

SS H A D D O W E A L



TACTICAL DIVING VEHICLE





INSPIRED BY WW2 COMMANDO TACTICS 'THE SLEEPING BEAUTY'

'Sleeping Beauty' was a motorised submersible canoe developed by the British Special Operations Executive (SOE) during World War II.

The single man craft was designed to perform clandestine surface and sub-surface reconnaissance or covert attacks and was operationally deployed on a number of occasions.

Following the war there was minimal requirement to further develop these vehicles and they became stories of legend.

However, JFD understands the modern undersea battlespace and recognises the underwater manoeuvre capability a vehicle such as the Sleeping Beauty offers maritime Special Operations Forces (SOF). And so, the Shadow Seal was born.

Using advanced design methods and cutting edge materials, Shadow Seal combines the original Sleeping Beauty concept with modern navigation propulsion and sensor technology to create a unique Tactical Diving Vehicle (TDV) suitable of undertaking a range of complex mission profiles.



JFD PRESENTS SHADOW SEAL

Shadow Seal is a unique TDV design that enables the discrete and covert transportation of four operators and equipment on the surface, semi-submerged or fully submerged.

Shadow Seal has been designed to be lightweight and portable, ideal for rapid insertion into the littoral operational environment by a variety of support platforms.

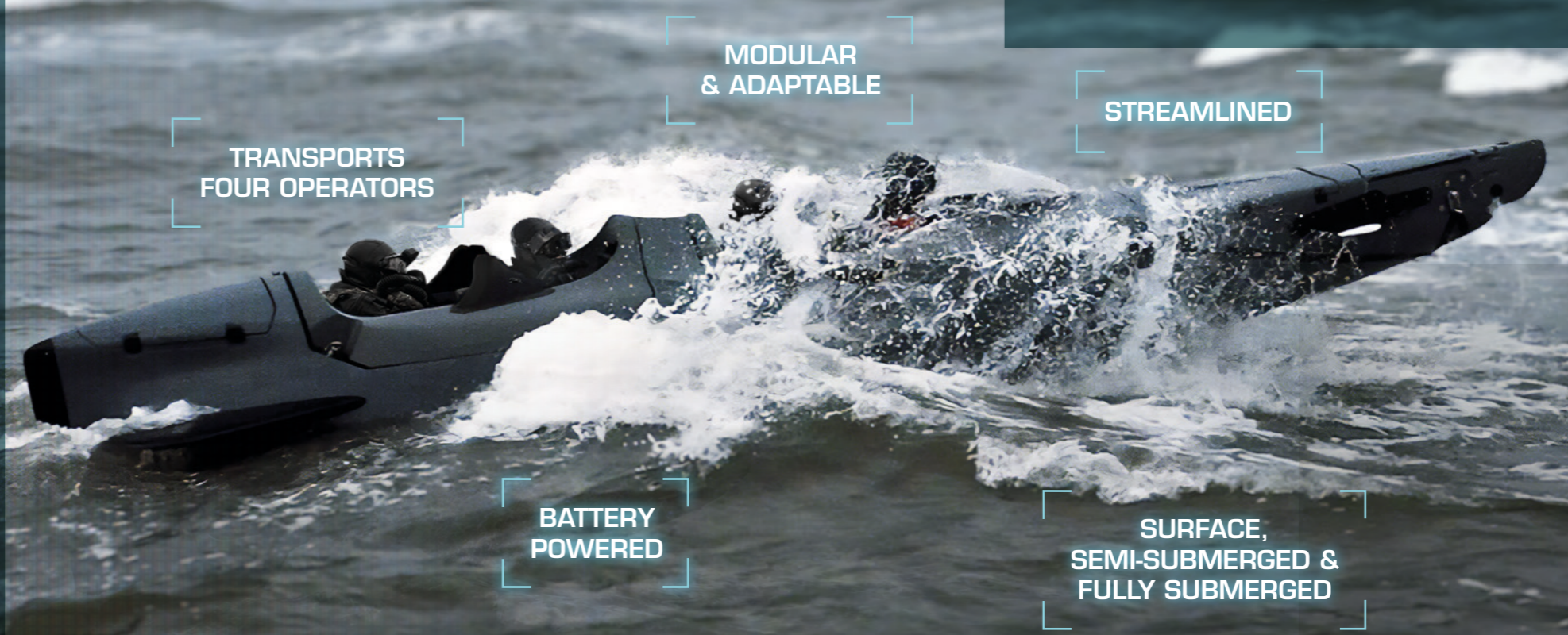
The craft is powered by batteries and propelled by two directional thrusters positioned above the keel enabling the craft to be bottomed out on the seabed.

