Joren Marine
Marine Equipment

TABLE OF CONTENTS

DOCUMENT REVISION RECORD 2
TABLE OF CONTENTS 3
1.0 INTRODUCTION 4
2.0 MRV BASIC VEHICLE SPECIFICATION 5
2.1 MRV ROV 5
2.2 VEHICLE MANIPULATOR AND SENSOR FIT 6
2.2.1 Manipulators 6
2.2.2 Sensors 6
2.3 Other Equipment 7
3.0 TOOLING OPTIONS 8
3.1 Hydraulically-operated Tooling Equipment 8
3.2 Electrical/ electronic interfaces 8
4.0 TETHER MANAGEMENT SYSTEM 9
4.1 Introduction 9
4.2 TMS Topside Control Unit 10
4.3 TMS General Specification 10
4.4 Tether composition 11
5.0 Launch and Recovery System 12
5.1 Introduction 12
5.2 A- Frame 12
5.3 Snubber Assembly (top of A-frame) 13
5.4 Umbilical Winch 13
5.5 Winch Electro-Hydraulic Power Pack 14
5.6 Deck Testing Hydraulic Pack (Deck Pack) 15
Quick connect couplings are fitted all-round, ensuring adaptability to all requirements. ... 15
6.0 SURFACE CONTROL VAN 16
6.1 Introduction 16
6.2 Physical Construction 16
6.3 Insulation, linings and openings. 16
6.4 Electrical Features. 17
6.5 Control Console Features. 17
7.0 WORKSHOP GENERAL INFORMATION 19
7.1 General Information 19
7.2 Workshop Furniture 19

1.0 INTRODUCTION

This document details the MRV ROV system.

2.0 MRV BASIC VEHICLE SPECIFICATION

2.1 MRV ROV

Weight in air	: 3000kg
Dimensions	: L= 3600mm B= 1850mm H= 1900mm
Depth Rating	: 1000 msw

Buoyancy: 1000 msw rated syntactic foam buoyancy. Easily removable to facilitate maintenance and to allow attachment of additional buoyancy

Payload: The vehicle has a payload (removable lead ballast) of 150 kg in addition to the normal equipment fit of manipulators, camera, sonar etc. The removal of the lead ballast does not adversely affect the vehicle's trim or handling characteristics.

Vehicle frame: Constructed from high strength aluminium alloy (no sealed hollow sections) with stainless steel fasteners used throughout c/w 4 off primary and 4 secondary attachment points for forward, aft and side mounted work packages. The frame has no welded sections and is easily repairable should any damage occur.

Through-frame lift capacity: The vehicle is capable of operating with an all up weight of 7000kg (including buoyancy) and the frame is designed to accommodate such additional payload in a variety of attachment locations e.g. 5000kg under slung, up to 2200kg forward or aft mounted, 1.8m from vehicles transverse centre line and up to 500kg on either side at up to 1.25m from vehicles longitudinal centre line.

Auto-functions	: Heading +_ 1 degree
	: Depth +_ 75mm
	: Altitude +_ 100mm
Pitch and Roll	: Display on VDU, resolution of +/- 1 degree
	: For Survey purposes, resolution of 0.1 degrees on Data String.
Hydraulic	: Electro-hydraulic pack, nominal rating of 75kW (100hp)
Power Pack	: Output pressure of 230 bar, 155 Lpm
Propulsion	: 4 vectored axial, 2 vertical, all 15" diameter RHL thrusters. Individual isolation, control and feedback.
Thrust figures	: 650kgf forward, 650kgf aft, 650 kgf lateral, 600kgf up, 450kgf down
Speed at Depth	: 2.0 knots forward, 1.8 knots lateral, 2.0 knots vertical

