
JFD
Submarine Rescue Systems
GLOBAL & REGIONAL
DSAR-500 L
jfdglobal.com

1973

Over 40 years ago a coordinated, multinational rescue effort culminated in the recovery of Roger Chapman and Roger Mallinson from their Pisces III submersible. After more than 76 hours trapped on the seabed, and with fewer than 20 minutes of life support remaining, their rescue was the first of its kind and, at 480 metres, remains the deepest ever performed.

Roger Chapman would go on to dedicate his life to the safety of those who spend their lives subsea by founding Rumic, the company that would eventually become JFD.

JFD continues to develop pioneering solutions for submarine escape and rescue and is now recognised as the world leader in this capability.

ABOUT JFD

CAPABILITY & PEDIGREE

As an established provider to 42 navies, JFD delivers innovative and technically advanced submarine escape and rescue solutions that improve safety and preserve life in the event of a submarine incident.

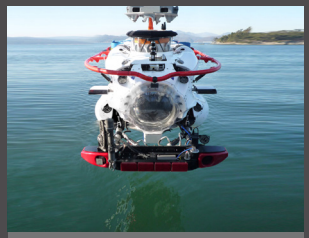
JFD's capabilities span the entire submarine escape, rescue, abandonment and survival (SMERAS) environment. JFD is unique in being able to deliver solutions across all of these areas as a one-stop shop. Offering a portfolio of products and services including design, manufacture, operations and support, JFD has incomparable experience within this challenging environment.

A rigorous set of management systems and processes and an unblemished safety record ensure that the company delivers high quality services around the clock, around the world. JFD continues to set new benchmarks and standards for submarine escape and rescue, this continuous improvement is the hallmark of how we deliver long-term value to all our customers.

JFD is the recognised world leader in the provision of submarine rescue services and supports some of the most advanced navies in the world.

ABOUT JFD

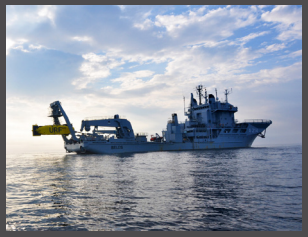
1ST GENERATION RESCUE SYSTEM
In 1999, JFD transformed LR5 into a steel-hulled, Transfer Under Pressure (TUP) capable submarine rescue vehicle. The design for the new LR5, known internally as DSAR-1, formed the basis for future generation SRVs.



ROKN DSRV-II, KOREA
In December 2006, JFD was awarded a contract to deliver a 2nd Generation DSAR Class submarine rescue vehicle to Korea. The contract included a multi-year in-service support period.

SWIFT RESCUE, SINGAPORE
In January 2007, JFD and partners ST Marine were selected for the provision of a 2nd Generation submarine rescue capability under a 20 year COCO arrangement; the first of its kind.

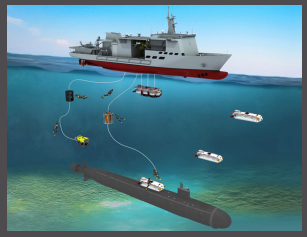
JFSRS, AUSTRALIA
In December 2008, JFD was contracted by the Commonwealth for the provision of the JFSRS on a COCO basis. In 2020, the contract was extended for a minimum further 4 years.



URF MKII, SWEDEN
In May 2011, JFD carried out the complete refurbishment of the Swedish Navy's URF SRV. URF benefits from pull-through of 2nd Generation technologies. A period of in-service support followed.

NSRS, NATO
In January 2015 JFD was awarded the contract for the provision of the NATO submarine rescue system under an eight year GOCO agreement.

ISRS, INDIA
In March 2016, JFD was selected to provide two 3rd Generation submarine rescue systems to the Indian Navy alongside a 25 year support contract.



ASR-II, KOREA
In 2019 JFD was selected to provide a new moonpool launched DSRV for the Republic of Korea Navy's (RoKN's) new submarine rescue ship ASR-II.

OPERATING MODELS - REGIONAL VS GLOBAL

The most fundamental decision in choosing a submarine rescue system is determining whether it will be a regional (MOSHIP based) system or a global (flyaway) system.

REGIONAL

A regional system will be permanently installed on a MOSHIP, immediately ready to sail to the location of a sunken submarine.

A regional system can reach local submarine emergencies very quickly. However due to sailing time limitations it has a maximum effective radius beyond which a viable rescue is unlikely - this is indicated in the graph to the right.

