VDR-100G3/G3S Data Recovery User Manual

RUT-UM-02-003 Rev. 1.1

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Rutter Technologies Inc.
VDR-100G3/G3S Data Recovery
User Manual

RUT-UM-02-003 Rev. 1.1

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The **Rutter Technologies' Worldwide Service List** is available for download in PDF format at the following web site address: *http://www.ruttertech.com/support/*

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Amendment Record

The details of any amendment made to this documentation should be recorded in the table below. These details should include the signature of the person responsible for inserting the latest amendment.

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Rutter VDR—100G3/G3S Data Recovery Manual
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Manual Notes

VDR-100G3S Reference

Please note that while this manual references the VDR-100G3, it is also applicable to the Simplified Voyage Data Recorder (VDR-100G3S) unless otherwise stated. The VDR-100G3S has many similar components to the VDR-100G3, with the following differences:

- The Video Module is only required if the vessel's radar has an available COTS (commercial off-the-shelf) interface. Therefore, the recording of video data may not be applicable in some VDR-100G3S installations.
- The VDR-100G3S has an accompanying Simplified FRM (SFRM) capsule.

Software Reference

Software procedures in this manual are based upon a PC running a Windows XP operating system. There may be minor differences depending on the operating system and configuration in use on the Client PC.

1   Introduction to Data Recovery for the Rutter VDR-100G3/G3S

The Rutter VDR-100G3/G3S is designed to collect and maintain a secure, retrievable record of information related to the position, movement, physical status, and command and control of a marine vessel. It maintains a continuous record of the most recent 12 hours of activity in the Data Processing Unit (DPU). This is referred to as the Current Data Set. The current data set is not affected by any method of copying, backing up or downloading data.

In addition to the current data, the VDR-100G3 offers 5 methods of storing copies of the data:

1. The DPU contains an internal hard drive capable of retaining multiple copies of 12 hour data sets. Emergency backup of data initiated at the Operation & Alarm Unit (OAU) creates Secured Data directories on this drive named according to the date and time of backup. Each data backup is referred to as a **Secured Data Set**.

   Secured data may be copied to a download PC via Ethernet LAN connection using Rutter Technologies proprietary download software. Refer to *Chapter 2:Client PC Download— Data Retrieval Method Number 1* for instructions on retrieving data from this internal hard drive.

2. The DPU contains an internal hard drive capable of retaining multiple copies of 12 hour archived data sets. The DPU will create an archived data set every 12 hours, capturing the most recent 12 hours of recorded data. The archiving operation creates Archived Data directories on this drive named according to the date and time of archive operation. Each data archive is referred to as an **Archived Data Set**.

   Archived data may be copied to a download PC via Ethernet LAN connection using Rutter Technologies proprietary download software. Refer to *Chapter 2: Client PC Download—Data Retrieval Method Number 1* for instructions on retrieving data from this internal hard drive.

3. The DPU stores the most current 4 GB of recorded data to the Rutter USB Memory Stick. When the USB Memory Stick is full, the oldest data on it is over-written with new data.

   Current, Secured or Archived data sets can be copied to the **Rutter USB Memory Stick**. This operation is manually initiated via the OAU. Refer to *Chapter 3 – USB Memory Stick (or Optional RSM)—Data Retrieval Method Number 2* for instructions on downloading data to and retrieving data from the USB Memory Stick.

4. Multiple data sets can be copied to the optional **Remote Storage Module** (RSM), if connected.   Refer to *Chapter 3 – USB Memory Stick (or Optional RSM)—Data Retrieval Method Number 2* for instructions on downloading data to and retrieving data from the RSM.

5. The fifth method of storage is the **Final Recording Medium** (FRM) or capsule. This IMO required data storage method **should only be attempted when the above-listed methods (1) and (2) are not available** (i.e., in a situation where the VDR-100G3 is no longer functioning due to a major incident.) Refer to *Chapter 4 – FRM/SFRM Download—Data Retrieval Method Number 3* for instructions on retrieving data from the FRM.

Once the data has been copied, it may be necessary to contact the ship's owner / operator or Rutter Technologies Inc. to obtain download and playback software or information necessary for viewing the data. Contact information is available in *Appendix C* of this document. The name and IMO number of the vessel involved will be required in order to provide appropriate files and information.

If the FRM must be recovered after an incident, it may be necessary to contact the FRM manufacturer for assistance to reconstruct and/or refurbish the unit before it is possible to download data from the capsule. (Refer to *Chapter 4 – FRM/SFRM Download—Data* Retrieval Method Number 3).

> *NOTE! The configuration file <config.txt> used to correctly interpret playback data, is contained in the root directory of all data sets and in the FRM capsule memory. Therefore, the vessel owner only needs to provide the configuration file when the data has been received on a storage medium other than the RSM and/or FRM.*

The IMO *Guidelines on Voyage Data Recorder (VDR) Ownership and Recovery* white paper is available in *Appendix D* of this document.

> *NOTE! While this manual references the VDR-100G3, it is also applicable to the Simplified Voyage Data Recorder (VDR-100G3S) unless otherwise stated.*

2   Client PC Download—Data Retrieval Method Number 1

The Client PC Download is designed for convenient downloading of VDR-100G3 data for immediate playback or the storage on a separate recordable medium.

The Client PC is connected to the **Data Management Module** (DMM) via an Ethernet connection. The Client PC can download data to a recordable medium, such as a writeable CDs, at any time during normal VDR-100G3 operation. **This will not interrupt the system's recording process.**

NOTE: A typical data set is too large to be recorded to a single CD and will need to be split into shorter segments, occupying several discs, if it is to be removed from the client PC via a CD.

2.1   Minimum Client PC Requirements

The minimum requirements for a Client PC include:
- Pentium III or higher processor
- 256 MB of memory
- SVGA Video port and monitor (it is recommended that the monitor be 15" or larger and supports a non-scrollable resolution of 1024x768 or greater)
- Audio hardware with PC speakers or headphones
- 100 Base-TX Ethernet Interface
- USB 2.0 Port
- Serial data port (if external ECDIS display support is required)
- 16X DVD-R/DVD-RW drive
- 80 GB or larger internal Hard Disk Drive
- USB, AT or PS/2 mouse and keyboard
- Power Supply: Dual Input Voltage: 115V at 60 Hz; or 220V at 50 Hz
- English O/S Edition: Windows 2000 or Windows XP (recommended).

> *NOTE! If the Client PC is being installed on the bridge of the vessel, it must be IEC 60945 certified.*

To review downloaded data for playback, contact the vessel owner with vessel specific information (i.e., vessel name and IMO number). With this information the vessel owner can use the necessary files and software for proper data interpretation. If a vessel owner is unable to provide the required files, it will be necessary to contact Rutter Technologies Inc. (contact information is available in *Appendix C* of this document).

2.2 Installation of Download Software on Client PC

There are 2 steps necessary to install the Download application on the Client PC:

1. Copy the Download application <*VDR_Download.exe*> from the supplied media to the desktop of the download computer, or if an install file is supplied, double-click the **Install VDR Download.exe file**.

2. Configure the download computer as a 'Client' for the 'Download Application' to connect to the VDR-100G3 and retrieve the recorded data. To do this, the download PC must be in the same IP segment as the download port on the VDR. The VDR's download port occupies IP address 200.200.200.200. The client PC must be in the same range, with the last segment different than the VDR (as shown below.) To change the IP segment:
   a) Open the Control Panel via the Start menu.
   b) Double-click the Network Connections icon.
   c) Right-click on the Local Area Connection icon and select Properties from the pop-up menu.
   d) In the Local Area Connection Properties window, highlight "Internet Protocol (TCP/IP)" and click the "Properties" button located directly below the available options.
   e) In the subsequent Internet Protocol (TCP/IP) Properties window, select the "Use the following IP address" radio button and enter 200.200.200.2 (the last number can be any number from 2 to 254, **except 200**.)
   f) Click the "OK" button in the Internet Protocol (TCP/IP) Properties and the Local Area Connection Properties.

Figure 2-1 - Establishing TCP/IP Address

2.3   Connecting to the VDR

To connect the Client PC to the VDR, complete the following steps:

1.   Locate the VDR Data Port, a RJ45 wall jack, mounted on the bridge.

Figure 2-2 - VDR Data Port

2.   Connect the Client PC to the VDR Data Port using a straight-through Ethernet cable.

> *Note! Ensure the time setting on the Client PC is set to GMT (Greenwich Mean Time) and the daylight savings time setting is disabled. To change these settings, double-click the clock in bottom right corner of the Windows desktop, select the 'Time Zone' tab, select "(GMT) Greenwich Mean Time" from the time zone drop-down menu and ensure the "Automatically adjust clock for daylight savings changes" checkbox **is not** checked.*

2.4   Starting the Download Process

Start the download utility by double-clicking the download.exe icon located on the Windows desktop. See *Figure 2-3 - Download Software Main Screen* for an example of the download utility.
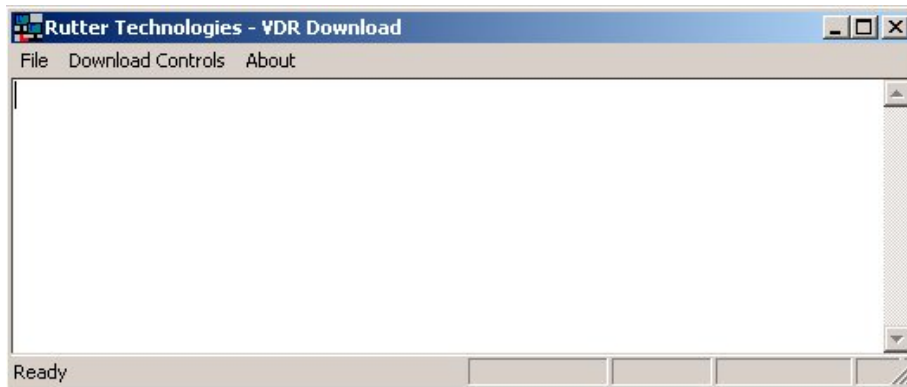
Figure 2-3 - Download Software Main Screen

2.4.1   Download The Current Data Set

Complete the following steps to begin the download of the current data set:

1. Select 'Download Current Dataset' from the 'Download Controls' menu.

Figure 2-4 - Download Controls Menu

2. Enter a password when prompted.

3. Once prompted with the 'Download Settings' window (see *Figure 2-5 - Download Settings Window*), choose from the following available settings:
   - 'Download complete data set'.
   - 'Download partial data set' – once this option has been chosen, 'Start' and 'Stop' times become available. Using the appropriate slide-bar, set the time frame that will begin and end the downloaded data set..
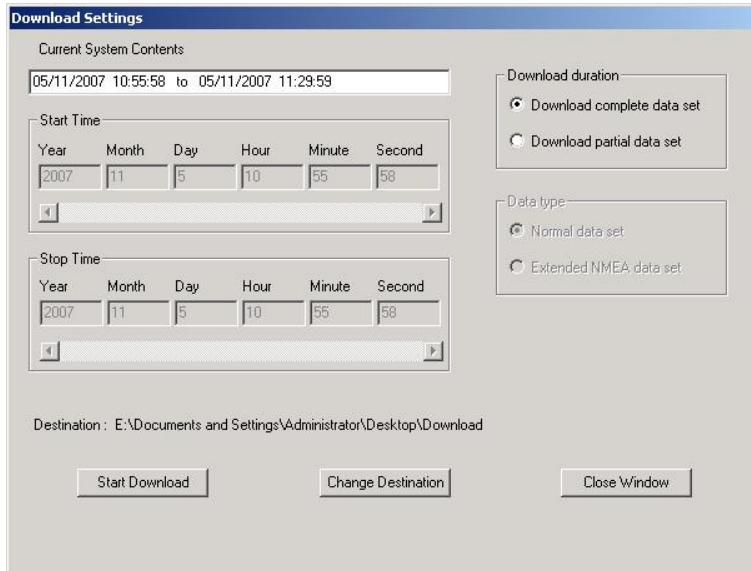
Figure 2-5 - Download Settings Window

4. Confirm that the stated download destination is correct. If it is not, press the 'Change Destination' button, select the correct destination from the file window, and press 'OK'.

5. Press the 'Start Download' button.

6. Confirm all settings are correct in the confirmation window and press 'OK' (if they are not, press 'Cancel' and make the appropriate changes in the 'Download Settings' window).

Name ▲	Size	Type	Date Modified
MainAudio		File Folder	8/23/2005 10:14 AM
MainNMEA		File Folder	8/23/2005 10:12 AM
MainVideo		File Folder	8/23/2005 10:13 AM
AudioDir.vdr	57 KB	VDR File	8/23/2005 10:14 AM
NMEADir.vdr	56 KB	VDR File	8/23/2005 10:14 AM
vdr-cfg.txt	1 KB	Text Document	8/18/2005 1:55 PM
vdrparams.ini	5 KB	Configuration Settings	8/18/2005 1:55 PM
VideoDir.vdr	57 KB	VDR File	8/23/2005 10:14 AM

Figure 2-6 - Sample Download Directory

Once a download is complete, "MainAudio", "MainNMEA", and "MainVideo" folders are visible. The vdrparams.ini and vdr-cfg.txt files are also downloaded and saved to the specified download directory. See *Figure 2-6 - Sample Download Directory* for an example of a typical download directory.

2.4.2 Download A Secured Data Set

Complete the following steps to download one (1) of multiple secured data sets from the DMM's internal hard drive:

1. Select 'Download Secured Dataset' from the 'Download Controls' menu.

2. A download progress window will appear indicating that the application is receiving information from the DMM.

3. In the subsequent 'Download Secured Datasets' window, all available secured data sets will be visible. Each data set shows the date it was initially secured, file size, and start and end time.
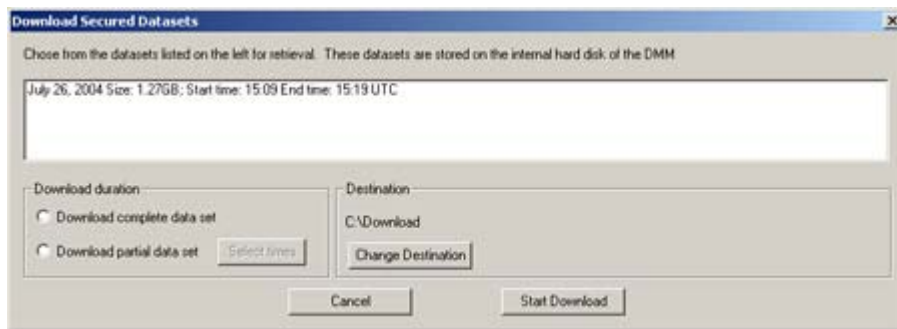
Figure 2-7 - Download Secured Data Sets

4. Select the appropriate data set from the list.

5. To download a complete data set, choose the "Download complete data set" radio button under 'Download duration'. To download a partial data set, choose "Download partial data set".

6. If choosing to download a partial data set, a window will appear from which the time range to be downloaded must be chosen. The associated scroll bar is used to select a start and/or end time (the exact time may also be entered directly in to the time fields.)
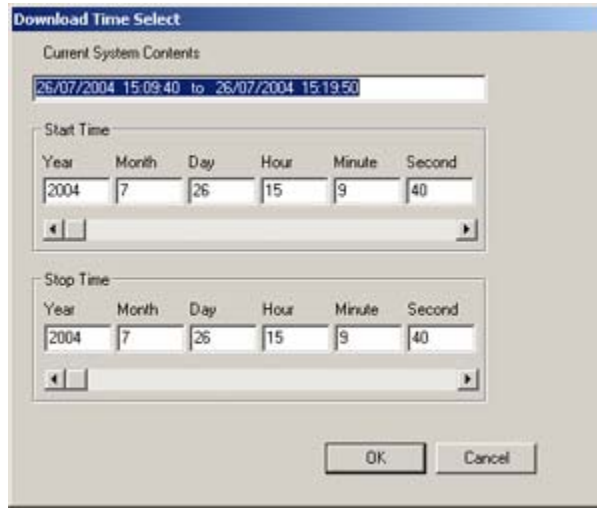
Figure 2-8 - Partial Download Window

7. To choose a directory to which the data sets will be downloaded, other than the one listed under 'Destination', press the "Change Destination" button and follow standard Windows procedure for selecting a desired directory.

8. Once the duration and destination are correct, press 'Start Download'.

9. Enter a password and press 'OK'.

10. A "Download Settings" dialog will appear providing confirmation information for the data set to be downloaded. If all information is correct, press 'OK' to begin the download.
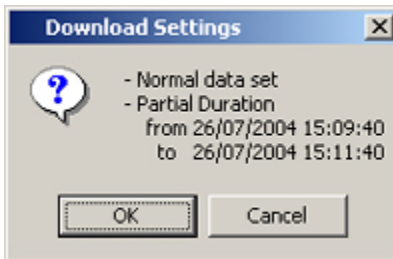
Figure 2-9 - Confirm Download Settings

2.4.3   Download An Archived Data Set

Complete the following steps to download one of multiple archived data sets from the DMM's internal hard drive:

1. Select 'Download Archived Dataset' from the 'Download Controls' menu.

2. A download progress window will appear indicating that the application is receiving information from the DMM. This operation may take several minutes to complete.

3. In the subsequent 'Download Archived Datasets' window, all available archived data sets will be visible. Each data set shows the date it was initially archived, file size, and start and end time.
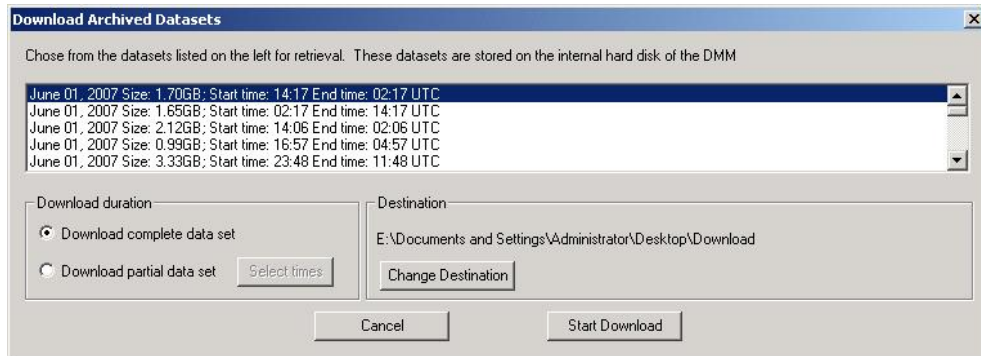
Figure 2-10 - Download Archived Data Sets

4. Select the appropriate data set from the list.

5. To download a complete data set, choose the "Download complete data set" radio button under 'Download duration'. To download a partial data set, choose "Download partial data set".