2.2 VEHICLE MANIPULATOR AND SENSOR FIT

2.2.1 Manipulators

Left Hand Manipulator

Model	: Schilling Rigmaster manipulator
Control	: Push Button
Lift Capacity	: 270kg @ 996mm (fully retracted)
Wrist Torque	: 170 Nm
Jaw Closure Force	: 4,448 Nm
Jaw Opening	: 284 mm

2.2.2 Sensors

Video Capability	: Can Accommodate 7 cameras.
Cameras Fitted	: 1x Kongsberg 15-100 NSIT,3 x Kongsberg 1366/14-366
Sonar System	: UDI- Sonavision 4000 (100m range, high resolution display)
Pan and Tilt Units	: 2-off Tritech PT3636-c
Altimeter	: Altimeter missing
Depth Sensor	: Digiquartz pressure transducer type 43KIO (2000m rated)
Heading Sensors	: AIM 205BL gyro (can be slaved to compass and slewed) : Thorn EMI HR3MA Fluxgate Compass
Water Ingress Sensors	: Junction Boxes, Valve Packs, HPP (hydraulic power pack) Pump, HPP electric motor and 8-off user-defined spares.
Alarms	: Water ingress, dc and ac insulation resistance. Telemetry Failure, HPP electric motor temperature, hydraulic oil temperature & pressure alarms.

2.3 Other Equipment

Lights	:7-off ROS QL3000 (Tungsten Halogen) Unit @ 250W, 120 V each (dimmable in pairs)
Junction Box No.1 (JB1) includes;	: Tether termination of all fibers & conductors. : ROV standard equipment Interfaces (Sonar, lights, etc.) : All required interconnecting cabling
Junction Box No.2 (JB2) includes;	: 2000V/ 120V/ 28V Transformer for all instrumentation/ equipment power requirements.

3.0 TOOLING OPTIONS

3.1 Hydraulically-operated Tooling Equipment

There are two interface points on the MRV for hydraulic tooling. These are;

a) Tooling Manifold : 2 outlet hydraulic supply available with QD connections. Maximum flow 70 Lpm @ 200 bar, undirectional or bi-directional.

b) General Functions VPs : Two valve packs each with 11-off three position valves. These are for low flow (8 lpm @ 166 bar) tools are more commonly used for hydraulic cylinders, pan & tilt units, small hydraulic motors, etc.

3.2 Electrical/ electronic interfaces

The MRV has in-built spare capacity, in terms of electrical & electronic expandability.

Electrical : Up to 81 kW of main system electrical power available at the user output.

Electronic: 32 digital input/output unallocated and available for user, 12 analogue input/output, unallocated and available for user. A total of 7 Data I/O's are available for user equipment.

Survey Junction Box includes: 10-off 6 way Wetcon bulkheads pre-wired to tag-strips configured for common power supplies and spare data channels. SJB is commonly interfaced for 8 channels of equipment on RS422/485 / Arcnet and various ac/dc power supplies wired for general use. This can easily be reconfigured for specific equipment.

4.0 TETHER MANAGEMENT SYSTEM

4.1 Introduction

The Tether Management System (TMS) was designed and built by Perry(PSSL) and is fabricated from mild steel sections. It is attached to the surface launch system by a main lift umbilical with conductors and fibres, connected to a universal joint/lift bullet assembly.

The following components are fitted to the TMS frame;

1) Tether Drum and drive assembly.
2) Tether Sheave Wheel and drive assembly.
3) Pressure Vessel containing all control electronics and video transmitter.
4) Electro-hydraulic Power Pack, valve packs and all associated pipe-work.
5) Camera- fixed
6) Lights
7) Interconnect cabling between the Fixed Junction Box and the Pressure Vessel
8) Docking Box Assembly
9) Level wind assembly and chain driven sprockets
10) Fixed and Rotating Junction Boxes and Slip-ring unit

The TMS has two functions:

a) Tether Management and
b) Vehicle launch and recovery

a) The tether is stored on a horizontally-mounted drum which is hydraulically driven. From the drum, the tether passes around a roller group which forms part of the spooling assembly. After it has passed around another static roller group, the tether is fed around a hydraulically-driven pulley. The logic controlling the drum and the driven pulley always ensures that the tether between the two is under tension. From the drive pulley, the tether is driven a short distance to the docking box and out of the TMS.

