WinFrog Device Group:	ROV
Device Name/Model:	General Dynamics
Device Manufacturer:	
Device Data String(s) Output to WinFrog:	See Appendix (end of this document)
WinFrog Data String(s) Output to Device:	
WinFrog Data Item(s) and their RAW record:	ROV Data 496 Heading 409 Bottom Depth 911 Position 303

DEVICE DESCRIPTION:

Driver to interface with an ROV used by General Dynamics and/or their customers.

DEVICE CONFIGURATION INSTRUCTIONS

WINFROG I/O DEVICES > EDIT I/O:

Serial
Configurable Parameters

WINFROG I/O DEVICES > CONFIGURE DEVICE:

No configuration is required at the I/O Device window level.

The ROV status, sensor depth, altitude, heading, and SSBL determined Latitude, Longitude and depth are available in the Decoded Data of the I/O Device Window.

WINFROG VEHICLE TEXT WINDOW > CONFIGURE VEHICLE DEVICES > DEVICE > EDIT OPTIONS:
The **ROVDATA**, **HEADING, POSITION** and **BOTTOMDEPTH** data items can be added to the General Dynamics ROV vehicle. This will permit logging of the raw data files. All of the data items can be edited from the Configure Vehicle-Devices dialog box.

Data item: ROV, General Dynamics, POSITION

The POSITION data item must be edited once it is added to a vehicle's device list. Highlight the data item in the vehicle's device list and click the Edit button. The Configure Position dialog box appears as seen below.
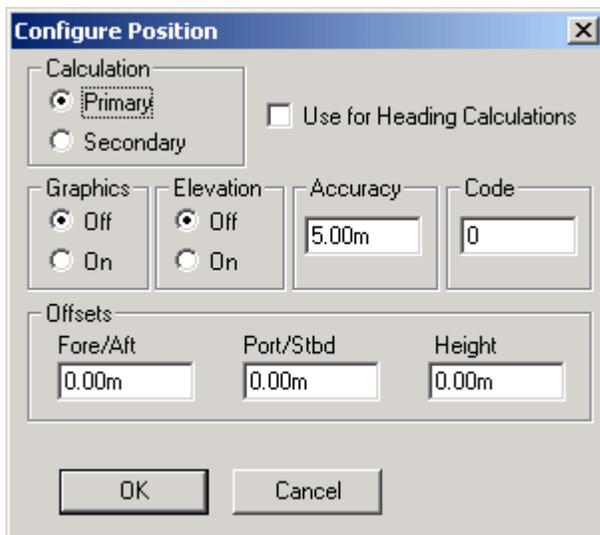
Calculation:
Set the Calculation selection to Primary or Secondary. Devices set to Primary calculation are used to provide a vessel position. Note that more than one Primary positioning device can be added to a vehicle's device list; data from these devices will be combined in a weighted mean solution. (See the paragraph on Accuracy below for more on the weighting of Primary calculation device data).

If the Calculation type is set to Secondary, WinFrog will simply monitor the device's data. WinFrog will not use the position data from the device in the final solution of the vehicles' position.

Note: In the case of Primary device failure, WinFrog will not automatically use the Secondary devices for the vessel's position computation. Instead, the vehicle's positioning will go to dead reckoning (if dead reckoning is turned on). You must manually change a Secondary device to Primary in order for the data to be utilized.

Use For Heading Calculations:
Select this checkbox if the device is to be used in conjunction with another GPS device for determination of the heading of the vessel.

Graphics:
If On is selected, a labeled square will show the raw (offset but unfiltered) location of the GPS antenna in the Graphics and Bird's Eye windows. This provides a means of comparing raw device and filtered vehicle positions.

Elevation:
Setting the Elevation option to On will result in the elevation determined by GPS to be used as the elevation of the vessel referencing the GPS (WGS84) Ellipsoid. The sounder data recorded in WinFrog's .RAW data files will not be affected.
This option is meant only for those applications where there is no fixed vertical reference (i.e. mean sea level), such as on a river. For acceptable results, this option requires the use of high accuracy "RTK" GPS data.

Accuracy:
The Accuracy value entered provides WinFrog with the expected accuracy of the position from this device. This value is used in the weighting of this device compared to other positioning devices that may be added to the vehicle's device list. The smaller the value entered, the more accurate it is considered to be, and hence the more weight that will be applied to the device's data.

