NEWTROV

The NewtROV is an electric work class ROV that has been designed to replace the traditional hydraulic concept. Electric propulsion converts power into thrust far more efficiently than an electric/hydraulic powertrain; it also reduces weight and cost, and improves reliability. Risk of oil leakage is also greatly reduced (in fact short of the manipulators & tooling the vehicle requires **no oil at all**).

The muscle for the 33Kw propulsion system is Nuytco's NMT12-MK2 magnetically coupled thruster. Over a hundred of these units have been manufactured, with some early units accumulating over 3000 hours; their reliability has been proven excellent.

'Thruster mapping' and 'installed spares' are a couple of the features that have been added to expedite field repairs – recovery from damage often will not require opening a junction can. Each load on the vehicle is galvanically isolated when turned off. This allows the automated line insulation testing feature to quickly locate and quantize faults. The graphic user interface is highly evolved and provides novice as well as veteran operators and engineers intuitive access to all of the vehicle's features.

Ultra low latency (< 35mS) HD video over IP encoding effectively removes the limit of video channels for the vehicle (up to 6 x 1080p60 cameras) over the standard Gigabit uplink (upgradable to 10 Gigabit). This provides a very generous amount of bandwidth for other network and serial instruments.

To control cost and reduce launch weight, buoyancy modules (blocks) have been employed rather than a traditional monolithic foam block (add payload when you need it). The frame will readily accept tool skids and excess buoyancy up to a maximum launch weight of 10,000 lbs (typical launch weight approximately 5,500 lbs).

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NEWTROV

General:

- Depth: 2km
- Materials: HDPE and 6061 Aluminum
- Weight in air: 3,700 - 5,500 lbs
- Length: 10ft (3.05m)
- Beam: 5.5ft (1.68m)
- Height: 5.8ft (1.78m)
- Power Budget: 50kW
- Lift Frame SWL: 10,000 lbs

Propulsion:

- Magnetically coupled electric thrusters
- 11 x NMT12 Mk2 thrusters @ 3kW each
- Thruster vectors are field-configurable
- Ability to operate with multiple thrusters offline

Thrust:

	45 ° Vector	30 ° Vector
Forward	904 lbs	1,104 lbs
Translate	904 lbs	640 lbs
Vertical	550 lbs	550 lbs

Umbilical:

- OD: 0.87 inch
- SWL: 7,500 lbs
- Breaking strength: 47,000 lbs
- Kevlar reinforced

Electrical

- Transmission Voltage: 3kV
- ROV Systems Voltage: 300Vdc
- Up to 15 Thrusters channels
  - 20A @ 300Vdc (6,000W)
  - Isolated +/- 10 Vdc control signal
  - Soft start
  - Full galvanic isolation
  - Can be used for tooling
- Up to 12 Lighting channels
  - 6A @ 300Vdc (1,800W)
  - Soft start
  - Full galvanic isolation
  - Can be used for tooling
- 'Thruster Mapping' allows for extensive damage recovery without opening electrical junction cans

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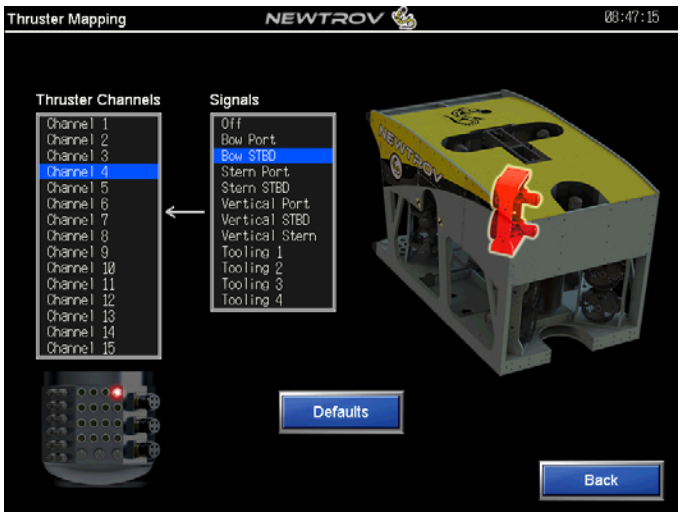


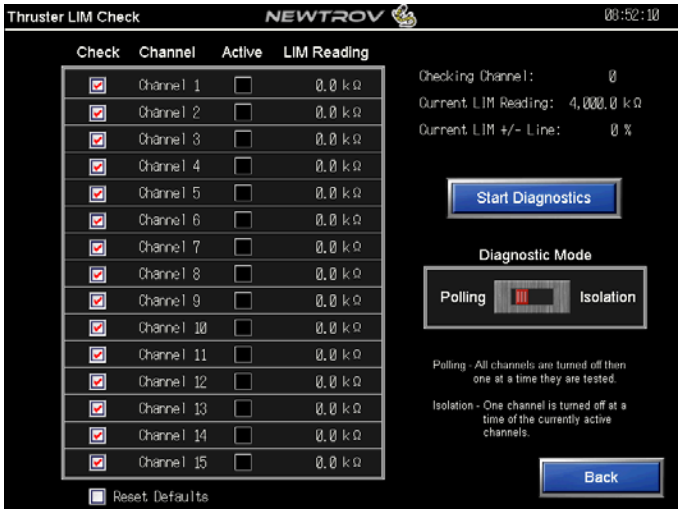
'Thruster Mapping' allows channel functions to be reassigned.

