

Z.ONE Ultra

Z.ONEUltra SP - ULTRASOUND SYSTEM



SERVICE MANUAL

BREAK THROUGH THE SOUND BARRIER



ZONARE

REVISION HISTORY		
REV	DESCRIPTION	DATE
A	Initial Release of Service Manual for Z.ONEULTRA SP Product	9/09
B	Updated Release to Support 4.3 SW Product Changes	1/10

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1 INTRODUCTION

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1.1 Purpose

This manual's purpose is to provide information to assist service personnel in performing the service, maintenance, and repair procedures that may be required to support ZONARE's **Z.ONEULTRA SP** Diagnostic Ultrasound System product.

1.2 Product Overview

ZONARE's **Z.ONEULTRA SP** Ultrasound System provides a full-featured, cart-based ultrasound system, in a very lightweight package.

The sub-systems that comprise the **Z.ONEULTRA SP** product are listed below:

- Full-Feature **SmartCart SP**
- Docked “**Scanner**” (*Scan Engine* or *Scan Module*)
- Ultrasound transducer(s)

The **SmartCart SP** consists of a limited number of field replaceable units (FRU's). The FRU's for this unit are:

- 19” Display Monitor
- User Interface Assembly
- OLED Sub-Assembly (part of UI)
- Main Board Assembly
- Power Supply Module
- Z-PAK Battery Pack
- Scanner Deck (w/MTP)

- MTP Bolster Plate (or MTP)
- Misc cables and mechanical assemblies

The **Z.ONEULTRA SP** Ultrasound System is offered with two different configurations of scanner electronics.

One version being a standalone portable use “**Scan Engine**” (with local LCD display and user interface controls), and the other being a “brains only” (non-portable) “**Scan Module**”.



Scan Engine



Scan Module

The ultrasound transducers are replaced as a single FRU, with no field-serviceable parts.

1.3 Product Features

The **Z.ONEULTRA SP** ultrasound system includes the following key features:

- Full function scanning modalities (B-Scan, M-Mode, Color Flow, Power Doppler, PW Doppler)
- Remote portability for patient scanning

1.4 Definitions/Acronyms

2D: Two dimensional (B-Mode, Color mode)

BMP: **Bit MaP**

C: Color Flow Mode (Doppler)

D: Doppler (Pulsed Wave) Mode

DICOM: **D**igital **I**maging and **C**ommunication in **M**edicine

DSP: **D**igital **S**ignal **P**rocessing

ESD: **E**lectro **S**tatic **D**ischarge

EV: **E**ndo **V**aginal

FPGA: **F**ield **P**rogrammable **G**ate **A**rray

FRU: **F**ield **R**eplaceable **U**nit

HSSL: **H**igh **S**peed **S**erial **L**ink
LCD: **L**iquid **C**rystal **D**isplay
LED: **L**ight **E**mitting **D**iode
M:..... **M**-Mode (Motion Mode - Tissue)
NTSC:..... **N**ational **T**elevision **S**tandards **C**ommittee (video standard)
PAL: **P**hase **A**lternation by **L**ine (video standard)
PRF:..... **P**ulse **R**epetition **F**requency
PW: **P**ulsed **W**ave **M**ode (Doppler)
Retrospective: .. Post-processing performed on frozen images from memory
SVGA: **S**uper **V**ideo **G**raphics **A**rray
DGC: **D**epth **G**ain **C**ompensation
USB:..... **U**niversal **S**erial **B**us
VKB:..... **V**irtual **K**ey**B**oard

1.5 Documentation Conventions

This following alert conventions are used in this manual:

1.5.1 Alert Messages

1. A **WARNING** indicates that **PERSONAL INJURY OR DEATH** may occur to patient and/or user if the user does not observe the provided information.

WARNING

2. A **CAUTION** indicates that **DAMAGE TO EQUIPMENT** may occur if the user does not observe the provided information.

CAUTION

3. A **PRECAUTION** indicates that **INCONVENIENCE TO THE USER** (such as loss of text entries or saved settings) may result if the user does not observe the provided information.

PRECAUTION

4. Common terms that have a special meaning for the **Z.ONEULTRA SP** (e.g. **Menu Control** or **Trackball**) are capitalized to distinguish their special usage (as opposed to a person who does navigation).
5. Control and function names (e.g. **Print Button**, **Image Display**) are capitalized for recognition.
6. Items to be acted upon are underlined (e.g. press the Store Button). Items needing emphasis are in boldface type.

1.5.2 Symbols

The following symbol conventions are used in this manual, and/or on the **Z.ONEULTRA SP** product:



This symbol is used to draw attention to information that may relate to safety of the patient, the operator, or the equipment.



Caution: ESD sensitive



This symbol indicates that the equipment is not Category AP, and therefore must not be used in the presence of flammable liquids or gasses.



Type BF patient applied part (B= body, F= floating applied part).



This symbol indicates that the equipment does not utilize a floating double insulated isolation connection, and therefore must not be connected to external equipment that is not protectively earthed (DO NOT connect to class II equipment).



Storage/Operating Temperature conditions



Alternating Current (AC)



Direct Current (DC)



Date of manufacture

2 SAFETY

It is extremely important to read the following definitions of WARNING information, prior to beginning any service on any sub-system within the **Z.ONEULTRA SP** product. As you see applicability of each of these noted WARNINGS, during the course of the servicing process, be prepared to avoid harm to persons and equipment by proper adherence.

2.1 WARNINGS During Service/Operation

WARNING



*On the **miniCart**, to prevent possible damage to the 13" display monitor during system transport (or moving for relocation within the facility) the monitor should first be folded down to horizontal, rotated to a center position, and "locked" into place using the provided retaining pin located on the bottom of the display arm.*

WARNING



To prevent possible damage to the electronics of the system from condensation, the following warning must be observed:

Anytime that any Zonare equipment (Scan Engine, SmartCart SP or minCart) is being moved from an environment that differs greatly in temperature and/or humidity, from the environment where it has been moved for intended operation, (as a result of shipping or transport) the unit should be allowed to stand for a period of no less than 30 minutes, prior to inserting battery or powering on.

WARNING



*Inspect all cables and power cords **BEFORE** powering-on the **Z.ONEULTRA SP** system; or connecting the transducer. Do not use the system if visual signs of external damage are observed.*

WARNING



*To achieve proper grounding reliability, the **Z.ONEULTRA SP** SmartCart SP or miniCart power plug must be fully inserted into a receptacle marked 'Hospital Grade'. Do not remove the grounding wire. If there is any question of power outlet or power cord integrity, do not proceed. Obtain qualified technical assistance.*

WARNING



*The ZONARE **Z.ONEULTRA SP** contains no operator-serviceable components within the enclosures. To avoid electrical shock, the no covers should be removed except by ZONARE factory trained personnel. Failure to do so may void the system warranty or service contract coverage Warnings.*

WARNING



Do not operate the **Z.ONEULTRA SP** system in the presence of flammable anesthetics or in a room recently washed with flammable cleaning and disinfecting agents. Cleaners can produce explosive vapors. Check labels of original containers of cleaners and disinfectants for warnings about vapors. Thoroughly ventilate the room, if such vapors may potentially be present, prior to activating any of the **Z.ONEULTRA SP** components.

2.2 Battery WARNINGS

WARNINGS



- The battery has a safe smart device. Do not disassemble or alter the battery in any way.
- Charge the battery at room temperature.
- Do not short-circuit battery by directly connecting the positive and negative terminals with metal objects.
- Do not heat or discard battery in a fire.
- Do not expose the battery to temperatures above 150 degree F.
- Do not charge the battery near a heat source
- Do not leave battery in direct sunlight
- Recharge battery only using Scan Engine in a docked condition in **Z.ONE Ultra** SuperCar or miniCartt, or remotely using ZONARE Z.ONE battery charger.
- Do not use a damaged battery.
- Inspect the battery for damage before charging or placing the battery in the **Z.ONE Ultra**.
- Do not connect battery to an electrical power outlet.
- Do not continue to recharge the battery if it does not recharge fully after 4 hours
- Battery **MUST** be **REMOVED** from Scan Engine, during shipping/transport of the **Z.ONE Ultra**

2.3 CAUTIONS During Service

CAUTIONS



- Apply proper line voltage. Verify that the **Z.ONEULTRA SP** system is compatible to match the AC voltage of site receptacle. Also verify that all plugs match the receptacle type. Mismatched voltage or plug configuration can damage system components.
- Protect the system from water or other liquids that could drip into the electronic components.
- Do not drop the transducer(s), or allow them to impact any hard surfaces.

- Avoid allowing metal contact pins on connector-end of transducers to come in contact with foreign surfaces (potential for bending pins).
- Perform no unauthorized modification to any of the **Z.ONEULTRA SP** sub-systems. Unauthorized modification can introduce additional hazards to the product.

2.4 Battery CAUTIONS

CAUTIONS



- To protect the battery from potential thermal damage, the system monitors the temperature of the battery at all times. If the battery is detected as exceeding the maximum safe operating temperature, a warning message will appear on the display of the **Z.ONE Ultra**.
- To prevent possible damage to the unit, the battery should be **REMOVED** from the Scan Engine prior to transport or shipment.
- Do not immerse battery in water or allow it to get wet.
- Do not put the battery into a microwave oven or pressurized container.
- Use only batteries provided by ZONARE
- Store the battery between -20 to 60° Celsius (-4° to 158° F).
- If the battery leaks, emits orders, emits heat, is deformed or discolored in any way immediately remove it and stop using it.

2.5 USB Memory Stick CAUTIONS

CAUTIONS



USB Memory Sticks that are purchased from outside sources (besides Zonare) may not be compatible for use in the **Z.ONEULTRA SP**. USB Memory Sticks which are labeled as “**U3 Smart Technology**” on their label or packaging, will **NOT** be recognized (or function) in the **Z.ONEULTRA SP**.