6. If choosing to download a partial data set, a window will appear from which the time range to be downloaded must be chosen. The associated scroll bar is used to select a start and/or end time (the exact time may also be entered directly in to the time fields.)

Figure 2-11 - Partial Download Window

7. To choose a directory to which the data sets will be downloaded, other than the one listed under 'Destination', press the "Change Destination" button and follow standard Windows procedure for selecting a desired directory.

8. Once the duration and destination are correct, press 'Start Download'.

9. Enter a password and press 'OK'.

10. A "Download Settings" dialog will appear providing confirmation information for the data set to be downloaded. If all information is correct, press 'OK' to begin the download.
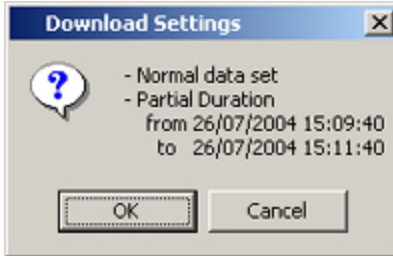
Figure 2-12 - Confirm Download Settings

2.4.4 Download All Current, Secured And Archived Data Sets

The VDR Download Application allows the user to select the option to download all Current, Secured and Archived data sets from the G3/G3S in one operation. To achieve this, the destination drive for the data must have sufficient capacity and free drive space to accommodate up to 160GB of VDR data. If there is insufficient available drive space, the operation will terminate before all data is copied off of the VDR.

NOTE: As this is can be a large copy operation (up to 160 GB), please allow sufficient time for the operation to complete. In the case of 160GB of data to copy, it could take up to 2.5 to 3 hours to complete.

Complete the following steps to download all of the current, secured and archived data sets from the DMM's internal hard drive:

1. Select 'Download All secured And Archived Datasets' from the 'Download Controls' menu.

2. A download progress window will appear indicating that the application is receiving information from the DMM. This operation may take several minutes to complete. When complete, the VDR Download Application will display the total number of Secured and Archived data sets available for download in the main log window.

Figure 2-13 - Download All Secured And Archived Data Sets

3. To choose a directory to which the data sets will be downloaded, other than the one listed under 'Destination', press the "Change Destination" button and follow standard Windows procedure for selecting a desired directory.

4. Once the destination is correct, press 'Start Download'.

5. Enter a password and press 'OK' to begin the download.

The download begins by downloading all available Secured data sets, in order of date and time secured, beginning with the oldest and ending with the most recent. Following the download of the most recent Secured data set, the download of all available Archived data sets commences. The download of the Archived data sets also occurs in order of date and time archived, beginning with the oldest and ending with the most recent.

2.4.5 Get Current Data Set Contents

This option allows the user to verify the contents of the current data on the VDR internal Hard Drive. It displays the time range of the Video, Audio and NMEA data contained in the VDR_DATA folder.
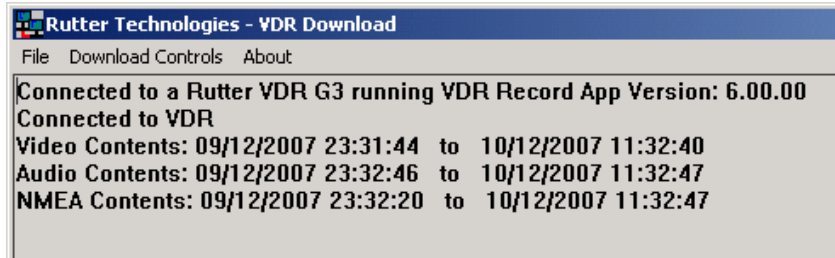

Figure 2-14 - Current Data Set Contents

2.4.6 Error Log and Battery Log

To download the error log or battery log file, select the applicable item ('Download Error Log' or 'Download Battery Log') from the 'Download Controls' menu. The system will prompt the user to select a location to save the log file.

2.5 Complete vs. Partial Download

A 'complete' download is the process of downloading a full 12-hour data set from the DMM. As a user may want only a 'partial' download, a 'Download partial data set' option is available. Select either 'Download complete data set' or 'Download partial data set' in the 'Download Settings' window (see *Figure 2-5 - Download Settings Window*) to download the desired data set.

2.6 Disconnecting from the VDR

To disconnect, simply choose 'Exit' from the 'File' menu.

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3 USB Memory Stick (or Optional RSM)—Data Retrieval Method Number 2

Normally when the G3 is installed the USB Memory Stick is connected to the USB port located in the front compartment of the DPU

3.1 Copying Data to a USB Memory Stick (or optional RSM)

Normally when the G3 is installed the USB Memory Stick is connected to the USB port located in the front compartment of the DPU.

For copying data to the removable USB Memory Stick, (or RSM) press "Enter" after you have selected the desired data set. Depending on the amount of data to be copied, and the free memory space available, you may have to acknowledge a display prompt.

The USB Memory Stick will typically hold 2 data sets of 12 hours each (dependant on the data set size).
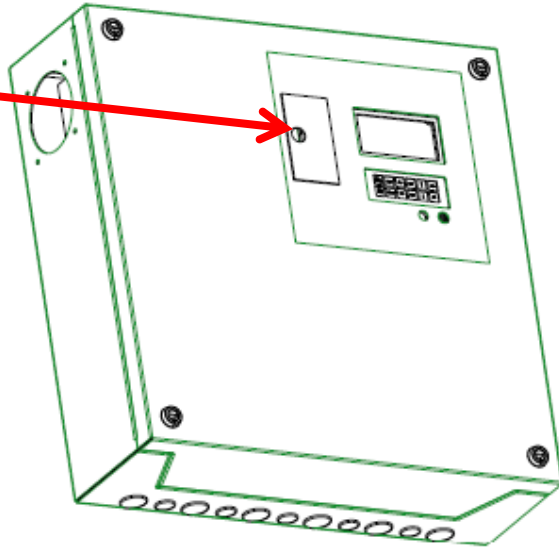
*Warning: Before performing a **Copy** function, make sure the USB Memory Stick (or RSM) does not contain data which you want to keep. Before copying it is recommended that the operator:*
1. *"Eject" the USB Memory Stick using the OAU keypad,*
2. *Physically remove the USB Memory Stick from the DPU,*
3. *Copy the USB Memory Stick contents to an external computer,*
4. *Return the USB Memory Stick to the DPU compartment.*

*Warning: Before performing a **Copy All** operation, the USB Memory Stick should be replaced with the RSM having sufficient storage capacity to copy all the contents of the DMM hard drive. This could be as much as 160GB.*

Note: The copy process **may take from several minutes to several hours**, depending on the amount of data to be copied. The progress of the recording is displayed on the OAU LCD as a percentage.

If the copy process has finished, failed or been cancelled manually, **t**he OAU LCD will display "**USB: Stby**". **The USB Memory Stick will not immediately resume normal operation.** After

one hour, if the USB Memory Stick has not been ejected from the system, the system will delete all data on it and resume the data recording process to it.

If the system has no USB Memory Stick nor other USB storage device with sufficient free space connected, the display will show the error message **"Removable Storage Drive Absent."**

> ⚠️ *Warning: The following situations will result in all data being deleted from the USB Memory Stick:*

1. *When the USB Memory Stick is ejected and physically removed from the system, and then re-connected, the VDR will erase all the data on the USB Memory Stick and begin recording data to it again;*

2. *When data is downloaded or copied to the USB Memory Stick, if the drive is NOT ejected and physically removed within 1 hour after the download is complete, then the VDR will erase all data on the USB Memory Stick and begin recording data to it again;*

3. *When the USB Memory Stick is unplugged from the system, without first ejecting it, and then it is re-connected, then the VDR will erase all data on the USB Memory Stick and begin recording data to it again;*

4. *When attempting to download or copy a data set to the USB Memory Stick, if there is insufficient memory, then the VDR will erase all data on the USB Memory Stick in an attempt to free enough memory for the download to succeed.*

3.2 Connecting the USB Memory Stick

To connect the USB Memory Stick, insert it into the available USB port. The system will detect the drive and the OAU will display a USB Memory Stick status of "USB: STBY". After at least 10 seconds, the system will begin recording to the USB Memory Stick and the OAU will display a USB Memory Stick status of "USB: REC".

> ⚠️ *Once the USB Memory Stick RSM is physically connected, the DMM will automatically detect it and begin the recording process to it. As part of this process, all data on the USB Memory Stick will be deleted.*

3.3   Connecting the RSM

To connect the RSM, once the USB Memory Stick has been properly ejected and physically removed, complete the following steps:

1. Attach the USB 2.0 cable from the RSM to the USB 2.0 port in the compartment in the front panel of the DPU;
2. Connect the AC power cable to the RSM;
3. Power on the RSM (switch RSM Power to "**On**" position);

USB 2.0 Input

Power Input

Power Switch

Ethernet Port
(NOT USED)
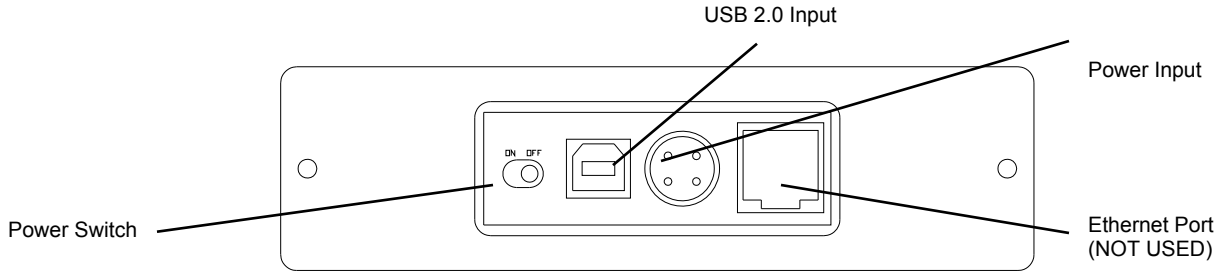
Figure 3–1 - Rear View of RSM Unit

The system will auto-detect the RSM and the OAU will display the status as "USB: STBY".

> *Once the RSM is physically connected, the DMM will automatically detect it. As part of this process, all data on the RSM will be deleted.*

3.4   Disconnecting the USB Memory Stick or RSM

The process to disconnect/eject the USB Memory Stick or RSM must be performed prior to physically disconnecting the unit from the system.

> *Important! Do not physically disconnect the USB Memory Stick or RSM before ejecting it from the system via the OAU. Failure to eject the drive properly will trigger a "REMOTE ERROR" on the OAU. This error can be cleared only by re-connecting the improperly removed drive (See Sections* Connecting the USB Memory Stick *and* Connecting the RSM*).*
> *Warning: Failure to properly eject the drive may result in disk corruption.*
>
> *It is recommended to POWER OFF the RSM BEFORE physically disconnecting it.*

To disconnect the USB Memory Stick (USB) or RSM, the following steps must be completed:

Eject

1. Press the **"Eject"** button on the OAU menu pad;
2. Press **"Enter"** to select the "**USB**" option on the OAU display;
3. The OAU will display the message **"Disconnecting"** indicating that the operator should wait while the USB Memory Stick or RSM is disconnected.
4. The OAU will then display a message **"USB Archiving has been disabled for 1 hour"**, meaning that which indicated it is safe to remove the external device;

5. After approximately 10 seconds the OAU will display the message **"USB: Stby"** for up to 1 hour, until the device is removed or disconnected;
6. To remove the USB Memory Stick open the USB compartment cover on the DPU and unplug the USB Memory Stick;
7. To disconnect an RSM, turn off RSM power and uplug the RSM cable from the USB compartment on the DPU.

*NOTE: After the OAU LCD displays **"USB: STBY"** then the USB Memory Stick should be removed immediately. If the USB Memory Stick is NOT unplugged within 1 hour after the eject operation the VDR – 100G3 will erase all data on the USB Memory Stick and begin recording data to it again.*
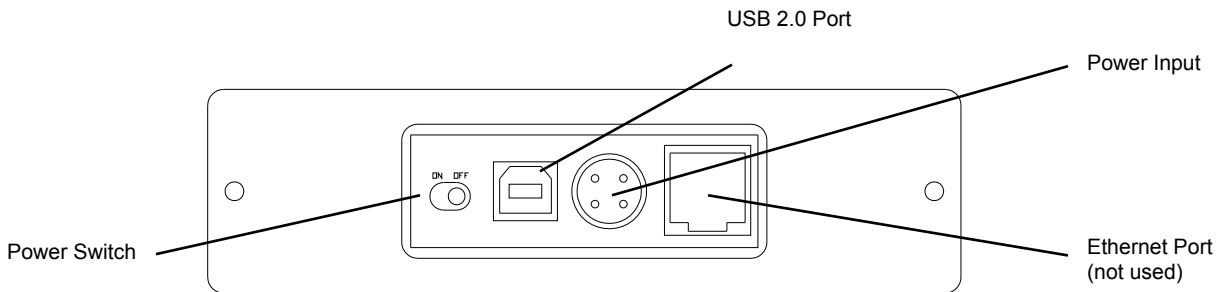
Figure 3-2 - Rear View of RSM Unit

3.5 Re-connecting the USB Memory Stick or RSM

To connect the USB Memory Stick, insert it into the USB compartment of the DPU or connect the power and data cables to the RSM.

The system will detect the drive and the OAU will display "**USB: Stby**" If connecting a USB Memory Stick, after at least 10 seconds, the system will begin recording to the USB Memory Stick and the OAU will display a "**USB: Rec**"

Once the USB Memory Stick is physically connected, the VDR will automatically detect it and begin the recording process to it. As part of this process, all data on the USB Memory Stick will be deleted.

Once the RSM is physically connected, the VDR will automatically detect it. As part of this process, all data on the RSM will be deleted.

3.6   Connecting the Client PC to the USB Memory Stick

To retrieve data from the USB Memory Stick using the client PC complete the following steps:

1.   Plug the USB Memory Stick in to an available USB 2.0 port on the client PC.
2.   The USB Memory Stick will be visible on the Client PC as a connected USB drive.

Note: A USB 1.1 port may also be used but it takes much longer to transfer the data than a 2.0 port.

The VDR - 100G3 Playback Application may be used to view the data.

3.7   Connecting Client PC to RSM

To retrieve data from the RSM using the Client PC, complete the following steps:

1.   Connect the RSM to an available USB 2.0 port on the client PC using an "A to B" USB cable;
2.   The RSM will be visible on the Client PC as a connected USB drive.

The VDR - 100G3 Playback Application may be used to viewthe data.

4 FRM/SFRM Download—Data Retrieval Method Number 3

Recovery of data from the FRM/SFRM **should only be carried out in a situation where an incident has rendered the VDR inoperative**. Data recovery must be carried out according to the manufacturer's instructions, using proprietary software provided by Rutter Technologies Inc.

The VDR-100G3 can currently accommodate the Rutter FRM (RUT-02447) Fixed Capsule or the L3 HVR-01/ 02 Fixed FRM Capsule. The VDR-100G3S can currently accommodate the Rutter FRM (RUT-02447) Fixed Capsule, the L3 SVR-01/02, the Jotron Float-Free SFRM Capsule, and the Rutter-ACR Float-Free SFRM Capsule.

Once the FRM/SFRM capsule has been recovered, dependant upon the severity of the incident, it may be necessary to contact the capsule manufacturer in order to reconstruct and/or refurbish the unit before downloading may commence. Contact information for the FRM/SFRM manufacturer mentioned above is available in *Appendix C – Contact Information*.

It will also be necessary to contact Rutter Technologies Inc., providing the vessel name and IMO number in order to receive the necessary download, playback, configuration, and partition information files (contact information is available in *Appendix C* of this document). *Appendix A – Incident Data Recovery Checklist* provides a guideline of steps to be carried out by the incident investigation team in the event that they may have to recover a FRM/SFRM unit.

The following procedure should **only** be attempted by an authorized service technician and is **not** required for day-to-day operations.

4.1 Damage to Ship and Minor Damage to FRM/SFRM

The VDR-100G3 is capable of downloading data directly from the FRM/SFRM. Therefore, if the VDR-100G3 can communicate with the FRM/SFRM, data can be retrieved using the VDR-100G3 as the Client PC.

If preferred, or if damage makes VDR-FRM/SFRM communication impossible, the methods described in *Section **Error! Reference source not found. - Error! Reference source not found.**may also be employed to retrieve the FRM/SFRM data.

> **Note!** *Before downloading from an L3 HVR/SVR capsule, it is essential to have the capsule's partition information. In the case of an incident, please contact Rutter Technologies Inc. for further instructions on obtaining the correct partition information.*

4.1.1 Downloading FRM/SFRM Data Directly to the VDR-100G3

In the case where the VDR-100G3 can communicate with the FRM/SFRM, the VDR-100G3 may be used to download data directly from the FRM/SFRM. After the data is downloaded, it may then be copied off of the VDR-100G3 internal storage drive to a Playback PC. The following steps outline the procedure to download data directly to the VDR-100G3.

