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Revision History

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Rev.** |  | **Date** |  | **Initials** | **Description** |
| 0.1 |  | 090312 |  | DAT | Initial draft based upon 15000292 Rev 1.6 |
| 0.2 |  | 090409 |  | DAT | Updated section 2.1 for EIP to use SAM-ICE and J-Link Arm, expanded test setup section, replaced occurrences of PASS with an underline to indicate where a result is to be filled in, removed serial numbers of devices previously used in section 2.2 |
| 0.3 |  | 090707 |  | DAT | Updated after dry run on D2 EIP |
| 0.4 |  | 091001 |  | DAT | Updated based on comments of test execution Aug 24-31 2009 |
| A |  | 10-Sep-2016 |  | DAT | Initial Release |
| A.1 |  | 15-May-2019 |  | DAT | Undated for INTELLIO Link, removed CONDOR and Intellijet |
| A.2 |  | 23-Jul-2019 |  | DAT | Added Reliant MDU and Serial Number Testing |
| B |  | 25-Sep-2019 |  | DAT | Updated to Revision B |
| C |  | 07-Jan-2021 |  | DAT | Reduce supported Footswitches to DYONICS POWER II Footswitch 72201092 and Pedal Style 7205396  Reduce supported Power Instrument handpiece support to Pistol Grip Drill 7205785 and Inline Sagittal Saw 7205786  Remove UltraLight 7205971 |

Glossary

SC – System Controller

MC – Motor Controller

GUI – Graphical User Interface

DLL – Dynamic Link Library

MDU – Motor Drive Unit

MCU – Micro Control Unit

Handpiece – MDU, Saw or Drill

References

15000695 – DYONICS II EIP System Controller Software Requirements Specification

15000696 – DYONICS II EIP System Controller Software Design Specification

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System Controller Software Design Verification

# Overview

The purpose of this document is to:

* + Show the traceability of the verification procedures against the System Controller Software Requirements Specification and the System Controller Software Design Specification
  + Provide a summary of the Verification procedures
  + Provide a summary of the Verification results
  + Provide a link to more detailed internal engineering verification reports when required

Verification is defined as the process by which the design output meets the design input requirements. The results of the design verification, including identification of the design, method(s), the date, and the individual(s) performing the verification, shall be documented in the DHF. Design verification shall be traceable to product specifications.

The verification is traceable to the following functional requirement and specification documents:

DYONICS II EIP System Controller Software Requirement Specification - Document # 15000695

DYONICS II EIP System Controller Software Design Specification - Document # 15000696

# System Controller Verification

The verification of requirements for the System Controller is divided into two major sections, the System Interfaces and the Controlling Application.

## System Interfaces Verification

System Interfaces Unit Testing was performed with following software and hardware:

* DYONICS POWER II EIP Control System – REF 72200873 modified for debugging purposes, per 11500060
* USB Key programmed with the DYONICS II EIP Control System software version under test
* USB Key programmed with an alternate version of the DYONICS II EIP Control System
* Wireless Loopback Test Fixture – REF 20600619
* Pump Loopback Test Fixture – REF 91000270
* CONDOR Loopback Test Fixture – REF 91000269
* USB Factory Mode Key
* An x86 computer that has a free USB port and can run the following software and hardware. (PC)
  + - SEGGER J-Flash ARM V4.02 software
    - ATMEL SAM-ICE JTAG device with USB interface and cable
    - AT91SAM9263.jflash project file for the SAM-ICE.
    - License from www.segger.com for using J-Flash ARM software with the SAM-ICE
    - Platform Builder for Microsoft Windows CE 5.0 software
    - Microsoft embedded Visual C++ 4.0 software

**Test Preparation:**

* Connect the USB cable between the Atmel SAM-ICE and the PC.
* Turn off the DYONICS POWER II (DII) and install the USB key with the software to be tested into one of the USB ports in the back of the DYONICS POWER II.
* Turn on the DYONICS POWER II.
* After the Software Upgrade screen appears on the DYONICS POWER II press the Start button at the bottom of the screen.
* Allow the software upgrade to run to completion.
* When prompted; remove the USB key from the back of the unit.
* Cycle power to the DYONICS POWER II.
* After the system powers up press the Settings button at the bottom of the screen, then in the Settings display press the button for System Information.
* Press the System Reset button and then press the Yes button on the System Reset display.
* Record the information below:

DYONICS POWER II EIP Control System software under test:

Software Version

Application Version

Motor Controller Version

* Power off the DYONICS Power II system.
* Remove the jumper from J10 on the DYONICS Power II processor board.
* Connect the SAM-ICE 20 pin JTAG cable to J13 on the DYONICS Power II processor board.
* Turn on the DYONICS Power II.
* On the PC startup the SEGGER J-Flash ARM program (Start-Programs-SEGGER-J-Link Arm V4.2-J-Flash ARM
* Open the AT91SAM9263.jflash project file (File-Open Project)
* In the Menu Select View-Log and View-Project.
* Close all other windows within the J-Flash ARM program.
* In the Project –AT91SAM9263 window confirm the following:

RAM address 0x300000

RAM size 96KB

Flash memory S29GL128P

Base address 0x10000000

Organization 16 bits x 1 chip

* Select Options-Project Settings
* In the Project settings menu select the Flash Tab.
* Select the Individual sectors option and press the All button. Selected ranges: reports 128 Sectors, 1 Range: 0x0000-0xFFFFFF
* Press the Apply button and then the OK button.
* From the Main Menu select Target-Read back-Entire chip.
* After reading is complete a message box will appear reporting “Target memory read successfully, (16777216 bytes, 1 range)”. Select OK.
* Select File-Save As… In the Save data file as menu set the Save as type: to Binary File (\*.bin). Set the file name to DII\_EIP.bin.
* The Enter address range dialog box reports Start Address 10000000 End Address 10FFFFFF. Select the OK button.

