GD300 Rugged Wearable Computer

Lightweight • Rugged • Open • High Performance

The Problem
The information and personal technology revolution of the past decade has vast potential for application on the battlefield where mission effectiveness depends on reliable dispensing and reception of information as well as local processing. Wearable computing and communication technology can provide crucial real-time awareness, decision support, and tactical intelligence in the harshest environments.

Up to now, the effectiveness and successful application of wearable computer technology for dismounted applications has been limited by equipment size, weight and reliability. While wearable computing systems have been available, they were too heavy and bulky for useful battlefield deployment. They also suffered from insufficient battery life, limited connectivity, limited expansion potential, and a cumbersome user interface.

The Solution
General Dynamics Itronix has addressed all of these limitations with the GD300, a small wearable computer that combines rugged computing, GPS and data communication into one device specifically designed to provide access to tactical networks and enhance situational awareness. Using emerging open-system technology, the revolutionary GD300 was designed to easily accommodate current and future applications for warfighters at all command levels.

Thinking outside the box, in designing the GD300, General Dynamics Itronix examined the challenges and problems faced by dismounted users and then built a solution around it. The result is a fully rugged, lightweight 8-ounce computer that runs the open-system Android operating system platform on a hardware architecture similar to that of a modern smartphone. The GD300 delivers information anywhere. Ultra-sensitive GPS reception provides a strong, reliable signal where it's needed most. The device is fully ruggedized for the harshest environments. It's radio-agnostic for use with most military and commercial radios. And it's cost-effective and adaptable to user needs.
The General Dynamics Itronix GD300

In essence, with the GD300, General Dynamics Itronix makes available the user-oriented advanced technology of today's smartphones in a rugged, military and industrial version. This technology was designed from the ground up for portability, usability and meeting the demands of users on the go. It is NOT down-sized desktop and notebook computing technology.

Bright High-Resolution Touch Display
To that effect, the GD300 offers a display that is large enough for comfortable viewing, easily readable even in bright sunshine per MIL-STD-3009 as tested per MIL-L-85762A, and crisp and sharp enough to display all the detail of modern tactical and mapping software. The GD300’s wide-format 800 x 480 pixel resolution exceeds that of most commercial smartphones, but unlike consumer products, its resistive 4-wire touch-screen can even be operated with gloves.

Small Size, Low Weight
In the past, the weight of wearable computing systems was measured in pounds whereas the GD300 weighs just ounces. Yet, this 8-ounce 5.8 x 2.6 x 0.7 inch device is fully rugged, designed for forearm or chest-mount use via special mounting kits, and facilitates proper air circulation even in the most extreme conditions.

All-Day Battery
While in the past battery life of wearable systems has been a serious limitation in the field, the GD300 offers all-day operation. Its powerful battery is good for over eight hours of continuous use.

Superior GPS Performance Via SIRFstarIV and Quadra-Helix Antenna
GPS has evolved into a crucial technology used in numerous innovative applications around the globe. However, even advanced commercial GPS often does not achieve the precision and sensitivity required on the battlefield and in other mission-critical applications. The GD300’s high-gain Quadra-Helix antenna combines with fully integrated SIRFstarIV technology to provide superior ultra-sensitive GPS.

Android OS Platform: Open System, Obsolescence-Proof
On the software side, an open software architecture with readily available development tools is as important as a small OS and memory footprint in a powerful, flexible package. The GD300 utilizes the latest advances in Android open system architecture to leverage both military and commercial applications. Many custom software packages are available, and a vibrant Android developer community represents a formidable open systems software resource.
Opening A New Era In Battlefield Communication

COTS Components: Superior Performance, Low Cost
The use of COTS components and strict adherence to industry standards make the GD300 both inexpensive and easily expandable. Its ARM Cortex A8 OMAP processor made by Texas Instruments provides excellent processing and graphics performance while 256MB of DDR RAM and 8GB of flash memory, both soldered-on-board, provide ample and reliable storage. The GD300 also supports solid state drives up to 32GB via a microSD card slot. And instead of fragile consumer market plugs, the GD300 uses a robust docking connector to interface both with military and commercial radios.

Connectivity Unleashed: Radio Interface Kits
To make the use of PRR radios as simple as possible, General Dynamics supplies optional Radio Interface Kits (RIKs) with adjustable length quick-connect cabling systems that can be customized for use with any radio. The RIK includes hardware volume and preselect controls for rapid, reliable operation in the field. It supports the US military’s Joint Tactical Radio System (JTRS) architecture for data communication and network access, offering a secure, jam-resistant communications network used for almost real-time tactical information. Should an additional interface be required, they can be supplied by alternate RIKs without changing the device itself and potentially compromising ruggedness.

