Sonardyne
SOUND IN DEPTH

SM-7663 / 7

# Software Manual for Type 7763 / 7767 LCU PSION


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QUALITY MANAGEMENT CERTIFIED DNV

**SM-7663/7667**

**SOFTWARE MANUAL**

**FOR THE**

**TYPE 7663/7667 LCU PSION MX**

**ISSUE B**

**REVISION 1**

**PSION SOFTWARE VERSION V4.02**

| | | |
|---|---|---|
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# CONTENTS

# AMENDMENT RECORD

All amendments and additions will be issued with a new copy of this sheet, recording the history of amendments.

| Issue | Revision | Date | Comments | Section | Page |
|---|---|---|---|---|---|
| A | 0 | 03.06.91 | Provisional Issue | All | All |
| A | 1 | 15.11.95 | Addition to paragraph 3.6.3 to include operation of positive release D/ORT<br>Corrections to paragraph 3.6.4 – addition of status information when using a simple terminal | 3 | 6 & 7 |
| A | 2 | 22.04.96 | Changed to reflect change of Company name | 0 | 1 & 3 |
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| B | 0 | 28.10.01 | Rewritten for the PSION MX Workabout<br>See ECN 6924 | All | All |
| B | 1 | 7.05.04 | PGT/SSM commands added at V4.02<br>DMT commands removed CN8176 | 3 | 1,8,9 |
| | | | | | |

# SECTION 1

## 1. INTRODUCTION

Section 1 of this manual describes the operation of PSION MX Workabout™, Section 2 is the initialisation of the PSION and LCU software and Section 3 is for the LCU software functions.

### 1.1 PSION MX WORKABOUT

The PSION has been designed for use in harsh environments and out of its leather case, is rated to IP54 (protected against dust and splashing water).

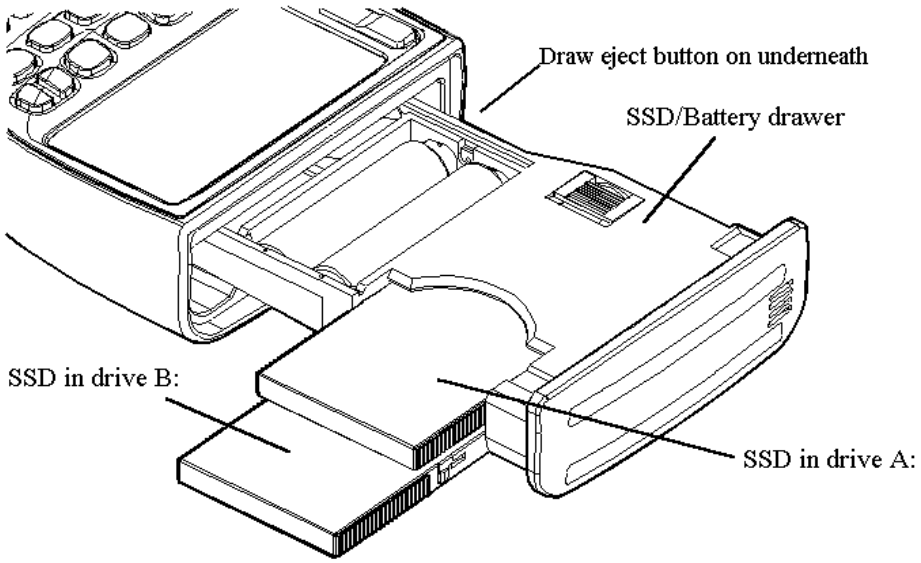
### 1.2 SWITCHING ON AND OFF

The PSION can be switched on by means of the yellow On/Esc key, or by means of the light grey Off key near the top left corner of its front face.

There is no need to "Exit" the LCU program before switching off. When the PSION is next switched on, the program will continue from its previous state.

### 1.3 SOLID STATE DRIVE (SSD)

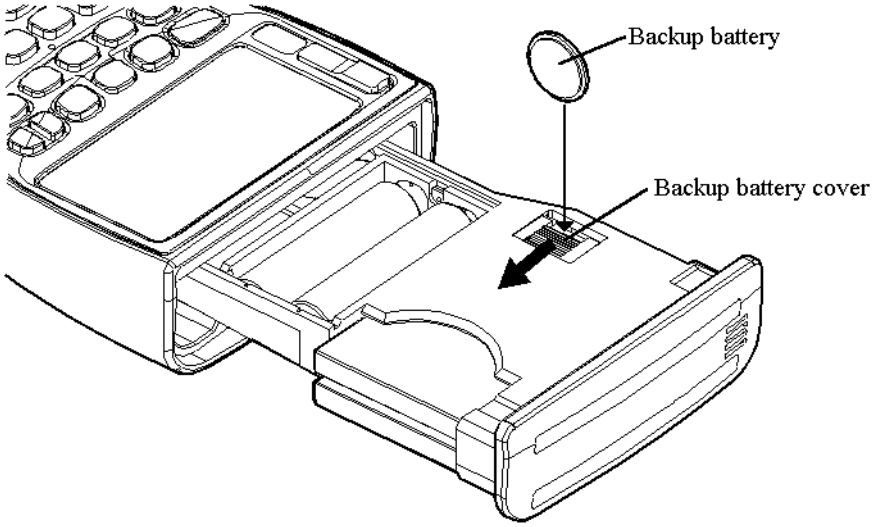
The LCU software is held on a solid state disk drive, which is the equivalent of disk drive on a PC. To access it, open the top cover by pressing down the catch to the left side of the screen. The drawer then slides out of the machine. The SSDs is inserted into drive A in the top right of the drawer.



## 1.4 BACKUP BATTERY

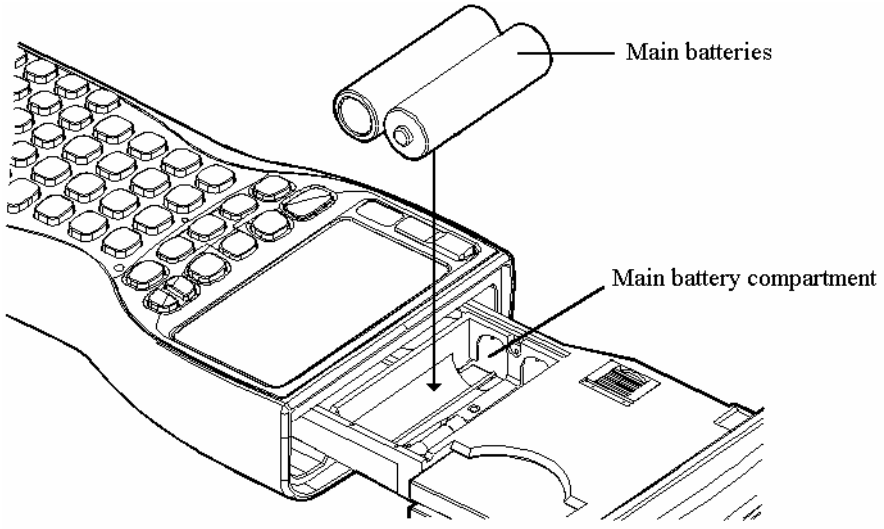
The PSION is also supplied with a lithium backup battery. It is essential because it keeps the internal memory secure in the absence of the main power source, for example, while the main batteries are being changed. It should be fitted before the main batteries, but note that the PSION can not be run using only the backup battery.