| **Section Number** | **Verification Procedure Summary** | **Summary Results**  **(may include links to other verification reports)** | **Pass/Fail** | **Initial/ Date** |
| --- | --- | --- | --- | --- |
| 2.1.1 a | Verify that there is a Boot FLASH located at location 0x10000000.  Verify that there is a copy of the Image FLASH located at location 0x10880000.  Verify that the SC will boot if the Upper Image FLASH is erased, but the Lower Image FLASH is valid.  Observe that there is a copy of the Image FLASH located at location 0x10100000.  Verify that the SC will boot if the Lower Image FLASH is erased, but the Upper Image FLASH is valid.  Observe that the upper and lower flash regions are identical.  Observe that the Buzzer sounds when both the Lower and Upper Image FLASH are erased. | Complete the Test Preparation section above.  In the window displaying the DII\_EIP.bin file set bytes 0x10000000 to 0x1000000F to “FF”. Press the F7 button on the PC keyboard to program the DII with the update. After programming is complete Turn off power to the DII system. Unplug the SAM-ICE JTAG connector from the DII and replace the J10 Jumper. Power on the DII. Verify that the DII fails to startup.  Close the file window and reopen the DII\_EIP.bin file. When the Enter start address dialog box appears set the Start address is 10000000 and press the OK button. Turn off power to the DII. Connect the SAM-ICE JTAG connector to J13 on the Controller Board. Remove Jumper J10 from the Controller Board. Turn on the DII. In the J-Flash Arm program on the PC press the F7 key to reload the software.  Turn off the DII system. Unplug the SAM-ICE JTAG connector from the DII and replace the J10 Jumper. Power on the DII. Verify that the DII starts up successfully.  Turn off power to the DII. Connect the SAM-ICE JTAG connector to J13 on the Controller Board. Remove Jumper J10 from the Controller Board. Turn on the DII. In the J-Flash Arm program on the PC select Options-Project Settings. In the Project Settings menu select the Flash tab. Select Start/End sector. Set the Start Addr to Sector [68]: 0x880000 and the End Addr to Sector [127]: 0xFFFFFF. Press the OK button to accept the changes and exit the menu. Press the F3 button to erase the specified sectors. The Image FLASH at location 0x10880000 is erased.  In the J-Flash Arm program on the PC select Options-Project Settings. In the Project Settings menu select the Flash tab. Select Start/End sector. Set the Start Addr to Sector [0]: 0x0 and the End Addr to Sector [127]: 0xFFFFFF. Press the OK button. Press the F8 button to compare the DII Flash to the DII\_EIP.bin file. Verify the comparison fails at address 0x10880000.  Turn off the DII system. Unplug the SAM-ICE JTAG connector from the DII and replace the J10 Jumper. Power on the DII. Verify that the DII reports Upper flash data is corrupt. Repairing….  After the system reports Repair Complete. Turn off power to the DII. Connect the SAM-ICE JTAG connector to J13 on the Controller Board. Remove Jumper J10 from the Controller Board. Turn on the DII. In the J-Flash Arm program on the PC press the F8 button to compare the image against the DII\_EIP.bin file. The software will report All loaded bytes verified OK!  Comparing the flash Image FLASH shows against the DII\_EIP.bin shows the software fully restored the Image.  Turn off power to the DII. Connect the SAM-ICE JTAG connector to J13 on the Controller Board. Remove Jumper J10 from the Controller Board. Turn on the DII. In the J-Flash Arm program on the PC select Options-Project Settings. In the Project Settings menu select the Flash tab. Select Start/End sector. Set the Start Addr to Sector [8]: 0x100000 and the End Addr to Sector[67]: 0x87FFFF. Press the F3 button to erase the specified sectors. The Image FLASH at location 0x10100000 is erased.  In the J-Flash Arm program on the PC select Options-Project Settings. In the Project Settings menu select the Flash tab. Select Start/End sector. Set the Start Addr to Sector [0]: 0x0 and the End Addr to Sector [127]: 0xFFFFFF. Press the OK button. Press the F8 button to compare the DII Flash to the DII\_EIP.bin file. The comparison fails at address 0x10100000.  Turn off the DII system. Unplug the SAM-ICE JTAG connector from the DII and replace the J10 Jumper. Power on the DII. Verify that the DII reports Lower flash data is corrupt. Repairing….  After the system reports Repair Complete, turn off power to the DII. Connect the SAM-ICE JTAG connector to J13 on the Controller Board. Remove Jumper J10 from the Controller Board. Turn on the DII. In the J-Flash Arm program on the PC press the F8 button to compare the image against the DII\_EIP.bin file. The software will report All loaded bytes verified OK! Comparing the flash Image FLASH shows against the DII\_EIP.bin shows the software fully restored the Image.  In the J-Flash ARM application select Target-Read Back-Range. Set the program to read back the Upper Flash region by setting the Start address to 10880000 and the End address to 10FFFFFF. Press the OK button. After the read of the Upper Flash a dialog box will appear and report Target memory read successfully. Press the OK button. Select File-Save As. In the Save data file as dialog box set the Save as type: to Binary file (\*.bin). Set the File name: to Upper.bin. Press the Save button. The Enter address range dialog box appears. Set the S Start address to 10880000 and the End address to 10FFFFFF. Press the OK button.  Close all windows except the Project and Log windows. Select File-Open. In the Open data file dialog set the File name: to Upper.bin. Press the Open button. In the Enter start address set the Start address to 10100000. Press OK. Press the F6 key on the keyboard. The PC will display a message box asking Do you want to erase the affected area before program?. Press the Yes button to program upper.bin into the lower flash region. The software log file reports –Erasing sector 8, 9…. The software stop erasing before sector 68. Software reports Target programmed and verified successfully.  Press the OK button. Close the Upper.bin window.  Select File-Open... In the Open data file window set the File name to DII\_EIP.bin. Press the Open button. In the Enter start address set the Start address to 10000000. Press the OK button. Press the F8 button to verify that the DII\_EIP.bin file is the same as the image stored in flash. The software reports All loaded bytes verified OK!  Demonstrating that DII\_EIP.bin file is the same as the image stored in flash and that the upper and lower images flash images are identical.  In the J-Flash Arm program on the PC select Options-Project Settings. In the Project Settings menu select the Flash tab. Select Start/End sector. Set the Start Addr to Sector [8]: 0x100000 and the End Addr to Sector [127]: 0xFFFFFF. Press the F3 button to erase the specified sectors. The Image FLASH at location 0x10100000 and The Image FLASH at location 0x10880000 are erased.  In the J-Flash Arm program on the PC select Options-Project Settings. In the Project Settings menu select the Flash tab. Select Start/End sector. Set the Start Addr to Sector [0]: 0x0 and the End Addr to Sector [127]: 0xFFFFFF. Press the OK button. Press the F8 button to compare the DII Flash to the DII\_EIP.bin file. The comparison fails at address 0x10100000.  Turn off the DII system. Unplug the SAM-ICE JTAG connector from the DII and replace the J10 Jumper. Power on the DII. Verify that the System recognizes that both the lower and upper flash images are invalid by turning on the buzzer and reporting A problem has occurred with the system. Please return the unit for repair.  Turn off power to the DII. Connect the SAM-ICE JTAG connector to J13 on the Controller Board. Remove Jumper J10 from the Controller Board. Turn on the DII. In the J-Flash Arm program on the PC press the F7 button to reload DII\_EIP.bin into the DII. Software will report Target erase, programmed and verified successfully.  Turn off power to the DII. Disconnect the SAM-ICE JTAG connector from J13 on the Controller Board. Replace Jumper 10 on the Controller Board. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.1.1 b | Observe that Splash Screen gets displayed during boot process and shows the Smith & Nephew Logo, Product Name and Software Version.  Observe that the Controlling Application is started after the displaying the Splash Screen. | Powering on the system shows a Splash Screen with the Smith & Nephew Logo, Product Name (DYONICS Power II Control System) and Software Version.  The Controlling Application is started after displaying the Splash Screen. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.1.2 a | Observe that the Adeneo Embedded AT91SAM9263 USB device driver is present in the SC Windows CE Image.  Observe that the Software Upgrade will copy the lower SC Image FLASH to the upper SC Image FLASH when the upper Image FLASH fails CRC.  Observe that the Software Upgrade will copy the upper SC Image FLASH to the lower SC Image FLASH when the lower Image FLASH fails CRC.  Observe that if both the upper and the lower Image FLASH fail the CRC the Software Upgrade will report an error and stop.  Verify that the Software Upgrade will scan for the upgrade file on a SanDisk USB thumb drive inserted in to the external USB port for 4 seconds.  Observe the Software Upgrade process will recognize an upgrade file on an external USB port and display the current version and proposed upgrade version of the software and prompt the user to Start or Cancel the upgrade.  Observe that if Cancel is pressed the upgrade will not take place.  Observe that if Start is selected the Software Upgrade will copy the SC Image into both the upper and lower FLASH locations. | Using Platform Builder and opening up Basic.pbxml in the Shaver directory. Clicking on the OSDesignView Tab under Basic Catalog items the item AT91SAM9263EK appears. Select AT91SAM9263EK and then View-Properties shows the Vendor as “ADENEO” and description “A BSP for the AT91SAM9263EK board from Atmel.”. Under Basic Catalog items\AT91SAM9263EK\Device Drivers\USB Hoster the item “USB Host” appears. Select USB Host and then View-Properties shows the description “USB Host Driver”.  Tested in Section 2.1.1 a  Tested in Section 2.1.1 a  Tested in Section 2.1.1 a  Power cycling the system and waiting for the Splash Screen to change to the Controlling Application screen and immediately inserting a USB upgrade key into one of the external USB connectors shows that the Software Upgrade screen will come up.  Power cycling the system and waiting till 5 seconds after the Splash Screen to changes to the Controlling Application screen and then inserting a USB upgrade key into one of the external USB connectors has no effect.  Inserting the USB upgrade key into one of the external USB connectors and power cycling the system displays the current version and proposed upgrade version of the software and prompts for the user to Start or Cancel the upgrade.  Pressing the Cancel button prompts the user that the upgrade failed and to remove the USB key from the USB drive. The application will come up after power cycling the unit.  Insert the USB upgrade key into one of the external USB connectors and power cycling the system brings up the Software Upgrade screen. Perform the software upgrade. Remove the USB key from the external USB connector when the software upgrade is finished.  Power cycle the DII and Verify that the updated software version.  Press the Settings button to enter the Settings Menu. Press the System Information button. Verify that the Software Version and Application Version have changed.  Insert a USB upgrade key with the software under test into one of the external USB connectors and power cycling the system brings up the Software Upgrade screen. Perform the software upgrade. Removed the USB key from the external USB connector when the software upgrade is finished. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.1.2 b | Observe that if the SC is powered down during the upgrading of the lower SC Flash Image, that when the SC is powered back up the SC boots and the upper SC Image Flash is copied to the lower SC Image Flash.  Observe that if the SC is powered down during the upgrading of the upper SC Flash Image, that when the SC is powered back up the SC boots and the lower SC Image Flash is copied to the upper SC Image Flash. | Insert the USB upgrade key with an alternate version into one of the external USB connectors and power cycling the system brings up the Software Upgrade screen. Press the Start button and wait for the status to display Writing Lower Flash Data… power off the system. Remove the USB drive. Powering on the system showed the Flash Data Repair screen followed by the Repair Complete message. Power cycling the system shows that the Splash Screen reporting software version under test before booting into the Controlling Application.  Turn off the DII. Connect the SAM-ICE JTAG connector to J13 on the Controller Board. Remove Jumper J10 from the Controller Board. Turn on the DII. In the J-Flash Arm program on the PC press the F8 button to compare the image against the DII\_EIP.bin file. The software will report All loaded bytes verified OK! Comparing the flash Image FLASH shows against the DII\_EIP.bin shows the software fully restored the Image.  Turn off the DII system. Unplug the SAM-ICE JTAG connector from the DII and replace the J10 Jumper. Insert the USB upgrade key with the alternate version still into the DII, power on the DII. The system brings up the Software Upgrade screen. Press the Start button. Allow the software upgrade to complete and then turn off the DII. Remove the USB key.  Insert the USB upgrade key with the software version under test into one of the external USB connectors. Power on the DII. The system brings up the Software Upgrade screen. Press the Start button and wait for the status to display Writing Upper Flash Data… Power off the system. Powering on the system showed the Flash Data Repair screen followed by the Repair Complete message.  Turn off the DII. Connect the SAM-ICE JTAG connector to J13 on the Controller Board. Remove Jumper J10 from the Controller Board. Turn on the DII. In the J-Flash Arm program on the PC press the F8 button to compare the image against the DII\_EIP.bin file. The software will report All loaded bytes verified OK! Comparing the flash Image FLASH shows against the DII\_EIP.bin shows the software fully restored the Image. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.1.3 a | Observe that the Adeneo Embedded AT91SAM9263 serial driver is present in the SC Windows CE Image.  Verify that the SC provides a serial port interface for INTELLIO Link communication. | Using Platform Builder and opening up Basic.pbxml in the Shaver directory. Click on the OSDesignView Tab. Under Basic Catalog items\AT91SAM9263EK\Device Drivers\Serial Driver the item “Serial Driver (USART0)” appears. Select Serial Driver (USART0) and then View-Properties shows the Vendor as “ADENEO” and description “Serial driver”.  Insert the CONDOR, Pump, and Wireless loopback connectors in the back of the DYONICS II system.  Insert a USB Factory Test key into one of the external USB connectors and cycle power to the system to bring up the Factory Test screen. Press the System Test button to show the Serial Ports Test screen.  Pressing the OK button shows that all Serial Port Tests passed.  Remove the CONDOR loopback connector from the back of the DYONICS II system. After repeating the above sequence pressing the OK button shows that the INTELLIO Link Port Test fails.  Insert the CONDOR loopback connector in the back of the DYONICS II system. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.1.3 b | Verify that the SC provides a serial port interface for Pump/Shaver communication. | Remove the Pump loopback connector from the back of the DYONICS II system.  After repeating the above sequence pressing the OK button shows that the Pump Port Test fails.  Insert the Pump loopback connector in the back of the DYONICS II system. | \_\_\_\_\_ |  |
| 2.1.3 c | Verify that the SC provides a serial port interface for future communication. | Remove the Wireless loopback connector  After repeating the above sequence pressing the OK button shows that the Wireless Serial Port Test fails.  Remove all Loopback connectors and the USB Factory Key from the DYONICS II system. | \_\_\_\_\_ |  |
| 2.1.4 | Observe that the Adeneo Embedded AT91SAM9263 display driver present in the SC Windows CE Image.  Verify that the SC provides an 800x480 pixel color graphics display and allows use of Windows CE graphic functions for use by the Controlling Application. | Using Platform Builder and opening up Basic.pbxml in the Shaver directory. Clicki on the OSDesignView Tab. Under Basic Catalog items\AT91SAM9263EK\Device Drivers\Display the item “LCDC” appears. Selecting LCDC and then View-Properties shows the Vendor as “ADENEO” and description “Built-in Graphic Controller”.  Selecting the FileView tab and opening the Projects\SNE\_Driver\driver\SneDriver.c and looking at the SetLCDCRegistery() function shows that the Display is set to ptHantronixDisplay. Examining the ptHantronixDisplay definition shows that the display width is configured to 800 and the display height is configured to 480. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.1.5 | Observe that the Adeneo Embedded AT91SAM9263 touch screen driver is present in the SC Windows CE Image.  Verify that the SC provides the frame work with positional data for the Controlling Application button control. | Using Platform Builder and opening up Basic.pbxml in the Shaver directory. Click on the OSDesignView Tab. Under Basic Catalog items\AT91SAM9263EK\Device Drivers the item “TouchScreen” appears. Selecting TouchScreen and then View-Properties shows the Vendor as “ADENEO” and description “Implementation touchscreen ADS7843”.  Power cycling the DYONICS II system and pressing the Settings button shows the Controlling Application is responding to the touch panel data. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.1.6 | Observe that the Smith & Nephew driver is present in the SC Windows CE Image.  Verify that the Smith & Nephew driver provides an parallel communication interface to the Controlling Application which allows read and write variable length word functions to communicate with the Motor Controller. | Using Platform Builder and opening up Basic.pbxml in the Shaver directory. Clicking on the FileView Tab shows SneDriver (the Smith & Nephew device driver) under Projects.  Opening up the source file SneDriver.c shows that the SNE\_IOControl command IOCTL\_SND\_CMD uses the SndCmd. Opening the source file Msg.c shows the SndCmd uses the PIO interface.  Using embedded Visual C++ 4.0 and opening up Shaver.vcw in the Shaver directory, opening up the source file Driver.cpp and looking at the InitDriver(), ReadWordFromDevice(), WriteWordToDevice(), ReadWordsFromDevice() and WriteWordsToDevice() functions and shows that the software is using the Smith & Nephew driver to communicate to the Motor Controller. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.1.7 | Observe that the Smith & Nephew driver is present in the SC Windows CE Image.  Observe that the Smith & Nephew driver provides the Controlling Application function calls to read and write the battery backed up non-volatile RAM storage.  Observer that the Smith & Nephew driver provides the Controlling Application function calls to read, and write and erase the on board System Controller on board non-volatile FLASH storage. | Using Platform Builder and opening up Basic.pbxml in the Shaver directory. Clicking on the FileView Tab shows SNE\_Driver (the Smith & Nephew device driver) under Projects.  Opening up the source file Driver.cpp and looking at the ReadNVRam() and WriteNVRam() functions shows that the Smith & Nephew driver provides the Controlling Application.  Opening up the source file Driver.cpp and looking at the ReadFlashStore(), WriteFlashStore() and EraseFlashStore() functions shows that the Smith & Nephew driver provides the Controlling Application and Software Upgrade Interface read, write and erase functions for the on board System Controller non-volatile FLASH storage. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.1.7 a | Observe that the System Controller uses the interface to the battery backed up non-volatile RAM storage for the Setting Screens. | Opening up the source file Control.cpp and looking at RecallNvRamData() and SaveNvRamData() function show that the System Controller uses the interface to the battery backed up non-volatile RAM storage for the Setting Screens. | \_\_\_\_\_ |  |
| 2.1.7 b | Observe that System Controller uses the non-volatile interface to FLASH storage for the Boot Interface | Testing covered in .Section Number 2.1.1 | \_\_\_\_\_ |  |
| 2.1.7 c | Observe that the Smith & Nephew driver provides the Controlling Application function calls to set the on board System Controller non-volatile FLASH storage. | Opening the source file Software\WINCE500\ShaverProjects.vcw in an editor, and confirming that SoftwareUpgrade.vcp file is included in the project confirms that Software Upgrade is included in non-volatile FLASH storage. | \_\_\_\_\_ |  |
| 2.1.7 d | Observe that the System Controller uses the non-volatile interface to FLASH storage for the storage of Blade Recall Mode data. | Opening the source file Control.cpp and reviewing RecallFlashData() and FlashToDevice() use the Driver.cpp the ReadFlashStore() and WriteFlashStore() functions for storage of Blade Recall Mode Data in non-volatile FLASH storage. | \_\_\_\_\_ |  |
| 2.1.7 e | Observe that the System Controller uses the non-volatile interface to FLASH storage for the storage of the Serial Number. | Opening the source file Control.cpp and reviewing RestoreShaverSerialNumber(),SaveShaverSerialNumber() and EraseShaverSerialNumber() use the Driver.cpp the ReadFlashStore() and WriteFlashStore() functions for storage of Serial Number of the DYONICS POWER II in non-volatile FLASH storage. | \_\_\_\_\_ |  |
| 2.1.7 f | Observe that System Controller uses the non-volatile interface to FLASH storage for recording the number of times the DYONICS POWER II has been powered on and a handpiece activated. | Opening the source file Control.cpp and reviewing UpdateUsageCnt() uses the Driver.cpp the ReadFlashStore() and EraseFlashStore() functions for storage for recording the number of times the DYONICS POWER II has been powered on and a handpiece activated. | \_\_\_\_\_ |  |

## Controlling Application Verification

Controlling Application Unit Testing was performed with following equipment:

|  |  |  |
| --- | --- | --- |
| Device | REF/Part Number | Serial Number |
| DYONICS 25 Fluid Management System | 7211010 |  |
| DYONICS II Footswitch | 72201092 |  |
| DYONICS Mini-Motor MDU | 7205357 |  |
| DYONICS PowerMax Elite MDU | 7200616 |  |
| DYONICS Power Reliant MDU |  |  |
| DYONICS PowerMini MDU | 7221500 |  |
| DYONICS PowerMini MDU No Hand Controls | 7221503 |  |
| Reliant MDU /MDU Tester |  |  |
| Inline Sagittal Saw | 7205786 |  |
| Pistol Grip Drill | 7205785 |  |
| Power Cable (2) | 7205788 |  |
| Wireless Loopback Test Fixture | 20600619 |  |
| Pump Loopback Test Fixture | 91000270 |  |
| CONDOR Loopback Test Fixture | 91000269 |  |
| Handpiece / Footswitch Test Fixture | 20600579 |  |
| Footswitch Harness Assembly | 90500865 |  |
| Pedal Style Footswitch | 7205396 |  |
| DYONICS POWER II Footswitch | 72201092 |  |

All references to Footswitch or footswitch refer to the DYONICS II Footswitch. The Pedal Style Footswitch is only used by the Board and System Tests when prompted for by the software.

