Medical Digital Recorder™

This operator manual applies to the following configurations:

MDR® Publisher

NOTE: This manual includes instructions for version _____ software.

This manual presents operating instructions for the NAI Tech Products Medical Digital Recorder™ (MDR® Publisher). Read it in its entirety prior to operation to ensure that the MDR® Publisher is properly set up, and keep it available for future reference.

This document is provided as a reference only regarding the MDR Publisher. All questions must be referred to NAI Tech Products, Inc. Uncontrolled copies are for reference only, and users are responsible to obtain the latest information.

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General Upkeep

The outside of the MDR Publisher may be cleaned occasionally as required. First, turn off power to the MDR Publisher. Gently wipe the outside of the unit with a soft lint-free cloth. The cloth may be moistened with a mild soap solution. Be certain to avoid solvent type cleaners as these chemicals can cause deterioration which may cause a safety hazard.

Clean and vacuum the air intake openings in the front of the module. Remove the fan filter and clean it thoroughly at regular intervals. See Figure 12 for the location of the fan filter. To remove the fan filter, unsnap the filter retainer. Clean the filter and replace it. Press the filter retainer back into position over the fan filter.

☑ Important Safety information 

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL. THIS INCLUDES FUSE AND BATTERY REPLACEMENT. IMPROPER FUSE REPLACEMENT CAN CAUSE SHOCK AND FIRE HAZARD.

WARNING: Shock hazards may exist if this system is not properly grounded. Protection against electrical shock is provided by grounding the chassis with a 3-wire cable and plug. The MDR Publisher must be plugged into a hospital-grade three-contact outlet. The grounding wire must not be removed or defeated. In North America always use the cord supplied with the unit and connect to 115 V ac only.

Do not touch any MDR Publisher connector and the patient simultaneously.

CAUTION: Do not remove the protective covers on the MDR Publisher; hazardous voltages are present inside. Cabinet covers must be in place while the unit is in use. All internal adjustments and replacements must be made by a qualified electronic technician.

DANGER: Do not operate the MDR Publisher in the presence of flammable gasses or anesthetics. Explosion can result.

The appropriate IEC cord set must be used to ensure that protective earth (grounding) is secure prior to application of power. “Appropriate” means that it is designed to mate with the wall outlet in use.

125 V ac, 15 A, 3 wire, 16 AWG, grounding type, 5-15P Hospital Grade plug cap, less than 2.45m (8 ft) long, CSA & UL approved;

250 V ac, 15 A, 3 wire, 16 AWG, grounding type, 6-15P Hospital Grade plug cap, less than 2.45m (8 ft) long, CSA & UL approved.

WARNING: Always disconnect the MDR Publisher from the power source prior to cleaning the unit.

Accessory equipment connected to the MDR Publisher interfaces must be certified according to the respective IEC standards (i.e. IEC 950 for data processing equipment and IEC 601 for medical equipment). All configurations shall comply with the system standards IEC 601-1-1. Additional equipment connected to the signal input or output shall meet the system standard IEC 601-1-1. If in doubt, consult the technical service department or your local representative.

☑ EMC Interference

This equipment may be affected by electromagnetic interference. Should interference occur, determine which equipment is causing the interference; this can be done by turning the suspected equipment off. Once the source of EMC interference has been found, try correcting the interference by one or more of the following measures:

- Increase the separation between the equipment and that source of interference.
- Connect the equipment into an outlet on a circuit different from that of the interference source.
- Consult the service department or qualified technician.

☑ Disposal

Disposal of this product shall be in accordance with all applicable laws and regulations in effect at the locality at the time of disposal.

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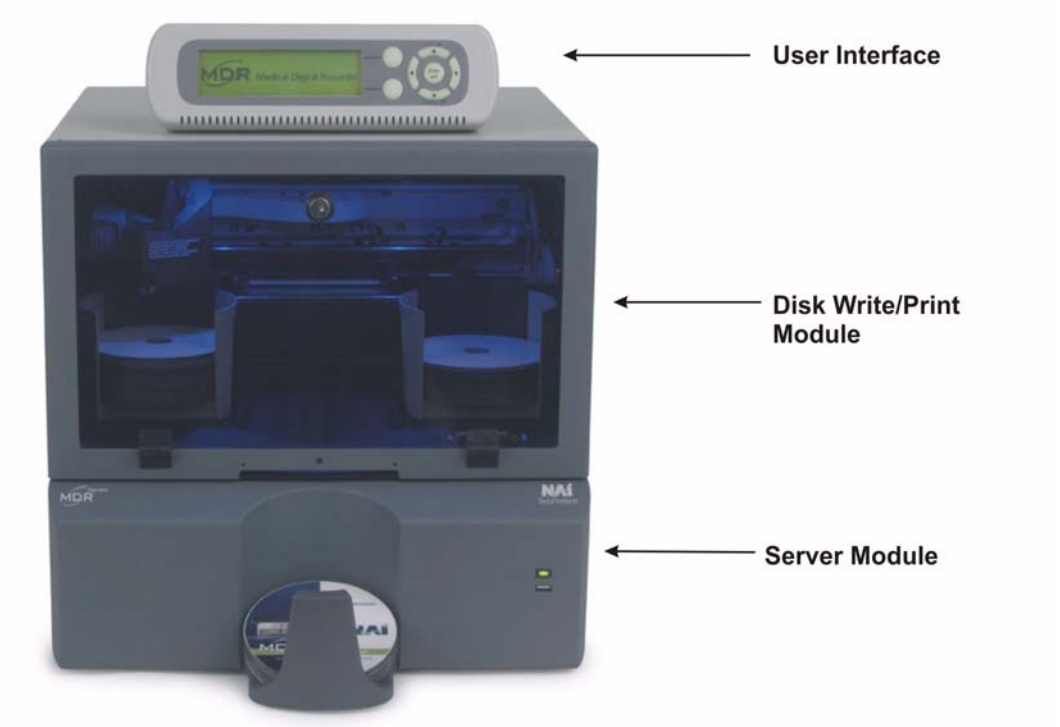
1.0 MDR Publisher Description

The MDR (Medical Digital Recorder) Publisher is a DICOM Service Class Provider (SCP). It is intended for use with medical imaging equipment and workstations conforming to the current DICOM standard.

DICOM Storage Class information, (images, cine loops, etc.), may be transferred to the MDR Publisher then copied to CD, DVD, or USB Storage device. The CD/DVDs can also have labels printed containing patient information, exam information and customized label images (graphics).

Figure 1MDR Publisher, Front View



1.1 MDR Publisher System Modules

The MDR Publisher is made up of three modules:

1. The User Interface Module (top of stack in Figure 1) - this module is the operators interface and system display for the MDR Publisher.
2. The Disk Write/Print Module (center module, with plastic access/viewing door, in Figure 1) - this module holds the CD/DVDs used to burn the patient information and print the labels for the CD/DVDs.
3. The Server Module (bottom module, with the output bin, in Figure 1) - this is the computer server for the MDR Publisher system.

Other than the Server Module fan filter, Disk Write/Print module CD/DVDs, and Ink Cartridges, the MDR Publisher contains no user serviceable components. Only the manufacturer's qualified personnel should service the equipment. Refer to Appendix B for instructions to return the MDR Publisher for service.

1.2 Installation Considerations

Before unpacking and assembling the MDR Publisher, there are a few things to consider:

- The weight of each Module and amount of space used on a work surface, (refer to specifications for the weights and dimensions in Appendix A), have to be considered.

CAUTION: Be sure the installation location for the MDR Publisher can safely support more than 28.58 kg (63 lb).

- There needs to be at least two power outlets available for the MDR Publisher. Refer to Appendix A and front material for information regarding power requirements and safety.
- EMC Interference concerns, refer to the EMC statement on page i.
- The installation site must be close to the network or modality connections.
- Rear access to the Server Module and Disk Write/Print module for power On/Off switches, and cabling considerations.
- Front access considerations for the Disk Write/Print module for loading CD/DVDs and changing ink cartridges. The output bin also extends from the front of the Server Module.
- Storage area for consumable supplies, (CD/DVDs, ink cartridges, etc.).

1.3 Environmental Considerations

- The MDR Publisher is a computer and as such it does require a non-toxic, temperature and humidity controlled environment. Refer to the Specifications in Appendix A and Important Safety Information on page i.
- There needs to be a minimum of three inches of clearance on all sides of the MDR Publisher, for systems cooling needs.

1.4 Tools Required

Two screw drivers are required to install the MDR Publisher. One, small, Philips head, and one small flat blade screw driver. The Philips head screw driver is used for the output bin. The flat blade screw driver is used to secure the connector on the cable between the User Interface module and the Server Module's "Remote" connector.

2.0 Unpacking Instructions

This section provides the information to unpack and identify all the MDR Publisher system components and modules. Before removing the components from the packing boxes, inspect each box for signs of external damage, such as, crushed corners, gashes or punctures, etc., in the containers. These may be signs of internal equipment damage incurred during shipment and delivery. If external damage or internal damage is observed, contact the shipper and NAI Tech Products immediately.

The modules are designed to stack on top of each other in a specific order, with the Server Module on the bottom, and the Disk Write/Print module on top (as shown in Figure 1). **DO NOT** invert the stack design. There are depressions in the Server Module case to accommodate the feet of the Disk Write/Print Module. The User Interface Module can sit on top of the Disk Write/Print Module secured to the top by a magnetic strip on the base of the User Interface Module, or on the work surface for the operators convenience, (restricted only by the connected cable length).

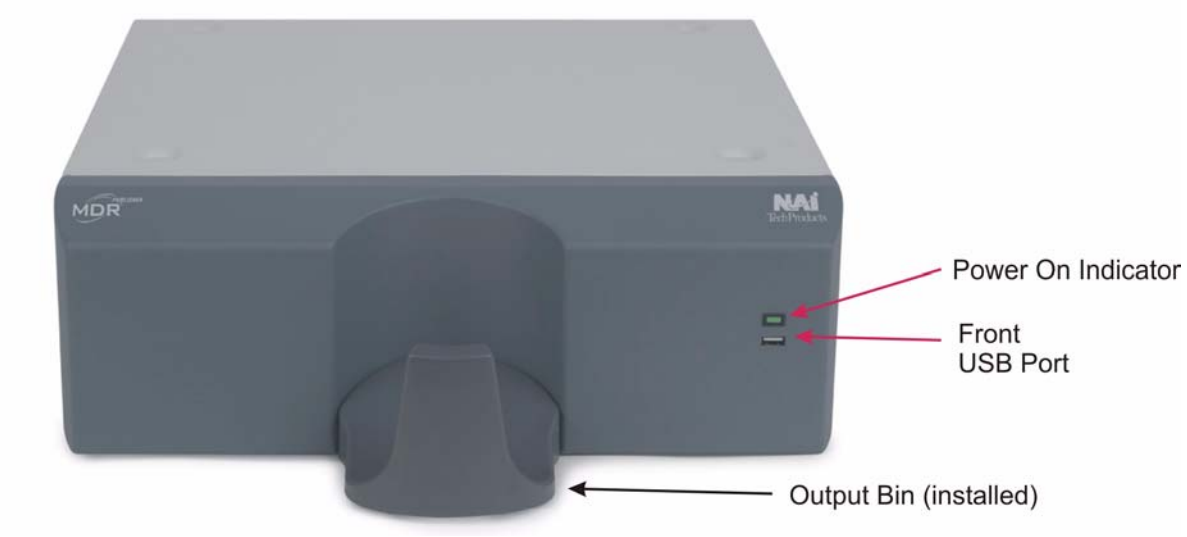
The Server Module should be unpacked first.

2.1 Server Module Unpacking

The contents of the Server Module package are:

- Server Module (refer to Figure 2). The Server Module does not come with the Output Bin installed.
- User Interface Module and interconnect cable.
- Output Bin (zip-lock bag containing the screws and washers, and output bin installation instructions).
- 25 blank CDs (Optional).
- USB Flash Memory Stick (Optional)
- Power cord, RJ45 patch cord, and a crossover cable (7 ft).
- USB 2.0 A-B cable, 18 inches (for connection to the Disk Write/Print Module) (Optional).
- Declaration of Conformity, a CD of this manual and this operators manual.

Figure 2 Server Module



Make sure all listed items are in the package, if not contact your support or sales representative immediately.

To unpack the Server Module, perform the following steps:

1. Open the box and remove the top foam shipping pad.
2. Remove the User Interface module, output bin, CDs, cables, plastic bag (with screws and washers), and documentation from the top of the inner foam shipping pad.

