SECTION 4

4. TRANSCEIVER COMMAND LANGUAGE

Transceiver commands and replies use 9600 baud with 8 data bits, no parity and 1 stop bit.

4.1 COMMAND AND REPLY TERMINATORS

All transceiver commands consist of ASCII printable characters with a terminator sent at the end of every command. The essential terminator on command inputs is the ASCII "line feed" character <LF>, although a carriage return, line feed (<CR> <LF>) combination is also acceptable.

Terminators on output messages consist of ASCII carriage return/line feed character pair.

Examples of commands are given throughout this section. Characters in bold type are the command sent to the transceiver. Characters in plain type are those returned as the reply. Note that the command characters are always echoed as a prefix to the reply.

4.2 STANDARD SETUP COMMANDS

4.2.1 Reset (RS)

4.2.1.1 **Description**

The "RS" command will reset the transceiver to its default (power-up condition).

In the case where the unit has locked up sending a Break sequence of 30ms on the serial line will cause the unit to reset, however some ROV umbilical systems do not support break sequence functionality. Alternatively, sending the string <DLE> <STX> UNLK <LF> at 9600 Baud will also cause the unit to reset.

4.2.1.2 **Example**

Command : **RS**
Reply : (Note - there is no reply to the reset command)

4.2.1.3 **Timing**

The transceiver takes up to 5 seconds to perform the complete reset and be ready for further commands irrespective of the reset method used.

4.2.2 Firmware Version (FV)

4.2.2.1 **Description**

The “FV” command retrieves the current Firmware Version of the transceiver, along with the frequency band (e.g. HMF – High Medium Frequency band) and other capabilities (e.g. USBL capable).

4.2.2.2 **Example**

Command : **FV**
Reply : **FV** `V8.01 HMF,XC,LB,USBL(GDT)`

4.2.2.3 **Timing**

The transceiver will reply within 100ms

4.2.3 Programmable Gain (PG)

4.2.3.1 **Description**

The “PG” command sets and/or retrieves the Programmable Acoustic Navigation (PAN) Gain setting of the transceiver. The optional parameter can be set to 0,1,2 or 3 to configure for standard gain settings of Very Low, Low, Medium and High respectively. Alternatively, the parameter can be set to a value between 80 and 180 to indicate the anticipated Signal Level in dB//1uPa, allowing the transceiver to optimise its gain setting accordingly.

On reset, the Gain Level is set to High.

4.2.3.2 **Examples**

Command : **PG**↵
Reply : **PG** PAN TDR GAIN: HIGH↵

Command : **PG2**↵
Reply : **PG2** PAN TDR GAIN: MEDIUM↵

Command : **PG107**↵
Reply : **PG107** PAN TDR GAIN: 107 dB re 1uPa↵

4.2.3.3 **Timing**

The transceiver will reply within 100ms

4.2.4 Power Level (PL)

4.2.4.1 **Description**

The “PL” command sets and/or retrieves the Power Level setting of the transceiver. The optional parameter can be set to 0,1,2 or 3 to configure the transceiver to Very Low, Low, Medium or High Power Level respectively[1]. On reset the Power Level is set to Very Low (VLOW) power.

4.2.4.2 **Examples**

Command : **PL**↵
Reply : **PL** PAN POWER: VLOW↵

Command : **PL3**↵
Reply : **PL3** PAN POWER: HIGH↵

4.2.4.3 **Timing**

The transceiver will reply within 100ms

4.2.5 Sound Velocity (SV)

4.2.5.1 **Description**

The “SV” command sets and/or retrieves the estimated Sound Velocity to be used by the transceiver when calculating range and bearing. The optional parameter after the

[1] Prior to V8.03 firmware, only two Power Levels were selectable – 0 or 1 configuring Low or High Power Level respectively.

command is interpreted as the Sound Velocity in m/s. On reset, the estimated Sound Velocity is set to 1485m/s.

