Eye in the Sky

Tracking devices have become a hot topic as pilots fly further and technology delivers more. Alistair Stuart investigates what's on offer for pilots in SA

There are three basic types of tracking units available. The first uses a GSM (mobile phone) network to transmit the data between the pilot and the retrieve driver. If there is no reception however, it doesn't work well.

The second type uses a satellite network to transmit the position of the pilot. This is the most robust system as the pilot is likely to have satellite reception at all times.

The third type of tracking uses a radio to transmit the pilot's position. Out of all tracking devices this is the least well known.

1. GSM BASED TRACKERS

INTERNAL MOBILE PHONE GPS

For this system to work the mobile phone must have a built-in GPS. The position of the phone can then be sent to a server. This is how the Red Bull X-Alps organisers track their pilots so they can be followed online.

Advantages: Everything is contained within the mobile phone, which makes it easy and compact. It is also an economical option for people who already use a phone with a built in GPS.

Disadvantages: The battery life of the phone is severely reduced. Using a Nokia with a built-in GPS option the battery goes flat within three hours. This is obviously a major disadvantage on long flights. However, there are now a number of small external battery packs available to supplement the life of the phone (available from www.bluegravity.co.za). Depending on the type of software used internet access is necessary to view the data positions.

MOBILE PHONE WITH AN EXTERNAL BLUETOOTH GPS

This tracker works using a little GPS unit that connects to a mobile phone via a Bluetooth connection. It sends the GPS position data to the mobile phone every three seconds, and the mobile phone decides when it sends the SMS. Alternatively, the mobile phone uploads the data to a server. Pilot position can then be viewed on Google Maps, for example. Units are available from Laura Nelson for R 400.

Advantages: The external GPS system has all the advantages of the internal system. Except you now have another matchbox-sized gadget to carry in your pocket. The added benefit is that the battery life of your phone is extended. Ulf Arndt tested the GS-R238 external GPS and found battery life was about eight hours. Good enough to break a world record in SA.

Disadvantages: You must remember to enable Bluetooth on your phone before taking off otherwise it won't work.

MOBILE PHONE BASED TOWER LOCATION

This type of tracking (Vodacom Look4Me service for example) uses the network's towers to provide a rough location of the mobile phone. The retrieve driver or other interested party can SMS (text message) the service provider and get a position on the mobile phone.

Advantages: It is easy to use, you switch on the mobile phone and it works immediately. On a contract it costs R 1 per query so it is very cheap. Multiple people can query the pilot's location provided they are registered with the Vodacom service.

Disadvantages: It's very inaccurate: it gives a 10-40 km radius of accuracy if the phone has reception, which out there in the bush is arguably useless. It is not automatic: the retrieve driver needs to SMS the service to get a position SMSed back. Consequently it does not send an automatic alert if you crash. It does not leave a track log so if the pilot has no reception you have no idea where they are.

Comments: Not a good option to realistically find a pilot.

COMPETINO+ WITH BLUETOOTH SMS

Using Bluetooth the Brauniger Competino+ flight instrument is available with the option to link to your mobile phone. It can then send your coordinates to another mobile phone via SMS. There is a one-off step to configure the mobile phone with the Competino and after that it works, provided Bluetooth on your phone is enabled. The Competino+ costs around R 10,000.

Advantages: It's easy to use. Even if the pilot forgets to enable Bluetooth on the ground he can do it in the air and the device will send the accumulated data. The Competino recognises a crash. If there is no pilot interaction with the instrument after it has stopped moving it will send an emergency SMS with position.

Disadvantages: Only one person can receive the SMS sent by the instrument. So that person has to be reliable and competent (including making sure they have enough inbox space to receive your SMSes). It only works in a GSM network covered area. If you don't already own such an instrument it is relatively costly to buy one; but of course you would get all the other features associated with the instrument, not only the SMS option.

Comments: If you fly competitions seriously in an area with good reception this may be a good option for you.

NETSTAR BOOMERANG

Netstar Boomerang devices are in essence small GSM modules coupled with a GPS receiver. James Braid has tested this device: "They send their position at a pre-set interval via the GSM network to Netstar's server, which can be viewed via the web. The units are quite small, about the size of three matchboxes stacked together, and have enough battery power to last the whole day – even at a relatively high update rate. The units cost about R 1,200 and a monthly fee of R 30 each is paid for airtime and server access."