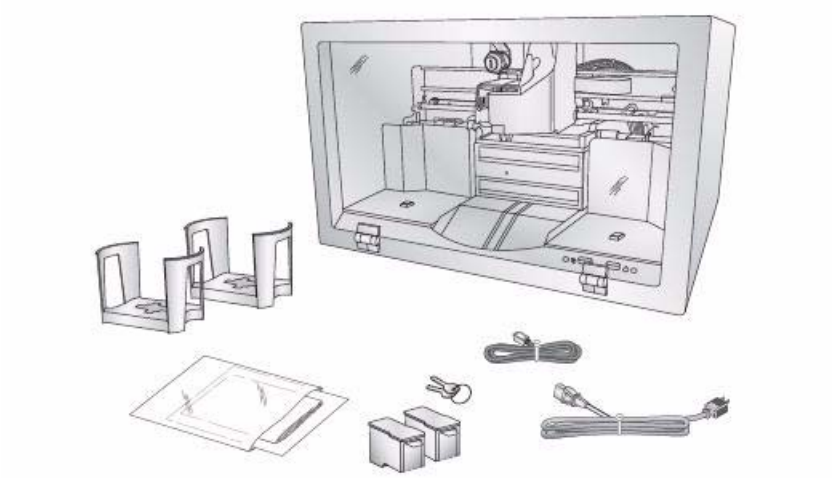
3. Remove the inner foam shipping pad.
4. Lift the Server Module out of the package. Be aware that the Server Module weights 9.1 kg (20 lb), use proper lifting techniques to avoid injury.
5. Remove the Server Module from the plastic shipping bag.
6. Locate the output bin, screws and washers, and instructions for their installation.
7. The output bin needs to be installed on the module. Perform this procedure before proceeding to the Disk Write/Print module. The installation requires a Phillips head screw driver. Refer to the output bin installation instructions.
8. Place the Server Module in it's work space. Be sure there is adequate room at the rear of the modules for power On/Off switch access and cabling purposes.
9. Remove the bubble wrap, protective packing material from the User Interface Module.
10. Remove the protective vinyl from the User Interface display.
11. Place the User Interface Module aside for the moment.

Once the Server Module and it's components are unpacked, save all packing material. It can be used if the modules ever need to be transported to another location, or a module needs to be returned for service.

2.2 Disk Write/Print Module Unpacking

Be aware that the Disk Write/Print module weights 19.5 kg (43 lb). It may require two people to safely unpack and position the module, use proper lifting techniques to avoid injury. The contents of the Disk Write/Print module are:

Figure 3 Disk Write/Print Module Contents



- Disk Write/Print module
- Two Gray plastic input bins
- Power cord
- One three color (CMY) ink cartridge
- One monochrome black ink cartridge
- USB 2.0 interface cable
- Set of keys (taped to the Access Door)

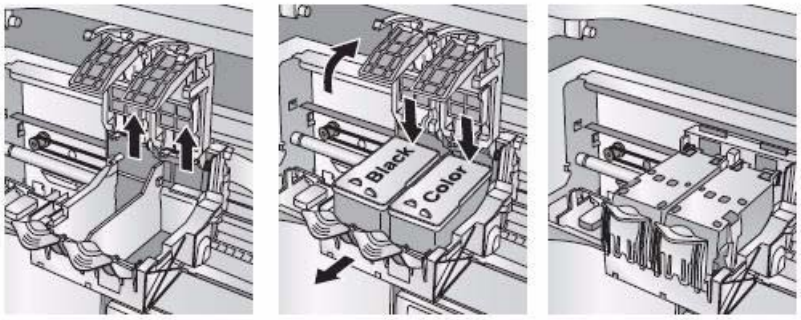
Perform the following steps to unpack the Disk Write/Print module:

1. Open the shipping box and remove the material from the top of the package.
2. Remove the Disk Write/Print module from the box. Keep all packing material for any future transport of the module.
3. Remove the packing foam and plastic bag.
4. Place the Disk Write/Print module on top of the Server Module.
5. Locate the small sealed bag taped to the outside of the module. It contains the keys to open the access door to the module.

   NOTE: It is recommended that the keys be separated and one put away, in case one is lost. The access door cannot be opened without the key.
6. Open the access door and remove the cardboard spacer. Be sure to keep this spacer. It protects the robot arm and ink carrier in shipment and also contains instructions for repacking the module.

7. To install the ink cartridges, open the ink cartridge carrier tops by pulling the tab towards the front of the module. The cartridge carrier top springs open. They are located on the inside left of the module (refer to Figure 4).

Figure 4 Ink Cartridge Carrier



8. Remove the ink cartridges from the packaging.
9. Carefully remove the tape covering the ink cartridge print heads.

   NOTE: Do not touch the “Copper” area of the ink cartridge.

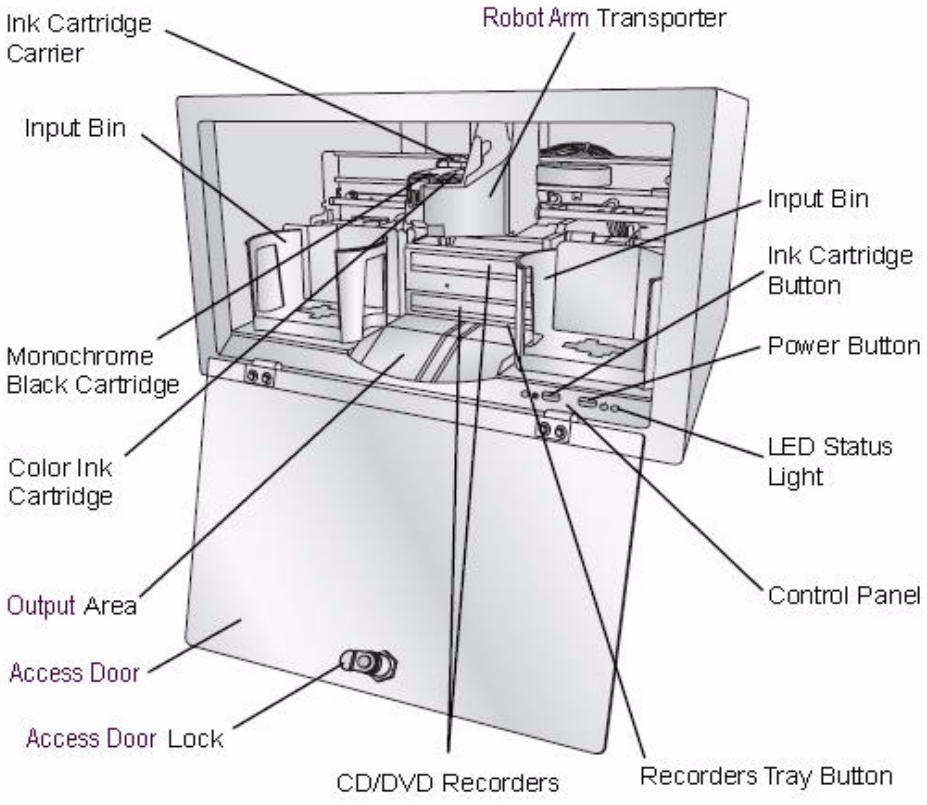
10. Install the “black monochrome” cartridge into the left cartridge holder, (copper end first), and the “color (CMY)” cartridge into the right cartridge holder, (copper end first). Refer to Figure 4.

    NOTE: The ink cartridges are color coded on top, as are the ink cartridge carriers in the module.

11. Push the cartridge cover down over the ink cartridge until it snaps closed. Refer to Figure 4.
12. Close and lock the Access Door. The Access Door needs to be opened several times during the power on and initialization process. It is recommended that a key be left in the Access Door.
13. Remove the vinyl, protective cover from the Disk Write/Print Module access door.

    NOTE: DO NOT turn the Server Module or Disk Write/Print Module power on at this point.

Figure 5Disk Write/Print Module Components



3.0 MDR Publisher Cable Connections

Make sure there is sufficient room for accessing the rear of the system. Refer to Figure 6 while performing the following steps:

1. Be sure the modules are stacked in the recommended order, (Server Module on the bottom, Disk Write/Print Module next, then the User Interface Module).
2. Be sure the power switches in the back of both modules are in the "**OFF**" position before connecting the power cords.
3. Check the input power select switch at the back of the Disk Write/Print module. Be sure it is in the correct position for the AC outlet voltage (115 or 230 VAC).
4. Connect both the power cords to the backs of the modules and to the appropriate power outlets.

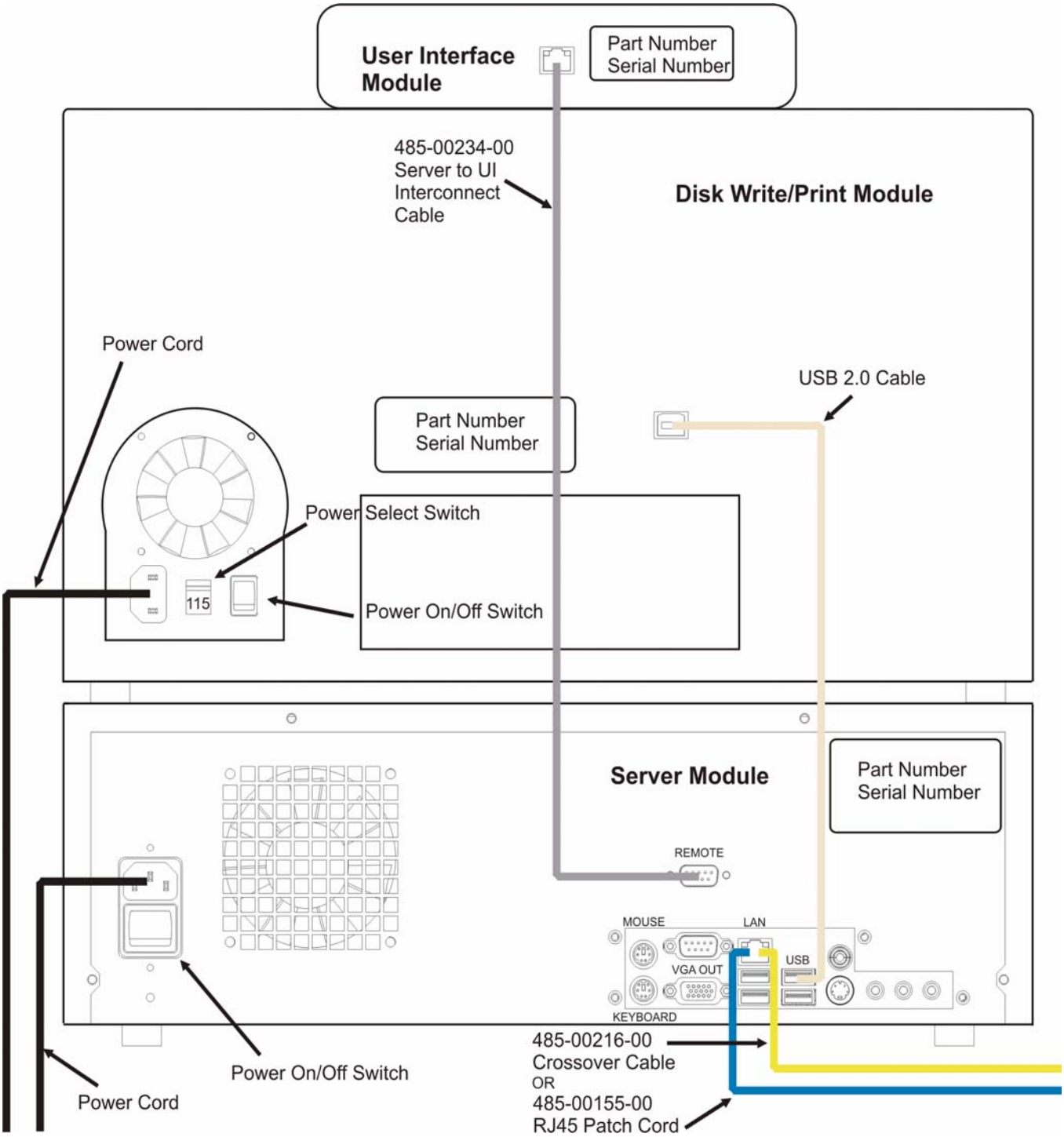
   NOTE: The User Interface receives it's power from the Server Module.
5. Connect the User Interface Cable (485-00234-00) between the User Interface Module and the Server Module connector labeled "REMOTE". Secure the cable connector to the Server Module with a small flat blade screw driver.
6. Insert one end of the USB 2.0 A-B cable (from the Server Module package) into the back of the Disk Write/Print Module and the other end into one of the four USB connectors on the back of the Sever Module.
7. If the MDR Publisher is being connected directly to an Ethernet port on a modality, use the Crossover cable, (485-00216-00), between the modality connector and the "LAN" connector on the back of the Server Module.

   If the MDR Publisher is being connected to the local area network, use the RJ45 Patch Cord, (485-00155-00), between network port connector and the "LAN" connector on the back of the Server Module.

   By connecting to the Ethernet interface, the MDR Publisher functions as a DICOM Storage Class SCP in a network environment conforming to the TCP/IP Standard.

   The MDR Publisher has Ethernet network interface capability that allows connection to the network environment via an IEEE 802.3 10/100/1000 BASE-T interface.
8. This is all the cabling required for normal operation. Proceed to Section 4 Initialization Process.

Figure 6MDR Publisher Cable Connection Diagram



CAUTION: The Disk Write/Print Module does <u>NOT</u> automatically sense the input line voltage. Be certain the power select switch is set to the appropriate power setting (115 or 230) for the outlet power available before turning the module on. The Server Module power supply automatically senses the input line voltage.

4.0 Initialization Process

This section provides instructions for the first time power on and initialization process. Once the first time power on and initialization is complete, it **Does Not** have to be repeated at each subsequent power on. For normal power on and use of the MDR Publisher, refer to Section 6.0 Operating Instructions.

The power on and first time initialization of the modules is unique for each module. Therefore, it is important to perform the power on, and initialization procedures in the documented sequence. Also, be aware that the first time power on and initialization of the MDR Publisher takes some time and monitoring.

4.1 Disk Write/Print Module Procedures

1. Turn the Disk Write/Print Module power switch, (at the back of the module), to the “On” position. This starts the initialization process for the module.

   NOTE: For the first power on and initialization of the Disk Write/Print Module, the Server Module should be powered off. Do not power on the Server Module until the Disk Write/Print initialization is complete. The first power on and initialization of the MDR Publisher may use from one up to three blank CDs. This is necessary for the print head calibration.