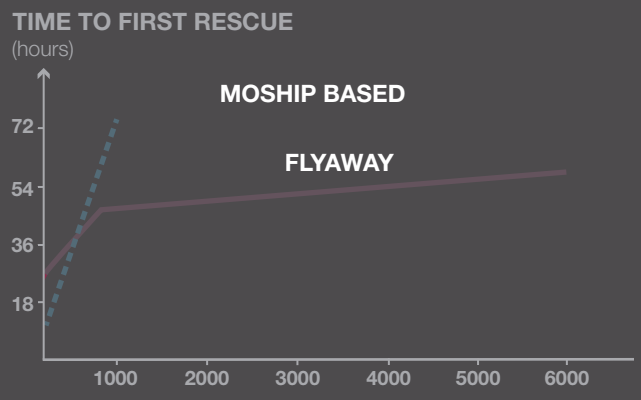
V

GLOBAL

A global system will have worldwide coverage and be land based, deployed to a vessel in the event of an emergency.

A global system will have a minimum mobilisation time and can reach anywhere in the world.

RESPONSE TIME



Distance from system to distressed submarine (nautical miles)
Flyaway aircraft may need to refuel

DETERMINING THE OPERATING MODEL

Select an operating model to suit your submarine force.

Once the operating model is selected then the required balance between the following 3 characteristics should be considered:

DEPLOYMENT TIME

The time taken to mobilise the system from its primary location to the rescue site.

➔

CAPACITY

The amount of sorties taken to complete the rescue mission. Typical capacity of the transfer under pressure system and the vehicle, higher capacity = lower time to rescue any given submarine of a specific size.

➔

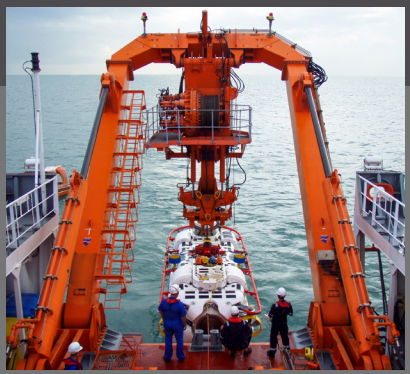
ENVIRONMENTAL ENVELOPE

The ability of the system to adapt to extreme environmental factors; sea state, dynamic positioning issues, mating angles, changes in current.

The ability of the system to operate in less ideal environmental conditions including; sea state, wind speed and available VOOs and MOSHIPs.

All of these capability drivers will have an impact on cost, however more importantly they impact each other. For example, a system with a large capacity is likely to have a longer deployment time and a system designed for low deployment time may have a restricted environmental envelope.


SEAHORSE STANDARD




IMO 7623930
SEAHORSE STANDARD

WHAT IS A REGIONAL SYSTEM?

Ideal for navies with a local operating area, a regional system is stored locally and designed for rapid mobilisation on a MOSHIP in the event of an emergency.

ADVANTAGES

- Provides a reliable, low risk, high speed regional submarine rescue capability.
- Rescue system operating costs, especially training/exercise costs are low (offset by ship operating costs).
- Vessel can be multi role.
- Smaller operating team.
- Do not have to worry about compromising for transportability - e.g. cost, size, weight, maintenance access etc.

