

## Ashtech Precision Products Position You For Success.

Ashtech Precision Products offer accurate, robust GPS modules for precision navigation and OEM solutions.

In today's world, our customers are our partners. To meet the growing demands of our partners, we've designed an extensive offering of positioning solutions that will meet their requirements. Ashtech Precision Products are found in a wide range of applications, such as airborne and offshore navigation, agriculture, mining, construction, transportation, car navigation, fleet management, telematics, mobile communication, surveying, mapping, and even weather prediction — just to name a few.

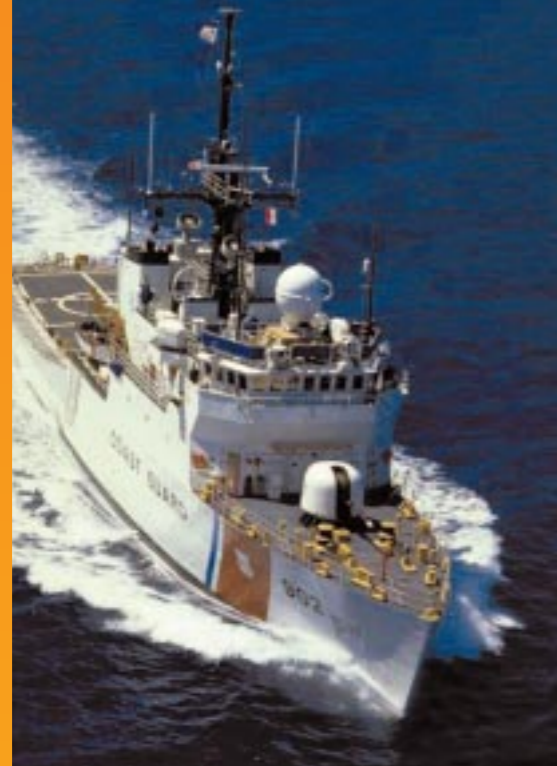
Perhaps, you require autonomous GPS, sub-meter or centimeter-level accuracy or the redundancy of GPS+GLONASS™. Maybe you require the convenience of combined GPS+Beacon™, precise attitude determination, or fast update rates and high-dynamic capability — whatever your needs — we've got you covered.

### Marine

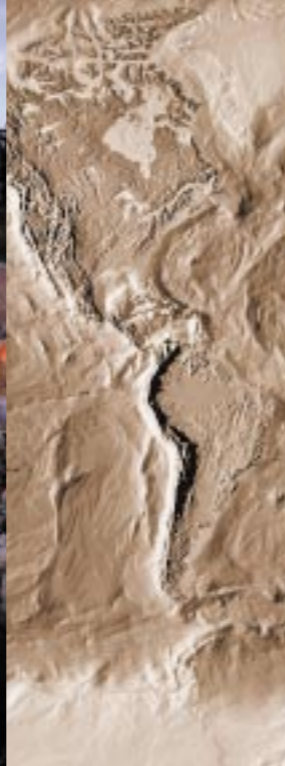
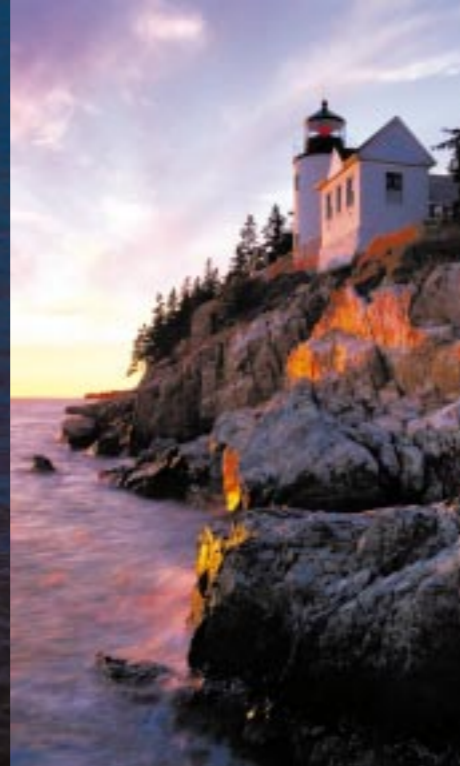
Ashtech Precision Products make the seas safer and increase productivity for mariners who live and work on the water. Because we specialize in precision solutions for navigation, our customer ranks include those that require nothing but the best. That's why you'll find Ashtech inside Coast Guard DGPS reference stations, onboard survey and mining vessels, on oil rigs, dredging platforms, ferries, oil tankers, cargo ships, and most every other type of vessel that requires accurate, reliable positioning or attitude determination.