In the case of having one of these incompatible format USB Memory Sticks. There are freeware U3 Smart Technology “Removal” programs available on the internet, that can be downloaded and run to make the USB Memory Sticks useable on the **Z.ONEULTRA SP**

2.6 Networking CAUTION

CAUTIONS



In order to comply with Electro-Magnetic Compliance it is necessary that the **Z.ONEULTRA SP** be connected to available Ethernet resources using a high quality, shielded CAT-5 cable.

3 SYSTEM SPECIFICATIONS

This section contains **Z.ONEULTRA SP** system and accessory specifications. For information on the specifications for ZONARE authorized peripherals, refer to the manufacturers' documentation.

3.1 System Dimensions

SmartCart SP (with Scan Module installed)

- Height:
 - Max operational: 157.5 cm (62 in)
 - Min operational: 128 cm (50.5 in)
 - Display lowered for transport: 104 cm (41 in)
- Width: 51 cm (20.1 in)
- Depth: 72 cm (28.2 in)
- Weight: 56 kg (122lb.)

Scan Module

- Height: 5.3 cm (2.1 in)
- Width: 22.3 cm (8.8 in)
- Depth: 25 cm (10.0 in)
- Weight: 1.6 kg (3.5 lb)

Scan Engine

- Height: 7.3 cm (2.9 in)
- Width: 18.7 cm (7.4 in)
- Depth: 25 cm (9.8 in)
- Weight: 2.5 kg (5.6 lb) – with battery, no probe

3.2 Displays

SmartCart SP

- 19" high resolution color LCD display
- 1280 x 1024 display format (internal)
- 1280 x 1024 / 800 x 600 video format - *configurable* (HDMI output)
- 0.41 mm pixel pitch
- Viewing angle (H/V): 170 degrees typical
- Minimum 10:1 contrast

- +/- 90° rotation
- 30° backward tilt
- Full 90° forward tilt into secure transport position
- Advanced setup parameters via on-screen menu
- Integrated system programmed video settings
- Multi-Transducer Port (3 Connectors) - Option

Scan Module

- 640x480 video format (HDMI port)
- USB 2.0 port (one)
- DC power (+12V) input port

Scan Engine

- 5.8" high resolution color LCD display
- 800x480 display format (internal)
- 640x480 video format (HDMI output)
- 0.16 mm pitch
- Manual Brightness and Contrast controls

3.3 Image Archive or Export Storage

IMPORTANT



*The image storage capacity numbers listed below apply **ONLY** to standalone (undocked) Scan Engine use, or use when docked in a **miniCart**. In these applications resolution of the individual image is **640 x 480**.*

*The image storage capacity numbers, when a Scan Engine (or always with a Scan Module) is being used while docked in a SmartCart, will be approximately 1/3 less. This is due to the higher image resolution of **800 x 600** that is used in the **Z.ONEUltra** application.*

Scan Engine - Internal:

- 512MB Internal CompactFlash Storage (Standard)

- DICOM uncompressed: 1280 images
- DICOM RLE: 4060 images
- BMP: 1700 images

- 2GB Internal CompactFlash Storage (Option)

- DICOM uncompressed: 5000 images

- DICOM RLE: 15,900 images
- BMP: 6650 images

SmartCart SP - Internal:

- Internal Hard Drive (*120GB version specs referenced below*)

- DICOM uncompressed: 300,000 images
- DICOM RLE: 944,000 images
- BMP: 399,0000 images

- Slimline Internal DVD+RW / CD-RW Drive

- ATAPI Interface
- 24X speed writing for CD-R, DVD+R, or DVD+RW discs

3.4 Transducers

C8-3D 3-D (*New @ 4.ISW*) **(I.D. 140)**

- Penetration Depth 24 CM
- Number of Elements 128
- Field of View 79 degrees
- Radius of Curvature 40 mm
- Ultrasound Bandwidth 8-3 MHz

C9-4T Convex **(I.D. 146)**

- Penetration Depth 14 CM
- Number of Elements 128
- Field of View 135 degrees
- Radius of Curvature 11.5 mm
- Ultrasound Bandwidth 9-4 MHz

C9-3 Convex **(I.D. 130)**

- Penetration Depth 18 CM
- Number of Elements 128
- Field of View 67 degrees
- Radius of Curvature 33 mm
- Ultrasound Bandwidth 9-3 MHz

C6-2 Convex **(I.D. 129)**

- Penetration Depth 24 CM
- Number of Elements 128

- Field of View 65 degrees
- Radius of Curvature 50 mm
- Ultrasound Bandwidth 6-2 MHz

C5-2 Convex..... (I.D. 128)

- Penetration Depth 24 CM
- Number of Elements 128
- Field of View 65 degrees
- Radius of Curvature 50 mm
- Ultrasound Bandwidth 4-1 MHz

C4-1 Convex..... (I.D. 2)

- Penetration Depth 30 CM
- Number of Elements 64
- Field of View 80 degrees
- Ultrasound Bandwidth 4-1 MHz

L14-5sp Linear..... (I.D. 70)

- Penetration Depth 6 CM
- Number of Elements 128
- Field of View 26 mm
- Ultrasound Bandwidth 14-5 MHz

L14-5W Wide Aperture Linear..... (I.D. 66 or 71)

- Penetration Depth 10 CM
- Number of Elements 192
- Field of View 55 mm
- Ultrasound Bandwidth 14-5 MHz

L12-4V Veterinary..... (I.D. 67)

- Penetration Depth 10 CM
- Number of Elements 128
- Field of View 63 degrees
- Ultrasound Bandwidth 12-4 MHz

L10-5 Linear..... (I.D. 64)

- Penetration Depth 10 CM
- Number of Elements 128
- Field of View 38 mm
- Ultrasound Bandwidth 10-5 MHz

L8-3 Linear..... (I.D. 65)

- Penetration Depth 10 CM
- Number of Elements 128
- Field of View 38 mm
- Ultrasound Bandwidth 8-3 MHz

EV9-4 Transvaginal..... (I.D. 144)

- Penetration Depth 14 CM
- Number of Elements 128
- Field of View 135 degrees
- Radius of Curvature 12 mm
- Ultrasound Bandwidth 9-4 MHz

P10-4 Phased (I.D. 7)

- Penetration Depth 14 CM
- Number of Elements 128
- Field of View 80 degrees
- Ultrasound Bandwidth 10-4 MHz

P4-1 Phased (I.D. 4)

- Penetration Depth 30 CM
- Number of Elements 128
- Field of View 84 degrees
- Ultrasound Bandwidth 4-1 MHz

P4-1c Phased (I.D. 5 or 6)

- Penetration Depth 30 CM
- Number of Elements 64
- Field of View 84 degrees
- Ultrasound Bandwidth 4-1 MHz

P8-3 TEE (I.D. tbd)

- Penetration Depth 18 CM
- Number of Elements 64
- Ultrasound Bandwidth 7.5-2.7 MHz

A2CW Doppler-Only (New 4.0)

- Number of Elements 2

- Ultrasound Frequency 2.0 MHz
- Ultrasound Bandwidth n/a

A5CW Doppler-Only (New @ 4.1SW) .. (I.D. 513)

- Number of Elements 2
- Ultrasound Frequency 5.0 MHz
- Ultrasound Bandwidth n/a

3.5 Accessories/Options

- 2-Pedal Footswitch (*Freeze/Store*)
- 2-Bay Battery Charger
- AC Power Adapter
- USB Memory Stick
- **AVED** (Audio Video Extension Device) Box
 - NTSC output:
 - Horizontal frequency:..... 15.733 KHz
 - Vertical frequency:..... 59.94 Hz.
 - PAL output:
 - Horizontal frequency:..... 15.625 KHz
 - Vertical frequency:..... 50.0 Hz.

3.6 Peripherals

SmartCart SP:

On-Board (Mounted) – Local Image Printing

- Sony UP-D897 USB Digital B/W Printer

Off-Board (Un-mounted)

- Sony UP-D23MD Color Printer
- HP LaserJet (PostScript-3 style) Network Printer ----- (Report printing only)

3.7 Site Requirements

Power

- 100 – 120VAC, 50-60Hz or 200 – 240VAC, 50-60Hz (Factory Configurable)

Environmental

- Cooling consistent with 1024 BTU / hour system output
- Ambient air temperature of 0° – 35° Celsius (32° - 95° F)

- Ambient relative humidity of up to 80%, non-condensing

3.8 System Power

- **SmartCart SP**
 - 90 – 120V @ 6A (max)
 - 200 – 240V @3A (max)
 - Line Frequency: 50 – 60Hz
 - 250 W-h - Nickel Metal Hydride (NiMH) battery pack - (*Option*)

3.9 System Power Protection

- **SmartCart SP**
 - Re-settable AC circuit breaker

3.10 Electrical Specifications

DC Voltages:

- **SmartCart SP DC Power Supplies**

Voltage	Purpose	Max Current Rating
+12V	VMain Logic Power	12 A
+12V	VScanner Power	8 A
+7 to +14V	VFan Power	variable
+12 to +25V	VAux Power (<i>Peripherals</i>)	<i>Future use</i>

- **Scanner Power Board DC Supplies**

Voltage	Purpose	Total Current
+1.2V	DSP Power	2.3 A
+1.5V	Digital FPGA (Digital Board)	11.2 A
	Striker (Analog Board)	
+1.8V	FPGA busses	7.4 A
	ADC's	
	ADC's and AFE's	
+2.5V	DDR SDRAM	0.30 A
+3.3V	CPU, FPGA's, etc.	2.5 A
Vfan	Cooling fans	0.25A
+5.0V	Power Supply monitoring	10 mA
	Levels shifters, muxes, eeprom.	
V5.0RTC	Local power for PIC, etc.	25 mA
+12V	Pulsers	170 mA
HV1	Probe Mux Bias Power	Transducer dependent
HV2	Transmit Power (Tissue)	User variable
HV3	Transmit Power (Doppler)	User variable

