

# 1 VIT SYSTEM READ ME FIRST

IODP VIT Assembly Part Number OV7000

IODP JRSO

Version 1

9/25/22



Revision	Date	Originator	Approval
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## CHAPTER 1.0 OVERVIEW

### 1.1 PURPOSE

The main function of the VIT system is to provide visual reference for reentering boreholes in the seafloor. It is also used to perform seafloor surveys and inspect CORK heads and other hardware.

### 1.2 VIT DOCUMENT ORGANIZATION

Because of the complexity of the VIT system, the documentation is organized on the ship server (U:\Operations\2-Engineering\1 VIT) under the following subcategories:

#### VIT

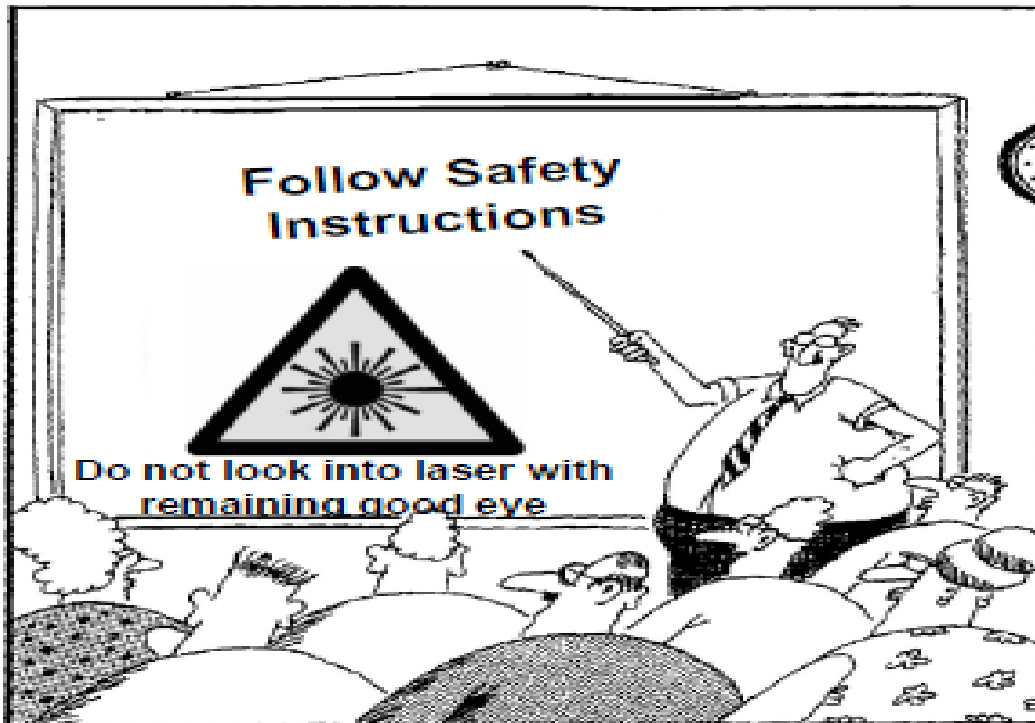
0. ARCHIVE
1. ADMIN
2. USER MANUALS
  - a. Read Me First
  - b. End Devices
    - i. End Devices (altimeter, cameras, gyroscope, sonar system, etc.)
    - ii. Frame Components
    - iii. Other Systems
    - iv. Underwater Cable/Connections
  - c. Video DVR Overlay and IRIS VIT
  - d. Winch Umbilical
  - e. Diagnostics Parts Maintenance
3. SCHEMATIC DIAGRAMS (25 block diagrams and schematics)
4. END DEVICES
5. CONNECTIORS AND CABLES
6. UMBILICAL
7. SEAVIEW MULTIPLEXER

Schematics and Manuals are also readily available via the ships web page <http://confluence.ship.iodp.tamu.edu:8090/> on Confluence > Engineering and Tools > VIT.

## CHAPTER 2.0 SAFETY CONSIDERATIONS

### 2.1 OPTICAL SAFETY

Figure 1. Safety Cartoon.



Small Form-Factor Pluggable (SFP) Transceiver Modules are equipped with Class 1 Lasers, these are considered safe, based upon current medical knowledge. Do not stare into any open optical port.

**Warning! Never stare into an open optical port!**

### 2.2 ELECTRICAL SAFETY

The Vibration Isolated Television (VIT) Telemetry pod is powered by 3-phase 480 VAC. Take the necessary safety precautions when working on the system to avoid electrical shock. Only remove equipment when it is disconnected. Components with dangerously high voltage and high stored energy are located in the Power Supply!