For example, the Ashtech Attitude Determination Unit (ADU2) offers precise determination of roll and pitch, as well as heading from true north. It's like having a gyro compass, pitch and roll indicators and DGPS in one instrument. By recording the roll and pitch of vessels during offshore voyages, shipping companies have accurate records of the vessel's movement across the oceans.

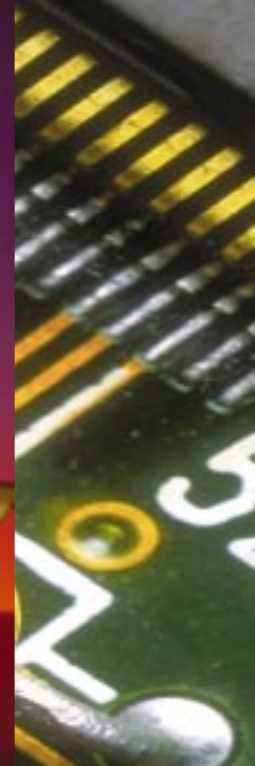
**Ashtech Precision Products provide professional mariners with the most advanced satellite navigation receivers available to improve safety while maximizing productivity.**



Seatex integrates Ashtech GPS for high-performance navigation and Vessel Reference Systems



Universal Avionics® – another leader chooses Ashtech for aviation safety



Integrating GPS for precision mining applications



Seatex is another leading navigation system supplier that chose to put Ashtech technology inside their products. Seatex is an international maritime electronics manufacturer with over a decade of experience in the offshore and maritime industry. Seatex has included our precision GPS and GPS+GLONASS modules in a number of their products for vessel and position reference systems. For example, Seapos 100 E is a high

performance navigation sensor for cruise ships and high-speed ferries utilizing the advanced tracking capability of the Ashtech G12. Why did Seatex choose Ashtech Precision Products? Simple. Seatex is committed to quality products and solutions for their customers. Arne Rinnan of Seatex comments, "We continuously choose Ashtech for our products — their excellent performance, support and product range in both L1/L2 and GPS/GLONASS receivers always works well to our common advantage."

Universal Avionics manufactures a line of advanced flight management systems that provide sophisticated lateral and vertical guidance from takeoff to touchdown. Their industry-leading UNS-1 is found on corporate, commercial and paramilitary aircraft worldwide. By utilizing the Ashtech GPS modules, Universal Avionics' flight management systems became the first in the industry to provide pilots with GPS non-precision approach capability. Their latest-generation systems provide combined GPS+GLONASS benefits. And, their

airborne GPS Landing System will integrate differential corrections, adding future precision approach capability. "Magellan works with us to achieve solutions. The teaming efforts with them enable us to develop new capabilities and proceed to certification in record time. This excellent working relationship continues to grow as we work together to provide advanced GPS-equipped airborne systems which further enhance the safety of flight." – Charles H. Edmondson, Executive Vice President, Universal Avionics.



### Mining & Machine Control

Ashtech Precision Products can help your equipment operate more efficiently with accurate, expert guidance. We specialize in leading satellite positioning technology, which is revolutionizing mining productivity. What does this mean to you? It means the highest gains in surveying productivity, centimeter-level control of your equipment onsite, and the ability to pinpoint where each piece of your expensive machinery is at any given time.

Ashtech Precision Products offer a full range of OEM GPS receivers for every mining application: from low cost meter-level GPS for dispatch systems to centimeter-level dual-frequency GPS for accurate machine control and guidance. At the core of all this productivity is our patented real-time Z-Tracking™ technology. Z-tracking allows companies to precisely position their machinery with centimeter accuracy, on the move.

**Ashtech Precision Products make every step of the mining process easier and more profitable.**

Tritronics is a world leader in the design, development and installation of mine machine monitoring and information systems. When they decided to pioneer the next frontier in earthmoving controls with GPS, they chose Ashtech. They integrated the Z-Eurocard™ GPS OEM board in their DrillNav Plus™, a precise, easy to use blast hole drill navigation system with RTK

solutions. Tritronics has also integrated the G12™ into their real-time Fleet Monitoring System (FMS) for monitoring vital mining operations. The G12™ provides a quick accurate position, so you know the location and speed of your equipment at all times. Why Ashtech? Simply because we provided the right price/performance ratio and were flexible in meeting their unique requirements.

## Technology Guide

Now that we've shown you what people are doing with Ashtech technology, we'd like to explain what makes our technology and performance better.