> **Note!** *Before downloading directly to the VDR-100G3, it is necessary to stop the VDR-100G3 Watchdog Application and the VDR-100G3 Record Application. The Investigator must then log out of the MyUser account, and then log in to the VDR-100G3 as Administrator. Please contact Rutter Technologies Inc. for further instructions on obtaining the correct username and password information.*

4.1.1.1 Downloading Data Using the FRM Download Application

As Administrator on the VDR-100G3, use the **FRM Download Application** to download data directly from the FRM/SFRM. The following steps outline the procedure to use the FRM Download Application the retrieve data from an FRM/SFRM:

1. Start the FRM Download Application by clicking "Start", "All Programs", "Rutter", "VDR", and finally "FRM Download". Alternatively, locate the FRM Download.exe file in the VDR-100G3 'C:\VDRApps\' folder, and double-click to start the application.
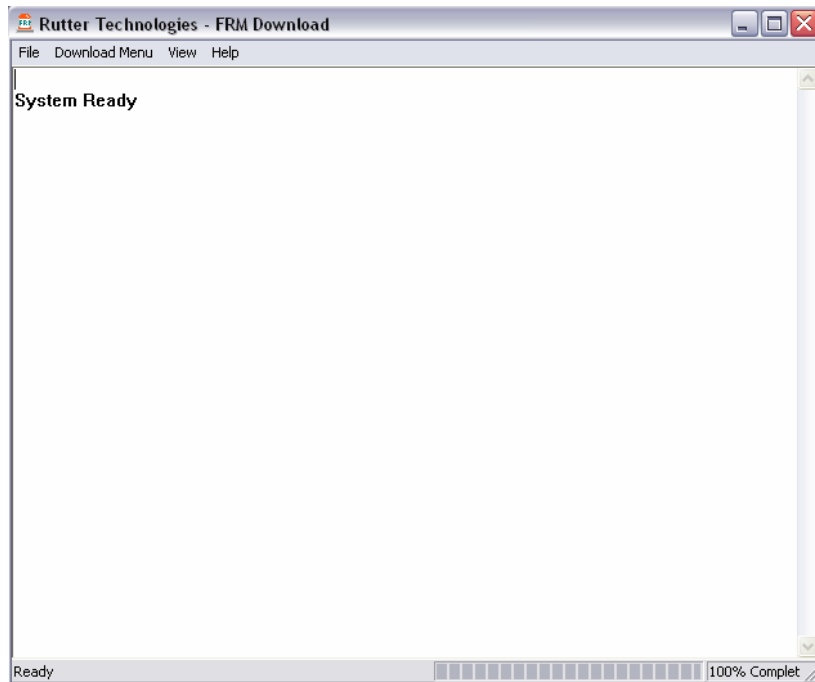
Figure 4-1 – VDR FRM Download Application

2. From the "Download" Menu select "Download Wizard…". Select the FRM/SFRM type for this download session from the list of FRM/SFRMs on the first page of the Download Wizard

Figure 4-2 – Download Wizard FRM Setup Page

3. Select "Use default settings to connect to FRM" and click next.
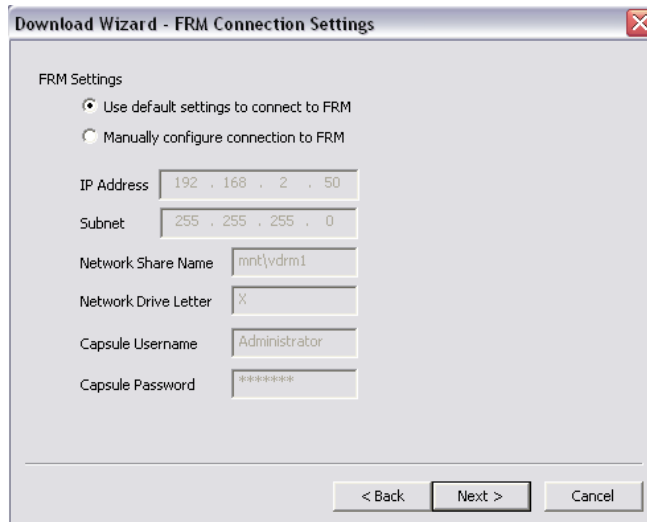
Figure 4-3 - Download Wizard FRM Connection Settings Page

4. Select the data types you wish to download (Ensure all are selected).

5. Use the 'Browse' button to select a suitable location to extract the contents of the FRM/SFRM to. When downloading directly to the VDR-100G3, it is recommended that the data be downloaded to the 'E:\' drive. This directory is '*shared*' and is accessible to a Playback PC via the download port on the VDR-100G3. Alternatively, data may be copied directly to an attached RSM or USB Memory Stick.

> **Note!** *In either case, there must be sufficient free memory space to accommodate the entire downloaded data set. This may require up to 4GB of free memory space, dependant on the FRM/SFRM being downloaded.*
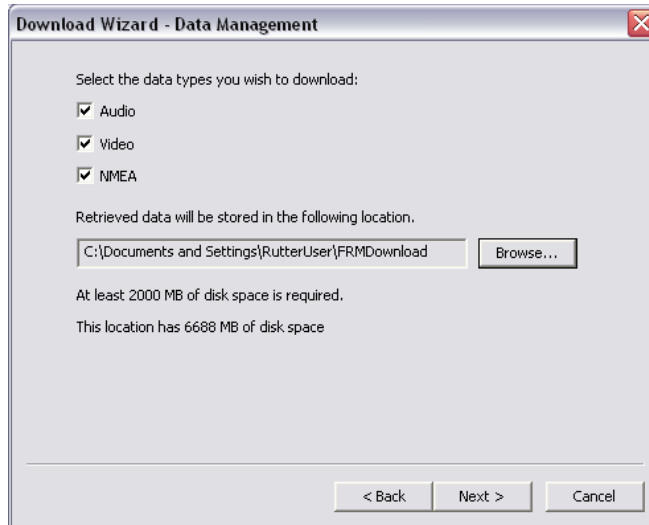
Figure 4-4 - Download Wizard Data Management Page

6. Enter the password to begin the download process. The default password is 'VDR' (case sensitive).

Note! Depending on the FRM/SFRM design, the download process may take anywhere from 15 minute up to 4 hours.
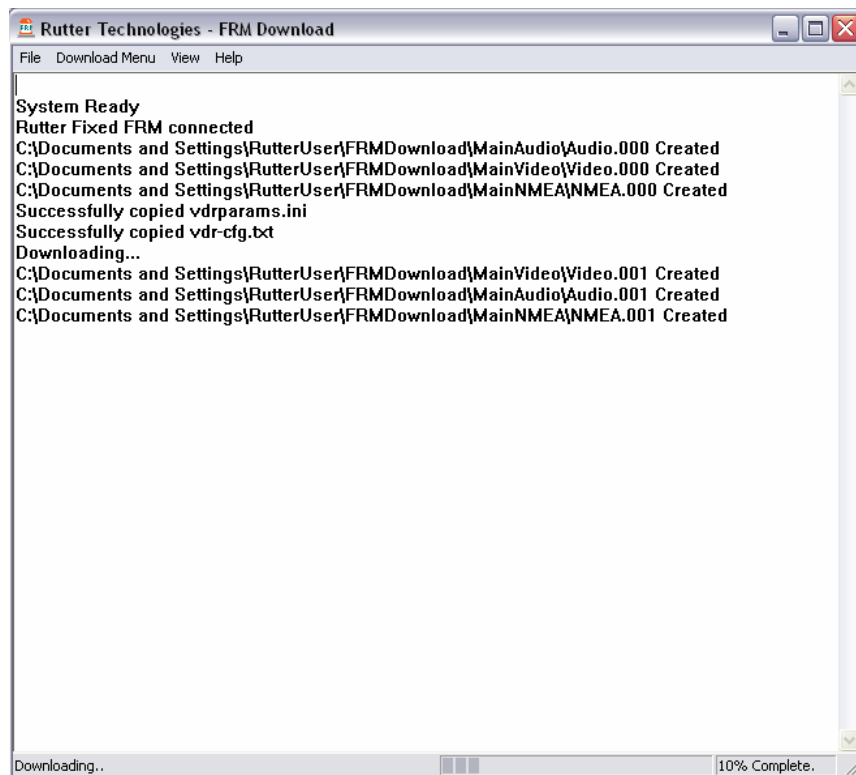
Figure 4-5 – Download in Progress

7. When the download has completed successfully, a message will appear in the log window of the FRM Download application indicating the download has completed along with the elapsed download time and the average speed of the download.
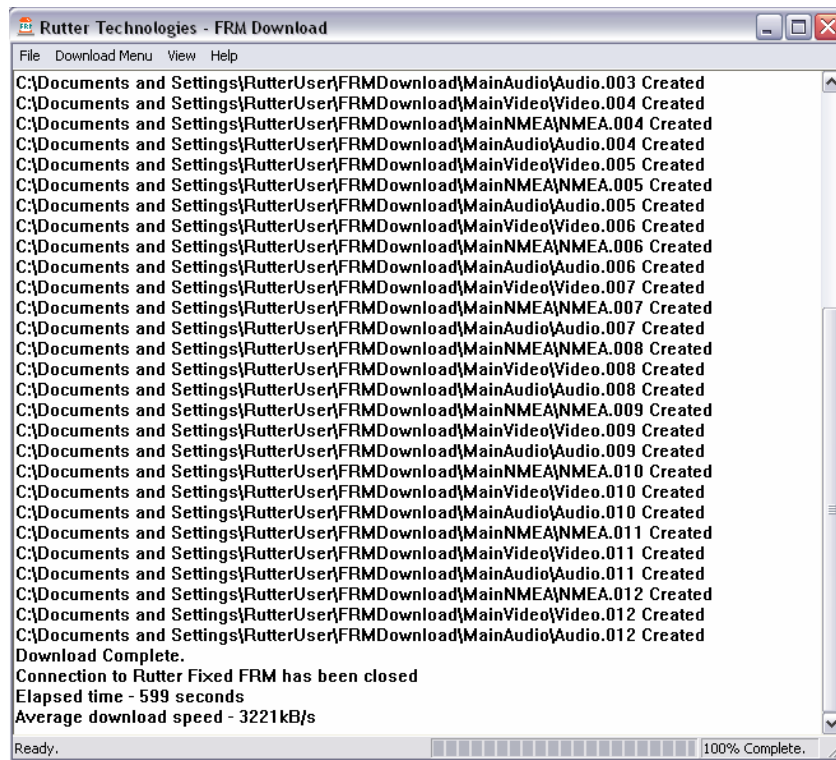
Figure 4-6 – Download Complete.

8. Once the download is complete, disconnect from the FRM/SFRM by selecting 'Exit' from the 'File' menu.

9. The downloaded data may now be moved to a Playback PC running the Rutter Playback software for review. See Section 4.1.1.2 Copying the Downloaded Data to a Playback PC for details.

4.1.1.2   Copying the Downloaded Data to a Playback PC

With the data now downloaded to the VDR-100G3, it may now be moved to a Playback PC running the Rutter Playback Application for review. See Chapter 6 - Playback Software for details of installing and using the Rutter Playback software,

4.1.1.2.1 Copying The Downloaded Data Via Drive Mapping

If the FRM/SFRM data was downloaded to the VDR-100G3's 'E:\' drive, connect the Playback PC to the VDR-100G3's Download Ethernet port to retrieve the data. The following steps illustrate this procedure:

1. The Playback PC must be in the same IP segment as the VDR-100G3's Download Ethernet port. The VDR-100G3's Download Ethernet port occupies IP address 200.200.200.200. The Playback PC must be in the same range, with the last segment different than the VDR-100G3 (as shown below.) To change the IP segment:
    a) Open the Control Panel via the Start menu.
    b) Double-click the Network Connections icon.

c) Right-click on the Local Area Connection icon and select Properties from the pop-up menu.

d) In the Local Area Connection Properties window, highlight "Internet Protocol (TCP/IP)" and click the "Properties" button located directly below the available options.

e) In the subsequent Internet Protocol (TCP/IP) Properties window, select the "Use the following IP address" radio button and enter 200.200.200.2 (the last number can be any number from 2 to 254, **except 200**.)

f) Click the "OK" button in the Internet Protocol (TCP/IP) Properties and the Local Area Connection Properties.

Figure 4-7- Establishing TCP/IP Address

2. Locate the VDR Data Port, a RJ45 wall jack, mounted on the bridge.

Figure 4-8 - VDR Data Port

3. Connect the Playback PC to the VDR Data Port via a straight-through Ethernet cable.

4. Via Windows Explorer, select 'Tools>Map Network Drive'. Select a drive letter not in use by the Playback PC, and enter '\\200.200.200.200\Secured Data' in the 'Folder' text box.
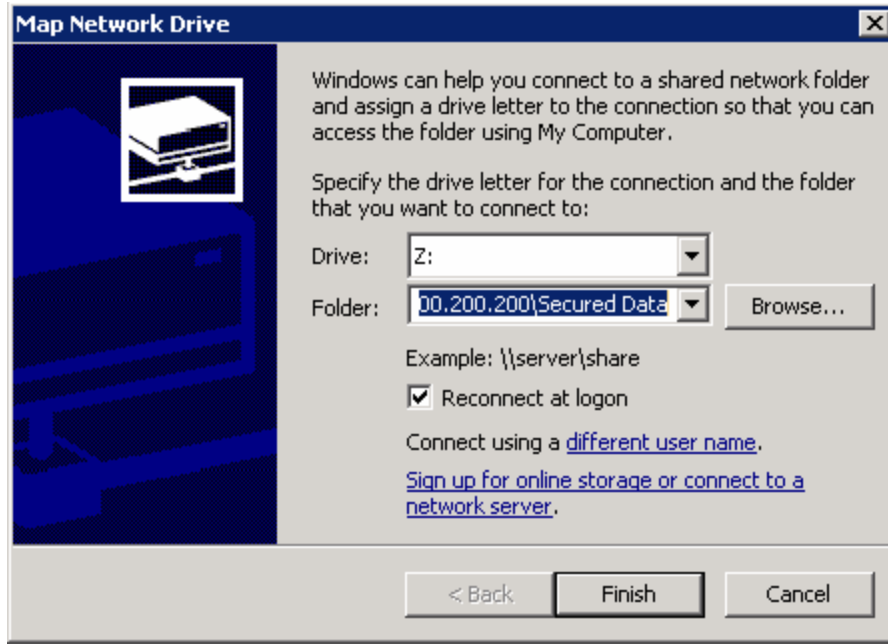
Figure 4-9 – Mapping the Secured Data Drive

5. When prompted, enter 'MyUser' for the user name and 'Rutter' for the password. Please note that these entries are case-sensitive.

Figure 4-10 – Enter Password and User name

6. When the Playback PC connects to the 'Secured Data' drive on the VDR-100G3, it will appear in Windows Explorer.
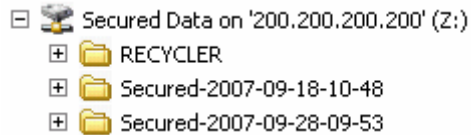
Figure 4-11 – The Mapped Secured Data Drive

7. Select the downloaded data set of interest, and copy it to the Playback PC.

4.1.1.2.2 Copying the Downloaded Data Via RSM/USB Memory Stick

If the FRM/SFRM data was downloaded to the VDR-100G3's RSM or USB Memory Stick, the investigator can copy the data directly to the Playback PC.

Remove the device containing the downloaded data from the VDR-100G3, and connect it to the Playback PC. When connected, the downloaded data may be copied off of the device, or the Playback software may be used to play back the data directly off of the device.

4.1.2 Downloading FRM/SFRM Data Direct to Playback/Client PC

Even if the VDR-100G3 is capable of downloading data directly from the FRM/SFRM (i.e. there is VDR-FRM/SFRM communication), it may be preferred to download the FRM/SFRM data directly to the Client/Playback PC. If this is the case, use the methods described in Section 4.2: No VDR Communications with FRM/SFRM to retrieve the FRM/SFRM data.

4.2   No VDR Communications with FRM/SFRM

If the FRM/SFRM is intact but is unable to communicate with the VDR-100G3, it is possible to connect a Client/Playback PC to the FRM/SFRM and download the recorded data directly to it. To download data directly from the FRM/SFRM to a Client PC, the Client PC must have the following:

- A 100 Base-TX Ethernet Interface (RJ45).
- Rutter Technologies Inc. proprietary FRM Download Application software.