The backup battery should last for approximately one year, provided the PSION does not spend long periods with no other power supply. It is recommended that a new backup battery be fitted yearly. If the PSION is left powered only by the backup battery, the battery will preserve the internal memory for approximately five days.




## 1.5 MAIN BATTERY

The main batteries are also stored in the drawer of the PSION, next to the two SSD drives. The main battery recess may contain a rechargeable battery cartridge pack. *Do not attempt to disassemble a rechargeable battery pack*.




A new set of alkaline batteries should last for about 80 hours of continuous use. A fully recharged battery pack should last for between 30 and 35 hours. Using the backlight (where fitted), or attached peripherals, will increase power consumption considerably. If left unused, a battery pack will slowly lose its charge over a period of approximately six months.

The PSION automatically displays a warning message, when switched on, if either the main or backup battery is low. Independently of this, there is a battery information dialog available from any application. Pressing the Shift-Ctrl-B key combination accesses this. It displays the state of the main and backup batteries, and whether the batteries are alkaline or rechargeable, or whether an external power supply is being used. For correct information ensure that the drawer is securely closed.

The nickel-cadmium batteries in the battery pack can be recharged using the docking station provided.

When the main battery is low, the PSION may have enough power to display the screen and accept input from the keyboard, but not enough to write to Flash SSD or access expansion devices. The PSION will turn off if an operation is attempted for which it does not have enough power. New batteries should be fitted, (or the existing batteries recharged), before the operation is tried again.

In order to save power, the PSION will, by default, switch itself off automatically, if left alone for five minutes. The "auto-switch-off" time can be changed to another value, if desired, or the PSION set so that it does not auto-switch-off at all.

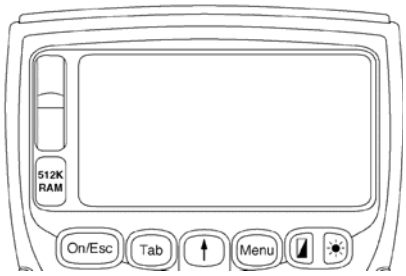
## 1.6 THE FUSE

The drawer of the PSION contains a fuse (in the bottom of the battery compartment). This is to generally protect the circuitry of the machine if too much current is being drawn through the batteries. If the PSION will not switch on, or has suddenly stopped working, it could be that a fault has caused the fuse to blow. It may be possible to see the melted wire inside the fuse through its glass tube.

Note that, if the fuse blows, the backup battery will still preserve the memory of the machine.

## 1.7 THE SCREEN

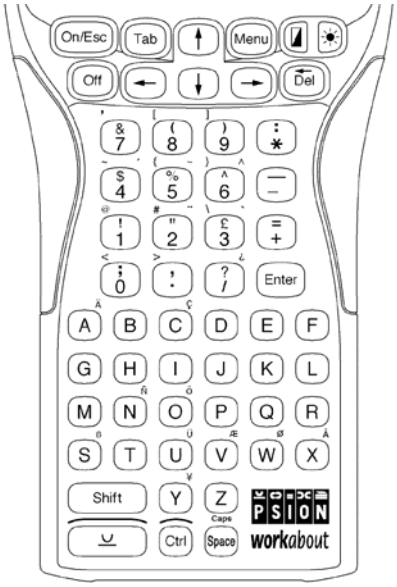
By default, the screen is illuminated by reflected light. The backlight can be switched on or off whenever the user requires, (bearing in mind that there is an inevitable additional drain on the batteries whenever the backlight is used).




The switch for the backlight has a ☀ symbol on it. In addition, the PSION can be configured to switch off the backlight automatically once a given time period has elapsed.

Screen contrast may be adjusted using the contrast key, which has a ◪ symbol on it. Pressing this key on its own makes the background darker. Pressing Shift-Contrast makes the screen background lighter. In both cases the operation cycles round when the adjustment reaches the end of its range.

## 1.8 THE KEYBOARD




The following special keys are present:

| | |
|---|---|
| On/Esc | Switches the PSION on, and functions as an Escape key, (used to clear a line of input or cancel an entry). |
| Off | Switches the PSION off. |
| Menu | The use of this is under *application control*, i.e. it is not used by any core system code. It may be acted upon by the foreground process, or by any process that captures the keypress including the Command Processor and System Screen. Used to bring up a set of menus. In the Startup Shell it brings up the Special menu that allows you to choose a system interface, or to restart the shell. |
| ☀ (Backlight) | Switches the backlight on and off, (where fitted). |
| ◪ (Contrast) | Controls the contrast of the LCD display. |
| Del | Used to edit typing, and to delete items of various kinds, database records, for example. |
| Enter | Terminates a line of input, exits a dialog, etc. |
| ⊍ (PSION) | An extra modifier key (analogous to Alt on a PC), recognisable by its familiar "cup and saucer" PSION logo. |

There are also several special keypress combinations:

| | |
|---|---|
| Shift-Esc | The "Help" hotkey combination. The use of this is under *application control*, i.e. it is not used by any core system code. It may be acted upon by the foreground process, or by any process that captures the keypress including the Command Processor and System Screen. It is used to bring up a Help menu. |
| Ctrl-Esc | The "Help index" hotkey combination. It is used to bring up a Help index. |

| | |
|---|---|
| PSION-Tab | The "Task" hotkey combination. It allows switching between tasks. |
| PSION-Space | The "Caps lock" key combination. This is used to switch between normal and "Caps lock" modes. In normal operations lower case characters are the default, with upper case only when the Shift key is held down. In "Caps lock" mode, upper case characters are the default and lower case characters are obtained by holding down the Shift key. |
| PSION-Left | The "Home" key combination. The use of this is under *application control*. |
| PSION-Right | The "End" key combination. The use of this is under *application control*. |
| PSION-Up | The "Page Up" key combination. The use of this is under *application control*. |
| PSION-Down | The "Page Down" key combination. The use of this is under *application control*. |
| Shift-Ctrl-B | The "Battery" hotkey combination. It displays battery information: main battery state and type, backup battery state and whether external power is present. It is available at all times regardless of what application is running, (it is implemented in the Startup Shell). Note: for correct information the drawer must be securely closed. |

## 1.9 RESETTING THE PSION

It is rarely necessary to reset the PSION. Even a serious bug in the application being developed is unlikely to cause the entire PSION system to hang. To avoid the possibility of losing any data used by an application, terminate all applications and save any important data to an SSD or a PC before performing a reset.

Note: There are two holes at the top and bottom centre of the keyboard on the PSION. Neither of these is for a recessed reset switch.

### 1.1.1 Soft Reset

To perform a soft reset, press PSION-Ctrl-Del, (equivalent to Alt-Ctrl-Del on a PC). You will hear a short warning buzz. The PSION then turns off, abandoning all programs running at the time, without saving any data currently in use by them. The files in the internal memory (M:) will *not* be lost, however.

### 1.1.2 Hard Reset

If, unusually, all the internal memory (including environment variables) is to be erased too, keep the Shift key held down while resetting the machine, i.e. press PSION-Shift-Ctrl-Del. You will hear a short warning buzz. This is known as a *hard* reset. It is essentially equivalent to using the reset switch on a PC.

