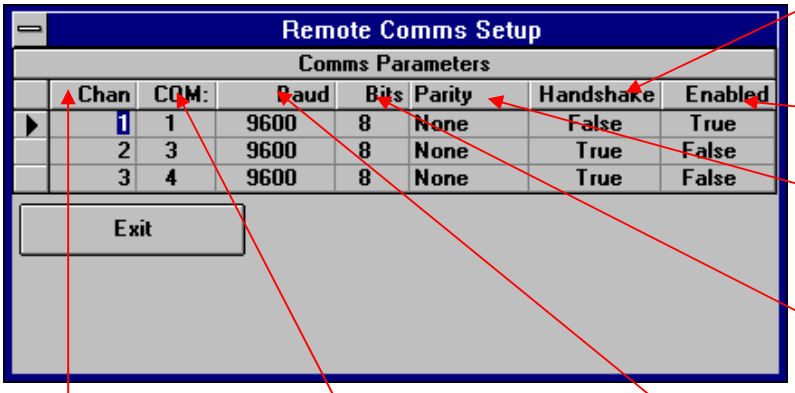
Output Format. Available options are ASCII, HEX, Binary and CSV (Comma separated ASCII).

Enable Remote Cursor Reporting with any of the 3 RAT buttons (Sonar Only).

Selection of Profiler **RAW** (checked box) or **PROCESSED** data output. N.B. Bathy data format selection is made in the Bathy Tools menu.

Enable Continuous Data Output (check this box to enable)

REMOTE COMMS SETUP MENU



Handshake Enable. Switch on/off RTS/CTS control for serial port data transfer.

Channel Enable / Disable.

Parity Checking. Options are None, Odd, Even, Mark, Space.

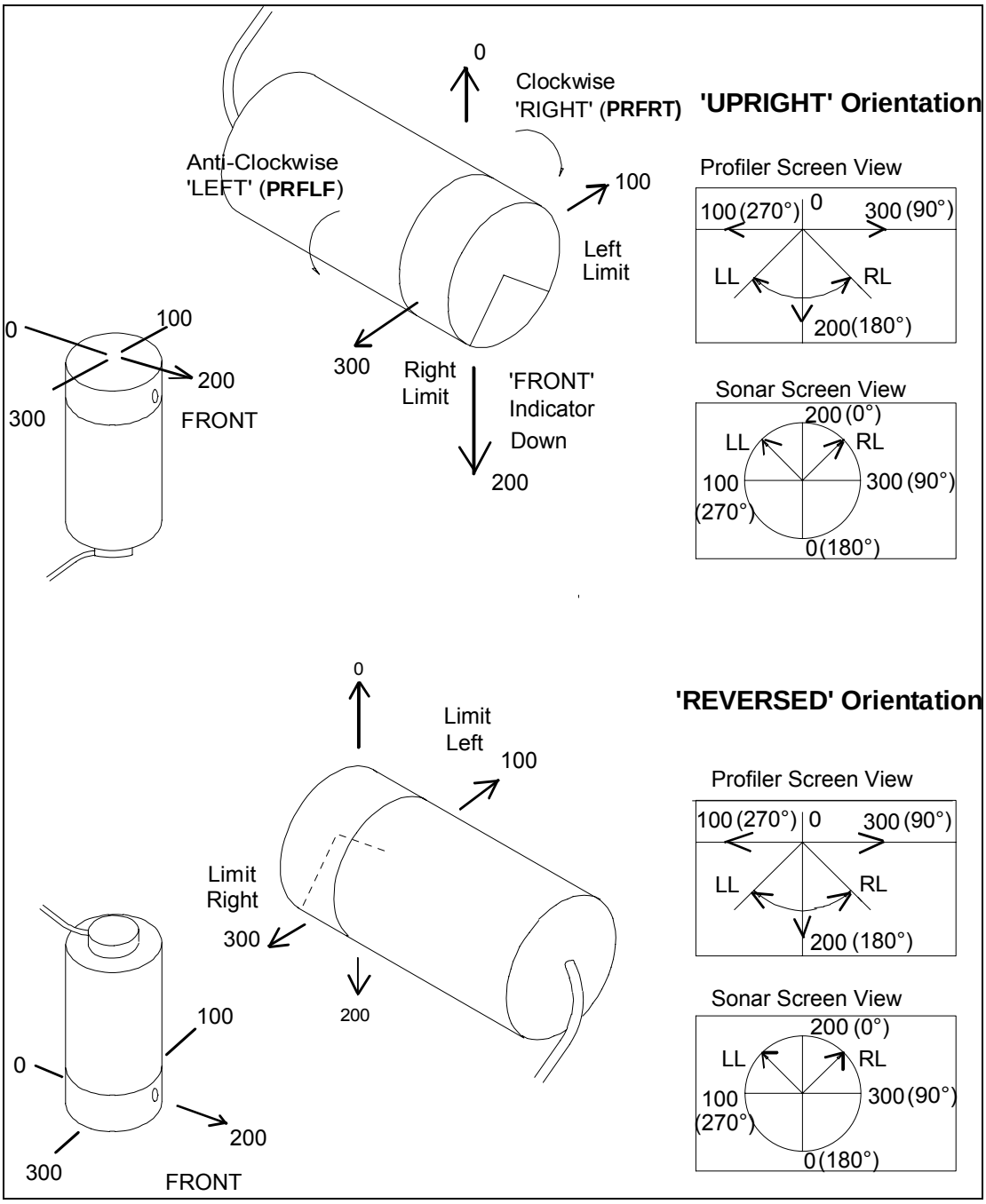
Number of data bits. Available options are 7 or 8.

Channel selection. 3 channels available for use.

Serial Port selection. COM 1, 3 & 4 available for use (Note: COM 2 is assigned to the RAT on a SeaKing SCU but is available on SeaNet SCU).

Transmission Baud Rate. Up to 19200 Baud available.

Profiler & Sonar Orientations & Directions of Scan



Directions	0, 100, 200, 300 are in head data units (gradians). 0 - 400 gradians = 0 - 360°
Directions	(0°), (90), (180), (270) are displayed direction in degrees.
Scan Right	scans collecting data from LEFT limit to RIGHT limit followed by a 'FLYBACK' to LEFT limit and vice versa for **Scan Left**.
Alternate Scan	Collects data in both scan directions with no 'FLYBACK'.

