MBARI Instruments

Laser Raman Spectrometer Reference Guide

Release 0.0
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Monterey Bay Aquarium Research Institute

M B A R I

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Introduction 1

Overview

MBARI's laser Raman spectrometer (LRS), officially known as DORISS (Deep Ocean Raman In Situ Spectrometer), is based on a Kaiser Optical Systems, Inc. HoloSpec f1.8i with a holographic duplex (HoloPlex) grating that covers the 100-4400 cm^{-1}spectral region, an Andor 2048 x 512 CCD camera, and a 532-nanometer, 100-milliwatt laser. The system was originally divided into three pressure housings. The electronics housing contains a single-board computer with Andor controller card, a power inverter, and the excitation laser. The spectrometer housing contains the optical bench and camera and associated electronics, including a power supply and controllers for two linear stages. The probe head housing contains the Kaiser Mark II probe head and (as needed) a linear focus stage.

Terminology note

Although the name of the modified system is DORISS (Deep Ocean Raman In Situ Spectrometer), in this document the instrument will be referred to generically as the LRS.

As the system will continually be undergoing modification and improvement, the document will use generic terminology as much as possible. For example, the single board computer (currently named *ramansbc*) may be replaced with a PC 104 computer (which may be named *ramanpc*). Therefore, as much as possible, this bottom-side computer will be referred to as the *target* computer. The shipboard scientist controls the LRS via a computer. The project desktop computer is named *ramandesktop* and the project laptop is named *mudpuppy*. The top-side computer will be referred to as the *host* computer.

Software Installation 2

Overview

This chapter describes the steps to install the software on the host client.

The HoloGRAMS software runs the laser Raman spectrometer (LRS) and can be used to operate the spectrometer directly or remotely. The following describes installation of HoloGRAMS for *remote operation only*.

GRAMS, a spectral processing package from ThermoGalactic, Inc., is used for spectral analysis of the LRS data.

VNC is a program to remotely access the target computer desktop.

Installation CDs

Installation CDs are in the LRS project black media binder labeled LASER RAMAN DISKS.

- HoloGrams is on the custom HoloGrams CD.
- GRAMS has an installation CD and a floppy disk with license files.
- The floppy disk, *Installation files*, contains the `hologram.ini` file and the `Hosts` file.
- VNC is on a custom CD which includes directions for use.

HoloGRAMS installation

1. Insert the HoloGRAMS disk in the host CD drive, and open it in Windows Explorer
2. Go to the directory `Hologram_vXXX/HoloGRAMS` and double-click on `setup.exe`.

3. Install using the defaults.
4. Go to the directory `Hologram_vXXX\Andor` and double-click on `support.bat`. An MSDOS window will open and the HoloGRAMS installation will automatically proceed.

Edit *hologram.ini*

A shortcut to the `hologram.ini` file is located on the desktop.(File is in `c:\holograms\hologram.ini`).

If you need to edit `hologram.ini,` be sure that:

```
Manufacturer = 3
```

Format for IP address:

```
IP Address = <target IP>
```

HoloGRAMS update installation

Note: The HoloGRAMS update must be done *after* HoloGRAMS installation.

1. Go to the director `HologramUpdgrade_vXXX` and double-click on `setup.ex`e
2. Install using the defaults.

GRAMS installation

1. Insert the GRAMS license disk in the host floppy disk drive and save the file license.txt on to the hard drive. (This is only necessary when a CD drive and floppy drive cannot be used simultaneously.)
2. Insert the GRAMS disk into the host CD drive.
3. Install using defaults. (Note: If you have saved the license file on the hard drive, you must manually indicate the location of the license file.)

VNC installation

Instructions for VNC installation can be found on the VNC CD.

VNC server IP address: 134.89.10.94

LRS Network Setup 3

Overview

This document describes the procedure to set up the Laser Raman Spectrometer (LRS) instrument for networked operation. In all cases, the embedded instrument computer is the *target*, and the client desktop computer is the *host*.

The LRS is controlled over a standard Ethernet connection using TCP-IP protocol. Network connectivity must be established between the target and the host to operate the instrument.

The steps required to establish and test a network connection are:

1. Make correct cable connections.
2. Ping test the network connection.
3. Run HoloGRAMS software from the host computer.