**Z-Tracking** Our patented Z-Tracking observes P-code regardless of encryption. This patented technology gives users the highest possible accuracy — centimeter in real-time — and maintains a resistance to interference such as atmospheric effects like sunspot activity that can cause loss of satellite lock. Z-Tracking is what makes our precision equipment the GPS receivers of choice for surveying and high-accuracy navigation.

**20G/20 Hz Tracking** High-dynamic and missile applications require that our receivers have 20G tracking and 20 Hz processing to keep up with and mark vehicle movement — which is frequently moving in un-predictable directions. The G12-HDMA offers 20G tracking for these types of applications.

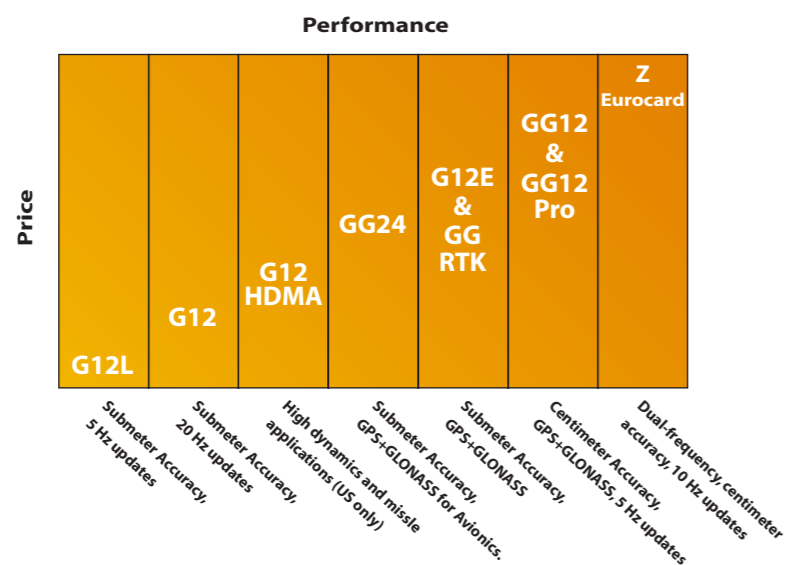
**GPS+GLONASS** By combining GPS and GLONASS, we have enhanced the GPS system in three important ways: availability, integrity and accuracy. The combined GPS+GLONASS constellation means greater probability of computing a position, even in difficult environments such as open pit mines.

**GPS+Beacon** Combined GPS and Coast Guard DGPS beacon integrated in a single, easy-to-use product provides accurate DGPS positioning and navigation. This powerful combination gives you DGPS performance without the need to set up a DGPS reference station.

**Strobe Correlator™ Multipath** is the unfortunate effect of global positioning satellite signals reflecting off nearby objects. With Strobe Correlation activated, multipath interference is avoided to prevent errors that can be as large as 10 meters or more.



This chart provides a general overview of price/performance considerations when choosing GPS engines. This brochure covers a sampling of user applications, the best receiver for the job, and accuracy requirements. Below is a matrix that compares the specifications for each receiver, and a technology guide to help you choose the best GPS receiver for your requirements.



