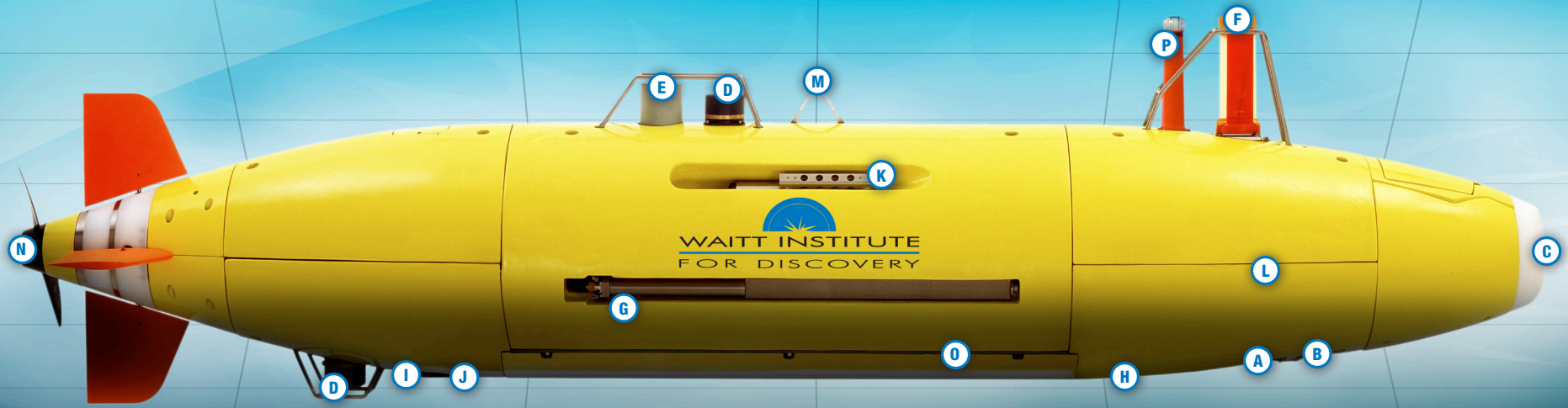
WAITT INSTITUTE FOR DISCOVERY CATALYST AUV



NAVIGATION

A. Inertial Navigation Unit (INU)
- Consists of accelerometers and gyros which measure the vehicle's movement in three directions (surge, sway, heave), and three rotations (roll, pitch, yaw), just like an airplane or a rocket to determine the vehicle's velocity and current mission travel distance
- Integrates data from other instruments to calculate a "best estimate" of the vehicles actual location, simulating a kind an underwater GPS computer

B. Acoustic Doppler Current Profiler (ADCP)
- Uses pulses of sound bounced off of the seafloor to determine the vehicle's altitude and ground speed

C. Pencil-Beam Sonar Collision Avoidance System
- Uses pulses of sound sent in the direction the vehicle is headed that bounce off of obstacles in its way, determining the need for evasive action to maneuver around an obstacle

COMMUNICATIONS

D. Upper and Lower Long Baseline Transducers
- Consists of an underwater microphone and speaker that communicate through "pings" with pre-laid Deep Ocean Transponders (DOTs) to determine the vehicle's location relative to its pre-programmed route
- Enables shipboard ops to track the vehicles, as well as send data to the vehicle via pulses
- Allows for clear communications in any vehicle position via either the upper or lower instrument

E. Acoustic Modem Transducer
- Enables shipboard ops to send data to the vehicle via multiple pulses similar to morse code

F. GPS/Iridium/Wi-Fi Antenna
- Consists of a 3-way antenna that allows the vehicle, when at the surface, to determine its position using GPS
- Connects the vehicle's system to the shipboard computer via a WiFi connection, or Iridium satellite phone connection
- Enables the vehicle to "phone home" with its location, if it becomes lost

SURVEY INSTRUMENTS

Main Instrument/Fore Payload Bay:

G. Dual-frequency Side-Scan Sonar
- Consists of two arrays of transducers (underwater speaker/microphones) which look out and down on either side of the AUV
- Illuminates the seafloor via sound-waves, using "pings" to assemble a 2D image of the seafloor and the objects resting on it

Mapping Instruments/Aft Payload Bay:

H. Custom Digital Camera w/Strobe Light
- Snaps digital photographs when the vehicle is within 10 meters of the seafloor bottom, synced with strobe light just like a flash bulb on a typical consumer camera
- Tags photos with position and time and stores them in an onboard hard drive, downloadable at the surface

I. Multibeam Profiling Sonar
- Consists of multiple sonar beams which "ping" the seafloor at different angles, creating a 3D image of its contours and shape

J. Sub-Bottom Profiling Sonar
- Uses a powerful sound beam to look at what's buried under the sediment on the seafloor

Additional Data Acquisition:

K. Conductivity, Temperature, and Depth Sensor (CTD)
- Measures conductivity (the saltiness of the water), water temperature, and vehicle depth

STRUCTURE

L. Vehicle Frame and Foam Hull
- The Titanium internal spine (called a strongback) provides structural support and a frame to which all the instruments, motors, and electronics are secured in water-tight, pressure-resistant metal cans
- The outside hull consists of large blocks of syntactic foam (in yellow) that provide flotation, are impenetrable by water and do not crush at depth under extreme pressures

M. Lifting Bail
- Provides a safe structural lifting point for pulling the vehicle out of the water

N. Propulsion/Propeller Shaft
- Provides precision thrust and direction capability to steer the vehicle

O. Electronics and Battery Compartment
- Holds the vehicle computer and its Lithium-Ion batteries which provide a rechargeable, lightweight, and efficient power source

P. Recovery Strobe Light
- Supplies a bright, blinking white light for nighttime vehicle recovery operations

AUV Instruments Diagram

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