HELIUM SPEECH UNSCRAMBLER SYSTEMS

The Nautronix DSP Helium Speech Unscrambler is fully digital in design, and utilises the latest and most modern processing systems to provide the highest speech intelligibility.

The physical properties of the high pressure heliox (helium-oxygen) atmosphere produces significant changes in the speech generation mechanism for a resident diver which at deeper depths results in largely unintelligible speech.

Traditional speech unscramblers have implemented time, or hybrid combinations of time and frequency domain processing. Time domain processing is not capable of fully compensating for all of the helium-induced distortion.

Nautronix have developed a full frequency domain algorithm, which completely models the effects of the high-pressure helium environment on the vocal tract. The algorithm is computationally intensive, sampling speech at 44kHz, and makes use of the very latest DSP (Digital Signal Processing) devices. These devices are capable of executing over 100 million floating-point arithmetic operations per second and are fully utilised in the new algorithm. Evaluation of unscrambled speech from these algorithms has shown intelligibility levels close to 100% at standard helium diving depths and better than 91% at 450m.

Individual modules are available for wet diver, dry diver, tender control, power, entertainment, telephone, record and unscrambler. Full control of the systems provided via the tender module where communication ‘groups’ are set up. A group can consist of any number of modules and one unscrambler. Full control of the system is provided via the tender module where communication ‘groups’ are set up. A group can consist of any number of modules and one unscrambler. A unique group cross talk feature is available to allow divers at the different depths to communicate clearly.

Other unique features include a design with no electronics at the diver end, innovative noise and electrical pick up cancelling circuitry and built in breathing noise reduction and full integration to Nautronix Emergency Through Water Communication System.

Summary of Capabilities

- Modular Construction
  Easy Reconfiguration / Expansion, Minimum Spares Holding
- Frequency Domain Processing:
  Highest Possible Intelligibility Using Latest Algorithms Processor
- Full Switching Capability:
  Flexibility and Configurability for Various Scenarios
- Group Facilities:
  Easy Communications with Other Locations e.g. ROV, Deck Crane and Bridge
- No Tuning or Electronics at Bottom End:
  Reliability, Minimum Maintenance
- Standard 4 Wire System:
  Easily Understood - no Maintenance
- Interfacing between Units:
  Back Up
- Comms Between Chambers at Different Depths
- Interface to Telephone System:
  Direct Private Calls from Divers at Depth to Shore, Fully Unscrambled
- Interface to Emergency Acoustic Bell Comms:
  Intelligible Unscrambled Speech for Emergency Situations

350X DSP Communication system

350X DSP COMMUNICATION SYSTEM - MODULES AVAILABLE

Model	Description
3500 DSP Unscrambler Module	This unit is the brains of the system using a high specification DSP processor. The module allowing entry of the diving depth and selection of the group to be unscrambled.
3501 Tender Module	The tender module effectively does away with the need for one off switch panels and allows the tender to select which groups can be talkerd to and listened to. A press to talk for each group and entertainment are also available, along with a headset connection and volume up and down control. A remote speaker is available via the rear panel connector.
35011 Tender Module with Bluetooth®	This module has Bluetooth® compatability when used in conjunction with the Nautronix Bluetooth® belt pack allowing wireless communications for the user.
3502 Power Supply Unit	This UPS module provides universal mains input, or 12V DC, and includes battery back up for a minimum of 1 hours operation from the internal batteries. Indicators are available for power (charge) battery and low battery warning.
3503 Dry Diver Module	The 3503 dry diver module is the standard diver module, providing full 4 wire comms, group and entertainment select and including a unique pick-up cancelling circuitry, which nullifies any electrical pick-up between the diver module. Seperate volume up and down with limit indicator are provided as standard. A 2-wire/4-wire switchover allows the module to be used for comms boxes using a press to talk switch.
3504 Wet Diver Module	The 3504 is designed for the excursion divers, and as well as providing group select seperate volume up and down and pick-up cancelling it has built in breathing noise reduction. An emergency 4-wire/2-wire switchover allows communications to be maintained in the event of a microphone failure.
3505 Telephone Module	The 3505 Telephone module allows a standard telephone line to be connected to the system and assigned to a group, thus allowing a private conversation between divers and the outside world
3506 Record Module	Recording of all communications is provided via the 3506 module which allows 2 seperate outputs and an additional auxiliary monitoring output.
3507 Entertainment Module	Up to 3 external audio sources can be input on seperate channels with individual volume and enable control. Selection of the channels is available on dry diver and tender modules.
3508 Emergency Acoustic Communications Module	The 3508 module allows a Nautronix 3136B Emergency Acoustic Communications system surface unit to be fully interfaced to the DSP Unscrambler such that uplink speech is fully unscrambled, and downlink speech is channelled direct from the Supervisor's headset mic via the press to talk switch.
3511 Interface Module	The 3511 interface module allows configuration of priorities between interconnected systems by specifying which groups are soley controlled from that unit and which from other units in the event of a problem.
3512 Surface Communication Module	The 3512 module allows an interface between a surface location such as the deck crane or bridge and any other selected group. Seperate volume knobs for uplink and downlink with limit indicator are provided as standard. The surface card does not allow unscrambling of surface location speech.

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