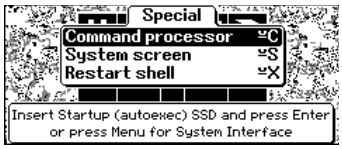
### 1.1.3 Cold Reset

If neither a soft nor a hard reset work, remove all power and wait a few minutes before restoring power. The machine must then be switched back on. You will hear a short warning buzz. This is called a *cold* reset and will, like a hard reset, also erase the contents of all internal memory.

### 1.1.4 What Happens After a Reset

Following a hard or soft reset, or the temporary removal of all power, the PSION displays the PSION logo and startup message, as if switched on for the first time.


Select the System Screen from the Menu key



# SECTION 2

## 2. INITIALISATION OF PSION & LCU

This chapter describes how to run the software contained within the PSION Organiser and get to the main PSION LCU menu.

### 2.1 GETTING STARTED

Before starting ensure the following:

a. That the PSION has new battery (or sufficient battery life for desired operation).

b. The LCU has been recharged sufficiently for use.

c. All cables are connected properly (PSION to LCU).

When the PSION is turned on (press **ON/ESC** to do this) the following screen is displayed:


Press **Enter** to start the LCU program.

### 2.2 PSION SOFTWARE INITIALISATION

#### 2.2.1 Title Page

When the software is run a title page will be displayed for approximately 10 seconds. Pressing the key labelled **SPC** (space) will cause the software to move onto the next display. The title page will be similar to the following:-

"LCU PSION Software "
"Version X.XX "
"DD/MM/YYYY "
"SONARDYNE LTD. "

The version number indicates the version of software running in the PSION (not to be confused with the LCU firmware number). The date indicates the release date of the software. These should always be quoted in any reference to the PSION LCU software.

#### 2.2.2 Establishing the Comms Link

The software will check that it is there by displaying:-

"Checking PSION "
"Comms Port "

If no errors are detected the following message will be displayed underneath:-

"Comms Port O.K "
"Press a key "

If however an error occurred (e.g. comms not in menu) the following will be displayed:-

"Comms Port failed "
"Re-try Port [Y/N] "
"N=Exit "

You may now either enter Y to re-try comms link or N to exit back to the PSION Organiser menu. This error can be caused by not having the comms in the PSION menu. The software will not proceed until the comms link has been established.

## 2.3 LCU INITIALISATION

This chapter describes the initialisation of the LCU by the PSION LCU software.

### 2.3.1 LCU Comms

After the PSION comms (section 2.2) has been successfully completed the software will check that a LCU is connected. The software will send the command control-E (ASCII character 5) to the LCU to identify the LCU type and serial number.

The following will be displayed on the screen:-

"Initialising LCU... "
“Please wait ... "

If no LCU is found, the following will be displayed:-

"Comms error -54 detected "
"Is the LCU connected? "
"To continue press C "
"To exit press On/Esc "

Pressing **On/Esc** will exit back to PSION menu.

When a reply is received back from the LCU a display similar to the following will be shown on the PSION Organiser:-

"MF LCU Ser No 50006 "
"LCU Type 2 "
"Firmware Ver 1.04 "
"Press a key... "

The above information tells you the frequency band of the LCU (MF or LF), the LCU type and hence the commands available on the LCU and the firmware version of the LCU.

### 2.3.2 LCU Low Battery Warning

The PSION software will check to see if the LCU internal batteries are low. If they are (**L.BAT** in reply string to control-E) the following warning message will be displayed :-

"Warning LCU battery "
"In low state of "
"Charge "
"Press a key... "

The low LCU battery condition will not effect the operation of the PSION software but will effect the LCU operation. The occurrence of the error message,

"Bad or no Reply "
"To command ccccc "

will increase until this message is continually seen in response to all commands sent to the LCU.

2.3.3 LCU Initial Set-up

Initially the PSION will prompt you with several questions relating to the LCU. The questions are as follows:-

"Is the LCU deployed "
"In water [Y/N] "

To this question you can enter only Y or N.

If you enter Y to the question the LCU will be set to normal power (NP command sent) and the following messages displayed:-

"Setting LCU to "
"Normal power as it "
"Is deployed in water "
"Press a key... "

When you are ready press any key to send the normal power command (will be sent after 10 seconds if no key pressed).

If you response with N to the question the following question will be displayed:-

"LCU set to low pwr "
"As not in water "

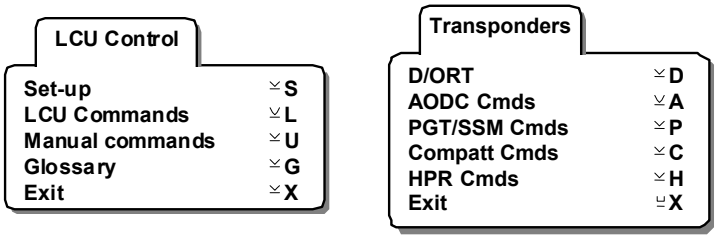
Use this facility if good communications exist in air between the LCU acoustic transducer and the device you are communicating with. This mode could also be used to minimise battery consumption if good in-water communications are achieved at low power.

The main PSION LCU menu will now be displayed, see section 3.0 for a full description of the menus and what they do.

# SECTION 3

## 3. MAIN MENU OPTIONS

After the PSION comms and LCU initialisation the main PSION LCU menu will be displayed as follows: -




### LCU Control

| | | |
|---|---|---|
| **Set-up** | - | Operational constants, see section 3.2 |
| **LCU Commands** | - | Send LCU specific commands to the LCU, see section 3.3 |
| **Manual** | - | Send ANY command to LCU, see section 3.4 |
| **Glossary** | - | Glossary of abbreviations used, see section 3.5 |
| **Exit** | - | Exits PSION menu, see section 3.1 |

### Transponders

| | | |
|---|---|---|
| **D/ORT cmds** | - | see section 3.6 |
| **AODC cmds** | - | see section 3.7 |
| **PGT/SSM cmds** | - | see section 3.8 |
| **Compatt cmds** | - | see section 3.9 |
| **Exit** | - | Exits PSION menu, see section 3.1 |

### 3.1 EXITING FROM MAIN LCU MENU

Selecting this option will exit from the PSION LCU software back to the main menu. In doing so any set-up parameters etc, will be lost and have to be re-entered.

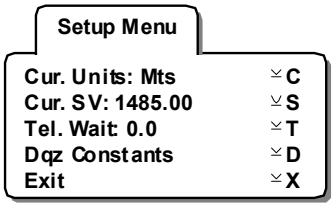
When this option is selected you will be prompted with the following question:

"Exit Program "
"[Y/N] "

Enter Y to exit the PSION LCU software or N to return back to the main PSION LCU menu.

### 3.2 SET-UP

Selecting this menu option will allow you to configure the system. When selected the following menu will be displayed:-



3.2.1 Changing Units **(Cur. Units: )**

This option will allow you select the current units used by the system. Current units allowed are metres, feet or Milli seconds. In this case the range will be displayed in these units, all other information will otherwise be displayed in metres.

The current units selected are displayed in the menu option (metres by default). Select the option then press **Enter**. The units will toggle between metres (mts), feet (ft) and milli seconds (ms).

