



## ASL Client Training Courses

### Pre-Requisites:

- Our courses can be targeted to either the experienced engineer requiring refresher training or to staff new to the industry. We would encourage groups to be of similar experience to allow best differentiation of learning. Trainee Group Sizes (2-6).
- The only prerequisite is a willingness to embrace both the classroom and practical theory.
- The courses are delivered in English. However we can assist with arranging translation services if required.
- Inclusive accommodation is available on location in Somerton, UK for groups sizes up to 6. Lunch is also provided.
- We recommend trainees bring a laptop PC for classroom theory.
- Health and Safety - All course tasks are risk assessed and take place in a safe environment. All PPE items are provided, although we advise trainees to bring their own protective footwear to ensure maximum comfort.

ASL understands the diverse skill sets required for providing an effective borehole seismic service. We can tailor our training courses appropriately to meet the needs of the seismic field engineer, technical/electrical maintenance engineer, in addition to providing a more general industry overview and well-deployment experience to business development/administrative staff and engineering/geoscience undergraduates.

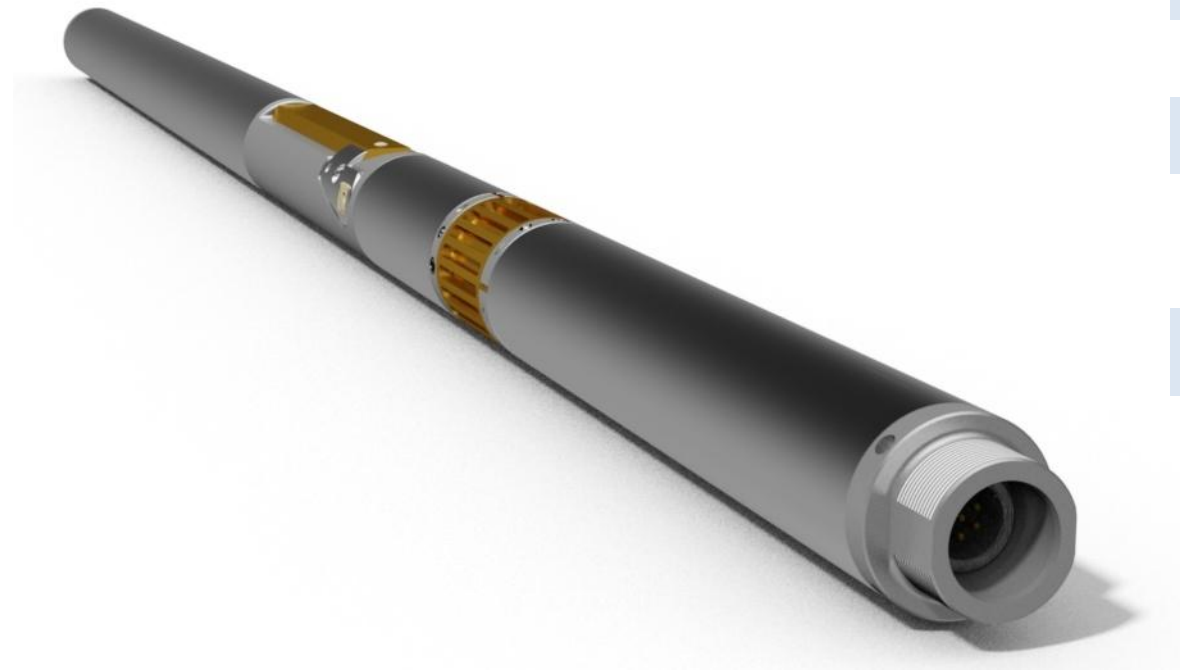
	Module Title	Avalon Maintenance Course	Field Engineer Course	Avalon Borehole Seismic Course	Geosciences Short Course
<b>M1</b>		<b>Introduction to Geochain and Geochain Slim Systems</b>			
M 1.1	Foundation Seismic Theory	Core Module	Core Module	Core Module	Core Module
M 1.2	System Overview	Core Module	Core Module	Core Module	Core Module
M 1.3	Downhole Connections	Core Module	Core Module	Core Module	Core Module
<b>M2</b>		<b>Geochain and Geochain Slim Routine Maintenance</b>			
M 2.1	ASR/GSR Routine Maintenance	Core Module	Core Module	N/A	N/A
