WinFrog Device Group:	ROV
Device Name/Model:	**INNOVATUM (Ultra)**
Device Manufacturer:	**Innovatum International Ltd.** Units 11/12, Woodside Business Park Thetford Road, Ingham BURY ST EDMUNDS Suffolk IP31 1NR, UNITED KINGDOM Phone: +44 (0)1284 729123 Fax: +44 (0)1284 729133 email: info@innovatum.co.uk www.innovatum.co.uk **Innovatum Inc.** 2020 Southwest Freeway, Suite 203 Houston, Texas 77098 4807 Tel: +1 (713) 526-6333; Fax: +1(713) 526-2555 email: innovatum@argolink.net internet: http://www.innovatum.net
Device Data String(s) Output to WinFrog:	Day, Month, Year, Hour, Minutes, Seconds, Relative Heading, Mode, Solution, Signal Strength, Horiz. Video Overlay, Depth Video Overlay, **Source Type** (not shown in I/O Devices/Decoded Data), Horiz. Displacement, Horiz. Displacement Error, Vertical Displacement, Vertical Displacement Error, Burial Depth, Magnetic/Current. For 80 character string add: Altitude, Pitch, Roll, Absolute Heading, Time Split. See Configuration Details for more complete information.
WinFrog Data String(s) Output to Device:	Nill
WinFrog .raw Data Record Type(s):	Type 491

DEVICE DESCRIPTION:
Innovatum Ultra and Multi systems are magnetic cable and pipeline tracking systems capable of Passive Magnetic, Active AC (tone), Active DC and Pulse Induction tracking modes, with simultaneous calculation in the first mode and signal monitoring in the others.

There are numerous variations of the Ultra system. The systems can have AC sensors, DC sensors, gradiometers or pulse induction coils installed on the front, or on the front and rear of the vehicle. The simplest system is the Ultra/Multi #02, which has two forward sensors and can only be used for AC tone cable tracking. One of the more complex systems is the Ultra II, which has 4-axis pulse induction coils installed at both

the front and rear of a vehicle. This system can track pipelines or cables using all four tracking modes. Obviously more complex system installations will result in more accurate 3D-target positions.

The systems can be fitted to ROV's, manned submersibles, towed sleds, ploughs and even surface vessels (for shallow water work).

Innovatum manufactures the following Ultra systems:
- Model #00P
- Model #02
- Model #02P
- Model #04
- Model #04P
- Model #44
- Model #44P
- Model ULTRA II

The above systems which have outputs similar to those detailed in the Configuration Details section of this document will operate via the INNOVATUM driver. If the system being used has a different output, check the documentation on the INNOSPIDER driver for matching output. The INNOSPIDER driver was written for use on the Sea Spider, where the ROV has sensors on the front and rear of the vehicle.

Innovatum sensors include: Gradiometers, Triaxial Fluxgate Sensors, Hybrid Sensors, Pulse Induction Sensors, Echosounders, Altimeters, and Tone generators.


DEVICE CONFIGURATION INSTRUCTIONS (suggested):
Baud Rate: 9600
Data Bits: 8
Stop Bits: 1
Parity: None

**WINFROG I/O DEVICES > CONFIG OPTIONS:**
The INNOVATUM device is added to WinFrog from the ROV device category. The INNODATA, ATTITUDE AND HEADING data items are added to the system when the INNOVATUM device is initiated. Attitude and heading data are available to WinFrog only when the 80-character string is output from the device. Refer to the CONFIGURATION DETAILS section for more information on the data string from this device.