Supported networks

The following table describes the supported network setups. The connection from host to target can be made with a standard RJ45 Ethernet cable or through an ROV fiber-to-Ethernet connection. The network routing may be peer-to-peer or through a hub or router, depending on the network setup

Table 2-1: Supported networks

Network	***<target name>***	**Target IP address**	**Routing**
MBARI Bldg A or Point-to-point	*ramansbc*	134.89.10.94	Test box (or switch)
ROV	*ramansbc*	134.89.10.94	Point-to-point through ROV fiber

*<*target name*> is not case sensitive

Network setup

Cable connections

Here are diagrams of the different network configurations. The cables referenced in the drawing are:

A - Standart CAT5 network cable with RJ45 connectors

B - Underwater Seacon MINK, 10-pin cable (black)

Note: POINT-TO-POINT option is preferred.

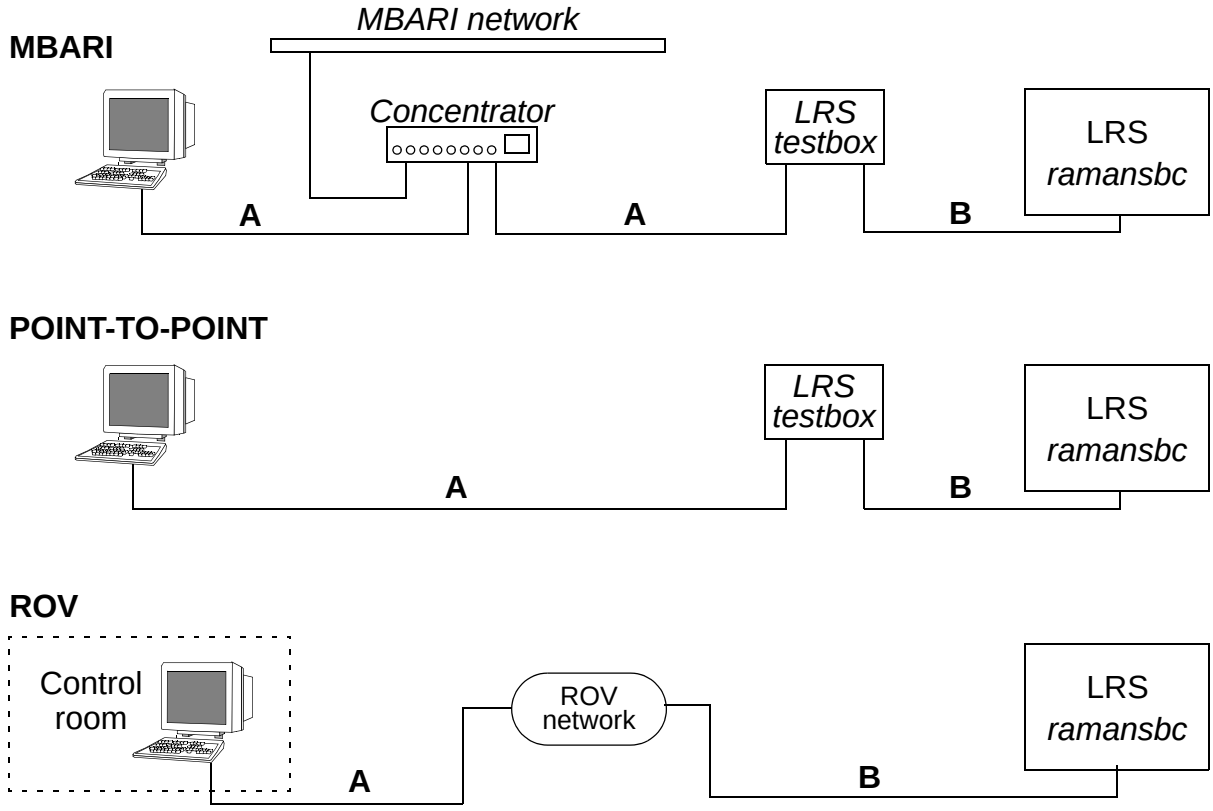

Figure 2-1 Cabling diagrams for various networks

Power-on procedure (LRS only)

The host computer should be running. Each network target has a different power-on procedure.

Table 2-2: Network power-on procedures

Network name	Target	Power-on procedure
MBARI lab (POINT-TO-POINT)	*ramansbc*	Switch the test box ON.
POINT LOBOS	*ramansbc*	Using the **Port-Science 12** button from the instrument dropdown menu on the Ventana GUI, click once to turn ON.
WESTERN FLYER	*ramansbc*	On the Tiburon Power GUI: 1. Select the **HpBusA** button (High Power A Bus) 2. Click once on the **Tsled 240V** button.

Note: When you are using the PUP (precision underwater positioner), LRS power is controlled through the PUP GUI. See Chapter 5, page 3 for powering on with the PUP.

Using the serial connection

A serial connection is made by plugging the old test box into the MIN-M-25 connector on the electronics housing. A serial cable is used between the test box and the host computer.