3.2.2 Changing the Sound Velocity **(Cur. SV:)**

This option allows you to enter a new sound velocity used in the range calculation. The default used is 1485.0 metres/second. To select a new sound velocity select this option then press **Enter**, the following prompt will then be displayed:-

"Enter new SV within "
"Range 1399-1599 "
"New SV : "

The current units selected will be used when entering a sound velocity. The value must be within the range indicated.

To enter the new value for the sound velocity, enter the value then press **Enter**. If the value is within the range indicated the display will return back to the set-up menu. If however it is not the following error message will be displayed.

"Entered S.V. nnnnnnn "
"Is out of range "
"rrrrr-rrrrr "
"Press a key... "

If the above is displayed the previous value (entry value) will be used.

3.2.3 Changing the Telemetry Wait Time **(Tel. Wait:)**

The telemetry wait time is calculated as follows:

Telemetry Wait = Command time + (Through water Time x 2) + command execution time

The through water time is the time taken for the command to reach the transponder from the LCU and may be calculated as:

Range (metres)/Sound velocity

This calculates the one way travel time so, therefore, it needs to be multiplied by two to give the current through water time.

Increasing the telemetry wait time will increase the time the LCU waits for the reply from D/ORT's, PGTs, SSMs and COMPATTs. The default telemetry wait in the LCU will depend on the command being sent and should suffice. This timeout may be set, by changing the telemetry wait time. To change the telemetry wait time proceed as follows:

Select the third option on the menu (Tel. Wait) then press **Enter**. You will then be asked to enter the telemetry wait value as follows:-

"Enter new telemetry "
"Wait time in seconds "
"Old value : 0.0 "
"New value : "

Enter the new value in seconds e.g. 2.2 then press **Enter**. Once entered the new telemetry wait time will be sent to the LCU.

3.2.4 Digiquartz Sensor Constants **(Dgz Constants)**

The menu is only applicable if you getting depth readings from COMPATTS fitted with a digiquartz depth sensor. It allows you to enter the calibration constants associated with each COMPATT (C,D and T0) that is used to convert counts to pressure. The equation is given below:

$$T = \frac{9 \times 10^6}{\text{DQZ COUNT}}$$

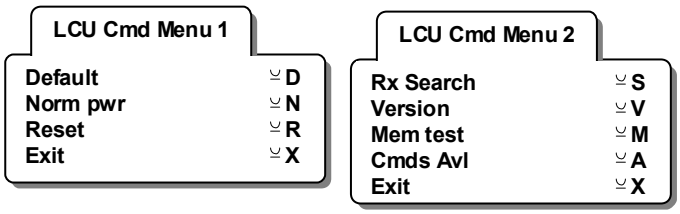
$$\text{Pressure (psia)} = C * ( 1 - (To^2/T^2) ) * ( 1 - D ( 1 - (To^2 / T^2 ) ) )$$

When the option is selected a display showing the constant and the current value for it will be shown. To change this value, move the cursor to the required constant then press **Enter**. You will then be prompted for the new value.

Note: This is only for Compatt III with 3 parameter data sheet.

3.3 LCU COMMANDS

This option will allow you to send commands to the LCU. This option is spread across two Menus as shown below:




When one of the options from Menu 1 or 2 is selected it will send the appropriate command to the LCU and display the reply.

**LCU Cmd Menu 1**

| | | |
|---|---|---|
| **Default** | - | Sends command DF |
| **Norm pwr** | - | Sends normal power command NP |
| **Reset** | - | Send reset command RS |
| **Exit** | - | Returns back to main menu. |

**LCU Cmd Menu 2**

| | | |
|---|---|---|
| **RX search** | - | Listens for noise with RX command. |
| **Version** | - | Send control-E to LCU to get serial and version numbers. |
| **Mem test** | - | Sends ST command to LCU |
| **Cmd avl** | - | Lists what commands are available on LCU with the ? command |
| **Exit** | - | Returns back to main menu. |

Select the option in the normal way as described earlier. The PSION will display:

"Sending Command aaaa "

then display the reply from the LCU.

## 3.4 MANUAL COMMAND ENTRY

This will allow you to send any command to the LCU directly. When this option is selected the following will be displayed:

"Manual Cmd Entry "
"(On/Esc=Exit, X=Repeat "
"Enter=send last Cmd) "
"Command : "

Enter the command to be sent at the prompt then press **Enter** to send it. Any valid LCU command may be sent. Invalid commands will cause the LCU to return a **"?"** appended to the end of the string sent.

To repeat the last command press **Enter** (without entering any characters). The last command entered will then be sent to the LCU.

To repeat a command, continuously precede the command with an "X" e.g. X? would continuously send the commands available command to the LCU. Press "**On/Esc**" to stop sending the command.

To exit from manual command entry, enter **" On/Esc "** at the prompt and press **Enter**. The display will now show the main PSION LCU options.

A list of command mnemonics recognised by the LCU can be obtained via the 'cmd Avl' option in 3.3, or using "?" as the command.

## 3.5 GLOSSARY

As the PSION can only display limited text at a time, so abbreviations have been used. This option shows what the abbreviations mean. This option is split into two pages as follows:-

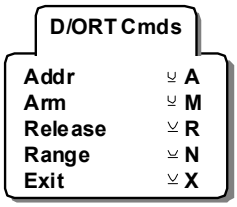
Select the required abbreviation in the usual way, then press **Enter** to select to display the abbreviation in full.

The abbreviations are as follows:-

| | | |
|---|---|---|
| **CIF** | : | Common Interrogation Frequency |
| **COMPATT** | : | Computing and Telemetering Transponder |
| **DMT** | : | Dual Mode Transponder |
| **DORT** | : | Deep Oceanographic Release Transponder |
| **HPR** | : | Hyro Acoustic positioning Reference. |
| **IIF** | : | Individual Interrogation Frequency |
| **IRF** | : | Individual Reply Frequency |
| **LCU** | : | Lightweight Command Unit |
| **ORT** | : | Oceanographic Release Transponder |
| **PGT** | : | Programmable Generic Transponder |
| **SSM** | : | Super-Sub Mini Transponder |
| **TAT** | : | Turn Around Time |
| **USBL** | : | Ultra Short/Super Short Baseline |

## 3.6 D/ORT COMMANDS

When this option is initially selected it will prompt you for the address of the D/ORT that you wish to communicate with (the address will be shown on the label on the D/ORT). You must enter the correct address at the prompt. The address will be made up of three characters (hexadecimal number). The address will be checked when you enter it. If it is not valid you will be informed and the display will return back to the main PSION LCU menu. If the address is valid the following menu will be displayed:




Move the cursor to the required option then press **Enter**, to select that option.

Select **Enter** to return back to the main PSION LCU menu.

### 3.6.1 Entering a New D/ORT Address **(Addr)**

Select this option if you wish to select another D/ORT to communicate to. The prompts will be the same as above.

### 3.6.2 Arming D/ORT'S Prior to Release **(Arm)**

The arm command (AC) must be sent before the release command will work. Select the Arm option from the menu and press **Enter** and answer the prompt **Y** to send or **N** to return back to the menu.

Once the command has been sent and the reply received the following will be displayed on the screen:

"aaa D/ORT now ARMED " (aaa = D/ORT address)
"Ready for Release "
"Press a key.. "

### 3.6.3 Releasing D/ORT'S **(RELEASE)**

Note that D/ORT incorporating positive mechanisms operate differently from non-positive release units. Positive Release D/ORTS are covered in paragraph 3.6.3.2 below.