TRADEOFFS

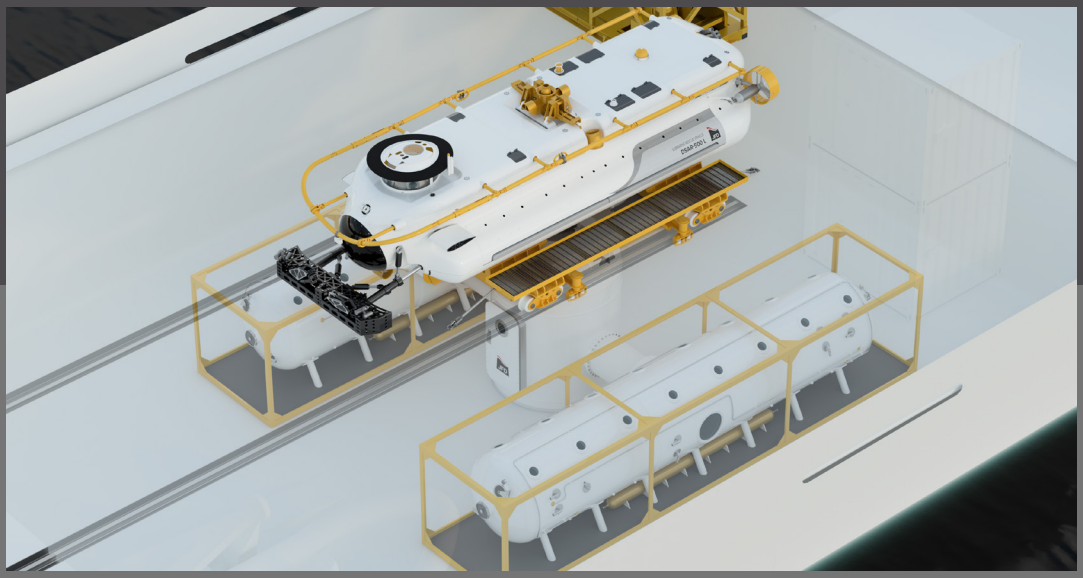
- Rescue coverage area limited by vessel sailing range in rescue scenario - no global reach.
- MOSHIP system has higher operating costs if MOSHIP is counted as a cost of the rescue system ((offset by reduced exercise and training costs and ship having other roles - e.g. hydrographic survey/oceanographic research; deployment of Unmanned Systems and Modular Mission Packages).

CAPABILITY MATRIX

FEATURE	INTEGRATED SRV SYSTEM	RAPID RESPONSE BELL	RAPID RESPONSE BELL XL
Deployment Time	Determined by distance from MOSHIP to site		
Capacity	★★★★★	★★	★★★
Environmental Envelope	★★★★★	★★	★★★

COST			
MOSHIP*	●●●●	●●●	●●●◖
Build	●●●●	●●	●●●
Through Life	●●●●	●●●	●●●◖

* Combined cost of build and through life.



INTEGRATED **SRV SYSTEM**
(horizontal or vertical)

An integrated MOSHIP based system will be designed into the ship, ideally stored within a hangar on the main deck to minimise maintenance burden and free up the main deck space for other roles.

Selection of a horizontal or vertical transfer system will generally be determined by the vessels secondary roles - a vertical system will maximise free main deck space by locating the decompression chambers on a lower deck, whilst a horizontal system will occupy more of the main deck whilst occupying space on a lower deck.

ADVANTAGES

- Maximum capability; ability to operate at the fullest extent of depth and current and adapt to changing rescue scenarios.
- Maximum sortie capacity and minimum sortie time.
- Minimum time to complete rescue, particularly for DISSUBs with larger crews.
- Potentially able to be used for wide range of secondary salvage or inspection tasks.

TRADEOFFS

- Requires high crew skill level and corresponding standard of training and upkeep.
- More complex and expensive to maintain than a bell.

SPECIFICATION

VEHICLE	
Rescue Capacity	16
Depth	500m*
Classification	Lloyds Register

LAUNCH & RECOVERY SYSTEM	
Load Rating	30 tonnes
Operating Sea State	5**
Classification	Lloyds Register

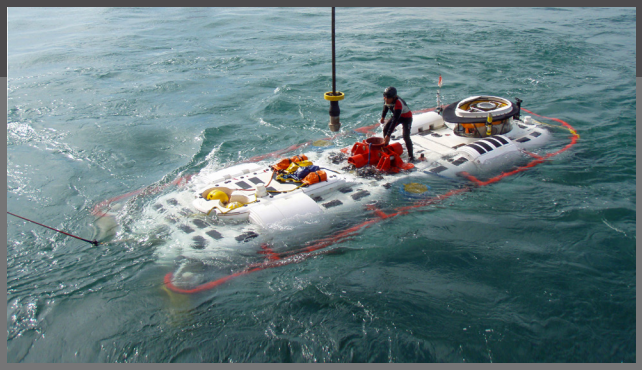
TUP	
Capacity	Restricted only by MOSHIP space availability
Classification	Lloyds Register

ROV
1000m intervention ROV as standard

ANCILLARY EQUIPMENT	
Optional	Mating targets, side scan sonar, surface comms, ELSS pods and pod posting target

MOSHIP INTERFACE	
DP Class	N/A
Deck Space	475m^{2}†
On Board Power	600kVA

* Option available of depth rating up to 610m.
** Option available up to sea state 6.
† Flexible deck arrangement, dependant on TUP capacity. Equipment can be located to suit required configuration.



