WinFrog Device Group:	**Output**
Device Name/Model:	**Cegelec 901 DP**
Device Manufacturer:	**Cegelec Industrial Controls Ltd.** West Avenue, Kidsgrove, Stoke-On-Trent, Staffordshire, ST7 1TW, England. Phone: 01782 783511 **Cegelec ESCA Corporation** 11120 NE 33rd Pl. Bellevue, WA 98004 Tel: (425) 822-6800; Fax: (425) 889-1702
Device Data String(s) Output to WinFrog:	$PKDRW (request for a waypoint), $PKWPC (end of waypoint reached telegram)
WinFrog Data String(s) Output to Device:	Position: $GPGGA or Cegelec Position Format Waypoint/Line: $PKNCW (clear buffer cmd), $PKNNW,
WinFrog .raw Data Record Type(s):	Type: 450

DEVICE DESCRIPTION:
Cegelec is the electrical contracting branch of the multinational Alcatel Alsthom Group. WinFrog is presently capable of interfacing to two Cegelec Dynamic Positioning Systems, the 901 and the 802. The Celegec Dynamic Positioning Systems can be found on numerous vessels where they control vessels propulsion systems via inputs from positioning systems, gyrocompasses, wind speed and direction monitoring equipment, and any other sensors which can assist with the automatic positioning of the vessel.

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

The above communication parameters are the standards used for configuring both the Position Telegram (Port) and the Waypoint Telegram (Port) as shown in the Cegelec 901 DP (Edit I/O) configuration dialog box.

WINFROG I/O DEVICES > CONFIG OPTIONS:
The Cegelec 901 DP is added to WinFrog from the OUTPUT device types. The DP OUTPUT data type is added along with the Cegelec 901 DP device. When the device is added to WinFrog, the following (Edit I/O) dialog box appears for configuring output data. This dialog box is also accessible after the device is added, via the Configure > I/O Devices > Edit I/O command or highlight the Cegelec 901 device in the I/O window, right-click and choose Edit I/O.

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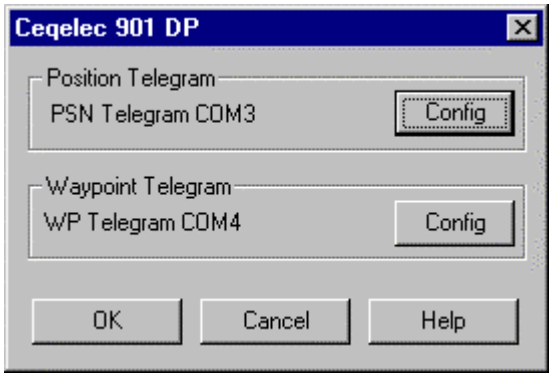
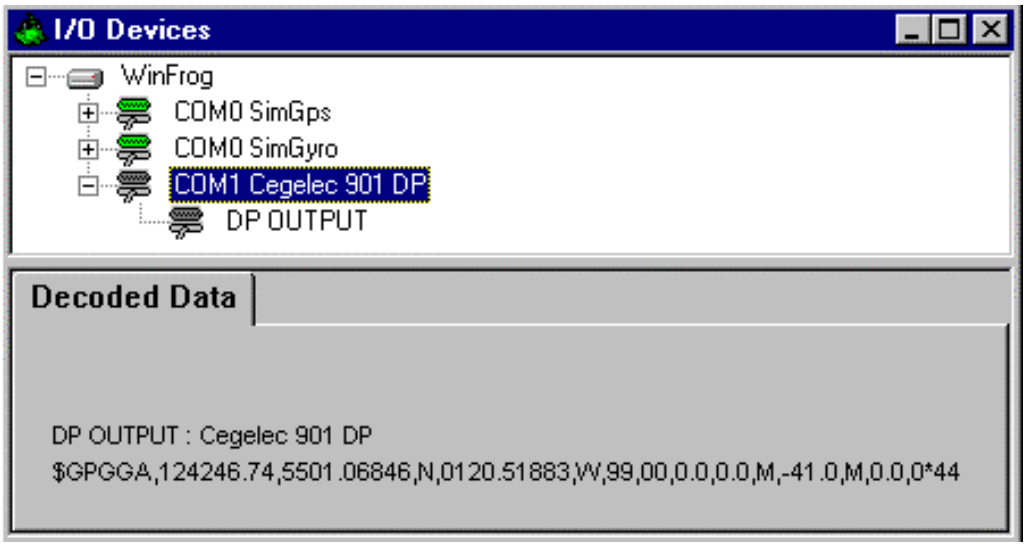
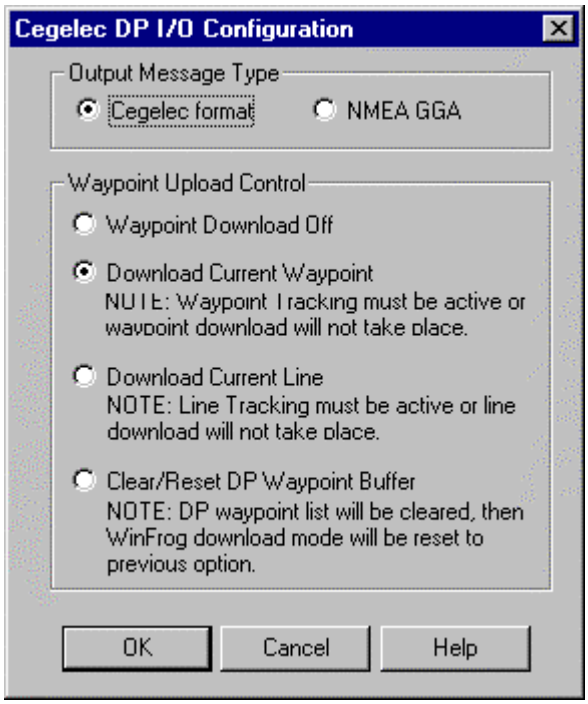


