

BLUE OCEAN VDR / S-VDR

Chapter 6 Maintenance

6.1 Maintenance tasks

The BlueOcean VDR-SVDR is a unit of low maintenance need. It is expected that it will function trouble free for years. This does not mean that the device shouldn't be checked regularly to be sure that it is in perfect working condition. Regular maintenance is necessary to maintain performance. A yearly maintenance program should be established and should at least include the items listed below, to ensure the serviceability and continued seaworthiness of the S-VDR.

Every day maintenance tasks, possibly done by ship officers, are described in "C2 - Crew Supported Maintenance" manual. This manual should be read prior to this text.

As it is with all critical ship instruments, only licensed technicians should do maintenance. Our company licenses technicians on three levels:

- Hardware inspection
- Failure diagnosis
- Installation and repair

The system contains numerous tools to assist in diagnosis and repair. It generates messages in various situations if a problem is present.

It should be noted that maintenance must not stop normal operation. As some maintenance tasks can stop data recording (for example a cable replacement), full maintenance can be done only in harbor when the vessel is inactive or in dry dock. Local rules may apply - in doubt ask permission from the ship's master.

Troubleshooting

The troubleshooting table below provides common symptoms of trouble and the means to rectify them. If you cannot restore normal operation, do not attempt to check inside the equipment. Refer any repair work to a qualified technician.

Symptom	Possible cause	Tests and Actions	Remedy
No power at all	Fuse failure	Check the fuses at the back of the system	Replace with same rating fuses
	Power supply problem	Check power supply connections	Call a technician to repair connections
Red lamp alarm	Main controller malfunction	Check screen	If a message exist on screen, call service and ask for

			instructions
			If screen is off, cycle power to the main unit
No green lamp	All auxiliary power sources are off	Check battery	Replace as necessary
		Check ship's 24 Vdc	Repair if faulty
	Lamp problem	Press lamp to test	Replace if faulty
An error message appears on screen	Cause according to message		Call service for assistance

If none of the above apply call service for assistance.

6.2 Maintenance tools

A small set of hand tools is needed:

- the usual electrician tools – screwdrivers, pliers, cutters ect.
- a voltmeter

All electronic parts of the system can be checked with tools included in software of the system.

6.3 Annual survey

The annual survey consists of 3 parts:

- Capsule check
- Cable check
- Main Unit Check
- Power supply check

First check the “Ship Data” configuration sheet used in first SVDR installation. If any item is changed a new sheet must be prepared. A copy should be left in the documentation remaining in the ship and a second should be returned to the company.

A. Capsule check

Please follow the procedures included in capsule documentation.

Stop the SVDR program. Connect your computer to the capsule. Activate the special transfer program to read the data from the capsule (see Software setup for detailed instructions). Connect your computer to the main unit through the

network connection. Copy to an other directory the same period of stored data from the main unit. Run windiff and check for differences. Ignore boundary files, e.g. the first and last file of every king, boundaries used may be marginally erroneous. Normally all data should match. Acceptable error rates are $< 10^{-8}$.

B. Cable check

All cables should be checked optically for wear and tear. Cables in bad condition should be replaced with cables of the same type. Do not replace a cable carrying voltages over 42V or a power cable while power is applied. Disconnect all 3 supplies: 220V, battery and ship's 24Vdc! Any of 3 supplies can generate lethal voltages.

The cables to check are:

- Connection to capsule
- Connection between the main unit and the power supply
- Signals from the ship

A worn cable must be replaced with exactly the same type cable.

C. Power supply check

- Charger

While the system is connected as normally measure battery voltage. It should be higher than 13,5 V.

- Battery

Disconnect positive pole. Voltage should drop a little, but not lower than 11 V

Connect battery again. Interrupt 220V supply. The system should revert to battery. Measure battery voltage. It should be higher than 11V. If not replace battery with ship-approved type.

D. Main Unit Check

Subsystems

- Alarms

Press the yellow button. An audible alarm will sound and the lamps will be on.

- Main controller

Let the system run normally. The main controller should execute the BlueOcean main program. If it is not the case, an alarm will sound and the red lamp will turn on.

Reboot the system. It should automatically return to normal operation. If not check software setup.

- Screen
Turn the dimming to full. Check screen quality.
- PLC
Run the PLC check tool from the maintenance menu. See relevant manual.
- NMEA concentrator
Run the NMEA tool. Check on the configuration of the ship for the connected NMEA channels. Check the script. It should be readable with lines from all channels.
- Microphones
Press the microphone test button. If it turns red at least one microphone failed. If the button turns green then all microphones passed the test. The test is better done in a quiet environment but advanced signal processing techniques make it possible even in loud noise conditions.

Remote test

It is possible to do all these software-assisted tests remotely. Connect the VDR to an available communications device. Activate remote desktop. On the remote side connect to the IP address seen on the configuration notes for the machine.

The written report of the above tests should be send to our offices properly signed in order to issue a re-certification document.

6.4 Additional maintenance tasks

Infant mortality prevention

The failure of electronics follows the well known “bath tube curve”. This means that the failure rate at the beginning of their life is high, drops gradually almost to zero, to rise again after some years.

The BlueOcean VDR is always going through a burn-in period in the factory after construction, thus avoiding most early failures. To further prevent failures, inspections are recommended just after installation, after three months, after six months and on every annual survey, as part of the legal verification procedure.

The control software forces these tests: at the right time a screen appears asking from a competent technician to verify the function of key subsystems. If the verification is not done in 48 hours, an alarm sounds and the system enters a “failure suspected” mode. These events are written in the system log. The verification screen is password protected, to limit access to not authorized persons.

Annual Certification Checklist

Item	Status	Comments
Capsule check		
Data check		
Capsule maintenance sheet		
Cable check		
Connection to capsule		
Connection main unit - power supply		
Signals from the ship		
Power supply		
Charger		
Battery		
Main Unit		
Alarms		
Main controller		
Screen		
PLC		
NMEA concentrator		
Microphones		

Please fill one sheet on every annual re-certification. Enter number of signal cables of each type checked. Compare with first checklist.