INTEGRATED **RAPID RESPONSE BELL**

A MOSHIP based Rapid Response Bell allows for the low local Time to First Rescue associated with a MOSHIP based system whilst maximising the MOSHIP's ability to conduct secondary roles.

The Rapid Response bell is rated to 5 bar gauge internally, allowing for pressurised rescue. Onboard operational and emergency life support capacity meet LR Class standards, meaning only a power and comms umbilical is required - this avoids air transport issues associated with onboard batteries but is primarily designed to minimise both umbilical handling/drag issues and overall system size for transport.

Integrating the bell and launch and recovery system into a side hangar for example frees the prime main deck space for other equipment whilst retaining the possibility of removing the bell in the event of an emergency if air transporting is desired.

CAPACITY

ENVIRONMENTAL ENVELOPE

COST

MOSHIP

BUILD

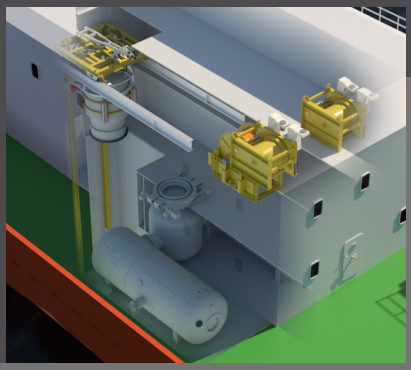
THROUGH LIFE

ADVANTAGES

- Takes up a minimum of deck space - either allowing for a smaller MOSHIP and/or increasing flexibility for secondary roles.
- Simple system.
- Easy to flyaway (bell) in the event of an accident out of the MOSHIP's range.

TRADEOFFS

- Limited depth.
- Limited rescue capacity requires more sorties per submarine, increasing overall rescue duration.
- DP2/4-point mooring MOSHIP required.
- Cannot operate without ROV or divers capable of safely diving to DISSUB depth.
- Most restricted environmental operating envelope i.e. sea state, DISSUB angle etc.
- Submarine escape hatches must be fitted with haul down points.



SPECIFICATION

VEHICLE	
Rescue Capacity	6
Depth	300m
Classification	Lloyds Register

LAUNCH & RECOVERY SYSTEM	
Load Rating	6 tonnes
Operating Sea State	4
Classification	Lloyds Register

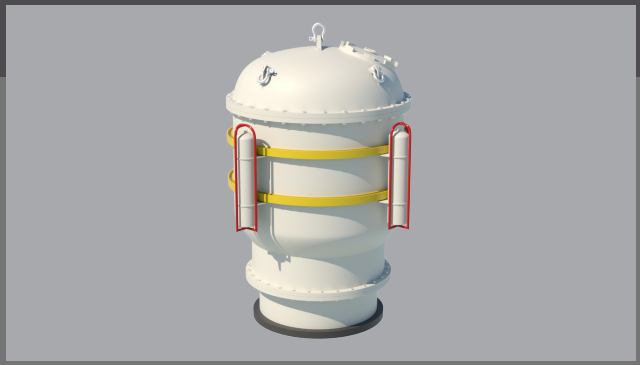
TUP	
Capacity	Restricted only by MOSHIP space availability
Classification	Lloyds Register

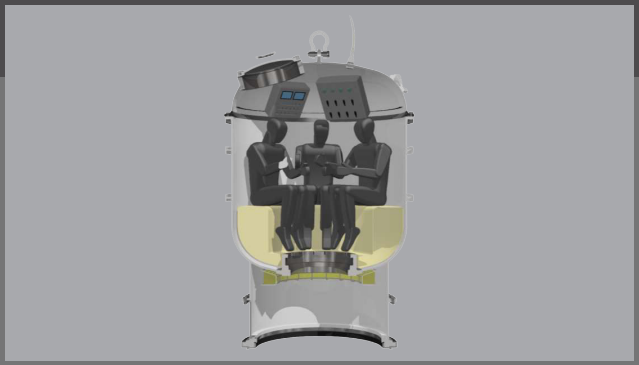
ROV
1000m intervention ROV as standard

ANCILLARY EQUIPMENT	
Optional	Mating targets, side scan sonar, tracking system, surface comms, ELSS pods and pod posting target

MOSHIP INTERFACE	
DP Class	2
Deck Space	150m²†
On Board Power	150kVA

† Flexible deck arrangement, dependant on TUP capacity. Equipment can be located to suit required configuration.





