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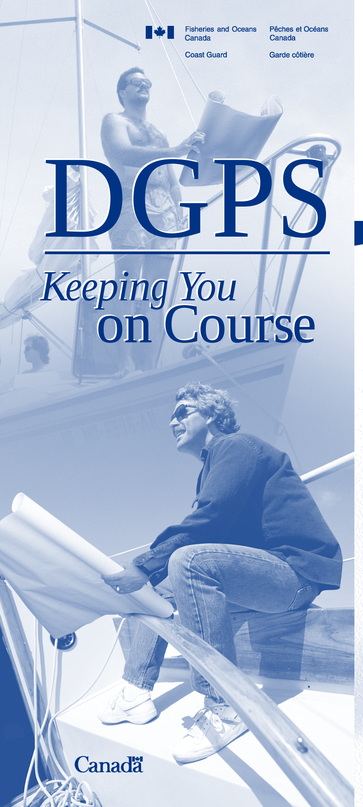
DGPS

Keeping You on Course



Canada

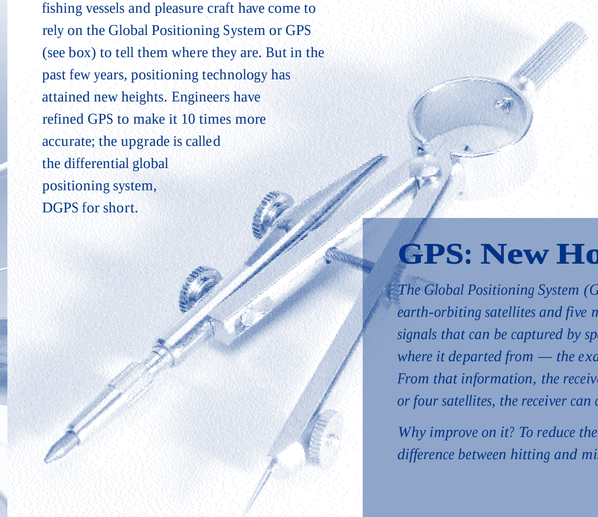
Knowing where you really are

If you've ever tried threading your vessel between shoals in a fog, you'll agree that knowing where you really are can be a big help.

We've come a long way since sailors steered by the stars. More and more navigators of small fishing vessels and pleasure craft have come to rely on the Global Positioning System or GPS (see box) to tell them where they are. But in the past few years, positioning technology has attained new heights. Engineers have refined GPS to make it 10 times more accurate; the upgrade is called the differential global positioning system, DGPS for short.

Reaching new heights

With DGPS, any vessel with the right kind of radio receiver can determine its position to an accuracy of within 10 metres. And that position can be read straight from a monitor.



DGPS: Eliminating Errors

DGPS technology was created to correct the errors that accumulate in a satellite's signal. Some of these errors are caused by the signal's rough passage through the earth's atmosphere. Also, although all satellite orbits are monitored by ground stations that send regular updates to each satellite computer, tiny errors creep into a satellite's calculation of its position between updates, causing an error in the signal. Even more significant is a deliberate error introduced into the signal by the U.S. military. All these errors add up to about 100 metres' worth of uncertainty. DGPS technology reduces that margin of error to just 10 metres, so you can relax and enjoy the ride.

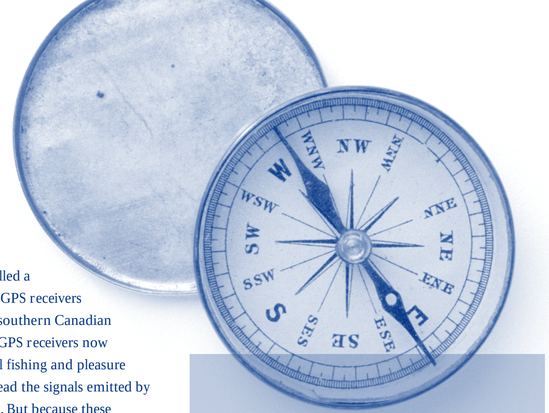
GPS: New Horizons

The Global Positioning System (GPS) is a worldwide radio-navigation system consisting of a network of 24 earth-orbiting satellites and five monitoring stations dotted around the world. The satellites send out radio signals that can be captured by special receivers called GPS receivers. Each satellite's signal tells the receiver where it departed from — the exact point in space — and how long it took the signal to travel to the vessel. From that information, the receiver calculates its distance from the satellite. With distance data from three or four satellites, the receiver can calculate where it is anywhere on the planet to within 100 metres.

Why improve on it? To reduce the guesswork. After all, a 100-metre margin of error could mean the difference between hitting and missing an underwater hazard.

How does DGPS work?

To make DGPS technology available to Canadian boaters, the Canadian Coast Guard has installed a network of stationary GPS receivers at 18 stations serving southern Canadian waters. Similar to the GPS receivers now common aboard small fishing and pleasure craft, these receivers read the signals emitted by orbiting GPS satellites. But because these receivers don't move, the position data they receive from the satellites can be more rigorously tested for accuracy. The receiver computes any error for each satellite and communicates the information to a nearby marine radio beacon. The beacon transmits a special signal containing the correction factor of every satellite in its line of sight. Any vessel equipped with a DGPS receiver and within range of the radio beacon can pick up the signal. The DGPS receiver then uses the correction factors to alter the satellite signal, improving its accuracy.



A DGPS receiver is a special radio receiver that can pick up both a GPS (satellite) signal and the marine radio beacon signal that carries correction factors. The DGPS receiver actually combines the two signals and produces a corrected satellite signal. This blended signal is all that is shown on the DGPS monitor when the receiver is picking up the correction signal.

And the bottom line?

Once you own the receiver, you get the signal for free. There is no subscription cost or user fee. On the down side, compared with GPS technology, DGPS technology has one disadvantage. DGPS receivers cost five to ten times as much as their hand-held GPS counterparts. The good news is that, like personal computers, their price is likely to drop in the years to come.

Want to Learn More?

To obtain a list of Coast Guard reference stations and their transmission ranges, or for more information about the DGPS service, contact your regional Coast Guard Headquarters office.

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