| **Section Number** | **Verification Procedure Summary** | **Summary Results** | **Pass/Fail** | **Initials/Date** |
| --- | --- | --- | --- | --- |
| 2.2 | Observe that the application contains a GUI, Control and String Resource module. | Using break points and stepping through the Controlling application I observed that the GUI module handled the graphical displays, the Control module initialized, controlled and monitored status of the Motor Controller and all strings displayed on the screen were retrieved from resource DLL’s. | \_\_\_\_\_ |  |
| 2.2.1 a | Observe that a Impeller Icon is displayed above Port A when a DYONICS 25 Fluid Management System is connected and the Pump Interface is mapped to Port A via the Settings menus.  Observe that the Impeller icon above Port A goes away when the connection is terminated.  Observe that the Impeller icon above Port A turns blue and animates when a DYONICS 25 Fluid Management System is connected and the pump is activated.  Observe that the Impeller icon above Port A turns gray when the pump is de-activated  Observe that an Impeller Icon is displayed above Port B when a DYONICS 25 Fluid Management System is connected and the Pump Interface is mapped to Port B via the Settings menus.  Observe that the Impeller icon above Port B goes away when the connection is terminated.  Observe that the Impeller icon above Port B turns blue and animates when a DYONICS 25 Fluid Management System is connected and the pump is activated.  Observe that the Pump icon turns gray when the pump is de-activated | Mapped the pump interface to Port A via the Pump Interface Setting screen. Connected and powered on a DYONICS 25 Fluid Management System a and observed that the Impeller icon appeared above Port A  Removed cable and observed that in both cases the impeller icon goes away when the pump connection is terminated.  Turned the DYONICS 25 Fluid Management pump on and observed that the impeller icon above Port A turned blue and animated.  Turned the DYONICS 25 Fluid Management pump off and observed that the impeller icon above Port A turned gray.  Mapped the pump interface to Port B via the Pump Interface Setting screen. Connected and powered on a DYONICS 25 Fluid Management System and observed that the Impeller icon appeared above Port B  Removed cable and observed that in both cases the impeller icon goes away when the pump connection is terminated.  Turned the DYONICS 25 Fluid Management pump on and observed that the impeller icon above Port B turned blue and animated.  Turned the DYONICS 25 Fluid Management pump off and observed that the impeller icon above Port B turned gray. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.1 b | Observe that a INTELLIO Link icon is displayed in the upper right hand side of the screen when a INTELLIO Link Host connection is detected.  Observe that the INTELLIO Link icon is removed from the screen when the INTELLIO Link Host connection is terminated. | Connected the DYONICS II unit to a PC and ran the application d2bdmand observed that the INTELLIO Link icon was displayed on the DYONICS II unit in the upper right hand side of the screen.  Terminated the d2bdm application and observed that the INTELLIO Link icon was removed from the DYONICS II screen. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.1 c | Observe that a Footswitch Icon is displayed above Port A when a footswitch is connected and mapped to Port A via the Settings menus.  Observe that the Footswitch icon above Port A goes away when the connection is terminated.  Observe that a Footswitch Icon is displayed above Port B when a footswitch is connected and mapped to Port B via the Settings menus.  Observe that the Footswitch icon above Port B goes away when the connection is terminated. | Mapped the footswitch to Port A via the Footswitch Setting screen. Connected a Footswitch and observed that the footswitch icon appeared above Port A.  Removed the Footswitch and observed that the Footswitch icon goes away above Port A when the connection is terminated.  Mapped the footswitch to Port B via the Footswitch Setting screen. Connected a Footswitch and observed that the footswitch icon appeared above Port B.  Removed the Footswitch and observed that the Footswitch icon goes away above Port B when the connection is terminated. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.1 d | Observe that an MDU Icon is displayed above Port A when an MDU is connected to Port A.  Observe that the MDU icon above Port A goes away when the connection is terminated.  Observe that an MDU Icon is displayed above Port B when an MDU is connected to Port B  Observe that the MDU icon above Port B goes away when the connection is terminated. | Connected an MDU to the Port A connector and observed that the MDU icon appeared above Port A.  Removed the MDU from the Port A connector and observed that the MDU icon goes away when the connection is terminated.  Connected an MDU to the Port B connector and observed that the MDU icon appeared above Port B.  Removed the MDU from the Port B connector and observed that the MDU icon goes away when the connection is terminated. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.1 e | Observe that a Saw Icon is displayed above Port A when a Saw is connected to Port A.  Observe that the Saw icon above Port A goes away when the connection is terminated.  Observe that a Saw Icon is displayed above Port B when a Saw is connected to Port B.  Observe that the Saw icon above Port B goes away when the connection is terminated. | Connected a Saw to the Port A connector and observed that the Saw icon appeared above Port A.  Removed the Saw from the Port A connector and observed that the Saw icon goes away when the connection is terminated.  Connected a Saw to the Port B connector and observed that the Saw icon appeared above Port B.  Removed the Saw from the Port B connector and observed that the Saw icon goes away when the connection is terminated. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.1 f | Observe that a Drill Icon is displayed above Port A when a Drill is connected to Port A.  Observe that the Drill icon above Port A goes away when the connection is terminated.  Observe that a Drill Icon is displayed above Port B when a Drill is connected to Port B.  Observe that the Drill icon above Port B goes away when the connection is terminated. | Connected a Drill to the Port A connector and observed that the Drill icon appeared above Port A.  Removed the Drill from the Port A connector and observed that the Drill icon goes away when the connection is terminated.  Connected a Drill to the Port B connector and observed that the Drill icon appeared above Port B.  Removed the Drill from the Port B connector and observed that the Drill icon goes away when the connection is terminated. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.2 | Observe that an INTELLIO Link host can request packet information and initiate commands correctly while connected to a DYONICS II unit. | Connected the DYONICS II unit to an INTELLIO Link and ran the application runbdm. Observed that the requested packet information by the Host PC was correct and the commands initiated by the Host PC worked properly on the DYONICS II unit. | \_\_\_\_\_ |  |
| 2.2.3 | Observe that a DYONICS II unit connected to a DYONICS 25 Fluid Management System transmits the correct packet information when the initial connection is made and when a change in state occurs. | Connected a DYONICS 25 Fluid Management System to a DYONICS II unit. Connected a Reliant MDU to Port A, mapped the Pump Interface to Port A and inserted a curved blade (3K). Turned on the DYONICS 25 Fluid Management System and verified that the blade family in the Set Suction screen corresponded with the blade inserted in the MDU.  Changed the blade to a Burr (8K) and verified again that the blade family in the Set Suction screen corresponded with the High Speed blade inserted in the MDU. In the Set Suction screen the Shaver On was set to 100% and Shaver Off was set to 50%. Turned on and off the MDU and observed that the pinch valve moved in and out on the pump system.  Changed the blade to a High Speed Burr (10K) and verified again that the blade family in the Set Suction screen corresponded with the High Speed blade inserted in the MDU. In the Set Suction screen the Shaver On was set to 100% and Shaver Off was set to 50%. Turned on and off the MDU and observed that the pinch valve moved in and out on the pump system. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
|  | Observe that a DYONICS II unit connected to a DYONICS 25 Fluid Management System transmits a Lavage Start or Stop command in the event that the Lavage Button on a footswitch that supports this is pressed. | Tested in Section 2.2.4.4 b | \_\_\_\_\_ |  |
| 2.2.4 a | Refer to section 2.2.4.1 and 2.2.4.2 for handpiece required data and widgets.  Observe that a handpiece of any type connected to Port A has its required data and widgets displayed on the left hand side of the screen.  Observe that the required data and widgets displayed on the left hand side of the screen are removed when the connection is terminated.  Observe that a handpiece of any type connected to Port B has its required data and widgets displayed on the right hand side of the screen.  Observe that the required data and widgets displayed on the right hand side of the screen are removed when the connection is terminated.  Observe that the left and right hand side of the screen have the required widgets displayed if no handpieces are connected to either Port. | Connected an MDU to the Port A connector and observed that the required data and widgets were displayed on the left hand side of the screen.  Removed the MDU from the Port A connector and observed that the required data and widgets were removed from the left hand side of the screen when the connection was terminated.  Connected an MDU to the Port B connector and observed that the required data and widgets were displayed on the right hand side of the screen.  Removed the MDU from the Port B connector and observed that the required data and widgets were removed from the right hand side of the screen when the connection was terminated.  Observed that the left and right hand side of the screen has the required widgets displayed when no handpieces are connected to the Port A and Port B connectors. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4 b | Refer to section 2.2.4, 2.2.4.1 and 2.2.4.2 for handpiece required data and widgets.  Observe that a handpiece of any type connected to Port A and Port B has its required data and widgets displayed on the screen simultaneously.  Observe that a handpiece connected to Port A and Port B can be controlled simultaneously by activating the handpiece | Connected an MDU to the Port A connector and a Drill to the Port B connector and observed that both ports had its required data and widgets simultaneously.  Activated the MDU connected to the Port A connector and the Drill connected to the Port B connector. Observed that both handpieces were capable of being controlled simultaneously.  Connected a Saw to the Port A connector and a MDU to the Port B connector and observed that both ports had its required data and widgets simultaneously.  Activated the Saw connected to the Port A connector and the MDU connected to the Port B connector. Observed that both handpieces were capable of being controlled simultaneously. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4 c | Observe that the required “No Handpiece Detected” widget appears in Port A and Port B when no handpieces are connected. | Disconnected all handpieces from the DII and powered on the DII unit. Observed that the required widget appeared for Port A and Port B. Connected a handpiece to Port A and then to Port B. Observed that when the handpiece was removed the required widget appeared. | \_\_\_\_\_ |  |
| 2.2.4.1 | Observe that the required data and widgets are displayed when an MDU is connected to Port A and Port B.  Observe that when an MDU is plugged into Port A the direction indicators, Set Speed, blue outline around the Set Speed box, unit of measure, maximum range, decrement adjustment button and an increment adjustment △ Mode, and Window Lock buttons appear on the left side of the display.  Observe that when an MDU is plugged into Port B the direction indicators, Set Speed, yellow outline around the Set Speed box, unit of measure, maximum range, decrement adjustment button and an increment adjustment △ Mode, and Window Lock buttons appear on the right side of the display. | Connected an MDU to the Port A connector and an MDU to the Port B connector and observed that the required data and widgets shown in section 2.2.4.1 was displayed for both ports.  Connected a PowerMax Elite MDU to Port A and observed that the direction indicators, Set Speed, blue outline around the Set Speed Box, unit of measure, maximum range, decrement and increment adjustment, △ Mode, and Window Lock buttons all appeared on the left hand side of the screen.  Connected a PowerMax Elite MDU to Port B and observed that the direction indicators, Set Speed, yellow outline around the Set Speed Box, unit of measure, maximum range, decrement and increment adjustment, △ Mode, and Window Lock buttons all appeared on the right hand side of the screen. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 a | Observe that direction indicators are sufficiently large to stand out against the rest of the display.  Observe that the Forward, Reverse, Oscillate, and Window Lock direction indicators are displayed correctly when the Forward, Reverse, Oscillate, and Window Lock modes of operation are selected for Port A and Port B while the MDU is activated and deactivated. | When a Reliant MDU was connected to Port A and run in the forward, reverse, oscillate and window-lock modes the direction indicators were sufficiently large to stand out against the rest of the display.  When a Reliant MDU was connected to Port B and run in the forward, reverse, oscillate and window-lock modes the direction indicators were sufficiently large to stand out against the rest of the display.  Connected a Reliant MDU to Port A.  With the MDU connected to Port A, the forward mode of operation was selected and it was observed that the forward direction indicators were displayed in green on the left hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the forward direction indicators were displayed in white.  With the MDU connected to Port A, the reverse mode of operation was selected and it was observed that the reverse direction indicators were displayed in green on the left hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the reverse direction indicators were displayed in white.  With the MDU connected to Port A, the oscillate mode of operation was selected and it was observed that the oscillate direction indicators were displayed in green on the left hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the oscillate direction indicators were displayed in white.  With the MDU connected to Port A, the Window Lock mode of operation was selected and it was observed that the Window Lock direction indicators were displayed in green on the left hand side of the screen. Upon the release of the hand control button the MDU the MDU was deactivated and the oscillate direction indicators were displayed in white.  Connected a Reliant MDU to Port B.  With the MDU connected to Port B, the forward mode of operation was selected and it was observed that the forward direction indicators were displayed in green on the right hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the forward direction indicators were displayed in white.  With the MDU connected to Port B, the reverse mode of operation was selected and it was observed that the reverse direction indicators were displayed in green on the right hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the reverse direction indicators were displayed in white.  With the MDU connected to Port B, the oscillate mode of operation was selected and it was observed that the oscillate direction indicators were displayed in green on the right hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the oscillate direction indicators were displayed in white.  With the MDU connected to Port B, the Window Lock mode of operation was selected and it was observed that the Window Lock direction indicators were displayed in green on the right hand side of the screen. Upon the release of the hand control button the MDU the MDU was deactivated and the oscillate direction indicators were displayed in white. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