2. The ink cartridge and power LEDs start a rapid, alternate blinking pattern, and the print tray opens and closes. This is normal.
3. The ink carrier and robot arm start to move back and forth. This is the Disk Write/Print Module’s sequence for calibrating and checking it’s internal sensors.
4. When the lights stop blinking and the ink carrier and robot arm are still, unlock and open the access door. The ink carrier and robot arm move to the center of the module.
5. Place the input bins inside the Disk Write/Print Module, (one on the left, one on the right). They are interchangeable.
6. Place at least four blank CDs into the input bins (two into the left side and two into the right side). The CDs are used in the initial power on robot arm calibration and print head alignment. Normally, only one disk is used for print head alignment.

   CAUTION: Be aware that there may be a clear plastic, or other type of protective cover on the top or bottom of new CD/DVD packages. This protective disk must be removed and discarded prior to loading disks into the Disk Write/Print Module.

7. Close and lock the Disk Write/Print Module access door. The ink carrier and robot arm reposition to the left side of the module.
8. The Ink Cartridge and Power LEDs should be On solid, to indicate the power on sequence is done and the Disk Write/Print Module is in Ready mode. Proceed to Section 4.2 the Server Module procedures.

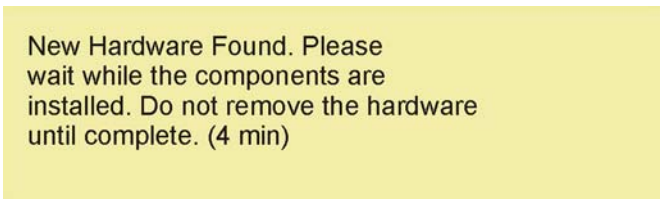
4.2 Server Module Procedures

Be sure the Disk Write/Print Module initialization is complete before starting the Server Module initialization procedures. The initialization of the Server Module also includes the robot arm calibration and print head alignment process.

1. Switch the power on at the back of the Server Module. The User Interface Module also powers on when the Server Module powers on. The MDR Logo is displayed on the User Interface at this point.
2. The Server Module takes approximately 40 seconds to start its initialization process and recognize the Disk Write/Print Module.

   NOTE: During this time the User Interface displays a “No Disk” message and only one activity progress bar. This is normal, until the informational screen in step 3 is displayed.

3. After the Server Module completes boot up, it displays the following informational screen:



NOTE: There is no activity indicator while this informational screen is displayed, please be patient.

4. When the Server Module recognizes the Disk Write/Print Module, it automatically starts the top/bottom burner designation process. The User Interface displays the following message:

NOTE: If the robot arm starts to place a disk in the open burner before the top and bottom burners are designated, both modules **MUST BE POWERED OFF**. Then power ON the Disk Write/Print Module and wait for the LEDs to be On solid, then return to Step 1 of these procedures.

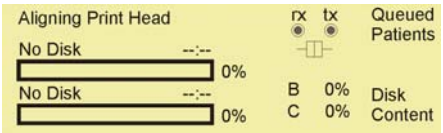
5. Configure the MDR Publisher so that the correct drive tray opens when “Burner 1” or “Burner 2” is selected. The **Configure Drive** selection is used to identify the top CD/DVD drive and the bottom CD/DVD drive in the Disk Write/Print Module.

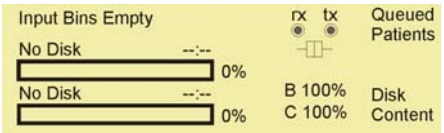
   In this example, the Bottom CD/DVD drive tray opens and then closes. If the Top tray opens, press the “Enter” button to toggle the description for Burner 1 to Top. Press the “Down” arrow to highlight the description for Burner 2, if Burner 1 is the Top CD/DVD drive, then Burner 2 must be the Bottom CD/DVD drive.

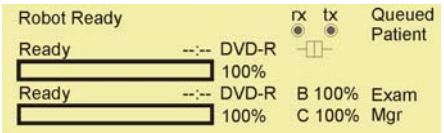
6. The Server Module now starts the robot arm calibration and print alignment process on the Disk Write/Print Module.
   - The robot arm moves from one input bin to the other, sensing for disks.
   - The robot arm then picks a disk and places it in the print tray.
   - The print head then prints an alignment pattern on a disk label.
   - The robot arm then picks the disk and places it in the output area and the disk drops it into the output bin attached to the Server Module.
   - Check the alignment pattern, (shown below), for print quality, clarity, and position on the label.

NOTE: The calibration and print head alignment processes are run automatically by the Server Module. The print head alignment is also automatically performed whenever a ink cartridge is replaced. Also, the print quality and clarity are affected by the type of label on the CD/DVD. The MDR Publisher is preset for the WaterShield disks.

7. The MDR User Interface Module may display one of the following information screens:



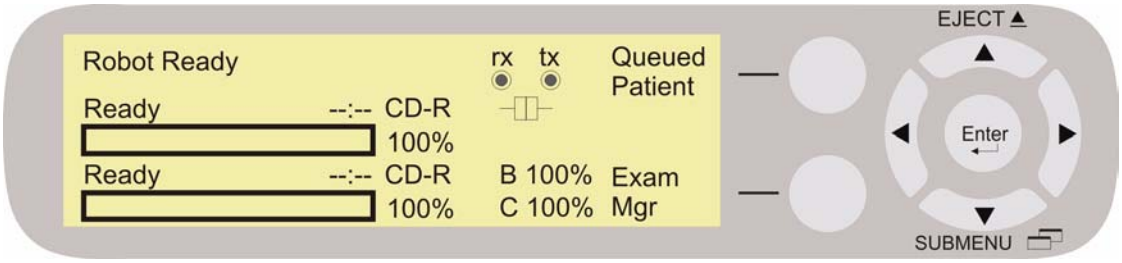




8. If the Disk Write/Print Module was not previously loaded with CD/DVDs, unlock and open the Access door and load the Input bins with CD/DVD disks, (up to 50 per input bin). Then, close and lock the Access door.

   CAUTION: Be aware that there may be a clear plastic, or other type of protective cover on the top or bottom of new CD/DVD packages. This protective disk must be removed and discarded prior to loading disks into the Disk Write/Print Module.

9. When this process is complete, the Disk Writer/Print Module loads both CD/DVD drives and the User Interface Module displays the following screen:



Proceed to Section 5.0 to configure the options and functions of the MDR Publisher that best suits the workflow of the facility.

NOTE: If all the MDR Publisher default settings are going to be used, then the MDR Publisher is ready for use, refer to Section 6 operating Instructions.

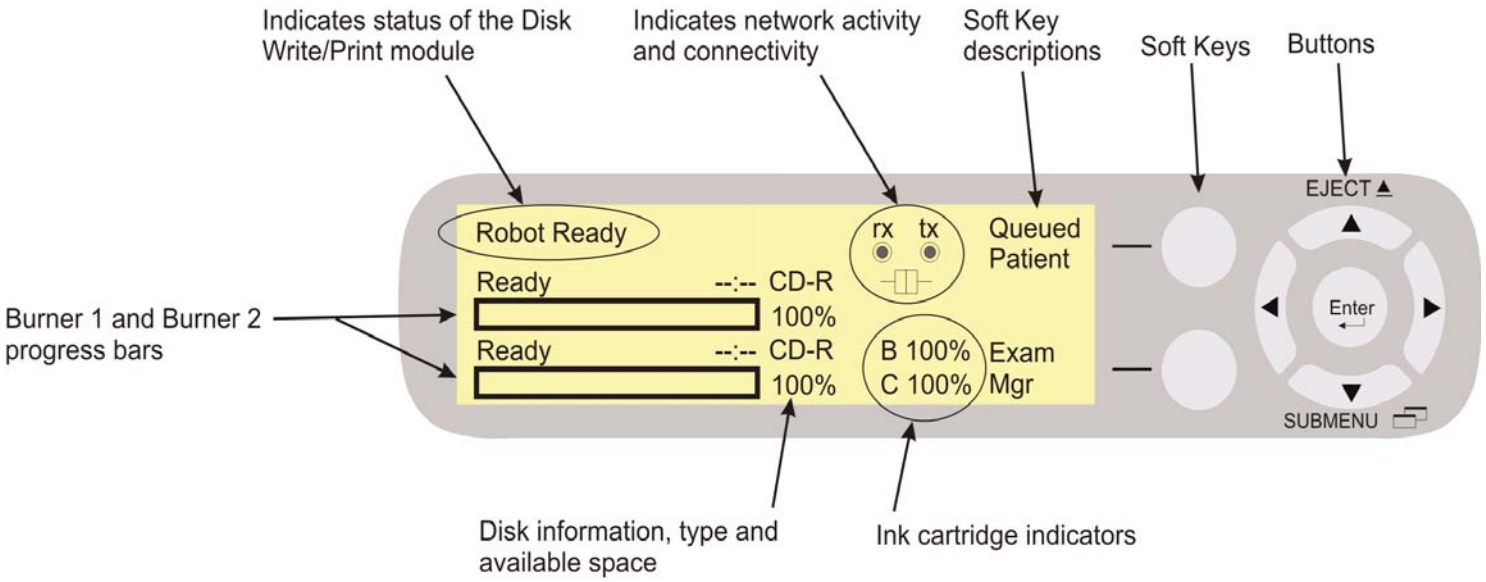
4.3 User Interface Module

There are no initialization procedures specifically for the User Interface Module. Figure 7 shows the User Interface Module with the display and indicator components.

The User Interface Module consists of a LCD display with LED backlighting and seven buttons (located on the right side). Refer to Figure 7. Button functionality is dependent on the current status of the MDR Publisher, (i.e., data entry, images writing to disk, etc.)

The User Interface Module display indicates the current status of the MDR Publisher. Refer to Figure 7 for the location of status messages.

Figure 7 User Interface Module Display



5.0 MDR Publisher Configuration

This section provides information and procedures for customer configuration of the MDR Publisher. This is accomplished through the Main Setup Screen and the MDR Utilities Menu. These two menus are used to review the default or current settings of the MDR Publisher options. The menus are also used to reset or select modes of operation if they change on a job to job basis.

To configure the MDR Publisher for the customers preferences, review the sub-menus associated with both the Main Setup Screen and the MDR Utilities Menu. There are numerous data inputs that need to be known before the configuration starts (such as the I.P. address, Netmask, Gateway address, etc.). This type of information can be obtained from the sites IT department. It is recommended that all the pertinent information be decided and collected before the configuration process starts.

Refer to the Main Setup Screen diagram (on page 12) and the MDR Utilities Menu (on page 16) for the information and configuration choices that are available.

5.1 User Customization

The MDR Publisher offers three customization options for the user:

- Custom Logo (Viewer Utility Splash Screen).
- Disk Label (Single Patient).
- Disk Label (Multiple Patient).

These customizable options can be implemented during configuration, or at anytime there is a need for updating or modifying the custom logo or disk label.

5.1.1 Custom Logo

This option allows the customer to design and load a custom Logo (Viewer utility splash screen) for the Viewer software. The custom logo image can be a logo or design to represent the specific entity or organization of the MDR Publisher customer. It would be seen each time the Viewer is launched by the user. If no custom logo is loaded, the default Viewer logo, shown in Figure 8, is used.

Figure 8 Default Logo (Viewer Splash Screen)

The Custom Logo (Viewer utility splash screen) is a JPEG (JPG) image that must be in a 640 x 480 pixels format. The filename for the JPG image has to be “*logo.jpg*”. Save the Custom Logo JPG image to a USB storage device. Once the image is done, refer to the “Load Custom Logo JPG Instructions” located on page 14 for instructions on loading the *logo.jpg* image to the MDR Publisher.

5.1.2 Disk Label

There are two disk labels, Single Patient and Multiple Patient. Each type can be customized individually, or can use the same custom graphics as long as the areas to keep blank, listed below, are adhered to.

The customer only needs to create or supply the graphical image, for the single patient, or multiple patient, CD/DVD labels. The patient information printed on the label is not programmable. The custom label must be 1024 by 1024 pixels and saved in a JPG format with the following naming conventions.

- The file name for a single patient disk label must be *“customer_single_patient.jpg”*.
- The file name for a multiple patient disk label must be “*customer_mult_patient.jpg”*.

The MDR Publisher automatically places the patient and exam specific information to the disk label.

The positioning of the Patient information on the disk label (refer to Figure 9) is automatically determined by the MDR Publisher and is not programmable. The customized graphics for the label must be positioned on the upper side of the label, with the patient information on the lower side.

