WinFrog Device Group:	**LBL ACOUSTIC**
Device Name/Model:	**PAN** **Pan Mk2 Type 7145**
Device Manufacturer:	Sonardyne International Limited Blackbushe Business Park Yateley, Hampshire GU46 6GD United Kingdom
Device Data String(s) Output to WinFrog:	Pan command responses See manual OM7145-V7
WinFrog Data String(s) Output to Device:	Pan commands See manual OM7145-V7
WinFrog Data Item(s) and their RAW record:	Transceiver (LBL TRANCEIVER) 420 Transponder (XPONDER) 421 Transponder (FIXED XPONDER) 426 Elevation (ELEVATION) 372 Attitude (ATTITUDE) 413

DEVICE DESCRIPTION:
Long base line acoustic equipment. Used to position underwater vehicles or structures and surface vehicles. Uses fixed transponders placed upon the bottom and other transponders placed on vehicles; relay or sequential only. See also chapter 5, "WORKING TRANSPONDERS (.XPT) FILE", chapter 17 "LBL ACOUSTICS" and chapter 20 "ACOUSTIC CALIBRATIONS".

There are two data items: LBL TRANCEIVER and XPONDER.

DEVICE CONFIGURATION INSTRUCTIONS

WINFROG I/O DEVICES > EDIT I/O:

Baud Rate: 9600
Stop Bits: 2
Parity: None
Data bits: 8

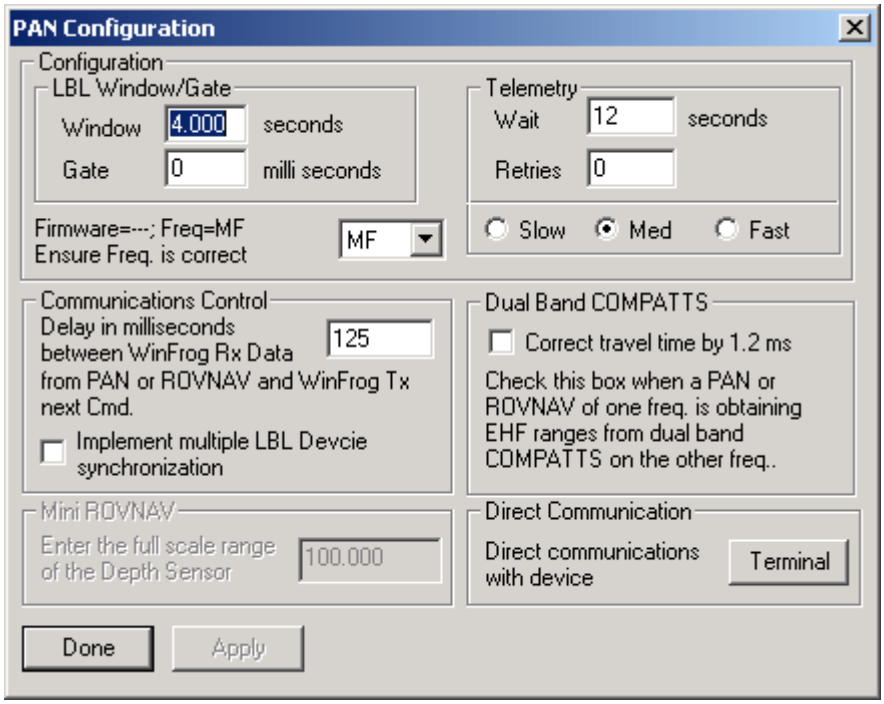
These are the factory settings that can only be changed by opening the Pan's case and changing the appropriate switch settings. See Pan manual.

The serial interface cable comes with the equipment and with a cannon connector at one end and a DB25P connector at the other. This requires a null modem and gender changer to connect it to a standard DP25P PC COM port. The factory setting for the transducer port is TDR 1. The power cables are specially wired for the AC voltage that matches the plug on the cable. **DO NOT USE AN AC PLUG ADAPTER WITH THIS EQUIPMENT. See the Pan manual for complete details.**

WINFROG I/O DEVICES > CONFIGURE DEVICE:

This dialog provides access to a terminal for communications with the Pan as well as options to set some Pan parameters.