Advantages: They work very well if both the pilot and the retrieve driver have reception. When the pilot is high (and can see a tower, even from miles away) and the retrieve driver is near town, then the pilot's position can be determined very easily. They can be Velcro-ed to your cockpit and no further input is necessary, so they are easy to use.

Disadvantages: The person tracking the pilot can only access the data via the web. James uses a backdoor method that allows him to SMS the unit directly, and it responds immediately and directly to him with its position – by-passing the Netstar server. Although this is very convenient, it only works if both the unit and the phone have good reception.

Comments: It is usually very rare that both parties have reception, and so this device cannot be used as a primary tracking device in areas where there is no decent coverage – the Northern Cape for example.

This last point applies to all tracking devices that operate on a GSM network. If coverage is poor the device will not work very well, but where reception is good they are a good option.

2. SATELLITE BASED TRACKERS

COSPAS-SARSAT

Cospas-Sarsat is an international, humanitarian search and rescue system that uses satellites to detect and locate emergency beacons carried by ships, aircraft, or individuals (www.sarsat.noaa.gov). The system consists of a network of satellites, ground stations, mission control centers, and rescue coordination centers. Once the pilot has bought the 250 g unit / beacon for around R 6,500 the service is offered at no cost. With a 406 MHz beacon a distress message can be sent to the appropriate authorities from anywhere on Earth 24 hours a day 365 days a year.

Advantages: The device works everywhere and is light and convenient. The service is offered at no cost to the user. When the distress signal is activated it triggers immediate search and rescue to the position of the beacon.

Disadvantages: It has to be activated manually when there is an emergency, ie when you crash. The unit does not actually provide a track log, it only provides a position once the emergency distress function is activated. This is not terribly helpful to the recovery driver who needs to find a lost pilot, but if you are flying in the Himalayas this might be the device for you.

SPOT

Arguably the most well-known satellite-tracking device Spot does not yet work in South Africa.

3. RADIO-BASED TRACKERS

GPS BASED RADIO TRACKING DEVICE WITH SEPARATE UNIT

The other device that James has tested is a radio-based skytracker unit. He says: "This is a small standalone 5 W transmitter, on the 2 m band (144 MHz) that has a built in GPS receiver. It transmits its position at a preset interval. Electronics connected to a 2 m base station unit in a car then decode the audio packets and spit out a GPS coordinate." The coordinates can be fed into a laptop or GPS to track the pilot. The unit is small and the battery lasts all day, even when transmitting at 30-second intervals.

Advantages: It doesn't depend on the mobile phone network. It has a range of about 30 km that can be extended by using a high gain antenna.

Disadvantages: The frequency it uses – 144.800 Mhz – is in the 2 meter HAM band and, strictly speaking, you need a Ham radio license to operate it. It also typically needs a dedicated receiver on the same frequency to decode the packets. This means the retrieve vehicle needs two receivers – the second one to talk to the pilot.

Comments: The cost of the unit plus electronic decoder is about R 2,000. There are no other costs. This might be a good option for a serious expedition, in an area with inadequate GSM coverage, or where there is a dedicated recovery driver and multiple pilots flying XC in the same vicinity (within 30km of each other).

INTEGRATED RADIO TRACKING DEVICE

The third method James investigated is to combine the above unit with the pilot's 2 m handheld radio. With the GPS connected to an APRS (automatic packet reporting system) encoder when the pilot transmits, the encoder attaches a coded GPS position to the end of the voice transmission. With a suitable decoder on the base station side (or in the retrieve vehicle) the pilot can be tracked.

Advantages: A lot less equipment, and the position comes through every time the pilot transmits. Also, the retrieve vehicle only needs one radio. The cost of the encoder and decoder required for this setup is about R 700.

Disadvantages: The extra power drawn by the pilot's handheld radio will shorten its life, so the pilot must fly with a spare battery. The signal strength of the GPS data depends a lot on distance. If the pilot is far away his voice may still be audible but the encoded data may not be. Expect a maximum range of about 30 km to successfully decode the GPS data with this method. XC

Thanks to Ulf Arndt and James Braid, who both contributed to this article. For more information on tracking devices and how to set them up visit Ulf's website at ***tinyurl.com/yb8mmhc***