The custom disk label has to be designed to fit the allotted area of the label, with the following areas left blank for patient information printing:

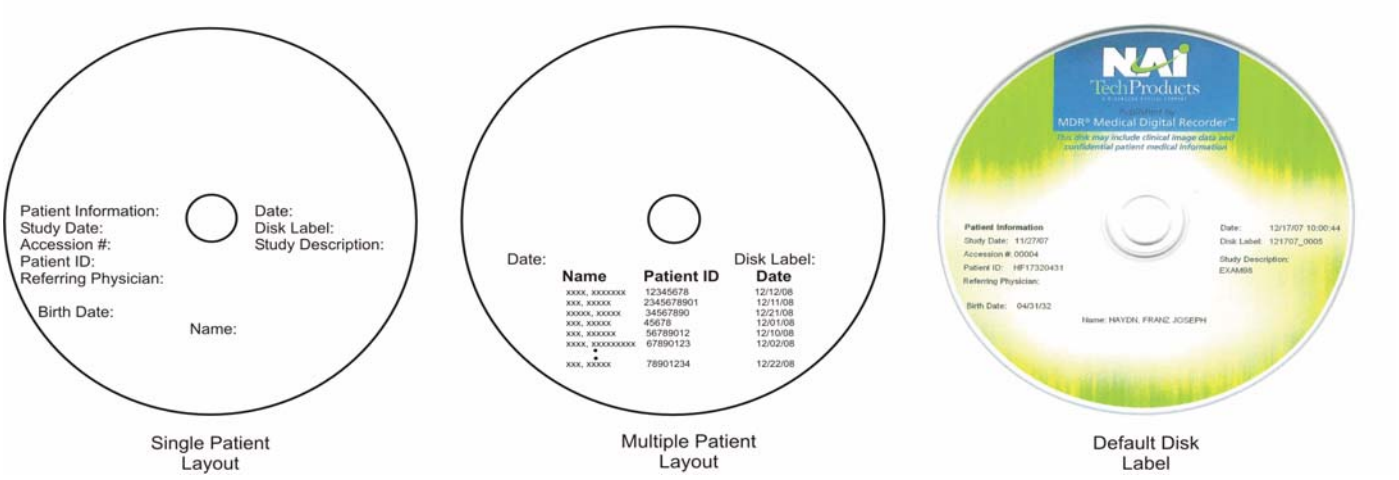
Area to Keep Blank (Patient information area)

Disk Hole:	Top = 400 pixels	Bottom = 620 pixels	Left = 400 pixels	Right = 620 pixels
Single Patient Disk:	Top = 510 pixels	Bottom = 800 pixels	Left = 0 pixels	Right = 1024 pixels
Multiple Patient Disk:	Top = 645 pixels	Bottom = 1024 pixels	Left = 0 pixels	Right = 1024 pixels

The custom design can color the entire label (as shown by the Default Disk Label in Figure 9). Be aware that the patient information and the color of the custom label can over lay on the lower area of the label. The custom design color and print color (black) should be compatible for ease of reading. For instructions on loading custom disk label designs, refer to Section 5.3.2 Disk, in the MDR Utilities Menu.

It is possible to record more patients on a disk than can be printed on a disk label. For that reason, on Multiple Patient labels, only the first six names and the last name are printed on the disk label, with fill periods between the sixth and the last name, to indicate a range of names.

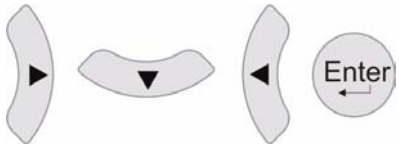
Figure 9 Patient Information Layout and Default Disk LabeL



5.2 Main Setup Screen

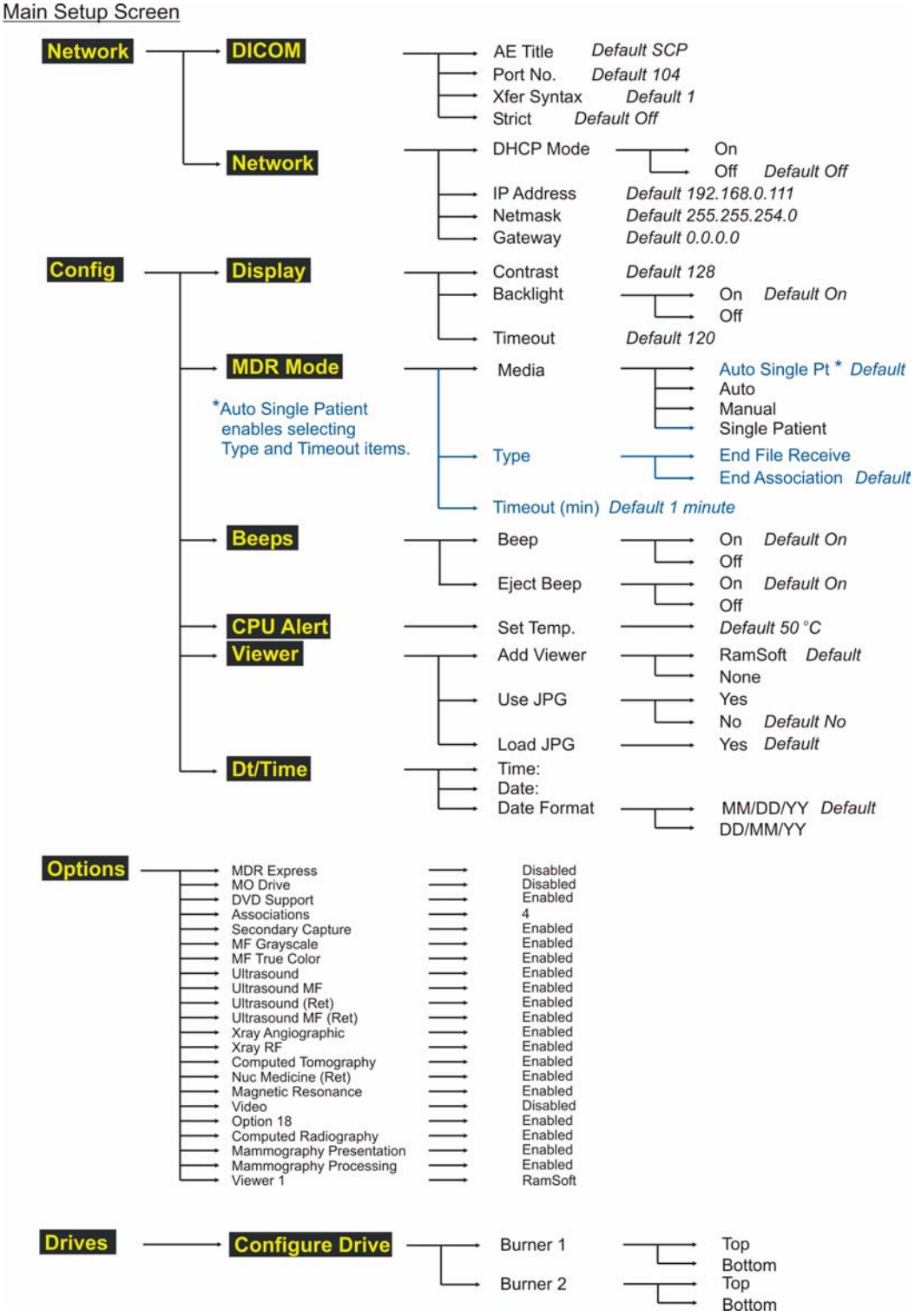
The MDR Publisher is configured for network parameters and operator preferences via the Main Setup Screen. The User Interface must be displaying the “Robot Ready” screen while the buttons are pressed.

The Main Setup Screen is accessed by pressing the following buttons sequentially: “Right” arrow, “Down” arrow, “Left” arrow, “Enter” button.



Use the “Left” and “Right” arrows to navigate the Main Setup Screen. Use the “Enter” button to select the highlighted menu item. Use the “Up” and “Down” arrows to change the selected items value. Use the “OK” soft key to save changes or the “Cancel” soft key to exit without saving changes.

Figure 10 Main Setup Screen



5.2.1 Network

Network configuration is accomplished via the User Interface Module buttons. The network configuration function is divided into two sections:

- **DICOM** parameters and
- **Network** parameters (i.e., TCP/IP).

NOTE: If DHCP Mode is set to “On”, the other network parameters (IP Address, Netmask and Gateway) are not changeable (they are read only).

In the “**DICOM**” selection the following attributes can be set:

- **AE Title** (Application Entity) - is a case sensitive string limited to 16 characters (default is SCP).
- **Port No.** (number) - specifies the port used by the Server Module process as its contact port (the valid range is 0 to 65535, the default is 104).
- **Xfer Syntax** (transfer) - the actual representation of data as it is transmitted over a network (default is Mode 1).

  The “**Xfer Syntax”** acceptance modes are as follows:

  Mode 0 - Order of transfer syntax preference is Implicit VR Little Endian, Explicit VR Little Endian, JPEG Lossy or RLE.

  Mode 1 - Accept first offered transfer syntax that is supported. (Default).

  Mode 2 - Accept a compressed syntax if offered.

  Mode 3 - Do not accept a compressed transfer syntax if offered unless it is the only offered syntax.

  NOTE: Modes 2 and 3 allow for control of image compression. The MDR Publisher uses JPEG (JPG) lossy or RLE compression which may not be acceptable for archival purposes.

- **Strict** - (DICOM) On or Off. If set to “On”, a duplicate image UID results in an association rejection (default is Off).

In the “**Network**” selection the following attributes can be set:

- **DHCP Mode** - On or Off. If DHCP Mode is set to “On”, the other network parameters (IP Address, Netmask and Gateway) are not changeable (default is Off).
- **IP Address** - internet protocol address (default is 192.168.0.111)
- **Netmask** - network mask (default is 255.255.254.0)
- **Gateway** - gateway address (default is 0.0.0.0)

To change the settings:

1. Highlight desired settings.
2. Press the “Enter” button.
3. Move the underscore cursor with the “Left” or “Right” arrow buttons to the value to be changed.
4. Change the values of the selection with the “Up” or “Down” arrow buttons.
5. When done, press the “Enter” button.

5.2.2 Configuration (Config)

In the **Config** selection, the following attributes can be programmed.

Display, the User Interface Module’s display contrast, backlighting, and timeout can be set to the operators preference.

- The **Contrast** adjustment can be set in the range of 000 (no contrast) to 999 (the brightest contrast). The default is 128.
- The **Backlight** can be turned On or Off. The default is “On”.
- The **Timeout** sets the amount of time (in seconds) that elapse without button presses until the display goes into screen save (dims) mode. The display comes back on again when any button is pressed. The default is 120 seconds (the range is 0 to 999). Setting the timeout to zero (0), the display never goes into screen save mode.

MDR Mode, configures how exam data is written to the CD/DVD. The MDR Publisher has four media modes, Auto, Manual, Single Patient and Auto Single Patient (Default).

- In **Auto Single Pt** (Patient) mode, the MDR Publisher automatically writes the exam data to the CD/DVD after the exam has completed transfer from the DICOM modality. Selecting the Auto Single Patient mode allows the operator to select whether the MDR Publisher stops writing exam data after the association is closed and the timeout has expired, or after the end of file is received and the timeout has expired. This is the default mode.
  - **Type**: The operator can select to stop recording the data with either the “End File Receive” or “End Association” (default is End Association).
  - **Timeout**: The operator can select the timeout (default is 1, range is 1 to 60 maximum), in minutes. The timeout does not start until the “Type” selection is received.

    The “Type” in conjunction with the “Timeout” selection stops the exam data recording, prints the CD/DVD label, and then ejects the disk. If the MDR Publisher receives additional exam data with the same exam ID within the timeout period, this is also recorded to the current CD/DVD.
- In **Auto** mode operation the MDR Publisher writes exam data to the CD/DVD as it is received from the DICOM scanners and workstations on the network. It writes exam data until the CD/DVD is full, then prints the label and ejects the disk and continues to write exam data to the next CD/DVD.

- In **Manual** mode, the operator selects the exams to be written to CD/DVD from an exam list which is accessed via the “Exam Mgr” or “Queued Patients” soft keys.
- In **Single Patient** mode, The operator selects the exam ID from the exam list. This exam ID then becomes the only ID that can be written to the CD/DVD.

NOTE: In single patient mode, once an exam ID has been selected and written to disk, the exam list only displays exams with the chosen exam ID.

The **Beeps** selection is used to produce a “Beep” tone when any button or soft key, on the User Interface Module, is pressed. The default is On.

The **CPU Alert** selection is used to inform the operator to the possibility of an internal temperature problem. This alert can be caused by restricted ventilation around the MDR Publisher, or a clogged fan filter, which can lead to MDR Publisher malfunction or failure. The default setting is 50° C (122° F). If the CPU Alert is on, inspect the area around the MDR Publisher and the fan filter on the back of the Server Module. The MDR Publisher requires a minimum of three inches of clearance on all sides for air circulation. If the fan filter does not require cleaning, check the room temperature to be sure it is within the operating temperature range for the Server Module (refer to Server Module specifications in Appendix A), or increase the CPU Alert threshold by a degree or two. Refer to Appendix B for instructions on cleaning the filter.

The **Viewer** selection gives the operator the option to add the viewer software to the CD/DVD, or not add the viewer.

- The **Add Viewer** puts the viewer software on the CD/DVD and allows for DICOM images to be opened on any PC with the appropriate CD or DVD drive, (assumes the disk was finalized). The default is “Ramsoft”, which adds the software. MDR Publisher Viewer Utility provides for instructions on using the Viewer.

  MDR Publisher Viewer Utility

  The MDR Publisher may be configured to add a Viewer application to the CD or DVD. This application allows viewing of DICOM images, that have been written to the disk, on a computer that does not have a DICOM Viewer.

  NOTE: The Viewer is only written to the CD/DVD if “Add Viewer” is set to a selection other than “None” (currently “Ramsoft” is the only viewer available).

  The “None” option does not add a viewer.

  To open the MDR Publisher Viewer on a computer, perform the following steps:

  1. Place the CD, DVD, or USB device into the computer’s CD or DVD drive, or USB port.
  2. Select the “My Computer” icon.
  3. Select the drive letter that corresponds to the CD, DVD drive, or USB device.
  4. Select the “viewer.exe” icon to launch the MDR Viewer application. (See the MDR DICOM Viewer quick reference card for viewer application information.)