M 2.2	ASR/GSR Wire Insertion	Core Module	Core Module	N/A	N/A
M 2.3	VRS/SVRS Routine Maintenance	Core Module	Core Module	N/A	N/A
M 2.4	TAS/STAS Routine Maintenance	Core Module	Core Module	N/A	N/A
<b>M3</b>		<b>Geochain and Geochain Slim Major Maintenance</b>			
M 3.1	Arm Drive Major Maintenance	Core Module	Core Module	N/A	N/A
M 3.2	ITC Reheading	Core Module	Core Module	N/A	N/A
<b>M4</b>		<b>Ancillary Tool Maintenance</b>			
M 4.1	TCU Maintenance and Operation	Core Module	Core Module	N/A	N/A
M 4.2	Gamma Tool Maintenance and Operation	Core Module	Core Module	N/A	N/A
M 4.3	Cross Over Maintenance	Core Module	Core Module	N/A	N/A
<b>M5</b>		<b>Advanced Electronic Maintenance of Electronic Components</b>			
M 5.1	Technical Maintenance	Core Module	N/A	N/A	N/A
M 5.2	Advanced Maintenance of digital components	Core Module	N/A	N/A	N/A
<b>M6</b>		<b>ACQ Acquisition Software</b>			
M 6.1	Introduction to ACQ Software	Core Module	Core Module	Core Module	Core Module
M 6.2	Internal System Tests	Core Module	Core Module	Core Module	Core Module
M 6.3	Acquiring Data	Core Module	Core Module	Core Module	Core Module
M 6.4	Simulating ZVSP	Core Module	Core Module	Core Module	Core Module
M 6.5	Advanced ACQ	Core Module	Core Module	Core Module	Core Module
<b>M7</b>		<b>Well Operations</b>			
M 7.1	Configuration of Geochain/Geochain Slim	N/A	Core Module	N/A	Core Module
M 7.2	Configuration of Sources	N/A	Core Module	N/A	Core Module
M 7.3	Acquire real ZVSP	N/A	Core Module	N/A	Core Module
<b>M8</b>		<b>VSP Processing Fundamentals using VSProwess</b>			
M 8.1	Introduction to VSProwess	N/A	Optional Module	Optional Module	Core Module
M 8.2	Further Data Processing	N/A	Optional Module	Optional Module	Core Module
M 8.3	VSProwess-A rigside data QC Tool	N/A	Optional Module	Optional Module	Core Module
M 8.4	Logs, Data formats and data displays	N/A	Optional Module	Optional Module	Core Module