The first item is designating the input/output ports for the interface. In the example above, the output (position) to the Cegelec 901 is via COM 3, while the input/output (Waypoint/Line data) is via COM4. Since the DP system requests, and then receives the Waypoint/Line data from WinFrog, this port operates at full duplex. The Surveyor and DP Operator must ensure that the communication parameters are identical for both the DP System, and WinFrog.

Once the COM ports are chosen, the Cegelec 901 DP device will appear in the I/O Devices Window. For this example, simulated devices have been added to the system and appear in the I/O Device Window only for display of the $GPGGA position string output (under Decoded Data).



Waypoint and Line data transfer between WinFrog and the Cegelec DP System is configurable via the Cegelec DP I/O Configuration dialog box shown below. This dialog box is accessible after the Cegelec 901 DP device is added, via the Configure > I/O Devices > Configuration command or highlight the Cegelec 901 device in the I/O window, right-click and choose Configure Device.



The Position Output and Waypoint/Line communication will be discussed in this section; however, in order for any data to be sent, or received from the DP System, the following must be in place:

- A Position Sensor must be added to the Vehicle,
- The Vehicle must be tracking a Line or Waypoint.

Adding sensors and items to the Vehicle is covered in the section WINFROG VEHICLE TEXT WINDOW > CONFIGURE VEHICLE DEVICES > DEVICE > EDIT OPTIONS. The operation of the configuration window is discussed below.

Position Output Message Type:
A position string can be output from WinFrog in either the Celegec Format, or the NMEA $GPGGA format. These two data strings are listed in the Configuration Details section. Refer to the Cegelec DP I/O Configuration dialog box for this option.

Waypoint (or Line) Upload Control:
To transfer waypoint or line data to the Cegelec DP System, a WinFrog Vehicle must have the **OUTPUT,Cegelec 901 DP,DP OUTPUT** added, as well as a waypoint or line selected (depending upon the option). The Cegelec DP System initiates the download from the Track Follow option, which is accessible via the Cegelec 901 DP Console. Once WinFrog is configured, the DP Operator (not the Surveyor) can download Waypoint or Line Node data when desired.

The four download options the Surveyor can configure and provide to the DP Operator are as follows:

Waypoint Download Off - WinFrog disables the waypoint download. When set to this, a download initiated from the DP System will result in no action.