- The **Use JPG** feature enables or disables the loading of the custom JPG image. The default is “No”.
- The **Load JPG** feature allows placing a custom logo (splash screen) in the Viewer boot up sequence. Refer to the Load JPG Instructions to utilize this feature.

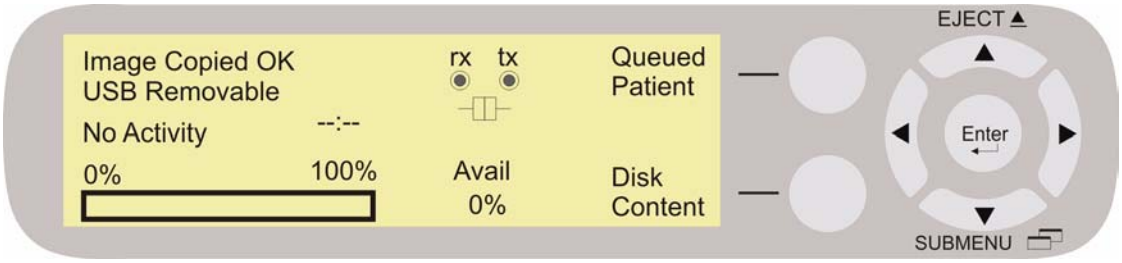
Load Custom Logo JPG Instructions

The custom logo JPG image must be in a 640 x 480 pixels format. Save the custom JPG image to a USB storage device. The filename for the JPG image has to be “*logo.jpg*”. (Be sure it is saved in the JPG format). To load the custom JPG image into the MDR Publisher, perform the following steps:

1. Insert the USB device, with the JPG image (logo.jpg), into the USB port on the Server Module.
2. The User Interface display shows “Drive XXX has been found. Would you like to set this as the default drive?” Press the “Yes” soft key. (or change the default disk (in the MDR Publisher Utilities menu) to the USB device.)

NOTE: The XXX represents a USB system name. Each device has it’s own system name.

3. Enter the Main Setup Screen by pressing the “Right” arrow, then the “Down” arrow, then the “Left” arrow, then the “Enter” button, in that sequence.
4. Select the “Config” menu.
5. Select the “Viewer” menu.
6. Select the “Use JPG” item. Change the Use JPG item to “Yes”.
7. Select the “Load JPG” item and verify it is set to “Yes”.
8. Press the “Enter” button. The following confirmation screen is displayed:



This indicates that the custom logo JPG image was down loaded to the MDR Publisher.

9. Remove the USB device from the Server Module, the display shows “The default drive was removed. Would you like to change the default drive to be the Disk Publisher XRP?”
10. Press the “Yes” soft key. The Server Module default is automatically set to Disk Publisher XRP (Disk Write/Print Module).

The **Dt/Time** (Date and Time) selection provides ability to set the Date and Time for the local time zone, and select a date format.

To change the date and time settings:

1. Highlight desired settings.
2. Press the “Enter” button.
3. Move the underscore cursor, with the “Left” or “Right” arrow buttons, to the value to be changed.
4. Change the values of the selection with the “Up” or “Down” arrow buttons.
5. When done, press the “Enter” button.

To select the date format:

1. Highlight the current date format.
2. Press the “Enter” button to switch between the two formats (DD/MM/YY or MM/DD/YY). (Where DD = day, MM = month, and YY = year)
3. When done, press the “OK” soft key.

5.2.3 Options

The Options selection shows the current configuration of the MDR Publisher.

5.2.4 Drives

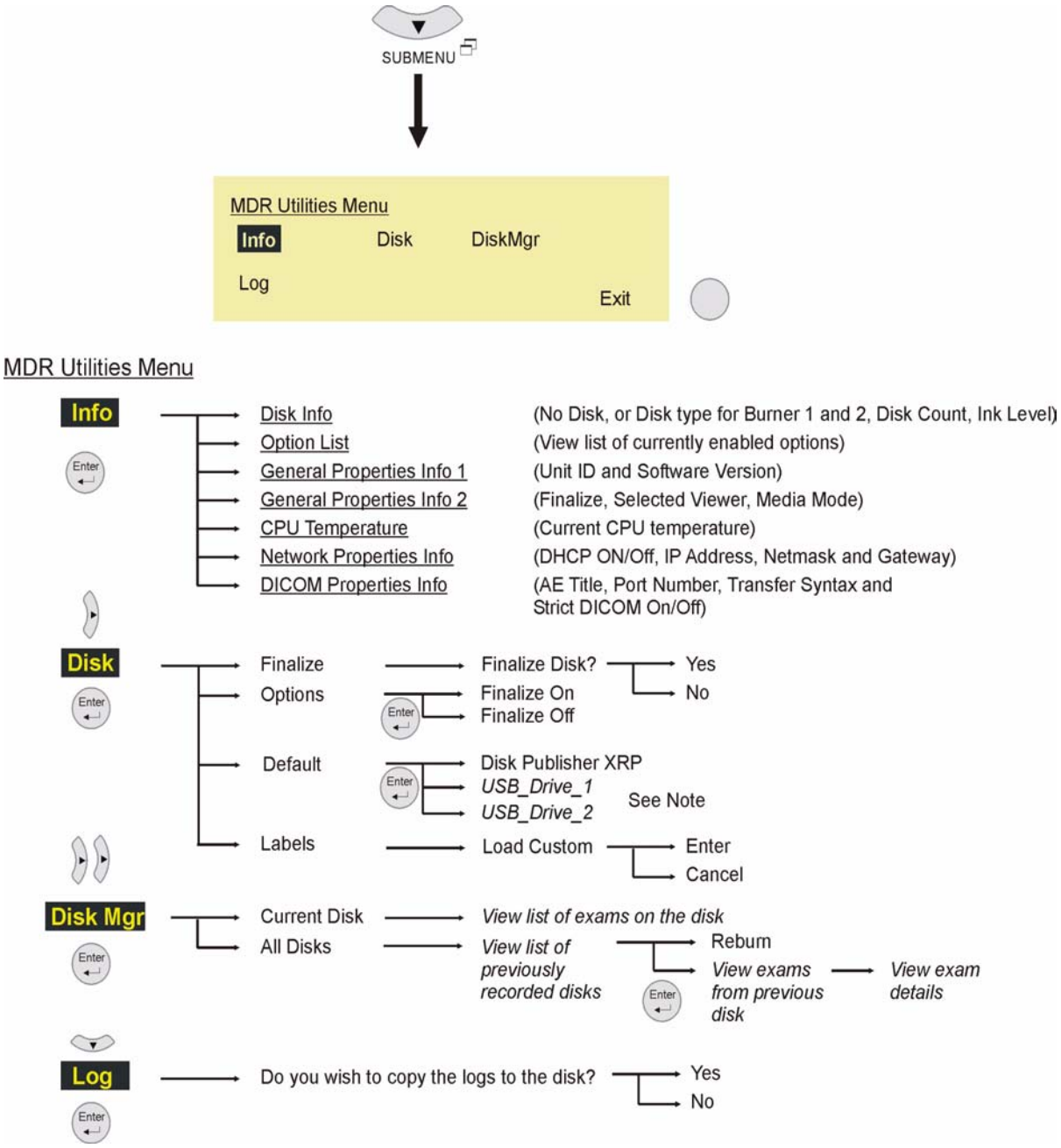
The **Configure Drive** selection is used to identify the upper CD/DVD drive and lower CD/DVD drive in the Disk Write/Print Module. This is completed during the first time power on initialization (refer to Section 4.2). It only needs to be done once during initial installation, or if there is a service exchange of the Sever or Disk Write/Print Modules. This should not need to be performed at any other time.

5.3 MDR Utilities Menu

The MDR Utilities Menu contains four sub-menus that allow the operator to view the current setup of the MDR Publisher and perform various disk functions. The User Interface display must show the “Robot Ready” screen.

To access the MDR Utilities Menu, press the “Down” arrow (Submenu).

Figure 11MDR Utilities Menu



NOTE: The “USB_Drive_1 and USB_Drive_2” only display if there are USB devices inserted into the Server Module, otherwise, just the “Disc Publisher XRP” (MDR Publisher) is displayed.

5.3.1 Information (Info)

To access the MDR Publisher Information (**Info**) Screens, follow the instructions in the MDR Utilities Menu section 5.3. Press the “Left” arrow or “Right” arrow, if necessary, to highlight the “Info” selection.

- Press the “Enter” button to view the **Disk Info** (information) screen. The Disk Information screen displays the type of CD or DVD that is currently in the Disk Write/Print disk trays, total number of disks and ink level.
- Press the “Next” soft key to view the **Option List** screen. This screen contains a list of MDR Publisher options and their current status.

- Press the “Next” soft key to view the **General Properties Info 1** screen. This screen contains the Unit ID and Software version.
- Press the “Next” soft key to view the **General Properties Info 2** screen. This screen contains the setting for Finalize (i.e., On or Off), Viewer and Media Mode.
- Press the “Next” soft key to view the **CPU Temperature** screen. This screen displays the current CPU (internal to the Server Module) temperature. If the current CPU temperature is greater than the setting in the “MDR Setup/ Config/CPU Alert” configuration, then the following message is also displayed:

  “CPU is hot! Please check the fan filter!”
- Press the “Next” soft key to view the **Network Properties Info** screen. This screen displays the current TCP/IP network information for the MDR Publisher.
- Press the “Next” soft key to view the **DICOM Properties Info** screen. This screen displays the current DICOM identification information for the MDR Publisher.

5.3.2 Disk

To access the **Disk** Utilities, follow the instructions in the MDR Utilities Menu section 5.2. Use the “Right” arrow, if necessary, to highlight the “**Disk**” selection.

- The “**Finalize**” screen prompts the operator to “Finalize Disk?”. Press the “Yes” soft key to finalize the current disk or the “No” soft key to return to the MDR Disk Utilities menu. Finalizing makes the disk more compatible with other CD/DVD drives. Not finalizing (the “No” selection) the disk allows for more data to be written at other times.
- The **Options** screen allows the operator to choose between finalizing and not finalizing the disk automatically. A disk that has not been finalized can have additional image data written to it. A disk that has been finalized is more compatible with other CD/DVD drives. The default is “ON”, to automatically finalize.
- The **Default** selection is used when an external USB device has been connected to the Server Module. Press the “Enter” button to toggle between the “Disc Publisher XRP” (the Disk Write/Print Module) and any external USB devices inserted.

NOTE: The User Interface only displays the number of USB devices inserted, one USB port on the front and four in the back of the Server Module. One port on the back is used by the Disk Write/Print Module (Disc Publisher XRP).

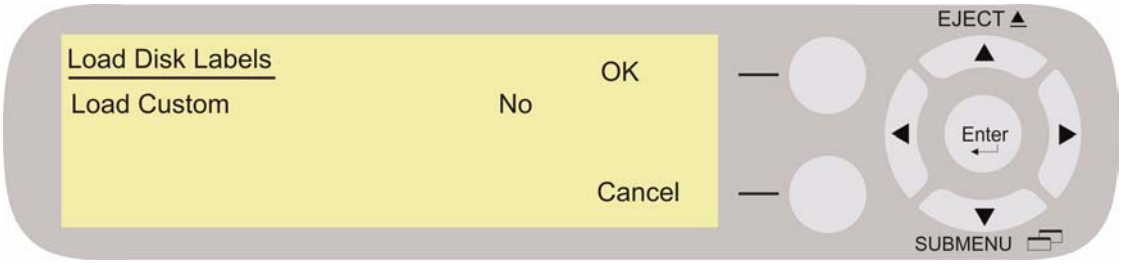
- The **Labels** selection allows the loading of custom disk labels that are printed on the CD/DVD along with the exam description. The custom label must be 1024 by 1024 pixels and saved in a JPG format.

  - The file name for a single patient disk label must be *“customer_single_patient.jpg”*.
  - The file name for a multiple patient disk label must be “*customer_mult_patient.jpg”*.

  To download the custom disk label to the MDR Publisher:

1. When the “Load Disk Labels” is displayed, insert the USB device (if not all ready inserted) that contains the custom labels into the Server Module USB connector (on the front of the Server Module).

   NOTE: The inserted USB device does not have to be set as the default device.
2. Then press the “Enter” button (this downloads the custom labels to the Server Module).



NOTE: If the “OK” or “Cancel” soft key is pressed, the MDR Publisher returns to the Robot Ready screen, and does not load the customer labels.

3. If the MDR Publisher finds the correctly named files, it starts the download process. If the proper file names are not found, the MDR Publisher, displays the following message:

   “No custom label found on the media. Make sure the image is on media and formatted properly and try again.”
4. Press the “OK” soft key to go back to the Robot Ready screen.
5. Check the files on the USB device and be sure the customer JPG files are present and correctly named and start the procedure again.

5.3.3 Disk Mgr (Manager)

Use the “Right” arrow, if necessary, to highlight the “**Disk Mgr**” selection.

- Select “**Current Disk**” to view the contents of the CD/DVD that is currently in the Disk Write/Print Module CD/DVD drive.
- Select “**All Disks**” to view a list of previously recorded disks.
  - Select “**Reburn**” to make a copy of the highlighted disk (when “Reburn” is selected, the system automatically burns the image and prints the disk label), or
  - Press the “Enter” button to “**View exam**” details of the highlighted disk.

To delete a disk from the list, highlight the disk, then press the “Enter” button, then the “Down” arrow.

5.3.4 Log

The “**Log**” selection from the Utilities Menu copies the log files to a USB storage device.

6.0 Operating Instructions

This section provides the information to operate the MDR Publisher once the unpacking, cabling, and initialization process has been completed.