**Course Overview**

This course is targeted at field maintenance crew who wish to be able to perform routine and major mechanical and wiring maintenance of ASL downhole products.

**Trainee Group Size: 2-6**



**LEADERS IN BOREHOLE SEISMIC TECHNOLOGY**

**Modules**

*ATC 1*

**Avalon Maintenance Course**

**Time Required:**

4 Days for coverage of 1 complete tool system plus ancillaries

+ 2 days per additional alternative tool system

3 Days for Analogue System Only

**Modules:**

M. 1 Introduction to your downhole system (Geochain/Slim/EHP)

M. 2 Downhole System Routine Maintenance

M. 3 Downhole System Major Maintenance

M. 4 Ancillary Tool Maintenance (Optional)

M. 5 Advanced Maintenance of Electronic Components (Technical Prerequisite)

M. 6 ACQ Acquisition Software for Test

**Module Topics**



**Can only be attended by qualified technical electronics staff.**

**Prerequisite**



## Module Overview

This module is aimed at trainees who wish to gain a basic understanding of seismic theory and gain an understanding of the Geochain and/or Geochain Slim tool systems.

**Difficulty:** Foundation

**No Prior Experience of using ASL Products Required**

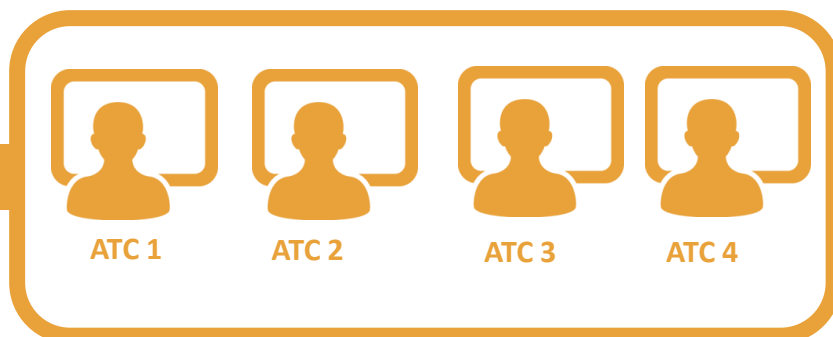
## M1.1 Foundation to Seismic Theory

**Learning Objective:** Trainees will have an introductory understanding of seismic source exploration . Key concepts and the application of VSP and microseismic monitoring.

**Topics:**

- Basic Petroleum Geology – Defining an Oil and Gas Trap
- Wave Propagation and Reflection at an Interface
- Wavelet Theory Fundamentals and Seismic Resolution
- Surface Seismic Concepts
- What are VSPs and their Applications?
- Hydraulic Fracture – Induced Seismicity and Monitoring.

### Relevant ATC Courses



## LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

### M1.2 System Overview

**Learning Objective:** Trainees will gain an understanding of the Geochain and/or the Geochain Slim tool system functionality, along with surface tools required for operations.

**Topics:**

- Acquisition System Overview
  - Geochain System Concepts (Analogue or Digital)
  - Description of the Distribution Telemetry System
  - ASR Locking Arm Control
- System Power Distribution
  - Detailed Examination of the Geochain Power System
  - Voltage Regulation and the Functionality of the VRS
  - Combination of Telemetry Signals and Power in the Wireline
- Module Description and Function
  - Module by Module Description of Capability and Functions
  - Geochain Fail Safe System
  - Geochain Safe Recovery System

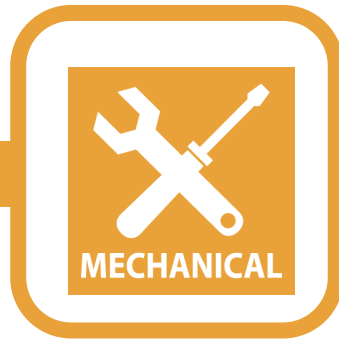
### M1.3 Downhole Connections

**Learning Objective:** Trainees will have a deeper understanding of Geochain and/or Geochain Slim systems, downhole connections and will have an understanding of the importance of good tool diagnostics and maintenance.

**Topics:**

- Geochain System Checks
  - Checking and Installation of Inter-Tool Cable
  - Power System Routing
  - Digital Signal Paths
- Using Wireline Adaptors
  - Selection of Correction Adaptor
  - Checking and Installation of Adaptor
- TCU-Tension Compression Unit Connection
  - Capabilities and Functions of TCU
  - Checking and Installation of TCU
- Importance of Maintenance





## Module Overview

This module is aimed at engineers and geoscientists who wish to carry out a Geochain and/or Geochain Slim routine maintenance.

**Difficulty:** Foundation

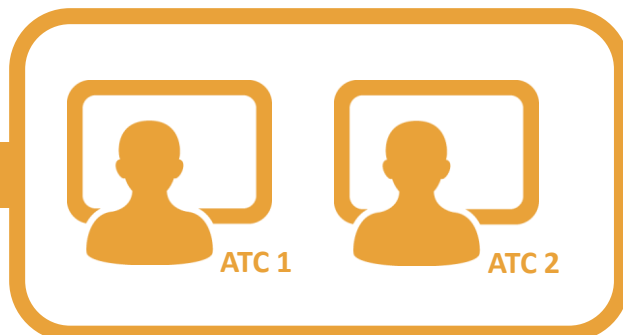
**No Prior Experience of using ASL Products Required**

### M2.1 Standard ASR/GSR post Job Maintenance

**Learning Objective:** The trainee will gain the ability to carry out a standard maintenance on the ASR/GSR downhole satellites.