> *Note! The following information is only applicable to the Rutter FRM (RUT-02447) Fixed Capsule, the L3 HVR/SVR Fixed FRM/SFRM Capsule and the Rutter-ACR Float-Free SFRM Capsule. For information on connecting to the Jotron Float-Free SFRM Capsule, refer to the manufacturer's technical manual.*

4.2.1   Connecting to Rutter FRM (RUT-02447) or L3 HVR/SVR Fixed FRM/SFRM Capsules

1. Locate the capsule and its associated FRM Junction Box.
2. Remove the power and Ethernet cable from the Junction Box.
3. Connect the power cable to a 24V power source.
4. Using the information in Table 4-1 - Wiring Diagram for 10BaseT Crossover Cable below, adjust the wiring of the existing Ethernet cable to make it a crossover cable and add a RJ45 connector.
5. Connect the RJ45 connector to the Client PC.
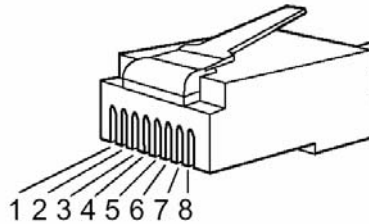
Figure 4-12 - RJ45 Connector

Pinout	Striped Colour	Solid Colour
Pin 1 (TD+) --------------------- (RD+) Pin 3	White/Orange	Green
Pin 2 (TD+) ---------------------- (RD-) Pin 6	Orange	Yellow
Pin 3 (TD+) ---------------------- (TD+) Pin 1	White/Green	Blue
Pin 4 ---- (Not used by 10BaseT) ---- Pin 4	Blue	Red
Pin 5 ---- (Not used by 10BaseT)----- Pin 5	White/Blue	Black
Pin 6 (RD-) ------------------------ (TD-) Pin 2	Green	Orange
Pin 7 ----- (Not used by 10BaseT)---- Pin 7	White/Brown	Brown
Pin 8 ----- (Not used by 10BaseT) --- Pin 8	Brown	Grey

Table 4-1 - Wiring Diagram for 10BaseT Crossover Cable

> **NOTE!** *It is important to remember that Pins 1 & 2 are a twisted pair and Pins 3 & 6 are a twisted pair.*

4.2.2   Connecting to a Rutter-ACR Float-Free SFRM Capsule

The Rutter-ACR Float-Free SFRM Capsule uses PoE technology to provide power and data connectivity between it and the VDR-100G3. The following steps illustrate how to connect the Rutter-ACR Float-Free SFRM Capsule directly to a Client PC:

1. Locate the Rutter-ACR Float-Free SFRM Capsule and its associated PoE Power Injector (PS-100). The PoE Power Injector is located inside the DPU.
2. Remove the power and Ethernet cable between PoE Power Injector and the DMM and DPU power terminal block, respectively.
3. Connect the power cable to a 24V power source.
4. Connect the RJ45 connector to the Client PC. The Ethernet connection may be made with the existing Ethernet cable. It is not necessary to change either of the Ethernet cables from straight-through to cross-over or from cross-over to straight-through.
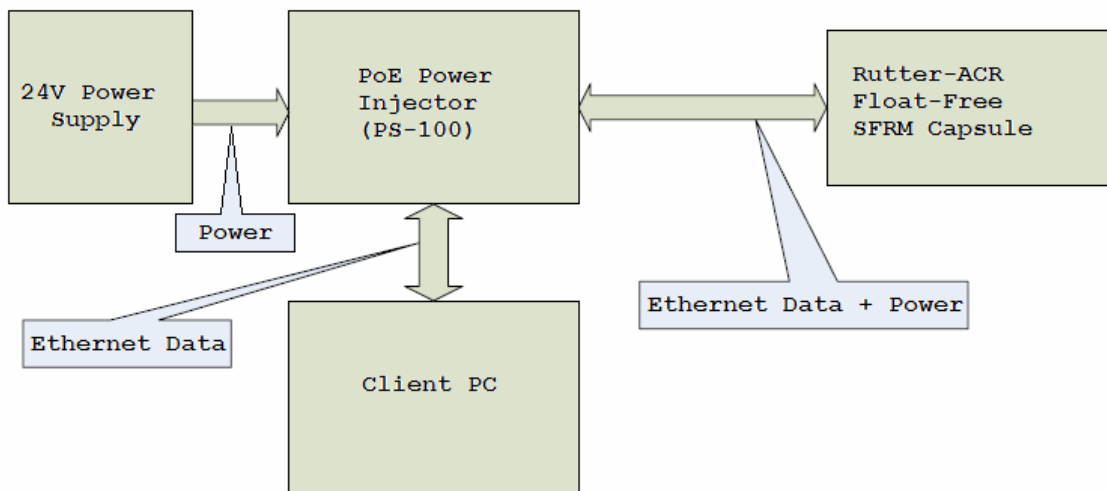
Figure 4-13 – Client PC to Rutter-ACR Float-Free SFRM Capsule Connectivity

4.2.3   Connecting to a Jotron Float-Free SFRM Capsule

For information on connecting to the Jotron Float-Free SFRM Capsule to a Client PC, refer to the manufacturer's technical manual.

4.2.4   Installing the FRM Download Application

Prior to downloading data from the FRM/SFRM directly to the Client PC, the FRM Download Application must be installed on the Client PC. The installation of the FRM Download Application is mostly automated and requires little user interaction. The install is performed via a self-extracting executable file and is installed to **C:\Program Files\Rutter\FRM Download** by default. There will be a shortcut added to the Start menu upon completion of the installation.

To complete the installation of the FRM Download Application, complete the steps listed below:

1. Copy the FRM Download Application installer (FRM Download Setup.exe) from the VDR Data Recovery CD supplied by Rutter Technologies Inc. to the desktop of the Client PC.
2. Once copied, locate the file entitled 'FRM Download Setup.exe' and double-click it.

Figure 4-14 – Installation Executable File

3. Read the information on the welcome page of the setup wizard and click 'next'.

Figure 4-15 – Setup Wizard Welcome Page

4. The 'Choose Components' page there will be an option to include or exclude 'Windows Services for Unix'. This option should be checked when using the FRM Download Application with a Rutter Fixed Capsule. Otherwise, this option can be unchecked.
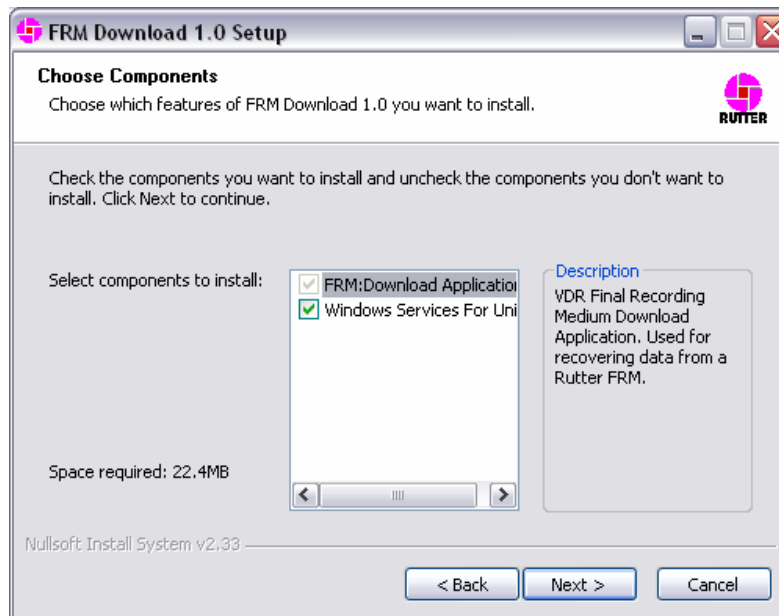
Figure 4-16 - Setup Wizard Component Selection Page

5. Choose the directory to which the FRM Download Application will be installed and click 'Install' to proceed with the installation.

> **Note!** *Due to limitations with the installation process of 'Windows Services for Unix', this component will be installed to "C:\SFU" by default.*
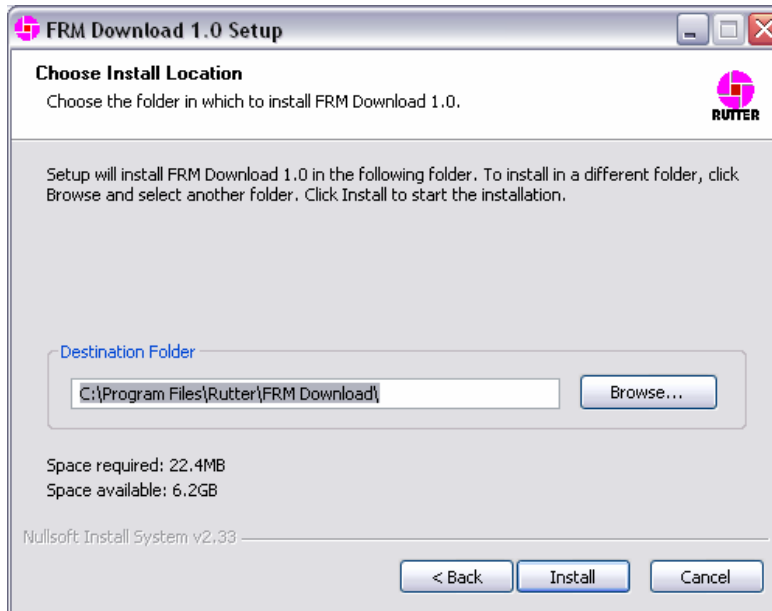
Figure 4-17 – Setup Wizard Install Location Page

6. Installation will proceed until the process is completed
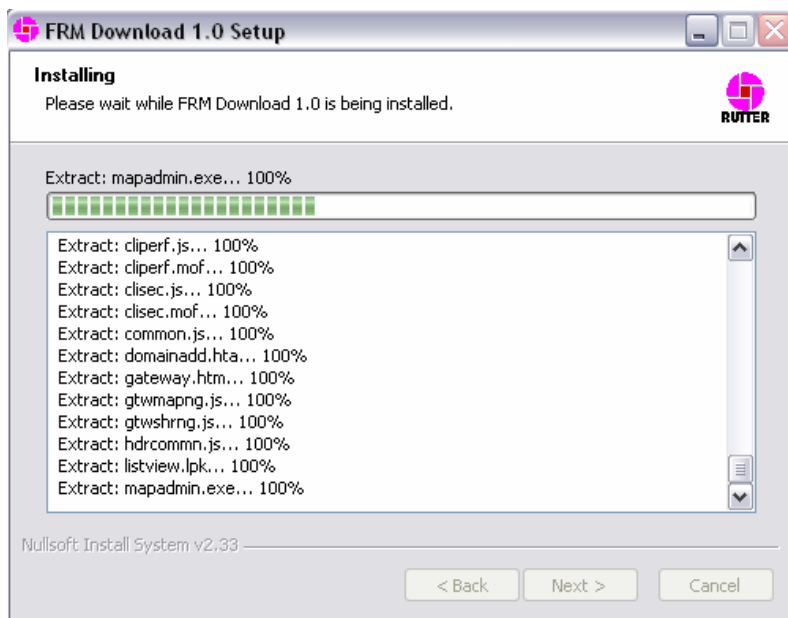
Figure 4-18 – Installing the Application Files

7. Once the FRM Download Application setup wizard has completed, click 'Finish' to complete the installation process.
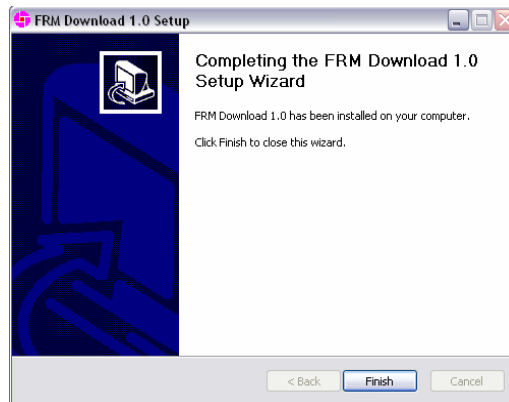
Figure 4-19 – Setup Completed

4.2.5   Copy VDRPARAMS.INI

Copy the 'vdrparams.ini' file to the 'C:\WINDOWS' folder from the VDR Data Recovery Software CD supplied by Rutter Technologies Inc.

4.2.6   Setting the Client PC IP Address

The IP address of the Client PC must be altered to match the IP of the FRM/SFRM (excluding the last segment). The FRM/SFRM IP is provided in the vdrparams.ini file.

1. To change the Client PC's IP address, open the 'Control Panel' > 'Network and Dial-up Connections' > 'Local Area Connection' and click the 'Properties' button.
2. In the subsequent 'Local Area Connection Properties' window select 'Internet Protocol (TCP/IP) in the 'Components checked are used by this connection:' selection area and click the 'Properties' button.
3. In the subsequent 'Internet Protocol (TCP/IP) Properties' window, select the 'Use the following IP address' radio button and enter the appropriate FRM/SFRM IP address in the 'IP Address:' field.
4. The last segment will have to be changed to a number between 3 and 255, but **cannot** be the same number as the FRM/SFRM IP address (i.e., if the FRM/SFRM IP address is 192.168.0.2, the Client PC address may be entered as 192.168.0.3).
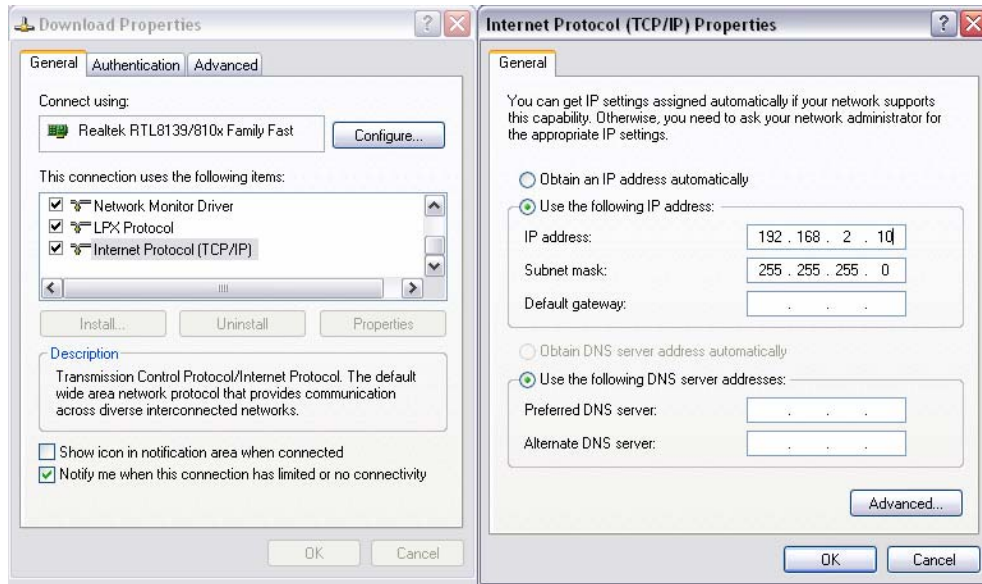
Figure 4-20 – TCP/IP Configuration

4.2.7   Downloading Data Using the FRM Download Application

After installing the FRM Download Application, it can be used to download data directly from the FRM/SFRM to the Client PC. The following steps outline the procedure to use the FRM Download Application the retrieve data from an FRM/SFRM:

> **Note!** *Before downloading from an L3 HVR/SVR Fixed FRM/SFRM, it is essential to have the capsule's partition information. In the case of an incident, please contact Rutter Technologies Inc. for further instructions on obtaining the correct partition information.*

1. Start the FRM Download Application by clicking "Start", "All Programs", "Rutter", "VDR", and finally "FRM Download".
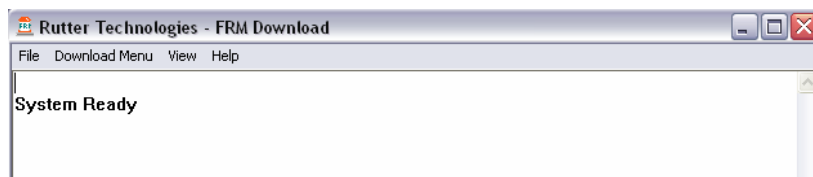
Figure 4-21 – VDR FRM Download Application

2. From the "Download" Menu select "Download Wizard…". Select the FRM/SFRM type for this download session from the list of FRM/SFRMs on the first page of the Download Wizard
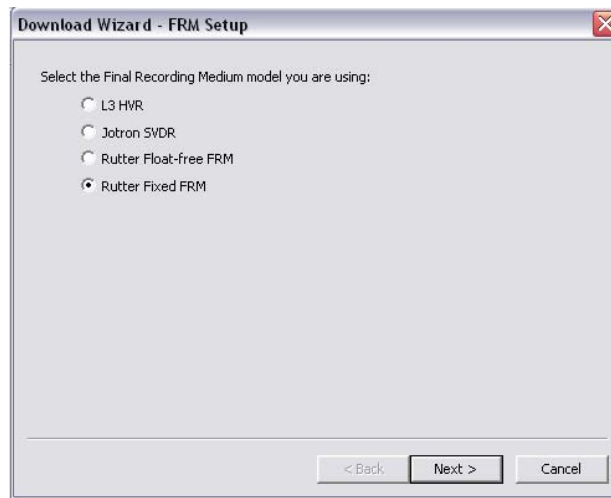
Figure 4-22 – Download Wizard FRM Setup Page

3. Select "Use default settings to connect to FRM" and click next.
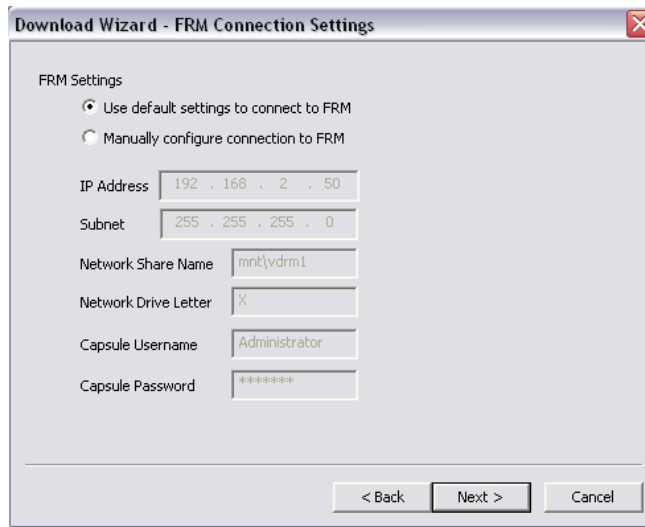
Figure 4-23 – Download Wizard FRM Connection Settings Page

4. Select the data types you wish to download (Ensure all are selected).

5. Use the 'Browse' button to select a suitable location to extract the contents of the FRM/SFRM to.

Note! *There must be sufficient free memory space to accommodate the entire downloaded data set. This may require up to 4GB of free memory space, dependant on the FRM/SFRM being downloaded.*
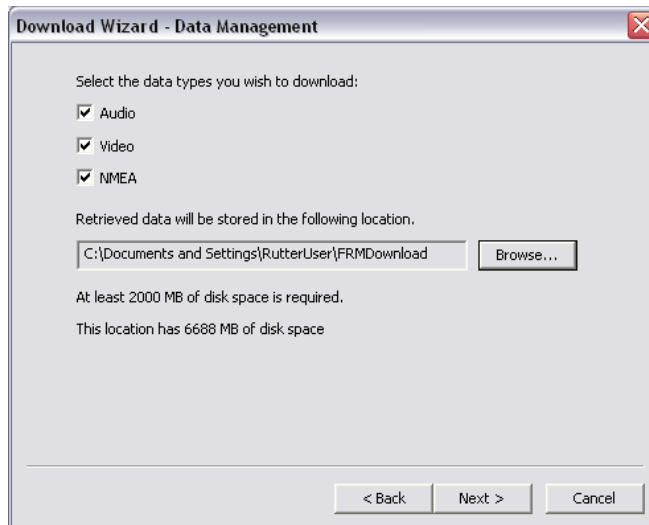
Figure 4-24 – Download Wizard Data Management Page