- **“Z-Pack” Battery (SmartCart SP) – (Option)**

- Battery, 13-cell, 15.6 VDC, 16 A-hours, rechargeable Nickel Metal Hydride battery pack
- Weight: 7.7 lbs.
- Operating range: (values listed are approximations)
 - Active use At least 1 hour (mode/display brightness dependent)
 - Storage mode (in Scan Engine) Less than 50% loss - 1 month

- **Battery (Scan Engine Only)**

- Battery, 4-cell, 7.4 VDC, 4.4 amp-hours, rechargeable lithium ion battery pack
- Operating range: (values listed are approximations)
 - Active use 30-40 minutes (mode & display brightness dependent)
 - Standby mode 2.0-3.0 hours
 - Storage mode (in Scan Engine) 3 weeks

- **Battery Charger, 2-Bay**

- Models:
 - Z311: Domestic Version..... 110 VAC power cord
 - Z312 : International Version 220VAC power cord
- Operating Modes:

- **CHARGE** Mode 1.0 hour (dependent current charge state)
- **RECALIBRATE** Mode..... 14 hours (discharge->charge->discharge-fully charge)
- Bays:
 - Left Bay **Recalibrate** or **Charge** operation
 - Right Bay **Charge** operation only
- **AC Power Adapter (Scan Engine)**
 - Models:
 - Z316 : Domestic Version..... 110 VAC power cord
 - Z317 : International Version 220 VAC power cord
 - Voltage Output
 - +9V to +12V +/- 5% over loading

3.11 Temperature, Humidity, Pressure Limits

System: (During Operation):

- Temperature 0° to 35° Celsius | (32° to 95 ° F)
- Relative Humidity 15–80%
- Elevation 3,100 to (-116) Meters | 10,200 to (-1,250) Feet

System: (During Shipping/Storage):

- Temperature -20 to 60° Celsius | (-4° to 158 ° F)
- Relative Humidity 15–90%
- Elevation 5,944 to (-116) Meters | 19,500 to (-1,250) Feet

3.12 Device Classification

- FDA Class II Device Classification
- CE / MDD Class IIa-rule 10 active device intended for diagnosis

3.13 Safety Standards

All ZONARE instruments, cables, and diagnostic ultrasound imaging transducers have been designed to meet the essential requirements contained in:

- 93/42/EEC (Medical Device Directive).

In addition, all the above listed equipment meets the following appropriate requirements:

- UL 60601-1 (Standard for Medical Electrical Equipment Part 1: General Requirements for Safety)
- IEC 60601- (Medical Electrical Equipment Part 1: General Requirements for Safety)
- JIS-T-1001 (General Requirements of Medical Electrical Equipment), including limits for current leakage and isolation from a primary power line
- Testing for compliance with the essential requirements of the Medical Device Directive has been performed.

The **Z.ONEULTRA SP** meets the acoustic output emission guidelines established by the U.S. Food and Drug Administration (FDA). Acoustic output quantities have been measured, and are displayed, in accordance with the standards listed under “Guidance Documents”.

3.14 DICOM Standard

- NEMA PS 3.15: 2000, Digital Imaging and Communications in Medicine (DICOM)-Part 15: Security Profiles

3.15 Product Labeling

The following figures depict the labeling that is required by various regulatory authorities, and describe their location.

Contact ZONARE if any of these labels are missing or damaged beyond legibility. The **Z.ONEULTRA SP** labels herein are for reference only and are not shown to scale.

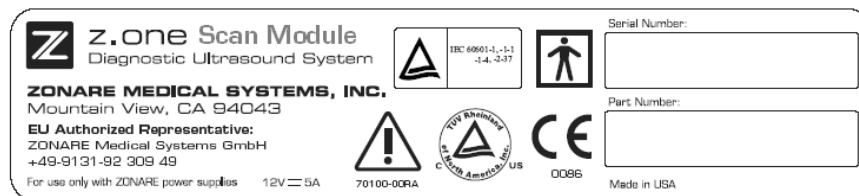


Figure 1: Label, Scan Module - Serial/Part No.



Figure 2: Label, Scan Engine - Serial/Part No.

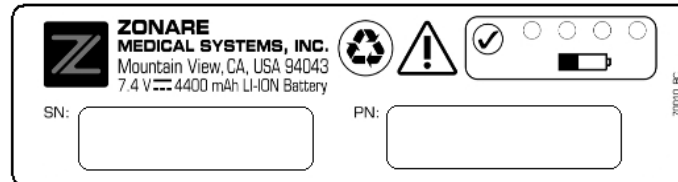


Figure 3: Label, Scan Engine Battery (Version 1) - Serial/Part No.

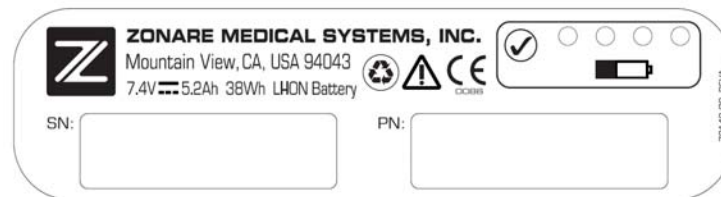


Figure 4: Label, Scan Engine Battery (Version 2) - Serial/Part No.

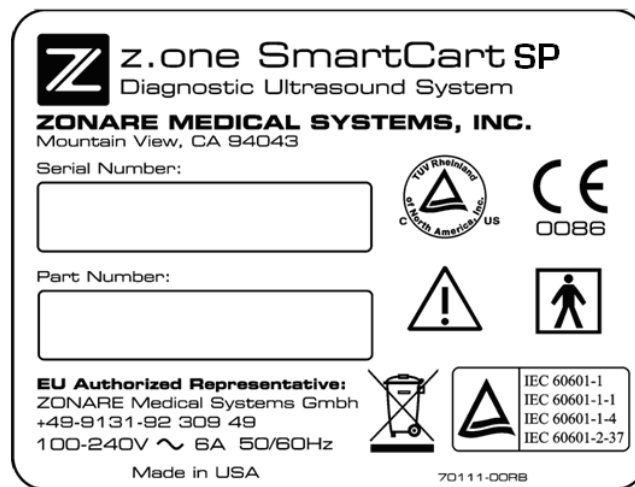


Figure 5: Label, 100V-240V SmartCart SP Rear Panel - Serial/Part No.

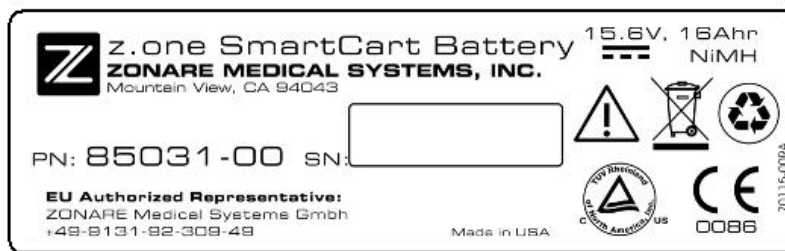


Figure 6: Label, SmartCart SP Z-Pak Battery



Figure 7: Label, Linear Array Transducers - Serial/Part No.



Figure 8: Label, Curved Array Transducers - Serial/Part No.



Figure 9: Label, Endo Cavity Transducer - Serial/Part No.



Figure 10: Label, Phased Transducers - Serial/Part No.



Figure 11: Label, Specialty Transducers - Serial/Part No.