REMOTE PROFILER COMMUNICATIONS

DEFINITIONS

'device' A 'device' is any valid SCU data device, e.g. Profiler, Bathy, Altimeter, etc.

'Slot' Within the SCU each device and its data is associated with a 'Slot'. A SCU has 12 slots, allowing for a maximum of 12 different devices to be connected to it.

'Trigger' The trigger command enables some devices to sample data upon user request

'Continuous' Allows devices to send all data as it is collected without further request or triggering

'Cursor' Allows some devices to report SCU cursor position

'Send Mode' Refers to the 4 different format modes for data transfer; Binary, Hex, ASCII & CSV.

'ASCIIText' Data from SCU can be sent in ASCIIText mode. All Data from user to SCU must be sent to the SCU in ASCIIText mode. Numeric data is represented in its Decimal ASCII form appropriate to its DATA TYPE. All Commands are sent as ASCII printable characters.

'Hex' Numeric data from SCU can be sent in Hexadecimal mode (characters "0" .."F"), where the byte order is a function of the data type, and not as LSBF.

E.g.	Byte	01000111	Hex	"47"
	Word	00100001 01000111	Hex	"2147"

'Binary' Numeric data from SCU can be sent in raw binary mode. Multiple byte data types are sent in 'Least Significant Byte First' (LSBF, Intel convention). NOTE: Motorola convention is Most Significant Byte First,

'CSV' Data from SCU can be sent in ASCII mode with each field separated by comma delimiters. Numeric data is represented in Decimal ASCII format although not following the exact number of characters as defined by the DATA TYPE for ASCIIText mode.
For example, in ASCIIText mode, the Integer value –128 will be represented as '–00128', as defined by the DATA TYPE. In CSV mode this field would read as 'xx,-128,xx' (shown as part of comma delimited string). Only the required number of characters that will represent the ASCII value are used in each case.

'WAP' The application currently running on the SCU e.g. SONV3 Application Identifier - 'SBP' or 'SBPQ'.

'SOURCEN' Generic Device Type A number identifying the device type as for example sonar or profiler.

DATA TYPES

For Hex characters, Upper case = Most Significant, Lower Case = Least Significant
E.G."Nn" = 2 Hex bytes where "N" = Most Significant 4 bits (Nibble). "n" = Least Significant Nibble

Single Bytes are represent between <> brackets.

A Nibble is the lower 4 bits of a byte. A Nibble is packed into 1 byte, therefore 2 Nibbles will be packed into 2 Bytes.

In ASCIIText Mode SHORTINT, INTEGER must have leading + or - sign, and REAL, LONGREAL must have signed exponent and mantissa

LineFeed (LF) and Carriage Return (CR) are considered to be Printable ASCII characters

TIME is in units of Hours (0 to 23), Minutes (0 to 59), Seconds (0 to 59), Secs/100 (0 to 99)
Ultimate TIME resolution is in SCU3 18.2 Hertz System Clock Units.

Command Messages and Replies are concatenated Strings e.g.: ":GM"+Slot1+LF = ":GM01<LF>"

Data Type	Binary Mode	Hex Mode	ASCIIText Mode
REMCH			":"
REPCH			"%"
BOOLEAN	Nibble	"b"	ASCII Digit "0" or "1"
DIGIT	Nibble	"n"	Any ASCII Digit "0" to "9"
CHAR	<byte>	<byte>	Any printable ASCII character
SHORTCARD	<byte>	"Nn"	"000" to "255"
SHORTINT	<byte>	"Nn"	"-128" to "+128"
CARDINAL	<LSB><MSB>	"MmLl"	"00000" to "65535"
INTEGER	<LSB><MSB>	"MmLl"	"-32768" to "+32767"
LONGCARD	<LSB><.><.><MSB>	"Mm....Ll"	"0000000000" to "4294967296"
LONGINT	<LSB><.><.><MSB>	"Mm....Ll"	"-2147483648" to "+2147483647"
REAL	<LSB><.><.><MSB>	"Mm....Ll"	"-9.99999E-37 to "+9.99999E+37"
LONGREAL	<LSB>,6*<><MSB>	"Mm.....Ll"	"-9.999999999999E-307 to "+9.999999999999E+307
TIME	<C><S><M><H>	"HhMmScCc"	"HHMMSSCC"
DATE	<D><M><Y>	"DdMmYyyy"	"DDMMYYYY"
SLOTN	<1..12>	"Nn" ("01" to "0C")	"01" to "12"
SOURCEN	<0..99>	"Nn" ("00" to "63")	"00" to "99"
DEVICEN	<0..99>	"Nn" ("00" to "63")	"00" to "99"
NODEN	<1..15>	"Nn" ("01" to "0F")	"01" to "15"

SPECIAL CASES AND LIMITATIONS

Slots 1 to 11 are application configurable slots. The allocation of devices to slots is controlled by parameters within the SONV3 configuration file and these are pre-set for each system at delivery. They cannot be changed by remote control.
Multiple head profiler systems (Dual or Quad) use a slot for each head device. Each Master/Slave pair of profilers are configured to be in consecutive slots, Master followed by Slave e.g. Slot2=Master, Slot3=Slave). Quad systems are treated as 2 dual systems, which may be separated (e.g. Slot2=Master1, Slot3=Slave1, Slot5=Master2, Slot6=Slave2).

TRITECH-SKV4 REMOTE COMMUNICATIONS DATA CONSTANTS AND STRUCTURES

GENERAL DATA DESCRIPTIONS

Data Description	DataCodes	Data Types
Slot Number (range “01” to “12”)	SlotN	SLOTN
Device Source Code (range “00” to “99”)	SourceN	SOURCEN
Reply Terminator , ASCII(13) + ASCII(10))	CRLF	2*CHAR
Command Terminator, ASCII(10)	LF	1*CHAR
Space Character	□	1*CHAR
Total Number of Bytes in Message in Hex (including Command and Reply codes)	NB	CARDINAL
SONV3 Application Identifier	WAP	10*CHAR

SYSTEM DATA CONSTANTS

SourceType Data Constants	DataType = SOURCEN
Device Description	**ASCIIText Data Code**
Null Device (nothing in a slot) (sNUL)	“32” Hex“20”
Reserved	“33” Hex“21”
SeaKing Imaging Sonar Head (hSON)	“34” Hex“22”
Reserved	“35” Hex“23”
Reserved	“36” Hex“24”
SeaKing Profiler Head (hPRF)	“37” Hex“25”
Reserved	“38” Hex“26”
SeaKing Bathy	“39” Hex“27”
Reserved	“40” -> “52”
SeaKing Attitude Sensor	“53” Hex”35”

TRITECH-SKV4 REMOTE COMMUNICATIONS COMMAND SUMMARY

Command Messages to the SCU are made up of Command Codes followed by required data codes.

