



Introduction

The Oceantrench 01 is a tracked vehicle capable of trenching a product to a depth of 3m either fully submerged or through dried out areas and is capable of simultaneous or post lay burial.

The product is fed into the forward bellmouth and runs over the vehicle and into the depressor aft of the chain cutter. A hydraulically operated lockable depressor guides the cable to the bottom of the trench.

When out of water conventional tractors with onboard HPUs (Hydraulic Power Units) suffer from overheating problems of the motors and the oil as they require water to keep them operating at the required temperature. Having surface fed hydraulics allows the vehicle to operate in dried out sections as well as when submerged.

The 3.3m chain cutter fitted is fed directly from a surface hydraulic power pack. A separate hydraulic power pack feeds the vehicle valve tanks for auxiliary functions.

Dimensions (approx.)

Length	13.4m long (Cutter fitted)
Width	5.8m wide
Height	3.5m
Weight, ready for operating	30te

Performance

Maximum operating depth	30m tbc
Burial Depth	0 to 3m to top of product
Cutting capacity	Sand to very stiff clay
Diver less launch and recovery	Method TBC
EMG cable ejection	Method TBC
Minimum ground pressure	10Kpa

Trenching Speed 50 to 350m/hr Depending on seabed make-up.

Features

Depth control	Continuously variable
Burial system	3.3m Chain Cutter
Operation	Tracks
Control	Full remote control from shipboard control cabin
Product size	Diameter 30mm to 300mm
Product bend radius	3m minimum along the product path during normal trenching.
Launch/Recovery Method	Lift wire
Cable entry angle indication	Vertical and Horizontal feelers
Structure	High strength tubular steel
Wear Parts	Hard faced plate
Paint	2 pack epoxy
Cathodic Protection	Suitable sacrificial anodes

Chain Cutter

The chain is driven by two Rexroth MCR 20 radial piston motors. These motors have a maximum out torque of 17043Nm, maximum displacement of 3000cm³ and a maximum operating pressure of 450bar. The flange of the motor bolts directly onto the chain drive shaft from opposing sides, and the body of the motor is held by a bolted torque reaction arm secured to the vehicle main chassis.

Cutter HPU

Diesel-hydraulic power pack with remote control of pump output from Control container. Supply oil is from a closed loop Dennison P24P gold cup pump giving a theoretical 606l/min @ 1500 revs and a maximum continuous pressure of 350bar.

Oil Petro Canada Environ MV 46

Length	5.898m
Width	2.438m
Height	2.591m
Weight	15te

Track Drive

Final Drive units are Komatsu PC300 with a epicyclical reduction of 130:1
Track Drive motors are Komatsu PC220-3 fixed displacement piston motor
One revolution of the drive sprocket takes 15 seconds @ 50L/min supply = 2.2metres per revolution.

Auxillary HPU

A 127kw Electro-hydraulic power pack with a star delta changeover.

Oil Petro Canada Environ MV 46

Length	1.800m
Width	1.25m
Height	2.20m
Weight	2.5te

Hydraulic functions

The vehicle has 2 valve tanks fed from the surface auxiliary HPU.

- Chain tension adjust
- Tool up/down
- Depressor up/down
- Depressor lock/unlock
- Depressor heel open/close
- Bellmouth open/close
- Port track fwd/reverse
- Starboard fwd/reverse
- Feelers open/close

Control and Indication

Instrumentation

Pressure transducers

Linear transducers

Proximity sensors

Inclinometers

Encoders

Rota linear transducers

Impulse molded neoprene
Pepperl-Fuchs NMB2-12GM65-E2-C-FE-V1
Pepperl-Fuchs

Incremental Shaft Encoder Type R1 32

Surveillance

Cameras

Lights

Altimeter

Depth sensor

Pan & Tilt unit

Sonar

Gyro, Pitch and Roll

Transponder

GPS Receiver

Hydrophone

Kongsberg Simrad OE14-110/111 Compact
Colour.
Kongsberg Simrad OE14-364 High Resolution
Colour.

Bowtech LED-1600 Light

Tritech PA200 Digital Precision Altimeter

Keller High Precision Pressure Transmitter

Sub Atlantic

Kongsberg MS 1000 Scanning Sonar

Octans Gyro

Sonardyne Wideband Sub-Mini

Trimble DSM Modular GPS Receiver

CTG0756 General Hydrophone

Surface Control Container

10ft lined and insulated container housing main power distribution (PDU) and control system.

Width	2430mm
Length	3000mm
Weight	_____

The desk contains both the pilots and co-pilots panels. The pilot controls vehicle speed and direction and the co-pilot controls the Chain Cutter controls.

Four LCD VGA/Composite monitors display the graphics, camera, sonar and navigation screens. A 4 channel MPEG-4 digital video recorder (DVR) records the composite pictures and is fitted with a DVD-RW drive and USB 2.0 port for archiving. Separate PC for logging vehicle data using I/O Sys logging software.