6.1 Power On

This section describes the process of applying power to the MDR Publisher. The Sever and Disk Write/Print Modules have individual power On/Off switches located in the back of the modules. The Disk Write/Print Module and the Server Module perform their own, individual, boot up processes in preparation for operation. The modules should be powered on in the documented sequence, the Disk Write/Print Module first, then the Server Module.

NOTE: If the Disk Write/Print Module and Server Module are plugged into a power strip that is used to turn the modules On and Off, they can be powered up simultaneously after the initialization process.

6.1.1 Disk Write/Print Module Power On

To power on the Disk Write/Print Module, perform the following steps:

1. Put the power switch, located on the back of the module, in the “On” position.
2. The Disk Write/Print Module lights blink rapidly, the ink carrier and robot arm move slightly to the home position (all the way to the left side), the print tray opens and closes.
3. This process takes approximately 20 seconds, then both the lights should both be on, steady.

This indicates the Disk Write/Print Module is powered up and ready. If the ink cartridge and power on LEDs are in any other state, refer to Appendix B, Section B.6, for LED descriptions.

6.1.2 Server Module Power On

The Sever Module should only be powered on after the Disk Write/Print Module has completed its power on sequence.

1. Put the power switch, located at the back of the module, in the “On” position.

NOTE: This also applies power to the User Interface Module.

2. The Server Module power LED turns green and the User Interface displays the MDR logo. The Server Module is going through its own boot up process which takes approximately 40 to 60 seconds.
3. Once the Server Module has recognized the Disk Write/Print Module and checked the input bins and burners for disks, it displays the “Robot Ready” screen and is ready for operation.

6.2 Power Off

There is no required power off sequence for the MDR Publisher. If the Disk Write/Print Module is turned off and the Server Module is left on, the User Interface displays the “Media burning disabled. There is no media available. Please insert media.” message. If the “OK” soft key is pressed with the Disk Write/Print Module still off, the “Robot Not Present” screen is displayed.

6.3 MDR Publisher Mode Selection

Data transfer to the MDR Publisher can be initiated by the DICOM modalities on the hospital network, or initiated by the operator. The MDR Publisher can be configured to automatically write all received exam data to a CD/DVD (in Auto or Auto Single Patient modes) or hold the exam data on the Server Module internal hard drive (in Manual or Single Patient modes), so the operator can choose which exams are written to the CD/DVD. Changing modes is done through the Main Setup Screen. Refer to “Main Setup Screen” on page 11 for instructions.

The MDR Publisher has four operational modes:

1. Auto Single Pt (default mode)
2. Auto (archive)
3. Manual
4. Single Patient

The optimal performance mode for the MDR Publisher is “Auto Single Pt”, the default mode.

6.3.1 Auto Single Pt (Patient) Mode Operation

In Auto Single Patient mode the MDR Publisher holds all exam data on the internal hard drive. Once the exam transfer is complete (selectable by “End File Received”, or “End Association”), the images are written to the CD/DVD, the label is printed, and the disk is ejected. Each disk contains the exam data for one patient only. The Auto Single Pt mode is the default mode for the MDR Publisher.

6.3.2 Auto Mode Operation

The Auto mode writes patient exam data to the CD/DVD disk as it is received from the DICOM modality on the host network. Exam data is written to the disk until the disk is full. The disk label is written and then the disk is moved to the output bin. The MDR Publisher then re-loads the burner and continues to write exam data as it is received.

Since more patients may be written to a CD/DVD than can be listed on the label, the printed label (Multiple Patient) contains the first six names and the last name written, with fill periods between the sixth and the last name, to indicate a range of names. To look at the patient names written to a CD/DVD that are not listed on the label, the operator must use a Viewer and make a note of all recorded patient names.

6.3.3 Manual Mode Operation

In Manual mode the MDR Publisher holds all exam data on the internal hard drive. Exam selection may be performed from the Queued Patients or Exam Manager soft keys. The exam is selected from a list. Then the “Send to Disk” (for Queued Patients or Exam Mgr) soft key is pressed. Next, select “Finish” to write the exam to disk and print the label, or select “More” to add additional exams to the disk. Once an exam is selected and the “Send to Disk” soft key is pressed, the exam cannot be taken off the print queue. If the exams selected are not wanted or were selected by mistake, the disk is written, labeled and can then be discarded or archived. The desired or correct exams must be selected and the process repeated.

Note: Once you have selected the exams to be written to disk, you can also press the “Exit” soft key two times, then the “Eject” button to start the writing and labeling process. The “Eject” button does not work for exams being written to a USB device.

6.3.4 Single Patient Mode Operation

In Single Patient Mode (which is a manual mode) the MDR Publisher holds all exam data on the Server Module’s internal hard drive. Once an exam is selected by the operator, via the Queued Patients function, only exams with the same patient ID are allowed on the CD/DVD.

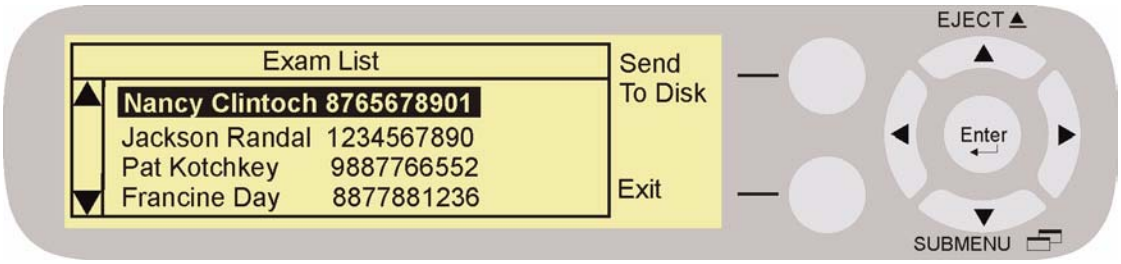
When the MDR Publisher is used in single patient mode, be sure the Disk Write/Print Module has disks inserted prior to selecting the exam ID to be written to the disk. Refer to Section 5.0 MDR Publisher Configuration to enable this feature.

NOTE: In single patient mode operation, once an exam ID is selected, the queued patients list only displays exams with that ID.

Once an exam is selected and the “Send to Disk” soft key is pressed, the exam cannot be taken off the print queue. If the exams selected are not wanted or were selected by mistake, the disk is written and labeled, and can then be discarded or archived. The desired or correct exams must be selected and the process repeated.

6.4 Exam Mgr (Manager)

To view a list of previously recorded patients or exams press the “Exam Mgr” soft key. The exams are listed by patient name and ID with the most recently received exam on the top of the list.



The display can also show if an exam has been selected to be written to disk. Use the “Up” or “Down” arrow to scroll through additional patient exams that have been sent to the MDR Publisher. If there is an * (asterisk) by the exam, it indicates that the exam is queued for writing to disk.

NOTE: Exams sent to the MDR Publisher must contain a Patient Name and ID number to be viewed properly with the DICOM Viewer.

To view the exam details press the “Enter” button. The exam’s ID, date, time and exam description are displayed.

To delete this exam from the Exam Mgr list, press the “Down” arrow from the exam details screen. The MDR Publisher displays a delete exam confirmation screen, after pressing the “Yes” soft key the exam is deleted. If the exam has previously been recorded to disk the following message is displayed:

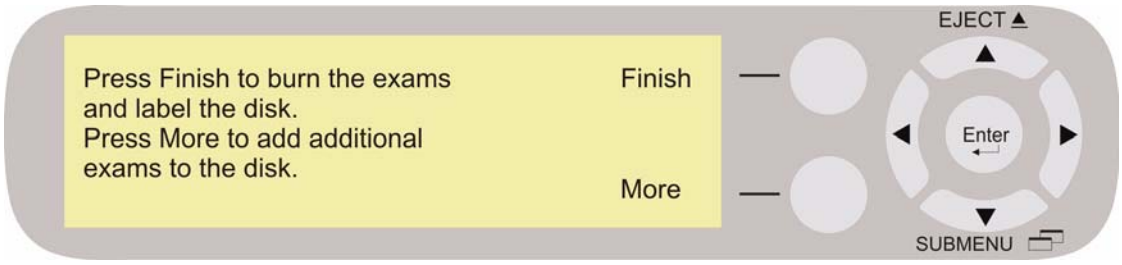
“This exam could not be deleted. It is being referenced by a disk in disk manager.”

To delete an exam that has been written to disk, see the Disk Manager section in the MDR Utilities Menu.

Once an exam is selected and the “Send to Disk” soft key is pressed, the exam cannot be taken off the print queue. If the exams selected are not wanted or were selected by mistake, the disk is written and labeled, and can then be discarded or archived. The desired or correct exams must be selected and the process repeated.

To write the exam to CD/DVD (Disk):

1. Highlight the desired exam using the Up arrow or Down arrow.
2. Press the “Send To Disk” soft key.
3. The “Finish” or “More” screen is displayed.



4. Press the “Finish” soft key to write the exam to disk, print the disk label, and return to the “Robot Ready” screen.
5. The “More” soft key is used to write additional exams to the disk.
6. Once all exams are selected, press the “Finish” soft key to write the exams to disk and return to the “Robot Ready” screen.

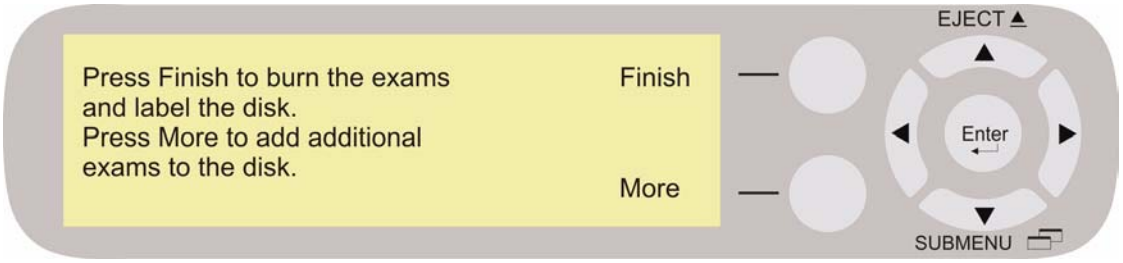
To write the exam to a USB device:

1. Plug the USB device into an available USB port on the front or back of the MDR Server.
2. The User Interface display shows “Drive XYZ has been found. Would you like to set this as the default drive?” Press the “Yes” soft key. (or change the default disk (in the MDR Utilities menu) to the USB device.)

   NOTE: The XYZ represents a system name. Each device has it’s own system name.
3. The display shows the “Disk Inserted USB Removable” screen (instead of the “Robot Ready” screen).
4. Press the “Exam Mgr” soft key.
5. Highlight the desired exam using the “Up” arrow or “Down” arrow.

   NOTE: Be aware of the memory capacity of the USB device inserted. Multiple exams can have large files associated with them. Be sure the capacity of the USB device is not less than the sum of all the file sizes.
6. Press the “Send To Disk” soft key.

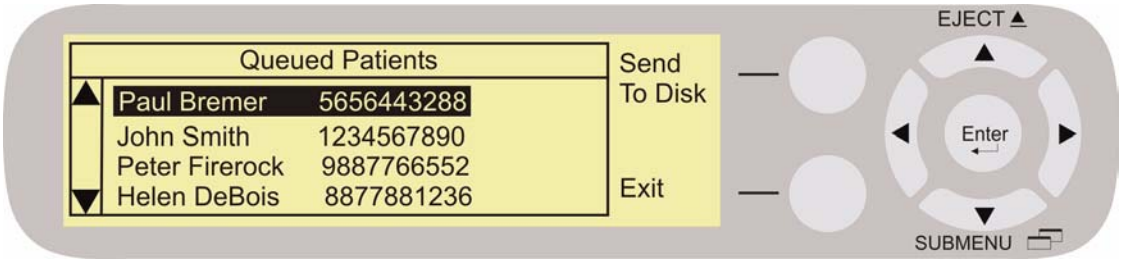
7. The “Finish” or “More” screen is displayed.



8. Press the “Finish” soft key to write the exam to the USB device and return to the “Disk Inserted” screen.
9. The “More” soft key is used to write additional exams to the USB device.
10. Once all exams are selected, press the “Finish” soft key to write the exams to the USB device and return to the “Disk Inserted” screen.
11. If the USB device is removed the display shows “The default drive was removed. Would you like to change the default drive to be the Disk Publisher XRP?”
12. If another USB device is plugged in, press the “No” soft key and continue.
13. If the “Yes” soft key is pressed the Server Module default is automatically set to Disk Write/Print Module, (Disk Publisher XRP).

6.5 Queued Patients

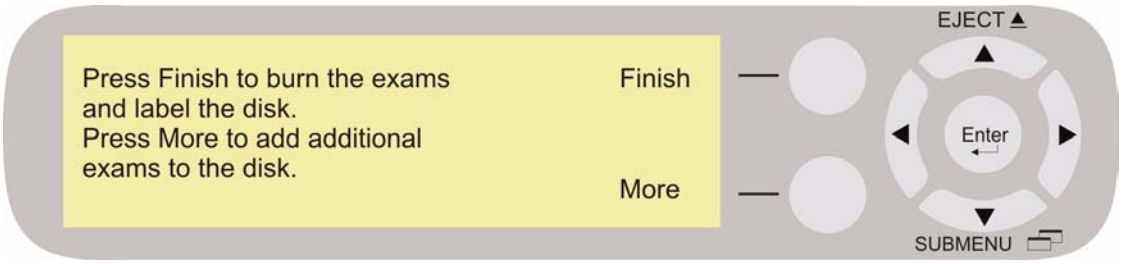
To view a list of the current (not yet sent to disk) patients press the “Queued Patients” soft key. The patient names are listed along with their ID number. Once a patients information is written to a disk, the patient name and exam information is removed from the Queued Patients list. The patients exam data may still be seen with the Exam Mgr (manager) function, or the Disk Mgr (manager) selection in the MDR Utilities menu.