INTEGRATED **RAPID RESPONSE BELL XL**

The Rapid Response Bell XL increases the environmental envelope and capacity, extending depth from 300m to 500m and the rescuee capacity from 6 to 11. This will reduce required number of sorties by approximately 45% when compared with the standard Rapid Response Bell.

The Rapid Response Bell XL is rated to 5 bar gauge internally, allowing for pressurised rescue. LR Class compliant onboard operational and emergency life support requirements are provided for as well as sufficient onboard electrical power for 12 hours of continual operation and 96 hours of emergency operation. This removes the umbilical requirement for both gas and power, resulting in a very thin, light and low drag umbilical only providing surface communications and allowing for emergency recovery.

These improvements come at a cost of MOSHIP space and reduced transportability.

CAPACITY

ENVIRONMENTAL ENVELOPE

COST

MOSHIP

BUILD

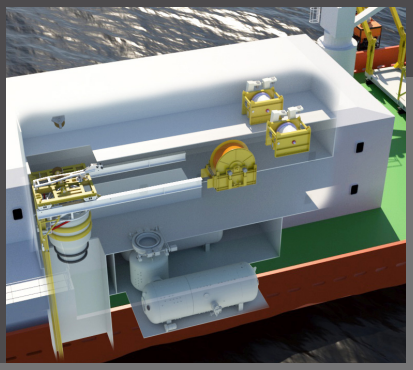
THROUGH LIFE

ADVANTAGES

- Balance between standard Rapid Response Bell and SRV based systems - good depth and environmental operating envelope whilst still not requiring as much deck space as an SRV based system.
- Easy to flyaway (bell) in the event of an accident out of the MOSHIP's range.

TRADEOFFS

- Limited rescue capacity requires more sorties per submarine, increasing overall rescue duration.
- DP2/4-point mooring MOSHIP required.
- Restricted environmental operating envelope i.e. sea state, DISSUB angle etc.
- Cannot operate without ROV or divers capable of safely diving to DISSUB depth.
- Submarine escape hatches must be fitted with haul down points.



SPECIFICATION

VEHICLE	
Rescue Capacity	11
Depth	500m*
Classification	Lloyds Register

LAUNCH & RECOVERY SYSTEM	
Load Rating	8 tonnes
Operating Sea State	4**
Classification	Lloyds Register

TUP	
Capacity	Restricted only by MOSHIP space availability
Classification	Lloyds Register

ROV
1000m intervention ROV as standard

ANCILLARY EQUIPMENT	
Optional	Mating targets, side scan sonar, tracking system, surface comms, ELSS pods and pod posting target

MOSHIP INTERFACE	
DP Class	2
Deck Space	225m²†
On Board Power	200kVA

* Option available of depth rating up to 610m.
** Option available up to sea state 6.
† Flexible deck arrangement, dependant on TUP capacity. Equipment can be located to suit required configuration.

WHAT IS A GLOBAL SYSTEM?

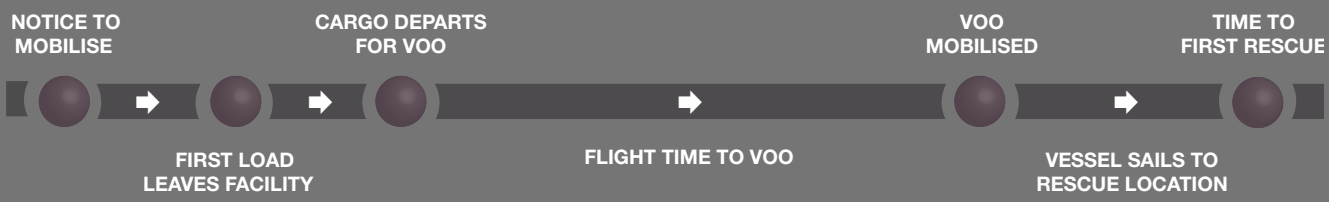
A global system is designed to enable air transportation offering much wider coverage area for navies with large operating regions.

ADVANTAGES

- Global reach.
- Does not require permanent MOSHIP.

TRADEOFFS

- Almost certainly requires compromising some aspect in exchange for transportability - using more expensive materials to minimise weight, reducing capacity to maintain aircraft compatibility etc.
- Higher up front cost.
- Higher through life costs.
- Needs a staffed land base.
- Larger permanent staff due to mobilisation requirements.
- Longer TTFR for regional incident.