The Accuracy parameter can be changed from the suggested values; changes should be made with caution, however, as they will affect the final filtered position of the vehicle.

Code:
This entry window is used when the GPS data is being received by a remote GPS receiver connected via telemetry link. If this is the case, set the Code to coincide with the code parameters associated with the GPS unit being used.
For all other applications, the Code entry must be set to 0.

Offsets:
Offsets are required to associate the GPS antenna position with the vessel's Common Reference Point (i.e. CRP). The offsets are applied *from* CRP (of the vehicle) *to* the GPS antenna location.
Forward Offsets are entered as positive values.
Aft Offsets are entered as negative values.
Starboard Offsets are entered as positive values.
Port Offsets are entered as negative values.
Height Offsets are positive upwards. (It is suggested that the vessel's Height origin should be at the water line.

Data item: ROV, General Dynamics, ROVDATA

Altitude Calculation/Burial Depth Calculation:
The altitude and burial depth calculations should be set to Primary if either is being used for real-time positioning of the ROV or towed vehicle.

Graphics:
Turning on the Graphics will display the device name and a square at the location of the hydrophone, within the Graphics and Bird's Eye windows.

Depth and Altimeter Sensor Configuration:
Vertical offsets of the altitude and depth sensors, relative to the CRP, can be input here. The Altitude Offset is the vertical distance (positive up) from the ROV's CRP to the acoustic beacon tracking the seafloor. The Depth Offset would be the vertical distance from the ROV's CRP to the sensor that provides depth information of the ROV. The water column depth would be the sum of the depth reading, the two offsets, and the altitude value.

Depth Sensor:
The real-time depth of the ROV can be determined from the ROV depth value or a separate depth (pressure) sensor, if one is installed on the ROV.

Odometer Based Positioning:
The odometer based positioning option is not used for this device.

Data item: ROV, General Dynamics, HEADING

The configuration of the Heading is accomplished using the Configure Gyro dialog box. The device driver supplies a heading value for the ROV. You may wish to set this device to secondary, where the heading will be available for post processing, but not for real-time display.
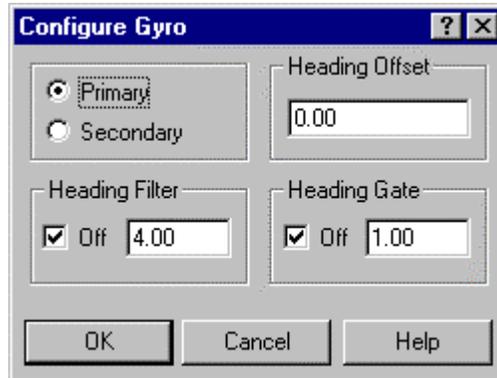
Heading Offset:
If the gyro is reading low, a positive offset (correction) should be applied.

Heading Filter:
This value operates similar to the velocity filter in the Configure Vehicle-Devices dialog box. When 'on', the vehicles' heading value takes previous heading fixes into account – the number input in the Heading Filter Box – for a 'smoothed' heading display for the vessel.

Heading Gate:
When initiated, any heading deviations observed that are greater than the value input, will be disregarded.