#### 3.6.3.1 **Releasing D/ORTS Types 7409 and 7710 Incorporating Non-Positive Release Endcaps:**

The release command (RC) will only work after the D/ORT has been armed (see section 3.6.3) and within **30 seconds** of it being armed.

When this option is selected from the main menu you will be prompted if you want to send the command enter **Y** to send the command or **N** to return back to the menu.

When the command has been sent the following will be displayed,

"Release Cmd Sent " (RC = release command,
"Cmd : RCaaa " aaa = D/ORT address)
"*=Releasing now "

As the release mechanism of the D/ORT turns the * character will appear on the screen and the PSION will also beep. About 8 *'s indicate that the release was successful.

"* * * * * * * * * * "

"Good Release "

Attention is drawn to paragraph 3.6.3.2, Notes 2 and 3 in the event of a non-release or possible fault condition.

3.6.3.2 **Releasing D/ORTs Types 7840 and 7841 Incorporating Positive Release Endcaps:**

Select the ARM option from the menu and the software will ask you to confirm that you wish to ARM the D/ORT. If you press Y (for yes) the ARM command will be sent to the D/ORT. The software will display a message indicating that the D/ORT is ready for the release command to be sent, otherwise it will display a message indicating that the LCU did not receive a reply from the D/ORT and offer the choice of re-sending the command (Y) or no (N).

You now have about 30 seconds to again finally satisfy yourself, that you are addressing and releasing the correct D/ORT.

To proceed with the release select the RELEASE option from the menu. The software will prompt that you want to release the D/ORT, enter Y to proceed. Note that a short delay will occur before the software will send the release command. The following message will then be displayed on the PSION:

```
Release Cmd Sent
CMD : RCxxx
* = Releasing Now
```

xxx = ORT address

After arming and satisfactory decoding of the release command D/ORT starts the release sequence by applying power to its release motor. Rotation of the D/ORT release motor causes the release shaft to rotate and this action in turn drives down the helix shaft attached to the hook to positively eject the Load Link. The D/ORT 'pings' once per second for six seconds during a release. Each 'ping' is represented by an asterisk on the PSION display and accompanied by an audible beep.

The PSION will display the following message during release:

```
* = Releasing Now
******
Only Six Pings
Press A Key
```

D/ORT release can be confirmed visually if the unit is on deck. During recovery confirmation of release can be gained by observing decreasing range following a ranging command (RO).

**Note:**

1. If the D/ORT is under heavy load fewer than six asterisks may be displayed on the PSION, this is because the release mechanism will be mechanically advantaged and thus release in a shorter time. This only applies to the 7840 & 7841 units as the inverse may occur for the 7409 & 7710 units when under heavy load.

2. If after a release command no 'pings' are transmitted by D/ORT no asterisks will be displayed on PSION and no beeps heard. This condition suggests that the ORT release motor did not move from its stop position or the D/ORT failed to receive the command. The PSION will display:

   "NO REPLY from "
   "ORT aaa for "
   "Release Cmd "
   "Press a key … "

   A further attempt at release is required which will also require re-arming.

3. If after receiving a release command the D/ORT release motor begins to turn but does not complete the sequence by reaching the 'stop' microswitch then a mechanical restriction of some sort is suggested. In this situation D/ORT electronics will time-out after 30 seconds. During the time-out interval D/ORT will transmit a ping each second for up to 30 seconds. The LCU and the PSION program shuts down if more than 3 seconds elapses since a ping has occurred. If a mechanical restriction is suspected attempt further releases but note that each additional attempt will reduce available battery power.

   If you were too slow in sending the release command after arming the D/ORT, the PSION will display "∗ = RELEASING NOW" as the LCU transmits the command and then reports:

   "Got reply but "
   "No release, Reply Was: "
   "Rcaaa ORT aaa 2WAY MS= "
   "n.nn STATUS= m.mm "

   After release is complete, you are returned to the D/ORT Cmd menu, select the range option so that the decreasing slant range to a surfacing D/ORT is displayed.

### 3.6.4 Ranging to D/ORT'S **(RANGE)**

When this option is selected you will be prompted if you wish to range to the selected D/ORT. Enter **N** to return back to the D/ORT menu or **Y** to range.

The range command (RO) will be sent continuously until the key **On/Esc** is pressed. The display will be updated to display the latest range.

Select the range option from the menu. The software will ask you to confirm that you want to range to the D/ORT. It will then display a message indicating that it is waiting for the first range.

The range will be displayed in metres along with the status received from the D/ORT, see example below. The ranging command will be sent continuously until the letter **On/Esc** is pressed when you will be returned to the D/ORT Cmd menu.

The PSION program gives a status reply when ranging to an D/ORT, typically as follows:

```
     Range nnn.n m
     Batt OK  Tiltd
(or  Batt Low Tilt OK)
     Ranging to D/ORT aaa
     Press On/Esc to stop
     Sending the Command ROaaa
```

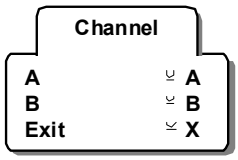
When using a simple terminal the LCU reply string includes the D/ORT status, which can comprise any of the following:

**Status 1.xx Vertical/Battery Low**
**Status 2.xx Tilted/Battery Low**
**Status 3.xx Vertical/Battery OK**
**Status 4.xx Tilted/Battery OK**
**Status 5.xx Armed (ready for release)**
**xx = don't care)**

If no reply is received from the D/ORT then the last range of 0.0m will be displayed indicating that it received no reply.

## 3.7 AODC COMMANDS

When this option is selected you will be asked to select either emergency channel A or B to range on from the following menu:




The IIA command will then be sent to the LCU.

## 3.8 PGT / SSM COMMANDS

PGT (Programmable Generic Transponder) and SSM (Super Sub-Mini Transponder) can receive acoustic commands provided their firmware issue is at or above the following version:

PGT: V2.03 on (Previous versions did receive commands but replied in a different format. For these, it is necessary to send commands as if it was a Compatt transponder but will result in apparent telemetry errors, which can be ignored).

SSM: V4.00 on

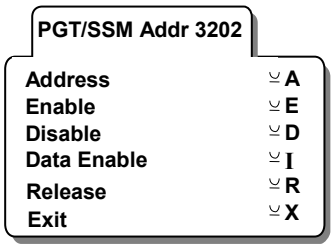
When this option is initially selected, if no previous valid address has been entered, it will prompt you for the address of the PGT or SSM with which you wish to communicate (the address can be determined using the WINSSM software which accompanies the transponder manual). You must enter the correct address at the prompt. The address will be made up of three or four digits. The address will be checked when you enter it. If it is not valid you will be informed and the display will return back to the main PSION LCU menu. For a more detailed discussion of the PGT or SSM, please refer to the transponder manuals.

The PSION will display a check that the transponder is suitable for the commands in this section:

"Is this a SSM with
firmware prior V4.00? [Y/N]?

SSMs with earlier firmware will not operate commands, so, if this is the case, answer Y and return to the main menu. Note that PGTs with firmware earlier than 2.03 will operate commands but answer in a different format. For these, it is necessary to send commands as if it was a Compatt transponder but will result in apparent telemetry errors, which can be ignored.

If the address is valid the following menu will be displayed:




The current transponder command address is shown on the title line.