Pilots Panel

The following functions are fitted to the pilot's panel:-

- Camera 1, 2 and 3.
- Lights 1, 2 and 3
- Sonar
- Altimeter
- Hydrophone
- Transponder
- GPS
- Chain Tension
- Bellmouth Open, Close, Lock and unlock
- Depressor Up, Down, Lock Unlock
- Tool Up and Down Joystick
- Track Enable
- Track Local/Remote
- Port Track Demand Joystick
- Starboard Track Demand Joystick
- Pan & Tilt Joystick
- Screen Select

Co-Pilots Panel

The following functions are fitted to the co-pilot's panel:-

- Pressure Regulator
- Cutter Demand Joystick

- HPU Reset
- Oil Level Ind.
- Oil Temp Ind.
- Vent Ind.

Control System

The surface and Subsea analogue and digital I/O are controlled by Adam 5000E PLC units fitted with various types of I/O modules. There are two 16 channel digital input modules and two 8 channel analogue modules fitted in the control console.

A rack mounted PC running Windows XP and A-Studio SCADA software communicates with the Adam 5000E units. The program controls the pilot's graphic display, all calibrations and the operation of the vehicle functions. Communication between the surface and Subsea PLCs is via an RS485 link.

The pilot has a choice of a number of screens from his control panel. The screens are:-

- Main Run Screen
- Calibration Screen
- Alarm Screen
- Diagnostic Screen

Main Run Screen

The main run screen displays the various sensors information and alarm status of the vehicle. The display is made up of bar graphs, digital values, alarm status and trend displays.

The pilot has an option of navigating the displays with the switch on the panel or by mouse.

Calibration Screen

The calibration screen shows the raw, calibration offset and display values. The calibration values are inputted via the screen either by the on screen keypad or the standard keyboard.

Navigation away from this screen is by mouse or by the selector on the panel.

Alarm Screen

The alarm screen displays all active alarms. The colour of the alarm indicates whether the alarm has been accepted or not.

Navigation away from this screen is by mouse or by the selector on the panel.

Diagnostics Screen

The diagnostic screen shows the state of the digital signals and the analogue values of the Subsea pod power supplies for fault finding purposes.

Navigation away from this screen is by mouse or by the selector on the panel.

Serial Outputs

The following variables are sent to the survey via an RS485 link:-

- Depressor angle
- Depressor foot angle
- Depth
- Cable Counter
- Pitch
- Roll
- Heading
- GPS position

Electrical Umbilical

The MacArneys supplied umbilical is connects directly from the surface console to the vehicle.

Description

Sheath	Polyurethane
Diameter	22mm
Min bend radius	220mm static 330mm dynamic
Length	200m
Cores	4 twisted screened quads (0.5 mm ²) 3 coax (RG 59) + 6 cores (1.0 mm ²).

Polyurethane sheath (R.T.2.5mm)
Overall diameter
4 twisted screened quads (0.5 mm²)

3 coax (RG 59) +
6 cores (1.0 mm²).

Subsea Pod

The Subsea pod is supplied with 250 VAC. This is protected by a Line Insulation Monitor (LIM).

The pod is rated to 120m water depth and houses the following components:-

- Subsea PLC
- GPS Tracker
- 4 Power Supplies
- Relay Contacts
- Re-settable Fuses
- Power Fuses
- Pitch & Roll Sensor

The PLC has two 16 channel digital output modules, one 4 channel analogue output module, two 8 channel analogue input modules and one 16 channel digital input module.

The digital outputs are as follows:-

- Camera 1, 2 and 3.
- Lights 1, 2 and 3
- Sonar
- Altimeter
- Hydrophone
- Transponder
- GPS
- Chain Tension
- Bellmouth Open, Close, Lock and unlock
- Depressor Up, Down, Lock Unlock
- Depressor foot open/close
- Depressor foot lock/unlock
- Tool Up and Down
- Port Track Drive
- Starboard Track Drive
- Pan & Tilt

The digital inputs are as follows:-

- Depressor locked
- Pod water detect
- Valve tank 1 & 2 water detect
- Termination JB water detect
- Port track fwd/astern indication

- Starboard track fwd/astern indication

The analogue outputs are as follows:-

- Port track drive
- Starboard track drive

The analogue inputs are as follows:-

- Tool depth
- Altimeter signal
- Pitch
- Roll
- Compensator 1, 2, 3 & 4
- Horizontal feeler position
- Vertical feeler position
- Heel angle
- 24vdc supply 1, 2, 3, & 4 voltage.

Track Drive

The track assemblies are Kamatsu units with 59 1600mm x 195mm nylon track pads and modified with 10 bottom rollers and three carriage rollers. The rollers are oil filled and compensated. The track box assembly is fitted with a recoil spring to help maintain correct track tension and to absorb shocks

Chain Cutter

2 x Radial piston multi stroke MCR series motor.

Hydraulic Hose Umbilical (Made into one bundle)

2 x 2" multi spiral hose for chain cutter A + B supply

1 x 1 ¼" 2 wire hose for chain cutter case drain

1 x 1" multi spiral hose for Auxiliary supply

1 x 1" 2 wire hose for Auxiliary return

1 x ¾" 2 wire hose for track drive case drain