6. Enter the password to begin the download process. The default password is 'VDR' (case sensitive).

Note! *Depending on the FRM/SFRM design, the download process may take anywhere from 15 minutes up to 4 hours.*
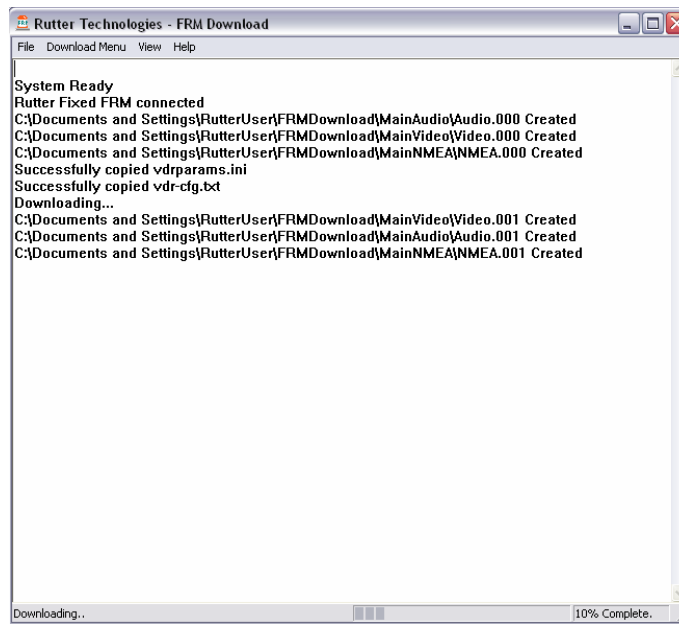
Figure 4-25 – Download in Progress

7. When the download has completed successfully, a message will appear in the log window of the FRM Download Application indicating the download has completed along with the elapsed download time and the average speed of the download.
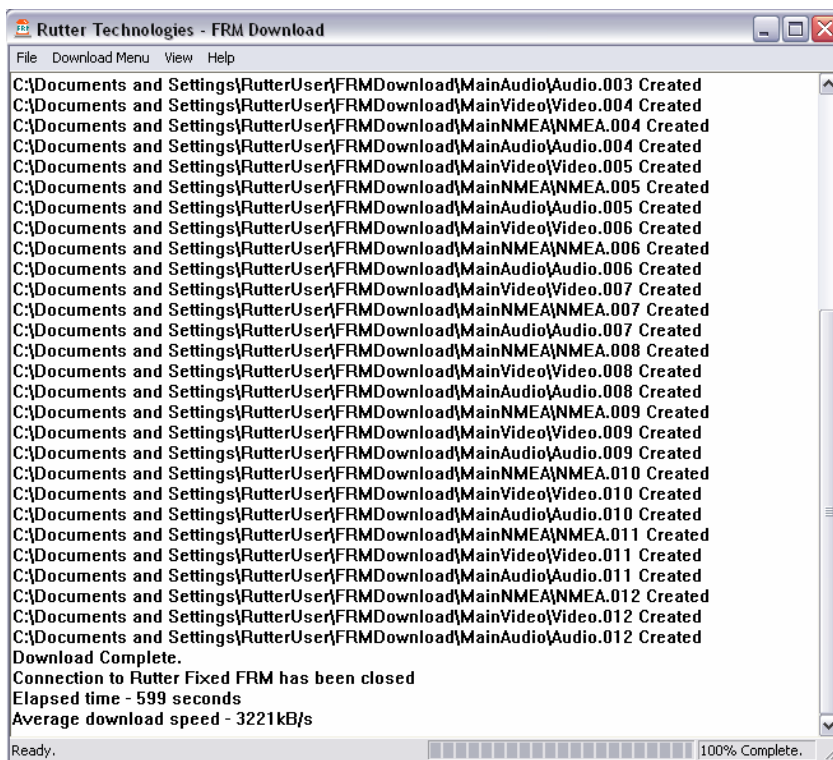
Figure 4-26 – Download Complete

8. Once the download is complete, disconnect from the FRM/SFRM by selecting 'Exit' from the 'File' menu.
9. The downloaded data may now be reviewed using the Rutter Playback software.

4.3   Damage to Ship and Severe Damage to FRM/SFRM

In the event that the FRM/SFRM has undergone severe mechanical damage, fire, or if the memory cable is damaged or destroyed, the module will have to be returned to the manufacturer's facility for repair. Refer to *Appendix C* for further information.

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5 Operation and Alarm Unit—User Guide

This section provides a user guide for operating the Operation and Alarm unit which is the user interface with the VDR-100G3/S. All user-level operation occurs via the OAU. The OAU provides the ability to secure data as well as offering audible alarms that alert the user to potential problems with the unit and/or component connections.

5.1 OAU Display

The OAU presents the following information, when in normal operational mode, at a 4 line alphanumeric illuminated display:

(Line 1)   (This line blank unless required to display longer messages)
(Line 2)   Status: Recording
(Line 3)   (This line blank unless required to display longer messages)
(Line 4)   USB: Rec

5.2 OAU Keypad

The VDR is operated by the illuminated keypad of the OAU and associated information presented on its display:
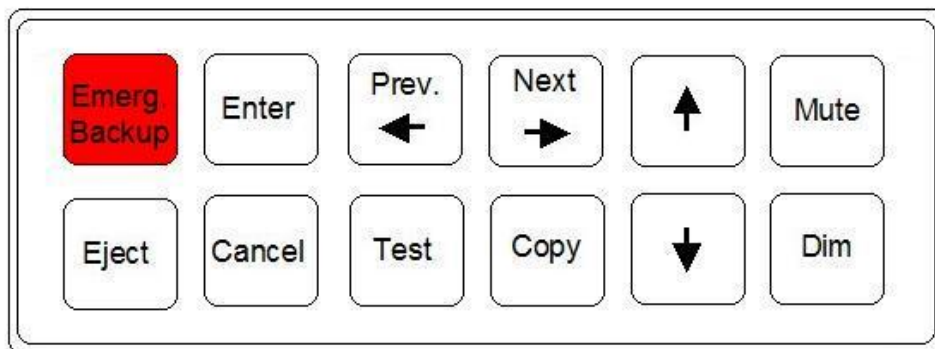
Figure 5-1 – OAU Keypad
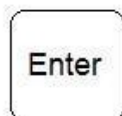
  Press "Enter" to execute a command
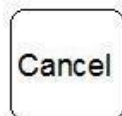
  Press "Cancel" to undo an initiated operation, if not otherwise instructed by the display menu.

5.3   Securing Data

To secure data to the DMM, complete the following steps:

1.   Press the "Emerg Backup" button on the OAU keypad. The following message will appear on the OAU's LCD:

"Perform Emergency Backup of VDR Data"
"<Enter to Confirm>"

2.   Press the "Enter" button on the OAU keypad. The following message will appear:

"Download Complete"
"<Enter" to Return>"

Note: This process will secure the current 12 hour data set; or all data since the last time the Emergency Backup button was pressed if this was less than 12 hours ago.

5.4   Muting Audible Alarm

To mute the audible alarm, press the "Mute" key on the OAU keypad.

For a list of alarm messages which appear on the OAU display, please see Section 3.6 Status and Alarm Messages
The alarm message will remain on the display until the cause of the alarm is resolved. Make note of all alarm messages to inform the technical support provider.

5.5   Dimming the Display

To dim or brighten the LCD display press the "Dim" key on the OAU keypad and toggle to any 1of the 4 brightness levels.

5.6   Test Screen

To get the VDR Record software version number or the unique DMM Hardware ID, press the "Test" key on the OAU keypad.

An example of the information provided via the "Tests" menu, is as follows:

Test Screen
Version: 6.0X.00
ID: 55N5SS5S55X21

Press the "Cancel" button to return to the main screen.

5.7   Viewing Recorded Data on the DMM Internal Hard Drive

The VDR-100G3 stores all data on the internal hard drive in 3 different locations:

- **Current Data**: 24 hours of the most recently recorded data, stored by 2 sets of 12 hours each,
- **Secured Data**: There may be several secured data sets in the overwrite-protected memory space, see 5.3., and
- **Archived Data**: Up to 30 days of data, archived by up to 60 sets of 12 hours each.

Note: Unlike the FRM, which may contain only the data required by IMO regulations, the internal storage locations typically contain a much larger and more detailed data set. This data set includes all AIS/NMEA, and all audio and video data channels collected by the VDR-100G3. If the VDR records more than the minimum data required by IMO, the timeframe recorded may be shorter than the times listed above.

To view a list of recorded data on the OAU display by date and time (To copy selected data sets to a removable USB storage device, see Copying Data to a USB Memory Stick (or optional RSM))

Important! *If you do not intend to copy data, <u>do not press "Enter"</u> when date/time indications of data sets are displayed, otherwise you will immediately initiate a copy process and you may overwrite data on the connected removable storage device, subject to its status, see below!*
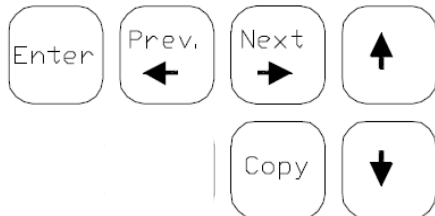
1. Press the "Copy" button on the OAU keypad. To leave the "View Data" function press "Cancel".

2. To use the view data function press the "↓↑" keys to move the OAU cursor to "**Copy Data**", "**Copy Secured**", or "**Copy Archived**", then press the "Enter" button on the OAU keypad.

3. When "**Copy Data**" is selected the OAU LCD displays:
    "Copy Current Data" (the current 12 h data set), or
    "Copy All Data" (the current 2 x 12 h most recently recorded data).

4. When "**Secured Data**" is selected the OAU will display secured data sets of 2 per page.
    a. Use the ← → keys to navigate through the data sets by pages, or the "↓↑" keys to navigate through the data sets one at a time.
    b. Data sets appear from oldest to newest and are recorded with the following time format: **yyyy-mm-dd-hh-mm** (where yyyy=year, mm=month, dd=day, hh=hour, and mm=minute).

5. When "**Archived Data**" is selected the operation is the same as for "Secured Data" except the may be a greater number of pages from which to select data sets.

5.8   Status and Alarm Messages

Listed below are the alarm codes that may appear on the OAU display:

Alarm Code	Description
System Error	Communication with the Record Application has been lost
Video Error	Communication with the Video Module has been lost
Audio Error	Communication with the Audio Module has been lost
FRM Error	Communication with the Final Recording Medium has been lost
Power Fail	Loss of utility power.
PCM Error	Communication has been lost with the Power Control Module
Remote Error	Communication has been lost with the RSM or the USB Memory Stick
Serial Error	Communication has been lost with the NMEA Module
Mic Error	Communication has been lost with one of the microphones
Disk Error	Failure to write data to the DMM internal hard drive
GPS Error	Failure to record GPS data

Table 5-1 - Alarm Code Description

⚠️ | *NOTE: Pressing the "Mute" button acknowledges the alarm code and silences the alarm. The alarm message will be displayed as long as the condition causing the alarm exists.*

USB Memory Stick and RSM OAU Status Messages				
	Drive Absent	Drive Present, Not Recording	Drive Present, Recording	Drive Error Detected*
USB	NONE	STBY	REC	ERR
RSM	NONE	STBY	Not Applicable	ERR
* When an error is detected with either the USB Memory Stick and/or the RSM, the OAU will also display a "REMOTE ERROR" alarm.				

Table 5-2 - USB Memory Stick and RSM OAU Status

6   Playback Software

The playback module accompanies the base model VDR and is resident on the download client PC. Additional playback software is available for use in shore-side offices. This additional software is necessary for the playback of data on the RSM or other media once it has been removed from the ship and transported to the office environment.

⚠️ *Important! The computer on which the Playback application is being installed must have its regional and language options adjusted to English. This may be done by double clicking the 'Regional Options' icon in the Control Panel window and selecting 'English' from the language drop down list. It is recommended that either 'English (United States)' or 'English (Canada)' is selected. However, any of the available English options are acceptable.*

The Playback application has two modes of operation. In Playback mode, the user can replay saved data sets. In Real Time Display mode, the Playback application will replay real time Audio and NMEA data that is received from the VDR. Audio data is not available during Real Time Display mode.

6.1   Playback Installation – Client/Standalone PC

The installation of playback software is automated and requires little interaction. The install is performed via a self-extracting executable file and is automatically installed to the **C:\Program Files\Playback** directory, with a shortcut placed on the Windows desktop. The install file will normally be named "Install VDR Playback.exe".

To begin the installation, complete the steps listed below:
1.   On the installation CD, double click the file entitled 'Install VDR Playback.exe'.
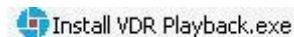
Figure 6-1 – Installation Executable File

2.   Choose the directory to which the executable will be installed.
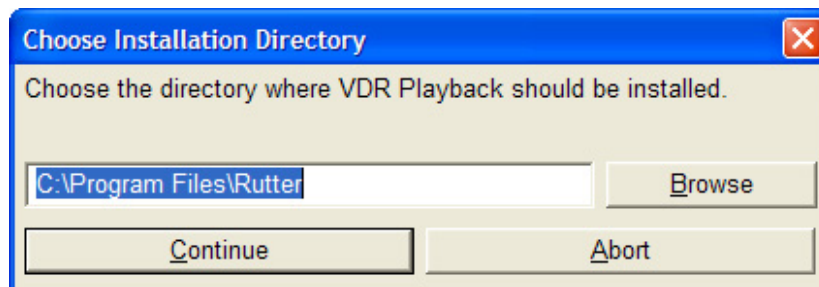
Figure 6-2 – Choose Installation Directory

3.   To abort the installation, click the 'Abort' button on the 'Installing…' message window.
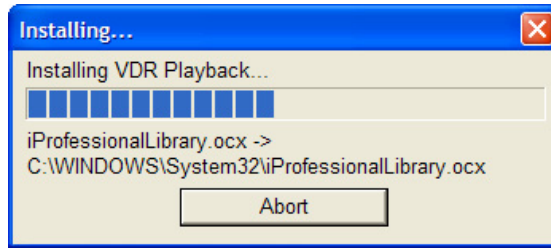
Figure 6-3 – Installing Message Window

4. A prompt will appear asking the user to clarify creating the install directory. Click "Yes" to create it. If "No" is chosen the user will be prompted to choose an alternative directory
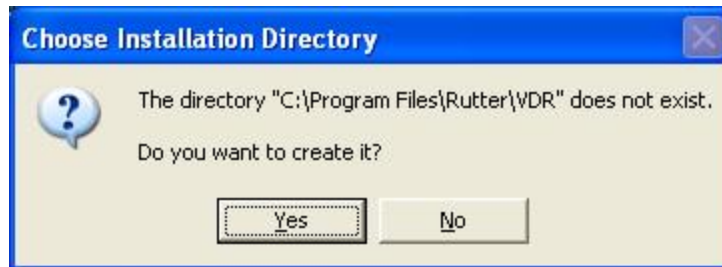
Figure 6-4 - Choose Installation Directory

5. Click "Yes" to reboot computer to finish the VDR Playback installation. Clicking "No" will allow a reboot at a later time.
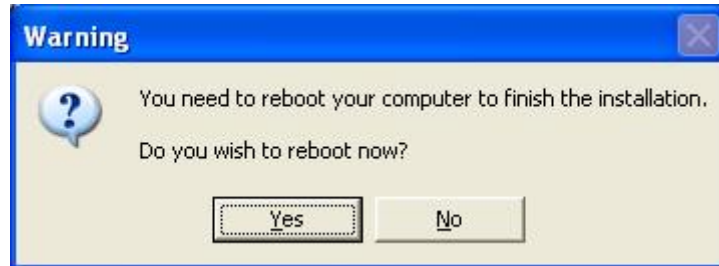
Figure 6-5 - Reboot warning

When the installation is complete, a shortcut to VDR Playback will be placed on the Windows desktop.

6.2   Starting the Playback Application

To start the playback application, double click the playback icon located on the desktop (as mentioned in step 4 of the installation process above). The application will look similar to *Figure 6-6 – Playback Software* shown below.

Note that the playback application interprets information provided in the ship's *VDRPlayback.ini* file therefore the playback interface may contain elements and controls different from what is shown below.
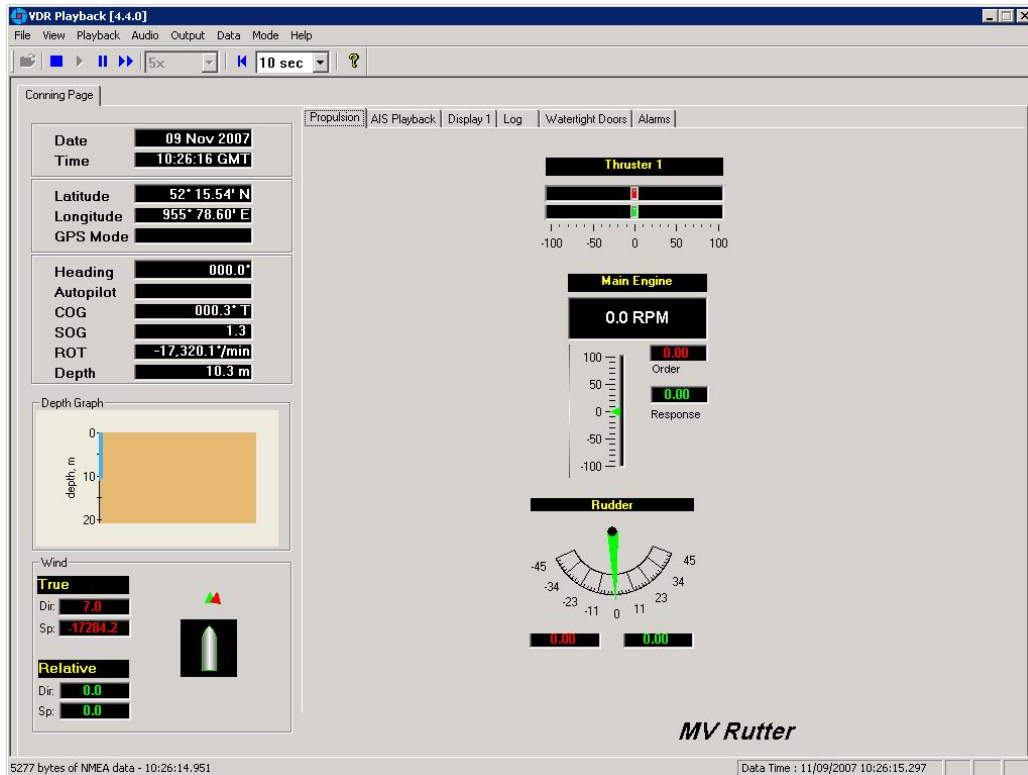
Figure 6-6 – Playback Software

6.2.1   Configuration File

The vessel displayed in the Playback application is automatically configured via the ship's configuration file, which is created by the installation technician during the installation of the VDR. The configuration file pertaining to the ship whose data will be used by the Playback application must be located in an easily accessed location on the local hard drive of the playback PC.