**Topics:**

- Arm Assembly
  - Removal of the locking arm and side arm
  - Disassembly of the spline shaft drive
  - Removal of O-ring seals and inspection of parts
  - Fitting of new O-rings seals and re-assembly
  - Re-assembly of locking arms
- Sensor Pack Assembly (ASR only)
  - Removal of geophone cartridge and lower barrel
  - Disassembly of lower barrel
  - Cleaning and inspection
  - Re-assembly of lower barrel with new O-ring seals
  - Fitting of lower barrel to tool
  - Inspection and test of geophone cartridge
  - Fitting of geophone cartridge



### M2.2 Wire Insertion

**Learning Objective:** The trainee will be able to insert the tool body wiring and carry out basic electrical operational tests on the receiver tool.

**Topics:**

- Continuity and Insulation Test
- Motor Resistance Test

### M2.3 VRS/SVRS Routine Maintenance

**Learning Objective:** The trainee will be able to carry out a routine maintenance of the VRS/SVRS section of the tool.

**Topics:**

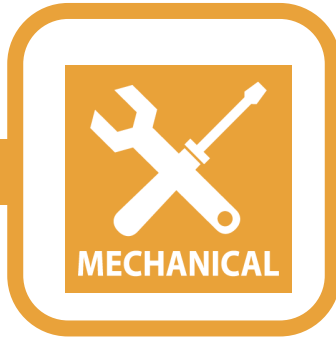
- Nose Cone
  - Removal of nose cone
  - Nose cone disassembly
  - Inspection and cleaning
  - Nose cone re-assembly
- VRS/SVRS Tool Body
  - Removal and maintenance of VRS plus (VRS only)
  - Removal of VRS barrel
  - Inspection and cleaning
  - Reassembly of barrel

### M2.4 TAS/STAS Routine Maintenance

**Learning Objective:** The trainee will be able to carry out a routine maintenance of the TAS/STAS.

**Topics:**

- Removal of TAS Assembly
- Cleaning of threat rings and heat sink
- Re-greasing and re-assembly



## Module Overview

This module is aimed at engineers who wish to perform a major maintenance of the Geochain and/or Geochain Slim downhole components.

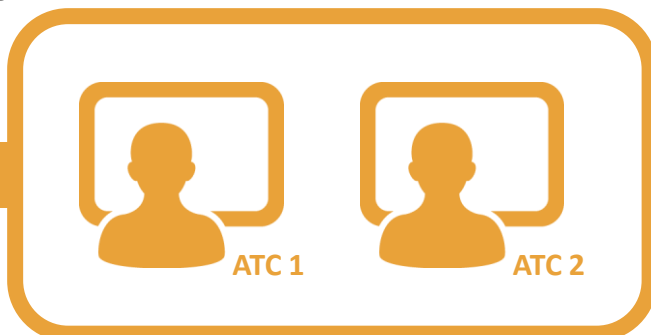
**Difficulty:** Intermediate

### M3.1 Arm Drive Maintenance

**Learning Objective:** The trainees will gain the ability to carry out a full maintenance on the ASR/GTS arm drive assembly.

**Topics:**

- Arm Disassembly
  - Removal of locking arm assembly
  - Removal of lower barrel
  - Disassembly of Lemo mount
  - Extraction of arm drive assembly
  - Extraction of main bearing
  - Removal of clutch
  - Removal of motor
  - Disassembly of nut mount
  - Disassembly of main bearing
  - Removal of link arm
- Arm Drive System Inspection and Test
  - Inspection of springs
  - Main bearing check and lubricate
  - Drive screw check and lubricate
- Clutch Inspection
  - Clutch torque checking and adjustment
- Motor Check
  - Removal of motor and cap
  - Removal of motor sleeve
  - Inspection and cleaning of brushes
  - Re-assembly of motor
- Arm Drive Re-Assembly
  - Fit motor to motor mount
  - Re-fit nut to nut mount
  - Reassembly main bearing
  - Main bearing adjustment
  - Refit clutch mount
  - Insert main bearing assembly to motor mount
  - Refit main drive assembly to tool body
  - Secure motor mount
  - Re-install Lemo connector mount
  - Re-assembly locking arm assembly
- Post Maintenance Test Procedure
  - Tool wiring continuity check
  - Tool wiring insulation check
  - Moto resistance and insulation check
  - Refit lower barrel geophone cartridge
  - Re-fit electronic cartridge
  - Tool function test