Figure 12: Label, AC Power Battery Adapter

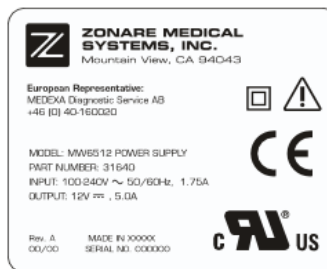


Figure 13: Label, AC Power Adapter Power Supply

4 TOP-LEVEL PRODUCT OVERVIEW

4.1 Major Assembly Identification



SmartCart SP



Scan Module



Scan Engine

Figure 14: Z.ONEUltra_{SP} Major Assembly Illustrations

4.2 Transducers



Linear



Curved



Phased



Endo-Cavity

Figure 15: Transducer Illustrations

4.3 Accessory Components



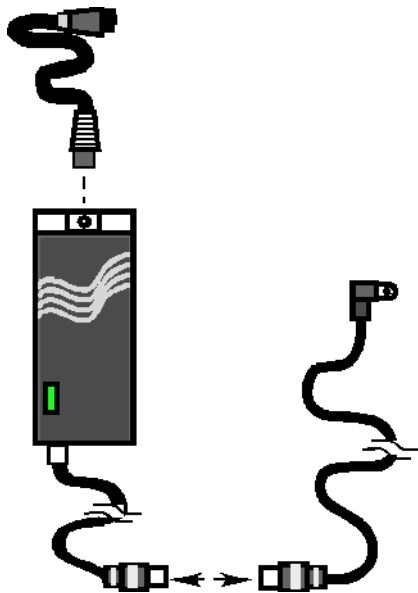
USB Memory Stick



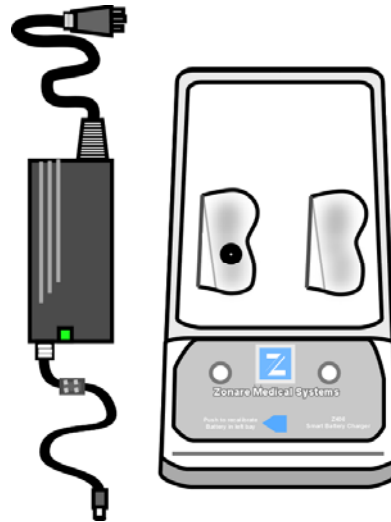
Lithium-Ion Battery Pack



2-Pedal Footswitch



AC Power Adapter



Battery Charger, 2-Bay

4.4 SmartCart SP Major Assemblies (shown with MTP Multi- probe Option)



4.5 SmartCart SP User Interface Controls (Overview)

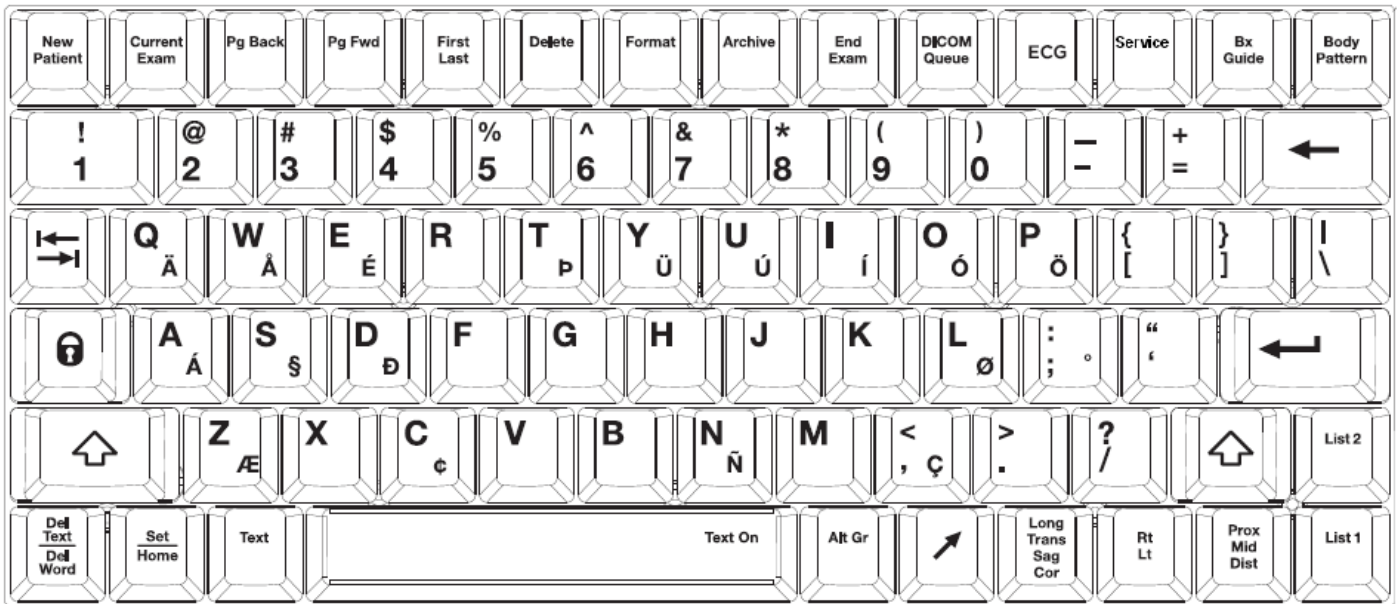
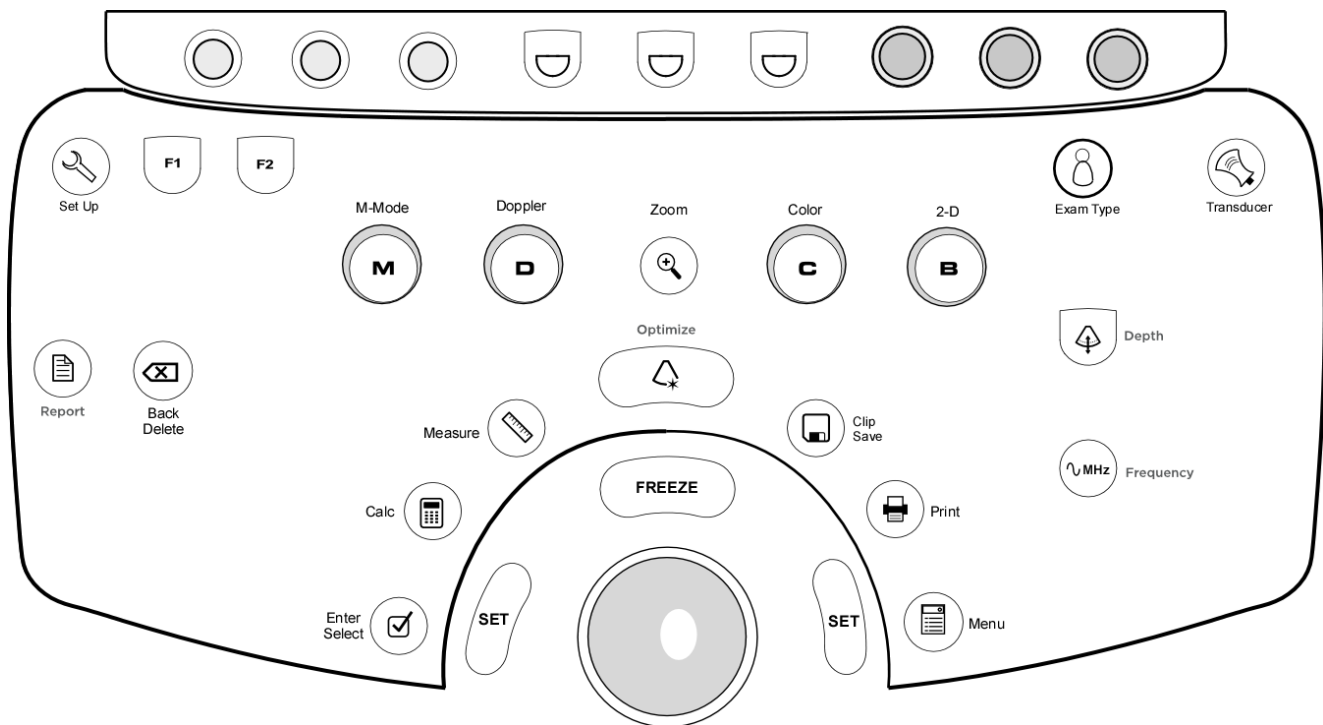


Figure 16: SmartCart SP User Interface Controls (Overview)



4.6 SP Cart User Interface Controls (Detailed)

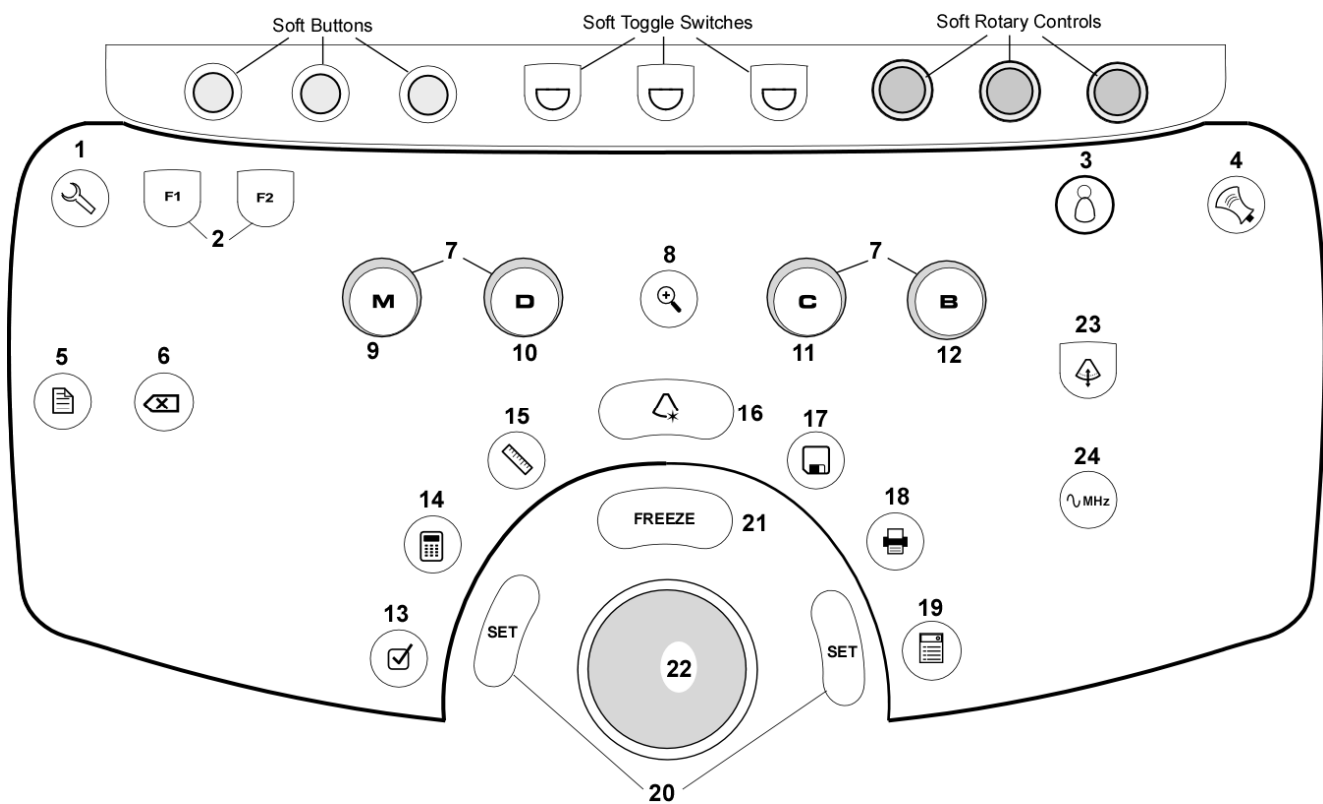






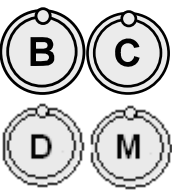
















Figure 17: SP Cart User Interface Layout


4.6.1 SP Cart User Interface Functions


Number	System Control	Description
1	 SETUP	Used to bring up the system setup configuration menu.
2	 F1 –F2	Function keys, user configurable in System Setup menu
3	 EXAM TYPE	Brings up selection of exam types to the OLED display windows.
4	 Transducer (MTP)	Used to bring the available transducers to the OLED display windows, for selection of a desired transducer from the 3-Port MTP panel.
5	 REPORT (Calc)	Initiates a Calculation report
6	 BACK/DELETE	Returns to the previous menu page, or deletes text entries
7	 GAIN	Changes overall gain for applicable modality (outer ring)
8	 ZOOM	Initiates the variable image magnification process
9	 M	M-Mode (tissue motion), toggle activates/de-activates