**Warning! Never work on live parts!**

**Note: LED lighting was designed for submerged operation. Do not operate at high settings for extended period of time.**

## CHAPTER 3.0 SPECIFICATIONS

### 3.1 VIT FEATURES

The VIT has the following features:

- Three cameras, two high-definition (HD) cameras, one fixed and the second with pan, tilt, and zoom, provide visual information. A third PAL Wide Field of View (WFOV) camera is used for searching.
- Three dimmable LED lights provide lighting.
- A side-scan sonar for detecting objects on the seafloor outside the camera range and in low visibility conditions.
- A Fiber Optic Gyro inside the pod to provide heading information.
- An Altimeter provides height above the seabed.
- An in-house LabVIEW application (IRIS VIT) running on the VIT personal computer (VIT-PC) located in the Dynamic Positioning (DP) room, controls these devices.
- A Digital Video Recorder personal computer (SUBCDVR) overlays depth, heading, and site/hole information onto both reentry and survey camera video streams before recording and distributing it to the IODP Network and ship's TV for distribution.
- Communication between surface and subsea is achieved through a Multiplexer from Seaview Systems via the optical fiber elements in the umbilical.

### 3.2 VIT SYSTEM SPECIFICATIONS

Maximum design depth:	5800 m
Operational depth	5000 m
Depth to 5800 m is allowed, but derated with Heave ( <i>see Safe Working Zone Chart Section 14.2 in this manual</i> ).	
Umbilical Safe Working Load (SWL).	14,000 lb
Weight of equipped VIT Frame in water.	1800 lb
Lighting:	3 x 10,000 In LEDs
Cameras:	2 x 1080i HD-SDI 1 x PAL 100° WFOV
Sidescan sonar:	Dual frequency head, 300/670 kHz
Heading indicator:	Drift ~1°/hr
Altimeter:	0-50 m
Primary power:	3-phase 480 VAC/2A

Pod power:	24 VDC/35A
Multiplexer:	Seaview Systems
Operating temperature:	0°C – 50°C

## CHAPTER 4.0 VIT HISTORY

The Ocean Drilling Program (ODP) inherited the VIT from the Deep Sea Drilling Program (DSDP) in 1983 when DSDP ended. At the end of ODP, some VIT equipment was getting harder to find and most of the VIT system had been pieced together over the years and, thus, was not a coherent system.

The Seafloor Visualization Report (May 2006) compiled information about the VIT equipment and issues at that time prior to the Scientific Ocean Drilling Vessel (SODV) refurbishment during 2006-2008. The SODV looked at replacing the coax cable with fiber optic cable to improve VIT performance; however, escalating refurbishment costs and time overruns eliminated the possibility of upgrading the VIT at that time.

In 2013, the VIT coaxial umbilical and telemetry pod were replaced with a fiber optic umbilical and a new Signal Multiplexer. The new system was an "in house" design, done in a way that allowed IODP technicians to build and assemble it. This also simplified the maintenance, which reduced costs and allowed IODP personnel to upgrade and add new devices/equipment to the system.

Substandard optical elements with high residual strain were used by the vendor who supplied the first fiber optic umbilical. The additional strain added by working load during deployments caused the optical elements to significantly degrade and eventually fail. The first fiber optic umbilical was replaced with a loose tube fiber optic cable. The cable design shielded the optical elements from any cable strain as a result of cable loading. This cable supplied by Cortland is still in use as of 2020.

## CHAPTER 5.0 ACRONYM LIST

Acronym	Definition
A	amps
AWG	American Wire Gage
CWDM	Coarse Wavelength Division Multiplexing
dB	decibel
dBm	decibel (reference milliwatts)
DP	dynamic positioning
DVR	Digital Video Recorder
FO	fiber optic
FORJ	Fiber Optic Rotator Joint
FOV	Field of View
Gbit	Gigabit
Gnd	ground
GRN	green
HD	high definition
HD-SDI	high definition serial digital interface
HDMI	high definition multimedia interface
ITU	International Telecommunications Union
kHZ	kilohertz
LED	light emitting diode
Mb	megabit
nm	nanometers
NTSC	National Television System Committee
ORG	orange
OTDR	Optical Time Domain Reflectometer
P/T	pan/tilt
PAL	Phase alternation line
PBOF	Pressure-balanced oil-filled
PEEK	polyether ether ketone
RHL	right hand lay
SECAM	Sequential Color with Memory
SFP	Small form-factor pluggable
SM	singlemode
SMB	SubMiniature version B (connectors)
SMF	SingleMiniature version F (connectors)
Stbd	starboard
SWL	safe working load
Tamb	ambient temperature
TTL	Transistor Transistor Logic
U/W	underway
VAC	Volts Alternating Current
VDC	Volts Direct Current



VIT	vibration isolated television
VIT-PC	vibration isolated television personal computer
YEL	Yellow

## CHAPTER 6.0 VIT 'READ ME FIRST' REVISION LOG

### 6.1 REVISION DATA

Revisions to the manual are recorded in this table. Please include the page, section or Chapter numbers in the revision Details.

Revision Date	Authority	Page	Revision Details
1/29/19	Graber	Title & ch 5	Added TOC, VIT assembly part number to title page, added revision log (ch 5), and fixed file name in footer
3/3/19	Graber	Chap 1	Expanded on VIT history. Added an overview chapter (1) and moved the VIT document organization info there.
3/5/19	Meiring	Approved	Updated date info and made this version 0.
2/18/20	Meiring	Section 3-2	Changed VIT maximum depth from 6000 m to 5800 m.
3/26/20	Meiring/Howard	Various	Minor changes.
9/25/22	Howard	Sections 1,3, & 4	Removed Cumulus references, replaced HD-VIT software references with IRIS VIT