Reply Messages from the SCU are made up of Reply Codes followed by required data codes.

E.G. Specific Enquire Slot Setup = ":GM"

COMMAND DESCRIPTION

Slot Commands	Command Code	Reply
Global Enquire Slot Mode	":GE"+ LF	"%E" + NB + WAP+ 12*(SlotModeHdr+SlotMode)+ CRLF
Specific Enquire Slot Mode	":GM"+SlotN +LF	"%M" + NB + SlotModeHdr + SlotMode + CRLF
Specific Send Slot Mode	":SM"+SlotN + SlotMode+LF	No Reply
Specific Enquire Device Configuration	":GC"+SlotN+LF	"%G" + SlotReplyHdr + device configuration. data + CRLF
Specific Send Device Configuration	":SC"+SlotN+SOURCEN+ device configuration data + CRLF	No Reply
Specific Enquire Slot Position	":GP"+SlotN+LF	"%P" + SlotReplyHdr + Position data + CRLF
Specific Send Slot Position	":SP"+ SlotN + Position Data + LF	No Reply
Specific Trigger Slot and Request next data	":ST"+SlotN+LF	"%D" + SlotReplyHdr + device system reply data + CRLF
Specific Request current data	":SR"+SlotN+LF	"%D" + SlotReplyHdr + device system reply data + CRLF
Specific Request continuous data output ON	":S+"+SlotN+LF	("%D" + SlotReplyHdr + device system reply data + CRLF) repeatedly until ":S-" is received
Specific Request continuous data output OFF	":S-"+SlotN+LF	No Reply
Specific Request current Mean V.O.S. *(valid with SK704 Bathy and surface software V1.50 ->)*	":GV"+SlotN+LF	"%V" + SlotReplyHdr + mean velocity reply data + CRLF
Specific Remote control OFF (send to any slot where :SC was issued to release controls from Remote back to Local)	":RO"+SlotN+LF	No Reply
Get Button Bar data	":GB"+LF	"%B" + NB + Title Bar Text + 8*(User Text) + TIME + DATE + Icon Library + Icon 1 + Icon 2 + CRLF
Set Button Bar data	":SB" + Title Bar Text + 8*(User Text) + TIME + DATE + Icon Library + Icon 1 + Icon 2 +LF	

See Device specific sections for device configuration data and device reply data structures.

STRUCTURED DATA DESCRIPTIONS

SlotReplyHdr Data Structure		
Data Description (always Hex)	**DataCodes/Range**	**Data Types**
The following Data structure is sent in Hex Format		
Total Number of Bytes in Message in Hex (including Command and Reply codes)	NB	CARDINAL
Slot Number (range "01" to "0C")	SlotN	SLOTN
Generic Device Type	SourceTypes	SOURCEN
Data Reply Mode (0=ASCIIText, 1=Hex, 2=Binary, 3=CSV) **CSV = Comma Separated ASCII*	0 or 1 or 2 or 3	DIGIT
Send SeaKing Long = 3*****, Send SeaKing Short = 2*****, Send Raw data = 1, Send Processed Data = 0 ****** *Bathy Applicable Only*	0 or 1 or 2 or 3 *(Always 0 in :GV reply)*	DIGIT
Example: Byte Count = Hex 002B (43) Slot = 02 = Profiler system Sourcetype = 37(Hex 25) = Profiler system Data reply mode is ASCIIText Send Rawdata = True ALWAYS Hex e.g. "002B022501"		

SlotModeHdr Data Structure		
Data Description (always Hex)	**DataCodes**	**Data Types**
Slot Number (range "01" to "0C")	SlotN	SLOTN
Generic Device Type	SourceTypes	SOURCEN
Unused, Always 00	00	
Node Number	1 to 1F	NODEN
Example: Slot 3, Slave Profiler, node number 21 (Hex 15) ALWAYS Hex e.g. "03250015"		

SlotMode Data Structure		
Data Description (always Hex)	**DataCodes**	**Data Types**
Profiler Data Reply Mode***** Send Raw data = 1, Send Processed Data = 0 ****** *Bathy = Unused, mode stated in SlotReplyHdr*	0 or 1	DIGIT
Continuously Send Data = 1, Data on demand = 0	0 or 1	DIGIT
Report Cursor Position On = 1, Off = 0	0 or 1	DIGIT
Data Reply Mode (0=ASCIIText, 1=Hex, 2= Binary, 3=CSV)	0 or 1 or 2	DIGIT
Communications Channel for Reply Data	1 or 2 or 3	DIGIT
Unused	Always 0	
Example: Send Processed data on demand with cursor reporting in binary on communications channel 3 ALWAYS hex e.g. 001230		

SLOT COMMANDS

EXAMPLES OF USE

SlotN = “04” for Bathymetric system
SlotN = “02” for Profiler system (“02” = Master, “03” = Slave)
WAP = BP for Bathymetric/Profiler system

Global Enquire Slot Mode - :GE

	Message Formats
Command	“:GE”+ LF
Reply	“%E” + NB + WAP+ 12*(SlotModeHdr+SlotMode)+ CRLF

	Message Strings
Command	“:GELF”
Reply	“%E00BA□□□□□□□□BP010000000000000**022500141010100**3250015101010**04270028100010**0500000000000000**0600000000000000**7000000000000**0800000000000000**9000000000000**0A000000000000**0B000000000000**0C000000000000CRLF**”

Specific Enquire Slot Mode - :GM

	Message Formats
Command	“:GM”+SlotN +LF
Reply	“%M” + **NB** + SlotModeHdr + **SlotMode** + CRLF

	Message Strings
Command	“:GM02LF”
Reply	“%M**0016**02250014**100010CRLF**”

Specific Send Slot Mode - :SM

	Message Formats
Command	“:SM”+SlotN + SlotMode+LF
Reply	No Reply

	Message Strings
Command	“:SM02**100010**LF”
Reply	No Reply

ST PROFILER SYSTEM DATA

SOURCETYPE = 37 (HEX 25)