10		D	Doppler (Pulsed Wave), toggle activates/de-activates
11		C	Color (Doppler) Mode, toggle activates/de-activates
12		B	B- Mode/2-D (Tissue mode)
13		SELECT	Activates currently highlighted selection in the on-screen menu.
14		CALC	Brings up the Calculations menu page.
15		MEASURE	Multi function key: 1) Brings up dynamic caliper (live) or Calc menu (frozen) 2) Toggles on/off the Auto-Dop Trace function, in PW Doppler mode
16		OPTIMIZE	Dual function: “ ZST ” Sound Speed Correction and/or “ AutoOpt ” (DGC)
17		CLIP/SAVE	Sends current image to device(s) previously specified in System Setup menu (Local Printer, DICOM printer, DICOM store).
18		PRINT	Sends current image to device(s) previously specified in System Setup menu (Local Printer, DICOM printer, DICOM store).
19		MENU	Brings up access to four (4) on-screen menus (<i>Imaging, Presets, Patient Info, Tools</i>)

20  **“SET”** Used to toggle the function of active items on display (equivalent to a “mouse click”)

21  **FREEZE** Halts or re-starts active imaging on the display

22  **Trackball** Used for positioning the cursor, defining size/position of ROI in color mode, positioning measurement tools, reviewing cine-loop images and navigating form/tables/worksheets/reports

23  **DEPTH** Adjusts (Up/Down) the imaging depth of the display

24  **FREQUENCY** Enables increasing/decreasing transmit frequency

4.7 SmartCart SP Keyboard Controls (Detailed)

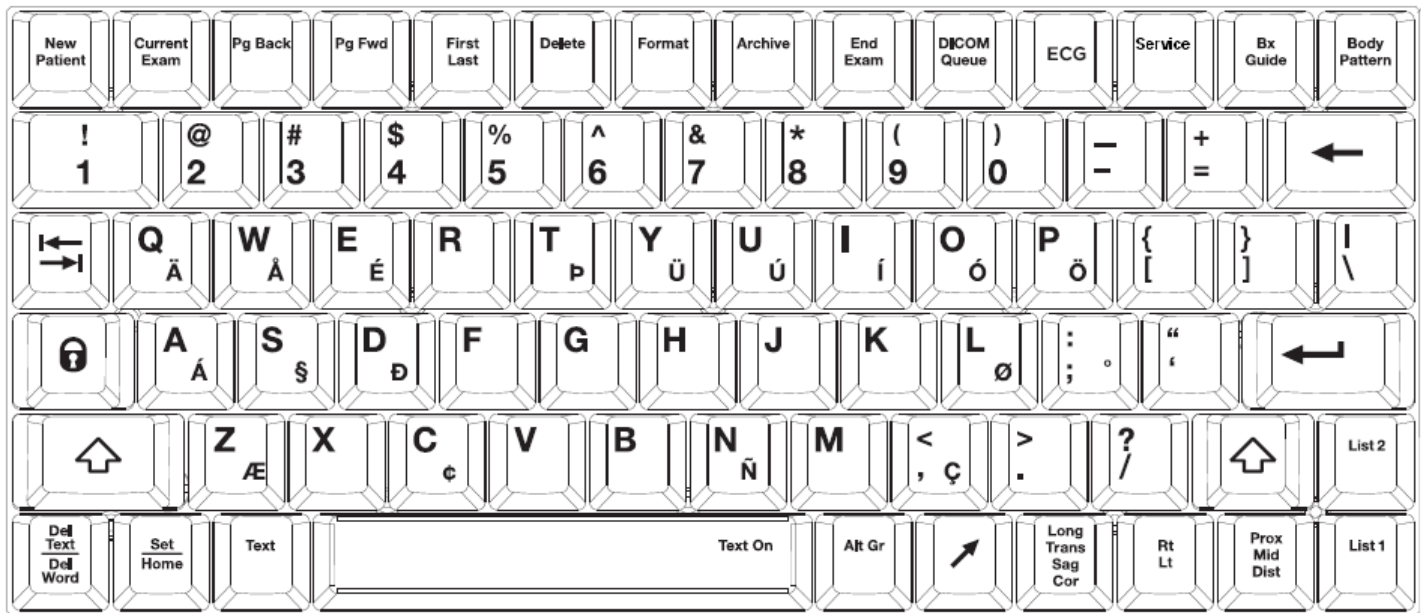


























Figure 18: SmartCart SP Keyboard Layout

KEYBOARD: SPECIAL FUNCTION CONTROLS

Key	System Control	Description
	NEW PATIENT	This is a toggle key. The first press will display the Patient Information page. The second press will return to the imaging display.
	CURRENT EXAM	If there is an exam in progress, pressing this key will display the in-progress exam's images, most recently stored image displayed first. If there is no exam in progress, pressing this key will have no effect.
	PG BACK	This key only works when in in-progress exam review or archived exam review. Pressing this key will display the previous image, or page of images if in a multi-image display format. Once the first page is reached, the key press will have no effect.
	PG FWD	This key only works when in in-progress exam review or archived exam review. Pressing this key will display the next image, or page of images if in a multi-image display format. Once the last page is reached, the key press will have no effect.
	FIRST LAST	This key only works when in in-progress exam review or archived exam review. Pressing this key will toggle between the first stored image (or first page of images in a multi-image display format) and the last stored image (or last page of images in a multi-image display format).
	DELETE	This key only works when in in-progress exam review or archived exam review. When an image has been selected, pressing the Delete key will tag the image for deletion by drawing a red X through it. If the selected image already has been tagged for deletion (red X) pressing the Delete key will remove the red X, untagging the image.
	FORMAT	This key only works when in in-progress exam review or archived exam review. Pressing this key will toggle between the following image formats: 2 x 2, displaying 2 rows of 2 images (4 images); 3 x 2, displaying 2 rows of 3 images (6 images); and a full-size image.
	ARCHIVE	This is a toggle key. The first press will display the Patient Selection Table. The second press will return to imaging.
	END EXAM	When an exam is in progress, pressing the End Exam key will close the exam. If no exam is in progress, pressing this key will have no effect.
	DICOM QUEUE	This is a toggle key. The first press will display the DICOM queue. The second press will return to imaging.
	ECG	CARDIAC Option Systems ONLY: This is a toggle key. The pressing of this key will activate ECG operation and display the ECG trace on the monitor. A repeat press will turn off this function.
	SERVICE	This is a dual-function key. A " quick " momentary press is a shortcut to bring up the USER DIAGNOSTIC PANEL screen. An " extended " press will trigger a capture of a set of current LOG files to the internal archive
	BX GUIDE	This is a toggle key. The first press will display the biopsy needle path guide. The second press will remove the biopsy needle path guide.
	(Arrow)	This is a toggle key. It will only work when the image is frozen. Pressing the key when the image is frozen will display an arrow graphic in the middle of the display.
	BODY PATTERN	This is a cycling key. Pressing the Body Pattern key will display a Body Pattern for the Exam Type in use. Pressing the key will cycle through available Body Patterns, including a blank.

	DEL WORD DEL TEXT	Pressing Del Text will remove all text annotations and arrow graphics displayed. Pressing Shift+Del Word will delete the most recently entered text annotation, whether it be free text, POT, or List entry.
	SET HOME	Pressing Home will move the text annotation cursor to its default home position. Pressing Shift+Set Home will set the current cursor position as the new Home position.
	TEXT	Pressing Text will display the text annotation cursor. Pressing Text again will remove the text annotation cursor.
	ALT GR	Alternate Graphics. Used in conjunction with the QWERTY keyboard, to enable access to international characters.
	LONG TRANS SAG COR	This is a cycling key. Pressing this key will cycle between displaying LONG, TRANS, SAG, and COR, for selection as pre-created text annotation.
	RT LT	This is a cycling key. Pressing this key will cycle between displaying RIGHT and LEFT, for selection as pre-created text annotation.
	PROX MID DIST	This is a cycling key. Pressing this key will cycle between displaying PROX, MID, and DIST, for selection as pre-created text annotation.
	LIST 1	Pressing List1 key will display a list of text items entered in List 2.
	LIST 2	Pressing List 2 key will display a list of text items entered in List 2.