Note: The old test box has only serial connection, no power or Ethernet.

1. Power on the target (instructions in Table 3-2, above and wait two minutes for the boot to complete.
2. On the host, or any Windows compatible machine, run Hyperterminal. With Windows NT or Windows 98 operating systems, select **Start>Programs>Accessories>HyperTerminal** . In Windows 2000, select **Start>Programs>Accessories>Communications>Hyperterminal**
3. After opening Hyperterminal, a window will pop up labeled *Connection Description*. Enter the name for the connection and select an icon.

4. In Hyperterminal, open a new connection, using the following port properties:

   Bits per second = 19200
   Data bits = 8
   Parity = None
   Stop Bits = 1
   Flow control = Hardware.

   For future use, save the connection using the **File->Save As** menu.

5. Hit the <**Enter**> key, and you will see the following text:

```
User \Administrator logged on successfully
*=============================================================
=
Welcome to Microsoft Administration Console
*=============================================================
=
C:\>
C:\>
```

6. To switch the network setup using Netswitcher:

   `C:\>`**`netswii -location <`**`network name`**`> -reboot`**

   The <*network name*> must be capital letters and must be enclosed in quotes if the name has any spaces.

   Example 1: to switch to the point lobos network:
   `C:\>`**`netswii -location "POINT LOBOS" -reboot`**

   Example 2: to switch to the POINT-TO-POINT network:
   `C:\>`**`netswii -location POINT-TO-POINT -reboot`**

   In 5-10 seconds, the target will reboot, and you will lose the Hyperterminal connection. (To verify you've lost the connection, hit <**Enter**> a few times and you will notice the C:> prompt and typed keys are no longer echoed back to the Hyperterminal window.)

7. To verify the network switch is complete, reset the host network, and use the ping test (following this procedure).

8. To shut down using the serial connection, enter the following command, and wait 35 seconds to power down.

   C:\>**`shutdown 4 force`**

ping test

To test network connectivity between the host and target:

1. Select **Start>Run** and enter:

   `ping -t <target name>`

2. You should get a reply from the target that looks like:

   `Reply from <target IP>  bytes=32   time<10ms   TTL=128`

   If you do not get a reply, check for the correct target name. If the name is correct, the network setup may be wrong on either the host or on the target.

LRS Operations 4

Operations overview

Note: USER NAMES AND PASSWORDS ARE CASE-SENSITIVE.

1. Power ON the host computer. For *ramandesktop*:
   User: **`Administrator`**
   Password: **`LRS`**

   For *mudpuppy*:
   User: **`puppy`**
   Password: **`puppy`**

2. Power on the LRS.
   (Takes 2 minutes for *ramansbc* to complete full boot up)

3. Use `ping` to verify connection from host to *ramansbc*

   On *mudpuppy* (or *ramandesktop*), in the command window, enter: **`ping –t ramansbc`**

4. Use VNC to monitor sensor data and operate remote stages from the *ramansbc* desktop. Click the VNC shortcut on the host computer taskbar. If the IP address of the server is not there, enter it. (Password is case-sensitive.)

   VNC server: **134.89.10.94**
   Password: **`LRS`**

5. At this point, there should be five windows open on the *ramansbc* desktop:

   ```
   AT Server
   client
   C:\winnt\System32\CMD.exe  (one of these will have scrolling
   C:\winnt\System32\CMD.exe  temp and humidity data)
   C:\winnt\System32\CMD.exe
   ```

   Note: DO NOT CLOSE any of the windows on *ramansbc* desktop—just minimize them.

6. Use LRSClient to monitor temperature, humidity, and water alarm.

   Click the LRSClient shortcut on the host desktop.
   (Takes about 1minute to start.) If debug messages appear, click “Ignore.”

   Note: The LRSClient window must be open to see the water alarm.

7. Use MVPdemo to run slit and focus stages. (The MVP demo cheat sheet is at the end of this document. Also see the MVP manual.)

   Click the *mvpdemo* shortcut on the target desktop
   (The executable file is in:
   `C:\program files\National Aperture’s Mvpdemo\`).

8. Use HoloGRAMS to collect spectra. (See HoloGRAMS manual for operational information.) The HoloGRAMS shortcut is on the host computer desktop

9. To shut down the system:
   a. Select **Start >Shut_Down** on the target desktop.
   b. Wait 30-40 seconds, and power off the LRS.

Binning

Always check the camera binning after the camera has been removed and reattached.