The platform is streamlined, easy to manoeuvre and has an intuitive navigation system requiring minimal training.

It is modular and adaptable, able to integrate custom systems, weaponry and software to enhance its operational effectiveness.

In addition to four Operators, Shadow Seal has storage space for mission critical equipment, such as communication systems, small arms, ammunition and demolitions.

Shadow Seal provides a practical and cost-effective solution for maritime SOF who are looking to project underwater manoeuvre capability within restricted or denied littoral and riverine environments.



TRANSPORTS
FOUR OPERATORS

MODULAR
& ADAPTABLE

STREAMLINED

BATTERY
POWERED

SURFACE,
SEMI-SUBMERGED &
FULLY SUBMERGED

THE CAPABILITY POTENTIAL OF SHADOW SEAL FACILITATES THE FOLLOWING OPERATIONAL TASKING:

- + Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR)
- + Pre-amphibious landing hydrographic survey
- + Over The Beach (OTB) operations
- + Critical asset or infrastructure neutralisation
- + Sea-bed sensor deployment
- + Maritime Interdiction Operations (MIO)
- + Maritime Counter Terrorism (MCT)
- + Counter narcotic operations
- + Agent infiltration and exfiltration
- + Tactical deception

Shadow Seal can adapt to a variety of mission profiles.

CONOPS

CONCEPT OF OPERATIONS

When mission planning, critical infiltration & exfiltration considerations are time, distance, speed, period of darkness, tidal conditions and weather windows. The extended surface and sub-surface range and battery duration of Shadow Seal facilitates an over the horizon release and rendezvous with insertion and extraction support platforms, thus limiting the likelihood of mission compromise.