4.8 Scan Engine User Interface Controls (Detailed)

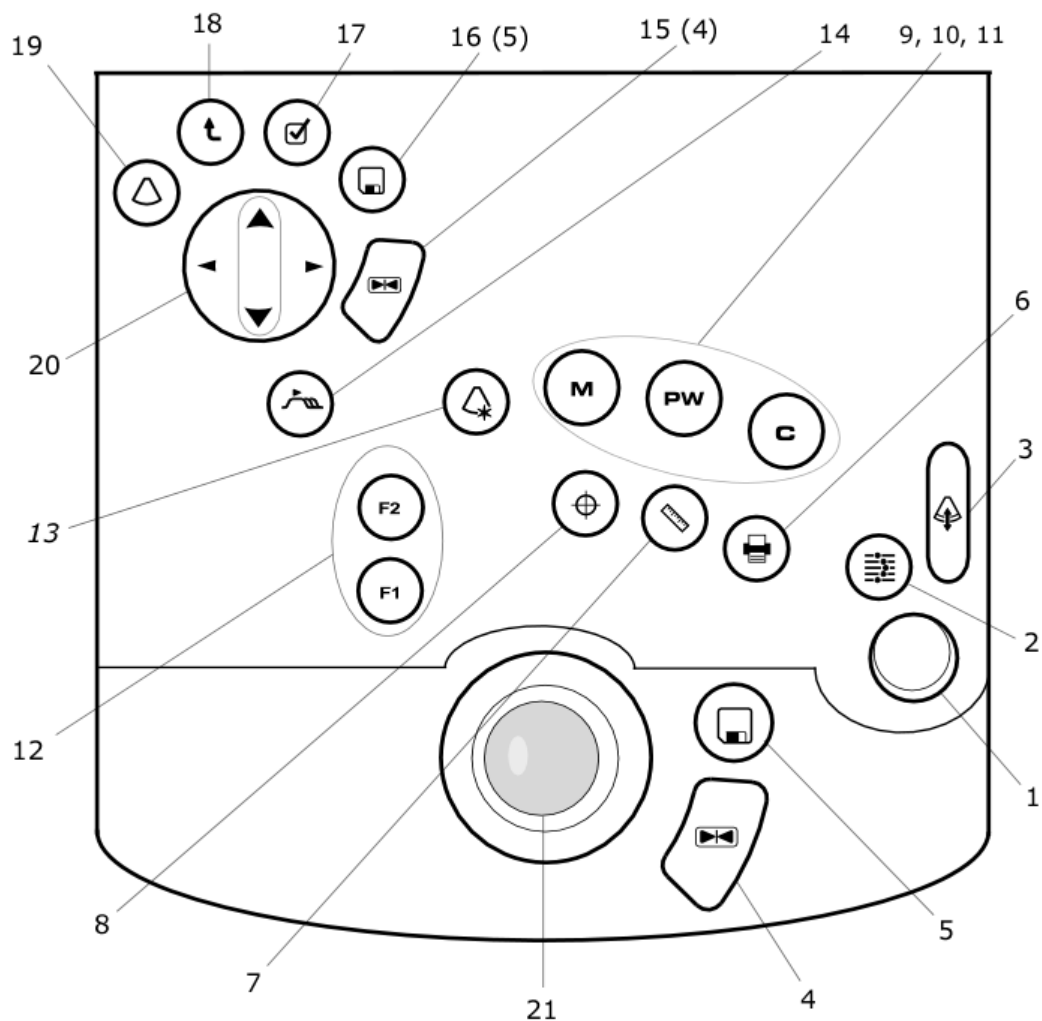
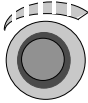

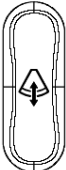


















Figure 19: Scan Engine User Interface Layout (Detailed)

4.8.1 Scan Engine User Interface Functions

Number	System Control	Description
1	 GAIN	Controls the overall gain for B-Mode and Color Doppler
2	 DGC	Turns on the virtual DGC graphic

3		DEPTH	Adjusts the imaging depth shown on the display
4, 16		FREEZE	Halts or re-starts active imaging
5, 17		STORE	Stores current image to the internal archive storage and sends images to device(s) previously specified in System Setup menu (DICOM printer, DICOM store, local Printer). When USB digital printer is selected, key press initiates sending a printed image to the B/W (or Color) printer
6		PRINT	Configurable for same functionality as STORE button above
7		MEASURE	Multi function key: 1) Brings up dynamic caliper (live) or Calc menu (frozen) 2) Toggles on/off the Auto-Dop Trace function, in PW Doppler mode
8		"SET"	Used to toggle a selected item/function on-screen
8		C	Color (Doppler) Mode, Activates/de-activates
10		PW	Pulsed Wave (Doppler), Activates/de-activates
11		M	M-Mode (tissue motion), Activates/de-activates

12		F1, F2	Function keys, user configurable in System Setup menu
13		OPTIMIZE	Dual function: “ ZST ” Sound Speed Correction and/or “ AutoOpt ” (DGC)
14		TAB	Advances through four (4) on-screen main menus (<i>Imaging, Presets, Patient Info, Tools</i>)
15, 16		<i>see item 4 and 5 above</i>	
17		SELECT	Activates the currently highlighted selection in the on-screen menu.
18		BACK	Returns back one window, in the on-screen display menu
19		MODE	Brings up the active scanning mode (C, PW, M) selection screen
20		Menu Control	Functions like a computer mouse or joystick, for scrolling through on-screen menu selections (up/down), and modifying settings for selected on-screen functions (left/right)
21		Trackball	Used for positioning the cursor, defining size/position of ROE in color mode, positioning measurement tools, reviewing cine-loop images and navigating form/tables/worksheets/reports

4.9 SmartCart SP Rear I/O Panel: Layout & Functional Definitions

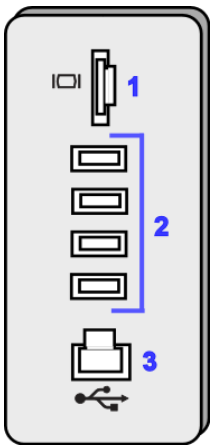


Figure 20: SmartCart SP Rear I/O Panel

4.9.1 Functions: I/O Connectors

#	Function	Direction
1	DVI Digital Video (Using HDMI connector)	Output
2	USB Ports (4)	Input/Output
3	Ethernet 10/100BaseT - (Network)	Input/Output

4.10 Scanner Rear I/O Ports: Layout & Functional Definitions

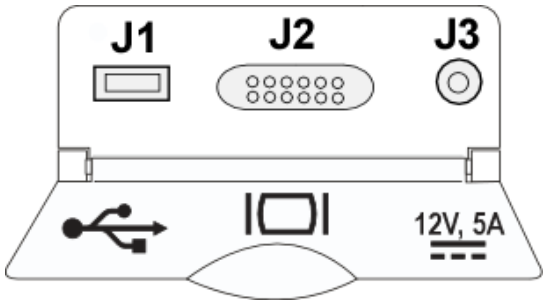


Figure 21: Scanner Rear I/O Connections

4.10.1 Functions: I/O Port Connectors

Jack #	Function	Direction
J1	USB Port	Input/Output

J2	DVI Video - - [HDMI connector]	Output
J3	+12VDC Input - (Zonare AC Power Adapter only!)	Input

4.11 AVED: Audio-Video Extension Device - I/O Panel: (Option)

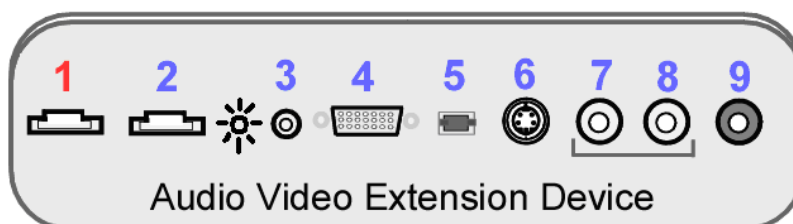











Figure 22: AVED Option - I/O Panel (SmartCart SP)

4.11.1 Functions: I/O Connectors

#	Function	Direction
1 	DVI Digital Video/Audio (Using HDMI connector)	Input
2 	DVI Digital Video (Using HDMI Connector)	Output
3 	VCR/Print Triggers – 2 discrete signals (3.5mm)	Output
4 	VGA Video (Analog)	Output
5 	TOS LINK Audio (Digital)	Output
6 	S-Video (Analog) - (800x600 mode only!)	Output
7 	Audio Out – Right (Analog)	Output
8 	Audio Out – Left (Analog)	Output
9 	Composite Video (Analog) - (800x600 mode only!)	Output

5 SYSTEM UNCRATING & INSTALLATION PROCEDURES

5.1 Product Shipment

Shipping containers should be inspected for damages, and the “Tip-n-Tell” indicator for signs of mishandling during shipment. If any problems are found, immediately notify the shipping carrier. All installation and set-up of equipment should be done following official ZONARE product installation procedures.

5.2 Electrical Requirements

Standard grounded (3-Prong) 110-120 VAC, 15 amp, 60Hz. wall outlets (or proper 220-240 VAC outlets for systems configured for these power requirements) are required for the **Z.ONEULTRA SP** Diagnostic Ultrasound System.

5.3 Environmental and Space Requirements

The **Z.ONEULTRA SP** Diagnostic Ultrasound System may be located anywhere within the facility, as long as there is adequate power outlets and remote network connectivity (at facilities utilizing a DICOM print/storage device hook-up).

5.4 Uncrating

5.4.1 SmartCart SP:

STEPS:

1. Prior to opening any packaging, inspect the “Tip-n-Tell” indicator (attached to the outside of the main shipping box) for signs that the **Z.ONEULTRA SP** has been subjected to shock or tilt conditions during shipment.
2. Also inspect the shipping container for any visual signs of rough handling or abuse during shipment.
3. Make notes of any discrepancies, and immediately report to the shipping carrier and to ZONARE’s shipping department representative.
4. Remove all banding straps surrounding the cardboard main shipping container.
5. Lift off the top cover portion of the main cardboard shipping container, and set aside.
6. Remove the small boxes (containing the **Z.ONEULTRA SP** transducers and Scan Engine) from the inner storage box area (resting atop the SmartCart SP).
7. Lift the inner storage box upwards, and remove it from the main shipping container.
8. Grasping the sides, slide the cardboard main shipping box upwards, exposing the **Z.ONEULTRA SP**. Continue lifting until the cardboard box can be completely removed, and set aside.