Profiler System Configuration Data Structure		
Data Description	**DataRange**	**Data Types**
Range Scale in decimetres	10 to 300	CARDINAL
ScanWidth in 1/16 Gradian Steps (400 Gradians = 360 degs)	0 to 6392	CARDINAL
Scan Centre Direction in 1/16 Gradian Steps	0 to 6392	CARDINAL
Profiler Head Gain Setting as percentage	0 to 100	CARDINAL
Resolution Control (0=Lo, 1=Med, 2=Hi, 3=Ult)	0 to 3	DIGIT
Manual Triggered Scan = 1, Continuous Scan = 0	0 or 1	BOOLEAN
Profiler Head Enabled Bit 0 = Master Profiler Head Bit 1 = Slave Profiler Head	0 to 3	DIGIT
Unused	Always 0	BOOLEAN
Operating Frequency (0=Low, 1=High)	0 or 1	BOOLEAN
Mirror Sector = 1 if Enabled default = 1	0 or 1	BOOLEAN
Unused	Always 0	BOOLEAN
Unused	Always 0	BOOLEAN
Ping Sync = 1 if Enabled default = 1	0 or 1	BOOLEAN
Scan Mode = Right=0, Left=1, Alternate=2 default = 2	0, 1 or 2	DIGIT
Orientation = Upright = 0, Reversed = 1 default = 0	0 or 1	DIGIT
Gain Slope in 1/255 units	0 to 255	CARDINAL
Unused	Always 000	SHORTCARD
Speed of Sound in Metres/Sec * 10 (Typ 14750 dm/sec)	14000 - 15500 (in 1 metre steps)	CARDINAL

Example:
RangeScale 10 metres
ScanWidth 180 degrees (200 Gradians)
ScanCentre Direction Front (Red LED on) (200 Gradians)
Gain Setting 15% (Normal)
Resolution Control High
Continuous Scan
Master and Slave Profiler Heads Enabled
Unused (Always 0)
Operating Freq. = Low
Mirror Sector enabled
Unused (Always 0)
Unused (Always 0)
Ping Sync enabled
Scan Mode Alternate
Orientation upright
Gain Slope = 30
Unused (Always 000)
Speed of Sound in Metres/Sec*10 = 14750

Always ASCIIText when sent to SONV3, SONV3 replies in data reply mode of slot
ASCIIText = “00100**0320**03200**0001520300100120000770001475****0**”

Position Data Structure		
Profiler Data Description	**DataCodes**	**Data Types**
Head Installation Positions Relative to Vehicle Datum		
Horizontal X Position in millimetres	-5000 to +5000	INTEGER
Vertical Y Position in millimetres	-5000 to +5000	INTEGER
Longitudinal Z Position in millimetres	-5000 to +5000	INTEGER
Rotational R Position in Gradians * 10	-02000 to +02000	INTEGER
EchoRanging Time Correction in microseconds	-100 to +100	INTEGER

Example:
Head 1/2 metre horizontally from vehicle datum point and 1 metre above the datum point
Head at X=500,Y=1000,Z=0,R=0, no time correction,
Always ASCIIText when sent to SONV3, SONV3 replies in data reply mode of slot
ASCIIText = "+00500-**01000**+00000**+00000**+00000"
Hex = "01F4**03E8**0000**0000**0000"

Profiler System Reply Data Structure (Attention: V1.53 Changes)		
Data Description	**DataRange**	**Data Types**
Head Installation Positions Relative to Vehicle Datum		
Horizontal X Position in millimetres	-5000 to +5000	INTEGER
Vertical Y Position in millimetres	-5000 to +5000	INTEGER
Longitudinal Z Position in millimetres	-5000 to +5000	INTEGER
Rotational R Position in 1/10 Gradians	-02000 to +02000	INTEGER
EchoRanging Time Correction in microseconds	-100 to +100	INTEGER
Number of Profile Samples (NPS)	00001 to 00799	CARDINAL
Scan Start Angle in 1/16 Gradians	00000 to 06392	CARDINAL
Step size and Direction during scan in 1/16 Gradians (008=Ult, 016=Hi, 024=Med, 032=Lo)	-032 (Scan Left) to +032 (Scan Right)	SHORTINT
Velocity of Sound in metres / second * 10 (dm/sec)	14000 to 15500 (in 1 metre steps)	CARDINAL
Time at Start of Scan	00000000 to 23595999	TIME
Duration of Scan in Units of 1 milliseconds	0 to 65535	CARDINAL
Profiler Head Operating Mode Bit 0 = 0 = Orientation Upright Bit 0 = 1 = Orientation Reversed Bit 1 = 0 = **Raw Data** in **µsec** clock units / **Processed Data** in **mm** (Applied when <= 30m Range Scale is set) Bit 1 = 1 = **Raw Data** in **10µsec** clock units / **Processed Data** in **cm** (Applied when 50 or 80m Range Scale set) Bit 4 = 0 = Profiler Data to surface excludes ping times Bit 4 = 1 = Profiler Data to surface includes ping times ****** Bit 2-3,5-7 = Reserved, Always 0 E.G. Upright, = "000" Reversed = "001" Upright, Profiler data sent to SCU includes ping times = "016" ****** *Important – Signifies that profiles CAN be Roll angle corrected when the Tritech Attitude Sensor is connected. Bit 4 = 1 should be applicable when an Attitude Sensor application is running (e.g. 'SBPA')*	0 to 7	BYTE
NPS * Profile Data Points *(Raw / Processed)*	0 to 65535	NPS*CARDINAL

RAW DATA is the return acoustic path length in µseconds (x10 when using 50m or 80m Range Scale). The slant range is therefore calculated by multiplying by velocity of sound divided by 2. **PROCESSED DATA** gives actual slant range in millimetres (or centimetres when using 50m or 80m Range Scale) using the system velocity of sound. ***Examples over-page ->***

Example 1: Head at XYZR=0, no time correction, 3 * 5metre ranges in microseconds, Start at 199, Ultimate, PRFRT, Vprop = 1500m/s, Scan at 15:27:33:02, Duration 33msecs, Orientation reversed with no ping times: 30 metre Range Scale selected
ASCIIText =
"+00000**+00000**+00000**+00000****00003**03184**+008**15000**1527330**20000**3001**06667**0666**706667"