Data item: ROV, General Dynamics, BOTTOMDEPTH

Editing the BOTTOMDEPTH data item in the Configure Vehicle – Devices dialog box brings up the Configure Sounder dialog box.
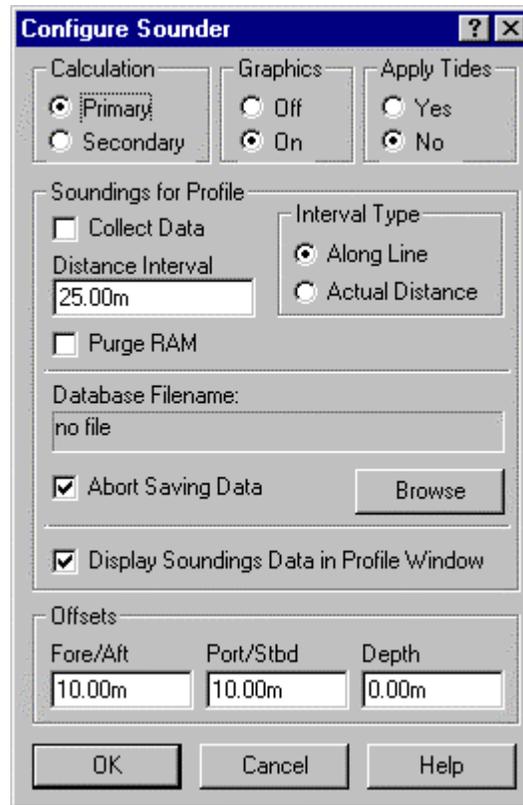
Calculation:
Set the type of calculation to primary or secondary using the calculation radio buttons. A primary sounder will record data in the vehicles' raw data files (i.e. raw data type 300, 350, 351), where the secondary sounder setup will not. In either case the raw data will still be recorded under the 411 data type.

Graphics:
If the Graphics is turned on, a labeled square will show the raw (unfiltered) location of the sounder, in the Graphics and/or Bird's Eye windows.

Apply Tides:
If the On radio button is selected, WinFrog will apply tidal corrections to the observed depth data to enable the display and recording of chart datum referenced depths. Tide data can be received from an interfaced real time depth sensor or from tide prediction files containing time and tide height data. Note that the tide device or file must also be added to the vehicle's device list. Refer to documentation on the Tide device for more information.

Note: The Ribbit processing program uses the same tide format as WinFrog.

Soundings for Profile:
This section permits the collection of data for database logging separate from WinFrog and Ribbit. This database can then be used for numerous applications including real time display within the Profile Window, or data collection for later display in the Profile Window.

Data will be collected, at the Distance Interval stated, when the 'Collect Data' checkbox is selected. The interval can be either Along Line, or at the Actual Distance (from last fix).

The data is stored in the RAM memory of the computer. Any data collected that will not be required at later time, can be deleted by selecting the **Purge RAM** checkbox and exiting the dialog by clicking the OK button.

A **Database Filename** can be chosen and the filename is displayed in this window. The **Abort Saving Data** checkbox can be selected if a problem occurs, and you want to stop saving the data at that instance.

The **Display Soundings Data in Profile Window** checkbox can be selected if you want the data to be displayed in the Profile Window, in real time.

Offsets:
The offsets for the individual transducer are input here. The standard Fore/Aft, Port/Starboard offset signage is used. The depth value is positive down. Rule of thumb suggests that the water line be used for the vertical datum.

Note: Presently the sounder offsets should be left out unless the Altitude and Depth sensors are in the same X, Y location. Post-processing the data, with an attitude (pitch and roll) sensor present on the ROV will provide more accurate water depths should the ROV be tilted.

CONFIGURATION DETAILS:
Refer to system documentation on the installation and hook up of this unit. Interfacing to this unit should only be performed by experienced personnel.

APPENDIX – Data String Format

DATA FORMAT   TABLE-1 (1/6)

ROV CONSOLE to S9 (FMS)

Byte	Function		Type	Description
0	STX(header)		02H	Start of Text
1	ROV POWER ON/OFF		ASCII	「0」 : OFF / 「1」 : ON
2	Comma		ASCII	「, 」
3	Time of SSBL fixed	24 hour	ASCII	$\times 10^1$ When SSBL is invalid,
4				$\times 10^0$ Data should be 「0」
5		Minute		$\times 10^1$ When SSBL is invalid,
6				$\times 10^0$ Data should be 「0」
7		Second		$\times 10^1$ When SSBL is invalid,
8				$\times 10^0$ Data should be 「0」
9	Comma		ASCII	「, 」
10	SSBL slant range[m]		ASCII	$\times 10^4$
11				$\times 10^3$ When SSBL is invalid,
12				$\times 10^2$ Data should be 「0」
13				$\times 10^1$
14				$\times 10^0$
15				「. 」 : Period
16				$\times 10^{-1}$
17	Comma		ASCII	「, 」
18	Latitude of SSBL ROV Position	N/S	ASCII	「N」 : North / 「S」 : South / 「0」 : Invalid data
19		Deg.		$\times 10^1$
20				$\times 10^0$
21		Min.		$\times 10^1$
22				$\times 10^0$
23				「. 」 : Period
24				$\times 10^{-1}$
25				$\times 10^{-2}$
26				$\times 10^{-3}$
27	Comma		ASCII	「, 」
28	Longtitude of SSBL ROV Position	E/W	ASCII	「E」 : East / 「W」 : West / 「0」 : Invalid data
29		Deg.		$\times 10^2$
30				$\times 10^1$
31				$\times 10^0$
32		Min.		$\times 10^1$
33				$\times 10^0$
34				「. 」 : Period
35				$\times 10^{-1}$
36				$\times 10^{-2}$
37				$\times 10^{-3}$
38	Comma		ASCII	「, 」
39	SSBL ROV Depth [m]		ASCII	$\times 10^4$
40				$\times 10^3$
41				$\times 10^2$
42				$\times 10^1$
43				$\times 10^0$
44				「. 」 : Period
45				$\times 10^{-1}$
46	Comma		ASCII	「, 」