To view the details of a patient, press the up arrow or down arrow buttons to highlight the name, then press the “Enter” button.

To write a Patients data to CD/DVD:

1. Highlight the desired patient using the Up arrow or Down arrow.
2. Press the “Send To Disk” soft key.
3. The “Finish” or “More” screen is displayed.



4. Press the “Finish” soft key to write the patient data to disk, print the disk label, and return to the “Robot Ready” screen.
5. The “More” soft key is used to write additional patients to the disk.
6. Once all patients are selected, press the “Finish” soft key to write the exams to disk and return to the “Robot Ready” screen.

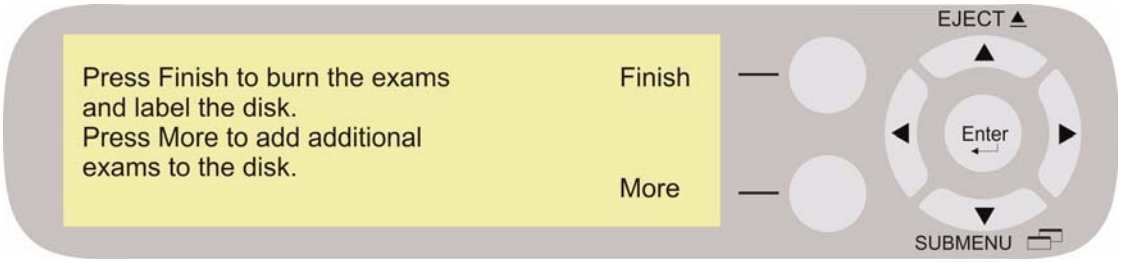
NOTE: The patient name written to the disk or USB, is now removed from the Queued Patients list.

To write a Patient to a USB device:

1. Plug the USB device into an available USB port on the front or back of the MDR Server.
2. The User Interface display shows “Drive XYZ has been found. Would you like to set this as the default drive?” Press the “Yes” soft key. (or change the default disk (in the MDR Utilities menu) to the USB device.)

   NOTE: The XYZ represents a system name. Each device has it’s own system name.
3. The display shows the “Disk Inserted USB Removable” screen (instead of the “Robot Ready” screen).
4. Press the “Queued Patients” soft key.
5. Highlight the desired patient using the “Up” arrow or “Down” arrow.

   NOTE: Be aware of the memory capacity of the USB device inserted. Multiple patients can have large files associated with them. Be sure the capacity of the USB device is not less than the sum of all the file sizes.
6. Press the “Send To Disk” soft key.
7. The “Finish” or “More” screen is displayed.



8. Press the “Finish” soft key to write the patient data to the USB device and return to the “Disk Inserted” screen.
9. The “More” soft key is used to write additional patients to the USB device.
10. Once all patients are selected, press the “Finish” soft key to write the exams to the USB device and return to the “Disk Inserted” screen.
11. If the USB device is removed the display shows “The default drive was removed. Would you like to change the default drive to be the Disk Publisher XRP?”
12. If another USB device is plugged in, press the “No” soft key and continue.
13. If the “Yes” soft key is pressed the Server Module default is automatically set to Disk Write/Print Module (the display shows Disk Publisher XRP).

6.6 Custom Logo

For information regarding custom logo (viewer splash screen), refer to “Custom Logo” on page 10. For instructions on loading a custom logo (viewer splash screen) JPG file, refer to “Main Setup Screen” on page 11, the “Config” then “Viewer” selection.

6.7 Custom CD/DVD Labels

For information regarding custom disk labels, refer to “Disk Label” on page 10. For instructions on loading custom disk label designs JPG files, refer to Section 5.3.2 Disk, in the MDR Utilities Menu.

6.8 Adding Media

When the User Interface displays a message stating that “media needs to be added”, “input bins are empty”, or the input bins are deemed empty by visual inspection, perform the following procedure:

1. Be sure the User Interface display shows the “Robot Ready” screen and there is no activity on the burner progress bars. This means there are no processes being run.
2. Unlock and open the Disk Write/Print Module access door. The robot arm and ink carrier move to the center of the module.

CAUTION: DO NOT reach inside the module when the robot arm and ink carrier are in motion.

3. Place up to 50 disks (CD/DVD) into each input bin. If there is an open burner tray, DO NOT place a disk in the open tray.

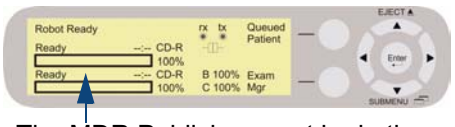
CAUTION: Be aware that there may be a clear plastic, or other type of protective cover on the top or bottom of new CD/DVD packages. This protective disk must be removed and discarded prior to loading disks into the Disk Write/Print Module.

4. Close and lock the access door.
5. The robot arm moves to each input bin checking for disks, then loads the empty burners. The robot arm re-checks the input bins once the burners are loaded. This process takes a few minutes, please be patient.
6. The “Robot Ready” screen should be displayed, indicating the MDR Publisher is ready for operation.

6.9 Main Setup Screen Example

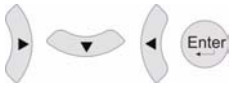
This example shows step by step instructions for accessing and changing the IP address of the MDR Publisher. Other MDR Publisher system setup changes are made in a similar manner. Refer to the Main Setup Screen Diagram, on page 12, for the remaining selection types.

Step 1



The MDR Publisher must be in the “Robot Ready” screen.

Step 2



Press the Right arrow, Down arrow, Left arrow and Enter buttons. (One at a time, in the stated order, count 1 through 4 as you press)

Step 3

Use the Left or Right arrow to highlight “Network”, press the Enter button.

Step 4

Use the Left or Right arrows to highlight “Network”, press the Enter button.

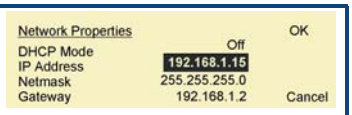
Step 5

The default is “DHCP Mode Off”. To turn DHCP On, press the Enter button.

Step 6

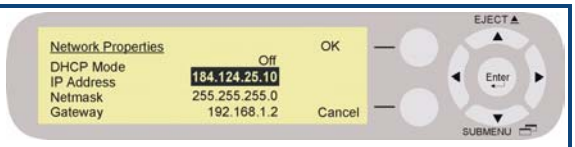
Press the Down arrow to highlight the IP address. Press the Enter button to allow editing the IP address.

Step 7



Use the Left or Right arrows to place the cursor below the number to be edited. Use the Up or Down arrows to change the value of the number. Press the Enter button when the changes have been made.

Step 8



Use the Up or Down arrows to select other Network Properties to edit. Press the OK soft key to exit and save changes, or the Cancel key to exit without saving changes.

Appendix A. Specifications

Appendix A provides the specifications for the modules that make up the MDR Publisher.

A.1 Server Module Specifications

DICOM Storage Classes	-	Secondary Capture, Multi-frame Grayscale Byte Secondary Capture, Multi-frame True Color Secondary Capture, Ultrasound, Ultrasound Multi-frame, Ultrasound (Retired), Ultrasound Multi-frame (Retired), Computed Radiography, Nuclear Medicine (Retired), X-Ray Angiography and X-Ray Radiofluoroscopy, Mammography Presentation, Mammography Processing.
Network	-	Ethernet IEEE 802.3 10/100/1000 BASE-T.
Supported media	-	CD-R, CD-RW, DVD±R, DVD±RW (DVD ± support is hardware dependent).
Storage Capacity	-	DVD+R 4.7 GB
	-	CD-R 700 MB
	-	Hard Drive 80 GB or Greater
Connectors	-	Network: 8 pin modular jack (RJ45).
	-	Serial Communication: DB9, Male pins.
	-	Remote: DB9, Female pins (User Interface connection).
	-	Keyboard: PS2, Female pins.
	-	Mouse: PS2, Female pins.
	-	Monitor: DB15 High Density Female pins.
	-	Universal Serial Bus (USB) interface (one on front, four on the back).
Power Input	-	100 – 240 VAC~, 15A, +/-10%, 47-63 Hz, 126 VAC. (automatic voltage select)
Dimensions	-	Height: 14.3 cm, (5.63 inches).
		Width: 43.18 cm, (17.0 inches).
		Depth: 54.61 cm, (21.5 inches).
Weight	-	9.1 kg, (20 pounds, see note at end of Server Module specifications).
Environmental	-	**Operating:**
		Temperature: +10º C to +40º C (+50º F to +104º F).
		Barometric pressure: 700 hPa to 1060 hPa
		Relative Humidity: 5% to 80% non-condensing.
	-	**Transportation and Storage:**
		Temperature: -10º C to +50º C (+14º F to +122º F).
		Barometric pressure: 500 hPa to 1060 hPa
		Relative Humidity: 5% to 85% non-condensing.
		Degree of protection against ingress of water (IPXO).
Clearance Requirements	-	AT least 3 inches on all sides and rear panel cable connection.
	-	Do not obstruct ventilation air flow at sides and rear of module.
	-	Do not remove Server Module feet, air flow exits from below the enclosure.
IEC 601 Classification	-	Class I, continuous operation.
		Complies with IEC 60601-1 with Amendments 1 & 2, C22.2 No 601.1-M90 and UL Std. No 2601-1.

NOTE: The combined weight of the MDR Publisher (the Server Module, Disk Write/Print Module and the User Interface Module) is 28.58 kg (63 lb).

A.2 Disk Write/Print Module Specifications

Printing Method	-	Ink-Jet
Printing Resolution	-	4800 x 1200 dpi, 2400 x 1200 dpi, 1200 x 1200 dpi, 600 x 600 dpi
Ink Types (Dual Cartridges)	-	One 3-color cartridge (CMY) One Black Monochrome cartridge (K)
Maximum print width	-	120 mm (4.724 in)
Interface	-	USB 2.0 port
Power Requirement	-	100-120 VAC, or (The input voltage is selected by a switch at the back of the module.) 220-240 VAC 50/60Hz, 1.0A
Dimensions:	-	Height: 27.40 cm (10.8 in) Width: 43.18 cm (17 in) Depth: 42.40 cm (16.7 in)
Weight	-	19.5 kg (43 lb, see the note that comes before these specifications.)
EMC Certifications	-	FCC Class B, CE
Safety	-	UL, UL-C, CE, RoHs

Appendix B. Service and Troubleshooting

Other than cleaning the Server Module fan filter, adding CD/DVDs, and changing the ink cartridges, the MDR Publisher contains no user serviceable components.

B.1 Server Module Fan Filter

The fan filter should be checked and or cleaned on a periodic basis. See Figure 12 for the location of the fan filter. To clean the filter, unsnap the filter retainer from the fan body.

CAUTION: The Sever Module should be OFF before accessing the fan filter, or replacing the fan filter. DO NOT power On the Server Module without the fan filter installed.

Clean the filter element using a vacuum cleaner or air blower and replace it. Secure the filter by snapping the filter retainer onto the fan body. There are no other accessible components on the Server Module.

Figure 12 Server Module Fan Filter

B.2 MDR Publisher Return Information

For any problem, other than the Sever Module fan filter or customer serviceable items for the Disk Write/Print Module, a module has to be returned to NAI Tech Products to be serviced by NAI trained personnel. The module being returned should be repacked in the shipping container it was received in (saved during the unpacking process). If the original packing material is unavailable, the module should be repackaged by experienced electronics movers. This should reduce the risk of damage during the return process.

To return a module to NAI Tech Products, call Customer Service at (530) 887-1008 and request a Return Material Authorization (RMA) number.

NOTE: Any equipment returned to NAI without an RMA number will not be accepted.

Return the MDR Publisher Module to:

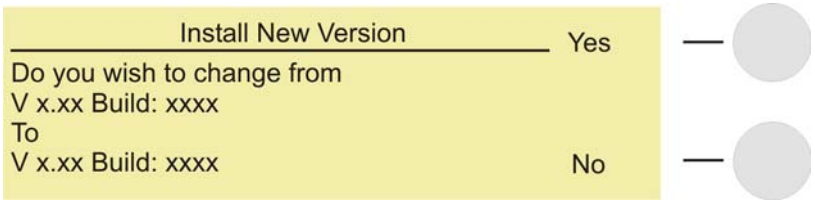
NAI Tech Products
12919 Earhart Ave.
Auburn Ca. 95602.

NOTE: NAI Tech Products is not responsible for any damage or loss of items returned to NAI Tech Products.

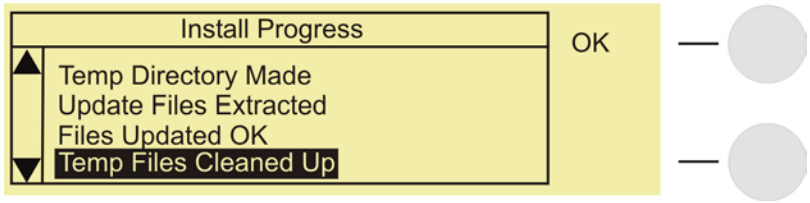
B.3 Software Upgrade

Software upgrade is accomplished via a USB storage device. To upgrade the MDR software, follow the steps outlined below.