No configuration is available or required at the device level.
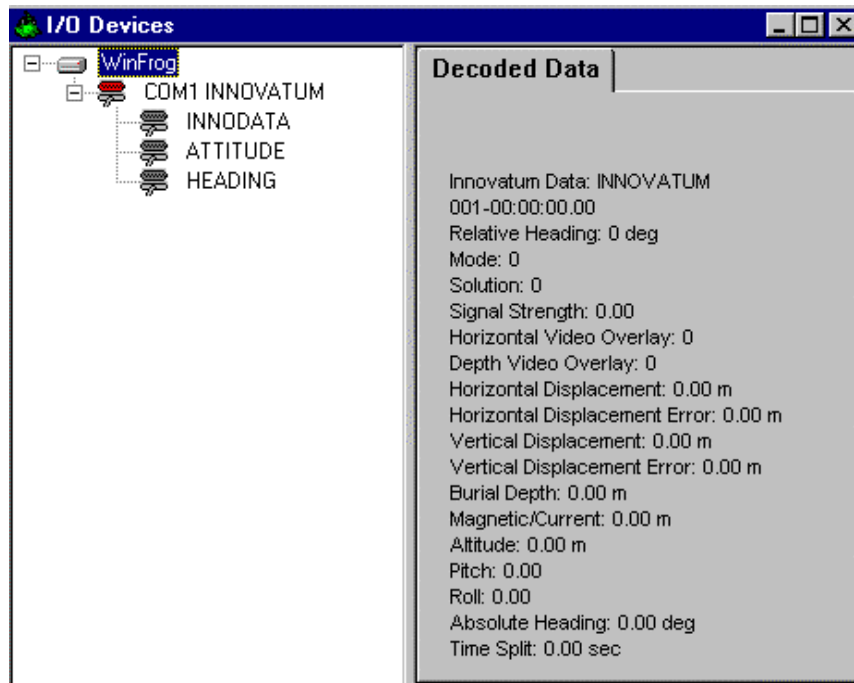
WINFROG VEHICLE > POSITION > DEVICE > EDIT OPTIONS:
The INNODATA data item must be added to the vehicle for cable and/or pipeline tracking. The ATTITUDE AND HEADING data types are optional and can be added to the vehicle if the Innovatum system data is to be utilized for pitch, roll and vehicle heading.
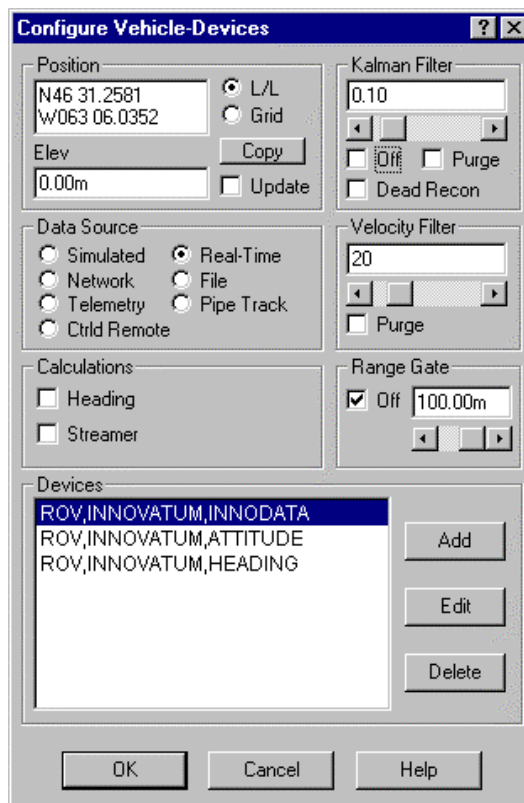
EDIT ROV, INNOVATUM, INNODATA: In the appropriate vehicle's Configure Vehicle-Devices window, highlight the ROV, INNOVATUM, INNODATA data item, and click the Edit button. The Configure Innovatum dialog box appears.
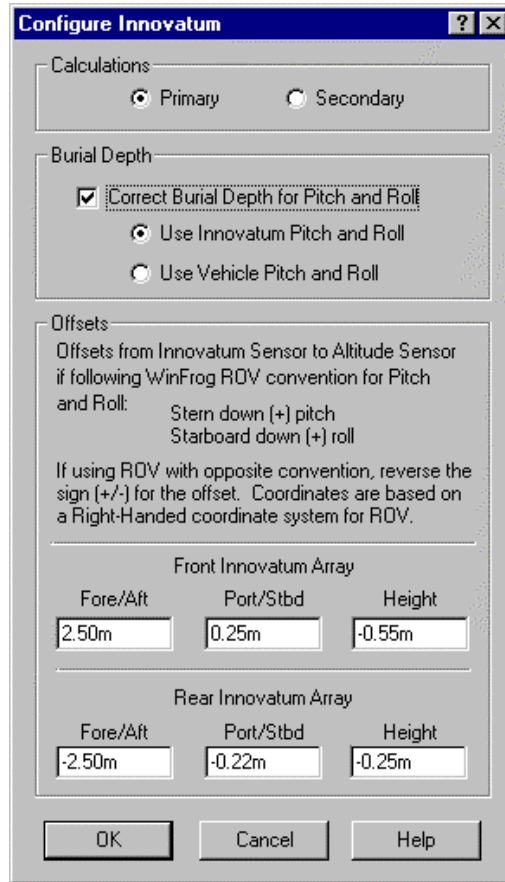
Calculations:
Selecting the Primary radio button will permit the Burial Depth, heading, pitch and roll data to be displayed in the Vehicle window, and the data will be available in the 491 raw data record. If Secondary is selected, the Burial Depth data will only be available in the 491 raw data record.