Upon start-up of the Playback application, the configuration file can be loaded using the File > Configure menu item.

Figure 6-7 – Configuration File Selection – Menu Item

A dialog window will appear allowing the user to select the applicable file. Once the file has been selected the Playback application will shut down momentarily and restart **automatically**. Upon restart the chosen configuration file will load automatically. To change the configuration file, select the File > Configure menu item, as above, and choose the newly desired file.

Figure 6-8 – Restart Warning

With the VDR-100G3, the ship's configuration file will accompany every available data set. When a data set is selected the configuration file will be automatically reloaded as necessary.

6.3   Choosing Data for Playback

To select a data set for playback:
1. From the "File " menu choose "Select Data Set". A dialog box will appear A dialog box will appear.
2. Locate the folder containing the downloaded data. The Playback application will automatically search for and select the *"AudioDir.vdr"* index file as seen in *Figure 6.9* below. Click "Open" to proceed.

Figure 6-9 - Locating Downloaded Data

3. The *.vdr* files accompany every download and act as an "index" to the actual data files. They are named according to the data items they reference: *AudioDir.vdr* for audio, *NMEADir.vdr* for NMEA data and *VideoDir.vdr* for video data. Select "All Files" from the "Files of Type" drop down box to view all *.vdr* index files. Selecting any one of these three files will open a data set for playback.

> **Note!** *If the download directory does not display three (3) files with extensions of ".vdr", it is possible that the Microsoft operating system is treating them as hidden files.*

To ensure that the .vdr files are being displayed (and not hidden by the operating system), follow these steps:

1. Open Windows Explorer
2. Select 'Folder Options' from the 'Tools' menu
3. Select the 'View' tab
4. Ensure that 'Show Hidden Files and Folders' **is** selected
5. Press the 'OK' button.

Figure 6-10 - Choose a .vdr File

If Playback cannot locate the vdr-cfg.txt file a prompt will appear as seen below. If the configuration file has already been pre-selected using "Configure" from the "File " menu then click "Cancel". Otherwise, click "OK" to select the configuration file contained on the local hard drive or other media.
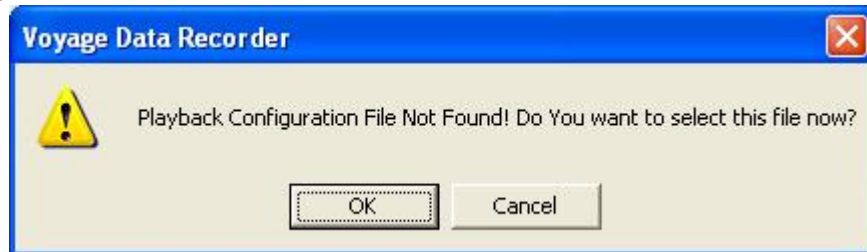
Figure 6-11 - Configuration file not found

6.3.1   Unarchive Extracted Data

Data for playback can also be chosen from a previously extracted data archive. If a portion of data has been previously extracted and archived it can be opened for playback via the File > Unarchive Extracted Data file menu option.

Figure 6-12 – Unarchive Extracted Data

To playback the archived data after selecting the "Unarchive Extracted Data" file menu option, a user will have to locate the .rfa (archive) file and select a folder to which the data can be extracted. Once extracted, an applicable configuration file will need to be selected in order to continue playback.

6.4   Enabling Ethernet Broadcasts

To enable the Playback software and Client PC to broadcast data across a network for use with a separate Electronic Charting System (ECS) or software, open the 'Output' menu dropdown and select "Enable Ethernet Broadcast". If a check appears adjacent to this option, broadcasting is currently enabled. To disable this option, ensure no check sign appears adjacent to it.
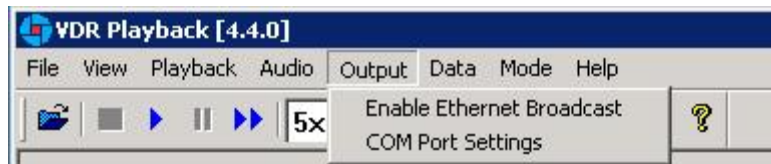
Figure 6-13 – Enabling Ethernet Broadcasting

The broadcast will occur on UDP Port 4450 and 4451. Refer to the relevant ECS manual to properly enable a PC to receive an Ethernet broadcast from Rutter Technologies' Playback software.

6.5   Starting the Playback

To start the data playback, complete the following steps:

1. Ensure that the Real Time Display mode of the Playback Application is disabled. Open the 'Mode' menu dropdown. If a check appears adjacent to the "Real Time Display" option, Real Time Display mode is currently enabled. To disable this option, ensure no check sign appears adjacent to it.

2. After a set of download data has been selected for playback, choose 'Start' from the 'Playback' menu or press the 'Play' button located on the 'Controls' toolbar
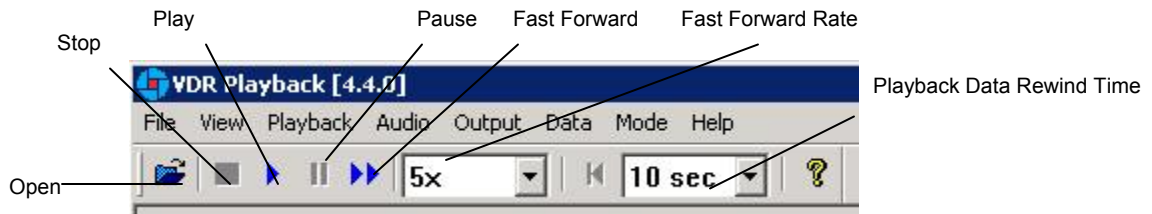
Figure 6-14 – Controls Toolbar

3. A dialog box will appear asking for a password. The default password is "VDR". The password **is case sensitive**. It must be typed in the text box and the 'OK' button clicked
4. After entering the correct password and clicking the 'OK' button, a second dialog box will appear, asking for a start time. Use the scroll bar (or enter a time in the text boxes) to select a playback start time. Click 'OK' to begin the playback.

Figure 6-15 – Choose Start Time For Playback

6.6   Configuring the Client to Receive Real Time Data

Configure the Client PC for the 'Playback Application' to connect to the VDR-100G3 and receive the recorded data. To do this, the Client PC must be in the same IP segment as the download port on the VDR. The VDR's download port occupies IP address 200.200.200.200. The client PC must be in the same range, with the last segment different than the VDR (as shown below.) To change the IP segment:
    a) Open the Control Panel via the Start menu.
    b) Double-click the Network Connections icon.

c) Right-click on the Local Area Connection icon, and select Properties from the pop-up menu.
d) In the Local Area Connection Properties window, highlight "Internet Protocol (TCP/IP)" and click the "Properties" button located directly below the available options.
e) In the subsequent Internet Protocol (TCP/IP) Properties window, select the "Use the following IP address" radio button and enter 200.200.200.2 (the last number can be any number from 2 to 254, **except 200**.)
f) Click the "OK" button in the Internet Protocol (TCP/IP) Properties and the Local Area Connection Properties.

Figure 6-16 - Establishing TCP/IP Address

6.7 Enabling Real Time Display Mode

The Playback application has two modes of operation. In playback mode, the user can replay saved data sets. In Real Time Display mode, the Playback application will replay real time Audio and NMEA data received from the VDR. Audio data is not available during Real Time Display Mode.

> **Note!** Prior to enabling Real Time Display on the Playback application, the Client PC must be connected to the VDR's download port (or the Ethernet switch that may be attached to the VDR's download port) via Ethernet. See 6.6 Configuring the Client to Receive Real Time Data for details.

To activate the Real Time Display mode of the Playback Application, open the 'Mode' menu dropdown and select "Real Time Display". If a check appears adjacent to this option, Real Time Display mode is currently enabled. To disable this option, ensure no check sign appears adjacent to it.
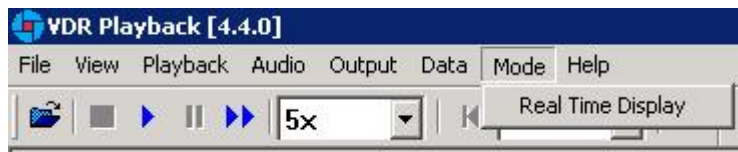

Figure 6-17 - Enabling Real Time Display Mode

When Real Time Display mode is entered, a pop-up window will appear indicating that Real Time Display has been enabled.

Figure 6-18 - Real Time Display Mode Confirmation

Many of the normal Playback mode options are disabled when operating in Real Time Display mode, as they are not applicable. All disabled options will be greyed, such that they are still visible but not available for selection.

6.8   Starting the Playback in Real Time Display Mode

To start the playback of real time data, complete the following steps:

1. Follow instructions in *Section 6.2.1: Configuration File* to select a valid configuration file.
2. Choose 'Start' from the 'Playback' menu or press the 'Play' button located on the 'Controls' toolbar

Figure 6-19 - Controls Toolbar

3. A dialog box will appear asking for a password. The default password is "VDR". The password **is case sensitive**. It must be typed in the text box and the 'OK' button clicked
4. After entering the correct password and clicking the 'OK' button Real Time Display playback will begin.

6.9   Passwords

There are 2 passwords required to run the playback software.

The first is necessary to run the playback. It is supplied with the software and can be changed by choosing 'Set Password' from the 'Playback' file menu. A dialog box will appear asking for the old and new passwords.

The second password is for playback of audio data. It can be changed by choosing 'Set Password' from the 'Audio' file menu. All default passwords are "VDR" (case sensitive).
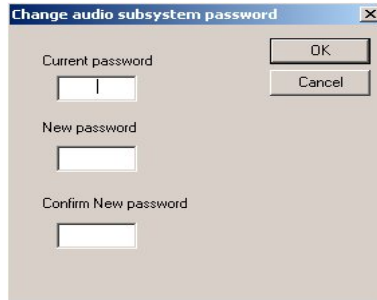
Figure 6-20 – Change Password

6.10   Playback Controls

The playback can be controlled via 'Playback' menu items or by using the buttons located on the Controls toolbar. Both options offer a full range of controls, including the ability to run the playback in fast time (with the additional option of choosing replay speed). *Figure 6-14 – Controls Toolbar* provides an illustration of the toolbar. If available for use, buttons will appear blue (such as the 'Play' button in the illustration). If unavailable for use, buttons will be greyed (such as the 'Pause' button in the illustration).

While playback is stopped, the 'Fast Forward Rate' drop down box can be used to set the playback fast forward speed.

⚠️ | *NOTE! The 'Fast Forward Rate' drop down box cannot be manipulated once a playback has started.*

⚠️ | *NOTE! Many of the controls available during Playback mode are not applicable during Real Time Display mode therefore they are disabled (greyed).*

To activate the fast forward feature, press the 'Fast Forward' button. Return the playback to normal time by pressing the fast forward button a second time.

Select 'Set Playback Rate' (Playback > Set Playback Rate) to adjust the speed of the replay using the 'Playback' menu. A dialog box will appear requiring a time compression rate. Enter any integer from 2 to 24 (inclusive) in the open text box and press 'OK' (see *Figure 6-21 – Set Fast Forward Rate*).
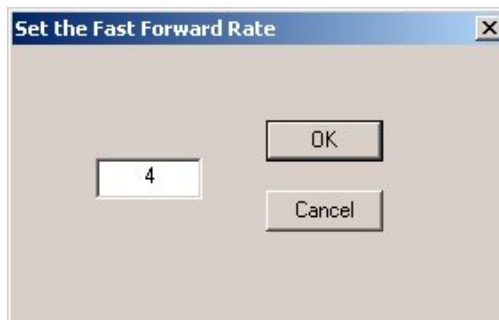
Figure 6-21 – Set Fast Forward Rate

The playback can be halted with the same time index in place by pressing the pause button. Press the pause button a second time to continue the playback.

The Controls toolbar can also be hidden by deselecting 'Controls' from the 'View' menu. By default it is visible therefore a check will appear adjacent to this option. Deselecting it will remove this check mark.

6.11   Audio Volume & Channel Selection

Audio data includes continuous bridge audio and radio communications. The configuration of audio will differ between ships but is generally arranged in 2 to 4 banks.

Individual channels contain audio data corresponding to an area of the bridge, bridge wings, or radio communications. Each channel may be included in the playback individually or in conjunction with other channels. For example, a user may wish to play back audio data recorded in the centre of the bridge while turning off external microphones where wind noise may be present.
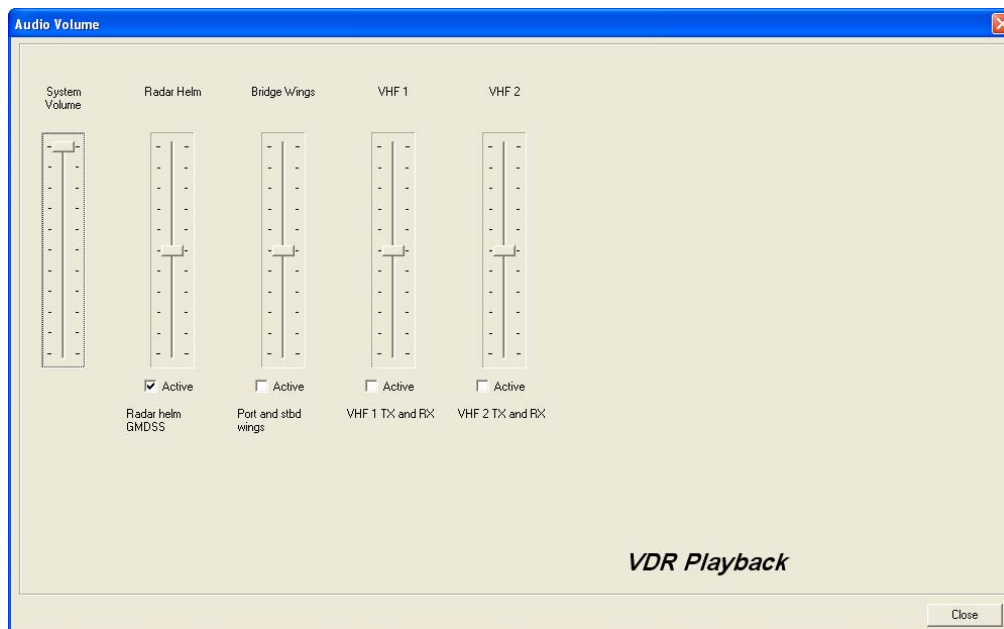
Figure 6-22 – Audio Interface

To activate the audio portion of a playback, choose 'Unlock Audio' from the 'Audio' file menu (see *Figure 6-23 – Audio Menu*). A prompt will appear requiring a password; the default password supplied with the VDR-100G3 is "VDR". Press 'OK' to activate the audio data and make each channel in the 'Audio' file menu selectable.

Once unlocked, audio data will be available for the remainder of the time playback is open. Audio can be adjusted by opening the "Audio Volume" window (see *Figure 6-22 – Audio Interface*) via the "Audio Volume" option in the Audio file menu.

Figure 6-23 – Audio Menu

There are two (2) ways to activate an available audio channel individually:

- · Select the appropriate audio channel from the 'Audio' file menu, or,
- · Click the 'Active' checkbox below the appropriate channel once the audio has been unlocked.
- · It is also possible to print the audio status to the 'Log' Tab Screen by selecting 'Status' from the 'Audio' file menu.

To silence a playback, simply uncheck each channel either on the 'Audio' menu or via the 'Active' checkbox.

⚠️ | *Note! Audio data is not available during Real Time Display mode, thus all Audio options are disabled, including all audio options under the 'Audio' file menu.*

6.12 Conning Page Tab

The Conning Data Tab is the default screen upon Playback start-up. In addition to the Propulsion and Video Channel(s) (for example, PORT X-Band, STBD S-Band, and CCTV) information tab(s) found in the centre of the screen, the Conning Data Tab also contains the following information (all along the upper left hand side of the tab screen):

- ▪ Date – Date of playback information
- ▪ Time – Time of playback information
- ▪ Latitude – Ship's latitude
- ▪ Longitude – Ship's longitude
- ▪ GPS Mode – Global Positioning System: SPS, DGPS (Differential GPS), PPS, RTK (Real Time Kinematic), FRTK (Float Real Time Kinematic), and DRM (Dead Reckoning Mode)
- ▪ Heading – Ship's heading
- ▪ Autopilot – Indicates the presence or non-presence of a heading control system (On/Off)
- ▪ COG – Ship's Course Over Ground
- ▪ SOG – Ship's Speed Over Ground
- ▪ Depth – Depth of ship
- ▪ ROT – Ship's Rate Of Turn

6.12.1 Depth Graph

The Depth Graph provides an illustration, in metres (m), of the ship's depth.
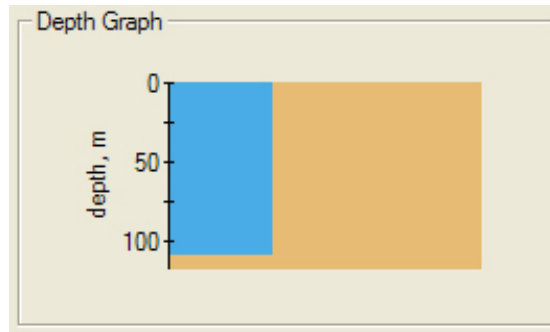
Figure 6-24 – Depth Graph

6.12.2 Wind Information

The Wind Information pane contains data regarding the wind's True and Relative Direction (Dir) and Speed (Sp).

