



Submarine Rescue Fibre Optic Communication System

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ISSUE/CHALLENGE

The perceived benefits of a Tethered System compared to a Free Swimming Submersible have long been discussed and debated in history, but advancements in technology (i.e. battery systems) and new capabilities (i.e. Diverless Recovery) have diminished the supposed issues faced by Free Swimming Submersibles.

The only remaining benefit a Tethered System has is the free transfer of voice, video and data, which allows benefits in command and control, and medical monitoring during a rescue. JFD is pleased to advise that this capability gap, for Free Swimming Submersibles, has now been removed and the solution has been proven by JFD in operation.

JFD's Submarine Rescue Fibre Optic Communications System provides live video and communications network across the vessel deck, bridge and Submarine Rescue System. The system acts as a primary and secondary communications link to the surface for the submersible during the critical stages of an operation.

**"GAME CHANGER" FOR RESCUE
ELEMENT COMMANDER (REC)/COORDINATOR
RESCUE FORCE (CRF)/MEDICAL MANAGEMENT
OF A DISSUB INCIDENT.**

FUTURE ENHANCEMENT

The capability can be evolved further to provide data from the SRV to the bridge including but not limited to:

- Life Support
- Navigational Data
- Power Management Data
- Alarm Indication Data

SOLUTION

The Fibre Optic Communication System provides a complete communication and video link to a rescue mission. Through establishing a fibre optic network, and the installation of key display and communication equipment, a tethered link can be established between the top side: Mothership (MOSHIP), and the bottom side: Submarine Rescue System (SRV), which enable seamless communication and video display.

The solution consists of the following key elements:

BRIDGE AND DECK COMMS

A video and communication console is set up within the bridge and deck locations to enable improved communication, command and control.

SUBMARINE RESCUE VEHICLE (SRV)

A video camera and communication system installed within the SRV feeds into the Fibre Optic link to the surface enabling a vital link between the medical staff on the MOSHIP and the rescued submariners. A Separation release mechanism is installed onto the SRV to release the fibre optic cable before ascent.

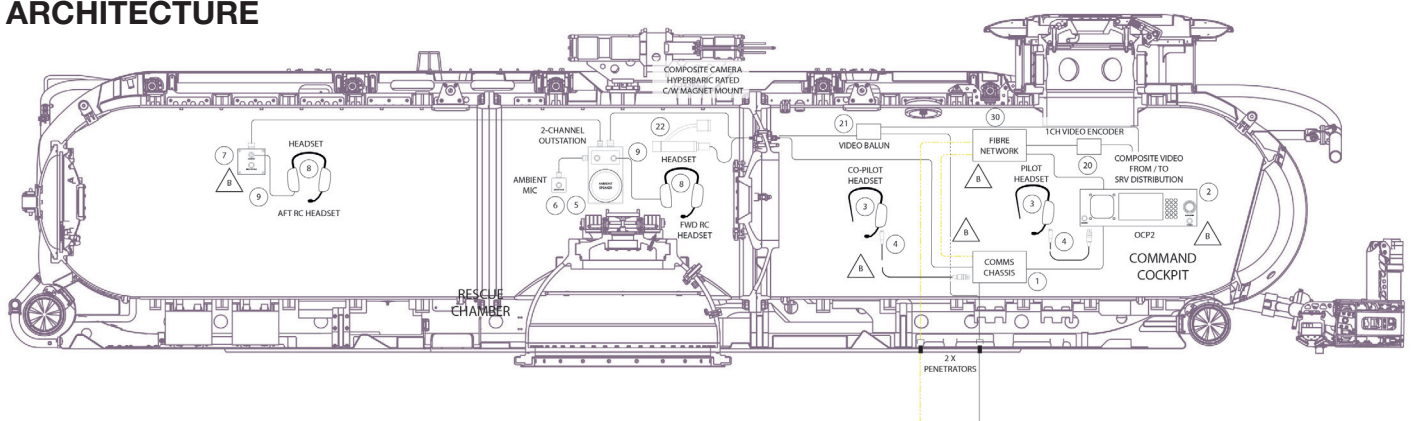
TRANSFER UNDER PRESSURE SYSTEM (TUPS)

A Operator Control Panel and various video and communication equipment are installed to enable chamber operators and medical staff to communicate and observe (via video) rescued submariners in the SRV and the decompression chambers.