|  | Observe that some of the direction indicators turn white while the MDU is running and the actual speed drops below the Set Speed for Port A and Port B. | Connected a Reliant MDU to Port A and DYONICS POWER II Footswitch to the DII. Set the Footswitch to Variable and Port A. Verified that as the Forward Pedal was slowly depressed and released, observed that some of the direction indicators remained white until the Pedal was fully depressed.  Connected a Reliant MDU to Port B and DYONICS POWER II Footswitch to the DII. Set the Footswitch to Variable and Port B. Verified that as the Forward Pedal was slowly depressed and released, observed that some of the direction indicators remained white until the Pedal was fully depressed. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 b | Observe that when an MDU is initially connected the Set Speed is displayed in large font, in RPMs for Port A and Port B.  Observe that the correct Set Speed is displayed for Reverse, Forward, Oscillate Mode1 and Oscillate Mode 2 when required for Port A and Port B. | Connected an MDU to Port A and Port B it was observed that the Set Speed is initially displayed in large font, and in RPMs for Port A and Port B.  Connected an MDU to Port A and Port B and observed that the Set Speed displayed for Reverse, Forward and Oscillate Mode 1 was displayed as RPM values and the Set Speed displayed for Oscillate Mode 2 was displayed as RATE values for Port A and Port B. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 c | Observe that when an MDU is connected and the current mode of operation is Forward or Reverse the Maximum Set Speed is displayed in small font for Port A and Port B.  Observe that when an MDU is connected and the current mode of operation is Oscillate Mode 1 the text RPM is displayed in small font for Port A and Port B.  Observe that when and MDU is connected and the current mode of operation is Oscillate Mode 2 text, RATE is displayed in small font for Port A and Port B. | With an MDU connected to Port A and Port B it was observed that the Maximum Set Speed for that particular MDU, referred to RANGE TABLE, for Forward and Reverse modes was displayed in small font for Port A and Port B.  With an MDU connected to Port A and Port B it was observed that the text “RPM” was displayed in small font, when the current mode of operation was Oscillate Mode 1, for Port A and Port B.  With an MDU connected to Port A and Port B it was observed the text “RATE” was displayed in small font, when the current mode of operation was Oscillate Mode 2 for Port A and Port B. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 d | Observe that the GUI display indicates when an MDU is running for Port A and Port B. | With an MDU connected to Port A and activated in the Forward, Reverse, Oscillate, and Window Lock mode of operation it was observed that in all cases the direction indicators are displayed in green and the background behind the Set Speed box turns green indicating the MDU is running.  With an MDU connected to Port B and activated in the Forward, Reverse, Oscillate, and Window Lock mode of operation it was observed that in all cases the direction indicators are displayed in green and the background behind the Set Speed box turns green indicating the MDU is running. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 e | Refer to DYONICS POWER MDU Table for minimum and maximum Set Speeds.  Observe that the GUI provides the ability to adjust RPMs in increments of 100 for forward, reverse and Oscillate while Oscillate Mode 1 is selected for Port A and Port B.  Observe that the GUI provides the ability to adjust RATE in increments of 1 for oscillate while Oscillate Mode 2 is selected for Port A and Port B.  Observe that the increment button disappears when the Set Speed reaches the Maximum Set Speed for Port A and Port B.  Observe that the decrement button disappears when the Set Speed reaches the minimum Set Speed for Port A and Port B.  Observe that when the Set Speed is not at maximum or minimum both increment and decrement buttons appear on the screen for Port A and Port B.  Observe that the MDU changes speed when the Set Speed is changed for Port A and Port B.  Observe that a DYONICS Mini-Motor MDU in the Forward direction with no blades inserted matches the Range and Default values in the DYONICS POWER MDU Table for Port A and Port B.  Observe that a DYONICS PowerMax Elite MDU in the Reverse direction with a Left Magnet blade inserted matches the Range and Default values in the DYONICS POWER MDU Table for Port A and Port B.  Observe that a DYONICS PowerMax MDU in the Oscillate (Mode 1) direction with a Right Magnet blade inserted matches the Range and Default values in the DYONICS POWER MDU Table for Port A and Port B.  Observe that a DYONICS PowerMini MDU in the Forward direction with a Right magnet blade inserted matches the Range and Default values in the RANGE TABLE. | With an MDU connected to Port A it was observed that pressing the increment or decrement adjust button adjusts the RPMs in increments of 100 for forward, reverse and oscillate, while oscillate Mode 1 is selected.  With an MDU connected to Port B it was observed that pressing the increment or decrement adjust button adjusts the RPMs in increments of 100 for forward, reverse and oscillate, while oscillate Mode 1 is selected.  With an MDU connected to Port A it was observed that pressing the increment or decrement adjust button adjusts the RATE in increments of 1 for oscillate, while oscillate mode 2 is selected.  With an MDU connected to Port B it was observed that pressing the increment or decrement adjust button adjusts the RATE in increments of 1 for oscillate, while oscillate mode 2 is selected.  With an MDU connected to Port A it was observed that pressing the increment button until the maximum Set Speed in the forward mode of operation was reached for that particular MDU caused the Increment button to disappear when the maximum set speed was reached.  With an MDU connected to Port B it was observed that pressing the increment button until the maximum Set Speed in the forward mode of operation was reached for that particular MDU caused the Increment button to disappear when the maximum set speed was reached.  With an MDU connected to Port A it was observed that pressing the decrement button until the minimum Set Speed in the forward mode of operation was reached for that particular MDU caused the decrement button to disappear when the minimum set speed was reached.  With an MDU connected to Port B it was observed that pressing the decrement button until the minimum Set Speed in the forward mode of operation was reached for that particular MDU caused the decrement button to disappear when the minimum set speed was reached.  With and MDU connected to Port A it was observed that when the Set Speed for that particular MDU was not at the minimum or maximum both the increment and decrement buttons appeared on the screen.  With and MDU connected to Port B it was observed that when the Set Speed for that particular MDU was not at the minimum or maximum both the increment and decrement buttons appeared on the screen.  With an MDU connected to Port A and Port B it was observed that changing the Set Speed while the MDU was activated changed the actual running speed of the MDU for Port A and Port B.  Connected a DYONICS Mini-Motor MDU with no blades inserted to Port A and Port B and observed that in the Forward direction the Range and Default values matched the DYONICS POWER MDU Table for Port A and Port B.  Connected a DYONICS PowerMax Elite MDU with a left magnet blade inserted to Port A and Port B and observed that in the Reverse direction the Range and Default values matched the DYONICS POWER MDU Table for Port A and Port B.  Connected a DYONICS PowerMax MDU with the right magnet blade inserted to Port A and Port B and observed that in the Oscillate (Mode 1) direction the Range and Default values matched the DYONICS POWER MDU Table for Port A and Port B.  Connected a DYONICS PowerMini MDU with a right Magnet blade inserted to Port A and Port B and observed that in the Forward direction the Range and Default values matched the DYONICS POWER MDU Table for Port A and Port B. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 f | Observe the ability to adjust the Set Speed in RPMs for forward and reverse modes. | Test performed in 2.2.4.1 e | \_\_\_\_\_ |  |
| 2.2.4.1 g | Observe that the adjustment buttons auto-scroll when held down for a second or more for Port A and Port B. | With a MDU connected to Port A and Port B it was observed that holding down the increment/decrement adjustment button for a second or more went into a repeat auto-scroll until the button was released or the minimum or maximum setting was reached for Port A and Port B. | \_\_\_\_\_ |  |
| 2.2.4.1 h | Observe that the GUI display indicates a blade change for Port A and Port B. | With a DYONICS Power POWERMAX Elite MDU connected to Port A and Port B it was observed that maximum range displayed next to the unit of measure changes its value when the blade is changed when the MDU is in Forward or Reverse. | \_\_\_\_\_ |  |
| 2.2.4.1 i | Observe the ability of the DYONICS POWER II to support the DYONICS POWERMAX Elite, DYONICS PowerMini, Ulralight, DYONICS Mini-Motor, and Reliant MDUs. | Test performed in 2.2.4.1 e | \_\_\_\_\_ |  |
| 2.2.4.1 j | Observe that a Delta Mode button appears when an MDU that supports Oscillate Mode 2 is connected.  Observe that pressing the Delta Mode button toggles between Oscillate Mode 1 and 2 for Port A and Port B while the MDU.  Observe that the Delta Mode button does not appear while the MDU is activated for Port A and Port B  Observe that a Delta Mode button does NOT appear when an MDU that does not support Oscillate Mode 2 is connected to Port A and Port B. | Connected a DYONICS POWERMAX Elite to Port A and Port B and observed that a Delta Mode button appeared as expected.  Observed that pressing the Delta Mode button toggled the Oscillate Mode selection for Port A and Port B. The MDU was also activated to ensure the new selection was correct for Port A and Port B.  Observed that the Delta Mode button disappeared when the MDU was activated for Port A and Port B.  Connected a Mini-Motor MDU and observed that a Delta Mode button did not appear for Port A and Port B. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 k | 3 Button Hand Control MDU  Observe when an MDU is first detected in either Port A or Port B the mode of operation is set to Oscillate.  Observe that the forward, reverse and oscillate modes of operation are correctly selected when the forward, reverse and oscillate hand control buttons of an MDU are pressed for Port A and Port B while the MDU is activated and deactivated.  Observe that holding down the oscillate hand control button for a second or more that the mode of operation is set to Window Lock for Port A and Port B. Also, observe that the mode is restored to oscillate when the button is released.  Observe that holding down the forward hand control button for a second or more alternates between 2 speeds for Port A and Port B. Also, observe that both Set Speeds are adjustable for Port A and Port B.  Observe that holding down the reverse hand control button for a second or more alternates between 2 speeds for Port A and Port B. Also, observe that both Set Speeds are adjustable for Port A and Port B.  2 Button Hand Control MDU  Observe when an MDU is first detected in either Port A or Port B the mode of operation is set to Oscillate.  Observe that the forward and oscillate modes of operation are correctly selected when the distal and proximal hand control buttons of an MDU are pressed for Port A and Port B while the MDU is activated and deactivated.  Observe that holding down the distal hand control button for a second or more that the mode of operation is set to reverse for Port A and Port B.  Observe that holding down the proximal hand control button for a second or more that the mode of operation is set to Window Lock for Port A and Port B. Also, observe that the MDU is deactivated and the mode is restored to oscillate when the button is released. | Connected a DYONICS POWERMAX Elite MDU with hand controls to Port A and to Port B and observed that the Oscillate direction indicators were displayed in white upon initial connection.  With the DYONICS POWERMAX Elite MDU connected to Port A, the forward hand control button was pressed and it was observed that the forward direction indicators were displayed in green on the left hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the forward direction indicators were displayed in white. With an MDU connected to Port A, the reverse hand control button was pressed and it was observed that the reverse direction indicators were displayed in green on the left hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the reverse direction indicators were displayed in white. With an MDU connected to Port A, the oscillate hand control button was pressed and it was observed that the oscillate direction indicators were displayed in green on the left hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the oscillate direction indicators were displayed in white.  With the DYONICS POWERMAX Elite MDU connected to Port B, the forward hand control button was pressed and it was observed that the forward direction indicators were displayed in green on the right hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the forward direction indicators were displayed in white. With an MDU connected to Port B, the reverse hand control button was pressed and it was observed that the reverse direction indicators were displayed in green on the right hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the reverse direction indicators were displayed in white. With an MDU connected to Port B, the oscillate hand control button was pressed and it was observed that the oscillate direction indicators were displayed in green on the right hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the oscillate direction indicators were displayed in white.  With the DYONICS POWERMAX Elite MDU connected to Port A, the oscillate hand control button was pressed and held down for a second and it was observed that the window lock direction indicators were displayed in green on the left hand side of the screen. Upon the release of the oscillate button the MDU was de-activated and the oscillate direction indicators were displayed in white.  With the DYONICS POWERMAX Elite MDU connected to Port B, the oscillate hand control button was pressed and held down for a second and it was observed that the Window Lock direction indicators were displayed in green on the right hand side of the screen. Upon the release of the oscillate button the MDU was de-activated and the oscillate direction indicators were displayed in white.  With the DYONICS POWERMAX Elite MDU connected to Port A, the forward hand control button was pressed and held down for a second. While continuing to hold down the forward hand control button speed 2 was adjusted to 500 RPM more than speed 1 and it was observed that the Set Speed alternated between the 2 speeds while in the forward mode of operation. Releasing the forward hand control button left the Set Speed at the speed displayed during the button release. Upon the depression of a hand control button the MDU was de-activated and the forward direction indicators were displayed in white.  With the DYONICS POWERMAX Elite MDU connected to Port B, the forward hand control button was pressed and held down for a second. While continuing to hold down the forward hand control button speed 2 was adjusted to 500 RPM more than speed 1 and it was observed that the Set Speed alternated between the 2 speeds while in the forward mode of operation Releasing the forward hand control button left the Set Speed at the speed displayed during the button release. Upon the depression of a hand control button the MDU was de-activated and the forward direction indicators were displayed in white.  With the DYONICS POWERMAX Elite MDU connected to Port A, the reverse hand control button was pressed and held down for a second. While continuing to hold down the reverse hand control button speed 2 was adjusted to 500 RPM more than speed 1 and it was observed that the Set Speed alternated between the 2 speeds while in the reverse mode of operation. Releasing the reverse hand control button left the Set Speed at the speed displayed during the button release.  With the 3 button MDU connected to Port B, the reverse hand control button was pressed and held down for a second. While continuing to hold down the reverse hand control button speed 2 was adjusted to 500 RPM more than speed 1 and it was observed that the Set Speed alternated between the 2 speeds while in the reverse mode of operation. Releasing the reverse hand control button left the Set Speed at the speed displayed during the button release.  Connected a PowerMini MDU with hand controls to Port A and Port B and observed that the Oscillate direction indicators were displayed in white upon initial connection.  With the PowerMini MDU connected to Port A, the distal hand control button was pressed and it was observed that the forward direction indicators were displayed in green on the left hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the forward direction indicators were displayed in white. With an MDU connected to Port A, the proximal hand control button was pressed and it was observed that the oscillate direction indicators were displayed in green on the left hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the oscillate direction indicators were displayed in white.  