Download Current Waypoint - WinFrog will send the current vehicle position, followed by the current active Waypoints. In this mode, the DP System requests waypoints, and WinFrog provides the required From and To Waypoints. Note that Waypoint Tracking must be active or waypoint down load will not take place.

Download Current Line - WinFrog determines the current line segment being tracked; and, starting with the node that defines the start point of this current segment, sends all the nodes in the line from this node to the last node. In this mode, when the DP System requests waypoints, the first point sent by WinFrog will be designated as Waypoint #1, regardless of the actual line segment involved. The correct WinFrog Line Segment designation is sent as the Waypoint Name. Note that Line Tracking must be active or 'waypoint' down load will not take place.

Clear/Reset DP Waypoint Buffer - Setting this option will result in the DP System waypoint buffer being cleared (by WinFrog). This is valuable in that it clears the waypoint buffer prior to future downloading operations. The Surveyor should clear the Buffer, then select one of the above download options, prior to the future waypoint or line data requests from the DP System.

Anytime the mode is changed, WinFrog will clear the DP System waypoint buffer, at the next request from the DP System, prior to sending new data. This is regardless of the Clear /Reset mode setting.

WinFrog should be set to the desired option and then left. In this way, the DP System can request and receive waypoint data, as it is required.

WINFROG VEHICLE TEXT WINDOW >CONFIGURE VEHICLE DEVICES > DEVICE > EDIT OPTIONS:

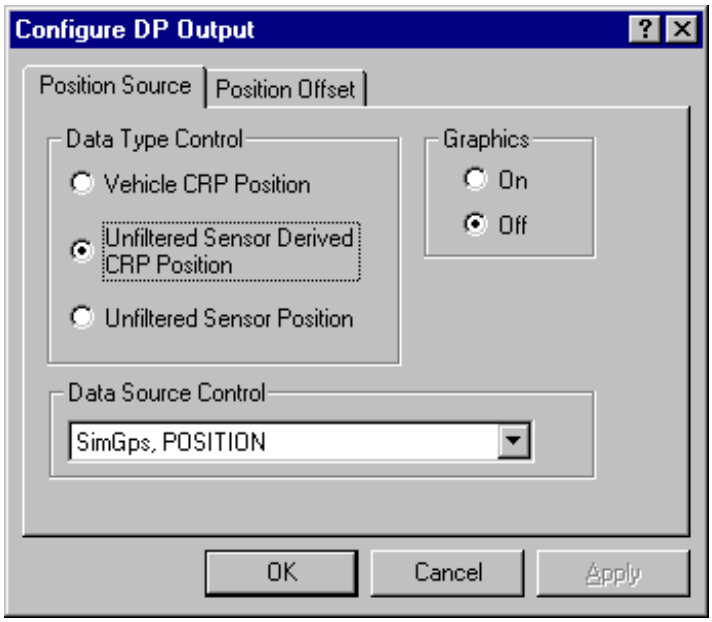
The **OUTPUT, CEGELEC 901 DP, DP OUTPUT** data item is added to the vehicle in which WinFrog is sending commands to the DP System. The DP data item and a positioning data item must be added in order to sent positioning data to the Cegelec 901 DP System.

If the Cegelec 901 DP Configuration is set to Download Current Waypoint (in the Cegelec DP I/O Configuration dialog box), then the vehicle must be tracking a Waypoint. Similarly, if the Cegelec 901 DP Configuration is set to Download Current Line, then the vehicle must be tracking a Survey Line. No warning window appears if any of the above is not executed; however, new data will not be visible in the I/O Devices Window under Decoded Data, as is shown previously in the Cegelec DP I/O Configuration dialog box.

When the **OUTPUT, CEGELEC 901 DP, DP OUTPUT** item is edited from the Configure Vehicle - Devices dialog box, the **Configure DP Output** dialog box appears as shown

below. The **Position Source** and the **Position Offset** tabs must be configured here. These items configure the vehicle position output. Refer to the type 450 record under Configuration Details for the raw data record.