|   | G12                | GG12                 | GG12Pro                          | GG24                            | G12E/<br>GG-RTK                             | Z-Eurocard                       | ADU2               |
|---|--------------------|----------------------|----------------------------------|---------------------------------|---|----------------------------------|--------------------|
| <b>Autonomous Accuracy (CEP)</b>            | 3m                 | 3.3m                 | 3.3m                             | 3.2m                            | 3.2m  | 3m                               | 5.0m               |
| <b>Real-time DGPS Accuracy (CEP)</b>        | 40cm               | 40cm                 | 40cm                             | 40cm                            | 10cm  | 1cm                              | 1m                 |
| <b>Post-processed DGPS Accuracy (2drms)</b> | 0.5cm+1ppm         | 0.5cm+1ppm           | 0.5cm+1ppm                       | 0.5cm+1ppm                      | 0.5cm+1ppm                                  | 0.5cm+1ppm                       | 0.5cm+1ppm         |
| <b>Channels</b>                             | 12                 | 12                   | 12                               | 24 (12 GPS<br>12 GLONASS)       | 24 (12 GPS<br>12 GLONASS)                   | 12 L1 (C/A)<br>12 L1 & 12 L2 (P) | 48                 |
| <b>Sustained Acceleration</b>               | 20G                | 10G                  | 10G                              | 10G                             | 10G   | 10G                              | 2G                 |
| <b>Time to First Fix (avg. sec)</b>         | 45 cold<br>35 warm | 90 cold<br>45 warm   | 90 cold<br>45 warm               | 40 cold<br>30 warm              | 40 cold<br>30 warm                          | 90 cold<br>35 warm               | 90 cold<br>60 warm |
| <b>Position Update Rate</b>                 | Up to 20 Hz        | Up to 5 Hz           | Up to 5 Hz                       | Up to 5 Hz                      | Up to 5 Hz                                  | Up to 10 Hz                      | 2Hz                |
| <b>Attitude Determination</b>               | No                 | No                   | No                               | No                              | No  | No                               | Yes                |
| <b>Power Consumption</b>                    | 1.8 watts          | 3.0 watts            | 5.1 watts                        | 2.5 watts                       | 2.5 watts                                   | 7.5 watts                        | 14 watts           |
| <b>Dimensions</b>                           | 10.8 x 5.7cm       | 10.84 x 8.25cm       | 19.68 x 11.68cm                  | 10 x 16.7cm                     | 9.9 x 17.27cm                               | 16 x 16cm                        | 21 x 9 x 19cm      |
| <b>Weight</b>                               | 2.8 oz             | 3.8 oz               | 3.8 oz                           | 8 oz                            | 8 oz  | 8.0 oz                           | 5 lbs              |
| <b>Operating Temp</b>                       | -30 to +70°C       | -30 to +70°C         | -30 to +70°C                     | -30 to +70°C                    | -30 to +70°C                                | -35 to +55°C                     | -20 to +55°C       |
| <b>RTCM SC-104</b>                          | Input/Output       | RTCA Input           | RTCA Input                       | Input/Output                    | Input/Output                                | Input/Output                     | Input              |
| <b>RTCM Input Message Types</b>             | 1, 2, 3, 6, 9, 16  | RTCA SC159<br>Type 1 | RTCA SC159<br>Type 1             | 1, 2, 3, 6, 9, 16<br>31, 32, 34 | 1, 2, 3, 6, 9, 16, 18<br>19, 22, 31, 32, 34 | 1, 2, 3, 6, 9<br>16, 18, 19      | 1, 2, 3, 6, 9, 16  |
| <b>RTCM Output Message Types</b>            | 1, 2, 3, 6, 9, 16  | N/A                  | N/A                              | 1, 2, 3, 6, 9, 16<br>31, 32, 34 | 1, 2, 3, 6, 9, 16, 18<br>19, 22, 31, 32, 34 | 1, 2, 3, 6, 9<br>16, 18, 19, 22  | N/A                |
| <b>NMEA 0183 Output</b>                     | Yes                | Yes                  | Yes                              | Yes                             | Yes   | Yes                              | Yes                |
| <b>Communication Ports</b>                  | 2 RS232 I/O        | 2 RS232 I/O          | 2 RS232 I/O<br>+ 2 ARINC 429 I/O | 3 RS232 I/O                     | 3 RS232 I/O                                 | 4 RS232 I/O                      | N/A                |
| <b>Event Marker</b>                         | Yes                | No                   | No                               | Yes                             | Yes   | Yes                              | Yes                |
| <b>1PPS Output</b>                          | Yes                | Yes                  | Yes                              | Yes                             | Yes   | Yes                              | Yes                |
| <b>GPS+GLONASS</b>                          | No                 | Yes                  | Yes                              | Yes                             | Yes   | No                               | No                 |
| <b>Real-time Kinematic</b>                  | No                 | No                   | No                               | No                              | Yes   | Yes                              | No                 |
| <b>Z-tracking</b>                           | No                 | No                   | No                               | No                              | No  | Yes                              | No                 |



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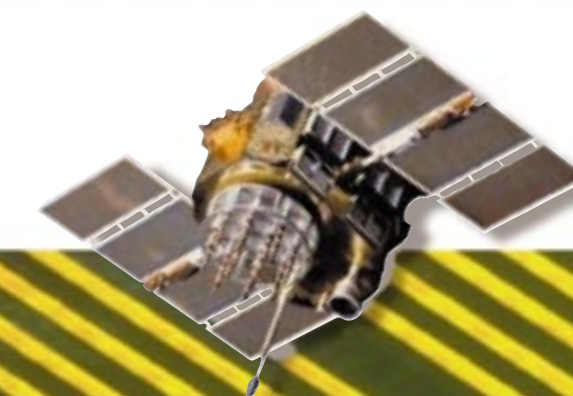
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