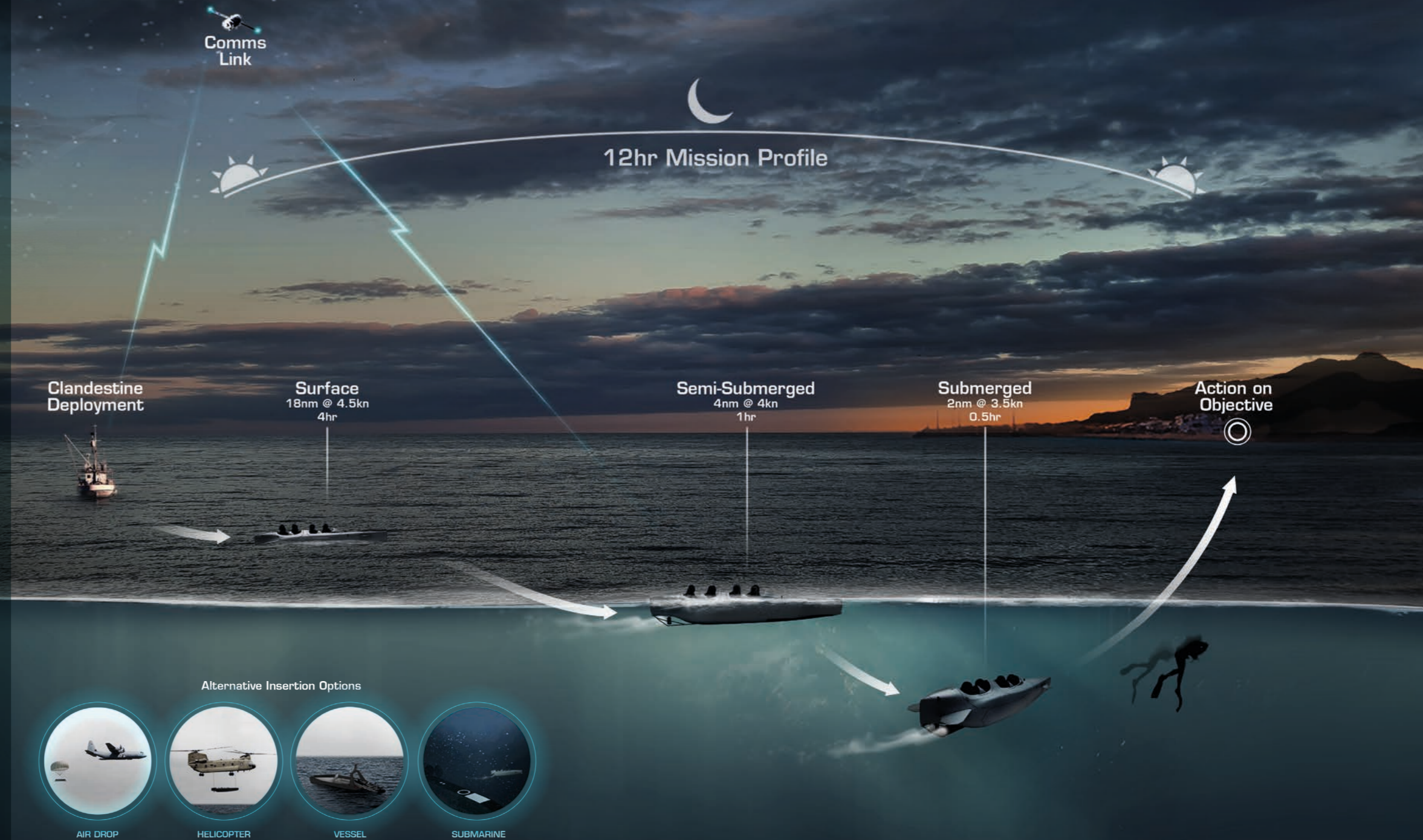
Shadow Seal is readily launched from its trailer across a suitable beach, down a slipway or by a small dockside crane and may be transported into the area of operations by small surface vessel, submarine, rotary wing aircraft or parachute.

In surface mode, Shadow Seal is manoeuvred like any small propellor driven surface craft. For diving operations, Operators wear a suitable long duration Tactical Diving Life Support System (TD LSS) such as the JFD Shadow.

If diving operations below the safe limits of oxygen is necessary, a TD LSS such as the JFD Excursion may be used enabling free-swimming diving to a depth of 30m.

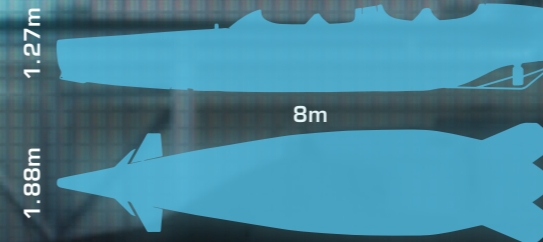
During the approach to the objective, Shadow Seal may submerge to remain undetected. Once at the objective, with a maximum diving depth of 24m, Shadow Seal may be cached on the seabed for exfiltration at a later time.

On-board sensors and navigation systems combine to provide safe transit and accurate positioning day and night, above or below the surface, regardless of vehicle speed or environmental conditions.



SHADOW SEAL

SPECIFICATIONS



OPERATIONAL STRETCH POTENTIAL

- + Air Drop
- + Extendable Mast
- + Electro optical system
- + Autonomy
- + Remote Control
- + Bespoke Launch And Recovery System
- + Bespoke Trailer
- + Stand-off weapon integration

BUOYANCY SYSTEM

To quickly achieve positive buoyancy for routine or emergency use, Shadow Seal incorporates a buoyancy system supplied by high pressure compressed air.

CLOSED CIRCUIT BALLAST & TRIM SYSTEM

To optimise performance and control, Shadow Seal incorporates a Closed Circuit Ballast & Trim System enabling neutral buoyancy to be readily achieved in a range of operational environments.