1. Set the calibration accessory to the white light source. (Flashlight is OK.)
2. Select **Configure>Camera>binning**
3. Acquire image (approx. 5-second exposure) This takes one minute to show .
4. Select the **Display tab**, and adjust **Brightness/contrast.**
5. Select the **Binning** tab, and display **Current**. To adjust, click **EDIT**. (Adjusts in increments of 5).
6. Click **SET** to save.
7. Change **Binning** to high. (Click **EDIT**, adjust, and click **SET**)
8. Click **Done**.
9. To check binning later, use the **Set options** dropdown menu.

Slit optimization

1. Set the calibration accessory to the neon light source.
2. Look at the neon peak (approximately pixel 1413) in the low lambda window, while in focus mode (1 second exposure).

   Use the left mouse button to drag/zoom onto the peak. Use the right mouse button to place the cursor line on the peak.

   The upper right windows display counts and the position of the cursor line.

Position the slit stage using MVP demo.

See the MVPdemo cheat sheet (at the end of this document) or the MVP manual.

1. Start with the `slit_setup.cmd`
2. Adjust slit position using command entry while watching the peak in HoloGRAMS.

Calibration protocol

This protocol is a shortened version of the HoloLab Calibration Accessory Operations Manual. Before starting the calibration, Holograms will already be running.

Setup

1. From the drop-down menus at the top, select **Set>Options** and select the INT_Axis tab. Under Accumulations, click SUMMED, and then click OK.
2. Select the **Acquire** tab.

   In the lower center of the screen, set **Auto New Dark** and **Cosmic Ray Filter** to **ENABLED**.

   At the right of the screen, set **Dark Subtract** to **ENABLED** and **Intensity Calibration** to **OFF**.

Note: Make a note in the log whether the laser is on or off.

Wavelength calibration (neon standard)

1. Log the temperature of the housings and turn on the neon lamp. (instructions in Hololab Manual).
2. Set exposure time so maximum counts are ~40,000 to 50,000 counts (~250-750 milliseconds)
3. Fill in the comment line with details—optic type, calibration source, and exposure time.
4. Acquire 25+ accumulations at that exposure. Note the filename at the top left of the screen.
5. On the main menu bar, select **Calibrate>Wavelength_Axis**.
6. Select **Low Lambda** (below spectrum), then click on the **Neon Cal** button. Table values and RMS fit should change, and it should say "`curve fit successful`. "(RMS fit should be 0.01 nm or better)
7. Select **High Lambda**, then click on **Neon Cal** button.
   Table values and RMS fit should change, and it should say,
   "`curve fit successful`".
   (RMS fit should be 0.01 nm or better)
8. Click on **Done**, calibration file (e.g., YYYYMMDDaa.wcl) is saved automatically in `C:\Hologram\Calibration\wavelength`

   Note: If the above procedure does not work, use the following *manual* wavelength calibration procedure, beginning after step 5 above.
9. Collect another neon spectrum with the same accumulations/exposures (Step 4).

Manual wavelength calibration

Continues after step 5 of Wavelength calibration (neon standard), above.

10. Set **Threshold level** using slide bar (low lambda: ~10,000 counts; high lambda:~6,000 counts)
11. Clear the spreadsheet (**Clear** button), and add peaks above baseline (**Add All** button)
12. Click on **Stored** to get neon peak file, then manually add peaks to the spreadsheet (click on an empty cell in spreadsheet, then on a peak in neon peak list).
13. Click on **Calibrate** (RMS fit should be 0.01 nm or better)
14. Switch to **High Lambda** and repeat steps 6 through 9
15. Click on **Done**. Calibration file (e.g., YYYYMMDDaa.wcl) is saved automatically in `C:\Hologram\Calibration\Intensity`
16. Collect another neon spectrum with the same accumulations/exposures (Step 4).

Intensity calibration (tungsten halogen standard)

1. Check and record temperatures in the housings.
2. Turn on halogen lamp (NOTE: lamp will shut off after 30 minutes)
3. Adjust exposure time so that strongest signal is ~30,000 to 40,000 counts [1-2 sec]
4. Fill in the comment line with details.
5. On the main menu bar, select **Calibrate>Intensity_Axis**.
   (To save a copy of the intensity spectrum, you must rerun the collection from the Acquire tab)
6. Enter accumulations and exposure time (e.g., 50 x 2 sec).
7. Make sure **Use Source Spectral File** is checked and that the file name points to the most recent calibration data file.

8. Click **OK** to calibrate.
9. After calibration is done, click on **OK**. The calibration file (`YYYYMMDDaa.icl`) is saved automatically. To save a copy of the intensity spectrum, you must rerun the collection from the **Acquire** tab.