CAPABILITY MATRIX

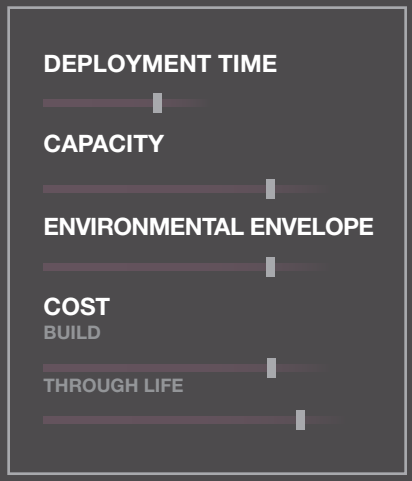
FEATURE	SRV SYSTEM	RAPID DEPLOYMENT SRV SYSTEM	RAPID RESPONSE BELL	RAPID RESPONSE BELL XL
Deployment Time	★★	★★★	★★★★★	★★★★
Capacity	★★★★	★★★★★	★★	★★★
Environmental Envelope	★★★★	★★★★★	★★	★★★
Range				
MOSHIP Availability				

COST				
Build	●●●●	●●●●●	●●	●●●
Through Life	●●●●◖	●●●●●	●●●	●●●●

FLYAWAY **SRV SYSTEM**

A conventional Flyaway SRV system offers the best environmental envelope and capacity of the global systems, however at the cost of the longest deployment time.

Able to deploy globally and rescue in the harshest of environmental conditions, the Flyaway SRV system must be complemented with a well trained and exercised emergency response capability to ensure it will be on site wherever and whenever required.



ADVANTAGES

- Maximum capability; ability to operate at the fullest extent of depth and current and adapt to changing rescue scenarios.
- Maximum sortie capacity and minimum sortie time.
- Low time to complete rescue, particularly for DISSUBs with larger crews.
- No Vessel of Opportunity (VOO) DP requirement.

TRADEOFFS

- Requires high crew skill level and corresponding standard of training and upkeep.
- More complex and expensive to maintain than a bell.

SPECIFICATION

VEHICLE	
Rescue Capacity	16
Depth	500m*
Classification	Lloyds Register

LAUNCH & RECOVERY SYSTEM	
Load Rating	25 tonnes
Operating Sea State	4**
Classification	Lloyds Register

TUP	
Capacity	72†
Classification	Lloyds Register

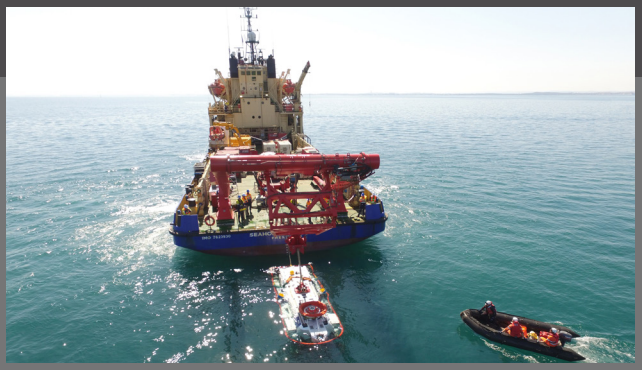
ROV
1000m intervention ROV as standard

ANCILLARY EQUIPMENT	
Standard	Tracking system, surface comms, workshop/spares container
Optional	Generator, mating targets, side scan sonar, ELSS pods and pod posting target

DECK	
Deck Footprint	475m²

TRANSPORT	
Trucks	14
Aircraft (small items)	777-200F, 747-400F, C130, Embraer C-390
Aircraft	A400M, IL-76, C17, AN-124, C5

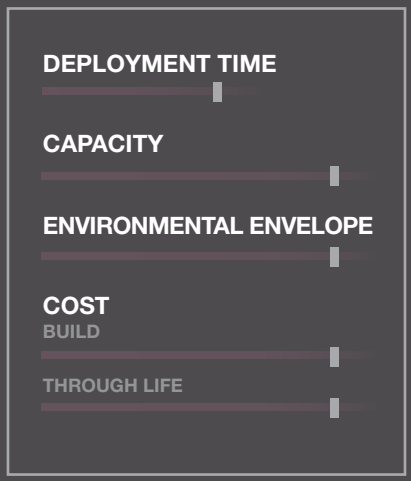
* Option available of depth rating up to 610m.
** Option available up to sea state 6.
† Other TUP capacities available on request.



