THALES NAVIGATION	Marketing & Technical Tips		
Z-Family	N° 18	March 17th ,2005	By : Denis BERNARD Checked by : Patrick BOURIAUD

Using Z-series equipment on board a vehicle

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A. Introduction

The Z-series rovers (Z-Xtreme , Z-Max) have been basically designed for Land Survey and their default configuration corresponds to a pedestrian use .

Should you intend to use them on board a vehicle , a few adjustments could be necessary, and several precautions have to be known before setting up the equipment .

B. Rover Dynamics

Applies to Real Time only

Dynamics: $PASHS,CPD,DYN

Select the dynamics for the fastest acceleration you expect to be moving. If the dynamics are not set properly, the CPD solution will be less accurate. Use the STATIC dynamics mode only if the antenna will remain on a solid setup such as a tripod. If the antenna is on a pole that may have some slight movement, select Q-STATIC. If you are doing stop-and-go kinematic or rapid static surveys, the WALKING (default) or AUTOMOBILE dynamic should be selected. SHIP dynamics assume limited vertical movement. AIRCRAFT dynamics assume higher speeds and accelerations.

DYN: Rover Dynamics

$PASHS,CPD,DYN,d1

This command sets rover's dynamic information, where d1 is a code number that best represents the motion of the rover receiver. This command is relevant only for ROVER or RVP BASE receiver. The default is 2 (walking dynamics).

Example: Set rover dynamics to aircraft dynamics:

$PASHS,CPD,DYN,4, <Enter>

Table 6.156. CPD,DYN Parameter Table

Parameter	Description
d1	Dynamic. One of the following values: 0 -- Static (antenna on tripod) 1 -- Quasi-static (antenna on manual pole) 2 -- Walking (default) 3 -- Automobile 4 -- Aircraft 5 -- Ship

C. Ambiguity Fix Parameter

In difficult conditions , the usual setting of the Ambiguity Fix Parametre, that Is 99%, can be too restrictive, in such a case it can be lowered.

This parameter can be adjusted through the $PASHS,CPD,AFP or directly using Fast Survey software on the Allegro (Symbol) terminal.

Ambiguity Fix: $PASHS,CPD,AFP

The ambiguity fixing parameter can be set to different confidence levels between 90.0 and 99.9. Higher confidence levels result in longer search times but increase the reliability of the ambiguity fixed solution.

The ambiguity fix mode can be set from 90.0 to 99.9. The default setting of 99.0 is recommended for most static and kinematic surveying applications. Setting the mode to 99.9 results in the highest reliability that the ambiguities are fixed correctly, but also results in a longer time to resolve the ambiguities and give the fixed solution. Setting the mode to 95.0 decreases the time to solve the ambiguities and give the fixed solution, but also increases the chances that the ambiguities are fixed incorrectly. Setting the mode to 90 results in the shortest time to resolve the ambiguities; however, mode 90.0 also has the highest chance that the ambiguities are fixed incorrectly.

Figure 4.1 shows the test results for over 12,000 ambiguity fix test performed by Ashtech on a Z-12 RZ receiver at various baseline lengths up to nine kilometers. These test results indicate that at the default setting, the typical time to resolve the ambiguities is 60 seconds, with a reliability of 99.9% At the fastest setting, the results indicate that the typical time to resolve the ambiguities is five seconds, with a reliability of 97.6%.

D. Loop tracking

Applies both to Post Processing & Real Time

LPS: Loop Tracking

$PASHS,LPS,d1,d2,d3

Set user-selectable third-order loop tracking parameters, where d1 is the 3rd order ratio of the carrier loop, d2 is the carrier loop parameter, and d3 is the code loop parameter (see $PASHR,LPS below for more information). Loop setting allows the user to select the tracking loop parameters based on the application. The receiver uses default values until another setting is selected. The user settings are saved in battery-backed memory if the $PASHS,SAV,Y command is issued afterwards and are used until a new setting is selected, or the memory is cleared. The default is 1, 2, 3.

Table 6.20. LPS Message Structure

Parameter	Description	Range
d1	3rd order loop ratio	00 - 10 0 - 2nd order only 1 - ratio of 0.1 (low acceleration) 10 - ratio of 1 (high acceleration)
d2	Carrier loop parameter (related to the noise bandwidth of the loop)	1 - ω0 = 10 Hz (static) 2 - ω0 = 25 Hz (low dynamics) 3 - ω0 = 50 Hz (high dynamics)
d3	Code loop parameter (related to the noise bandwidth of the loop)	1 - ω0 = 0.05 Hz 2 - ω0 = 0.1 Hz 3 - ω0 = 0.2 Hz

Example: Change loop parameters to ratio 0.2 and carrier bandwidth 10 Hz:

$PASHS,LPS,2,1,3 <Enter>

$PASHQ,LPS,c

Query tracking loop setting, where c is the optional output port and is not required to direct the response to the current port.

$PASHR,LPS

The response is in the form:

$PASHR,LPS,d1,d2,d3*cc <Enter>

where d1-d3 are as described in Table 6.20.

E. Car setting up TIPS

USING A HIGH ACCURACY GPS POSITIONNING PEDESTRIAN DEVICE ON A VEHICLE …. To prevent the risk of loosing sensitivity ….			
Topic	**Problem**	**Solution**	**Possible test**
Conducted interferences through power supply .	Interference from the engine through the power supply	To use a very high quality filter or to use a separate power supply	Test on the internal battery of the receiver if any or on an external battery
Conducted interference through the car ground	Interference between the ground currents and the receiver	To avoid the contact of GPS receiver (including coaxial connector, antenna bracket ..) with any exposed conducting part of the car	To make a temporary test at stop respecting this rule .
Radiated interference from the car	Direct interference between the engine and the GPS antenna . Depends mainly of the car model.	To find a correct position of the antenna (for example at the back on a small mast).	To make a test with the motor on, the receiver on board, but with the antenna on a tripod at a few metres .
Radiated interference from other vehicles	Interference from other vehicles in the street on the GPS antenna.	Cannot be avoid. Interference from some motorbikes can be very high .	To make a test in the country.
Interference between cables	Interference due to cross coupling between car cables and GPS cables.	To avoid to have car cables and GPS cables tied together or passing through following the same raceways.	To make a temporary test with cables clearly separated .
Vibrations	Possible troubles due to car vibrations	To set up the receiver on shock absorbers .	To test with the receiver on a seat .
Speed	Losing satellites at high speed	Configuration of SVs tracking loops & fix computation	Test at low speed
Acceleration	Losing satellite during accelerations	Configuration of SVs tracking loops & fix computation	Test at low speed
Radio Electrical Environment in Urban Areas	Generally very poor : buildings, power lines …	No real solution , antenna has to be as high as possible	To make a similar test in the countryside