Example 2: Head at XYZR=0, no time correction, 3 * 5metre ranges in microseconds, Start at 199, Ultimate, PRFRT, Vprop = 1500m/s, Scan at 15:27:33:02, Duration 33msecs, Orientation reversed with no ping times: As 'Example 1' but with 50 metre Range Scale selected
ASCIIText =
"+00000**+00000**+00000**+00000****00003**03184**+008**15000**1527330**20000**003**0066**70666**700667"

EXAMPLES OF USE
SlotN = "02"

Get Configuration Example - :GC

	Message Formats
Command	":GC"+SlotN+LF
Reply	"%G" + **SlotReplyHdr** + Profiler Configuration data + **CRLF**

	Message Strings
Command	":GC02LF"
Reply	"%G**003A022501**0001**03200**0320**0001520300100120000770001**4750**CRLF**"

Get Slot Position : GP

	Message Formats
Command	":GP"+SlotN+LF
Reply	"%P" + **SlotReplyHdr** + Profiler Position data + **CRLF**

	Message Strings
Command	":GP02LF"
Reply	"%P**002C022501**+00500-**01000**+00000**+00000**+00000**CRLF**"

Set Slot Position : SP

	Message Formats
Command	":SP" + SlotN + Profiler Position Data + LF
Reply	No Reply

	Message Strings
Command	":SP02+00500-**01000**+00000**+00000**+00000LF"
Reply	No Reply

Trigger New Data : ST (Use when 'Manual Triggered Scan' is enabled in the Profiler Configuration Data Structure. This control will trigger the head(s)***** and acquire data for one complete scan)

	Message Formats
Command	":ST"+SlotN+LF
Reply	"%D" + **SlotReplyHdr** + Profiler data + CRLF

***** *Only need to send to Master head, if a Dual Head pair is operational, to trigger both heads.*

	Message Strings
Command	":ST02LF"
Reply	"%D**005E022501**+00000**+00000**+00000**+00000****00003**03184**+008**15000**1527330**20000**3001**06667**0666**706667**CRLF**

Get Single Data record : SR

	Message Formats
Command	":SR"+SlotN+LF
Reply	"%D" + **SlotReplyHdr** + Profiler data + CRLF

	Message Strings
Command	":SR02LF"
Reply	"%D**005E022501**+00000**+00000**+00000**+00000****0000**03184**+008**150001**527 3302**00003**001**06667**0666**706667**CRLF**

Set Configuration Example : SC
Always send to the master of a dual head pair even if using slave only.
When sent to the Master head the configuration information is copied to the Slave

	Message Formats
Command	":SC"+SlotN+SOURCEN+ Profiler Configuration data + CRLF
Reply	No Reply

	Message Strings
Command	":SC02250001**0320**0320**0001520300100120000770001**4750**CRLF"
Reply	No Reply

Set Continuous Mode : S+

	Message Formats
Command	":S+"+SlotN+LF
Reply	("%D" + **SlotReplyHdr** + Profiler data + CRLF) repeatedly until ":S-"+SlotN is received

	Message Strings
Command	":S+02LF"
Reply	"%D**005E022501**+00000**+00000**+00000**+00000****0000**03184**+008**150001**527 3302**00003**001**06667**0666**706667**CRLF**

Turn Off Continuous mode : S-

	Message Formats
Command	":S-"+SlotN+LF
Reply	No Reply

	Message Strings
Command	":S-02LF"
Reply	No Reply

ST BATHYMETRIC SYSTEM DATA

SOURCETYPE = 39 (HEX 27)

BATHYMETRIC SYSTEM DATA STRUCTURES

Bathymetric System Configuration Data Structure		
Data Description	**DataRange**	**Data Types**
*Barometric Pressure in millibars (Typ. 1000.0)	900.0 to 1100.0	REAL
*Specific Gravity (Typ. 1.0270)	0.900 to 1.100	REAL
*Speed of Sound in Metres/Sec * 10 (Typ 14750 dm/sec) (this value only used to correct ST-Altimeter readings)	14000 to 15500	CARDINAL
Bathy Msg Format Selector 0 = WINSON Compatible Message Format (sets to RAW) 1 =Seaking Long Bathy Message Format 2 =Seaking Short Bathy Message Format	0 to 2	DIGIT
Measured / Supplied Parameter Selector 0 = Use Supplied Parameters (MANUAL) 1 = Select Measured Speed of Sound (AUTO_VOS) 2 = Select Measured Mean Specific Gravity (AUTO_SG) 4 = Select Measured Barometric Pressure (AUTO_BAR)	0 or any combination of 1 + 2 + 4	DIGIT
Bathy Data Message Update Rate 0 = Max Rate (Approx 4 Hz) 1 = 2 Hz Update Rate 2 = 1 Hz Update Rate 3 = Update every 2 seconds 4 = Update every 5 seconds 5 = Update every 10 seconds	0 to 5	DIGIT
Local Latitude (for Local Gravity Calculation)	0.0 to 90.0	REAL

Example:
Starred Items (*) are compatible with WINSON format, and a configuration message sent with just these first three fields will be accepted as commands for a WINSON compatible data reply.

If the 4 last fields are not sent, the system will always set, and reply in the WINSON (RAW) Compatible format.
If the system is in the WINSON Compatible mode, the last 4 fields are not sent in response to a :GC request. This is to preserve backward compatibility with existing user software.

Barometric Pressure 1100 millibars
Specific gravity 1.027
Speed of sound 1475 Metres / Second * 10
Always ASCIIText when sent to WINSON, WINSON replies in data reply mode of slot

Example WINSON Bathy command
ASCIIText = “+1.10000E+03+1.02700E+0014750”
Hex = “448980003F8374BC399E”

Example Seaking Bathy command for Seaking Short Bathy Message Format, AUTO_VOS, AUTO_SG, and a 1Hz Update Rate
ASCIIText = **“+1.10000E+03**+1.02700E+00**14750**232**+5.80000E+01**”
”Hex = “**4489**80003**F83**74BC**399E**232**LLLL**

:GC command **always** returns current Manual System Settings for Speed of Sound, MeanDensity and Barometric pressure

NOTE on Local Latitude and Gravity.