The first group, LB Window/Gate, allows you to set the long base line window and gate in the Pan. See Pan manual for details on the LW and RG commands. The second group, Telemetry, allows you to set the telemetry wait window in the Pan. See Pan manual for details on the TW command. The “retries” value indicates the maximum number of times WinFrog will attempt to obtain telemetry from a transponder. This applies to both baseline measurements and manually entered commands described below. After the initial command attempt, if “No Reply” or “?” is received, WinFrog will resend the same command up to the amount entered in this field or until it gets a reply to this command.



The Slow, Medium and Fast radio buttons set the telemetry baud rate through the water. See Pan manual for details on the BN and BF and BS commands.
When the PAN device is first selected for use it automatically send the commands mentioned above to initialize the PAN.

The Pan firmware version and frequency of the Pan is displayed if it has been received from the Pan. After the initialization commands, this command is sent to the Pan every few seconds until navigation interrogation commences or if navigation interrogation ceases.

Normally, WinFrog reads the frequency from the PAN. However, navigation interrogation doesn't read the frequency. The drop down list box is provided to ensure the frequency is correct, as the Dual Band COMPATT correction requires knowledge of the PAN's frequency. See below.

The Communications Control value is the time difference between receipt of a telegram from the Pan and the time that WinFrog will issue a new command. A delay is required to allow the reverberation, caused from the last acoustic energy to reach the Pan, to attenuate around the transducer.

If more then one Sonardyne LBL device is in use, e.g. a PAN and a ROVNAV, they must be synchronized, otherwise they will interfere with each other.

Dual band COMPATTS (EHF and MF) can range on one frequency and telemeter data on the other. The problem with this is that the unit receiving the telemetry applies the total turn around time which is comprised of the turn-around-time (TAT) at the COMPATT replying to the range interrogation plus the signal detection time at both the interrogating and responding COMPATT. The latter is frequency dependent, the signal detection time for EHF is 0.6ms quicker than that for MF. For example, a Dual Band COMPATT on an ROV, configured to telemeter on MF but execute measurements using EHF, is instructed by a PAN on MF to execute an SI command. It then ranges on the EHF band to fixed transponders. The two-way-travel-time (TWTT) for each transponder that replied is telemetered using MF back to the PAN. The PAN removes the COMPATT turn around time and two MF detection times for each transponder that replied. But it should remove two EHF detection times. The result in this scenario is that 1.2ms too much was removed from the observation and needs to be re-applied. If the telemetry were EHF and the ranges were MF then too little would be removed and 1.2ms would have to be subtracted. WinFrog decides whether to add or subtract this value according to the frequency above. The commands affected are SI, FS and CI. If this checkbox is selected, a1.2ms correction will be applied to all SI, FS and CI data as it comes into WinFrog and the result will be treated as the raw data. There is an option on the calibration dialog to apply this value as well, in case it was neglected when the calibration data was collected.

The terminal button provides access to a terminal window where you may enter Pan commands. The command is sent to the Pan when you hit the <Enter> key and any currently pending command, if any, has completed.

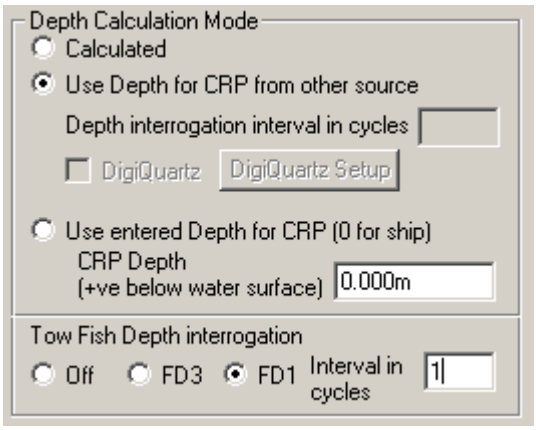
When clicked, the Apply button immediately accepts the settings displayed and WinFrog will begin to use them.

WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:

Data item: LBL,PAN,LBL TRANCEIVER

See chapter 17 for details on setting these parameters. They are the same across all LBL TRANCEIVERS except for the following:

Depth Calculation Mode-Use depth for CRP from other source. This option can be used to enable WinFrog to use a depth from a different device such as an ROV sensor suite. It can also be used if the PAN transducer is interfaced to the Sonardyne Towfish which can then be interrogated for depth in which case, the interrogation command is sent to the PAN and the resulting depth is passed as an ELEVATION data item to the TRANSCEIVER data item as the *other source*.



When this option is selected, the *Tow Fish Depth Interrogation* section of the panel becomes enabled. The configuration for the *other source* is done here.