When calibration is complete, the **Intensity Calibration** box on the right side of the screen will be checked.

Laser wavelength calibration (cyclohexane standard)

1. Check and record temperature of housing...
2. Turn on laser and position cyclohexane standard at focal point
3. Adjust exposure time so that 801.8 cm-1 peak is about 20,000 to 40,000 counts (1-5 sec).
4. Fill in the Holograms comment line with details.
5. Go to **Calibrate: Laser_Wavelength** on menu bar.
   Select **Material>Cyclohexane 801**
6. Perform 10 to 25 accumulations at that exposure.
7. Click on **Calibrate**, and record old and new laser wavelengths.
8. Note the filename, and click on **Done**.

Finish calibration

When finished with calibrations, set the intensity axis back to **Averaged**.

1. From the drop-down menus at the top, select **Set>Options** and select the **INT_Axis** tab.
2. Under **Accumulations**, click **Averaged**.

Precision Underwater Positioner (PUP) 5

Overview

The LRS will sometimes be used with the precision underwater positioner (PUP). For this purpose, the LRS is plugged directly into the vehicle interface can (VIC) which is connected to the ROV. Note that the LRS can be used with the VIC even if the PUP is not used (in which case a jumpered dummy must be used on the PUP connector). Network configurations for the LRS are not affected by the use of the PUP. Network configuration for the PUP is described in this chapter.

Cable connections

Below is a diagram of how the LRS and PUP are connected. Connections to the test box or the ship/ROV networks are the same as those described for the LRS in Chapter 3 (on page 3-2). The cables referenced in the drawing are:

A - Underwater Seacon MIN-K-long, 10-pin cable (black)

B - same as cable A, but longer

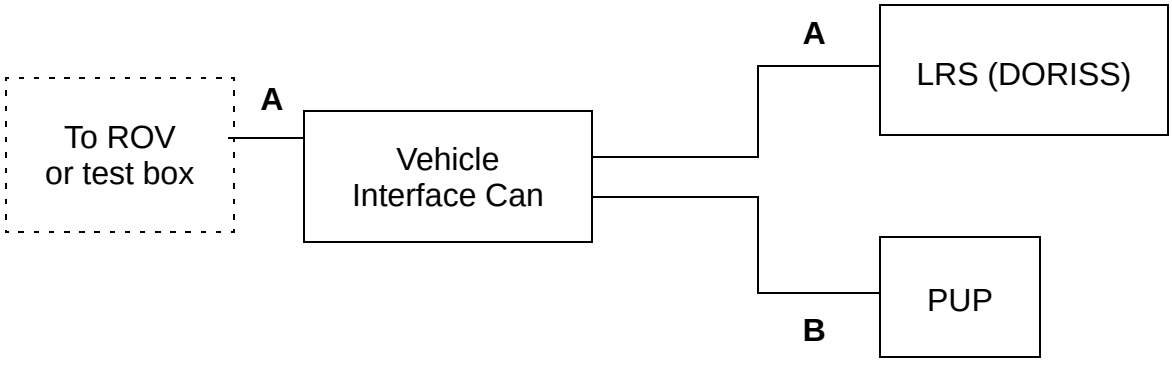

Figure 4-1 Cable diagram for PUP

Network setup

The following table lists the IP addresses for the supported network setups.

Table 4-1: Supported network setups

Network	Target	Target IP Address
MBARI POINT-TO-POINT	host computer (desktop) host computer (laptop) LRS Axis video server Galil controller	134.89.10.92 134.89.10.93 134.89.10.94 134.89.10.95 134.89.10.96

Additional information

Other network configuration addresses

DNS Server (Bldg A)	134.89.10.26 134.89.10.17
Subnet Mask	255.255.254.0
Gateway	134.89.10.1

Operations

The host computer should be running. Each configuration has a different power-on procedure.

Table 4-2: Power-on procedures

Network name	**Power-on procedure**
MBARI lab (POINT-TO-POINT)	Switch the test box ON.
POINT LOBOS	Using the **Port-Science 12** button from the instrument dropdown menu on the Ventana GUI, click once to turn ON.
WESTERN FLYER	On the Tiburon Power GUI: 1. Select the **HpBusA** button (High Power A Bus) 2. Click once on the **Tsled 240**V button.

The PUP GUI is opened from the `pup.exe` icon on the host desktop. The PUP dialog window shows the controller status. Click on the **Motion Control** button to open the control GUI.

PUP is operated from the control GUI. Additionally, the camera, light, lasers, and LRS are powered on or off using buttons on the PUP GUI.