RAPID DEPLOYMENT **SRV SYSTEM**

JFD's 3rd Generation Rapid Deployment SRV system has been designed from the ground up to rapidly mobilise to a MOSHIP. By integrating the decompression chambers and launch and recovery system, the requirement to install the A-Frame prior to the chambers (to ensure alignment) is removed. This greatly reduces the deck space required allowing for deployment to a wider range of Vessels of Opportunity resulting in a further reduced Time to First Rescue.

In addition to the key MOSHIP optimisations, the entire system is optimised for road and air transport with a reduced number of trucks required and more equipment able to be carried by commercial aircraft.



ADVANTAGES

- Maximum capability; ability to operate at the fullest extent of depth and current and adapt to changing rescue scenarios.
- Maximum sortie capacity and minimum sortie time.
- Lowest deck space requirement of SRV based systems.
- Lowest mobilisation time of SRV based system.
- No Vessel of Opportunity (VOO) DP requirement.

TRADEOFFS

- Requires high crew skill level and corresponding standard of training and upkeep.
- Highest upfront costs.
- Highest through life costs.
- Some compromises to capability/ comfort as a result of transport and mobilisation optimisations e.g. restricted volume of DDCs.

Small compromises in capacity and environmental envelope are required to achieve the rapid deployment times, however the 3rd Generation System remains amongst the most capable in the world.

SPECIFICATION

VEHICLE	
Rescue Capacity	16
Depth	500m*
Classification	Lloyds Register

LAUNCH & RECOVERY SYSTEM	
Load Rating	30 tonnes
Operating Sea State	4**
Classification	Lloyds Register

TUP	
Capacity	60 - 90†
Classification	Lloyds Register

ROV
1000m intervention ROV as standard

ANCILLARY EQUIPMENT	
Standard	Tracking system, surface comms, workshop/spares container
Optional	Generator, mating targets, side scan sonar, ELSS pods and pod posting target

DECK	
Deck Footprint	400m²

TRANSPORT	
Trucks	12
Aircraft (small items)	777-200F, 747-400F, C130, Embraer C-390, A400M
Aircraft	IL-76, C17, AN-124, A400M, C5

* Option available of depth rating up to 610m.
** Option available up to sea state 6.
† Other TUP capacities available on request.

FLYAWAY **RAPID RESPONSE BELL**

The Flyaway Rapid Response Bell had a single primary design goal - to allow the entire system to be transported by the widest range of commercial aircraft possible.

With air transport requirements being the most challenging aspect of a global submarine rescue deployment, the Flyaway Rapid Response Bell ensures that even without any military transport, the system will be on site at the location of a submarine emergency in the shortest possible time.

As a result of the air transport optimisation, the system also has the smallest deck footprint of any offered system, hugely increasing the range of possible Vessels of Opportunity for deployment.

DEPLOYMENT TIME

CAPACITY

ENVIRONMENTAL ENVELOPE

COST
BUILD

THROUGH LIFE

ADVANTAGES

- Compatible with widest range of aircraft including many commercial freight aircraft - minimising TTFR.
- Takes up a minimum of deck space - allowing widest range of VOOs therefore shorter TTFR.
- Simple system, low upfront and ongoing costs.

TRADEOFFS

- Limited depth.
- Limited rescue capacity requires more sorties per submarine, increasing overall rescue duration.
- DP2/4-point mooring VOO required.
- Cannot operate without ROV or divers capable of safely diving to DISSUB depth.
- Most restricted environmental operating envelope i.e. sea state, depth, DISSUB angle etc.
- Submarine escape hatches must be fitted with haul down points.

Whilst transport optimisations do come at the cost of capacity and environmental envelope, the Rapid Response Bell is still more than capable of dealing with the majority of submarine emergencies on its own and also makes an excellent complement to a larger, slower system.