If another device is to be used as the *other source*, this option is selected and the *Tow Fish Depth Interrogation* option is left at its default setting *Off*. The respective device's ELEVATION data item is then added to this vehicle and configured as per its documentation.

If the PAN is to be used as the *other source*, the appropriate query type is selected, either *FD3* or *FD1* (see the manufacturers documentation for details concerning which command to select) and the desired interrogation cycle is entered for the *Interval in cycles*. The reply is depth in meters. The PAN's ELEVATION data item is then added to the vehicle. See **Data type: LBL,PAN,ELEVATION** below for details for configuring this.

Transmit Code. The "transmit codes" for a Sonardyne Pan are provided in a dropdown list. They are:

None No interrogations for this data item are transmitted. Also halts any current interrogation.
CIF Interrogate on CIF i.e. use the LB command (same as LB below).
LB Interrogate LB command. Same as using CIF above.
LI Interrogate using the immediate LB command.
II Interrogate the selected transponders individually, sequentially, using the II command.

See the Pan manual for details on these commands.

The accuracy described in chapter 17 depends upon frequency. The published accuracies for the different frequencies are:

Frequency band	Standard Deviation
LF	0.5m
MF	0.15m
HF	0.04m
EHF	0.02m

These should be considered nominal values as they do not take into account sound velocity errors and ray path bending. Unless the transducer is on an ROV (e.g. flower pot) which is operating near the same depth as the transponders, larger values should be used.

It is not necessary to attach the TRANCEIVER to the ship if positioning with it is not required. It is required for collecting surface ranges for calibration or with relay operations.

Data type: LBL,PAN,XPONDER

See **chapter 17** for details on setting these parameters. They are the same across all transponders (XPONDERS).

Simultaneous Transponder
It is not necessary to attach the TRANCEIVER to the ship for simultaneous transponder operations. However it may be attached and None selected as the Transmit code. Attach the XPONDER device to the vehicle it is on. Edit the XPONDER data type as described in chapter 17 and from the dropdown list box select the simultaneous transponder. For details on the settings, see chapter 17. The accuracy described in chapter 17 depends upon frequency. The published accuracies for the different frequencies are:

Frequency band	Standard Deviation
LF	0.5m
MF	0.15m
HF	0.04m
EHF	0.02m

These should be considered nominal values as they do not take into account sound velocity errors and ray path bending. If the simultaneous transponder is working near the same depth as the fixed transponders and the sound velocity is considered accurate, these values may be correct, otherwise sound velocity and other errors should be included.

Relay Transponder
Currently WinFrog uses an observed range from the transceiver to a fixed transponder to reduce the observed relay transponder's range (which includes the ranges: vessel to relay, relay to fixed transponder and transponder to transceiver, sometimes called sing-around range). Consequently the LBL TRANCEIVER must be setup to interrogate, i.e. CIF, LB or LI must be selected. For details on the settings, see chapter 17. The accuracy described in chapter 17 depends upon frequency. The published accuracies for the different frequencies are:

Frequency band	Standard Deviation
LF	0.5m
MF	0.15m
HF	0.04m
EHF	0.02m

These should be considered nominal values, as they do not take into account sound velocity errors, ray path bending and the reduction of the sing-around range to the direct range. If the relay transponder is working near the same depth as the fixed transponders and the sound velocity is considered accurate, one should only need to account for the sing-around range reduction, otherwise sound velocity and other errors should be included.

Responder Transponder
Currently WinFrog does not support the Sonardyne responder.

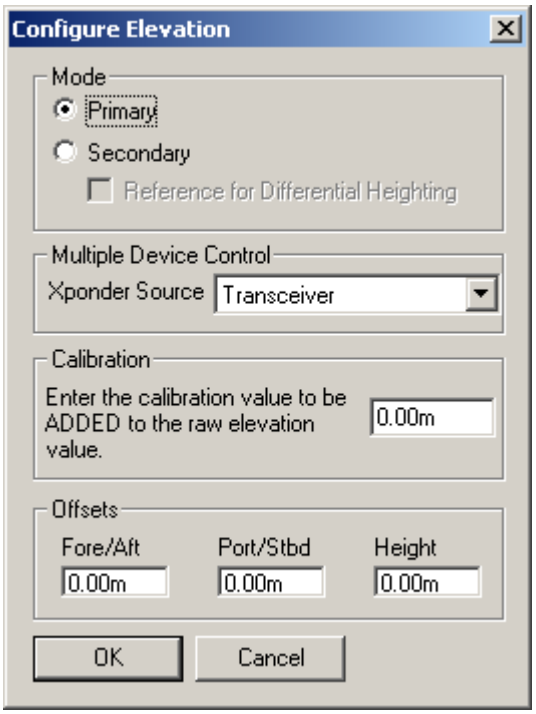
Data type: LBL,PAN,FIXED XPONDER

See **chapter 17** for details on setting these parameters.