Telemetry / Connectivity

- Gigabit fiber optic backbone
- 4 x Gigabit Ethernet ports
- 7 x POE+ Gigabit Ethernet ports
- 8 x RS232 channels
- Ultra low latency HD video over IP
  - (> 30mS)
  - Up to 6 x 1080p60 cameras
- 4K video over IP capable
- Depth transducer resolution 0.02%
- MEMS Gyro aided compass
  - Heading Repeatability: 0.1° RMS
  - Heading Accuracy: 0.2° RMS

Diagnostics

- Automated line insulation testing of lighting and thruster channels. Ground fault diagnostics for pre-dive checks and online trouble shooting
- Fuse monitoring of thrusters, lights and system devices
- Water ingress, temperature and humidity monitoring for the 3 main electrical junction cans
- Alarm history log and configurable alarm thresholds



Line insulation testing of thruster channels checking for ground faults.

Operator Friendly

- 12 in. touch screen for monitoring and control of the ROV
- Intuitive user interface that is useful for novice and advanced pilots
- Ergonomic and portable joystick controller
- Detailed vehicle information available by pressing on the various alarm status bars
- Auto-Heading, auto-altitude, auto-depth can be used as a 'fly by wire' system reducing pilot workload
- Compatible with *Greensea* and *Seabyte* advanced autopilot systems

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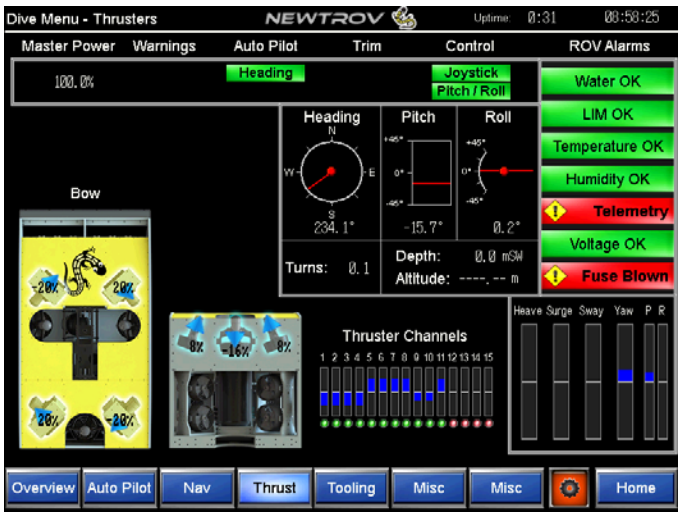
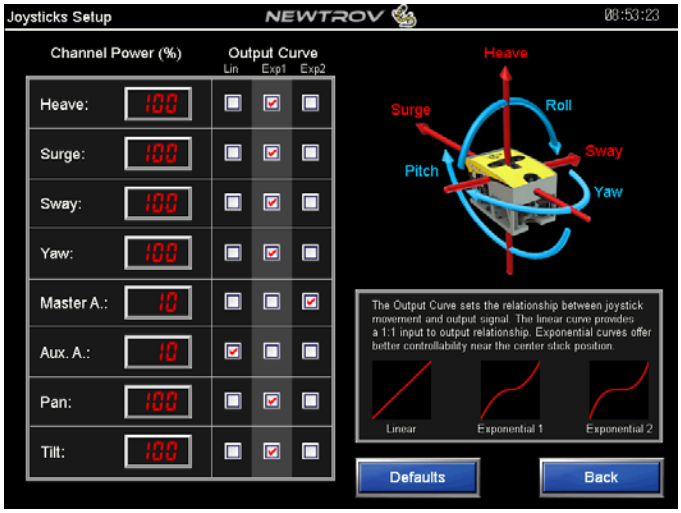


Thrusters overview on the dive menu page showing detailed thrust vector information.

NewtROV Joystick Controller

Configuration Flexibility

- Thruster and lighting channels are re-mappable
- Advanced thrust vector mixing options to avoid channel saturation
- Thruster linearization and deadband compensation for improved autopilot performance
- Adjustable thruster slew rates
- 5 PID controllers with auto-tuneability for altitude, depth, heading, pitch and roll
- Joystick calibration routines with adjustable deadband
- Joysticks have adjustable output curves
- 2 auxiliary buttons on the joystick controller that can be mapped to user configurable outputs/tools
- 1 auxiliary joystick axis that can be mapped to a tooling channel
- Startup sequencing of devices in LPC
- Calibration options for altimeter, compass and depth sensor



Joystick configuration for customizing the operation and feel of the ROV to the pilot's preferences.

Designed for Field Servicing

- Electrical junction cans are swing arm mounted and can be serviced comfortably without disconnecting or removing them from the ROV
- The power distribution junction can (PDC) is designed as a card cage. Lighting and thruster cards are replaceable
- The low power junction can (LPC) is designed as a rack where users integrate serial and Ethernet attached devices
- Additional standard 2 ft. x 1 ft. x 6 in. buoyancy modules can be mounted to accommodate for different payloads

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