4.2.5.2 **Examples**

Command : **SV1490.3**↵
Reply : **SV1490.3** SOUND VELOCITY: 1490.3↵

4.2.5.3 **Timing**

The transceiver will reply within 100ms

4.2.6 Long baseline Wait (LW)

4.2.6.1 **Description**

The "LW" command sets the Long baseline Wait time, in seconds, which defines how long the transceiver waits for a Transponder reply. On reset, and after an LW command with no parameter, the Long baseline Wait time is set to a default time of 3s.

The maximum range this allows for to a Transponder can be determined to be (LW – TAT) x SV / 2, where TAT is the Transponder Turn-around-Time (in seconds) and SV is the Sound Velocity (in m/s).

4.2.6.2 **Examples**

Command : **LW6**↵
Reply : **LW6**↵

4.2.6.3 **Timing**

The transceiver will reply within 100ms

4.2.7 Range Gate (RG)

4.2.7.1 **Description**

The "RG" command sets the Range Gate time, in ms, which defines when to start listening for Transponder replies. On reset, and after an RG command with no parameter, the Range Gate is set to 125ms.

The minimum range this allows to a Transponder can be determined to be (RG – TAT) x SV / 2000, where TAT is the Transponder Turn-around-Time (in ms) and SV is the Sound Velocity (in m/s).

4.2.7.2 **Examples**

Command : **RG300**↵
Reply : **RG300**↵

4.2.7.3 **Timing**

The transceiver will reply within 100ms

4.3 POSITIONING COMMAND

4.3.1 POSition (POS)

4.3.1.1 **Description**

The "POS" command initiates a ranging cycle to position a specific Transponder. The command requires details of the specific Transponder's interrogation address and reply channel.

All Transponders supported by the 8094 transceiver use interrogation addresses defined for Sonardyne's VLCT (Very Low Current Transponder) family. Therefore all can be interrogated by a VLCT address, which is prefixed with a V in the POS command, and can have one of nine reply channels.

The following table shows how to determine the Interrogation Address and Reply Channel for the different Transponder types supported:

Type	Description	Configuration / Label	Interrogation Address	Reply Channel
7815, 7986, 8044	OBC Transponder, LRT, LAT	Programmable : Address : *aaa* (1 - 401) Reply : *r* (1 - 9)	*aaa*	*r*
7815, 7815	Coastal Beacon, Prospector Beacon	A B C D	4 5 6 7	1 3 5 7
7835	Deep Marker Transponder	ID *xy* (*x* : 1 - 9, *y* : 0 - 9)	*y*+4	*x*

After transmitting the Interrogation Address specific interrogation pulses, the transceiver will wait for the Range Gate (RG) time before starting to listen for the Reply Channel. It will stop listening either after detecting the Reply Channel or reaching the Long baseline Wait (LW) time.

4.3.1.2 **Examples**

Command : **`POS V5,3`**↵

If the Reply is not detected:

Reply : **`POS V5,3`** `R0.00`↵

If Only Range (i.e. No Direction) can be determined:

Reply : **`POS V5,3`** `R100.00`↵

If Range and Direction have been determined:

Reply : **`POS V5,3`** `R100.00,X80.00,Y0.00,Z-60.00`↵

The command example used a VLCT Interrogation Address of 5 and a Reply Channel of 3, which would be used in the case of interrogating an *OBC Transponder set to Address 5 / Reply 3*, a *Prospector Beacon 'B'* or a *Deep Marker Transponder ID 31*.

The reply contains the following data: R = range (m), XYZ is position in the transceiver's coordinate frame as indicated on the housing of the transceiver. For a vertically mounted transceiver this equates to X = starboard (m), Y = forward (m), Z = up (m).

4.3.1.3 **Timing**

The reply will be generated exactly 50ms after the time of receiving the reply signal. In the case of no reply signal being detected, the reply will be generated at LW + 50ms.

4.4 DIAGNOSTIC COMMANDS

4.4.1 POSition Diagnostics (POSD)

4.4.1.1 Description

The “POSD” command returns diagnostic information from a preceding POS command. It reports the estimated Signal Level, S (dB re 1uPa), the SNR, N (dB in Receiver Bandwidth), Doppler offset, D (Hz), USBL Acceptance, U (0-8 – see UAL command for details) and USBL Quality check (<0.025 required).