FIBRE OPTIC CABLE AND WINCH

Inclusive of a slip ring, the fibre optic winch is installed onto the MOSHIP and provides a precise constant tension winch system that controls fibre tension from launch to release of the FO connector. The SRV controls release of connector.

SUBMARINE RESCUE VEHICLE ARCHITECTURE



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SUBMARINE RESCUE SYSTEM ARCHITECTURE

BRIDGE

The Mothership bridge will have a communications station that allows mission control staff to have clear two way communications and high quality video from the SRV. The display and control unit are integrated with a high quality laptop used for setup and messaging. This link allows senior command on the bridge to engage directly with the submarine senior survivor and any outstation.

The portable station can be placed and operated from a desktop/worktop anywhere within the bridge or situation control room.

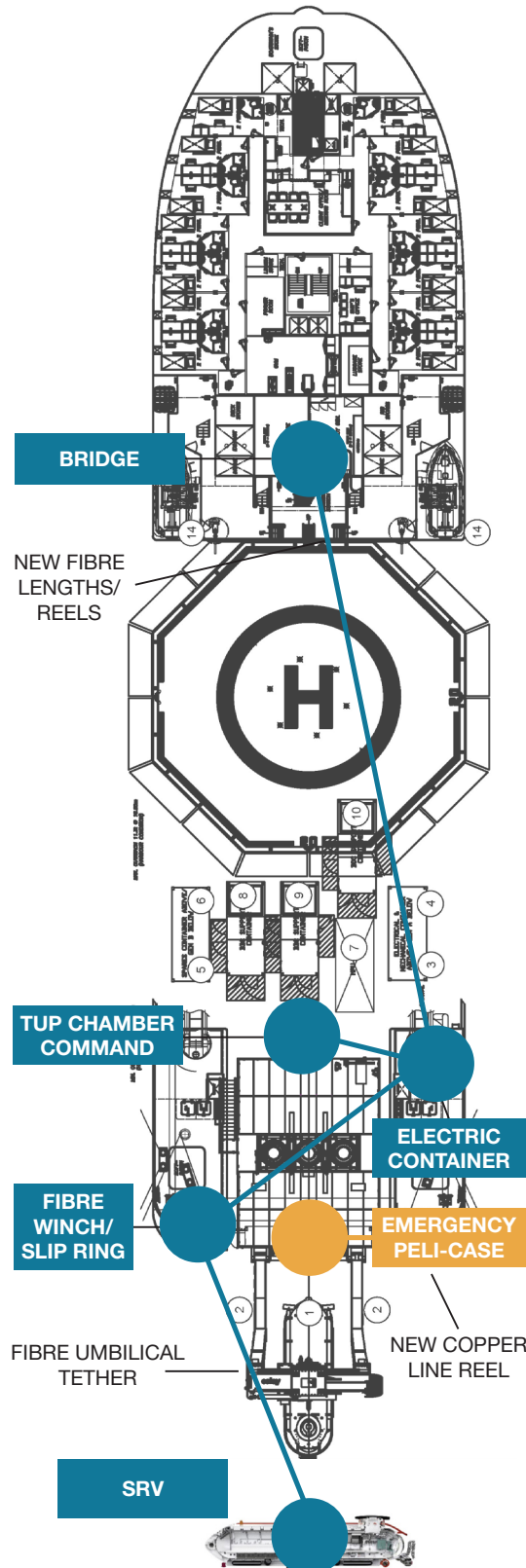
TUP CHAMBER COMMAND

The TUP control station will feature a permanent communication system capable of receiving and making audio calls from and to all stations on the System. It will include a display screen to receive live video from the SRV to enable the system diving supervisor and medical team within the TUP to assess the condition of casualties and interview survivors as they are brought on-board and make the necessary preparations topside in advance of their arrival.