All Tritech supplied Digiquartz Pressure Sensors are calibrated using a deadweight tester in a location where the Gravity value is 9.806 65 m / $sec^{2.}$

Computed Depth calculations take into account the Gravity of the operating location, which is specified as a latitude. The local gravity value used in the Depth calculations is computed from the following formula (Intl. Assoc of Geodesy, Sp.Pub.Bull. geodesy 1970):

G_{local} = Ge * (1 + B1* sin^2(lat) + B2* sin^2(2*lat))

Where:

Ge = 9.780 318 4 m / sec2
B1 = 0.005 302 4
B2 = 0.000 005 9
lat = local Latitude in degrees

If you are operating in a locality where G_{local} is known, choose a suitable Latitude value to give the desired value of G_{local}

If you do not have facilities to calculate G, it is calculated from an entered Latitude in the Bathy application setup form in the SeaKing system.

Position Data Structure		
Bathymetric Data Description	**DataCodes**	**Data Types**
Head Installation Positions Relative to Vehicle Datum		
Vertical Bathy Position in millimetres	-5000 to +5000	INTEGER
Vertical BathyAltimeter Position in millimetres	-5000 to +5000	INTEGER
Reserved	-5000 to +5000	INTEGER
Bathy Zero Offset in millimetres	-5000 to +5000	INTEGER
Reserved	-100 to +100	INTEGER

Example:
Bathy 1/2 metre below vehicle datum point and Altimeter 1 metre below the datum point
Bathy at Y=500, Altimeter at Y=1000, No Zero Offset
Always ASCIIText when sent to SONV3, SONV3 replies in data reply mode of slot
ASCIIText = "+00500**+01000**+00000**+00000**+00000"
Hex = "01F4**03E8**0000**0000**0000"

Mean Velocity Reply Data Structure		
Data Description	**DataCodes**	**Data Types**
Valid when SK704 (with CT probe) Bathy sensor deployed and with V1.50 (and later) surface software		
Vehicle Datum Depth in millimetres = ((Sensor Pressure - Atmospheric Pressure) * MeanDensity * Calibration Gravity / Local Gravity) - Vertical Bathy Position + Vertical Bathy Installation Zero Offset	0000000000 to 100000000	LONGINT
Velocity of Sound in metres per second * 10 and calculated from Local column measurements above at 1psi intervals.	14000 to 15500	CARDINAL

Example:
Bathy at 58.418 metres depth.
Mean Velocity of Sound = 1472m/s.

ASCIIText = "+000005841**14720**"
Hex = "0000E432**3980**"

Bathymetric System Reply Data Structure **WINSON 'RAW' DATA FORMAT**		
Data Description	**DataRange**	**Data Types**
Internal temperature in tenths of a degree centigrade	-200 to +500	INTEGER
Digiquartz pressure in 100,000ths of a PSIa	0000000000 to 100000000	LONGCARD
Digiquartz temperature in 1/100ths of a degree centigrade	-5400 to +10700	INTEGER
Raw digiquartz pressure reading is the number of 8MHz counts for 10,000 digiquartz pulses	0000000 to 10000000	LONGCARD
Raw digiquartz temperature reading is the number of 8MHz counts for 40,000 digiquartz pulses	0000000 to 10000000	LONGCARD
Local oscillator calibration coefficient in Hz	-500 to +500	INTEGER
Conductivity in µSiemens per centimetre	00000 to 65000	CARDINAL
Conductivity probe temperature in hundredths of a degree centigrade	-1000 to +5000	INTEGER
Salinity in parts per 1,000,000 calculated from Conductivity readings	00000 to 100000	CARDINAL
Velocity of Sound in metres per second * 10 calculated from Conductivity readings (or 'Manual' VOS if no CT probe)	14000 to 15500	CARDINAL
Altimeter (return path) reading in clicks of 200nsecs (This value DOES NOT include 'Altimeter Position offset'.)	0 to 203390	LONGINT
Bathymetric system devices Bit 0 = 1 = Digiquartz valid Bit 1 = 1 = Conductivity valid Bit 2 = 1 = Altimeter valid Bit 3 = 1 = Internal temperature valid *(only installed in SK701 Bathy)* Bit 4 = 1 = Velocity of sound calculation valid Bit 5 = 1 = Salinity calculation valid E.G. Digiquartz valid = "001" Digiquartz & Conductivity valid = "003" Digiquartz & Altimeter valid = "005" Digiquartz, Conductivity & Altimeter valid = "007"	000 to 063	SHORTCARD
Depth in millimetres (This value DOES NOT include 'Bathy Position offset' and 'Bathy Zero offset'.)	1000000 to 700000	LONGINT
Time at Start of Scan	00000000 to 23595999	TIME

Example:

Internal temperature	= 5 degrees	= 50
Digiquartz pressure	= 200 PSIa	= 20000000
Digiquartz temperature	= 5 degrees	= 500
Raw digiquartz pressure reading	= 2135648	= 2135648
Raw digiquartz temperature reading	= 1986497	= 1986497
Local oscillator calibration	= -10 Hz	= -10
Conductivity	= 40 mS/cm	= 40000
Conductivity temperature	= 5 degrees	= 500
Conductivity Salinity	= 3.4 pts/1000	= 3400
Velocity of Sound	= 1475 metres per second	= 14750
Altimeter reading	= 24 metres	= 162710 (return path)
Bathymetric system devices	= SK704 (CTDA)	= 55
Depth in millimetres	= 136.921 metres	= 136921
Time in HHMMSSCC	= 09:45:33:74	= 09453374

ASCIIText = "+00050**0020000000**+00500**0002135648**0001986497-**0001**040000
+005000340**14750**+0000162710**055+**0000136921**09453374**"
Hex = "0032**01312D00**01F4**00209660**01E4FC1**FFF6**9C40
01F40D48**399E**00027B963**7**000216D9**00903F3E**"

NOTE: To retrieve Bathy/Altimeter Position offsets and Bathy Zero offset, use the ':GP' command.