   All tether management operations are performed via a telemetry link to the surface topside controller. The telemetry link is used to switch the necessary valves and hydraulic power is provided by the 3.5kW HPP.

b) The TMS is deployed to the working depth and enables the MRV to operate without the additional problems of drag created by a “hard” umbilical to the surface. A docking box is provided at the base of the frame, enabling the MRV to be safely secured under the TMS. The docking box consists of two sets of rams and dogs which secure the vehicle for launch and recovery.

4.2 TMS Topside Control Unit

19" Rack mounted unit to provide control and indication of TMS operation.

This includes control transformer coils, TMS control/indication hardware and Ground Fault Detection. The TMS is controlled by a PLC based hard-wire system. All TMS control is by way of push-button switches on the front panel with an additional two footswitches on the floor for tether in/out control.

4.3 TMS General Specification

Safe Working Load	: 5.0 t
Weight in Air	: 1.8 t
Dimensions	: Height= 2.10m Diameter= 2.00m
Tether Capacity	: 520m @ 27mm Tether, 520m presently fitted.
HPP Power Requirements	: 3.5kW@ 1000 Vac, 3 phrase
HPP Output	: 170 bar @ 8 1pm
Function Distribution	: 1-off 2 function valve pack
HPP Oil Compensator Capacity	: 1.75 litres
Camera	: Sub Atlantic black and white camera
Lights	: 1-off 250W
Slipring Unit	: Focal Electro-optical (Type 176)
Slipring Capacity	: 5 Power conductors + Earth
	: 4-way Fibre Optic Rotary Joint (3 x MM, 1 x SM & 1 x Quad)

The slipring unit and all junction boxes (rotating and fixed), are oil filled and pressure compensated.

Latching Mechanism	: Operator controlled mechanical over-centre (hydraulic) main latches with spring-loaded failsafe latches.
Latch Indication Sensors	: Reed Switches on actuators for both Main and Failsafe Latches. Indicator lamps on topside control unit.

4.4 Tether composition

: 27mm with Aramid braid straighteners.

: 6-off 50/125 micrometers optical Fibres
: 6-off 9/125 micrometers optical Fibres
: 1-off (4 by 0.5mm) individual shielding quad
: 3-off 6mm power conductors
: 2-off 2.5mm power conductors
: Oil compensated from TMS and Vehicle ends.

5.0 Launch and Recovery System

5.1 Introduction

The LARS, as built by Odim of Norway to DNV design verification.

The LARS is a combined winch and A-frame complete with a hydraulically-operated extending work platform.

The A-frame extends hydraulically, enabling under slung work packages, to be mounted under the MRV.

5.2 A- Frame

SWL :42,000kg (fully deployed)

Skid Dimensions:
Width : 4845mm
Length : 7787mm including winch
A-frame Height : H= 9200mm
(for transport) : H= 3800mm,
Overboarding-Reach :4500mm
Distance Between Legs : 4000mm

Features a single-point lift using 4 sets of slings (supplied)

5.3 Snubber Assembly (top of A-frame)

This unit is bolted to the top of the A-frame, it is left in place, with the A-frame folded up for transport.

The snubber assembly consists of the following items;

a) Latch Box for latching/unlatching of the TMS bullet
b) Slew Ring-gear & motor for rotation/alignment of the TMS/MRV assembly to enable clearance for swinging inboard during recovery.
c) Dampening rams to reduce the swinging effect of the TMS/MRV assembly during rough weather.
d) Umbilical Sheave Wheel to maintain the umbilical above the minimum bend radius and provide safe handling.