With the PowerMini MDU connected to Port B, the distal hand control button was pressed and it was observed that the forward direction indicators were displayed in green on the right hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the forward direction indicators were displayed in white. With an MDU connected to Port B, the oscillate hand control button was pressed and it was observed that the oscillate direction indicators were displayed in green on the right hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the oscillate direction indicators were displayed in white.  With the PowerMini MDU connected to Port A, the distal hand control button was pressed and held down for a second and it was observed that the reverse direction indicators were displayed in green on the left hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the reverse direction indicators were displayed in white.  With the PowerMini MDU connected to Port B, the distal hand control button was pressed and held down for a second and it was observed that the reverse direction indicators were displayed in green on the right hand side of the screen. Upon the depression of a hand control button the MDU was de-activated and the reverse direction indicators were displayed in white.  With the PowerMini MDU connected to Port A, the proximal hand control button was pressed and held down for a second and it was observed that the Window Lock direction indicators were displayed in green on the left hand side of the screen. Upon the release of the proximal button the MDU was de-activated and the oscillate direction indicators were displayed in white.  With the PowerMini MDU connected to Port B, the proximal hand control button was pressed and held down for a second and it was observed that the Window Lock direction indicators were displayed in green on the right hand side of the screen. Upon the release of the proximal button the MDU was de-activated and the oscillate direction indicators were displayed in white. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 l | Observe when an MDU without hand controls is first detected in either Port A or Port B the mode of operation is set to Oscillate. Observe that an MDU without hand controls requires a footswitch for Port A and Port B.  Observe that the Forward, Reverse, Oscillate, and Window Lock modes of operation for an MDU are correctly selected when the Forward, Reverse, Oscillate and Window Lock buttons of a Footswitch are pressed for Port A and Port B while the MDU is activated and deactivated. | Disconnected any footswitch from the DYONICS II. Connected a PowerMini MDU without hand controls to Port A and Port B and observed that the Oscillate direction indicators were displayed in white upon initial connection and that the system reported Footswitch Required. Connected a Footswitch to the Footswitch Port and assigned the Footswitch to the port with the MDU, observed that the Footswitch Required message was erased. Observed that when the Footswitch is assigned to the other port the Footswitch Required message reappeared.  Connected a DYONICS POWERMAX Elite MDU without hand controls to Port A and connected a DYONICS II Footswitch to the Footswitch Port, mapped the footswitch to Port A via the Settings screens. When the Footswitch Forward button was pressed, it was observed that the Forward direction indicators were displayed in green on the left hand side of the screen. Upon release of the button the MDU was de-activated and the forward direction indicators were displayed in white. When the Footswitch Reverse button was pressed it was observed that the Reverse direction indicators were displayed in green on the left hand side of the screen. Upon release of the button the MDU was de-activated and the reverse direction indicators were displayed in white. When the Footswitch Oscillate button was pressed and it was observed that the Oscillate direction indicators were displayed in green on the left hand side of the screen. Upon release of the button the MDU was de-activated and the oscillate direction indicators were displayed in white. When the Footswitch Window Lock button was pressed it was observed that the Window Lock direction indicators were displayed in green on the left hand side of the screen. Upon the release of the footswitch button the MDU was de-activated and the oscillate direction indicators were displayed in white.  Connected an MDU without hand controls to Port B and connected a DYONICS II Footswitch to the Footswitch Port, mapped the footswitch to Port B via the Settings screens. When the Footswitch Forward button was pressed, it was observed that the Forward direction indicators were displayed in green on the right hand side of the screen. Upon release of the button the MDU was de-activated and the forward direction indicators were displayed in white. When the Footswitch Oscillate button was pressed and it was observed that the Oscillate direction indicators were displayed in green on the right hand side of the screen. Upon release of the button the MDU was de-activated and the oscillate direction indicators were displayed in white. When the Footswitch Reverse button was pressed it was observed that the Reverse direction indicators were displayed in green on the right hand side of the screen. Upon release of the button the MDU was de-activated and the reverse direction indicators were displayed in white. When the Footswitch Window Lock button was pressed it was observed that the Window Lock direction indicators were displayed in green on the right hand side of the screen. Upon the release of the footswitch button the MDU was de-activated and the Reverse direction indicators were displayed in white. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 m | Observe that the application continuously monitors the PowerMini MDU blade status and notifies the GUI module when a blade change occurs on Port A and Port B.  Observe that the correct minimum and maximum ranges for Forward, Reverse and Oscillate modes of operation are used when a blade change occurs using the DYONICS MDU POWER Table. | Connected a PowerMini MDU to Port A and Port B, activated it in the forward mode of operation and observed that the maximum range displayed next to the unit of measure changes its value when the blade is changed.  Using a Small Joint Blade Simulator (20600889) and the Set Speed buttons verified that the 3 supported blade families in the DYONICS MDU POWER for the PowerMini MDU used the correct minimum and maximum ranges for Forward, Reverse, Oscillate Mode 1, and Oscillate Mode 2 modes of operation determined by the installed blade (magnets).  Using a Small Joint Blade Simulator (20600889) and the Set Speed buttons verified that the 6 un-supported blade families in the DYONICS MDU POWER for the PowerMini MDU report Unknown Blade and used the Safe Mode minimum and maximum ranges for Forward, Reverse, Oscillate Mode 1, and Oscillate Mode 2 modes of operation determined by the installed blade (magnets). | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 n | Observe that a PowerMini MDU with and without hand controls is detected in Port A and Port B and the shaver icon appears in the appropriate port.  Observe that the PowerMini MDU with and without hand controls operates as described above in sections b, c, d, e, f, g, h, and j.  Observe that the PowerMini MDU with and without hand controls operates as described above in sections b, c, d, e, f, g, h, and j. | Connected a PowerMini MDU with hand controls and PowerMini without hand controls to Port A and observed that the shaver icon appeared on the upper left hand side of the screen as expected.  Connected a PowerMini MDU with hand controls and Power Mini without hand controls to Port B and observed that the shaver icon appeared on the upper right hand side of the screen as expected.  Performed tests sections b, c, d, e, f, g, h, and j  above using the PowerMini MDU with hand controls and observed that the DYONICS II and the MDU operated as expected for Port A and Port B.  Performed tests sections b, c, d, e, f, g, h, and j  above using the PowerMini MDU without hand controls and observed that the DYONICS II and the MDU operated as expected for Port A and Port B. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.1 o | Observe that a front panel Window Lock button is supported when an MDU is connected to Port A and Port B.  Observe that when an MDU is plugged into Port A the DYONICS POWER II supports a Window Lock button that appears on the left side of the display.  O  bserve that when an MDU is plugged into Port B the DYONICS POWER II supports a Window Lock button that appears on the right side of the display.  Observe that when an MDU is running the Window Lock Button for the Port disappears. | Disconnected any footswitch from the DYONICS POWER II.  Connected a DYONICS POWERMAX Elite MDU to Port A and observed that the Window Lock button appeared on the left hand side of the screen. Pressed the Window Lock button on the display and observed that the Port A MDU entered Window Lock Mode. Released the Window Lock button on the display and observed that the Port A MDU exited Window Lock Mode.  Connected a DYONICS POWERMAX Elite MDU to Port B and observed that the Window Lock button appeared on the right hand side of the screen. Pressed the Window Lock button on the display and observed that the Port B MDU entered Window Lock Mode. Released the Window Lock button on the display and observed that the Port B MDU exited Window Lock Mode.  Connected DYONICS POWERMAX Elite MDUs with hand controls to Ports A and B and observed that the Window Lock button appeared on the right hand and left hand side of the screen. Pressed the Oscillate button on the MDU in Port A and observed that the left hand Window Lock button was erased, but the right hand side Window Lock button remained. Pressed the Forward button on the MDU in Port B and observed that the right hand side Window Lock disappears. Press the Forward button on the Port A MDU and observed that only the Window Lock button on the left hand side reappeared. Pressed the Oscillate button on the MDU for Port B and the Window Lock button on the right hand side reappeared. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.2 | Observe that the required data and widgets are displayed when a Drill and Saw is connected to Port A and Port B. | Connected a Drill to the Port A connector and a Drill to the Port B connector and observed that the required data and widgets shown in section 2.2.4.2 was displayed for both ports.  Connected a Saw to the Port A connector and a Saw to the Port B connector and observed that the required data and widgets shown in section 2.2.4.2 was displayed for both ports. | \_\_\_\_\_ |  |
| 2.2.4.2 a | Observe that the Saw and Drill direction indicators are sufficiently large to stand out against the rest of the display.  Observe that the Saw direction indicators are displayed correctly for Port A while the Saw is activated and deactivated.  Observe that the Drill direction indicators are displayed correctly for Port A while the Drill is activated and deactivated.  Observe that the Saw direction indicators are displayed correctly for Port B while the Saw is activated and deactivated.  Observe that the Drill direction indicators are displayed correctly for Port B while the Drill is activated and deactivated. | When a Drill was connected to Port A and to Port B and run in the forward and reverse modes the direction indicators were sufficiently large to stand out against the rest of the display.  When a Saw was connected to Port A and to Port B and run in the oscillate mode the direction indicators were sufficiently large to stand out against the rest of the display  With a Saw connected to Port A, it was observed that the oscillate direction indicators were displayed in white during the initial connection. Upon activation of the saw it was observed that the oscillate direction indicators turned green while deactivation of the saw caused the oscillate direction indictors to turn white.  With a Drill connected to Port A, it was observed that the direction indicators were displayed correctly in the forward and reverse direction depending on the setting of the drill itself Upon activation of the drill it was observed that the direction indicators turned green while deactivation of the drill caused the direction indictors to turn white.  With a Saw connected to Port B, it was observed that the oscillate direction indicators were displayed in white during the initial connection. Upon activation of the saw it was observed that the oscillate direction indicators turned green while deactivation of the saw caused the oscillate direction indictors to turn white.  With a Drill connected to Port B, it was observed that the direction indicators were displayed correctly in the forward and reverse direction depending on the setting of the drill itself Upon activation of the drill it was observed that the direction indicators turned green while deactivation of the drill caused the direction indictors to turn white. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.2 b | Observe that the GUI display indicates when a drill and saw is running for Port A and Port B. | With a Drill connected to Port A and Port B, upon activation of the Powered Instrument it was observed that in both cases the direction indicators were displayed in green and the background behind the Speed % box turned green indicating the Powered Instrument was running.  With a Saw connected to Port A and Port B, upon activation of the Powered Instrument it was observed that in both cases the direction indicators were displayed in green and the background behind the Speed % box turned green indicating the Powered Instrument was running. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.2 c | Observe that when a saw and drill is connected the % of full Speed is displayed in large font for Port A and Port B. | With a Drill connected to Port A and Port B it was observed that the % of full speed is displayed in large font for Port A and Port B.  With a Saw connected to Port A and Port B it was observed that the % of full speed is displayed in large font for Port A and Port B. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.2 d | Observe that the GUI provides the ability to adjust % of full speed in increments of 10 for Port A and Port B.  Observe that the increment button disappears when the % of full speed reaches the Maximum Set Speed for Port A and Port B.  Observe that the decrement button disappears when the % of full speed reaches the minimum Set Speed for Port A and Port B.  Observe that when the % of full speed is not at maximum or minimum both increment and decrement buttons appear on the screen for Port A and Port B.  Observe that the Drill and Saw changes speed when the % of full speed is changed on the GUI for Port A and Port B. | With a Drill connected to Port A and Port B it was observed that pressing the increment or decrement button adjusts the % of full speed in increments of 10 for Port A and Port B.  With a Saw connected to Port A and Port B it was observed that pressing the increment or decrement button adjusts the % of full speed in increments of 10 for Port A and Port B.  With a Drill connected to Port A and Port B it was observed that pressing the increment button until the maximum % of full speed of 100 was reached caused the Increment button to disappear.  With a Saw connected to Port A and Port B it was observed that pressing the increment button until the maximum % of full speed of 100 was reached caused the Increment button to disappear.  With a Drill connected to Port A and Port B it was observed that pressing the decrement button until the minimum % of full speed of 10 was reached caused the decrement button to disappear.  With a Saw connected to Port A and Port B it was observed that pressing the decrement button until the minimum % of full speed of 10 was reached caused the decrement button to disappear.  With a Drill connected to Port A and Port B it was observed that when the % of full speed was not at the minimum or maximum both the increment and decrement buttons appeared on the screen.  With a Saw connected to Port A and Port B it was observed that when the % of full speed was not at the minimum or maximum both the increment and decrement buttons appeared on the screen.  With a Drill connected to Port A and Port B it was observed that the Drill speed on the Powered Instrument changed when the % of full speed was changed on the GUI.  With a Saw connected to Port A and Port B it was observed that the Saw speed on the Powered Instrument changed when the % of full speed was changed on the GUI. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.2 e | Observe that the adjustment buttons auto-scroll when held down for Port A and Port B. | With a Powered Instrument connected to Port A and Port B it was observed that holding down the increment/decrement adjustment button for a second or more went into a repeat auto-scroll until the button was released or the minimum or maximum setting was reached for Port A and Port B. | \_\_\_\_\_ |  |
| 2.2.4.2 f | Observe that the DYONICS POWER II supports Drill and Saw Powered Instruments. | Test performed in 2.2.4.2 d. | \_\_\_\_\_ |  |