Position Source:
Three items need to be configured in this Folder: Data Type Control, Graphics, and Data Source Control.



Data Type Control:
In Data Type Control, there are three options to choose from: Vehicle CRP Position, Unfiltered Sensor Derived CRP Position, and Unfiltered Sensor Position.

Choose the **Vehicle CRP Position** for filtered position updates (Kalman, velocity, etc. as applied to the vehicle) referenced to the vehicles' Central Reference Point (CRP). The offset input under the Position Offset Folder is added to the CRP position.

The **Unfiltered Sensor Derived CRP Position** is the same as the above only unfiltered data is output. With this option, filtering can be performed within the DP unit. This is often the preferred option as most DP units have more rigorous filtering routines that require an unfiltered data input.

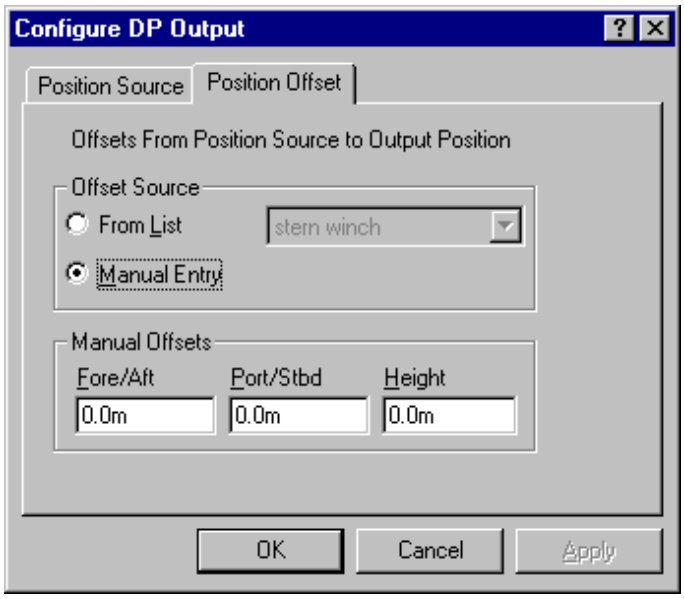
The **Unfiltered Sensor Position** outputs unfiltered positions from the positioning sensors' location. The offset input under the Position Offset Folder is added to the sensors raw position.

Data Source Control:
The data source depends on the Data Type Control that was selected. If the Vehicle CRP Position is chosen, the Data Source Control will automatically be set to

VEHICLE, CRP POSITION, and the primary positioning sensor data will be used. If either the Unfiltered Sensor Derived CRP Position or the Unfiltered Sensor Position is chosen in the Data Type Control, then the positioning sensor can be chosen from the dropdown list box under Data Source Control. Here a secondary positioning sensor can be chosen. It is important to note that the Unfiltered Sensor Derived CRP Position is based on the chosen sensor, however the data is related to the CRP. Note that the SimGps, POSITION is used in this window as an example only.

Graphics:
If the graphics on radio button is selected a small square with the label Cegelec 901 DP will appear at the output coordinates on the graphics screen.

Position Offset:
As shown in the dialog box below, the 'Offsets From Position Source to Output Position' can also be configured here. This means that any offset input here will be applied to the position output from the Position Source folder options listed above.



Offset Source:
The Offset Source can be chosen from the list of offsets for the vehicle, or the Manual Entry can be used.

Manual Offsets:
If Manual Entry is chosen under the Offset Source, the offsets must be input here. Offsets are input similar to all offsets in WinFrog.

CONFIGURATION DETAILS:
The Cegelec 901 system is installed on various vessels including the Coastal Connector, Tyco Provider and the Heimdal. In most cases a Configuration Document will be present onboard and should be referenced when setting up, or checking the WinFrog system installation.

Cegelec 901 Output Strings:
The Cegelec 901 DP Outputs Request for Waypoint, and End of Waypoint Reached data strings.

$PKDRW – Request for Waypoint
$PKDRW
When:
$PKDRW is sent to WinFrog, the string "%c",0xEA" is returned to the Cegelec in order to keep coms open.

