Department of Environment and Conservation

Our environment, our future

DEC Nature Conservation Service

Biodiversity

Standard Operating Procedure

Setup of the SOKKIA™Axis3 Differential GPS

SOP No:4.1

Prepared by:

Cassidy Newland, Ecologist, DEC Species and Communities Branch, Kensington WA, Dick Perry Avenue, Kensington WA

Prepared for:

Significant Native Species and Ecological Communities – Resource Condition Monitoring Project

Version 1.0 (June 2009)

Revision History Log			
Version #	**Revision Date**	**Author**	**Changes**

Approvals

Version 1.0

Approved by:_____ Date: 22 June 2009

Val English
Principal Ecologist, DEC Species and Communities Branch

Table of Contents

1 Purpose

The purpose of this Standard Operating Procedure (SOP) is to familiarise field staff with the SOKKIA™ Axis3 L1 Differential Global Positioning System (DGPS) and the methodology for setting it up. This SOP only details the setup of the Sokkia Axis3 and does not cover its use with or connection to a handheld computer.

2 Scope

This standard operating procedure applies to anyone wishing to set up a Sokkia™ Axis3 L1 DGPS.

3 Introduction

The Sokkia Axis3 is a DGPS, which means it is able to provide a more accurate global position than a standard GPS.

3.1 What is a DGPS

A DGPS improves the accuracy of the GPS satellite network by correcting errors resulting from atmospheric interference, discrepancies between satellite clocks and satellite orbit errors. In order to provide these corrections, a base station with a GPS receiver at a known position is set up. The DGPS base station is then able to calculate the errors provided by each satellite and transmit these corrections in real-time to a remote DGPS unit in the field such as the Sokkia Axis3. The remote unit then applies these corrections to the information it has received from the satellite network to provide a more accurate global position. As the corrections are transmitted in real-time, any time lag between transmitting and receiving the corrections will result in a degree of error.

3.2 Types of base station networks available

There are a number of different types of DGPS base stations which can be used in Australia. The first is the Australian Marine Safety Authority (AMSA) system which is a network of radio beacons located around major ports in Australia. The indicative Australia wide coverage of the AMSA DGPS can be located at:

http://www.amsa.gov.au/shipping_safety/Navigation_Safety/Differential_Global_Postitioning_System/Images/DGPS%20Coverage%20Map.gif

This network is maintained by AMSA, primarily as a maritime safety initiative but can be used for land based work as well. The AMSA network is free to access and generally provides accuracy of between 1-4m depending on the DGPS receiver and the distance from the base station used. Generally AMSA beacons have an effective range of 300 km however the accuracy in the outer extents of this range will be reduced and obstacles such as hills or valleys may prevent access to the signal. While not all DGPS receivers are capable of using the AMSA network the Sokkia Axis3 can.

The location and frequencies of base stations in the AMSA network can be found at:

http://www.amsa.gov.au/Shipping_Safety/Navigation_Safety/Differential_Global_Postitioning_System/Service_Status/

The second type of base station is a virtual base station which is established using a stationary satellite from the OmniSTAR® network. Depending on the DGPS receiver used, the Omnistar network is able to provide either 1m (VBS) or 0.1m (HP) accuracy. The Omnistar network is not free to use but unlike the AMSA network it provides coverage for the whole Australia as well as most of the world. OmniSTAR forms part of the Positioning Division of the Fugro group of companies. They can be contacted for connection to the Omnistar network on (08) 9322 5295 and you will need to provide them with the serial number of your DGPS receiver. Access can be purchased by the day, week, month or year. Not all DGPS receivers are able to use the Omnistar network and some may only be able to access the VBS signal that provides 1m accuracy. The Sokkia Axis3 can access both the AMSA network and the Omnistar network but is restricted to only using the VBS signal.

The third type of base station in use in Australia is that established by the user and is generally temporarily established for a specific project by using a known position such as a registered bench mark and a DGPS receiver base station. Generally this type is only used where a high degree of accuracy and/or precision is required. By having the base station close to the area of interest there is minimal time lag and with the appropriate DGPS receiver, an accuracy of 1cm can be achieved.

This protocol details how to connect the Sokkia Axis3 to both the AMSA and Omnistar networks.

3.3 The Sokkia Axis3

Information on the Sokkia Axis3 can be found at these links and setup information can be located in Section 5.1:

http://www.sokkia.com.au/

http://www.sokkia.com.au/products/gps_receivers/gis/axis_3.html

http://www.sokkia.com.au/media/brochure/Axis3_brochure.pdf

Figure 2. The associated parts of the Sokkia Axis3 Differential GPS.

Figure 3. GIR 1400 receiver, base view of ports.

4 Equipment and Materials Required

Sokkia Axis3 Differential GPS unit including:

- Sokkia GIR 1400 receiver
- Sokkia CDA-3 antenna

- Power cable
- Antenna cable
- 2x sealed Batteries
- Antenna pole
- Backpack
- Battery charger docking station
- Battery charger transformer

5 Procedure

The following procedure explains the setup and initialisation of the Sokkia Axis³ Differential Global Position System.

5.1 Familiarisation and setup of Sokkia Axis3

Before using the Sokkia Axis3 you should familiarise yourself with all parts of the DGPS (Figure 2) and be aware of how to set it up.

The primary parts of the Sokkia Axis3 are:

- the CDA 3 antenna which communicates with the satellites and base stations; and
- the GIR 1400 Receiver which processes the information received from the antenna and outputs a global position. The GIR 1400 Receiver is powered by a set of 2 external batteries which are fully sealed and the whole unit is secured into the backpack for use in the field.