Bathymetric System Reply Data Structure **WINSON 'PROCESSED' DATA FORMAT**		
Data Description	**DataRange**	**Data Types**
Internal temperature in tenths of a degree centigrade	-200 to +500	INTEGER
Digiquartz pressure in 100,000ths of a PSIa	0000000000 to 100000000	LONGCARD
Digiquartz temperature in hundredths of a degree centigrade	-5400 to +10700	INTEGER
Raw digiquartz pressure reading is the number of 8MHz counts for 10,000 digiquartz pulses	0000000 to 10000000	LONGCARD
Raw digiquartz temperature reading is the number of 8MHz counts for 40,000 digiquartz pulses	0000000 to 10000000	LONGCARD
Local oscillator calibration coefficient in Hz	-500 to +500	INTEGER
Conductivity in µSiemens per centimetre	00000 to 65000	CARDINAL
Conductivity probe temperature in hundredths of a degree centigrade	-1000 to +5000	INTEGER
Salinity in parts per 1,000,000 calculated from Conductivity readings	00000 to 100000	CARDINAL
Velocity of Sound in metres per second * 10 calculated from Conductivity readings	14000 to 15500	CARDINAL
Altimeter reading in millimetres (This value DOES include 'Altimeter Position offset'. V.O.S. figure in preceding field is applied)	0 to 30000	LONGINT
Bathymetric system devices Bit 0 = 1 = Digiquartz valid Bit 1 = 1 = Conductivity valid Bit 2 = 1 = Altimeter valid Bit 3 = 1 = Internal temperature valid *(Only installed in SK701 Bathy)* Bit 4 = 1 = Velocity of sound calculation valid Bit 5 = 1 = Salinity calculation valid E.G. Digiquartz valid = "001" Digiquartz & Conductivity valid = "003" Digiquartz & Altimeter valid = "005" Digiquartz, Conductivity & Altimeter valid = "007"	000 to 063	SHORTCARD
Depth in millimetres (This value DOES include 'Bathy Position offset' and 'Bathy Zero offset')	1000000 to 700000	LONGINT
Time at Start of Scan	00000000 to 23595999	TIME

Example:

Internal temperature	= 5 degrees	= 50
Digiquartz pressure	= 200 PSIa	= 20000000
Digiquartz temperature	= 5 degrees	= 500
Raw digiquartz pressure reading	= 2135648	= 2135648
Raw digiquartz temperature reading	= 1986497	= 1986497
Local oscillator calibration	= -10 Hz	= -10
Conductivity	= 40 mS/cm	= 40000
Conductivity temperature	= 5 degrees	= 500
Conductivity Salinity	= 3.4 pts/1000	= 3400
Velocity of Sound	= 1475 metres per second	= 14750
Altimeter reading	= 24 metres	= 24000
Bathymetric system devices	= SK704 (CTDA)	= 55
Depth in millimetres	= 136.921 metres	= 136921
Time in HHMMSSCC	= 09:45:33:74	= 09453374

ASCIIText = "+00050**0020000000**+00500**0002135648**0001986497-**0001**40000
+005000340**14750**+000024000**055+**000013692**109453374**"
Hex = "0032**01312D00**01F4**00209660**01E4FC1**FFF6**9C40
01F40D48**399E**00005DC0**37**000216D9**00903F3E**"

Bathymetric System Reply Data Structure SeaKing Long Data Format	**** Software V1.27 and later***	
Data Description	**DataRange**	**Data Types**
Time of Reading	00000000 to 23595999	TIME
Vehicle Datum Depth in millimetres = ((Sensor Pressure - Atmospheric Pressure) * MeanDensity * Calibration Gravity / Local Gravity) - Vertical Bathy Position + Vertical Bathy Installation Zero Offset	0000000000 to 100000000	LONGINT
Vehicle Datum Altitude in mm = (Altimeter Time * Speed of Sound) + Vertical Altimeter Position	0000000000 to 0000100000	LONGINT
Velocity of Sound in metres per second * 10 used for Altitude. Calculated from Conductivity readings (AUTO_VOS) or from System Speed of Sound(MANUAL)	14000 to 15500	CARDINAL
Mean Density used for Depth Calculation in 100 *(gms/litre) units. Calculated from Conductivity readings (AUTO_SG) or from System Density (MANUAL)	0000090000 to 0000110000	LONGCARD
Barometric Pressure used for Depth Calculation in mbar units. Measured from barometer readings (AUTO_Baro) or from System Barometric Pressure(MANUAL)	00900 to 01100	CARDINAL
Digiquartz pressure in 100,000ths of a PSIa	0000000000 to 100000000	LONGCARD
Altimeter reading in clicks of 200 nano seconds	0 to 200000 (0 - 30 metres)	LONGINT
System temperature in hundredths of a degree centigrade	-1000 to +5000	INTEGER
Conductivity in µSiemens per centimetre	00000 to 65000	CARDINAL
Local Density in 100 *(gms/litre) units. Calculated from Conductivity readings	0000090000 to 0000110000	LONGCARD
Bathymetric system devices Bit 0 = 1 = Digiquartz valid Bit 1 = 1 = Conductivity valid Bit 2 = 1 = Altimeter valid Bit 3 = 1 = Internal temperature valid *(Only installed in SK701 Bathy)* Bit 4 = 1 = Velocity of sound calculation valid Bit 5 = 1 = Salinity calculation valid E.G. Digiquartz valid = “001” Digiquartz & Conductivity valid = “003” Digiquartz & Altimeter valid = ”005” Digiquartz, Conductivity & Altimeter valid = “007”	000 to 063	SHORTCARD
Measured / Supplied Parameters Used in Depth and Altitude Calculations : 0 = User Supplied Parameters used (MANUAL) 1= Using Measured Speed of Sound (AUTO_VOS) 2= Using Measured Mean Specific Gravity (AUTO_SG) 4= Using Measured Barometric Pressure(AUTO_BAR) E.G. Using AUTO_VOS =“001” Using AUTO_VOS and AUTO_SG =“003”	000 to 007	SHORTCARD