ROV CONSOLE to S9 (FMS)

Byte	Function		Type	Description
47	ROV Sensor detected depth [m]		ASCII	$\times 10^3$ When Byte#1 is ON, this data is valid data.
48				$\times 10^2$ When Byte#1 is OFF, this data is invalid data.
49				$\times 10^1$
50				$\times 10^0$
51				「.」 : Period
52				$\times 10^{-1}$
53	Comma		ASCII	「,」
54	ROV Heading [°]		ASCII	$\times 10^2$ When Byte#1 is ON, this data is valid data.
55				$\times 10^1$ When Byte#1 is OFF, this data is invalid data.
56				$\times 10^0$
57				「.」 : Period
58				$\times 10^{-1}$
59	Comma		ASCII	「,」
60	ROV Altitude [m]		ASCII	$\times 10^1$ When Byte#1 is ON, this data is valid data.
61				$\times 10^0$ When Byte#1 is OFF, this data is invalid data.
62				「.」 : Period
63				$\times 10^{-1}$
64	Comma		ASCII	「,」
65	Latitude of ROV Waypoint 1	N/S	ASCII	「N」 : North / 「S」 : South / 「0」 : Invalid data
66		Deg.		$\times 10^1$
67				$\times 10^0$
68		Min.		$\times 10^1$
69				$\times 10^0$
70		Sec.		$\times 10^1$
71				$\times 10^0$
72				「.」 : Period
73				$\times 10^{-1}$
74	Comma		ASCII	「,」
75	Longtitude of ROV Waypoint 1	E/W	ASCII	「E」 : East / 「W」 : West / 「0」 : Invalid data
76		Deg.		$\times 10^2$
77				$\times 10^1$
78				$\times 10^0$
79		Min.		$\times 10^1$
80				$\times 10^0$
81		Sec.		$\times 10^1$
82				$\times 10^0$
83				「.」 : Period
84				$\times 10^{-1}$
85	Comma		ASCII	「,」
86	Latitude of ROV Waypoint 2	N/S	ASCII	「N」 : North / 「S」 : South / 「0」 : Invalid data
87		Deg.		$\times 10^1$
88				$\times 10^0$
89		Min.		$\times 10^1$
90				$\times 10^0$
91		Sec.		$\times 10^1$
92				$\times 10^0$
93				「.」 : Period
94				$\times 10^{-1}$
95	Comma		ASCII	「,」

ROV CONSOLE to S9 (FMS)

