

GPM 300 ACOUSTIC MODEM

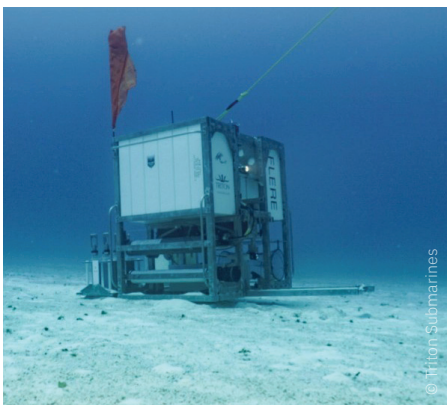
A long-range subsea communications system with unprecedented reliability in a compact, power-efficient package.

RECORD-BREAKING TECHNOLOGY

The GPM 300 acoustic modem can be used for reliably sending and receiving data and/or voice through water for communications, monitoring and remote command & control in harsh, multi path, reverberating and noisy hydro acoustic environments where other modems fail.

The leading performance of the GPM 300 is well proven. They are fitted to Triton's Hadal Exploration System – the world's first manned submersible commercially certified for repeatable exploration to the deepest point in the ocean.

In 2019, the Hadal system was used for the 'Five Deeps Expedition', an around-the-world journey to dive to the deepest point in each of the world's five oceans, and broke the world record for the deepest ever dive at 10,927m in the Marianas Trench. The modems were also used in James Cameron's Deepsea Challenge Expedition in 2012, again, providing communications and enabling a record-breaking 'tweet' from the deepest point of the ocean.



MINIMAL INTERFERENCE

The modem uses third-generation MASQ multichannel direct sequence spread spectrum (DSSS) technology for high reliability communications, robust against multipath inter symbol interference.

To compensate for channel fading and multipath interference, the GPM 300 offers continuous channel equalisation.

Communication between platforms moving at speed is supported with doppler tolerance +/-15 knots and continuous doppler correction.

The network-enabled GPM 300 is compatible with L3Harris ELAC UT 3000 underwater telephone and voice communication compliant with NATO STANAG 1074.

COMMUNICATIONS AT THE DEPTHS OF THE OCEAN

The landers of Triton's Hadal Exploration System, as used in the Five Deeps Expedition, providing communications from the deepest points of the world's five oceans.



ACTIONABLE
INTELLIGENCE

KEY FEATURES

- > **Third-generation MASQ multichannel direct sequence spread spectrum**
- > **Advanced forward error correction with error rates less than 1×10^{-4}**
- > **Supports remote configuration settings**
- > **Ultra-reliable data rates up to 1000 baud**
- > **Voice communications* up to 25 km**
- > **Digital communication up to 45 km†**
- > **Low probability of intercept**

* Voice requires optional GPM 300 voice interface units.

† Assumes best case sea conditions. Actual range obtained depends on deployment characteristics, environmental noise and sea conditions.

TECHNICAL SPECIFICATIONS

Dimensions

GPM 300 modem with head guard:	557 mm L x 158 mm W
GPM 300 modem without head guard:	492.3 mm L x 132 mm W
Transducer assembly only with head guard:	197.6 mm L x 158 mm W

Digital Data

Encoding	MASQ digital data (multi channel DSSS) acoustic communications configurable binary/ASCII terminal mode data transfer. NMEA command mode.
Power	TD10 omni-directional transducer gives 160-190.5 dB re 1uPA @ 1 m Baud rate Up to 1000 (raw rate, allow 20% for error correction and protocol overhead)
Doppler	+/- 15 knots standard
Maximum Range	Reliable operating ranges of up to 10 nautical miles (nm) are routinely achieved between moving platforms in noise conditions equivalent to sea state 3 (Beaufort wind scale 4). Theoretical maximum range under good conditions (calm and deep) at 10 baud is 45 km (27 nm), 100 baud is 25 km (15 nm) and 1000 baud is 5 km (3 nm).
Minimum SNR	Up to -9 dB
Bandwidth	Configurable with signaling Low: 6.3 kHz – 12.7 kHz Maximum (full transducer bandwidth): 6.5 kHz to 16.5 kHz

Voice

Encoding	STANAG 1074 compliant with configurable power, carrier, bandwidth and side bands
Power	TD10 Omni-directional transducer gives 160-192 dB re 1uPA @ 1 m
Maximum Range	Theoretical maximum range under good conditions (calm and deep) is 25 km. Actual range obtained will depend on deployment and environmental conditions.

Interfaces

Construction	Aluminum/eralyte barrel with butyl rubber pressure balanced transducer housing
Diameter	Transducer is 160 mm (6.3 in), barrel is 100 mm (3.9 in)
Length	Standard barrel is 350 mm (13.8 in), overall GPM 300 length 565 mm (22.2 in). Custom lengths from 250 mm (10 in)
Operating Temp	0 to 50 degrees celsius (32 to 122 degrees fahrenheit)
Operating Depth	1000 m
Weight 1000 m rated aluminum (350 mm barrel)	350 mm barrel (13.7 in) 100 mm (3.5 in) diameter 7 kg (15.4 lbs) in air, 3 kg (6.6 lbs) in water

Power and Interface

Voltage	13.8-48 VDC (48 V required for maximum power transmissions)
Transmit Power	Depends on power setting, maximum 300 W electrical
Receive Mode Power	1.8 W standby
Sleep Power	Less than 0.08 W sleep mode with receive telemetry alert. Schedule deep sleep mode (5mW) for long term deployments
Interface	NMEA-0183 compliant ASCII over RS232 at 1200 to 115,200 baud (factory RS422/485 configuration)

OPTIONS

- > GPM 300 voice interface units, microphone and headset
- > GPM 300 housing options:
 - Electronic stack and separate transducer assembly with surface mount transducer adapter for integration
 - 5000m aluminum—12 kg (26.4 lbs) in air, 7 kg (15.4 lbs) in water
 - 12000m titanium—18 kg (39.7 lbs) in air, 13 kg (28.6 lbs) in water
- > Transducer and connector protective cage assembly
- > Integrated pressure and temperature sensor
- > L3Harris high-precision timing reference (HPTR) unit (HPTR) for precision time stamping and one way time-of-flight. 1 ms accuracy with better than 1 ns/s (0.5 ppb) stability
- > Enhanced network access communication layer for relaying messages (extends communication range beyond 25-45 km and allows communication around obstructions)
- > Transponder mode or range pulse distance measurement
- > Private communication channel/ message encoding
- > Factory configurable doppler to +/- 80 knots (increases power consumption)
- > Customised options for longer communication ranges:
 - High power 2 kW 194 dB uPa ceramic (uses standard power amplifier)
- > Customised battery pack options available:
 - 200 Wh rechargeable
 - 500 Wh alkaline battery
- > Customised I/O interface protocol, sensor interface and command and control for specific user applications

GPM 300 Acoustic Modem

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L3Harris reserves the right to amend specifications in the light of continuing development.

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