1. Insert the USB device into the USB port on the Server Module. The display shows the, “Drive XYZ has been found. Would you like to set this as the default drive?”, message. **Do not** respond, just wait a few seconds.
2. The following message is automatically displayed:



3. Press the “Yes” soft key to continue the software upgrade. The “Install Progress” status message box displays the progress of the upgrade.
4. When the upgrade is complete, the “OK” soft key is displayed. When this occurs, press the “OK” soft key.



5. When the display indicates the MDR Publisher is ready to reboot, remove the USB device containing the software upgrade, then press the “OK” soft key to reboot the MDR Publisher.
6. The display shows the “Please wait Rebooting” message. This process takes approximately 60 seconds, then the “Robot Ready” screen should be displayed. The MDR Publisher is ready for operation.

B.4 Power On Situations

When the Server Module recognizes the Disk Write/Print Module and performs the input bins and disk checks, it responds in accordance with disks being absent.

Situation One: - Input bins empty, both burners with disks inserted.

The MDR Publisher powers up normally with no message stating that the input bins are empty. Once a disk is written and ejected, the display shows the following message:

Disc Publisher XRP
The input bin is empty. Open the cover, add more disks, and close the cover to continue.

NOTE: The empty burner tray remains open. DO NOT place a disk in the open burner tray.

Add media disks to the input bins (refer to “Adding Media” on page 24).

CAUTION: Be aware that there may be a clear plastic, or other type of protective cover on the top or bottom of new CD/DVD packages. This protective disk must be removed and discarded prior to loading disks into the Disk Write/Print Module.

When the access door (cover) is closed and locked, the robot arm picks a disk and places it in the open burner tray. The MDR Publisher checks both input bins for disks. The robot arm then moves to its home position (to the left side of the module). Press the “OK” soft key on the User Interface Module. The “Robot Ready” screen should display. The MDR Publisher is ready for operation.

Situation Two: - Input bins empty, burners empty.

The MDR Publisher powers up, then displays the message shown in Situation One.

NOTE: An empty burner tray remains open. DO NOT place a disk in any open burner tray.

Add media disks to the input bins (refer to “Adding Media” on page 24).

CAUTION: Be aware that there may be a clear plastic, or other type of protective cover on the top or bottom of new CD/DVD packages. This protective disk must be removed and discarded prior to loading disks into the Disk Write/Print Module.

When the access door (cover) is closed and locked, the robot arm picks a disk and places it in the open burner tray. The MDR Publisher checks both input bins for disks and places a disk in the other empty burner.

This process takes a few seconds, so be patient. Also, if one of the input bins is empty, and the other bin contains disks, there is no indicator for that. The input bins must be check visually.

B.5 Optical Disk Care

Optical disks, CD or DVD, may need cleaning if you experience difficulty opening the images or files that they contain. Disk cleaners can be obtained from most office or computer supply outlets. When storing a disk, follow the disk manufacturer's recommendations for environmental and handling precautions.

MDR Performance: CD vs. DVD

	CD-R	CD-RW	DVD+R	DVD+RW
Write Speed	Up to 16x or 2.4 Mbytes/sec	Up to 10x or 1.5 Mbytes/sec	2.4x or 3.32 Mbytes/sec 4x or 5.53 Mbytes/sec	2.4x or 3.32 Mbytes/sec
Disk Storage Capacity	700 Mb	700 Mb	4.7 Gb	4.7 Gb
Re-Writable	Write-Once	Yes	Write-Once	Yes

B.6 Disk Write/Print Module LEDs

The Disk Write/Print Ink Cartridge and Power LED patterns are defined in Table 1.

Table 1: Disk Write/Print Module LED Definitions

Ink Cartridge LED	Power LED	Description
Off	On solid	Access door is open
On solid	On solid	The module is ready to receive data.
Both LEDs are slowly blinking in an alternating pattern.		Waiting for an ink cartridge to be installed and the access door to be closed.
Both LEDs are rapidly blinking in an alternating pattern.		The Disk Write/Print Module is initializing. This pattern is also displayed when the module is first turned on. Wait until the LEDs stop blinking before starting a job.
Blinking rapidly	On solid	The printer tray or ink carrier has stalled. Press the ink button to retry the operation.
Blinking slowly	On solid	The module requires media or multiple disks have been picked. Add media or clear the error. Press the ink button to continue.
Repeating pattern on both LEDs, blinking in unison, then one LED momentarily on solid.		This is a low ink warning. If the left LED stays on solid after the flash, the color ink is low. If the right LED stays on after the flash, the black ink should be replaced.

B.7 Disk Write/Print Module Service and Troubleshooting

The Disk Write/Print Module is designed to operate for extended periods of time with very little attention. There is no regular maintenance recommended other than cleaning the outside case.

NOTE: DO NOT attempt to lubricate the Disk Write/Print Modules Robot Arm shaft or other components. All moving parts are designed to operate for the life of the module with no additional lubrication required.

B.7.1 Cleaning the Disk Write/Print Module

Use a clean, lint-free cloth with a small amount of window cleaner to clean the modules outside case and bins. This type of cleaner is very effective on inks that may accumulate on the printer tray. Stronger cleaning solutions are NOT recommended because they may damage the print and plastic materials. Always disconnect the Disk Write/Print Modules power cord before cleaning. Resume operation only after the cleaned surfaces are completely dry.

B.7.2 Cleaning the Ink Cartridge

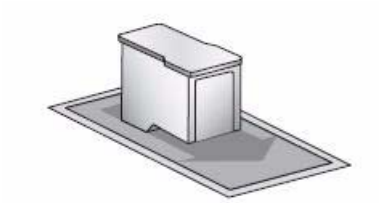
It may be necessary to clean the ink cartridge nozzles, if there is a noticeable reduction in print quality, or an ink cartridge nozzle has become slightly dried out or clogged. The suspect ink cartridge nozzles can be cleaned by performing the following steps:

1. Open the Access door. The robot arm and carrier move to the center of the Disk Write/Print Module.
2. Press the ink cartridge button (refer to Figure 14).
3. The robot arm moves to the right side of the module and the ink carrier moves to the left side of the module.
4. Remove the ink cartridge by pulling down on the blue tab (the cartridge carrier top springs open). Pull the ink cartridge out, (refer to Figure 4).

NOTE: Do not touch the “Copper” area of the ink cartridge.

5. Moisten a lint-free cloth with water.
6. Hold the cartridge nozzles against the cloth for approximately three seconds. This draws some ink from the cartridge into the damp cloth.
7. Gently slide the cartridge in the direction shown in Figure 13.

Figure 13 Ink Cartridge Cleaning



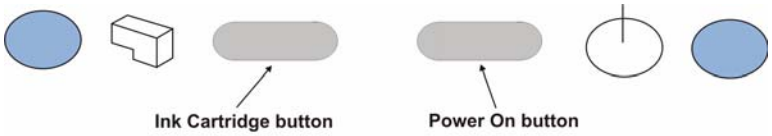
8. Repeat steps 6 and 7 a few times.
9. Replace the ink cartridge (copper end first). Push the cartridge cover down until it snaps closed.
10. Press the ink cartridge button. The robot arm and ink carrier should re-join.
11. Close and lock the access door.
12. The Disk Write/Print Module should perform a head alignment procedure. Check that the print quality issue is resolved. If the cleaning process does not resolve the issue, replace the suspect cartridge.

B.7.3 Replacing an Ink Cartridge

Be sure there is no activity on the burner progress bars. To replace an Ink Cartridge, perform the following steps:

1. Open the Access door. The robot arm and carrier move to the center of the Disk Write/Print Module.
2. Press the ink cartridge button (refer to Figure 14).

Figure 14 Disk Write/Print Module Buttons



3. The robot arm moves to the right side of the module and the ink carrier moves to the left side of the module.
4. Remove the old ink cartridge by pulling down on the blue tab (the cartridge carrier top springs open). Pull the old ink cartridge out, (refer to Figure 4).
5. Remove the new ink cartridge from its packaging.
6. Carefully remove the tape covering the ink cartridge print head.

NOTE: Do not touch the “Copper” area of the ink cartridge.

7. Place the new ink cartridge into the ink carrier (copper end first).

CAUTION: Be sure the color cartridge is on the right and the black cartridge is on the left, or the MDR Publisher will not print.

8. Push the cartridge cover down, over the ink cartridge, until it snaps closed.
9. Press the Ink Cartridge button. The Robot arm and ink carrier should re-join.
10. Close and lock the Access Door.

The Server Module performs a disk check routine and print head alignment process (refer to “Server Module Procedures” on page 7, step 6 for information).

B.7.4 Clearing a Print Area Media Jam

Before performing the following procedures, be sure there is no disk being burned. Check the burner progress bars on the user interface display for activity.

CAUTION: If the modules are powered off during the burning of a disk, the disk is not usable and has to be discarded. The data (patient exam information) has to be re-burned once the media jam is cleared.

1. Turn both the Server Module and the Disk Write/Print Module “Off” and then back “On”.
2. Check to see that the print area media jam is cleared by the disk being placed in the output bin.
3. If the action taken in Step 1 does not resolve the jam, contact NAI Tech Products Customer service at (530) 887-1008, for resolution.

B.7.5 Transporting The Disk Write/Print Module

To prevent damage to the modules robot arm and ink cartridge carrier during transport, it is important to properly secure both the robot arm and ink cartridge carrier inside the module with the original cardboard spacer.

CAUTION: The access door is open for this procedure, DO NOT reach into the Disk Write/Print Module while any internal parts are in motion.

To prepare for transport, perform the following steps:

1. Open the Access Door.
2. Press the ink cartridge button (refer to Figure 14). The robot arm moves to the right side of the module and the ink carrier moves to the left side of the module.
3. Remove the ink cartridges, media, and input bins. Also check for media in the burners.
4. Put the power switch in the “Off” position.
5. Press and hold the ink cartridge button.
6. While continuing to hold the ink cartridge button, put the power switch in the “On” position.
7. Continue to hold the ink cartridge button until the robot arm and ink carrier un-dock and park themselves into their respective transport positions (and the interior lights go off).
8. Once the robot arm and ink carrier are in transport position, put the power switch in the “Off” position and release the ink cartridge button.
9. Unplug the power cord and USB 2.0 cable from the back of the module.
10. Insert the cardboard spacer (removed during unpacking) between the robot arm and ink cartridge carrier.

NOTE: If you don't have the cardboard spacer, secure the robot arm and ink carrier to the sides of the unit with tape.

11. Close and lock the Access Door.
12. Remove the key(s) from the Access Door.

NOTE: It is recommended that the keys be put in a plastic bag and taped to the outside of the Disk Write/Print Module.

13. Repack the module with the plastic bag, packing foam, and packing box (saved from the unpacking procedures) it was received in. If the original packing materials are unavailable, the module should be packaged by an experienced electronics mover to avoid possible damage during transport.

NOTE: NAI Tech Products assumes no responsibility for damage incurred during repacking and transport of the equipment.

B.8 MDR Publisher Frequently Asked Questions (FAQ’s)

Q: **What is the difference between CD-R and CD-RW?**

A: CD-R = CD-Recordable. This disk is known as a “write-once” type of disk. In other words, once data has been written to the disk it can not be erased again. Once data is written to the disk it can be read back in a standard CD/DVD drive.

CD-RW = CD-Re-writable. A re-writable disk is one where data, once written to the disk, can be erased and the disk written to multiple times. There are two types of CD-RW available, 2x-4x CD-RW and High Speed 4x-10x CD-RW.

Q: **How many images can be written to a CD-R?**

A: The number of images that can be written to a CD-R is dependent on the image size and whether the images are monochrome (Grayscale) or color (RGB). A typical monochrome ultrasound image of 640 by 476 corresponds to a file size of approximately 305 kB. If it is a color image, the file size would be approximately 915 kB.

If you use a 700 MB CD-R, the number of color images would be approximately 710. If all the images were Gray scale, the CD-R would contain over 2000 images. The Viewer that can be added to the CD-R has a file size of approximately 19 MB, or about the same file size as 20 color images or 60 monochrome images.

Q: **Why is there a delay, after pressing the eject button, before the tray opens?**

A: The length of time for the tray to open is dependent on the MDR Publisher configuration. This time can also be the time it takes to write the remaining images and to write the Viewer software onto the disk. If you use a PC or workstation that already has a DICOM image viewing application, set the add Viewer option to off.

CD’s are written in a different manner than DVD’s, therefore the last few images in an exam are written to the CD after the eject button is pressed.

Q: **What are the COM 1, VGA, keyboard, and mouse ports used for?**

A: All these ports are for possible future use.

Q: **What ports are open?**

A: The Remote Desktop port is open.

Q: **Is there supplemental documentation for these applications/connections?**

A: Everything currently used for proper functionality is in this manual.

Q: **How do you transfer the images on media to PACS?**

A: This would be a function of the PACS software to import the images. The media produced by the MDR Publisher is in standard DICOM Part 10 format. The viewer installed on the disk can export as JPG's etc., but if you want to bring it into the hospital network, then you have to import onto the PACS.

Q: **What is the OS? And how are OS patches loaded?**

A: The Operating System (OS) is an embedded version of Windows XP (aka XPE). NAI Tech Products does not currently update the MDR Publisher OS in the field. The MDR Publisher runs a very small subset of the functionality of regular Windows and most updates that occur for desktop Windows XP are to do with the parts not installed or used (web browser fixes, media player updates, etc.). If a newer version or patch is ever needed it would be done via disk with auto load/install or remote desktop. However, after a number of years this has never been needed.