Flash Card Setup for Ramansbc

A

Overview

These are the instructions to setup a 128 MB (or larger) compact flash card for the Laser Raman Spectrometer (LRS).

> **Note:** Two spare compact flash cards for the LRS project are already configured to boot WinNT Embedded (NTE), so you can safely skip this procedure unless you are preparing a newly purchased compact flash card.

The two general steps to create a compact flash for the LRS are:

- Create a NTE-bootable compact flash card.
- Install the LRS software image into the NTE bootable flash.

Hardware

- Host computer
- Embedded Windows NT 4.0 server installation CD-ROM
- LRS electronics assembly
- External 3.5" floppy drive to connect to LRS electronics CPU board
- 128 MB (or larger) compact flash card. The embedded software will not fit on a card smaller than 128 MB.

Software

Windows NT headless workstation development kit (Annasoft Systems Inc.) Includes Embedded Windows NT 4.0 Server installation CD-ROM. (*Headless* means there is no support for a monitor, keyboard, or mouse.)

Create a bootable flash card

Note: If you are preparing a new compact flash card you must complete these steps. If you have a flash already modified to boot NTE, you can skip this procedure.

The following instructions explain the steps to initialize the boot sector on the Compact Flash card required for booting NTE. This procedure alters the compact flash boot sector to boot NTE (instead of remaining non-bootable and functioning as a standard IDE disk). Unless the boot sector is corrupted for some reason, this step is only required once in the lifetime of the flash card.

Connect the hardware

At the target computer—*ramansbc*—located in the LRS electronics assembly:

1. Unplug the test box to turn off the power. (Test box has no switch.)
2. Install a keyboard, monitor, and mouse.
3. If there is a compact flash card installed, remove it.
4. Install the floppy drive:
   a. Connect the 4-pin power cable from the Axiom SBC (single board computer) card to the floppy drive.
   b. Connect the SBC to the floppy with the standard ribbon cable, using the connector at the middle of the ribbon.

Naming/renaming the flash card

If the volume (flash card) needs to be named (or renamed) before starting:

1. Insert the flash card in the reader on the host (*ramandesktop* or *mudpuppy*).
2. At the prompt, type (all caps):

   C:\> ***VOLUMEID F: <NAME>***

3. Remove the card and insert it in the target computer—*ramansbc.*

Format the flash card

1. Before you power on the target computer, insert the DOS boot disk.
2. Power on the target computer.
3. At the prompt type:

   `fdisk`

4. Follow the program to set or format the partition:
   a. Enter **3** to delete the partition, then
      Enter **1**
      A “WARNING” appears...continue...
      Follow the directions. For example:

      Enter partition number **1**
      Enter volume label **AA**
      Are you sure? **Y**

   b. Enter **1** to create DOS partition
      Enter 1 to create primary DOS partition
      Make partition active? **Y**

      The message appears: **“**`System will now restart`”

   c. Press **Enter**.
5. Again, at the prompt type:

   `fdisk`

   a. Enter **4** to display partition information
      (System type will be “unknown”)

      Example:

Partition status	Type	Volume label	MBYTES	System	Usage
C:1	A	pri dos	LRS020303	122	FAT16	50%

6. Format disk
   A:\> **`FORMAT`** C: /V: **`LRS093003`** [volume label based on date]
   Proceed? **Y**
7. Power down *ramansbc*.

Make the card bootable

1. Insert the disk labeled “WinNT boot disk” (10-20-02) in the floppy drive.
2. Power on ramansbc

3. System should boot from the floppy drive. If not, check the polarity of the floppy drive cable.
4. At the prompt, enter:

   `dir/w`

   The floppy disk should contain the DOS boot files (such as `command.com`, `sys.com`, `autoexec.bat,` etc.) and the NTBoot script, `ntboot.bat`.
5. At the a:> prompt, enter:

   `sys.com c:`

   You will see the message: `system transferred` when complete.
6. At the prompt, enter

   `ntboot`

   You will see something like the following scroll by:

   ```
   debug a:\ntboot.sec > a:\insert.sec
   -l 500 2 0 1
   -n c:bootsect.old
   .
   .
   .
   -w 500 2 0 1
   -q
   ```
7. Change to the c drive

   `c:`
8. Use the `dir` command to view the files on the compact flash card. Viewing with DOS, you should see:

   ```
   command.com
   bootsect.old
   ```

   The other files are hidden. (io.sys, msdos.sys, drvspace.bin)
9. Power down *ramansbc*.

Install the LRS software image

The next step required to build a flash is to build the NT file image, then copy the built image on to the compact flash. Included in the NT file image are all NTE operating system files and LRS software required for operation.

