THALES

Using Coast Guard beacons with MobileMapper Pro

9 June 2006

This tech note will help you use any beacon receiver outputting standard RTCM SC-104 formatted differential corrections. For tips on using specifically the Thales beacon receiver with the MobileMapper Pro receiver, see "Using MM beacon with MM Pro.pdf" in the \Mobile Mapping\MM beacon\Application Notes\ folder of ftp.thalesnavigation.com.

What guidelines should I follow to ensure that everything is setup correctly for real-time corrections using the MobileMapper Pro and a beacon receiver?

You should not have any problems using the MobileMapper Pro and a beacon receiver if you follow the following set of instructions:

1. Turn on both the beacon receiver and the MobileMapper Pro.
2. Connect the two receivers using the MobileMapper Pro's data cable (P/N 730341-01) with a null modem adapter (available at most electronics stores) or the MobileMapper Pro-to- beacon receiver cable (P/N 980816).
3. Set the MobileMapper Pro's Baud rate to the Baud rate of the beacon receiver. (Press the MENU button, select the Setup option using the arrow button and then select the Baud Rate option. Highlight the correct Baud rate and press ENTER.)
4. Press the MobileMapper Pro's NAV button until you get to the Position screen and check that "DGPS" appears in the middle of the screen.
5. Press the MobileMapper Pro's LOG button and begin recording data.

How do I know if the MobileMapper Pro is using the beacon's DGPS corrections?

Press the NAV button repeatedly until you come to the Position screen. When the GPS receiver is stationary and using the DGPS corrections from the beacon receiver, the Position screen will say "DGPS Averaging" beneath the coordinates display.

What should I do if the beacon receiver says it is working properly but the MobileMapper Pro is not using the corrections?

First, check that the Baud rate of the MobileMapper Pro receiver is that of the beacon receiver. The factory default for many beacon receivers is 4800. While this is the same as the default Baud rate of the MobileMapper Pro, when you download data to MobileMapper Office, the receiver's Baud rate is automatically set to 115,200 for faster communications. If you then attach the receiver to the beacon, you must remember to reset the Baud rate to that of the beacon receiver. You can easily do this by pressing the MobileMapper Pro receiver's **MENU** button, selecting **Setup** and the **Baud Rate** option and then selecting the proper Baud rate.

Second, if you are using the Mobile Mapper Pro's standard data cable to connect to the beacon receiver, are you also using a null modem adapter? These are often required. Lastly, you should place the beacon at least 75 centimeters (30 inches) away from the MobileMapper Pro receiver in order to reduce any chance of cross-receiver interference.

What happens to MobileMapper Pro accuracy if the beacon receiver loses signal lock or loses power?

If the beacon loses lock on the reference station, it usually takes only a second or two to get it back. If it shuts down due to power loss or a loose cable, you have up to 90 seconds to load in new batteries or reconnect the cable before MobileMapper Pro will stop using the last corrections and return to autonomous mode. If you wish, you may pause the MobileMapper Pro's logging function at any time and so avoid recording any uncorrected positions until you once more receive differential corrections from the beacon receiver.

How accurate is the MobileMapper Pro when using beacon receiver corrections?

In general, you should expect accuracy in the 2-3 meter range 95% of the time. However, the factors affecting GPS accuracy are very complicated and it is hard to answer this question completely without recognizing what these factors are and what effect they have on GPS accuracy.

Multipath conditions – when GPS signals bounce off a building or hill and so take longer to reach the receiver than they would if they followed a straight path – are the biggest source of inaccuracy. These conditions are rarely the same for both the reference station and the rover receiver and so they cannot be removed by any differential correction technique – either real-time as with the beacon receiver or post-processed corrections as when using MobileMapper Office. Fortunately, the MobileMapper Pro's GPS antenna was specifically designed to reject multipath signals when the receiver is held vertically. In addition, all National Differential GPS (NDGPS) reference stations are installed in areas with a minimum of multipath.

Solar storms can also affect GPS accuracy but they are comparatively rare. Most other environmental sources of GPS error are common to the reference station and rover and so are largely nullified by differential correction techniques.

The quality of the GPS receiver and the beacon signal are also major determinants of positional accuracy. Real-time correction with the MobileMapper/Beacon receiver combination yields 2-3 meter accuracy under good-to-average environmental conditions such as near two-storey buildings and scattered trees. Increasingly dense tree canopy can degrade GPS accuracy to 10 meters. The heaviest tree canopy as well as "urban canyons" can prevent the calculation of any position at all.