SPECIFICATION

VEHICLE	
Rescue Capacity	6
Depth	300m
Classification	Lloyds Register

LAUNCH & RECOVERY SYSTEM	
Load Rating	6 tonnes
Operating Sea State	4
Classification	Lloyds Register

TUP	
Capacity	12†
Classification	Lloyds Register

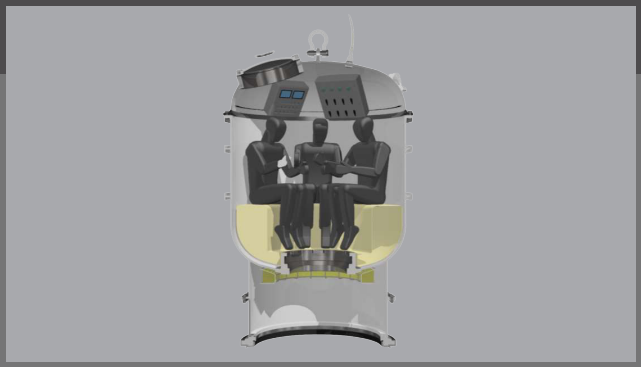
ROV
1000m intervention ROV as standard

ANCILLARY EQUIPMENT	
Standard	Transport cradle, winch umbilical and sheave wheel, compressor, surface comms, tracking system, workshop/spares container
Optional	Generator, mating targets, side scan sonar, ELSS pods and pod posting target

DECK	
Deck Footprint	150m^2

TRANSPORT	
Trucks	4
Aircraft	777-200F, 747-400F, C130, Embraer C-390 A400M, IL-76, C17, AN-124, C5

† Other TUP capacities available on request.



FLYAWAY **RAPID RESPONSE BELL XL**

The Flyaway Rapid Response Bell XL trades some of the transportability of the Flyaway Rapid Response Bell for capacity and environmental envelope.

The Flyaway Rapid Response Bell XL can still be transported by only commercial freight aircraft whilst nearly matching an SRV based system in environmental envelope.

DEPLOYMENT TIME

CAPACITY

ENVIRONMENTAL ENVELOPE

COST

BUILD

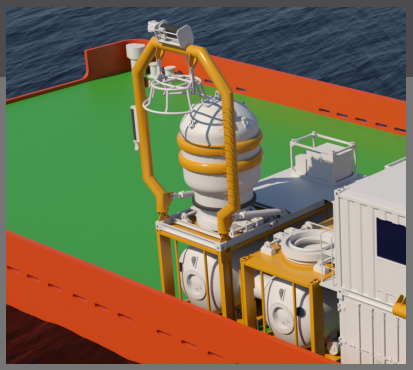
THROUGH LIFE

ADVANTAGES

- Compatible with larger commercial freight aircraft lowering TTFR.
- Balance between Rapid Response Bell and SRV based systems - good depth and environmental operating envelope whilst still not requiring as much deck space as an SRV based system.

TRADEOFFS

- Limited rescue capacity requires more sorties per submarine, increasing overall rescue duration.
- DP2/4-point mooring VOO required.
- Restricted environmental operating envelope i.e. sea-state DISSUB angle etc.
- Cannot operate without ROV or divers capable of safely diving to DISSUB depth.
- Submarine escape hatches must be fitted with haul down points.



SPECIFICATION

VEHICLE	
Rescue Capacity	11
Depth	500m*
Classification	Lloyds Register

LAUNCH & RECOVERY SYSTEM	
Load Rating	8 tonnes
Operating Sea State	4**
Classification	Lloyds Register

TUP	
Capacity	24†
Classification	Lloyds Register

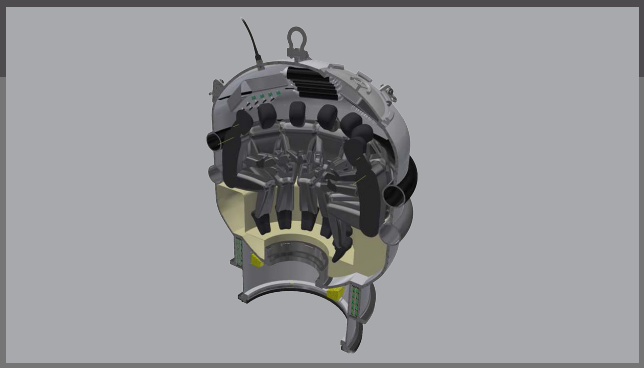
ROV
1000m intervention ROV as standard

ANCILLARY EQUIPMENT	
Standard	ISO transport skids, transport cradle, winch umbilical & sheave wheel, compressor, surface comms, tracking system, workshop/spares container
Optional	Generator, mating targets, side scan sonar, ELSS pods and pod posting target

DECK	
Deck Footprint	225m^2

TRANSPORT	
Trucks	5
Aircraft	777-200F, 747-400F, C130, Embraer C-390 A400M, IL-76, C17, AN-124, C5

* Option available of depth rating up to 610m.
** Option available up to sea state 6.
† Other TUP capacities available on request.



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