A compass is also provided in order to illustrate wind direction based on ship's heading. The red arrow indicates True wind direction while the green arrow indicates Relative wind direction. The ship graphic indicates the ship's heading.
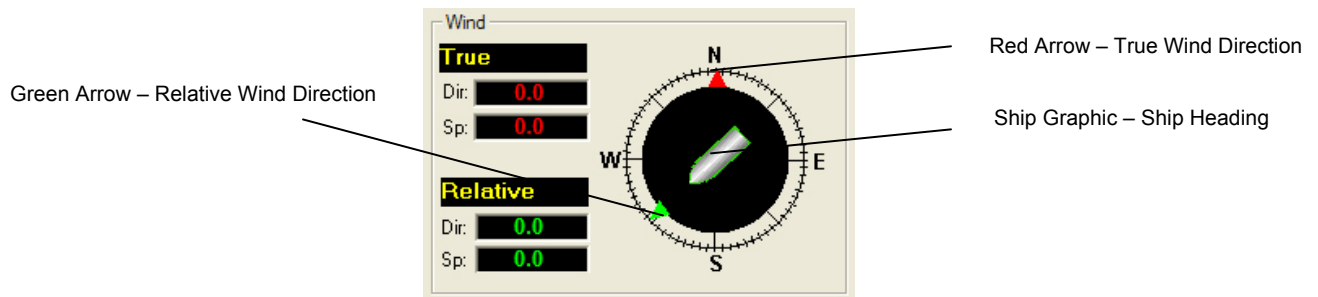
Figure 6-25 – Wind Information

6.13   Propulsion Tab

The Propulsion Data Tab is custom designed for each individual ship according to propulsion systems, bow thruster configuration and NMEA strings broadcast by bridge electronics. These displays are dependant upon the *VDRPlayback.ini* file created for a particular ship.
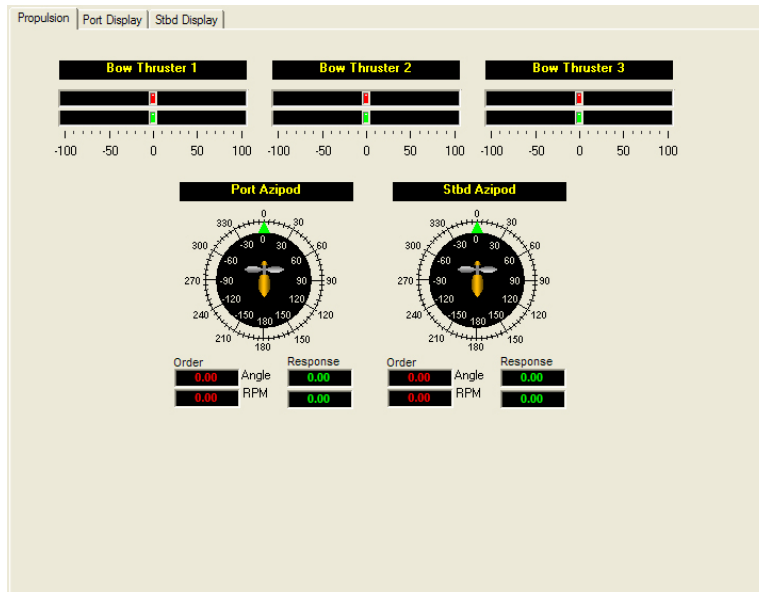
Figure 6-26 – Sample Propulsion Tab

6.14 Video Channel Display Tab(s)

Radar data is captured at 15-second intervals. If multiple radar images are available for video capture, capture times will be staggered but still allow for individual captures at 15-second intervals.

There are a number of options available when viewing the radar data:

· To display the radar data in its own window, choose View > Full Size Video > Video Channel. To close this window, click the 'x' in the top right corner.
· To move the radar image (once in its own window) in order to make a particular section visible without adjusting the window dimensions, click and drag by placing the mouse pointer over a section of the image, pressing the left mouse button and moving the mouse;
· To view the whole radar image available in its own window select View > Fit to Window > Video Channel;
· To save the radar image as a .bmp file, select the 'File' menu > Save > Video Channels. A dialogue will open allowing a save location to be chosen.
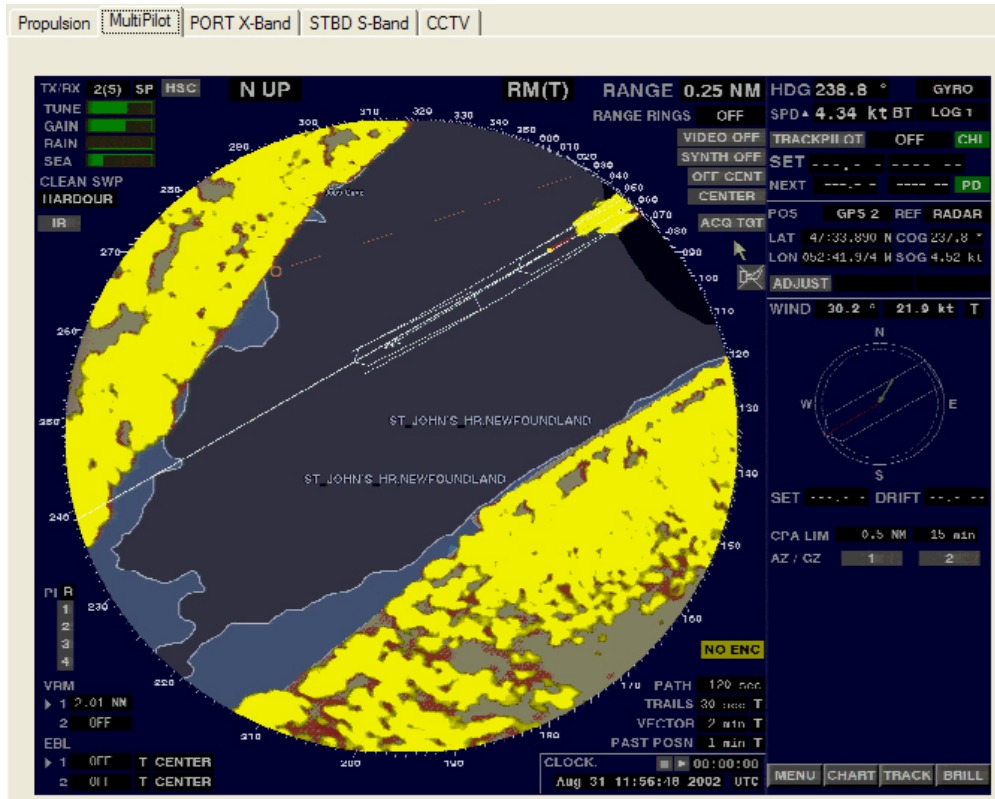
Figure 6-27 – MultiPilot Tab

The images are captured directly from the radar display; therefore any radar supporting ECDIS or chart displays will have the ECDIS or chart image recorded.

> ⚠️ | *Note! If proprietary data is present in the data playback, a "Proprietary" conning tab may appear. This tab window will present the available proprietary data in sentence format.*

6.15 Proprietary Tab

If proprietary data is present in the data playback, a "Proprietary" conning tab may appear. This tab window will present the available proprietary data in sentence format.

6.16   AIS Playback Tab

The 'AIS Playback' Tab Screen displays information captured from the ship's AIS.
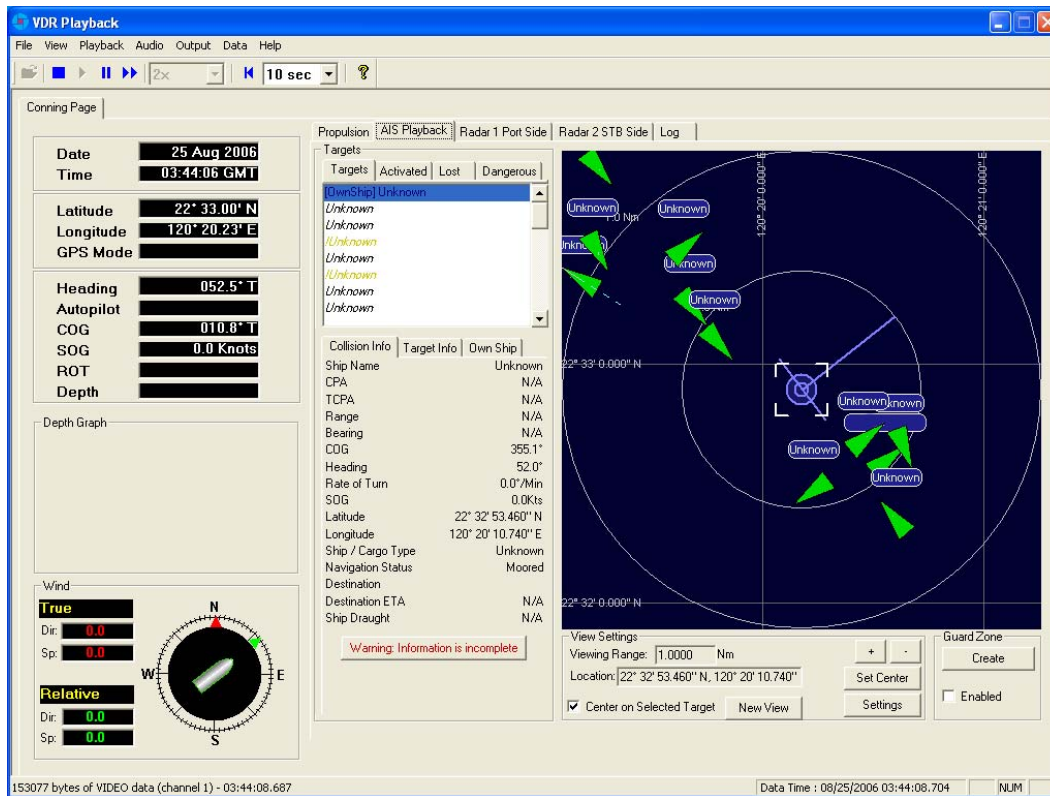
Figure 6-28 – AIS Playback Tab

There are a number of features available within the AIS Playback tab screen that allow a user to better interpret the downloaded information.

6.16.1   Targets

The Targets section of the AIS Playback tab screen provides a range of information about all targets visible in the playback window.

- **Targets Tab** – provides a list of all ships available within the AIS view screen. If a ship's information becomes unavailable it remains in the list but a line is drawn through its name (it is also added to the "Lost" tab list (see below)).
- **Activated Tab** – provides the name of the ship selected by the user in the AIS view screen.
- **Lost Tab** – provides a list of ships for which information is no longer available.
- **Dangerous Tab** – provides a list of all ships that are currently on a dangerous course relative to ownship.
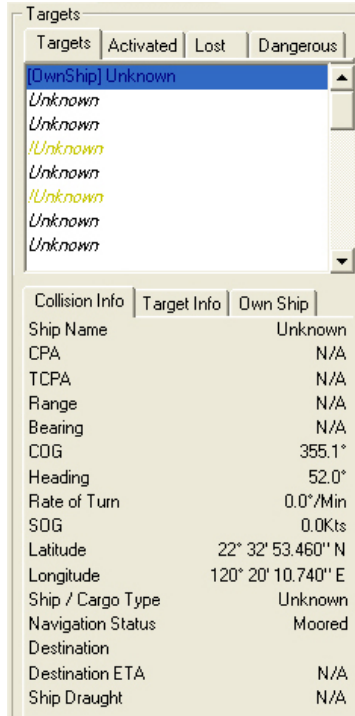
Figure 6-29 – Targets Information Section

Specific ship information is also available in the following tabs (located below the above mentioned tabs):

- **Collision Info** – provides information specific to a selected ship's navigational course.
- **Target Info** – provides registered information (e.g., MMSI, IMO, etc.) specific to a selected ship.
- **Own Ship** – provides registered and navigational information for ownship regardless of what target is selected.

6.16.2   View Settings

The View Settings section allows a user a high level of control over the AIS playback view screen.
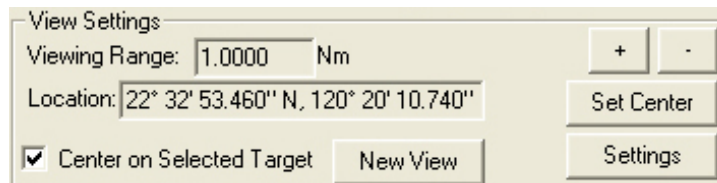
Figure 6-30 – View Settings Section

- **Viewing Range** – It is possible to increase or decrease the viewing range of the AIS playback view screen by pressing the "+" and "-" buttons located in the upper right of the View Settings section. Note that if using a wheel mouse the viewing range can also be increased/decreased by moving the wheel while the pointer is located in the view screen. The viewing range is listed in nautical miles.
- **Location** – The latitude and longitude of the selected target is listed.
- **Center on Selected Target** – If this checkbox is selected the view screen will center on the selected target.
- **Set Center Button** – To set the center point of the view screen, press the "Set Center" button, position the mouse pointer on a location on the view screen and left-click. This

point will now be the center point of the view screen. Turning on the "Center on Selected Target" checkbox overrides this control.
- **Full Screen** – Opens a dedicated AIS Playback window.

6.16.2.1 AIS Display Settings

The "Settings" button located in the View Settings section opens an "AIS Display Settings" window. The settings in this window allow the user to adjust the AIS Playback display.
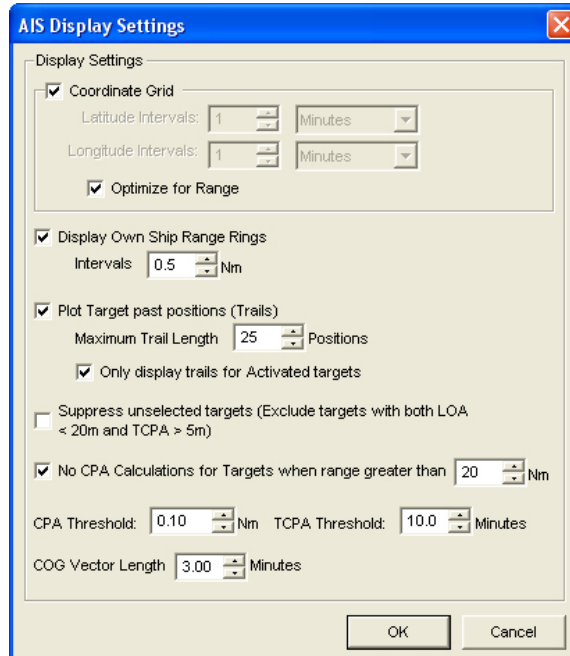
Figure 6-31 – AIS Display Settings Window

- CPA (Closest Point of Approach)
- TCPA (Time to Closest Point of Approach)
- COG (Course Over Ground)
- LOA (Length Over All)

6.16.3 GuardZone

The GuardZone section allows a user to create a guard zone in the view screen. To create a guard zone press the "Create" button, place the mouse cursor in the view screen area and left-click in the locations required to create a guard zone shape. Double-click to complete the guard zone formation.

The guard zone can be enabled or disabled by checking or unchecking the "Enabled" checkbox.

Figure 6-32 - GuardZone enable/disable

6.17 Log Tab

The 'Log' Tab Screen displays the size of each type of data block and the time it was recorded. When viewed in compressed time (fast forward), the size of data blocks written at each time-period is displayed, but the actual NMEA strings are not. When played back in normal time, the 'Log' Tab Screen will also display the NMEA strings.

'Log' information can be controlled via the Controls toolbar. To scroll illustrated information, press the 'Pause' button on the Controls toolbar and use the 'Log' scrollbar to navigate.

Figure 6-33 - Log Window

6.17.1 Error Codes

The following table provides a list of error codes and descriptions that may be observed in the Log Window of the Playback application:

Error Code	Alarm Message	Binary Bit Position
99$0	Status Clear	0000000000
99$1	Storage Error	0000000001
99$2	Video Error	0000000010
99$4	Audio Error	0000000100
99$8	NMEA Error	0000001000
99$16	Power Error	0000010000
99$32	Microphone Error	0000100000
99$64	FRM Error	0001000000
99$128	Lyngso Error	0010000000
99$256	Power Comms Error	0100000000
99$512	Remote Error	1000000000
99$1024	GPS Error	10000000000

Table 6-1 - Error Code - Playback Log Window

In the event of simultaneous errors, it will be necessary to convert the displayed error code to its binary counterpart. A multiple error will display multiple 1-bits in the binary string, which can then be interpreted. For example, the error code 99$17 converts to a binary string of 0000010001, representing a simultaneous Storage and Power error.

6.18   Fire Doors Tab

The Fire Doors Tab Screen displays information regarding the status of the ship's fire doors. The colour of the light adjacent to the door name, dependant upon the configuration, indicates an active (often indicated with the colour red) or non-active (often indicated with the colour green) door or opening.

Should the number of fire doors exceed the initial screen space, a scroll bar will become visible allowing a user to view all available.

Figure 6-34 – Fire Doors Tab

6.19   Water Doors Tab

The Water Doors Tab Screen displays information regarding the status of the ship's water doors. The colour of the light adjacent to the door name, dependant upon the configuration, indicates an active (often indicated with the colour red) or non-active (often indicated with the colour green) door or opening.