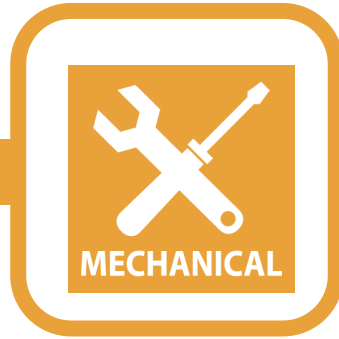
### M3.2 Inter-Tool Cable Re-Heading

**Learning Objective:** The trainee will be able to carry out a full maintenance and re-heading of the ITC.

**Topics:**

- ITC Inspection and Testing
  - Continuity and insulation testing
- ITC Disassembly
  - Disassembly of cable heads
  - Separation of cable from taper bush
  - Inspection of taper bush
- ITC Re-assembly
  - Fitting of taper spring
  - Fitting of taper bush
  - Removal of outer armour and fitting outer cone
  - Removal of inner armour and fitting of cone
  - Cutting away excess armour wire
  - Cutting conductor to length
  - Fitting of boots and contact to conductor
  - Measuring cable length
  - Fitting of second tapered spring
  - Preparation of second cable end
  - Re-assembly of cable heads
- Post Maintenance Test Procedure
  - Checking continuity and resistance of conductor
  - Safety proof load testing





## Module Overview

This module is aimed at engineers who wish to carry out maintenance on Avalon downhole ancillary tools.

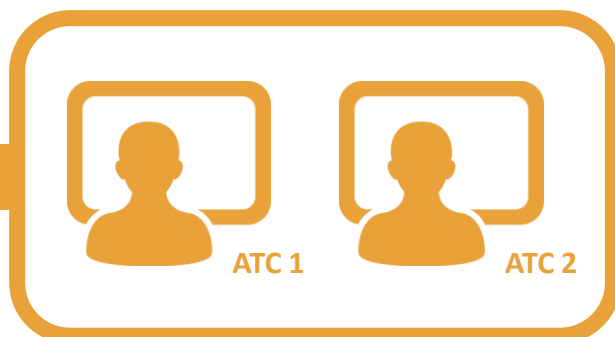
**Difficulty:** Foundation

### M4.1 Gamma Ray Tool Maintenance

**Learning Objective:** Trainees will gain an understanding of the setup required for GRT tools and will be able to carry out a routine maintenance of the tool.

**Topics:**

- GRT gamma Tool Set-Up
  - Introduction to the GRT-X gamma tool
  - Installation of the GRT-X gamma tool
  - Connection interface to the DCP or WIB
- Gamma Software
  - Configure gamma software (Detailed in Module 6)
  - Acquiring gamma Data]
- Maintenance of the GRT Gamma Tool
  - Routine post survey maintenance
  - Disassembly of the GRT and removal of the gamma sonde
  - Re-assembly of the GRT



### M4.2 TCU Maintenance

**Learning Objective:** Trainees will be able to carry out a full maintenance and checks of the TCU.

**Topics:**

- TCU Basic Checks
  - Checking continuity and leakage
  - Functional test
- Routine Post Survey Maintenance
  - Disassembly of coupling
  - Inspection and cleaning
  - Reassembly of coupling
  - Basic Checks
- Major Maintenance
  - Removal of lower connector mount
  - Inspection and cleaning of connector mount
  - Removal of lower barrel
  - Removal of centre barrel
  - Removal of upper connector mount
  - Removal of load cell
  - Removal of main shaft
  - Reassembly of load cell
  - Reassembly of upper connector
  - Reassembly of middle and lower barrel
  - Reassembly of lower connector mount
  - Continuity and insulation testing
  - Functional testing

### M4.3 Cross-Over Tool Maintenance

**Learning Objective:** Training will be able to carry out maintenance on any of the following cross-over tools.

- |            |         |
|------------|---------|
| • HAL-RWCH | • BAS-1 |
| • HAL-DITS | • HAL-1 |
| • HETS     | • HAL-7 |
| • LEHQ     |         |



## Module Overview

This module is aimed at electronic engineers who wish to carry out a full maintenance on the electrical components of the Geochain and Geochain Slim tools.