Figure 23: Main shipping container removal

9. Remove the clear packing tape that is used to secure the foldable wooden loading ramp in its upward-facing shipping position. Lower the ramp on its hinges.



Figure 24: Loading ramp lowering

10. Remove the clear packing tape that secures the front support to the base during shipping. Grasp the removable front support section of the wooden shipping base (at the bottom-front of the system), pull it directly outwards away from the **Z.ONEULTRA SP**, and set aside.



Figure 25: Removable section of shipping base

11. Remove the plastic packaging bag to expose the **Z.ONEULTRA SP**.



Figure 26: Removing protective storage bag

12. Pull up to the top position on the brake pedal (at the front of the **Z.ONEULTRA SP**), to release locking of the SmartCart SP's wheels.

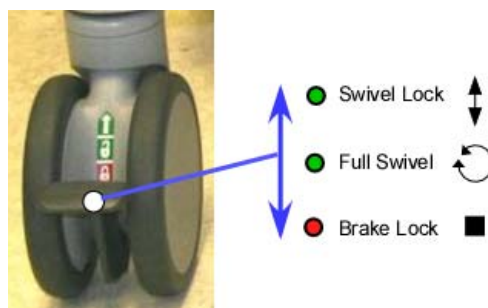


Figure 27: Brake release of wheels

13. Rotate the wheels from their 90 degree angled storage position, to be inline with the loading ramp and enable rolling the system out of crate.
14. Being careful to control the system's momentum, roll the **Z.ONEULTRA SP** down the ramp, and out of crate.
15. Remove all protective plastic wrap and foam packaging materials.
16. Inspect the entire **Z.ONEULTRA SP** for damage, paying close attention to the LCD display on the SmartCart SP.
17. Move the **Z.ONEULTRA SP** to the installation area.

5.5 Mechanical Verification

STEPS:

1. Perform a check to verify proper operation of all of the following mechanical components.
 - Ensure wheels and brakes function properly

- Raise and lower the Cart height adjuster (pull release lever located on the right of the system), to verify smooth operation and positive locking
- Ensure the LCD display monitor rotates and adjusts properly
- Place the Scan Engine onto the Scanner Deck and pull the Scan Engine towards you, to ensure full docking engagement.
- Immediately report any mechanical discrepancies to ZONARE.

5.6 System Installation:

5.6.1 Initial Checks

STEPS:

1. Check to ensure all peripherals, software level, and serial numbers correspond with sales order. Make note of any missing items or discrepancies, and immediately report to ZONARE.
2. Check the two AC power rating labels, located by the system power receptacle and inside the rear cover by the AC outlet box, to verify power rating matches AC power level present at installation site.
3. Measure voltage at AC receptacle, at install site, to verify proper power levels are present.

WARNING



To prevent possible damage to the electronics of the Scan Engine from condensation, the following warning must be observed:

If the Scan Engine has been subjected to an environment during shipping/transport that differs greatly in temperature and/or humidity, from the environment where it has been moved for installation/intended operation, the unit should be allowed to stand for a period of no less than 30 minutes prior to inserting battery or powering on.

5.6.2 Installing the Battery Pack, into the Scan Engine

STEPS:

1. Remove the battery pack from its shipping materials
2. Correctly orient the battery pack and slide fully into the battery port on the Scan Engine, until fully seated (latched).



Figure 28: Battery Pack Installation

5.6.3 Docking Scanner onto SmartCart SP

STEPS:

1. Place the Scan Engine (or Scan Module) in the molded area on the docking plate, so that it will align itself in the cradle.
2. Gently pull the unit towards you until you hear a clicking sound from the release lever securing the system into place.



Figure 29: Scanner Docking in SmartCart SP

WARNING



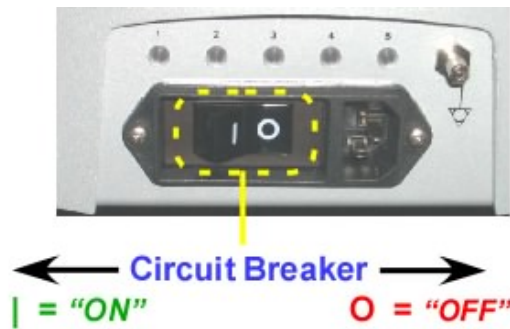
*To maintain the integrity of the electronic equipment within the **Z.ONEULTRA SP**, it is critically important that a specific sequence be followed at all times, for turning **ON** or **OFF** system power. The sequences listed below should always be followed.*

5.6.4 Powering-ON the **Z.ONEULTRA SP**

5.6.4.1 SmartCart SP Power-ON

STEPS:

1. Make sure the AC Main Circuit Breaker on the SmartCart SP is in the “1” (**ON**, pushed in on the **LEFT**) position (see illustration below).



NOTE: *The SmartCart SP has the ability to be powered by AC or battery (IF the Z-PAK battery pack "Option" is ordered). When the SmartCart SP is fully charged the battery should allow for normal system operation for more than 1 hour.*

When the scan engine is docked into the SmartCart SP, its internal battery is subject to being charged. If the SmartCart SP is being AC powered the Scan Engine will utilize the main power supply, with source power coming from the AC input. If the SmartCart SP is running on the Z-PAK battery the scan engine will be charged using source power derived from the battery in the SmartCart SP.

2. Locate the power button on the front/left of the scan engine Scanner Deck. Press and release the On/Off button to power on the **Z.ONEULTRA SP**.



3. The **Z.ONEULTRA SP** will take less than a minute to complete the normal power on sequence.

5.6.5 Powering-OFF the **Z.ONEULTRA SP** System

CAUTION



*To ensure the integrity of the stored User parameters, and system configuration, the Power ON/OFF button on the Scan Engine should always be used **FIRST**, as the method for shutting down a fully operating **Z.ONEULTRA SP** (SmartCart SP and Scan Engine) system.*

*Failure to allow for a normal power-down sequence by the Scan Engine (such as by improperly pulling out the AC power cord or toggling the AC circuit breaker on the SmartCart SP while the **Z.ONEULTRA SP** is still operating), may result in lost patient image data.*

5.6.5.1 Scan Engine (standalone) Power-OFF

STEPS:

- Using the underside of your finger, gently ***press-and-release*** (do not “HOLD”) the green-colored (rubber membrane) Power On/Off Switch at the back/left corner of the scan engine, to initiate the start of a power OFF sequence.



NOTE: *The system will NOT immediately power down, as the Scan Engine will perform a properly ordered shutdown sequence (taking approximately 10 seconds).*

- A message should appear on the display within a few seconds, indicating the start of the normal shutdown sequence.

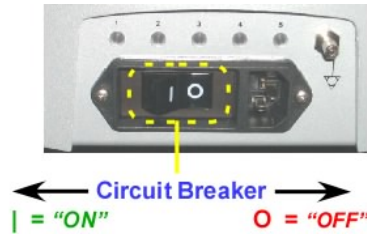
5.6.5.2 SmartCart SP Power-OFF

STEPS:

- Locate the power button on the front/left of the scan engine dock plate. Press and release the On/Off button to begin the power down cycle on the **Z.ONEULTRA SP**.



- Normally the SmartCart SP's main AC circuit breaker power is left "ON", even when the **Z.ONEULTRA SP** has been shutdown from normal use. However if the SmartCart SP is being transported the AC power can be turned OFF, by moving the circuit breaker to the "0" position (pushed in on the RIGHT), prior to disconnecting the AC power cord from the wall outlet



5.6.6 AC Power Adapter: Use & Operation – (Scan Engine Only)

WARNING



There are no User or Field Service repairable components within the AC Power Pack. Any defective units should be returned to the Zonare factory for repair/replacement.

Standalone use (undocked from the SmartCart SP) of a Scan Engine (not possible with Scan Module) normally utilizes a fully charged battery pack to power the unit. However to allow for extended standalone operation of the Scan Engine, an AC Power Pack is available from Zonare as an alternate power source. The output connector of the AC Power Pack is plugged into the DC power port on the rear of the Advanced Hardware Scan Engine.

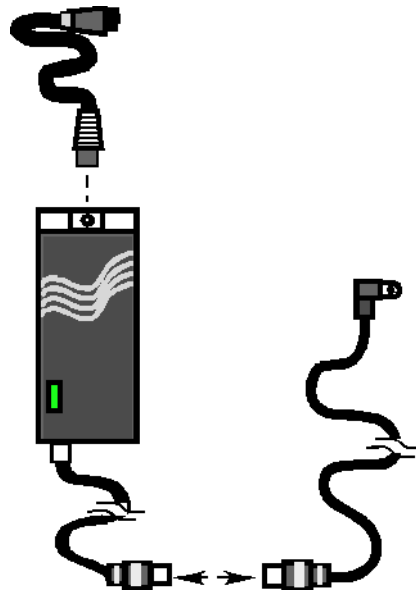


Figure 30: AC Power Adapter

STEPS:

1. Power off the Scan Engine, and ensure it is being used remotely (undocked) from the SmartCart SP
2. Plug the small connector of the DC Adapter Cable, into the mating socket on the DC power port, located at the back of the Scan Engine (inside the Rear I/O access door).
3. Connect the output connector of the DC Power Cable (out of the Power Supply) to the DC Adapter Cable's mating connector
4. Plug the AC Power Cable's female connector into the socket on the Power Supply
5. Plug the other end of the AC Power Cable into an active AC wall outlet
6. Inspect the Power-On indicator LED, on the Power Supply brick, to ensure power is on
7. Power on the Scan Engine and begin normal operation

5.6.7 2-Bay Battery Charger: Use & Operation

WARNING



There are no User or Field Service repairable components within the 2-Bay Battery Charger. Any defective units should be returned to the Zonare factory for repair/replacement.