DIMENSIONS & WEIGHT

- OVERALL LENGTH:** 8.0m / 26ft.3in.
- WIDTH:** 1.88m / 5ft.11in.
- HEIGHT WITH MAST:** 2.18m to 4.12m (fully extended mast) / 7ft.2in. to 13ft.6in.
- WEIGHT:** 2,500kg
- TOTAL WEIGHT:** 2,500kg + 750kg (Personnel and Equipment)

REMOTE CONTROL

The vehicle has the capability to be remotely controlled expanding its operational employment potential.

BUILT-IN-BREATHING SYSTEM

When submerged, operators use personal life support systems such as oxygen rebreathers, however, Shadow Seal incorporates a Built-In-Breathing System for extended diving profiles and emergency use.



4 OPERATOR CAPACITY



POWER SYSTEM

Shadow Seal is powered by 8 x 10kwh batteries that drive the propulsion system.

- BATTERY PACK:** 8 x 10 kWh
- PROPULSION THRUSTERS:** 2 x 9 kW
- RANGE SUBMERGED:** 25 nautical miles or 7hrs at 3.5 knots
- RANGE SURFACE:** 80 nautical miles or 20hrs at 4.5 knots

RELATED CAPABILITIES

PROVIDING FULL MISSION CAPABILITY

TACTICAL DIVING VEHICLES (TDV)

JFD has a pedigree and heritage in the manufacture and provision of one atmosphere and free-flooding manned submersibles.



WET SUB SEAL

- Designed for subsurface range and speed
- Launched from a dry deck shelter, surface vessel, rotary wing aircraft, trailer or quayside crane

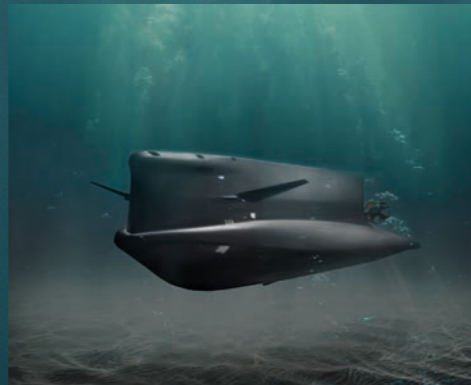
+ Length	7.4m
+ Beam	2.4m
+ Height	1.7m
+ Weight	3,500kg
+ Max Depth	30m
+ Max Speed	9 knots
+ Persons	2+6
+ Range	70nm



CARRIER SEAL

- Eight-man TDV
- Designed for covert insertion and extraction
- Carrier Seal can run fully submerged

+ Length	10.45m
+ Beam	2.23m
+ Height	1.65m
+ Weight	4,000kg
+ Max Depth	30m
+ Max Speed	30 knots
+ Persons	8
+ Range	15nm +



DRY CARRIER SEAL

- Rapid insertion over the horizon
- Two crew Operators
- Transporting upto ten Divers
- Dry environment prior to a sub-surface lock-out

+ Length	15.7m
+ Beam	3.5m
+ Height	2.5m
+ Weight	13,000kg
+ Max Depth	60m
+ Max Speed	35 knots
+ Persons	Upto 2+10
+ Range	25nm



ENFORCER

- Lightweight compact design
- Optimised for rapid deployment high tempo shallow water
- Short duration mission profiles

+ Height	45cm
+ Width	43cm
+ Depth	12cm
+ Weight	7kg
+ Max Depth	15
+ Duration (hrs)	2-3
+ Pressure	300 bar cylinders



SHADOW

- Long endurance
- Mission flexibility and operational capability
- Back-mounted option available

+ Height	55cm
+ Width	43cm
+ Depth	12cm
+ Weight	9kg
+ Max Depth	15
+ Duration (hrs)	4-6
+ Pressure	300 bar cylinders



EXCURSION

- Combined closed circuit oxygen/ semi-closed circuit nitrox
- Diving capability beyond the safe depth and time exposure limitations of oxygen

+ Height	67cm
+ Width	43cm
+ Depth	12cm
+ Weight	11kg
+ Max Depth	30
+ Duration (hrs)	4-6
+ Pressure	300 bar cylinders



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