3.8.1 Entering a new Address **(Address)**

Select this option if you wish to select another PGT or SSM with which to communicate. The PSION will prompt for the new address. Note that this address will also affect the address used to command Compatt transponders.

3.8.2 Enable and Disable Commands **(Enable) (Disable) (Data enable)**

Selecting the **Enable** option will send the command (PEN) to enable the transponder. An enabled transponder will reply to interrogations and will operate the Release command.

Selecting the **Disable** option will send the command (PDS) to the transponder. A disabled transponder will not reply to interrogations or the Release command.

Selecting the **Data Enable** option will send the command (PDE) to the transponder. Where transponders are fitted with a depth sensor, or otherwise configured to send data to the surface when interrogated, this option is enabled with the Data Enable command.

All these commands operate in a similar way, the example here is for the Enable command to a transponder with address 3202.

The PSION will ask for confirmation to send the command:

"Send Enable
Command to PGT/SSM
Address 3202 [Y/N]?"

Type Y or N. N returns to the PGT/SSM menu.

Entering Y will start the command transmission and the PSION will display:

"Sending Command PEN3202"

If a reply is received, the PSION will display:

“Received Reply was
PEN3202 ENABLED”

If no reply is received, the operator will be prompted to repeat the command or return to the menu.

3.8.3 Releasing a PGT or SSM **(Release)**

Before sending a Release command check that the transponder to be released is Enabled. If in doubt, send the Enable command.

When this option is selected you will be prompted with the following question:

“Auxiliary Release
or
Normal Release
[A/N]”

PGTs and SSMs can potentially operate two independent release commands. PGTs can be fitted with a mechanical release to disconnect the transponder from an anchor weight and this will always use the Normal Release command. Some PGTs and SSMs can be fitted with an actuation system, where a relay can be closed, or battery volts routed via the connector, to actuate external equipment. If a mechanical release is fitted, the actuation system will use the Auxiliary Release command. In some case, two independent actuation systems are fitted, one operated by the Normal Release and one by the Auxiliary release command.

Enter A or N to select Auxiliary or Normal Release command.

The process will continue in a similar way to the Enable command but the reply should be:

“Received Reply was
PRL3202 RELEASE NO= 01”

For security, both the PGT and SSM require three consecutive release commands to be received at the transponder within a two minute period. The transponders reply with information informing the surface how many commands have been received to date. Following a successful reply, as above, the PSION will ask:

“Repeat PRL command again
or Exit to menu
[R/E]”

Press R to repeat the command process or E to exit.

Following Replies should indicate:

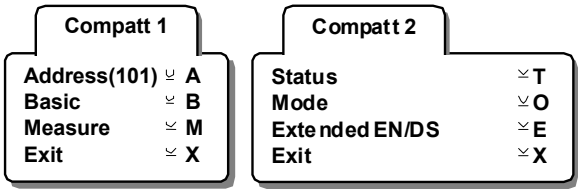
“PRL3202 RELEASE NO= 02”

then “PRL3202 RELEASE ACCEPTED”

Other valid commands received by the transponder will reset the release command counter. It can also be reset by an internal watchdog designed to prevent any permanent anomalous operation.

## 3.9 COMPATT COMMANDS (CMPT CMDS)

When this option is initially selected it will prompt you for the address of the COMPATT that you wish to communicate to (the address will be shown on the label on the COMPATT). You must enter the correct address at the prompt. The address will be made up of three or four digits, as the leading zeros are omitted. The address will be checked when you enter it. If it is not valid you will be informed and the display will return back to the main PSION LCU menu. For a more detailed discussion of Compatts capabilities, please refer to the Compatt Manual. If the address is valid the following menu will be displayed:




### 3.9.1 Changing the Current COMPATT Address **(Address)**

Each Compatt has an individual address, which is used to command it to perform any of its functions.

Compatts have three or four digit addresses.

The least significant two digits now define the frequency channel** and the most significant one or two digits define the address code (01 to 63 are valid).

** Valid channels are; 0 - 14 for MF, 1 - 10 for LF and 1 - 12 for EHF.

Typical addresses would be 203.

This system provides a total of 64 x 15 = 960 individually addressable Compatts.

Compatts with low address codes are normally more efficient as the time taken for an LCU to Compatt command is shorter.

Select this option if you wish to select another COMPATT with which to communicate. The prompts will be the same as above. Note that changing the Compatt Address used here will also affect the address used to command PGT and SSM transponders (section 3.8).

### 3.9.2 Basic COMPATT Commands **(Basic)**

This sub-menu will allow you to send basic Compatt commands to the current Compatt.

When a command is transmitted by the LCU it is possible that the reply may become corrupt due to interference in the water column. When this happens the following will be displayed:-

"Telemetry error nn "
"Detected in reply "
"To command ccccc " (ccccc=Compatt command)
"Re-send ? [Y/N "

Enter **Y** to re-send the command (ccccc) or **N** to continue. If the error code (nn) is greater than 0 an error has been detected in the reply these are as follows: -

i. If the Compatt which replied, was not the same as the one addressed 1 is added the error number.

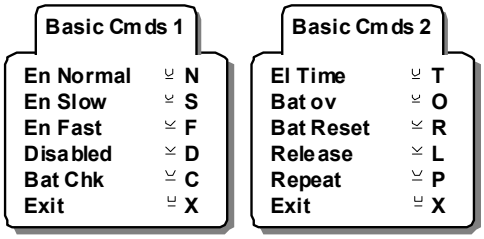
ii. If the command the Compatt carried out was different to the one requested, two will be added to the error number.

iii. If the data bits are incorrect then ten will be added to the error number.

e.g.

| Error Number | Appropriate Errors |
|---|---|
| 1 | i |
| 2 | ii |
| 3 | i & ii |
| 10 | iii |
| 11 | iii & i |
| 12 | iii & ii |
| 13 | iii & ii & i |

On entry the screen will display the following menu:




When any of the above commands (except **Repeat** and **Exit**) are select they send a command to the Compatt. You will be prompted if you want to send the command. Enter Y to send the command or N to return back to the menu.

3.9.2.2 **Enable Fast, Normal, Slow and Disable:**

If you selected the enable option the following command will be sent to the LCU:

**Enable Fast = EFaaaa**
**Enable Normal = ENaaaa**
**Enable Slow = ESaaaa**

(aaaa is the address of the current Compatt and will always be sent). The COMPATT has to be enabled before any other commands can be sent to it.

Selecting the disable command will send the command DSaaa to the Compatt. When this command is sent the Compatt will not reply to interrogations and the Release command until it has been enabled.

3.9.2.3 **Battery Check: (Bat Chk)**

Selecting this command will send the command **BC** to the Compatt. When the reply is received the battery count and battery voltage will be displayed as shown below:

"Battery check aaa " (aaa=COMPATT address)
"Battery Count= 2 "
“Battery Volts= 31.5 "
"Press a key... "

**WARNING:** When the battery alarm limit is reached, the Compatt will refuse to answer any interrogations, and the measurement commands are disabled. It can, however, still accept and reply to some commands (battery check, enable, disable, release, override), so it can be released and recovered before the batteries are completely flat. This automatic disable facility can be overridden using the "OV" command (see section nnnnnn).