The GIR 1400 Receiver has 4 ports located at the base of the unit, which include the antenna socket, the power socket and two serial ports. The GIR 1400 is a Bluetooth enabled unit but both Bluetooth and serial cable can be used to connect the unit to a PDA or other field computer. When using a serial cable to connect to the field computer it is important that you use the male serial port and not the female serial port, which is only for use in configuring the unit. Figure 3 depicts the layout of the ports.

5.1.1 Setup of the Sokkia Axis3

1. Check you have all the parts of the Sokkia Axis3.listed in section 4 of this SOP.

2. Charge both the batteries using the supplied battery charger shown in Figure 2. When charging, the power light (red) and the charge lights (green) for both batteries should be on. When the charge lights go off it indicates that the battery is fully charged.

3. Start by placing the GIR 1400 Receiver into the backpack as shown below.

Figure 4a: Placement of the GIR 1400 Receiver into the backpack. Figure 4b: Fastening the velcro strap around the receiver. Figure 4c: Tightening the drawstring at the base of the receiver.

4. Install the 2 batteries into the backpack and connect the power cable from the two batteries to the GIR 1400 Receiver as shown below.

Figure 5a:. Connecting the battery to the GIR 1400 Receiver. Figure 5b: Connecting the power plug to the socket on the receiver. Figure 5c: Power plug and socket.

5. Place the antenna pole into the pouch on the side of the bag and tighten the two straps around the pole. Then screw on the CDA 3 Antenna.

Figure 6. Placement of the antenna & pole onto the backpack. Note: red arrows indicate fastening points.

6. Connect the coaxial antenna cable to the antenna socket on the GIR 1400 Receiver and then run the cable through the slit at the base of the backpack as shown below.

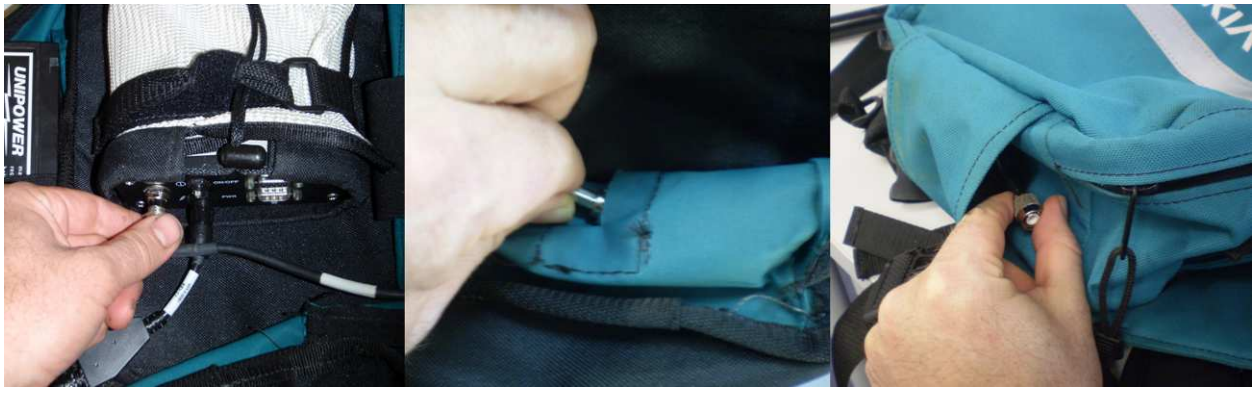

Figure 7. Connecting the Antenna cable to the GIR 1400 and feeding the cable through the backpack.

7. Run the cable neatly up the antenna pole, wrapping it around the pole a few times to prevent the cable snagging on vegetation in the field and then screw the plug on the coaxial cable into the socket on the CDA 3 Antenna.

Figure 8. Connecting the antenna cable to the CDA 3 antenna.

8. The Sokkia Axis³ is now set up and ready to be tested. To test the unit, take it outside a few meters away from any buildings and turn the unit on (ON/OFF switch is located at the base of the unit as shown in Figure 3).

   - Once turned on the red power light at the top of the unit should be illuminated (see Figure 9) and remain on, and the yellow GPS and DGPS lights will blink about 3-4 times at start up.

   - When the unit has obtained a GPS lock, the yellow GPS light will be illuminated and remain on.

   - When the unit has obtained a lock on either the omnistar satellite or an AMSA Beacon the yellow DGPS light will be illuminated and remain on.

Figure 9. Location of indicator lights on the GIR 1400 Reciever.

Troubleshooting

- If the red light is blinking, the batteries are running flat and should be charged before proceeding.

- If the yellow GPS light does not blink at all when the unit is first turned on then there may be a problem with the receiver. Switch the unit off, leave it for a few seconds and turn it on again. If the problem persists then contact a Sokkia service representative.

- If the yellow GPS light blinks repeatedly after turning the unit on then there may

be a problem with the unit. Turn the unit off, leave it for a few seconds and turn it on again. If the problem persists then contact the Sokkia service representative.

- If the DGPS is to close to buildings, trees or in bad weather, the GPS or DGPS may not be able to obtain a lock.

If the Axis3 is working correctly it can now be connected to a Nomad or other field computer in order to read and record location information.

6 Further Reading

For using GPS co-ordinates to create shapefiles in ESRI ArcMap 9.1/9.2 using the “Add XY data” tool, the link to the ESRI online is:

ArcGIS Desktop Help 9.2 - Adding x,y coordinate data as a layer

For extracting/clipping data such as orthophotos in ESRI ArcMap 9.1/9.2 for use in ArcPad on a PDA, the link to the ESRI online is:

ArcGIS Desktop Help 9.2 - Getting data for ArcPad

7 References

Sokkia manual

http://www.sokkia.com.au/