Part 2 of 4 Consecutive Instalments

The Global Positioning System, the world's first global utility, has become a proven innovation and a marvel of modern technology. Over a few short years, GPS has changed many of the traditional ways we do things and in a growing number of ways, has changed human kind forever. GPS is now such an integral part of many otherwise 'ordinary' everyday maritime situations, that we are already starting to take this extraordinary satellite-based system for granted. But according to GPS systems analyst Kerry Matthews, the best is yet to come.

GPS
Navigation In The 21st Century

Part Two: Understanding the 'Datum' Business

Reference Datum adopted by the Global Positioning System (GPS) relates to the World Geodetic System 1984 (WGS84) spheroid.

The WGS84 datum is based on the International Earth Rotation Service Terrestrial Reference Frame (ITRF) at a set point in time, and adopted by the International GPS service. Changes / adjustments made to the GPS precise orbit reference frame from time to time would be undetectable by users of standard GPS navigation receivers.

A global datum would be very good if all countries adopted the same for all charts and maps similar to the International Maritime Organisation. Much of the world is slowly moving to a common datum with Australia officially taking this step as of January 1, 2000.

Australia's new official datum is the Geocentric Datum of Australia 1994 (GDA94), which for most practical purposes is basically identical to WGS84 as used by NAVSTAR GPS. Australia's new GPS compatible geocentric (earth centred) datum will be progressively adopted for all positioning requirements.

The "old" Australian datum was based on the Australian National Spheroid (ANS), which relates to a shape of the earth that best fits the Australian region.

Datum's based on the ANS included AGD66, AGD84 (Australian Geodetic Datum, Geographic Coordinates) and the Transverse Mercator (UTM) projections AMG66, AMG84 (Australian Map Grid, Grid coordinates). WGS72 was also previously used for the Australian Antarctic Territory and other external territories lying outside the Australian Map Grid.

This move to a single world compatible datum will be Great Stuff – no more confusion (eventually) but this will be progressive as mapping and other related products are updated and/or revised. Until all coordinate products in Australia are GDA compliant one must be aware of this mixture of datum's and the possible (disastrous) effect it could have on safe navigation.

With approximately 200 metres difference between GDA and AGD, **an important point to remember, if somebody gives you a GPS position you also MUST know the reference datum for the coordinates to be useful.** This is probably one of the biggest dilemmas with many fishing related marks; in some cases no one can guarantee the datum. Two hundred metres might not sound significant in the open ocean but in confined waters, around submerged rocks, reefs etc it could be the difference between a safe passage and disaster.

GPS Fishing Marks: So remember, to find that fishing hot spot location using coordinates & GPS you must know the datum as:

The same physical point on the ground will have different coordinates in AGD and GDA, conversely identical coordinates in AGD and GDA will be a different physical ground point.

WGS84 – World Geodetic System 1984 (GPS Reference datum)

GDA94 – Geocentric Datum of Australia 1994 (Official since Jan 1, 2000)

MGA94 – Map Grid of Australia (GDA UTM Coordinates East / North)

AGD66 – Australian Geodetic Datum 1966

AMG66 – Australian Map Grid 1966 (AGD UTM Coordinates East / North)

AGD84 – Australian Geodetic Datum 1984

AMG84 – Australian Map Grid 1984 (AGD UTM Coordinates East / North)

WGS84 and GDA94 are basically equivalent (WGS84 ~ GDA94)

AGD66 and AGD84 differ by only a few metres

AGD and GDA94/WGS84 differ by approximately 200 metres

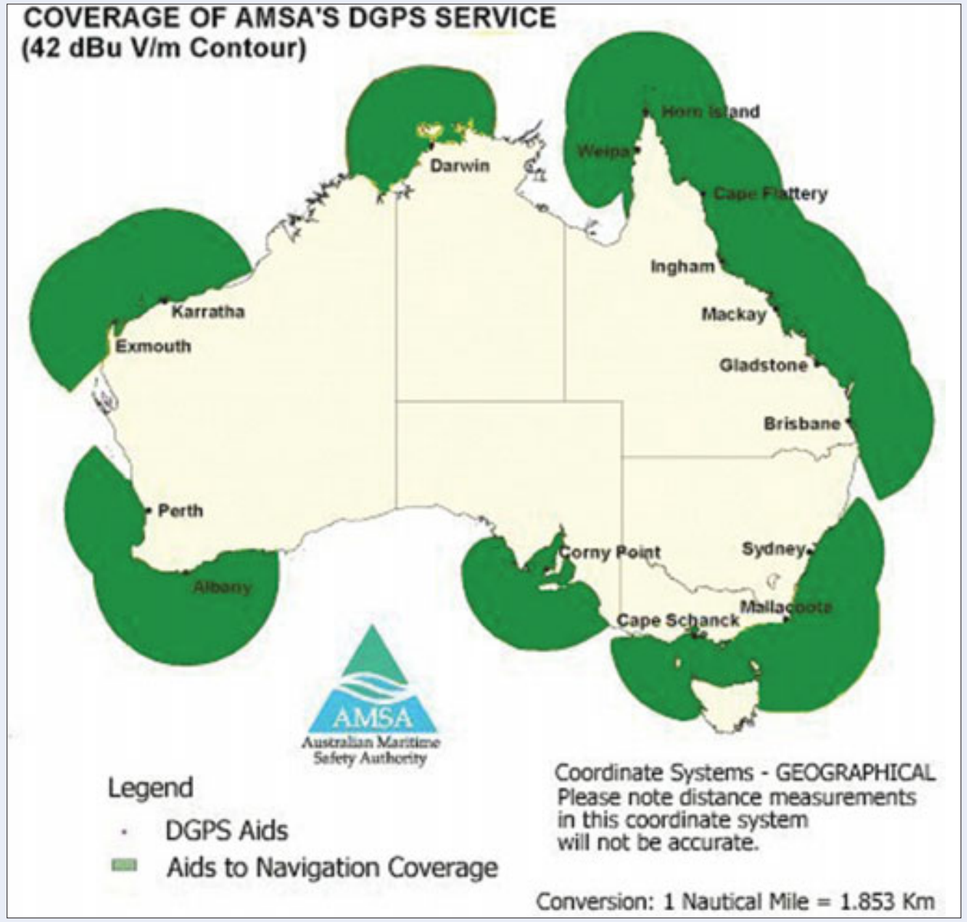
The datum must also be known to convert coordinates from one datum to another, either using the built-in capabilities of most GPS receivers or manually. Not all GPS receivers have the ability to convert stored coordinates when changing the GPS datum configuration. This effectively allows the same coordinates to be used with a different datum and hence will be a different physical point on the ground.

All users should thoroughly understand the operation of their GPS equipment, especially relating to correct Datum use and the issues of incorrect Datum in Australia.

Augmented GPS Methods

These are methods of improving the accuracy and/or integrity of a GPS position by overcoming some of the inherent errors of the system.

Some differential methods of improving accuracy are best left with



Research & Report by Kerry Matthews For F&B**