**Difficulty:** **Advanced**

### M5.1 Technical Maintenance

**Learning Objective:** Trainees will be able to carry out technical maintenance of the TAS/Digitiser.

**Topics:**

- Remove and Reflask Digitiser Electronics

### M5.2 Advanced Electrical Maintenance

**Learning Objective:** Trainees will be able to carry out a full maintenance on the TAS/Digitiser.

**Topics:**

- Replacement of TAS/Digitiser Thermo Electric Cooler (TEC)





## Module Overview

This module is aimed at Geoscientists and Engineers who wish to gain an understanding of ACQ acquisition software. They will be able to configure a tool system and perform diagnostics checks. The trainees may wish to go beyond this and learn to use ACQ to set up a VSP survey, configuring receivers and well site geometry. Trainees will be able to simulate a ZVSP acquisition exercise using ACQ.

**Difficulty:** Intermediate - Advanced

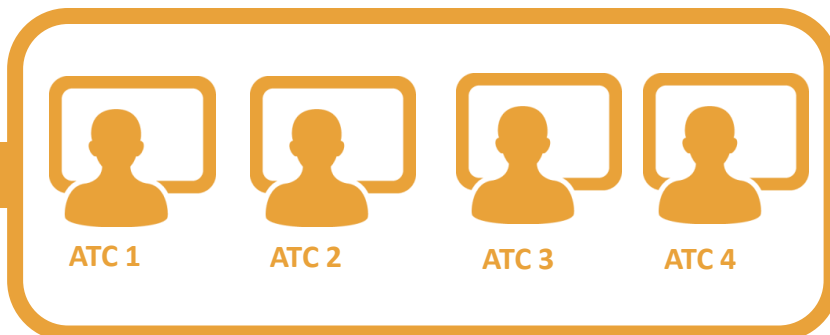
### M6.1 Introduction to ACQ

**Learning Objective:** Trainees will be introduced to the software and will be able to use ACQ to configure a seismic survey job.

**Topics:**

- Software Installation
  - Install ACQ
  - Default folder used by ACQ
- Job Manager
  - Creating a new job in ACQ
  - Selecting recorder and downhole tool type
  - Specifying a non-default Rcd folder
  - Entering general survey information
- Configuration of source, surface channel and downhole tools
  - Configuration parameters for airgun sources
  - Configuration parameters for explosion sources
  - Setting up GSP control
  - Setting auto pick parameters
  - Setting up automatic source location acquisition from a navigation system
  - Configuring surface channels
  - Configuring downhole tools

ATC Course



## LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

### M6.2 Internal System Test

**Learning Objective:** Trainees will be able to perform an instrument test and diagnostics in the ACQ software.

**Topics:**

- Instrument Test and System Diagnostics
- Spectral Analysis
- Using the Journal

### M6.3 Acquiring Data

**Learning Objective:** Trainees will know how to acquire data within the ACQ software, and will be able to do a basic interpretation of the data.

**Topics:**

- Monitor mode and Tool Control
- Recording, Stacking, and Displaying Data
- Plot Mode
- Profile Mode

### M6.4 Simulate ZVSP

**Learning Objective:** Trainees will be able to simulate a ZVSP, and interpret the VSP plot components.

**Topics:**

- Configuring the Survey Simulator
  - Types of survey which can be simulated
  - Choosing the downhole tool type
  - Configuring source
  - Configuring downhole tools
- Recording Simulation Data
  - How data is simulated
  - Recording data
  - Simulating telemetry errors
  - Features of VSP dataset

### M6.5 Advanced ACQ

**Learning Objective:** Trainees will be able to use the advanced features within ACQ (for complex VSP surveys), and the supplementary MIRFCOPY and WELLTRAK software.

**Topics:**

- Logs
- Vibroseis
  - Configuration for Vibroseis sources
  - Moving versus static sources
  - Walkaway sources
- Complex Geometries
- MIRF Copy
  - Configuring MIRFCOPY
  - Using MIRFCOPY with DVD-RAM
  - Using MIRFCOPY with ACQ simulator
- WELLTRAK
  - Configuring WELLTRAK
  - Importing deviation data into WELLTRAK
  - Editing WELLTRAK data
  - Interaction between ACQ and the WELLTRAK database