The following instructions explain the steps to install the Embedded Windows NT files and LRS application software on a bootable compact flash card.

Build and install the image using target designer

1. Insert the Embedded Windows NT 4.0 Server installation CD-ROM--Disk 1. (The disk can be found in the media binder, labeled LASER RAMAN DISKS.)
2. Insert the flash card into the flash card reader on the host computer.
   .
3. In the lab, the target should be drive G: Verify the path is correct by selecting *Image>Settings*. If it needs to be changed, select *Edit WinNT path:*
4. Select **Start>Programs>Windows NT Embedded 4.0>Target Designer**. In the *All Nodes* pane, you should see the `Laser Raman.cfg` node—a graphical representation of the system configuration for the LRS system. **DO NOT EDIT THIS CONFIGURATION**.Changing this configuration will break the LRS software. All NTE operating system and LRS application files are built based on the `Laser Raman.cfg`.
5. In Target Designer, select **Image>Build and Install**

   Target path: `c:\NTEmbedded/RamanOSimage`
6. A window labeled *Build Laser Raman.cfg*. will appear.
   Select **Start** to begin the build.

   A *Check Dependencies* warning window may pop-up. Select **Yes**.
   If the image has all the correct files needed, the dependency check will run (10-20 seconds). When the check is complete, it will indicate all dependencies have been resolved. Select **OK.**

   A few more windows (including Network Settings) will pop up. Select **OK** or **Yes** to the remaining windows. When the build finally starts, it will take a few minutes to complete.
7. Following the build, the next step is to copy the built image on the compact flash. Go to `c:/NTEmbedded\RamanOSimage`

8. The files will install on the compact flash. You should see the LED flashing on the compact flash reader.
9. When the install is complete, wait a few seconds for the LED to stop flashing, indicating all files are written.

Install the image by copying to flash card

1. Insert the flash card into the flash card reader on the host computer.
2. Locate the file, RamanOSImage on the host computer: //tornado/projectlibrary/600045.doriss/doriss/drawings/doriss.se.code/lrs022504
3. Highlight all files in RamanOSImage and copy them
4. Paste copied files onto the compact flash card.

Label and test

1. Pull out the flash card and label it, **`LRS,`** followed by the date, in the format MMDDYY.

   Example: **`LRS072802`**
2. Install the flash card in the target.
3. Test the disk.

Check and clean

To check or clean a compact flash card, run Scandisk from MS DOS 6.2 floppy.

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In Lab, before putting Electronics & Spectrometer in housings

- ❑ Check laser power out of fiber optic cable (_____ mW) and probe head (_____ mW)
- ❑ Check operations:
  - Ping test *OK / not OK* Ping time: _____ TTL: _____
  - LRS Client SH: _____C, _____% EH: _____C, _____%
  - PCAnywhere slit stage position:_____ focus stage position:_____
  - Holograms *OK / not OK*

Assemble instrument in housings

- ❑ Clean sealing surfaces, **check and grease o-rings** on all housings & connectors (replace damaged o-rings)
- ❑ Put instrument in housings with **desiccant** (~4 packs in EH & SH, 1-2 in probe head housing)
- ❑ Tighten ALL electronic and fiber optic connections on ALL housings with softjaws
- ❑ NOTE: A torque wrench must be used on the immersion probe glad seal (see next page for values)
- ❑ Tighten swagelok fittings (**NEW** = 1-1/4 turns past finger tight; **RE-USE** = 1/8-1/6 turns past finger tight)
- ❑ Check operations:
  - Laser power _____ mW
  - Ping test *OK / not OK* Ping time: _____ TTL: _____
  - LRS Client SH: _____C, _____% EH: _____C, _____%
  - PCAnywhere slit stage position:_____ focus stage position:_____
  - Holograms *OK / not OK*

Overnight vacuum check of Electronics & Spectrometer Housings

- ❑ Pump EH and SH down to ~ -25−30 in Hg

		Vacuum	Time	Date		Vacuum	Time	Date
SH	Start:				Finish:			
EH	Start:				Finish:			

- ❑ After releasing vacuum and removing vacuum gages, tighten all swagelok fittings appropriately

In lab testing and calibration

- ❑ Check operations:
  - Laser power _____ mW
  - Ping test *OK / not OK* Ping time: _____ TTL: _____
  - LRS Client SH: _____C, _____% EH: _____C, _____%
  - PCAnywhere slit stage position:_____ focus stage position:_____
  - Holograms *OK / not OK*
- ❑ Check binning, slit position and calibrate (see LRS Calibration Protocol → LRS_cal_auto.doc)