Burial Depth:
The Burial Depth can be corrected for pitch and roll using the Innovatum attitude data (if the 80-character record is used); or, via another ATTITUDE system added to the vehicle. Raw data will also be present in the associated records for post processing. Refer to the CONFIGURATION DETAILS section for information on data recorded.

Offsets:
The X,Y,Z offsets applied from the Innovatum Sensor to the Altitude Sensor are input for both the Front and Rear Innovatum Arrays. These offsets are applied as listed in the Configure Innovatum dialog seen above. Initially only front mounted Innovatum systems were operational via this driver (i.e. Ultra/Multi#02, Ultra 02P,

Multi 32). In WinFrog software versions compiled after September 1999 (incl. V.3.1), the driver was changed and now computes rear burial depth, for fore and aft mounted systems.

Note: It is advised to use the waterline as the vertical CRP reference for the Primary Vehicle, when sub-sea positioning devices are employed.

EDIT ROV, INNOVATUM, HEADING: In the vehicle's Configure Vehicle-Devices window, highlight the ROV, INNOVATUM, HEADING data item and click the Edit button. The Configure Gyro dialog box appears.

Configuration of the Heading is similar to all WinFrog Gyro (heading) Inputs. Refer to the Gyro/NMEA device for more complete instructions on using this data item.
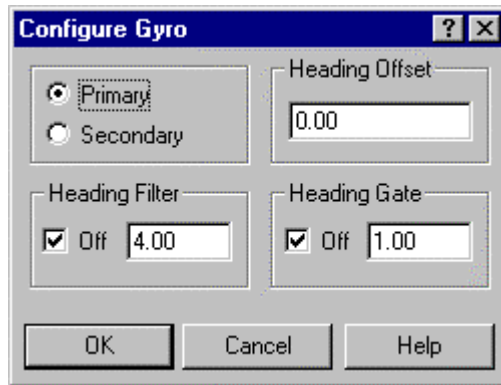
If there are two heading sensors on a vehicle, such as an additional underwater gyro on an ROV, then one device should be set to Secondary and used as a back up. WinFrog will not automatically switch to a Secondary device when the Primary device fails. The operator will have to open the configuration dialog shown below and change from Secondary to Primary for the working device, and change the Primary to Secondary on the inoperable device.
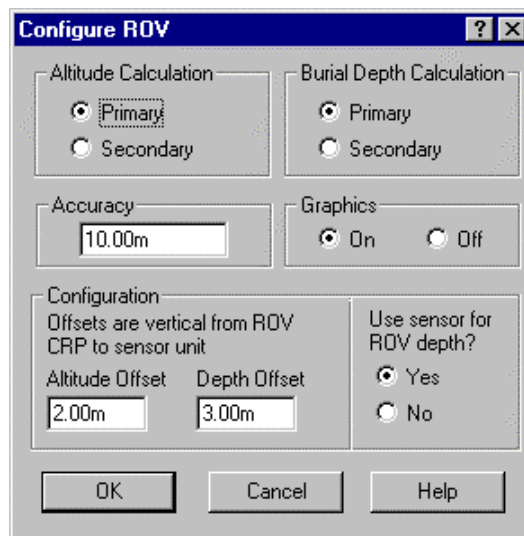
EDIT ROV, INNOVATUM, ATTITUDE: When attitude devices are added to a vehicle, they are initially turned OFF. To begin using the inclination corrections in the position output the operator must turn the sensor ON, and edit the device inside the 'Configure Vehicle Calculations' dialog box.