For Mk3 Compatts, the alarm levels are:

| | |
|---|---|
| **Ni-Cadnium** | **624** |
| **Alkaline cells** | **1568** |
| **Lithium cells** | **1376** |

In general, the appropriate Compatt maintenance manual should be referred to.

3.9.2.4 **Elapsed Time: (El Time)**

This option will send the command **EL**. Where a real-time clock is fitted to a Compatt the Elapsed time command is used to discover the time that has elapsed since the last reset command. The time is returned in days, and typical display is shown below:

"Elapsed Time for "
"COMPATT aaaa " (aaaa=Compatt address)
"Is 12.25 Hours "
"Press a key... "

3.9.2.5 **Battery Override Command: (Bat ov)**

This option will send the command **OV** to the Compatt.

The automatic disable which operates when releasable Compatts reach their battery alarm level may be overridden using the "OV(Adr)" command.

**WARNING:** If the Compatt is used for a significant time after the "OV" command there may be insufficient power in the batteries to drive the release mechanism.

After the command has been sent and a valid reply received from the Compatt the display will be as follows:

"Bat override for "
"Compatt aaa now " (aaa=Compatt address)
"Operating "

3.9.2.6 **Battery Reset Sequence: (Bat Reset)**

This option will reset the battery count and Elapsed time to zero. This command will only work for rechargeable batteries (Ni-Cad). To reset the battery count in alkaline and lithium Compatts please read the battery charging section of the appropriate Compatt Maintenance Manual.

The software will send several commands to the Compatt before the reset command is sent, these are required for the reset command to work. Enter **N** at any prompt to exit and return back to the menu.

The commands that will be sent to the Compatt are as follows (in this order) :

a. Reset default command (RD).

b. Enable command (EN).

c. Release Command (RL x 3).

d. Battery count reset (BX).

3.9.2.7 **Compatt Release: (Release)**

This option will allow you to send the commands necessary to operate the Compatt release mechanism. Before sending this command ensure the Compatt is enabled (see section 3.8.2.1) a disabled Compatt will not reply.

The PSION software will send the release command (RL) three times, prompting you between them to send the next. To prevent accidental release the Compatt must receive three release commands within two minutes.

As the release commands are sent the display will show the current release number being sent (1-3) after the third release command it will say **"Release Accepted"**. This indicates that the release command has been accepted by the Compatt and that the release mechanism of the Compatt is about to operate.

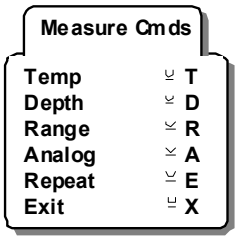
The when the release motor of the Compatt is turning you will see ***'s appear on the display (along with the PSION beeping).

3.9.2.8 **Command Repeat Facility: (Repeat)**

If you wish to continually send any Compatt command use the Repeat option. This option when selected will toggle through loop enabled or disabled. When enabled all Compatt commands subsequently sent will be repeatedly sent until the letter On/Esc is pressed.

3.9.3 Measurement COMPATT commands

This sub-menu will allow you to send measurement commands to the current Compatt. On entry the screen will display the following menu:




3.9.3.1 **Measure Temperature: (Temp)**

When this option is selected it will send the command **CT** to the Compatt. When the reply is received it will be decoded and the temperature, in Celsius displayed e.g.

"Compatt aaa temp is "
"+4.0 C "
"Press a key... "

3.9.3.2 **Measure Depth: (Depth)**

There are two depth commands that can be sent to a Compatt depending on the type of depth sensor fitted. If a digiquartz depth sensor is fitted then the command "CQ" should be used otherwise the "CD" command should be used.

When you enter this option you will be prompted which command to send as follows:

"Select Depth Cmd "
"(CQ=digiquartz depth "
"sensor fitted) "
"Exit CD CQ "

The Exit option returns you back to the measurement menu, the **CD** and **CQ** select the command to be sent.

The command will be sent and the reply decoded. If the command sent was **CD** then the depth will be displayed in the current units (metres if milli seconds are the current units) as shown below:

"COMPATT aaa Depth is " (aaa=Compatt address)
"25.6 Mts "

"Press a key... "

If however the command CQ is sent the display will be as follows:

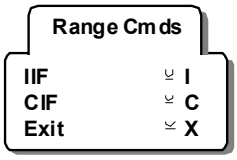
"NO surface offset "
"DQZ cnt = 123456 "
"DQZ PSI = 0.0 "

The pressure is displayed in PSI (sing the equation detailed in section nnnn). No account for atmospheric pressure is taken into account in the pressure reading.

### 3.9.3.3 Ranging to Compatts: (Range)

Selecting this option will allow you to range to a Compatt using either Individual Interrogation Frequency (IIF) or Common Interrogation Frequency (CIF). The range will be displayed in the current units selected and use the sound velocity specified (see section 3.2.1 on how to change current units and 3.2.2 on how to change sound velocity).

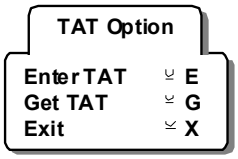
When selected the following menu will be displayed:




Exit returns you back to the measurement window. Select IIF to range using Individual interrogation frequency (sends command IIn, n = channel number of Compatt) or CIF to range using common interrogation frequency (send command LBn, n = channel number of Compatt). Once the ranging command has been selected the following will apply to either command.

You will be prompted with the following question:

"Turn around Time "
"For COMPATT 305 is "
"125 correct [Y/N] "




Enter **Y** only if you are certain that the turn around time is as indicated. The default time for Compatt is 125ms. The value displayed may not be 125.0, it can be any value between 62.5 - 875.0 ms (in multiplies of 62.5). For the correct range to be displayed this time must be correct (as it is subtracted from the 2-way travel time). If in any doubt enter **N** and the software will display the following options for you to choose from:

This option will allow you to either enter the turn around time if you already know it or get the software to interrogate the Compatt for its turn around time.

Select option **Get TAT** to interrogate the Compatt. The software will send the transponder status command (TS) to the Compatt, display the turn around time of the Compatt then start ranging.

The option **Enter TAT** is used to manually set the TAT in the PSION, when selected the following will be displayed:

"Old value was 125.0 "
"Use +/– to scroll "

"Press Enter to select "
"New TAT : 125 "

Use the plus and minus (+ -) keys to scroll through the turn around times allowed. Press **Enter** to select a turn around time and start ranging. Note, that there is a turn round time of zero, this is not a valid turn around time, but has been included so that if desired no time is subtracted from the travel time.

When the correct turn around time has been entered, the LCU will start ranging to the Compatt and the range displayed in the current units. The software will range continuously until the letter **On/Esc**.

### 3.9.3.4 Using the Analogue Option: (Analog)

The analogue multiplexor on the Compatt DAS card has eight inputs. Some of these are normally used by the environmental sensors (temperature, depth), battery voltage and future options (inclinometer, salinity). However, Compatts are available to special order to measure external sensors, cable connected via a socket on the bottom end cap. Voltages applied must be in the range -4v to +4v.

For these instruments a special command is available to measure the voltage applied to any particular multiplexor input, the analogue command.

The PSION will prompt you to enter the input number 1-8 or enter **On/Esc** to quit. The appropriate command when then be sent and the voltage displayed.