FIBRE WINCH/SLIP RING

The cable is deployed overboard suspended from a 7m long carbon fibre boom which is rotated to direct the fibre cable towards the SRV once in the water.

The winch is a precise constant tension winch that monitors fibre tension throughout the dive and can be adjusted for the prevailing environmental conditions.



ELECTRICAL CONTAINER

The electrical container shall operate as a connection hub on the surface, outfitted with a communications station where an operator will control which of the other stations receive broadcasts. It will also feature a DVR capable of continuously recording the camera feed from the SRV.

Equipment will be rack mounted installed within this container with a comms headset.

EMERGENCY PELI-CASE

The emergency peli-case will feature a video and audio enabled communications system. When the SRV is on deck the emergency peli-case system, with its video display connected to the IP camera feed will allow for communications and monitoring of inside the rescue chamber.

SUBMARINE RESCUE VEHICLE

The SRV will be equipped with a permanent communications station within the command module, with a headset for both pilots, and the rescue chamber will receive a link to the communication system with two headsets for internal occupants and all SRV cameras including an IP video camera (capable of withstanding a hyperbaric environment of up to 5bar). This is configured to allow communication between all staff within the SRV and for communication to the surface.

CONCEPT OF OPERATION (CONOPS)

It is important to note that this solution can be tailorable and scalable to the specific needs of a Submarine Rescue Authority.

1. SRV deploys with fibre optic cable attached.
2. SRV mates with submarine and submariners board.
3. Live video and communication between Submarine Rescue Chamber to MOSHIP bridge.
4. Live assessment by senior survivor and medical team (located and waiting in Transfer Under Pressure System (TUPS)).
5. Fibre Cable Connector is ejected from the SRV by pilots once dry transfer operation is complete and recovered to deck (avoid hazards associated with tangling and propeller ingestion of the cable upon ascent of the SRV).
6. SRV separated and returned to surface and recovered onto Mothership (MOSHIP).
7. Fibre reconnected once the SRV is on deck to provide link for Diving Supervision of the hyperbaric system including Rescue Chamber.

KEY FEATURES

- Solution can be tailored to needs of the specific Rescue System.
- Transferable (magnetically attached) camera located within Rescue Chamber to allow optimum positioning.
- Bridge/Deck Comms Unit to allow video and communications across whole fibre network (including SRV).
- Emergency Communications Case allows separate (back-up) hook-up to SRV on deck.

BENEFITS

- Provides reliable voice and video connection between the SRV, Transfer Under Pressure System and bridge and deck of the Mothership (MOSHIP).
- Provides medical team ability to understand, assess and plan in advance of recovery of the SRV.
- Designed, manufactured, tested and Operational System.
- Proven technology - JFD Fathom DDCCS - Digital Diver Communications System.
- Easy to retrofit onto existing system and installation.
- Phased install possible with incremental capability.
- No impact onto Standard Operating Procedures (SOPs) - makes easy to operate SOPs and EOPs.
- Compliant with Lloyd's Register Rules for Submersibles and diving regulations for monitoring of diving chambers.



FATHOM DIGITAL DIVER VOICE COMMUNICATION SYSTEM

The Fibre Optic Communication System features Fathom's (now part of JFD) Digital Diver Voice Communication System (DDVC) which features the following:

- Assurance of a fully integrated, high quality, 'best in class' Digital Diver Voice Communications System.
- Over 300 Digital Diver Comms system chassis' in operation on 40+ Client assets globally as certified by DNV, Lloyds, BV and ABS.
- Unrivalled audio performance, advanced helium speech unscrambler and digital audio processing.
- Easy to use HMI touch screen technology.
- Optional fibre optic networking.
- Modular, expandable system.
- Interconnected, tested and fully compliant system providing even greater reliability.
- Industry led, field proven, high performance state of the art technology.
- Zero reported in-field failures = zero reported down time.