



Spearfish

Specifications

August 2015

The *Spearfish* is DMT's long-range waterside security and marine radar system. It may be used to search and track threats coastal regions, oil platforms, and from sea going vessels.

This radar is an X-Band, pulsed-Doppler system that operates in all types of weather and in all types of environments.

Solid-state power amplifiers, RF components, and power supplies, as well as onboard wide-temperature processors, brushless motors with dual direct drive system, Peltier temperature stabilization system, and the protection of a Nomex radome results in a maintenance-free, high-performance radar.

Spearfish = long-range security.

THE BACKGROUND IMAGE IS DMT'S *SPEARFISH* BEING INSTALLED ON AN OIL PLATFORMS FOR LONG RANGE TRACKING OF VESSELS

Picture taken in 2015



Description

The *Spearfish* is the longest range maritime radar produced by DMT. The system can be ordered in a variety of configurations to perfectly fit many applications and missions, such as:

- Coastal Security
- Oil Platform Security
- Port Security
- And more.


The radar is a Pulsed Doppler system, which enables a variety of algorithms to remove unwanted returns (clutter) from generating alarms, such as: moving water, waterside vegetation, blowing trash and debris. Transmitting at 9.25 GHz (X-Band) permits the radar to see through most weather. And the Nomex radome seals the radar from sand and moisture, while special coatings on the radome protect it from oil, gas, solvents, UV, saltwater and other hazardous chemicals. Onboard CPU's support detection and tracking, which reduces communication bandwidth to the command stations.

The radar comes in a variety of solid-state transmit power options (100W, 300W-default, and even 1000W), antenna configurations, and mounting options. Unlike magnetrons used in most shipboard radars, the *Spearfish* uses solid-state power. Magnetrons must be changed out every few months when running the radar 24/7, and begin to degrade in weeks. Solid-state modules last for many years without degradation. The antenna comes standard with horizontal polarization. But vertical polarization is known to pick up oil spills and cross (dual) polarization is known to work better in really sheeting weather. Both vertical and dual polarizations are optional. And there are plenty of options for installing the radar on vessels or towers.

The *Spearfish* radar is usually purchased with an outdoor enclosure that supplies conditioned DC power to the radar and includes weatherproof RJ/45, multimode, or single mode fiber ports. Cameras can also be powered from this device, which is referred to as the UCM (Universal Communication Module). Other add-ons are available.

Spearfish Specifications

Transmitted Frequency:	X-Band, 9.25 GHz
Radar Type	Pulsed Doppler
Peak Radiated Power:	Models (Select on order): 100 Watts (Lowest Cost Option) 300 Watts (Default) 1,000 Watts (Longest Range Option) NOTE: All amps are gated solid-state GaN amplifiers
Antenna Beamwidth:	Azimuth beamwidth 2 degrees Elevation beamwidth 5 degrees
Polarization:	Select on order: <ul style="list-style-type: none"> • Horizontal Polarization (default) • Vertical Polarization (select from GUI) • Horizontal or Vertical Polarization and Cross Polarization (select from GUI)
Pulsewidth:	<50ns to > 500 nanoseconds (select from GUI)
PRF Rate:	3.5, 5, 7, 14 kHz (select from GUI; others available on request) Also available with 4, 8, 12 and 16 kHz.
Scanning:	<ul style="list-style-type: none"> • Continuous 360 degrees rotation (default mode), or • Sector Scanning (scanning between two angles of 1 to 360 degrees)
Range Gates:	1.5, 3, 6, or 12 meters (select from GUI)
Range Accuracy:	<< 10 meters
Maximum Range:	98 km (practical range limit is 24 km when spinning 360)
Doppler Resolution:	Nominal setting for most installations: < 3 cm/s
Radar Positioner:	<ul style="list-style-type: none"> • Direct drive, high-torque motors for scanning in azimuth and tilting in elevation. • Accuracy is better than 0.01 degrees. • Maximum rotation speed: 300 degrees per second • Variable Speed Motors, with two modes of operation: <ul style="list-style-type: none"> ○ Select from 1 to 300 degrees per second from GUI ○ Select Autoscan, which sets the best motor speed dynamically based probability of detection and range for any given look direction
Minimum Doppler Detectable	0 m/s
Maximum Doppler Detectable:	Based on PRF selected from GUI Example: 7 kHz yields +/-127 mph (+/-204 km/h)
Doppler Measurement Accuracy:	Dependent on settings for PRF and number of pulses integrated. Typically it is to within 0.25 mph (0.4 km/hr). Higher accuracy maybe set through the GUI.
Pulse Integration:	Coherent pulse integration of 64, 128, 256, 512, or 1024 pulses.
Communications:	Two Options: <ol style="list-style-type: none"> 1. Twist-on Weatherproof Rugged Port for Umbilical cable with integrated power and communications, or 2. Twist-on Weatherproof Rugged Ports for power (48 VDC) and network. Use #1 when purchasing the DMT Universal Communication Module (UCM)
Operating Temperature:	-40 to +65 degrees C
Operating Wind Speeds:	In excess of 300 kph sustained
Power Requirements:	<ul style="list-style-type: none"> • 110 and 220 VAC 50, 60 Hz (autosensing) when using DMT' UCM. Otherwise, 48 VDC.
Size:	61 inches in diameter 34 inches in height
Weight:	About 225 lbs
Modes of Operation:	<ul style="list-style-type: none"> • Autonomous (continuous 360 degrees or between start and stop angles) • Search zones (defined by drawing on coverage area on a map using a mouse)