In the Attitude dialog box, the operator can initiate the attitude corrections by clicking the 'ON' radio button. Correction values can be added here. Correction values are in degrees-decimal degrees, are added to the raw pitch, and roll readings.
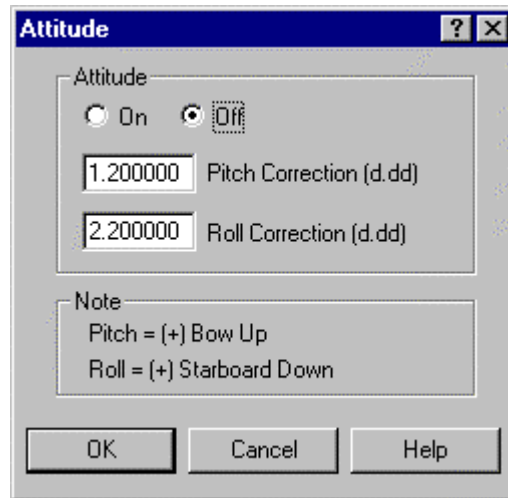
The operator should keep in mind that when the Attitude is turned on for a vehicle, the position displayed is affected a distance equal to the sin of the (pitch and roll) angle, multiplied by the positioning sensors' height. See CONFIGURATION DETAILS on the Digitilt INS device for the applicable formula.

CONFIGURATION DETAILS:
Refer to system documentation or vessel documentation for information on the installation and hook up of this unit. Interfacing to this unit should only be performed by experienced personnel. Listed below is the character string output from this device.

System performance can be found on the Innovatum web site listed at the beginning of this document.

Character String – 64 characters:

Character	Description
1	Space
2	Space
3	} Day of month (1 to 31)
4	}
5	} Space
6	}} Month of year (first three letters)
7	}}
8	}}
9	}}
10	} Year (all four digits)
11	}
12	}
13	}
14	}}Hour of day
15	}}
16	:
17	}Minutes of hour (0 to 59)
18	}
19	:
20	}} Seconds of minute (0 to 59)
21	}}
22	}Relative heading (+ or -) in degrees
23	}<equals Vehicle heading minus Target heading>
24	}
25	}} Mode 1=Passive, 2=Active DC, 3=Active AC, 4=Active AC (grads)
26	} Solution 0=No Signal, 1=Direction only, 2=Horizontal Displacement only, 3=Horizontal and vertical displacements
27	}} Signal Strength (logarithmic) & polarity
28	}}
29	}}
30	}}
31	} Video overlay (per cent horizontal displacement)
32	} (-99 to +99 equals full left to full right)
33	}
34	}} Video overlay (per cent maximum depth)
35	}} (0 to 99 equals minimum to maximum)
36	} Source type 0-Single 1=Complex
37	}} Target horizontal displacement (in metres)

38	}} (+ = target to right, - = target to left)
39	}}
40	}}
41	}}
42	} Probable error in horizontal displacement (in metres)
43	}
44	}
45	}
46	}} Target vertical displacement (in metres) from Innovatum reference to target
47	}} center
48	}}
49	}}
50	} Probable error in vertical displacement (in metres)
51	}
52	}
53	}
54	}} Vertical displacement from skids to top of target (in metres)
55	}} (this value is only equivalent to "depth of bury" provided that skids are
56	}} level with seabed)
57	}}
58	}}
59	} In passive mode - total normalized radial magnetization of target.
60	} In active mode - estimated magnitude of current flowing in target
61	} In active DC mode, + indicates DC current flowing in same direction as
62	} vehicle heading
63	}
64	}

A Typical Data String would be as follows:

```
"25 MAY 200015:33:27-4 33 3.6 19320.0.320.061.610.22 0.95 0.48"
```

Where:

Date =	25 May 2000
Time =	15:33:27
Relative Heading =	-4
Mode =	Active AC
Solution =	Horizontal & depth calculation
Signal Strength =	3.6
Overlay Horizontal =	19
Overlay depth =	32
Source =	Single
Horizontal Displacement =	0.32 metres
Horizontal Error =	+/- 0.06 metres
Vertical Displacement =	1.61 metres
Vertical Error =	+/- 0.22 metres
Skids to top =	0.95 metres
AC Current =	0.048 amps

Additional Characters when 80-character string is output:

Character	Description
65	} Altitude in metres referenced to skids
66	}
67 (.)	}
68	}
69	}
70 (+/-)	} Degrees Pitch
71	}
72	}
73 (+/-)	Degrees Roll
74	}
75	}
76	} Absolute heading
77	}
78	}
79	} Time Split (not used)
80	