The estimated signal level, S, is prefixed with a ‘+’ if the received signal has been clipped. The value can be used as the anticipated signal level in a PG command to optimise the transceivers gain setting.

4.4.1.2 Examples

Command : **POSD**↵
Reply : **POSD** S154.3,N18.6,D0,U8,Q0.000045

4.4.1.3 Timing

The transceiver will reply within 100ms

4.5 ADVANCED SETUP COMMANDS

The following commands are advanced setup options which should only need to be used if operational problems have been encountered.

4.5.1 Programmable Detection Threshold (PDT)

4.5.1.1 Description

The “PDT” command sets and/or retrieves the Programmable Detection Threshold (dB). The threshold defines the SNR (dB) in the receive channel bandwidth at which a signal is classified as being detected. The value can be raised up to a maximum of 20dB if interference is suspected from other active acoustic devices, or lowered to a minimum of 10dB if it is suspected that detections are failing due to poor acoustic conditions, perhaps due to noise or multi-path.

On reset, the Programmable Detection Threshold is set to 14dB.

4.5.1.2 Examples

Command : **PDT16.0**↵
Reply : **PDT16.0** DET: 16.0↵

4.5.1.3 Timing

The transceiver will reply within 100ms

4.5.2 Maximum Receive Pulse Length (MRPL)

4.5.2.1 **Description**

The “MRPL” command sets and/or retrieves the Maximum Receive Pulse Length (ms). In cases where multi-path may cause interference within the pulse length of the reply signal, such as 8ms pulses from AODC beacons in shallow water, the MRPL setting can be used to force the transceiver to only detect and analyse the beginning of the reply signal. It should be noted, though, that this will reduce detection performance against noise.

On reset, the Maximum Receive Pulse Length is set to 8ms.

Note that the transceiver will match to the shorter of the actual reply pulse length (e.g. 2ms for all HF Beacons) or the MRPL – i.e. it will never attempt to match to a pulse length longer than the actual reply pulse.

4.5.2.2 **Examples**

Command : **MRPL1**↵
Reply : **MRPL1** MAX USBL REPLY PULSE LENGTH: 1.0↵

4.5.2.3 **Timing**

The transceiver will reply within 100ms

4.5.3 USBL Acceptance Level (UAL)

4.5.3.1 **Description**

The “UAL” command sets and/or retrieves the USBL Acceptance Level (1-8). USBL processing generates an acceptance quotient (0-8) which is used as a confidence factor for acceptance of the USBL result.

On reset, the USBL Acceptance Level is set to 6. This level is readily achieved in a clean acoustic environment with a good SNR, where no multi-path interference is corrupting the direct path signal. In noisy environments it may prove necessary to lower this acceptance level, otherwise in multi-path environments it is preferable to reduce the MRPL.

4.5.3.2 **Examples**

Command : **UAL4**↵
Reply : **UAL4** USBL ACCEPTANCE LEVEL: 4↵

4.5.3.3 **Timing**

The transceiver will reply within 100ms

4.5.4 VLCT Jitter Suppression Enable / Disable (VJSE / VJSD)

4.5.4.1 **Description**

The “VJSE” and “VJSD” commands respectively enable and disable Jitter Suppression for VLCT interrogations. VLCT interrogations consist of a minimum of two pulses whose timing defines the address. In poor acoustic conditions, especially multi-path, the beacon may experience significant jitter on these interrogation pulses and fail to be interrogated. To mitigate this, the transceiver can be set to add off-frequency pre-pulses to each interrogation pulse in a technique known as jitter suppression.

On reset, the transceiver will maintain the current VLCT Jitter Suppression setting. The setting is only lost, and set to disabled, by a download of firmware.

4.5.4.2 **Examples**

Command : **VJSE**↵
Reply : **VJSE** ENABLED T0.5,F33.000↵

Command : **VJSD**↵
Reply : **VJSD** DISABLED↵

4.5.4.3 **Timing**

The transceiver will reply within 100ms