Rugged Enough To Go Anywhere
When using equipment in the field, ruggedness and the ability to operate and survive under the harshest possible conditions is key. That’s why the GD300 is military-rugged by design. The GD300 can handle operating temperatures between -30 and 60 degrees Centigrade, storage temperatures between -55 and 70 degrees Centigrade, and it reliably operates in unpressurized altitudes up to 32,000 feet.

The device is sealed to IP54 ingress protection standards, making it near impervious to dust, and able to survive 30 gallons of water blown at it at 40 mph for four hours from all directions. The GD300 can also handle the kind of shock and vibration experienced in the field. It has been tested for extreme vehicle and helicopter vibration, and can survive multiple drops from four feet onto all of its surfaces, edges and corners.

The device was further designed to resist salt fog, allow operation in extreme humidity, and provide compliance with IEC 61000-4-2 requirement for ESD as well as EMI immunity. All testing was conducted in conformance with the methods mandated in MIL-STD-810G.

THE IMPORTANCE OF GPS
The capability of quickly acquiring and then reliably maintaining satellite GPS signals is crucial in the field. The integrated GPS module used in the GD300 combines high-end GPS functionality with very low power consumption. The GD300 provides parallel tracking of 20 channels, 200,000+ correlators, -159 dBm tracking sensitivity, hot-start first fix times of as quick as less than a second, obscuration recovery of a tenth of a second, and cold start TFFF of under 35 seconds.

The design and quality of the GPS antenna of a device is of paramount importance to overall sensitivity of GPS. The quadripart helix antenna used in the GD300 employs four wires wound in a helix for an extraordinarily wide beam of over 120 degrees compared to only about 60 degrees for rectangular microstrip “patch” antennas that provide good overhead reception but poor horizon reception, or dipole antennas that work well at the horizon but not overhead. This means that with the GD300 more satellites can be received simultaneously, and that reception is not only good for overhead satellites, but also those on the horizon.
**Tactical xround Reporting** is a web-based multimedia reporting system that allows soldiers to collect and share information to improve situational awareness and to facilitate collaboration and information analysis. Initially sponsored by DARPA, TIGR is part of General Dynamics C4 Systems. TIGR has an intuitive graphical and map-referenced user interface and combines GPS tracks, digital images, and voice recordings to enhance local knowledge on terrain, landmarks, key infrastructure and other relevant data; track dynamic data (such as before/after imaging, new obstacles, etc.); and assist the unit rotation process by allowing quick review of past and ongoing activities in a theater.

Already used by more than 50,000 soldiers, TIGR is focused to provide lowest-level information to patrolling soldiers who can use it to share practical and life-saving intelligence. With simplicity reminiscent of Google Maps and Facebook, TIGR is a perfect soldier’s tool, and it is perfectly suited for the GD300 with its high-resolution touch screen.

**Application Example: AN/PRC-154 Rifleman Radio**

AN/PRC-154 “Rifleman” Radio is an example of a JTRS (Joint Tactical Radio System) Soldier Radio Waveform product. The NSA Type 2 Rifleman is a small single-channel handheld radio that uses JTRS standard mesh networks to provide connectivity in locations that are hard to reach. Though primarily meant for voice communication, the AN/PRC-154 can support data transmission and connect to the GD300 via Radio Interface Kit.

**General Dynamics GD300 — Key Benefits:**

- Lightweight wearable computer that provides real-time situational awareness.
- Offers ultra-sensitive GPS for signal acquisition where it is needed most.
- Designed from the ground up and inside out for use in the harshest environments.
- Simple cable connection for reliable compatibility with tactical and commercial radios.
- Provides state-of-the-art COTS technology and performance.

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**General Dynamics Itronix**

**Field Computing Concepts**

**Break-Away Cabling**

In the field, rapid connectivity is everything. There is no time for fumbling around or trying to get things to work. That applies to wireless as well as wired connectivity. While personal wireless networks such as Bluetooth have largely replaced wiring between phones and headsets, wires often remain a more feasible and more reliable solution to connect wearable computers with radios and other peripherals on dismounted operators.

The problem with conventional cabling is that it can get in the way, rely on bulky or fragile connectors, result in tripping or injuries, and simply isn’t designed for military interconnect applications that require high reliability as well as rugged environment performance.

General Dynamics’ solution for the GD300 is a simple 3-piece break-away cabling system specially designed for performance and safety-critical military deployment where absolute reliability, ease of handling, and reduced size and weight matter. Cabling consists of one part that quickly snaps onto the bottom of the GD300 wearable computer, a 15 or 30-inch extension, and a destination cable that supports both USB and the EIA-232 serial connection standards.

The breakaway connection is facilitated by Glencore push-pull “Mighty Mouse” Series 804 quick-disconnect plugs that offer rugged design and proper environmental sealing in a lightweight push-pull package that allows breakaway connections, yet meets immersion requirements and offers superior reliability and durability.

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**For more information:**

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