| 2.2.4.3.1 | Observe that the GUI displays the text “Mode 1” when Oscillate Mode 1 is selected, an MDU is connected and the mode of operation is oscillate for Port A and Port B. | Connected a DYONICS POWERMAX Elite MDU to Port A, activated the MDU in the oscillate mode of operation, selected Mode 1 by pressing the Delta Mode button and observed that the text “Mode 1” was displayed under the Set Speed box on the left hand side of the screen.  Connected a DYONICS POWERMAX Elite MDU to Port B, activated the MDU in the oscillate mode of operation, selected Mode 1 by pressing the Delta Mode button and observed that the text “Mode 1” was displayed under the Set Speed box on the right hand side of the screen | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.3.2 | Observe that the GUI displays the text “Mode 2” when Oscillate Mode 2 is selected, an MDU is connected and the mode of operation is oscillate for Port A and Port B. | Connected a DYONICS POWERMAX Elite MDU to Port A, activated the MDU in the oscillate mode of operation, selected Mode 2 by pressing the Delta Mode button and observed that the text “Mode 2” was displayed under the Set Speed box on the left hand side of the screen.  Connected a DYONICS POWERMAX Elite MDU to Port B, activated the MDU in the oscillate mode of operation, selected Mode 2 by pressing the Delta Mode button and observed that the text “Mode 2” was displayed under the Set Speed box on the right hand side of the screen. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.4 a | Observe that a connected footswitch has the ability to activate and control direction of a connected Drill, Saw and MDU for Port A and Port B. Refer to section 2.2.4.1 and 2.2.4.2 for direction indicator protocol.  Observe that the Hand Control Override feature allows an MDU with hand controls and a footswitch to control the MDU on a first come first serve basis when Hand Control Override is turned Off for Port A and Port B.  Observe that the Hand Control Override feature only allows a footswitch to control the MDU when Hand Control Override is On for Port A and Port B.  Observe that the Hand Control Override feature in the ON state does not have any effect on a Powered Instrument.  Observe that depression of a pedal or button after another pedal or button depression is ignored, with the exception of a Digital On/OFF Footswitch which depression of the Forward and Reverse pedals results in activation of Oscillate Mode. | Connected a Drill to Port A, mapped the footswitch to Port A via the Settings screens and observed that pressing the forward and reverse pedal on the footswitch triggered activation of the drill in the selected direction. A release of the pedal caused the deactivation of the drill.  Connected a Drill to Port B, mapped the footswitch to Port B via the Settings screens and observed that pressing the forward and reverse pedal on the footswitch triggered activation of the drill in the selected direction. A release of the pedal caused the deactivation of the drill.  Connected a Saw to Port A, mapped the footswitch to Port A via the Settings screens and observed that pressing the forward and reverse pedal on the footswitch activated the saw in the oscillate mode of operation. A release of the pedal caused the deactivation of the Saw.  Connected a Saw to Port B, mapped the footswitch to Port B via the Settings screens and observed that pressing the forward and reverse pedal on the footswitch activated the saw in the oscillate mode of operation. A release of the pedal caused the deactivation of the Saw.  Connected a DYONICS Mini-Motor MDU to Port A, mapped the footswitch to Port A via the Settings screens and observed that pressing the forward, reverse and oscillate pedal on the footswitch triggered activation of the MDU in the selected direction. A release of the pedal caused deactivation of the MDU.  Connected a DYONICS Mini-Motor MDU to Port B, mapped the footswitch to Port B via the Settings screens and observed that pressing the forward, reverse and oscillate pedal on the footswitch triggered activation of the MDU in the selected direction. A release of the pedal caused deactivation of the MDU.  Connected a DYONICS POWERMAX ELITE MDU with hand controls to Port A, mapped the footswitch to Port A via the Settings screens, turned Hand Control Override off via the Settings screens and observed that the footswitch or the MDU was capable of activating and deactivating the MDU on a first come first serve basis. It was noted that when the footswitch activated the MDU pressing the hand controls had no effect on the state and visa versa.  Connected a DYONICS POWERMAX ELITE MDU with hand controls to Port B, mapped the footswitch to Port B via the Settings screens, turned Hand Control Override off via the Settings screens and observed that the footswitch or the MDU was capable of activating and deactivating the MDU on a first come first serve basis. It was noted that when the footswitch activated the MDU pressing the hand controls had no effect on the state and visa versa.  Connected a DYONICS PowerMini MDU with hand controls to Port A, mapped the footswitch to Port A via the Settings screens, turn the Hand Control Override On via the Settings screens and observed that pressing any of the MDU hand controls did not activate the MDU. The MDU was activated only when a footswitch pedal was pressed.  Connected a DYONICS PowerMini MDU with hand controls to Port B, mapped the footswitch to Port B via the Settings screens, turn the Hand Control Override On via the Settings screens and observed that pressing any of the MDU hand controls did not activate the MDU. The MDU was activated only when a footswitch pedal was pressed.  Connected a Drill to Port A, mapped the footswitch to Port A via the Settings screens, turned the Hand Control Override On via the Settings screens and observed that the Drill was activated by pressing the trigger on the Drill itself, therefore the activation of the Drill was not affected by the Hand Control Override setting.  Connected a Drill to Port B, mapped the footswitch to Port B via the Settings screens, turned the Hand Control Override On via the Settings screens and observed that the Drill was activated by pressing the trigger on the Drill itself; therefore the activation of the Drill was not effected by the Hand Control Override setting.  Connected an MDU to Port A, connected and mapped an Analog Footswitch to Port A and observed that pressing a single pedal activated the MDU and the pressing of another pedal or button was ignored.  Repeated for Port B with same results.  Connected an MDU to Port A, connected and mapped a Digital ON/OFF Footswitch to Port A and observed that pressing a single pedal activated the MDU and the pressing of a button was ignored. Also observed that pressing 2 or more Foot pedals resulted in activation of Oscillate Mode.  Repeated for Port B with same results. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.4 b | Observe that a connected footswitch that supports the lavage button can start and stop the lavage process on a connected DYONICS 25 Fluid Management System when the lavage button on the footswitch is pressed for Port A and Port B. | Connected a DYONICS II Footswitch, a Footswitch that supports the lavage functionality, and mapped the Footswitch to Port A via the Settings screens. Connected a DYONICS 25 Fluid Management System and mapped the pump interface to Port A via the Settings screens. Pressed the START button on the DYONICS 25 to start the pump. It was observed that pressing the Lavage button on the footswitch turned the lavage process on, pressing the lavage button again turned the lavage process off.  Connected a DYONICS II Footswitch and mapped the Footswitch to Port B via the Settings screens. Connected a DYONICS 25 Fluid Management System and mapped the pump interface to Port B via the Settings screens. Pressed the START button on the DYONICS 25 to start the pump. It was observed that pressing the Lavage button on the footswitch turned the lavage process on, pressing the lavage button again turned the lavage process off. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.4 c | Observe that each Footswitch listed in the SC SDS DYONICS POWER Footswitch Table is supported. | Observed that when the Footswitches (7205396 and 72201092) were connected with an MDU in Port A, the footswitch was recognized and was able to control the MDU.  Observed that when the Footswitches (7205396 and 72201092) were connected with a Drill in Port A, the footswitch was recognized and was able to control the Drill.  Observed that when the Footswitches (7205396 and 72201092) were connected with an MDU in Port B, the footswitch was recognized and was able to control the MDU.  Observed that when the Footswitches (7205396 and 72201092) were connected with a Drill in Port B, each footswitch was recognized and was able to control the Drill. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.4 d | Observe that the DYONICS POWER II supports the DYONICS POWER II Footswitch. | Test performed in 2.2.4.4 b. | \_\_\_\_\_ |  |
| 2.2.4.4 e | Observe that a connected footswitch that supports the Speed Up/Down buttons can adjust the Set Speed of a handpiece in the same manner as the Set Speed buttons on the display. | Connected a footswitch that supports the Speed Up/Down Buttons and assigned it to an MDU in Port A.  Observed that the Footswitch Speed Up/Down Buttons performed the same functions as the Speed Up/Down buttons on the left side of the Display. Observed that the Speed Up/Down buttons on the Display reflected the state of the Footswitch Buttons. Observed that the Footswitch Speed Up button had no effect once the maximum Set Speed was reached. Observed that the Footswitch Speed Down button had no effect once the minimum Set Speed was reached.  Connected a footswitch that supports the Speed Up/Down Buttons and assigned it to an MDU in Port B.  Observed that the Footswitch Speed Up/Down Buttons performed the same functions as the Speed Up/Down buttons on the right side of the Display. Observed that the Speed Up/Down buttons on the Display reflected the state of the Footswitch Buttons. Observed that the Footswitch Speed Up button had no effect once the maximum Set Speed was reached. Observed that the Footswitch Speed Down button had no effect once the minimum Set Speed was reached.  Connected a footswitch that supports the Speed Up/Down Buttons and assigned it to a Drill in Port A.  Observed that the Footswitch Speed Up/Down Buttons performed the same functions as the Speed Up/Down buttons on the left side of the Display. Observed that the Speed Up/Down buttons on the Display reflected the state of the Footswitch Buttons. Observed that the Footswitch Speed Up button had no effect once the maximum Set Speed was reached. Observed that the Footswitch Speed Down button had no effect once the minimum Set Speed was reached.  Connected a footswitch that supports the Speed Up/Down Buttons and assigned it to a Drill in Port B.  Observed that the Footswitch Speed Up/Down Buttons performed the same functions as the Speed Up/Down buttons on the right Display. Observed that the Speed Up/Down buttons on the Display reflected the state of the Footswitch Buttons. Observed that the Footswitch Speed Up button had no effect once the maximum Set Speed was reached. Observed that the Footswitch Speed Down button had no effect once the minimum Set Speed was reached. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.4 f | Observe that a connected Footswitch that supports the Window Lock button has the ability to set the operating Mode of an assigned MDU to Window Lock.  Observe that a connected Footswitch that supports the Window Lock button has no effect on an assigned Powered Instrument. | Connected an MDU to Port A, mapped the footswitch to Port A via the Settings screens and observed that pressing the Window Lock button on the footswitch activated the MDU and caused the MDU to enter the Window Lock mode of operation. A release of the button caused the deactivation of the MDU. The MDU exited the Window Lock mode of operation.  Connected an MDU to Port B, mapped the footswitch to Port B via the Settings screens and observed that pressing the Window Lock button on the footswitch activated the MDU and caused the MDU to enter the Window Lock mode of operation. A release of the button caused the deactivation of the MDU. The MDU exited the Window Lock mode of operation.  Connected a Drill to Port A, mapped the footswitch to Port A via the Settings screens and observed that pressing the Window Lock button on the footswitch had no effect.  Connected a Drill to Port B, mapped the footswitch to Port B via the Settings screens and observed that pressing the Window Lock button on the footswitch had no effect. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.4.5 | Observe that when a warning is present that sounds the beeper, the beeper toggles between on and off at a 0.500 millisecond ± 5% interval. | Software triggered PW1 in PORT WARNING MESSAGE TABLE and observed that the beeper alarm was turned on and the beeper toggled between the on and off state at 500 millisecond ± 5% interval. | \_\_\_\_\_ |  |
| 2.2.4.5 a | Observe that when a warning has occurred a single line message is displayed on the correct side of the screen for Port A and Port B. | Software triggered PW2 warning (Unknown Blade ID) for Port A and Port B and observed that in both cases a single line message was displayed on the correct side of the screen in the correct location. | \_\_\_\_\_ |  |
| 2.2.4.5 b | Using the PORT WARNING MESSAGE TABLE Short Warning Message column, observe that each single line message when displayed describes the warning condition taking place for Port A and Port B. | Software triggered PW1-PW8 and PW10-PW16 for Port A and Port B and observed that the correct single line message was displayed for the warning condition taking place for Port A and Port B. | \_\_\_\_\_ |  |
| 2.2.4.5 c | Observe that each single line message when displayed consists of black text and a yellow background for Port A and Port B. | Observed that each single line message PW1-PW8 and PW10-PW16 displayed had a yellow background with black text for Port A and Port B. | \_\_\_\_\_ |  |
| 2.2.4.5 d | Using the PORT WARNING MESSAGE TABLE Detailed Warning Message column, observe that a full screen detailed message is displayed when each single line message is touched for Port A and Port B. | Software triggered PW1-PW8 and PW10-PW16 for Port A and Port B. Touched the single line message for each warning and observed that the correct detailed message popup box was displayed for each warning for Port A and Port B. | \_\_\_\_\_ |  |
| 2.2.4.5 e | Observe that when a full screen detailed message is displayed an OK button is provided to close the message. | In the step above, 2.2.4.5 d it was observed that an OK button was provided on detailed message screens and pressing the OK button closed the detailed message box. | \_\_\_\_\_ |  |
| 2.2.4.5 f | Using the PORT WARNING MESSAGE TABLE Action column, verify that the application reduces functionality for certain warning conditions when warranted for Port A and Port B. | PW1: (TEMPERATURE-LIMIT) Software triggered warning and observed that the beeper sounded until the warning condition went away.  PW2: (Unknown Blade) Software injected error and using a break point stepped through the code in port.cpp and verified that the blade type defaulted to the curved blade family.  PW3: (Unknown Handpiece) Software injected error and using a break point stepped through the code in port.cpp and verified that the handpiece was not allowed to operate under this condition.  PW4: (Handpiece Sensor Fault) Software injected error and using a breakpoint stepped through the code in port.cpp and verified that the motor was configured for the safest mode of operation which is Standard High Speed and a default blade family of curved.  PW5: (Blade Stall) Software injected error, activated the MDU and while using a stop watch observed that a warning was displayed on the screen when the warning condition was active for roughly 3 seconds or more. Observed that when the warning condition was active for roughly 6 seconds the motor was shut down deactivating the handpiece.  PW6: (Handpiece Stall) Software injected error, activated the MDU and while using a stop watch observed that a warning was displayed on the screen when the warning condition was active for roughly 3 seconds or more. Observed that when the warning condition was active for roughly 6 seconds the motor was shut down deactivating the handpiece.  PW7: (Handpiece Motor Fault) Software injected error, activated the MDU and observed that when the warning condition was set the motor was shut down deactivating the handpiece.  PW8: (Short Circuit Detected) Software injected error, connected an MDU and observed that when the warning condition was set the motor was shut down deactivating the handpiece permanently.  PW10: (Handpiece Overload) Software injected error, activated the MDU and while using a stop watch observed that a warning was displayed on the screen when the warning condition was active for roughly 10 seconds or more.  PW11: (Handpiece Overload Timeout) Software injected error, activated the MDU and while using a stop watch observed that a warning was displayed on the screen when the warning condition was active for roughly 60 seconds at which point the motor was shut down deactivating the device.  PW12: (Handpiece Error) Manually injected error by connecting an MDU while holding down one of the hand control buttons and observed that the warning was displayed on the screen until the warning condition went away.  PW13: (Unknown Footswitch) Software injected error, connected footswitch and observed that the warning was displayed on the screen until the error condition went away.  PW14: (Footswitch Error) Manually injected error by connecting a Footswitch while holding down one of the foot pedals and observed that the warning was displayed on the screen until the warning condition went away.  PW15: (Footswitch Battery Low) Software injected error and observed that the warning was displayed on the screen.  PW16: (Footswitch Required) Manually injected error by connecting an MDU without hand controls and no Footswitch connected and observed that the warning was displayed on the screen until the error condition went away. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