5.4 Umbilical Winch

This consists of a 75 hp General Purpose ROV Lifting Winch built and supplied by macartney of Denmark.

Drum Capacity	: 2000 meters of 34.5mm armoured umbilical, (1700 meters currently fitted)
SWL	: 6500kg (on outer layer)
Maximum line pull	: 8.5 tonnes (on outer layer)
Line Speed	: 0-36 meters per minute@ outer layer, infinitely variable, bi-directional
Brake rating	: 15 tonnes at outer layer

Winch Overall Weight and Dimensions

Width	: 2100mm
Length	: 4845mm
Height	: 2100mm
Estimated Weight(less umbilical)	: 12000Kg

LARS Slip Ring	: Focal Technology Model 176 slipring
LARS J/Boxes	: Rotating and Stationary J/ Boxes fitted
Umbilical	: 1700 meters of JDR Armoured Umbilical
Level-Wind Mechanism	: Trapezoidal screw shaft driven by hydraulic motor with vertical and horizontal guide rollers.

Additional Features	: Stainless Steel Quick disconnect fittings for all connections to Hydraulic Power pack and Snubber assembly : Exd rating possible for zoned areas.

5.5 Winch Electro-Hydraulic Power Pack (Built into the winch)

Electric Motor	: 75 hp (55kW), wash-down rated
Additional Features	: Water/oil heat exchanger

5.6 Deck Testing Hydraulic Pack (Deck Pack)

MRV has a small hydraulic unit for testing equipment functions on deck. It is capable of supplying 10 Lpm @ 170 bar.
It is fitted with two control valves for testing project equipment

There is also an oil/water separator for removing any water contamination from the vehicle hydraulic system. This ensures that the vehicle hydraulic components retain reliability and limits corrosion of internal components.

Quick connect couplings are fitted all-round, ensuring adaptability to all requirements.

6.0 SURFACE CONTROL VAN

6.1 Introduction

General Information

Control Van	: A60, (Zone II capable)
Weight	: 10.5t
Dimensions:	
Length	: 6.10m (20ft)
Width	: 2.44m (8ft)
Height	: 2.60m (8ft 6 in)

6.2 Physical Construction

- Corrugated steel walls, with four top corners fitted with recessed lugs and corner castings.
- Skid is fitted with forklift tunnels
- Recessed frame for personnel door, on end wall.
- Recessed frame for escape hatch, on side wall.
- Pressurisation inlet and extract ducts, for pneumatically operated fire dampers.
- 3 off RGS 6 MCT frames for cable access
- Supports fitted behind the internal wall and ceiling boards for the mounting of heavy equipment.
- Removable end for easy installation and removal of equipment.

6.3 Insulation, linings and openings.

- The floor, the roof and walls of the cabin are insulated and lined to comply with A60 regulations
- The internal walls and ceilings are lined with composite board bonded with a PVC-coated sheeting.
- The internal floor is covered with non-slip sheet vinyl. The cabin is fitted with an internal airlock which complies with B 15 standard.
- The cabin is fitted with an outward opening A60 personnel door c/w closer.
- The airlock is fitted with a BIS door c/w self closer.
- The cabin is fitted with an A60 escape hatch.
- The pressurisation inlet and extract ducts are insulated and lined to comply with A60 requirements.

6.4 Electrical Features.

: Vehicle instruments transformer 6kVA
: 75kW power pack transformer 120kVA
: 28kW power pack transformer 60kVA
: Power Distribution Panel c/w double pole circuit breakers for lighting and sockets.
: High Voltage Junction Box containing GFD sensors and a convenient location for Power Deck Cable connections
: 2-off twin fluorescent light fittings
: Exe emergency light in airlock
: Exe emergency light in cabin
: 220 V 13 Amp double pole switched sockets (Euro type).
: Dimmable bulkhead lights.