Byte	Function		Type	Description
96		E/W		「E」 : East / 「W」 : West / 「0」 : Invalid data
97				$\times 10^2$
98		Deg.		$\times 10^1$
99				$\times 10^0$
100	Longtitude of	Min.	ASCII	$\times 10^1$
101	ROV Waypoint 2			$\times 10^0$
102				$\times 10^1$
103				$\times 10^0$
104		Sec.		「.」 : Period
105				$\times 10^{-1}$
106	Comma		ASCII	「,」
107		N/S		「N」 : North / 「S」 : South / 「0」 : Invalid data
108		Deg.		$\times 10^1$
109				$\times 10^0$
110	Latitude of ROV	Min.	ASCII	$\times 10^1$
111	Waypoint 3			$\times 10^0$
112				$\times 10^1$
113				$\times 10^0$
114		Sec.		「.」 : Period
115				$\times 10^{-1}$
116	Comma		ASCII	「,」
117		E/W		「E」 : East / 「W」 : West / 「0」 : Invalid data
118				$\times 10^2$
119		Deg.		$\times 10^1$
120				$\times 10^0$
121	Longtitude of	Min.	ASCII	$\times 10^1$
122	ROV Waypoint 3			$\times 10^0$
123				$\times 10^1$
124				$\times 10^0$
125		Sec.		「.」 : Period
126				$\times 10^{-1}$
127	Comma		ASCII	「,」
128		N/S		「N」 : North / 「S」 : South / 「0」 : Invalid data
129		Deg.		$\times 10^1$
130				$\times 10^0$
131		Min.		$\times 10^1$
132	Latitude of ROV		ASCII	$\times 10^0$
133	Waypoint 4			$\times 10^1$
134				$\times 10^0$
135		Sec.		「.」 : Period
136				$\times 10^{-1}$
137	Comma		ASCII	「,」
138		E/W		「E」 : East / 「W」 : West / 「0」 : Invalid data
139				$\times 10^2$
140		Deg.		$\times 10^1$
141				$\times 10^0$
142	Longtitude of	Min.	ASCII	$\times 10^1$
143	ROV Waypoint 4			$\times 10^0$
144				$\times 10^1$
145				$\times 10^0$
146		Sec.		「.」 : Period
147				$\times 10^{-1}$

ROV CONSOLE to S9 (FMS)

Byte	Function		Type	Description
148	Comma		ASCII	「, 」
149		N/S		「N」 : North / 「S」 : South / 「0」 : Invalid data
150		Deg.		$\times 10^1$
151				$\times 10^0$
152	Latitude of ROV Waypoint 5	Min.	ASCII	$\times 10^1$
153				$\times 10^0$
154				$\times 10^1$
155		Sec.		$\times 10^0$
156				「. 」 : Period
157				$\times 10^{-1}$
158	Comma		ASCII	「, 」
159		E/W		「E」 : East / 「W」 : West / 「0」 : Invalid data
160				$\times 10^2$
161		Deg.		$\times 10^1$
162				$\times 10^0$
163	Longtitude of ROV Waypoint 5	Min.	ASCII	$\times 10^1$
164				$\times 10^0$
165				$\times 10^1$
166		Sec.		$\times 10^0$
167				「. 」 : Period
168				$\times 10^{-1}$
169	Comma		ASCII	「, 」
170		N/S		「N」 : North / 「S」 : South / 「0」 : Invalid data
171		Deg.		$\times 10^1$
172				$\times 10^0$
173	Latitude of ROV Waypoint 6	Min.	ASCII	$\times 10^1$
174				$\times 10^0$
175				$\times 10^1$
176		Sec.		$\times 10^0$
177				「. 」 : Period
178				$\times 10^{-1}$
179	Comma		ASCII	「, 」
180		E/W		「E」 : East / 「W」 : West / 「0」 : Invalid data
181				$\times 10^2$
182		Deg.		$\times 10^1$
183				$\times 10^0$
184	Longtitude of ROV Waypoint 6	Min.	ASCII	$\times 10^1$
185				$\times 10^0$
186				$\times 10^1$
187		Sec.		$\times 10^0$
188				「. 」 : Period
189				$\times 10^{-1}$
190	Comma		ASCII	「, 」
191		N/S		「N」 : North / 「S」 : South / 「0」 : Invalid data
192		Deg.		$\times 10^1$
193				$\times 10^0$
194	Latitude of ROV Waypoint 7	Min.	ASCII	$\times 10^1$
195				$\times 10^0$
196				$\times 10^1$
197		Sec.		$\times 10^0$
198				「. 」 : Period
199				$\times 10^{-1}$

DATA FORMAT   TABLE-1 (5/6)

ROV CONSOLE to S9 (FMS)