	<ul style="list-style-type: none"> Point-to-Click (point on map to point radar)
Tracking	Multiple track algorithms selectable from GUI
Internal Radar Operating System:	Windows 7 Embedded
User Interface Software:	<ul style="list-style-type: none"> Opens as a Windows standard software interface (Windows XP, 7, 8, 8.1, 32-bit or 64-bit) Map, drawing or aerial image/photo overlay of data May also be monitored from a browser on laptops, tablets and smartphones
Mission Option Buttons	Customer can construct any number of missions, which may be assigned to mission option buttons. When selected by the operator, the missions automatically sets radar parameters, search areas, motor speeds and tracker settings.
Compliance:	<ul style="list-style-type: none"> DMT Remote Client TACCS Priority 5 Mariner CommandBridge Boeing VSOC Harris C4ISR ICD-0100, ICD-0101 NMEA 0183 DMT Open Format REST web service
Data Recording:	Available recording: <ul style="list-style-type: none"> Raw I, Q Data (on radar only) Post Processed Data (can be saved to any available network location)
Alarm logs:	Date, time, position, bearing, range, strength, speed, track maturity
Doppler Signatures:	Radar should be capable of generating the full Doppler Signature of detected objects in real time.
Scheduling:	Event scheduler, which includes weeks, weekends, daily, start/stop time, sweep patterns, blanking zones, radar setup. This should be part of the software interface.
Brackets:	A pedestal mount is included. Other mounts are available, such as Schedule 80, 8-inch pipe mount, Rohn 45G, or 65G tower brackets.
Radomes:	Material: NOMEX. Coatings: Coatings to protect against wind, oil, gas, solvents and abrasion Colors: White (default), Sand, Gray, Green. Sheen: Gloss (default) or Satin sheen Camera Mounts: radome has a threaded hole pattern on top for mounting cameras. Additional mounts available for heavier, long-range cameras.
Connectors:	Twist-on style connectors that feed power and all signals (including network).
MTBF:	Designed to be years of operation at 24 hours/day, 7 days a week. MTBF: >=2 years.
IP Rating	IP66
Required Maintenance:	No required maintenance for 2 years with the exception of periodic radome cleaning and inspection.
Other Standard Items	<ul style="list-style-type: none"> Digital Compass for monitoring bearing, tilt and roll GPS for monitoring position on earth and altitude BITE/BIT for motors, RF transceiver, communication, and electronics
External Enclosures	<p>Best if used with DMT's IP66 Universal Communication Module (UCM), which includes:</p> <ul style="list-style-type: none"> AC/DC power supplies 4-port video server, multi-port Ethernet switch, conditioned autosensing AC-DC solid-state power supplies should be included. Fiber adapter for either multimode or single mode fiber (select on order). External power switch bank for UCM, radar, associated cameras Circuit breakers inside UCM for radar, associated cameras, equipment inside UCM Remote power toggle for radar and cameras (controlled via DMT software) Available in a matching radar color (powder coat) or stainless steel (additional cost). <div style="text-align: right;">  <p>UCM</p> </div>