6.5 Control Console Features.

- Control Console Shock Mounts are mounted on the floor and ceiling.
- Three pedestal-mounted chairs for personnel.
- Standard MRV Pilots Control Console consisting of a 19" rack containing the following:-

1-off 14" Colour Monitor (graphics)
1-off 14" Colour Monitor (video)
6-off 9" Colour Monitor (video)
3-off AG7350 VCR's
1-off 8*4 Video Switcher Unit
1-off PC Rack for MRV Control/ SELMEC System
1-off 240 Vac/ 120 Vac Transformer for Schilling Topside Control Unit Power
1-off Sonavision 4000 Topside Control Unit
1-off Canford Comms. System for communication with Survey Desk and/or other stations.
1-off Video Overlay Unit

- TMS Control Panel
- Deck Cable Breakout Box (Cross Connected) for termination of signal/data deck cable and interface to control console

Pilots Control Panel consisting of the following;

- Pilots Joystick
- Mini-joystick for control of Tether Camera Pan and Tilt unit.
- Joystick to control MRV thrusters, main pan and tilt unit and auto-trim functions.
- On/Off switches for vehicle equipment/ sub-systems power supplies and isolate switches
- Number Pad for Diagnostics Page Selection (0-15)

- Joystick Sensitivity potentiometer (0-100%)
- Alarm and System Resets
- Light Dimmer control potentiometers(4 off)
- Auto-heading, Auto-depth, Auto-trim and Auto-altitude select switches.
- Still camera trigger complete with counter and interface

Power Control Panel linked to PDP via SELMEC Telemetry Link for;

1) TMS and MRV instrumentation and HPP Power Switching.
2) Remote indication of Line Insulation conditions.
3) Remote indication of current drawn by each power train.

5.1.1 Power Distribution Panel

The MRV Power Distribution Panel (PDP) provides remote start and run circuits for the remote operation of the MRV System power trains. It requires 380-480 VAC, 3 phase, 50-60 Hz. 250A.

There are five power trains, namely;

1. Console Power
2. TMS Instruments Power
3. TMS Hydraulic Power Pack Power
4. MRV Instruments Power
5. MRV Hydraulic Power Pack Power

The PDP consists of the following items;

- Input voltage Meter
- System load current meter
- Elapsed Time Meters on all Power Trains
- Manual Breakers with lock off facility on all Power Trains
- Overload Protection on all Power Trains
- Line Insulation Monitoring Circuits. These units monitor all power trains for ground faults.

Inter-connect Cables:

- All internal inter-connect and power cables are provided to connect and operate the ROV system. These cables are flame retardent to meet A60 requirements.
- Certificates of conformity from vendor are provided.

Deck Inter-connect Cables:

1 off Deck Cable. HVJB- Umbilical Winch Fixed JB. 40m length

7.0 WORKSHOP GENERAL INFORMATION

7.1 General Information

Structure: 8ft by 8ft by 20ft ISO Control van, A60, Non Zone II

Dimensions are the same as the Control Container except there is no removable end.

Electrical: All electrical equipment in the cabin is wired in a combination of EPR CSP and PVC clipped direct to the walls.

List of Fitted Equipment.

1-off 10 kVA, 380V/ 480V input with 220V, 6kVA output
1-off 120V, 4kVA output single phase output
1-off Distribution board c/w double pole circuit breakers for lighting and sockets.
3-off Single fluorescent light fittings
1-off Exe emergency light in cabin
4-off 220V, 13 amp double pole switched sockets (Euro type).

7.2 Workshop Furniture

1-off Steel workbench (electrical) fitted along one end wall (Approx. 2.0m long)
1-off Steel workbench (mechanical) fitted along side wall (Approx. 2.5m)
3-off Steel wall mounted cupboards.
Dimensions 610mm high * 610mm wide * 310mm deep
3-off Steel 3 drawer units fitted under workbench
Dimensions 875mm high * 500mm wide * 500mm deep
2-off Cupboard units fitted under long bench

Open metallic shelving fitted along side walls.