Byte	Function		Type	Description
200	Comma		ASCII	「, 」
201		E/W		「E」 : East / 「W」 : West / 「0」 : Invalid data
202				$\times 1 0^{2}$
203		Deg.		$\times 1 0^{1}$
204			ASCII	$\times 1 0^{0}$
205	Longtitude of	Min.		$\times 1 0^{1}$
206	ROV Waypoint 7			$\times 1 0^{0}$
207				$\times 1 0^{1}$
208				$\times 1 0^{0}$
209		Sec.		「. 」 : Period
210				$\times 1 0^{-1}$
211	Comma		ASCII	「, 」
212		N/S		「N」 : North / 「S」 : South / 「0」 : Invalid data
213		Deg.		$\times 1 0^{1}$
214				$\times 1 0^{0}$
215	Latitude of ROV	Min.		$\times 1 0^{1}$
216	Waypoint 8		ASCII	$\times 1 0^{0}$
217				$\times 1 0^{1}$
218				$\times 1 0^{0}$
219		Sec.		「. 」 : Period
220				$\times 1 0^{-1}$
221	Comma		ASCII	「, 」
222		E/W		「E」 : East / 「W」 : West / 「0」 : Invalid data
223				$\times 1 0^{2}$
224		Deg.		$\times 1 0^{1}$
225				$\times 1 0^{0}$
226	Longtitude of	Min.	ASCII	$\times 1 0^{1}$
227	ROV Waypoint 8			$\times 1 0^{0}$
228				$\times 1 0^{1}$
229				$\times 1 0^{0}$
230		Sec.		「. 」 : Period
231				$\times 1 0^{-1}$
232	Comma		ASCII	[,]
233		N/S		「N」 : North / 「S」 : South / 「0」 : Invalid data
234		Deg.		$\times 1 0^{1}$
235				$\times 1 0^{0}$
236	Latitude of ROV	Min.		$\times 1 0^{1}$
237	Waypoint 9		ASCII	$\times 1 0^{0}$
238				$\times 1 0^{1}$
239				$\times 1 0^{0}$
240		Sec.		「. 」 : Period
241				$\times 1 0^{-1}$
242	Comma		ASCII	「, 」
243		E/W		「E」 : East / 「W」 : West / 「0」 : Invalid data
244				$\times 1 0^{2}$
245		Deg.		$\times 1 0^{1}$
246				$\times 1 0^{0}$
247	Longtitude of	Min.	ASCII	$\times 1 0^{1}$
248	ROV Waypoint 9			$\times 1 0^{0}$
249				$\times 1 0^{1}$
250				$\times 1 0^{0}$
251		Sec.		「. 」 : Period
252				$\times 1 0^{-1}$

DATA FORMAT   TABLE-1 (6/6)

ROV CONSOLE to S9 (FMS)

Byte	Function		Type	Description
253	Comma		ASCII	「, 」
254		N/S		「N」 : North / 「S」 : South / 「0」 : Invalid data
255		Deg.		$\times 10^1$
256				$\times 10^0$
257	Latitude of ROV Waypoint 10	Min.	ASCII	$\times 10^1$
258				$\times 10^0$
259		Sec.		$\times 10^1$
260				$\times 10^0$
261				「. 」 : Period
262				$\times 10^{-1}$
263	Comma		ASCII	「, 」
264		E/W		「E」 : East / 「W」 : West / 「0」 : Invalid data
265		Deg.		$\times 10^2$
266				$\times 10^1$
267				$\times 10^0$
268	Longtitude of ROV Waypoint 10	Min.	ASCII	$\times 10^1$
269				$\times 10^0$
270		Sec.		$\times 10^1$
271				$\times 10^0$
272				「. 」 : Period
273				$\times 10^{-1}$
274	Comma		ASCII	「, 」
275	ETX		03H	End of Text
276	BCC(H)			
277	BCC(L)			
278	CR			
279	LF			

Principle of BCC generation

STX	TEXT(DATA)	EXT	BCC(H)	BCC(H)	CR	LF

— * —
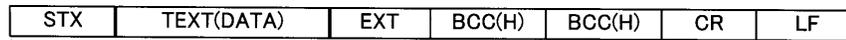
EXCLUSIVE-OR operation should be done among all bytes of this part (*).

Both 4 bits in the higher-order and lower-order of EXCLUSIVE-OR operation result should be converted into ASCII codes.
The code from the higher 4 bits shall be set as BCC(H) and the other one as BCC(L).
The transmission cycle shall be 30 seconds.