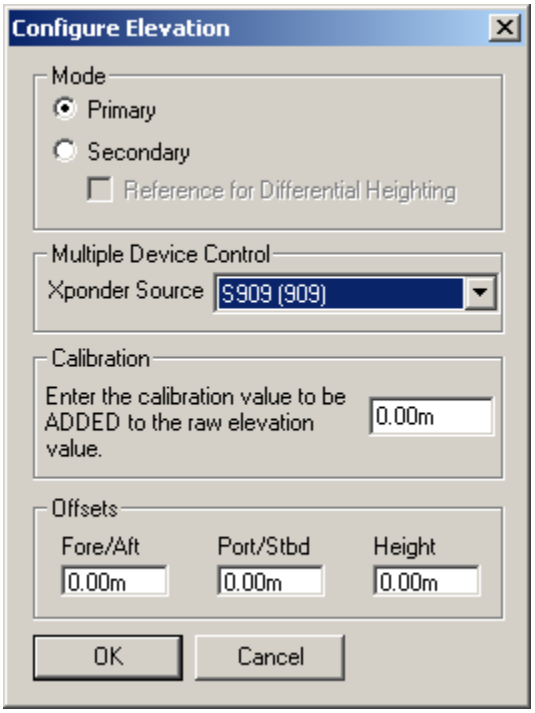
Data type: LBL,PAN,ELEVATION

The configuration of the ELEVATION data item when used in association with an acoustic device depends upon its application.

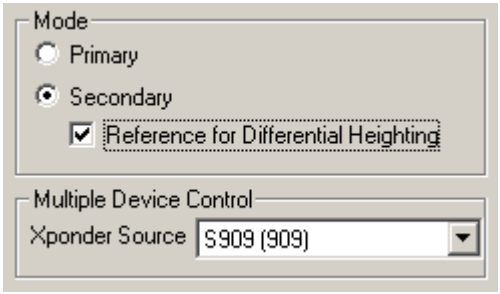
When being used as the *other source* for a TRANSCEIVER data item that is configured for *Use depth for CRP from other source* (i.e. the PAN is interrogating the towfish for depth) this data item is set to *Primary* and the *Transceiver* item selected from the drop down list in the *Multiple Device Control* panel.



When being used with an XPONDER data item configured for *Use Depth of CRP from other Source* or *Interrogate Depth/Attitude Only*, this data item is set to *Primary* and the transponder selected as the *Tracking Transponder* in the XPONDER configuration is selected from the drop down list in the *Multiple Device Control* panel.



If in the above, the XPONDER has been configured for *Use in differential depth mode…* this data item is set to *Secondary* and the *Reference for Differential Heighting* box is checked. The transponder selected as the *Tracking Transponder* in the XPONDER configuration is then selected from the drop down list in the *Multiple Device Control* panel.



In all above cases the following applies to the calibration and offsets.

If there is a known calibration value for the respective sensor, it is to be entered in the *Calibration* panel. Care must be taken with the sign convention. If the sensor is reading deeper than the actual depth, the entry is positive. If the sensor is reading shallower than the actual depth, the entry is negative. There are two important points to be aware of with respect to the calibration entry:

- When a transponder is selected, the depth sensor calibration value that was entered for the same transponder in the Xponder File is not automatically

retrieved and used here. However, the same value and sign convention as used for that calibration value is used here even though it is stated here that the calibration is *added* and in the Xponder File dialog it is stated that the value is *subtracted*. This is because in the Xponder File dialog it is referring to a depth but in the ELEVATION data item dialog it is referring to a height.

- The calibration value is a depth term, not a pressure.

Offsets can also be entered to relate the depth (pressure) sensor of the RovNav to the CRP of the vehicle. It is important to note that the offsets apply to the sensor not the transducer. If an attitude sensor is available, the data from it will be used to reduce the offsets.

Data type: LBL,PAN,ATTITUDE

See **chapter 17** for details on setting these parameters.