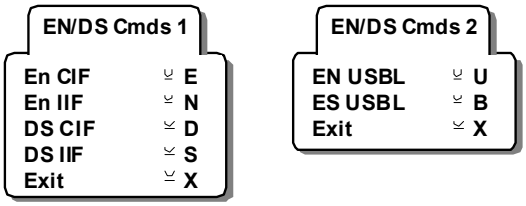
Signals applied to multiplexor inputs 5 to 8 are measured with a resolution of 11 bits plus sign.

Two inputs are measured for a single command.

**Inputs 5 and 6 are measured by entering either 5 or 6.**
**Inputs 7 and 8 are measured by entering either 7 or 8.**

### 3.9.4 Extended Enable/Disable Commands **(Extended EN/DS)**

This menu is as follows:




This menu will allow you to selectively enable and disable receiver functions of the Compatt (V7.3 onward).

**EN CIF** - sends the command EC(adr) and enables the CIF receive section. Reply will be on IRF.

**DS CIF** - sends the command DC(Adr) and disables the CIF receive section.

**EN IIF** - sends the command EI and enables the IIF receive section. Reply is normally on CRF but may now be switched to other reply modes.

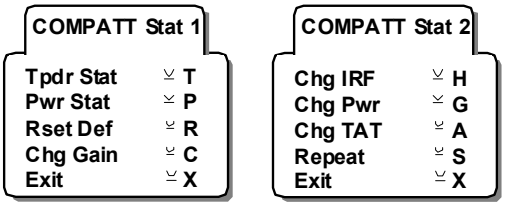
**DI IIF** - send the command DI(Adr) and disables the IIF receive section.

**EN USBL** - sends the command EU and enables the USBL receive section (USBL = Ultra short baseline, e.g. SIMRAD HPR system).

**DS USBL** - sends the command DU and disables the USBL receive section.

3.9.5 Compatt Status Commands

This menu allows to see and set the status of a Compatt. On entry the following menu options will be available:




The exit option will return back to the Compatt main menu (page 2).

3.9.5.1 **Transponder Status (Tpdr stat):**

This option will interrogate the Compatt for its current status and display the main ones in the format shown below:

"CMPT: aaa Ver : 7.9 " (aaa=Compatt address)
"Bat : ALK EN : YES "
"TAT : 125.0 ms "
"Press a key "

The version number is the version number of the firmware in the Compatt.

The battery type can be one of three, alkaline, Ni-Cad or Lithium.

En indicates whether or not it is enabled, YES indicates that it is and NO that it is disabled. The Compatt must be enabled to range to it.

TAT indicates the current value of the turn around time delay used by the Compatt.

3.9.5.2 **Power Status (Pwr stat):**

This displays the power settings of the Compatt. After the command has been sent and decoded the following will be displayed,

"Power status aaa " (aaa=Compatt address)
"LB: LOW GAIN : LOW "
"JIT: LOW USBL : LOW "
"Press a key... "

The power setting will either display LOW or HIGH (**????** may be seen if there is a bad or no reply).

3.9.5.3 **Reset Default (Rset def):**

Compatt with extended facilities accept the reset default command (RD) to reset all variables to their default settings. The following conditions are set,

1. Low battery OVERRIDE condition is reset.
2. The individual reply frequency (IRF) is set to the default individual reply frequency (IRF).
3. Compatt is set to low power (V7 onward).
4. Jitter suppression circuits, if available are switched OFF.

5. The turn around time of the transponder is set to the default value of 125.0 ms (MF & LF).

3.9.5.4 **Change Gain (Chg gain) (V7 Compatts onward):**

This option will allow you to change the receiver gain of the Compatt to either high or low. When this option is selected, you will be prompted with the following,

| | | |
|---|---|---|
| "Enter Gain for aaa | " | (aaa=Compatt address) |
| "Cur gain is LOW | " | |
| "Enter H,L, (High/Low) | " | |
| "On/Esc to Quit | " | |
| "New Gain : | " | |

At the prompt enter **L** to set to low power, **H** to set to high power and **On/Esc** to return back to the Compatt status menu.

The command will be sent and the reply decoded and the PSION will display the previous setting and the current setting of the Compatt. If they are the same the Compatt gain level has been set to the required setting.

**Note**: The LCU does not support CG4 or CG3 commands used by Mk4 Compatts via this menu. Use the manual command option, see 3.4

3.9.5.5 **Change Individual Reply Frequency (Chg IRF):**

This option allows you to change to individual reply frequency on which the Compatt replies.

When this option is selected you will be asked to enter the new reply frequency, this must be in the range 1-14. Enter the new value and press **Enter**, enter **On/Esc** to return back to the Compatt status menu.

The command with be sent and the reply decoded and if the reply frequency has been change to the new setting the PSION will display a message to that effect.

3.9.5.6 **Change Power (Chg pwr):**

This option will allow you to change the power level of the Compatt.

At the prompt enter the required setting. Enter **L** for low power, **H** for high power or **On/Esc** to return back to the Compatt status menu.

The command with be sent and the reply decoded and if the power level has been change to the new setting the PSION will display a message to that effect.

3.9.5.7 **Change Turn Around Time (Chg tat):**

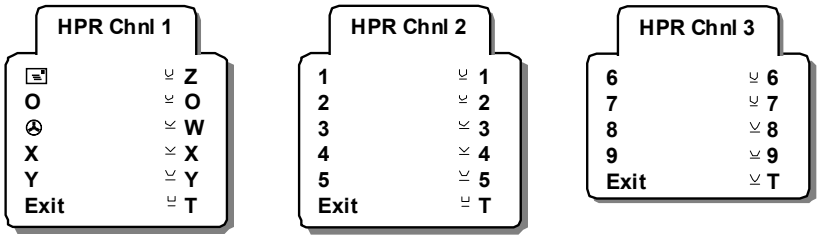
This will allow you to select the turn around time delay used by the Compatt.

Use the plus and minus (+/-) keys to scroll through the values allowed and press **Enter** to select the required one. You will then be prompted whether or not to send the command, enter **Y** to send or **N** to return back to the Compatt status menu.

The command will be sent and the reply decoded and if the turn around time has been change to the new setting to PSION will display a message to that effect.

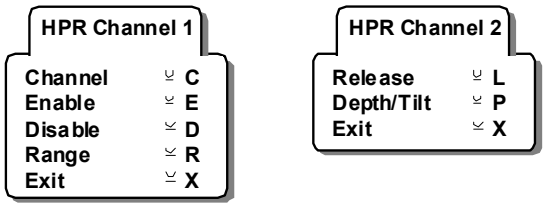
## 3.10 HYRO ACOUSTIC POSITIONING REFERENCE COMMANDS (HPR)

When this option is entered you will be asked to select the channel that you wish to transmit on. These are available from the following menu:




These are the symbols; square, circle, delta X, Y and 1-9. One of these must be selected to continue. The Exit option returns you back to the main menu.

The HPR menus are shown below:




**HPR Channel 1**

**Channel** - Selects a different HPR channel.

**Enable** - Sends the enable command to the HPR transponder.

**Disable** - Sends the disable command to the HPR transponder

**Range** - Will send the range command continually to the selected HPR transponder and display it until the letter Q is pressed.

**Exit** - Exits PSION main menu

**HPR Channel 2**

**Release** - Release HPR transponder

**Depth/Tilt** - Where available will be displayed.

**Exit** - Exits PSION main menu

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