Should the number of water doors exceed the initial screen space, a scroll bar will become visible allowing a user to view all available.
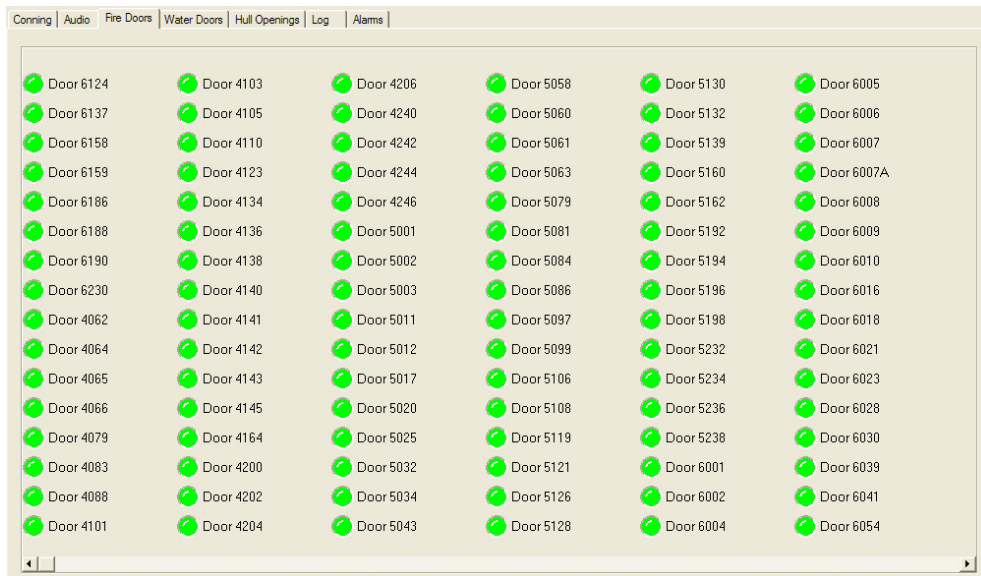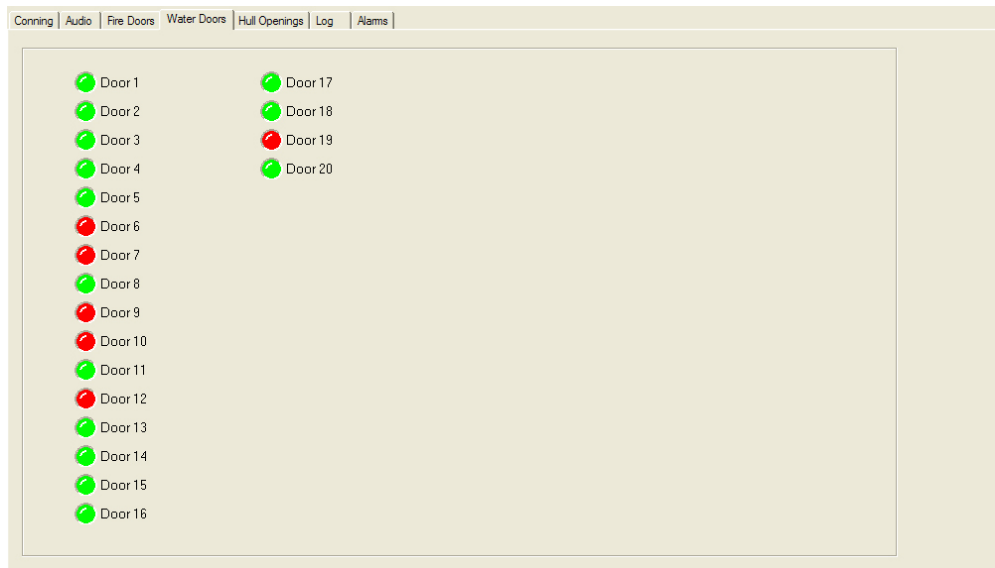

Figure 6-35 – Water Doors Tab

6.20   Hull Openings Tab

The Hull Openings Tab Screen displays information regarding the status of the ship's hull openings. The colour of the light adjacent to the door name, dependant upon the configuration, indicates an active (often indicated with the colour red) or non-active (often indicated with the colour green) door or opening.

Should the number of hull openings exceed the initial screen space, a scroll bar will become visible allowing a user to view all available.
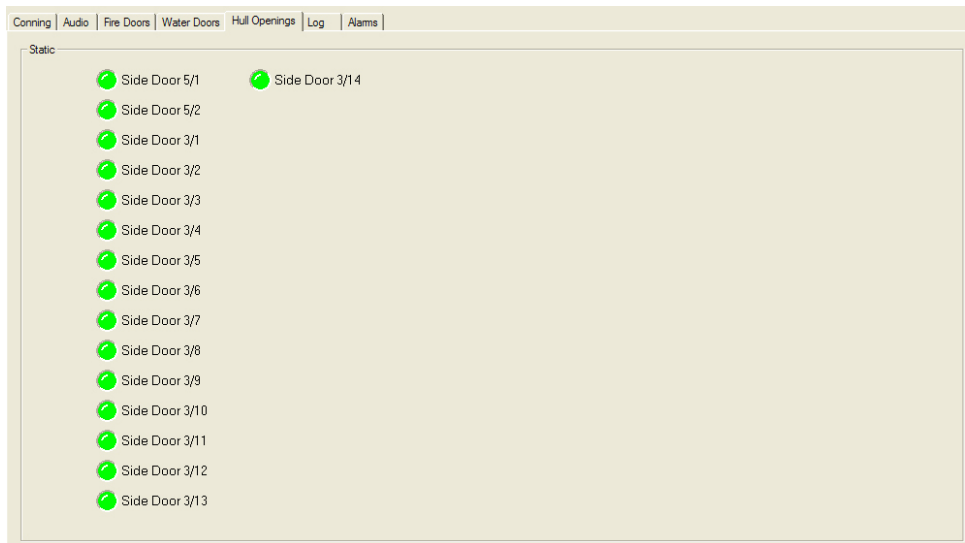
Figure 6-36 – Hull Openings Tab

6.21   Alarms Tab

An alarm is an "on" event, only displaying when triggered. When an alarm occurs, the word "ALARM" will display in the lower left corner of the Playback interface. The Alarms tab allows a user to view information pertaining to all triggered alarms.

6.22   Data Extraction

The volume of data contained in downloaded VDR data sets can be very large. In many instances it may be desirable to access smaller portions of the data without downloading the entire data set. As a result it is possible to copy only a specific portion of a data set, which can then be easily removed to a separate location for analysis or e-mailed to a third party.

Note! The Data Extraction option is not available during Real Time Display mode. The 'Data Extraction' option under the 'Data' file menu is disabled while the Playback application is operating in Real Time Display mode.

6.22.1   Open Extraction Window

To extract a specific portion of data, begin the playback of captured data.   Once data is in active playback mode allow it to play until the beginning point of the portion desired for extraction is reached:

1. Select "Data Extraction" option from the "Data" file menu.
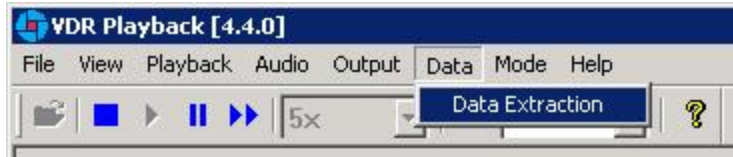
Figure 6-37 – Data Extraction Option

2. The Data Extraction window will open (see *Figure 6-38 – Data Extraction Window* below). This may take a number of seconds. The start time will automatically appear as the point in the playback where the Data Extraction window was opened.
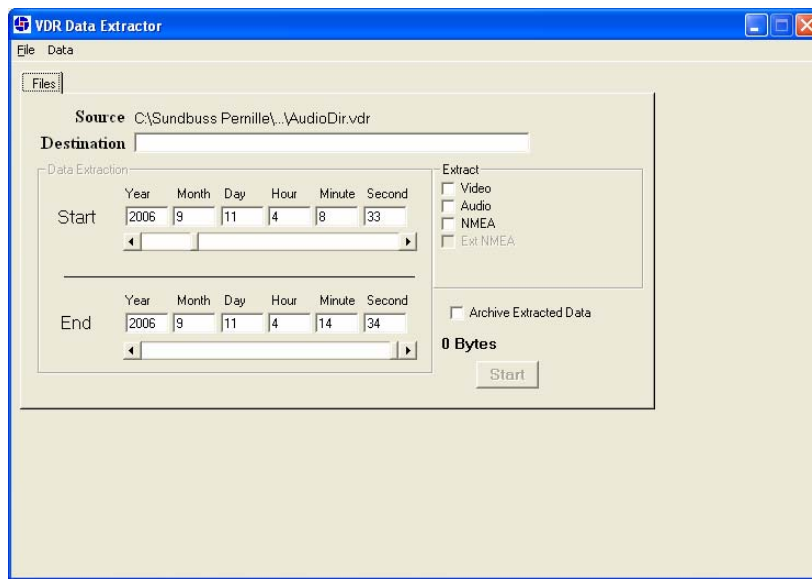
Figure 6-38 – Data Extraction Window

6.22.2 Selecting Data for Extraction

With the Data Extraction window open it is now necessary to select a segment of data to extract and an extraction destination.

1. Three data stream options (Video, Audio, and NMEA) are available for download. Check the adjacent checkbox to select the desired data stream. If no data stream is selected the Start and Stop scroll bars will not be available.
2. When the "Video" checkbox is selected additional options will appear (may take a number of seconds). The user will have the option to download individual Video channels as required (if available). There is also an option to select 1 to 4 video image(s) per minute; selecting "1" allows a user to reduce the size of the Video data extraction (1 image capture per minute).

Figure 6-39 – Data Stream Options w/ Video Selected

3. Select a destination directory by clicking the word "Destination" (or, alternately, choosing "Choose Destination Dir" from the "Data" file menu).

> ⚠️ *Note: the destination directory **cannot be the same as the source directory** and **cannot contain any other files**.*

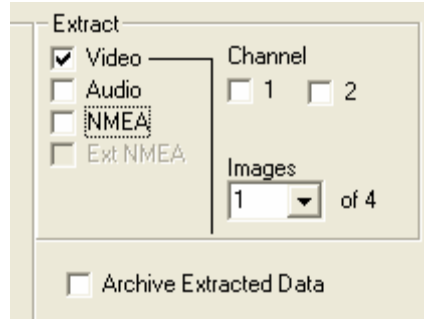4. Select a Start and Stop time for the extracted segment. As mentioned above, the Start time automatically appears as the time when the Data Extraction window was opened. However, this can be changed. To adjust either the Start or Stop time, move the applicable scroll bar. The file size of the extracted segment will appear to the right of the Stop scroll bar. This is useful, for example, when attempting to extract a segment to copy to a recordable Compact Disc.
5. To create an archived file of the extracted data at the same time as the extracted data is being copied to the selected destination folder, select the "Archive Extracted Data" checkbox.
6. To start the data extraction, press the "Start" button located in the lower right of the Data Extraction window or choose the "Extract" option in the "Data" file menu (Data > Extract).
7. A progress bar will appear at the bottom of the window to indicate the progress of the extraction.
8. Once completed, the Data Extraction window can be closed via the "Exit" option in the "File" menu (File > Exit).

6.23   Closing the Playback Application

The application cannot be closed while a voyage playback is running. To close the application follow these instructions::

1. Stop the playback by selecting 'Stop' from the 'Playback' menu, or by pressing the 'Stop' button in the Controls toolbar.
2. Press the 'Close' (x) button in the upper right hand corner of the application's main window, or choose 'Exit' from the 'File' menu.

When the Playback Application is restarted, it will restart in the mode in which it was operating when closed. For example, if the Playback Application was in Real Time Display mode when it was closed, on the next restart it will open in Real Time Display mode.

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Appendix A – Incident Data Recovery Checklist

This checklist is provided as a guideline of steps to be carried out by the incident investigation team in the process of recovering a FRM unit. This checklist is meant only as a **guideline** and **may not** represent all of the steps necessary in an incident investigation.

Checklist:

☐　　　Recover FRM/SFRM from incident site.

☐　　　Inspect the unit for damage.

☐　　　Contact the OEM with details of the damage incurred by the unit. Contact information is provided in *Appendix C – Contact Information*.

☐　　　Contact the Rutter Technologies Inc. and provide all available information about the vessel and FRM/SFRM unit in question in order to receive the necessary files for data download, playback, and interpretation (contact information is provided in *Appendix C – Contact Information*).

☐　　　Download data from the FRM/SFRM using methods outlined in this document.

☐　　　Playback data using methods outlined in this document.

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Appendix B – Software Download (FTP)

Rutter Technologies may require, from time-to-time, approved technicians to download updated software via a Rutter FTP site. Access to this site will require a Rutter Technologies provided password.

The following instructions are provided as a step-by-step procedure for downloading software via this FTP site:

1. Open an Internet browser, enter the following address: ftp://www.ruttertech.com in the "Address" field, and press "Enter".
2. When prompted, enter a Rutter Technologies provided User Name and Password combination. Note that both User Name and Password are case sensitive.
3. To download, right-click the applicable file and select "Copy" from the pop-up list.
4. Select a location on the PC's local hard drive where the file should be downloaded, right-click in this space, and select "Paste" from the pop-up list.

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Appendix C – Contact Information

⚠ | **IMPORTANT – READ THIS FIRST!**

Depending upon the severity and other extenuating circumstances of an incident, some investigative teams may opt to hand deliver the Final Recording Medium (FRM) or Simplified Final Recording Medium (SFRM) directly to the Original Equipment Manufacturer (OEM) personally. Please contact the OEM directly at the address and contact numbers listed on the following page to make this arrangement.

Shipping labels are provided for the FRM/SFRM manufacturer that Rutter Technologies Incorporated currently uses and supports with the Voyage Data Recorder VDR-100G3. A member of the investigating team should first determine whether the FRM/SFRM is damaged in such a way that the normal procedure for data download or retrieval is not an option, causing the unit to need repair and/or refurbishment before data can be successfully downloaded or retrieved.

The provided shipping labels should be used if the investigative team determines that the FRM/SFRM is damaged and should be sent back to the OEM.

NOTE TO INVESTIGATORS! BE SURE TO INCLUDE A RETURN ADDRESS OR SHIPPING LABEL FOR THE RETURN OF FRM.

Contact Information for L-3 Communications Aviation Recorders:

If unit is to be shipped back to L-3, please contact L-3 directly and obtain Return Merchandise Authorization (RMA). Clearly print this RMA on the shipping label in space provided and route shipment through L-3's Customs Agent in Tampa, Florida, USA.

L-3 Communications Custom Agents:
Tampa International Airport
Air Cargo Building
4700 North Hoover Blvd.
Tampa, Florida 33634 USA
Telephone: (813) 273 0975
Facsimile: (813) 875 5809

L-3 Shipping Address:
L-3 Communications
Attn: Repair Department
6000 East Fruitville Road
Sarasota, Florida 34232 USA
Telephone: (941) 371 0811
Facsimile: (941) 377 5591
Web: http://www.l-3ar.com/

Contact Information for Jotron Electronics:

If unit is to be shipped back to Jotron, please contact Jotron directly and obtain Return Merchandise Authorization (RMA). Clearly print this RMA on the shipping label in space provided.

Jotron Electronics s.a.
P.O. Box 54
NO-3280 Tjodalyng, Norway
Telephone: +47 33 13 97 00
Facsimile: +47 33 12 67 80
Web: http://www.jotron.com

Contact Information for Rutter Technologies Inc.:

Rutter Technologies Inc.
70 Brookfield Road
St. John's, Newfoundland
Canada A1E 3T9

Telephone: +1 709 368 4213 (available on a 24-hour basis)
Facsimile: +1 709 368 1337

Web: http://www.ruttertech.com

L-3 Communications Shipping Labels:

Included on the following two pages.

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SHIP TO:

L-3 Communications
Attention: Repair Department
6000 East Fruitville Road,
Sarasota, Florida 34232 USA

Telephone: (941) 371 0811

RMA# _____

This page is intentionally blank.

SHIP TO:

L-3 Communications
Attention: Repair Department
**6000 East Fruitville Road,
Sarasota, Florida 34232 USA**

Telephone: (941) 371 0811

RMA# _____

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Jotron Electronics Shipping Labels:

Included on the following two pages.

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SHIP TO:

Jotron Electronics s.a.
P.O. Box 54
NO-3280 Tjodalyng, Norway

Telephone: +47 33 13 97 00

RMA# _____

This page is intentionally blank.

SHIP TO:

Jotron Electronics s.a.
P.O. Box 54
NO-3280 Tjodalyng, Norway

Telephone: +47 33 13 97 00

RMA# _____

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Appendix D – IMO Guideline Document

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E

IMO

Ref. T2-HES/4.2

MSC.1/Circ.1253
26 October 2007

SHIPBOARD TECHNICAL OPERATING AND MAINTENANCE MANUALS

1   The Maritime Safety Committee, at its eighty-third session (3-12 October 2007), considered the recommendation that the attention of all relevant stakeholders needs to be drawn to the importance of ships' crews having access to up-to-date, accurate and user-friendly shipboard technical operating and maintenance manuals, particularly for safety-critical marine equipment.

2   The Committee noted that there exists a global and competitive marketplace for marine equipment and that seafarers were expected to assimilate different equipment fitted on board quickly and operate them efficiently. Also, seafarers were expected to be able to move from ship to ship with few restrictions; this flexibility being essential for the efficient management of human resources. Consequently, seafarers are likely to encounter a wide variety of equipment fitted on board.

3   The Committee also noted that the availability on board ships of up-to-date and accurate operating and maintenance manuals could be enforced via the implementation and enforcement mechanisms of the International Safety Management (ISM) Code.

4   The Committee further noted IACS Recommendation No.71 (dated September 2000) Guide for the development of shipboard technical manuals and agreed that this Guide provided a useful reference for those responsible for developing such manuals.

5   In light of the foregoing, Member Governments are invited to:

.1   recognize the necessity for up-to-date, accurate and user-friendly shipboard technical operating and maintenance manuals to be available on board ships;

.2   recommend that IACS Recommendation No.71 is used as a model for shipboard technical operating and maintenance manuals;

.3   recommend that shipboard technical operating and maintenance manuals should be provided in the working language of the ship and if the working language is not English, French or Spanish, a translation into English, or French, or Spanish should be provided; and

.4   encourage ship designers and shipbuilders to provide diagrams and drawings explaining the operation of integrated ship systems as well as emergency operation of such ship systems, recognizing that ship systems may be composed of several individual pieces of equipment,

and bring the above to the attention of shipowners, ship masters, shipbuilders, recognized organizations and, in particular, manufacturers of equipment for safety-critical marine equipment.

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Inside back cover

VDR-100G3/G3S Data Recovery manual

RUT-UM-10-002 Rev. 1.1