|  | Observe that the beeper is sounded for each warning when warranted. See PORT WARNING MESSAGE TABLE Beep. | Software triggered PW1-PW8 AND PW10-PW16 and observed that the following warnings for Port A and Port B sounded the beeper when required:  PW1, PW5, PW6, PW7, PW8, PW10, PW11, PW12, PW13, PW14 and PW15. | \_\_\_\_\_ |  |
| 2.2.4.5 g | Observe that a system warning popup message is displayed when all system warnings listed in the POPUP WARNING MESSAGE TABLE ID column occur. | Software injected all 4 system warnings and observed that a system warning popup box appeared in all cases. | \_\_\_\_\_ |  |
| 2.2.4.5 h | Observe that a fatal error screen is displayed and motors are shut down when all fatal errors listed in the Fatal Error Table ID column occur.  Observe that the reset line going to the Motor Controller Processor, (U25 Pin 4) toggles when a Communication Failure occurs. | Software injected FE1, FE2, FE3 and FE4 fatal errors and observed that a black screen containing the fatal error number was displayed and the beeper was sounded.  Hook up a scope probe to the reset line going to the Motor Controller Processor, (U25 Pin 4). Observe the reset line pulses for 400 ns ± 5% when a Communication Failure occurs. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5 | Observe that the application provides a mechanism for the user to configure Oscillate Mode Settings, Footswitch settings, Pump Interface settings, Language selection and to view System Information.  Observe that a Mode select button that alternates between Select Blade Default and Select Blade Recall mode is provided.  Observe that a Blade Reset A button along with the text” Blade Reset” is provided when an handpiece is connected to Port A.  Observe that a Blade Reset B button along with the text” Blade Reset” is provided when a handpiece is connected to Port B.  Observe that when no handpieces are connected to Port A and Port B the text ”Blade Reset” and the A and B buttons do not appear.  Observe that any changes made to these settings are saved and restored at system power up.  Observe that the user configurable settings are set to the default settings listed in the DEFAULT SETTINGS TABLE the first time the system is powered up.  Observe that pressing the DONE button returns to the previous screen.  Show that the Settings Screen settings are stored in the System Controller Interface for battery backed up non-volatile RAM. | Observed that the Settings Screen contains buttons to enter an Oscillate Mode adjust screen, Footswitch configuration screen, Pump Interface configuration screen, Language configuration screen and System Information status screen.  Observed that a Mode button that alternates between Select Blade Default and Select Blade Recall modes, when pressed, appeared on the Settings Screen.  Disconnected all handpieces and launched the Settings Screen. Connected a handpiece to Port A and observed that the text” Blade Reset” appeared along with a reset button for Port A.  Disconnected all handpieces and launched the Settings Screen. Connected a handpiece to Port B and observed that the text” Blade Reset” appeared along with a reset button for Port B.  Disconnected all handpieces and observed that the text “Blade Reset” along with the Port B reset button disappeared.  Observed that after changing the following settings from their default values did not change after a power cycling of the system:   * Oscillate Mode/Port A/Seconds set to 0.40 * Oscillate Mode/Port B/Seconds set to 0.50 * Oscillate Mode/Port A set Revolutions to 1 * Oscillate Mode/Port B/Revolutions set to 1 * Footswitch/Port Control set to Port B * Footswitch/Hand Control Override set to Off * Footswitch/Forward set to L * Footswitch/Mode set to On/Off * Pump Interface/Port Control set to Port B * Language set to Deutsch   Observed that after reproducing a first time system power up by pulling out the battery for the NVRAM waiting a minute and putting back the battery then powering up the system, the user configurable settings are set to the default settings listed in the DEFAULT SETTINGS TABLE.  Observed that after entering the Setting screen pressing the DONE button returns to the previous screen.  Performed a code review of Control.cpp and observed that it used the battery backed up non-volatile RAM ReadNvRam() and WriteNvRam() functions described in the System Interfaces section 2.1.8a for saving and restoring Settings Screen settings. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.1 | Observe that the application provides a mechanism for the user to reset the Blade Speeds and/or % of full speed to default values for Port A and Port B. | Connected an MDU to Port A and a Drill to Port B, set the Set Speed in Port A and the % of full speed in Port B to non-default values, entered the Settings screen and pressed the Port A and Port B Blade reset buttons, returned to the previous screen and observed that the Set Speed in Port A and the % full speed in Port B were reset to their default values. | \_\_\_\_\_ |  |
| 2.2.5.2 a | Observe that the application provides a means for the user to select Blade Default or Blade Recall modes of operation.  Observe that pressing the Blade Default/Blade Recall button toggles between the Blade Recall and Blade Default mode and displays text in the upper right hand side of the screen signifying the current selected mode. | Observed that entering the Settings screen there is a Blade Default/Blade Recall selection button.  Observed that pressing the Blade Default/Blade Recall button toggles between the Blade Recall and Blade Default mode and displays text in the upper right hand side of the screen signifying the current selected mode. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.2 b | Observe that application saves the last settings of Set Speeds and % of full speed, when Blade Recall mode is selected for Port A and Port B.  Show that the Set Speeds and % of full speed settings are stored in the System Controller Interface for non-volatile FLASH. | Selected Blade Recall mode from the Settings screen. Connected an MDU to Port A and a Drill to Port B. Changed the Forward, Reverse and Oscillate Set Speeds for the MDU and changed the % of full speed for the drill. Turned the unit off then on again and observed that the Forward, Reverse and Oscillate Set Speeds for Port A and the % of full speed for Port B had been saved.  Moved the Drill to Port A and the MDU to Port B, changed the % of full speed for the Drill and changed the Forward, Reverse and Oscillate Set Speeds for the MDU. Turned the unit off then on again and observed that the % of full speed for Port A and the Forward, Reverse and Oscillate Set Speeds for Port B had been saved.  Performed a code review of Control.cpp and observed that it used the non-volatile FLASH ReadFlashStore(), WriteFlashStore() and EraseFlashStore() functions described in the System Interfaces section 2.1.8b for saving and restoring the Set Speeds and % of full speed settings. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.2 c | Observe that the last settings of Set Speeds are saved per blade family when an MDU that supports blade recognition is connected and Blade Recall mode is selected for Port A and Port B. | Selected Blade Recall mode from the Settings screens.  Connected an MDU to Port A, inserted a curved blade and changed the Forward, Reverse and Oscillate Set Speeds. Removed the curved blade and inserted a Bur blade and changed the Forward, Reverse and Oscillate Set Speeds to different values than selected for the curved blade. Turned the unit off then on again with the MDU still connected to Port A and the Bur blade still inserted. Observed that the values selected for the Bur blade were saved. Removed the Bur blade and inserted a curved blade and observed that the values selected for the curved blade were saved. Repeated above test for Port B. | \_\_\_\_\_ |  |
|  | Show that the Set Speeds and % of full speed settings are stored in the System Controller Interface for non-volatile FLASH. | Performed a code review of Control.cpp and observed that it used the non-volatile FLASH ReadFlashStore(), WriteFlashStore() and EraseFlashStore() functions described in the System Interfaces section 2.1.8b for saving and restoring the Set Speeds and % of full speed settings. | \_\_\_\_\_ |  |
| 2.2.5.2 d | Observe that saved Set Speeds and % of full speed is displayed when a handpiece is connected at system power up and Blade Recall mode is selected for Port A and Port B  Show that the Set Speeds and % of full speed settings are stored in the System Controller Interface for non-volatile FLASH. | Selected Blade Recall mode from the Settings screen. Connected an MDU to Port A and a Drill to Port B. Changed the Forward, Reverse and Oscillate Set Speeds for the MDU and changed the % of full speed for the drill. Turned the unit off then on again and observed that the Forward, Reverse and Oscillate Set Speeds for Port A and the % of full speed for Port B had been saved and restored at system power up.  Moved the Drill to Port A and the MDU to Port B, changed the % of full speed for the Drill and changed the Forward, Reverse and Oscillate Set Speeds for the MDU. Turned the unit off then on again and observed that the % of full speed for Port A and the Forward, Reverse and Oscillate Set Speeds for Port B had been saved and restored at system power up.  Performed a code review of Control.cpp and observed that it used the non-volatile FLASH ReadFlashStore(), WriteFlashStore() and EraseFlashStore() functions described in the System Interfaces section 2.1.8b for saving and restoring the Set Speeds and % of full speed settings. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.2 e | Refer to DYONICS POWER MDU Table and DYONICS POWER II MDU Table for default values.  Observe that default Set Speeds and % of full speed is displayed when a handpiece is connected at system power up and Blade Default mode is selected for Port A and Port B. | Selected Blade Default mode from the Settings screen. Connected an MDU to Port A and a Drill to Port B. Changed the Forward, Reverse and Oscillate Set Speeds for the MDU and changed the % of full speed for the drill. Turned the unit off then on again and observed that the Forward, Reverse and Oscillate Set Speeds for Port A and the % of full speed for Port B were restored to default values at system power up.  Moved the Drill to Port A and the MDU to Port B, changed the % of full speed for the Drill and changed the Forward, Reverse and Oscillate Set Speeds for the MDU. Turned the unit off then on again and observed that the % of full speed for Port A and the Forward, Reverse and Oscillate Set Speeds for Port B were restored to default values at system power up. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.2 f | Observe that saved Set Speeds and % of full speed is displayed when a handpiece is connected after system power up and Blade Recall mode is selected for Port A and Port B.  Show that the Set Speeds and % of full speed settings are stored in the System Controller Interface for non-volatile FLASH. | Selected Blade Recall mode from the Settings screen. Connected an MDU to Port A and a Drill to Port B. Changed the Forward, Reverse and Oscillate Set Speeds for the MDU and changed the % of full speed for the drill. Removed the MDU from Port A and the Drill from Port B. Connected the MDU to Port A and the Drill to Port B and observed that the Forward, Reverse and Oscillate Set Speeds for Port A and the % of full speed for Port B had been saved and restored during the connection.  Moved the Drill to Port A and the MDU to Port B, changed the % of full speed for the Drill and changed the Forward, Reverse and Oscillate Set Speeds for the MDU. Removed the Drill from Port A and the MDU from Port B. Connected the Drill to Port A and the MDU to Port B and observed that the % of full speed for Port A and the Forward, Reverse and Oscillate Set Speeds for Port B had been saved and restored during the connection.  Performed a code review of Control.cpp and observed that it used the non-volatile FLASH ReadFlashStore(), WriteFlashStore() and EraseFlashStore() functions described in the System Interfaces section 2.1.8b for saving and restoring the Set Speeds and % of full speed settings. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.2 g | Refer to DYONICS POWER MDU Table and DYONICS POWER II MDU Table for default values.  Observe that default Set Speeds and % of full speed are not displayed when a handpiece is connected after system power up and Blade Default mode is selected for Port A and Port B. | Selected Blade Default mode from the Settings screen. Connected an MDU to Port A and a Drill to Port B. Changed the Forward, Reverse and Oscillate Set Speeds for the MDU and changed the % of full speed for the drill. Removed the MDU from Port A and the Drill from Port B. Connected the MDU to Port A and the Drill to Port B and observed that the Forward, Reverse and Oscillate Set Speeds for Port A and the % of full speed for Port B were not restored to default values during the connection.  Moved the Drill to Port A and the MDU to Port B, changed the % of full speed for the Drill and changed the Forward, Reverse and Oscillate Set Speeds for the MDU. Removed the Drill from Port A and the MDU from Port B. Connected the Drill to Port A and the MDU to Port B and observed that the % of full speed for Port A and the Forward, Reverse and Oscillate Set Speeds for Port B were not restored to default values during the connection. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.3 | Observe that pressing the OSCILLATE MODE button from the Settings screen launches the Oscillate Mode Screen.  Observe that pressing the DONE button returns to the previous screen. | Pressed the OSCILLATE MODE button from the Settings screen and observed that the Oscillate Mode screen was displayed.  Observed that pressing the DONE button from the Oscillate Mode screen returned to the previous screen. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.3 a | Verify that Oscillate Mode 1 is the initial default setting, for Port A and Port B. | Verified that Oscillate Mode 1 is the initial default setting for Port A and Port B by viewing the source code. | \_\_\_\_\_ |  |
| 2.2.5.3 b | Observe that software supports Section 2.2.4.1j | Already tested, refer to section 2.2.4.1 j | \_\_\_\_\_ |  |