Bathymetric System Reply Data Structure SeaKing Short Data Format	**** Software V1.27 and later***	
Data Description	**DataRange**	**Data Types**
Time of Reading	00000000 to 23595999	TIME
Vehicle Datum Depth in millimetres = ((Sensor Pressure - Atmospheric Pressure) * MeanDensity * Calibration Gravity / Local Gravity) - Vertical Bathy Position + Vertical Bathy Installation Zero Offset	0000000000 to 100000000	LONGINT
Vehicle Datum Altitude in mm = (Altimeter Time * Speed of Sound) + Vertical Altimeter Position	0000000000 to 0000100000	LONGINT
Velocity of Sound in metres per second * 10 used for Altitude. Calculated from Conductivity readings (AUTO_VOS) or from System Speed of Sound(MANUAL)	14000 to 15500	CARDINAL
Mean Density used for Depth Calculation in 100 *(gms/litre) units. Calculated from Conductivity readings (AUTO_SG) or from System Density (MANUAL)	0000090000 to 0000110000	LONGCARD
Barometric Pressure used for Depth Calculation in mbar units. Measured from barometer readings (AUTO_Baro) or from System Barometric Pressure(MANUAL)	00900 to 01100	CARDINAL
Bathymetric system devices Bit 0 = 1 = Digiquartz valid Bit 1 = 1 = Conductivity valid Bit 2 = 1 = Altimeter valid Bit 3 = 1 = Internal temperature valid *(Only installed in SK701 Bathy)* Bit 4 = 1 = Velocity of sound calculation valid Bit 5 = 1 = Salinity calculation valid E.G. Digiquartz valid = “001” Digiquartz & Conductivity valid = “003” Digiquartz & Altimeter valid = ”005” Digiquartz, Conductivity & Altimeter valid = “007”	000 to 063	SHORTCARD
Measured / Supplied Parameters Used in Depth and Altitude Calculations : 0 = User Supplied Parameters used (MANUAL) 1= Using Measured Speed of Sound (AUTO_VOS) 2= Using Measured Mean Specific Gravity (AUTO_SG) 4= Using Measured Barometric Pressure(AUTO_BAR) E.G. Using AUTO_VOS =“001” Using AUTO_VOS and AUTO_SG =“003”	000 to 007	SHORTCARD

EXAMPLES OF USE
SlotN = "04" in all examples

Get Configuration Example - :GC

	Message Formats
Command	":GC"+SlotN+LF
Reply	"%G" + **SlotReplyHdr** + Bathymetric Configuration data + **CRLF**

	Message String in WINSON RAW Data Mode
Command	":GC04LF"
Reply	"%G**002B042701**+1.10000E+03**+1.02700E+00**14750**CRLF**"
	Message String in SeaKing Long Data Mode
Command	":GC04LF"
Reply	"%G**003A042703**+1.10000E+03**+1.02700E+00**14750**132**+5.80000E+01**CRLF**"

Get Slot Position : GP

	Message Formats
Command	":GP"+SlotN+LF
Reply	"%P" + **SlotReplyHdr** + Bathymetric Position data + **CRLF**

	Message Strings
Command	":GP04LF"
Reply	"%P**002C042701**+00500**+01000**+00000**+00000**+00000**CRLF**"

Set Slot Position : SP

	Message Formats
Command	":SP" + Bathymetric Position Data + LF
Reply	No Reply

	Message Strings
Command	":SP04+00500**+01000**+00000**+00000**+00000LF"
Reply	No Reply

Trigger New Data : ST

	Message Formats
Command	":ST"+SlotN+LF
Reply	"%D" + **SlotReplyHdr** + Bathymetric data + CRLF

	Message Strings
Command	":ST04LF"
Reply	"%D0074**042701**+00000**0000020000**+00500**0002135648**0001986497-**0001**040000 **+00500**03400**14750**+000016000**031**+0000136921094533 74**CRLF**"

Get Single Data record : SR

	Message Formats
Command	":SR"+SlotN+LF
Reply	"%D" + **SlotReplyHdr** + Bathymetric data + CRLF

	Message Strings
Command	":SR04LF"
Reply	"%D**0074042701**+00000**0000020000**+00500**0002135648**0001986497-**0001**040000 **+00500**03400**14750**+000016000**031**+0000136921094533 74**CRLF**"

Set Configuration Example : SC

	Message Formats
Command	":SC"+SlotN+SOURCEN+ Bathymetric Configuration data + CRLF
Reply	No Reply

	Message String WINSON Raw/Processed Format
Command	":SC**0427**+1.10000E+03**+1.02700E+00**14750**CRLF**"
Reply	No Reply
	Message String Seaking Long/Short Format
Command	":SC**0427**+1.10000E+03**+1.02700E+00**14750**232**+5.80000E+01**CRLF**"
Reply	No Reply

Set Continuous Mode : S+

	Message Formats
Command	":S+"+SlotN+LF
Reply	("%D" + **SlotReplyHdr** + Bathymetric data + CRLF) repeatedly until ":S-" is received

	Message Strings
Command	":S+04LF"
Reply	"%D**0074042701**+00050**0000020000**+00500**0002135648**0001986497-**00010**40000 **+00500**03400**14750**+000016000**031**+0000136921094533 74**CRLF"**

Turn Off Continuous Mode : S-

	Message Formats
Command	":S-"+SlotN+LF
Reply	No Reply

	Message Strings
Command	":S-04LF"
Reply	No Reply

Get Current Mean Velocity of Sound : GV *(SONV3 V1.50 ->)*

	Message Formats
Command	":GV"+SlotN+LF
Reply	"%V" + **SlotReplyHdr** + Mean Velocity data + CRLF

	Message Strings
Command	":GV04LF"
Reply	"%V**001E042700**+000005841 8**14720**CRLF"

ST BUTTON BAR DATA

Get Button Bar data

	Message Formats
Command	":GB"+LF
Reply	"%B" + NB + Title Bar Text + 8*(User Text) + TIME + DATE + Icon Library + Icon 1 + Icon 2 + CRLF

Example

	Message Strings
Command	":GB"+LF
Reply	"%B006DTitle Bar Text~User1~User2~User3~User4~User5~User6~User7~User8~ 15094568~24071994~iconlib.exe~0003000A**CRLF**

Title Bar Text						
					Icon 3	Icon 10
					User1	
					User2	
					User3	
					User4	
					User5	
					User6	
					User7	
					User8	
				24-JUL-94 15:09:45		

Set Button Bar data *(128 character message limit)

	Message Formats
Command	":SB Title Bar Text + 8*(User Text) + TIME + DATE + Icon Library + Icon 1 + Icon 2 +LF"
Reply	No Reply

Example

	Message Strings
Command	":SBTitle␣Bar␣Text~User␣One~␣~~User␣Four~User5~User6~User7~User8~15094568~ 24071994~iconlib.exe~0003000ALF" *or* ":SBTitle␣Bar␣Text~User␣One~␣~~User␣FourLF"
Reply	No Reply

Title Bar Text						
					Icon 3	Icon 10
					User␣One	
					␣	
					Unchanged	
					User␣Four	
					User5	
					User6	
					User7	
					User8	
				24-JUL-94 15:09:45		

NB When setting the button bar data the ~ is a place holder for the string being sent. The string can be terminated prematurely with an LF and the remaining Button Bar data will be unchanged. To blank out a Button Bar string a space must be sent to separate the ~ place holder. To leave a string unchanged the ~ place holder follows the previous ~ immediately with no space.