WinFrog Waypoint Output Strings:
WinFrog outputs various Waypoint data including a Clear Buffer Command, and a 'reject' string to close the Com port.

If DP request waypoint and the current position has not been sent and accepted, WinFrog will first send current position. The string is shown below:

"%c$PKNNW,\r\n$PKTID,1,CURRENT PSN,2\r\n$PKWPC,1,1,%.2lf,M,N,%.2lf,M,E,U,,,V,,V,,V,CURRENT PSN\r\n%c", 0x02,
rawDpOutputRec->psnData->centerNorth, rawDpOutputRec->psnData->centerEast, 0x03);

If a current position has been sent and accepted by the DP System, then the following waypoint string is sent:

"%c$PKNNW,\r\n$PKTID,1,%s,2\r\n$PKWPC,1,2,%.2lf,M,N,%.2lf,M,E,U,,,V,,V,,V,%s\r\n%c", 0x02,
upData->waypointData->waypoint.name,upData->waypointData->waypoint.y,upData->waypointData->waypoint.x,upData->waypointData->waypoint.name,0x03)

$PKNNW – Waypoint Name
%c$PKNNW,\r\n

$PKTID – Actual Number of Waypoints being sent
$PKTID,1
Note: The Waypoint number in each waypoint coordinate telegram starts at 1

$PKWPC – Waypoints
$PKWPC,%04d,%012.2lf,M,N,%012.2lf,M,E

Where:

%04d:	is the Waypoint Request / End of String identifier
%012.2lf:	is the 'Y' or (Grid) Northing of the Waypoint
M,N:	is Meters North
%012.2lf,	is the 'X' or (Grid) Easting of the Waypoint
M,E:	is Meters East

$PKNCW – Clear Buffer Command

%c$PKNCW,\r\n%c",0x02,0x03

'Reject' string to close Coms Command

"%c",0xA2

Waypoint Position Outputs:

WinFrog can output (to the Cegelec 901 DP) either the Cegelec format position or a NMEA GGA position string.

Cegelec Position Format:

Y+6098030.0 X+0606008.7 F000 Q0005005

Where:

+6098030.0 is the current Northing (Grid)

+0606008.7 is the current Easting (Grid)

GGA Position Format:

$--GGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,Mx.x,xxxx*hh<CR><LF>

or

$--GGA,123519,4807.038,N,01131.324,E,1,08,0.9,545.4,M,46.9,M,1.8,530*4F

Where:

123519	Fix taken at 12:35:19 UTC		
4807.038,N	Latitude 48Deg. 07.038 min N		
01131.324,E	Longitude 11Deg 31.324 min E		
1	Fix quality:	0 = invalid	3=GPS PPS Mode,fix valid
		1 = GPS fix	99= Simulator Mode
		2 = DGPS fix	10= Simulator Mode Edit
08	Number of satellites being tracked		
0.9	Horizontal dilution of position		
545.4,M	Altitude, Metres, above mean sea level		
46.9,M	Height of geoid (mean sea level) above WGS84 ellipsoid		
1.8	time in seconds since last DGPS update		
530	DGPS station ID number		

Raw Data Logging (Type 450 record):

When the DP OUTPUT data type is attached to a vehicle the type 450 raw record is logged to file. This record is described in the WinFrog User's Guide (Appendix B) and is as follows:

In WinFrog:

```
sprintf(rawStr, "450,%s,%.2f,%.8f,%.8f,%.8f,%.8f,%.3f,%.3f,%.3f,%.8f,%.8f\n",name,
                fixTime,centreLat,centreLon,
                waypointX,waypointY,desiredBrg,desiredSpeed,desiredRange,
                currentX,currentY);
```

Raw 450 Record:

```
450,Cegelec 901 DP,982688562.97,55.01780983,-1.34198231,
605594.21404918,6098175.45648311,0.000,0.000,0.000,0.00000000,0.00000000
```

Where:

982688562.97, is the time of the last position,

55.01780983,-1.34198231, is the latitude and longitude of the vessel position,

605594.21404918,6098175.45648311, is the position (Grid) of the current or last Waypoint Tracked under Waypoint Tracking.