| 2.2.5.3.1 | Observe that the GUI provides the ability to adjust Seconds in increments of 0.1 for Port A and Port B.  Observe that the increment button disappears when the Seconds reaches the Maximum time for Port A and Port B.  Observe that the decrement button disappears when the Seconds reaches the minimum time for Port A and Port B.  Observe that when the Seconds is not at maximum or minimum both increment and decrement buttons appear on the screen for Port A and Port B  Observe that the range of the adjustment is correct for Port A and Port B.  Observe that pressing the RESTORE DEFAULT button resets the Seconds setting to the default value for Port A and Port B.  Observe that pressing the CANCEL button returns to the previous screen and that the Seconds setting is not saved for Port A and Port B.  Observe that pressing the SET button returns to the previous screen and that the Seconds setting is saved for Port A and Port B. | Connected an MDU to Port A and Port B and set the Oscillate Mode to Mode 1 by pressing the Mode toggle button. Observed that pressing the Adjust button from the Oscillate Mode screen launched the Oscillate Mode 1 screen which provides the ability to adjust Seconds in increments of 0.10 for Port A and Port B.  Observed that pressing the increment button until the Seconds reached the maximum range of 1.00 Seconds caused the increment button to disappear for Port A and Port B.  Observed that pressing the decrement button until the Seconds reached the minimum range of 0.30 Seconds caused the decrement button to disappear for Port A and Port B.  Observed that when the Seconds was not at the minimum range of 0.30 or the maximum range of 1.00 both the increment and decrement buttons appeared on the screen for Port A and Port B.  Observed that the range of adjustment was the correct range of 0.30 to 1.00 for Port A and Port B.  Set the Seconds setting to 0.40. Observed that pressing the RESTORE DEFAULT button reset the Seconds setting to the default value of 0.30 for Port A and Port B.  From the Oscillate screen pressed the Adjust button and noted the current Seconds setting. Changed the Seconds setting and pressed the CANCEL button. From the Oscillate screen pressed the Adjust button again and observed that the last setting before pressing the CANCEL button was not saved. Repeated above test for Port B.  From the Oscillate screen pressed the Adjust button and noted the current Seconds setting. Changed the Seconds setting and pressed the SET button. From the Oscillate screen pressed the Adjust button again and observed that the last setting before pressing the SET button was saved. Repeated above test for Port B. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.3.2 | Observe that the GUI provides the ability to adjust Revolutions in increments of 1 for Port A and Port B.  Observe that the increment button disappears when the Revolutions reach the Maximum Revolutions for Port A and Port B.  Observe that the decrement button disappears when the Revolutions reach the minimum time for Port A and Port B.  Observe that the range of the adjustment is correct for Port A and Port B.  Observe that pressing the RESTORE DEFAULT button resets the Revolutions setting to the default value for Port A and Port B.  Observe that pressing the CANCEL button returns to the previous screen and that the Revolutions setting are not saved for Port A and Port B.  Observe that pressing the SET button returns to the previous screen and that the Revolutions setting are saved for Port A and Port B. | Connected an MDU to Port A and Port B and set the Oscillate Mode to Mode 2 by pressing the Mode toggle button. Observed that pressing the Adjust button from the Oscillate Mode screen launched the Oscillate Mode 2 screen which provides the ability to adjust number of revolutions in increments of 1 for Port A and Port B.  Observed that pressing the increment button until the Revolutions reached the maximum range of 2 caused the increment button to disappear for Port A and Port B.  Observed that pressing the decrement button until the Revolutions reached the minimum range of 1 caused the decrement button to disappear for Port A and Port B.  Observed that the range of adjustment was the correct range of 1 to 2 for Port A and Port B.  Set the Revolutions setting to 1. Observed that pressing the RESTORE DEFAULT button reset the Revolutions setting to the default value of 2 for Port A and Port B.  From the Oscillate screen pressed the Adjust button and noted the current Revolution setting. Changed the Revolution setting and pressed the CANCEL button. From the Oscillate screen pressed the Adjust button again and observed that the last setting before pressing the CANCEL button was not saved. Repeated above test for Port B.  From the Oscillate screen pressed the Adjust button and noted the current Revolution setting. Changed the Revolution setting and pressed the SET button. From the Oscillate screen pressed the Adjust button again and observed that the last setting before pressing the SET button was saved. Repeated above test for Port B. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.4 | Observe that pressing the FOOTSWITCH button from the Settings screen launches the Footswitch screen.  Observe that pressing the CANCEL button returns to the previous screen and that the settings are not saved.  Observe that pressing the SET button returns to the previous screen and that the settings are saved. | Observed that pressing the FOOTSWITCH button from the Settings screen launches the Footswitch screen.  Observed that after changing the Port Control from Port A to Port B and pressing the CANCEL button returns to the previous screen and that the settings are not saved.  Observed that after changing the Port Control from Port A to Port B and pressing the SET button returns to the previous screen and that the settings are saved. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.4 a | Observe that the ability to configure a footswitch in a Variable mode or On/Off mode is provided. | Connected an MDU to Port A, connected a Footswitch and observed that setting the Footswitch Mode to On/Off caused the footswitch to behave like a switch and only allow full Set speed or off operation.  Connected an MDU to Port A, connected a Footswitch and observed that setting the Footswitch Mode to Variable caused the footswitch to behave in a variable manner where full Set speed is the pedal all the way depressed reducing speed until it turns off when the pedal is all the way up. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.4 b | Observe that a mechanism to map a footswitch to Port A or Port B is provided. | Connected an MDU to Port A, connected a Footswitch and observed that setting the Footswitch Port Control to Port A allowed the MDU to be controlled by the footswitch. Then connect the MDU to Port B and observed that the footswitch did not control the MDU.  Connected an MDU to Port B, connected a Footswitch and observed that setting the Footswitch Port Control to Port B allowed the MDU to be controlled by the footswitch. Then connect the MDU to Port A and observed that the footswitch did not control the MDU. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.4 c | Observe that the ability to set a hand-controlled handpiece to use either the hand controls and/or the footswitch is provided. | Connected an MDU with hand-controls to Port A, connected a Footswitch, set the Footswitch Port Control to Port A, set the Footswitch Hand Control Override to Off and observed that the MDU could be controlled by either the footswitch or the MDU hand-controls.  Connected an MDU with hand-controls to Port A, connected a Footswitch, set the Footswitch Port Control to Port A, set the Footswitch Hand Control Override to On and observed that the MDU could only be controlled by the footswitch. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.4 d | Observe that a mechanism to swap the forward and reverse pedals on a footswitch that supports this is provided. | Connected an MDU to Port A, connected a Footswitch and observed that setting the Footswitch Forward to L mapped forward to the Left pedal and reverse to the Right pedal.  Connected an MDU to Port A, connected a Footswitch and observed that setting the Footswitch Forward to R mapped forward to the Right pedal and reverse to the Left pedal. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.4 e | Observe that the DYONICS POWER II provides a mechanism for footswitch controls to override hand controls of an MDU. | Already tested, refer to section 2.2.5.4 c | \_\_\_\_\_ |  |
| 2.2.5.5 | Observe that pressing the PUMP INTERFACE button from the Settings screen launches the Pump Interface screen.  Observe that pressing the CANCEL button returns to the previous screen and that the settings are not saved.  Observe that pressing the SET button returns to the previous screen and that the settings are saved.  Observe that the ability to map the pump interface to Port A or Port B is provided. | Observed that pressing the PUMP INTERFACE button from the Settings screen launched the Pump Interface Screen.  Noted what the current selection is. Changed the current selection and pressed the CANCEL button. From the Settings screen pressed the PUMP INTERFACE button and observed that the last change before pressing the CANCEL button was not saved.  Noted what the current selection is. Changed the current selection and pressed the SET button. From the Settings screen pressed the PUMP INTERFACE button and observed that the last change before pressing the SET button was saved.  Connected a DYONICS 25 Fluid Management System and turned it on. Observed that when the Pump Interface, button PORT A was selected in the Settings screens the Impeller icon appeared above Port A indicating the pump interface was mapped to Port A. Observed that when the Pump Interface, button PORT B was selected in the Settings screens the Impeller icon appeared above Port B indicating the pump interface was mapped to Port B. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.6 | Observe that pressing the SYSTEM INFORMATION button from the Settings screen launches the System Information screen. | Observed that pressing the SYSTEM INFORMATION button from the Settings screen launched the System Information screen. | \_\_\_\_\_ |  |
| 2.2.5.6 a | Observe that the Product Name, Model Number, Serial Number, Copyright and Software revision levels are displayed.  Observe that when a DYONICS II Footswitch is connected the footswitch software version is displayed on the screen and when the footswitch connection is terminated the Software version disappears. | Observed that the Product Name, Model Number, Serial Number, Copyright and Software revisions levels were displayed on the screen.  Observed that the footswitch software version appears when a DYONICS II Footswitch is connected and disappears when the connection is terminated. | \_\_\_\_\_  \_\_\_\_\_ |  |
|  | Observe that when a DYONICS PowerMini MDU is connected to Port A or Port B the MDU software version is displayed on the screen and when the MDU connection is terminated the Software version disappears. | Observed that the MDU software version appears when a DYONICS PowerMini MDU is connected to Port A or Port B and disappears when the connection is terminated. | \_\_\_\_\_ |  |
|  | Observe that when a Reliant MDU is connected to Port A or Port B the MDU software version and serial number are displayed on the screen and | Observed that the MDU software version and serial number appears when a DYONICS Reliant MDU is connected to Port A or Port B. | \_\_\_\_\_ |  |
|  | Observe that when the Reliant MDU connection is terminated the Software version and serial number disappear. | Observed that the MDU software version and serial number disappears when a DYONICS Reliant MDU is disconnected from Port A or Port B. | \_\_\_\_\_ |  |
|  | Observe that when a Reliant MDU is connected to Port A or Port B the MDU software version of 8 characters and a serial number of 11 characters can be displayed on the screen and when the MDU connection is terminated the Software version disappears. | Set a break point in SystemInfoScreen.cpp function UpdateHandPieceVersion. Modify tPortStatus.pcSerialNumber to contain an 11 character serial number and major to be 2 digits. Observed that the MDU software version and serial number appears when a DYONICS Reliant MDU is connected to Port A and Port B and disappears when the connection is terminated. | \_\_\_\_\_ |  |
|  | Observe that when the Reliant MDU connection is terminated the Software version and serial number disappear. | Observed that the MDU software version and serial number disappears when a DYONICS Reliant MDU is disconnected from Port A or Port B. | \_\_\_\_\_ |  |
|  | Observe that pressing the DONE button returns to the previous screen. | Observed that pressing the DONE button from the System Information screen returned to the previous screen. | \_\_\_\_\_ |  |
| 2.2.5.6 b | Observe that pressing the System Reset button and pressing the Yes button for the popup confirmation resets the System Settings.  Observe that pressing the System Reset button and pressing the No button for the popup confirmation resets the System Settings. | Using a break point in the source code verified that when the System Reset button was pressed and the Yes button in the popup confirmation screen was pressed the software reset all required system settings.  Using a break point in the source code verified that when the System Reset button was pressed and the No button in the popup confirmation screen was pressed the software did NOT reset all required system settings. | \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.5.7 a | Observe that pressing the LANGUAGE button from the Settings screen launches the Language screen.  Observe that the language selections include English, German, Italian, Spanish, French, Danish, Dutch, Norwegian, Portuguese and Swedish.  Observe that pressing a button displays a confirmation popup screen.  Observe that pressing the **✓** (YES) button on the confirmation popup screen invokes the currently selected language.  Observe that pressing the **🗶** (NO) button on the confirmation popup screen causes no action.  Observe that pressing the DONE button returns to the previous screen and saves the currently selected language.  Observe that inserting a Test Mode USB key into one of the external USB ports and powering up the system launches the Test Mode warning/error string verification screen.  Observe that touching the Warning/Error on the screen displays the appropriate string in the selected language. | Observed that pressing the LANGUAGE button from the Setting screen launched the Language screen.  Observed that the language selection buttons included English, German, Italian, Spanish, French, Danish, Dutch, Norwegian, Portuguese and Swedish.  Observed that pressing any of the language buttons displays the confirmation popup screen.  Observed that pressing the YES button on the confirmation popup screen invoked the currently selected language by observing the Language screen title text.  Observed that pressing the NO button on the confirmation popup screen did not change the language.  Observed that pressing the DONE button from the Language screen returned to the previous screen.  Inserted a Test Mode USB key into one of the external USB ports, powered up the system and observed that the Test Mode warning/error string verification screen was displayed.  Touched the Warning/Errors on the screen and observed that the warnings and or language changed correctly with the selection. | \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ |  |
| 2.2.6 a | When executing Board Tests, observe that the following tests are performed:   * Power On Self Test * NV Ram Test * Serial Port Test * Buzzer Test * USB Test * Display Test * Handpiece A Test * Handpiece B Test * Footswitch Test * Temperature Test * Power Button Test | Inserting a USB Factory Test keys into either of the external USB connectors and power cycling the system brings up the Factory Test screen. Pressing the Board Tests button and following the instructions shows all of the tests listed are performed. | \_\_\_\_\_ |  |
| 2.2.6 b | Observe that the Board Tests displays a Pass/Fail status for each of the above tests. | Inserting two USB Factory Test keys into both of the external USB connectors and power cycling the system brings up the Factory Test screen. Pressing the Board Tests button and following the instructions shows that each test lists a Pass/Fail status on the left hand side of the screen. | \_\_\_\_\_ |  |
| 2.2.6 c | Observe that the Board Tests requires the use of a special USB key during power up. | Inserting an USB Factory Test key into of the two external USB connectors and power cycling the system brings up the Factory Test screen showing the choice of running Board Tests or System Tests. | \_\_\_\_\_ |  |
| 2.2.6 d | When executing System Tests, observe that the following tests are performed:   * Power On Self Test * Serial Number * NV Ram Test * Serial Port Test * Buzzer Test * USB Test * Display Test * Handpiece A Test * Handpiece B Test * Footswitch Test * Power Button Test | Inserting an USB Factory Test key into each of the two external USB connectors and power cycling the system brings up the Factory Test screen. Pressing the System Tests button and following the instructions shows all of the tests listed are performed. | \_\_\_\_\_ |  |
| 2.2.6 e | Observe that the System Tests displays a Pass/Fail status for each of the above tests. | Inserting two USB Factory Test keys into both of the external USB connectors and power cycling the system brings up the Factory Test screen. Pressing the System Tests button and following the instructions shows that each test lists a Pass/Fail status on the left hand side of the screen. | \_\_\_\_\_ |  |
| 2.2.6 f | Observe that the System Tests requires the use of a special USB key during power up. | Inserting two USB Factory Test keys into both of the external USB connectors and power cycling the system brings up the Factory Test screen showing the choice of running Board Tests or System Tests. | \_\_\_\_\_ |  |
| 2.2.6 g | Observe that pressing the Set Default button resets the Settings to factory default. | Using a break point and pressing the Set Default button, stepped through the code and observed that the Settings were returned to factory default. | \_\_\_\_\_ |  |
| 2.2.6 h | Observe that pressing the Repeat button will repeat a failed test. | Pressed the Repeat Button and observed that a failed test could be rerun. | \_\_\_\_\_ |  |
| 2.2.6 i | Observe that the number of times a System has been powered on and a handpiece activated is displayed as the Usage Count. | Inserted a USB Factory Test key into one of the external USB connectors and power cycling the system brings up the Factory Test screen. Observed that the Usage Count is displayed on the screen.  Removed the USB Factory Test Key, power cycled the device.  Connected a PowerMax Elite to the device. Started and stopped the device 3 times.  Reinserting a USB Factory Test key into one of the external USB connectors and power cycling the system brings up the Factory Test screen. Observed that the Usage Count is displayed on the screen, the value is incremented by 1. | \_\_\_\_\_  \_\_\_\_\_ |  |