On deck, connected to ROV

- ❑ Check operations:
  - Laser power _____ mW
  - Ping test *OK / not OK* Ping time: _____ TTL: _____
  - LRS Client SH: _____C, _____% EH: _____C, _____%
  - PCAnywhere slit stage position:_____ focus stage position:_____
  - Holograms *OK / not OK*

Conax Packing Gland (PG) Seal for the Immersion Probe (PG5-500-A)

Sealant	Torque (ft-lbs)
Neoprene (N)/Viton (V)	55-60
Teflon (T)	90-100
Lava (L)	200-220
Grafoil (G)	90-100

(See Conax catalog for more information)

Data table for troubleshooting

Date/Time	Ping	Spectrometer housing		Electronics housing		Slit stage position	Focus stage position	HoloGRAMS
		Temp	Humidity	Temp	Humidity			

DORISS/PUP System Test Checklist

Communications check: From a CMD window…

Check Mudpuppy (or Ramandesktop) `C:\> ping mudpuppy`
IP address should be 134.89.10.93 (or 134.89.10.92)
Check Galil (`134.89.10.96`) `C:\> ping galil`
Check Axis Server (`134.89.10.95`) `C:\> ping axis`

PUP GUI check:

Double-click on PUP.exe icon to start PUP GUI
Check all features

- ❑ Make sure axes position numbers look reasonable
- ❑ Make sure tilt, temperature, humidity numbers look reasonable
- ❑ Turn camera on
  - Double-click on Internet Explorer and check camera output
- ❑ Turn lasers on and off
- ❑ Turn light on and off
- ❑ Turn camera off

Check positioning

- ❑ Jog all three axes in both the positive and negative directions
- ❑ Run Homing command (double click on the button)
  - Make sure the axes' positions decrease and set to zero
  - (homing completed when error numbers are ~0)
- ❑ Go to HOME position

DORISS check:

Turn on DORISS the the button on the PUP GUI

Check Ramansbc from a CMD window
`C:\> ping ramansbc` *or* `doriss`
IP address should be 134.89.10.94 (It takes 2 minutes to fully boot up.)

Open LRSClient on the host computer
(should take a few minutes, click `Ignore` for any error message)

Open VNC and login to ramansbc (IP address: 134.89.10.94, password: *LRS*)

- ❑ Verify that temperature & humidity date are scrolling in one of the CMD windows

Open HoloGRAMS by double-clicking on the HoloGRAMS icon on the host computer
(I2C error is normal)

- ❑ In Acquire tab, set exposure to 1 sec, click `Focus` button (may have to hit button again).
  - Verify that spectrum refreshes every second.
- ❑ Stop Focus mode and exit HoloGRAMS

After checking all features, exit everything except for VNC.

On ramansbc desktop select Shutdown – turn off DORISS (from PUP GUI) after 35 sec.

Rev 1.2

MVP Demo Cheat Sheet

The slit and focus stages are run on Ramansbc through PCAnywhere/VNC/NetMeeting
Shortcut to `mvpdemo` is on Ramansbc desktop
(executable file is at C:\program files\National Aperture's Mvpdemo\ )

`Command File Processing` mode
A set of command files have been created for regular commands. Each file is prefaced by "`slit`" or "`focus`" to indicate which stage it operates.

`slit_setup.cmd`	— used on startup to initiate, home, and rezero stage
`slit_home.cmd`	— moves stage to home position (for the focus stage, home is aft in the pressure housing)
`slit_incrXX.cmd`	— increments by XX microns (increment moves away from home)
`slit_decrXX.cmd`	— decrements by XX microns (decrement moves towards home)

`Manual Command Entry` or **`Terminal Emulation`** mode
Every command begins with a `1` or a `2` to indicate which stage it operates (1 = slit, 2 = focus)

`st`	query node	`1 st`
`lr`	load relative	`1 lr 1000`
`la`	load absolute	`1 la 1000`
`m`	move	`1 m`
`ab`	abort	`1 ab`
`pos`	query position	`1 pos`
`ho`	define home position	`1 ho`

NOTE: When in Terminal Emulation mode, position data is shown in hex

Distance reference for slit stage:
10 µm = 20 counts
1 µ = 2 counts
½ µ = 1 count

16000 counts = 8 mm

NOTE: Sometimes cursor is not visible. Tab and arrow keys can help to navigate the window.

WARNING: Don't drive focus stage past 167,000. If the probe head hits the window it will jam the motor stage.

Configuration
COM 3 19200 baud

NOTE: If using serial port of computer, set baud to 19200, use straight cable (NOT null).