The Lithium-Ion battery packs, used to power the Scan Engine during standalone (undocked) use, have expected charge retention of approximately 1 hour (during full-use of the Scan Engine). The battery pack is normally kept charged when the Scan Engine is docked within the SmartCart SP. However to prepare multiple battery packs for standalone Scan Engine use, or to recalibrate battery packs for maximum performance, a Zonare 2-Bay Battery Charger is available.

Part Number

Description

Z311

2-Bay Battery Charger, Domestic (120V) Model

Z312

2-Bay Battery Charger, International (220V) Model

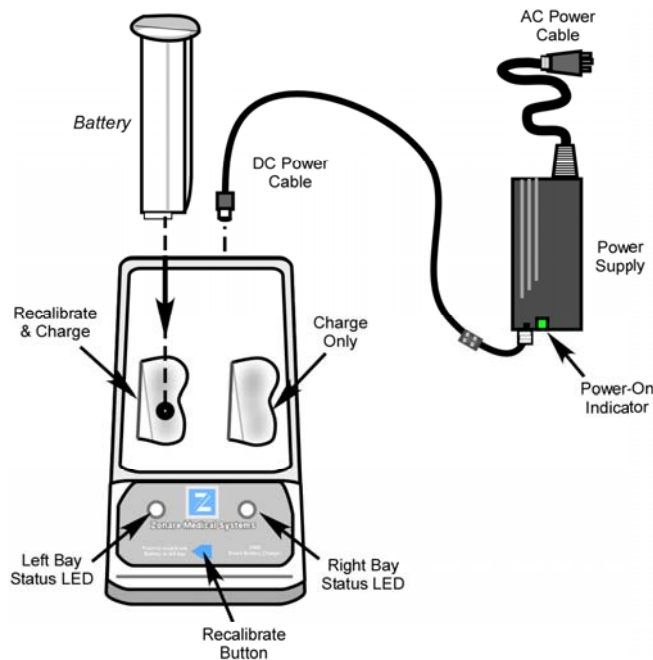


Figure 31: 2-Bay Battery Charger

5.6.7.1 “Recalibrating” Battery Packs

Recommended Intervals:

The **Z.ONEULTRA SP** battery pack contains Lithium-Ion battery cells as well as an electronic “fuel” gauge that keeps track of the charge and discharge cycles of the battery cells. During frequent charge/discharge cycles, it is possible for this fuel gauge to lose its synchronization to the actual charge remaining in the battery. When this happens, it is recommended to “Recalibrate” the battery pack. This process will re-synchronize the fuel gauge to the battery cells.

It is recommended that the “Recalibrating” process be performed on each battery pack at the following interval:

Usage Type	Recommended “Recalibration” Interval
<ul style="list-style-type: none"> Battery packs heavily used in <i>standalone</i> (undocked) Scan Engine mode 	Every 30 charge cycles (or approximately once per month, maximum)
<ul style="list-style-type: none"> Battery packs used in Scan Engines primarily operated docked in SmartCart SP 	Every 2 to 4 months

STEPS:

- Connect the AC power cable to an active wall outlet, and connect the DC power cable between the power supply and the 2-Bay Battery Charger
- Insert the battery pack into the LEFT bay of the 2-Bay Battery Charger (Note: Only the LEFT bay performs “Recalibration”)
- Press the “Recalibrate” button on the 2-Bay Battery Charger

11. During the “Recalibrate” process, the left status LED flashes ORANGE. Once the “Recalibrate” process is completed, this same LED will intermittently flash between ORANGE and GREEN.

NOTE:

- The “Recalibrate” process may require 14 hours to fully complete
- The battery pack should **NOT** be removed **prior** to completion of the “Recalibrate” process, as the battery will be at an unknown level of charge








5.6.7.2 Charging Scan Engine Battery Packs

STEPS:

12. Connect the AC power cable to an active wall outlet, and connect the DC power cable between the power supply and the 2-Bay Battery Charger
13. Insert the battery pack into the EITHER bay of the 2-Bay Battery Charger
14. The charging cycle on the docked battery pack will automatically begin to execute
15. During the “Charging” process, the corresponding status LED flashes GREEN. Once the “Charging” process is completed, this same LED becomes solid GREEN.

NOTE:

- The “Charging” process, in the two bays of the unit, is performed in a “sequential” fashion. If two battery packs are docked into the 2-Bay Battery Charger at the same time, the charger will perform the complete charging sequence on one battery pack, before starting the charging sequence on the second battery.

Status LED Condition	LED	Definition	
OFF		No battery pack detected in bay	
ORANGE – “Flashing”		“Recalibration” of battery pack in progress	
ORANGE/GREEN – “Flashing”		“Recalibration” complete (fully charged)	
GREEN – “Flashing”		“Charging” of battery pack in progress	
GREEN - Solid		“Charging” of battery pack complete	
ORANGE - Solid		“Standby” – Battery in bay, waiting to be charged	
RED – “Flashing” (Error)		Error Cause	Resolution
		<ul style="list-style-type: none"> - Foreign object in bays - Battery pack defective - Excessive battery temp [65°C / 149°F] 	<ul style="list-style-type: none"> Clear charging area Replace battery pack Remove battery to cool

5.7 Transporting - Shipping the Scanner

STEPS:

1. If a transducer is attached to Scanner, disconnect it and store in an appropriately safe/protected manner
2. Ensure that the system is powered off
3. Undock the Scanner from the SmartCart SP
4. Remove the battery pack (if a Scan Engine)

CAUTION




- *To prevent possible damage to the unit, the battery must be REMOVED from the Scan Engine prior to transport or shipment.*

5. For shipment, ensure that the Scanner is packaged in a suitably protective storage container

6 BASIC SYSTEM CONFIGURATION


6.1 Basic System Configuration Procedures

- Entering “**INSTITUTION**” (Hospital) Name

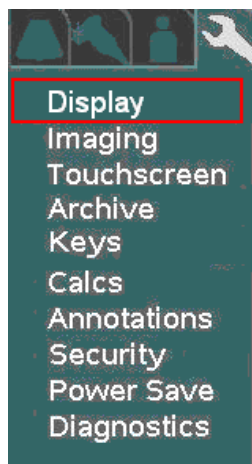
1. Using the MENU button , bring up the menu and select **Tools** menu.

TOOLS Menu



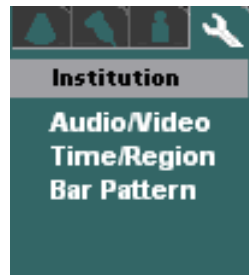
2. Using the Menu Control, arrow down to backlight **SYSTEM SETUP** selection, and press the SELECT button  to bring up this menu.

SYSTEM SETUP Sub-Menu



3. Within the **Display** selection, use the Menu Control to backlight **Institution** selection, press Select button to bring up this menu.

DISPLAY Sub-Menu



INSTITUTION Sub-Menu

Institution Configuration

Name

Institution Name

Address:

Department:

Apply Cancel

- Using the alpha-numeric keyboard, enter Institution name (**Note:** Field is limited to 20 character positions)

• Configuring “AUDIO/VIDEO” Setup

- Within the **Display** selection, use the Menu Control to backlight **Audio/Video** selection, press Select button to bring up this menu.

DISPLAY Sub-Menu



AUDIO/VIDEO Sub-Menu

UI Volume ☐ Off ☒ On

Video Format ☒ NTSC ☐ PAL

System Display ☒ Standard ☐ Image Only

External Video Mode ☒ Standard ☐ Image Only

SmartCart Monitor

Color Temperature

Red 102

Green 98

Blue 125

Brightness 215

Contrast 62

Apply Cancel **SmartCart Settings**

- Select the desired A/V setup parameters from the menu. This is done by using the trackball to move the arrow pointer (in conjunction with the **SET** key), or using the TAB key on the alpha-numeric keyboard to advance to each successive field, and the **ENTER** key to make selections.


Refer to Section 18.7.1 of this manual for details on the procedure and settings to be used in adjusting the Monitor on the SmartCart SP.

- **System Display Mode:**

This selection configures the format of the on-screen video. The selections allow for increasing the amount of screen area used for the display of the main ultrasound image. This enables increasing/decreasing the size of the image to suit the User. The two external video format options available are:

- **Standard:** Standard image size with Dashboard and Thumbnail images displayed
- **Image Only:** Expanded image size (**1280 x 1024**) occupying entire 19" display (no Dashboard/Thumbnails shown)
- **External Video Mode:** (Applicable to SmartCart SP systems ONLY)

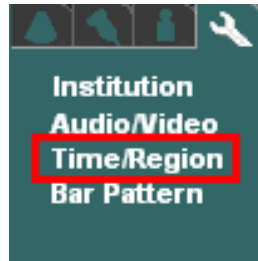
This selection configures the format of the digital video that will be produced at the external HDMI connector (DVI video), on the rear panel of the SmartCart SP. The output format is configurable to allow for matching the target peripheral device (external DVI monitor, etc). The two external video format options available are:

- **Standard:** **1280 x 1024** format (entire screen of SmartCart SP) – No S-Video/Composite output on AVED box.
- **Image Only:** **800 x 600** format (image area only) - Supports S-Video/Composite on AVED box.
- Once all the desired values have been selected, place the arrow cursor over the **APPLY** soft-button displayed in this menu, and press the **SET** key  to save new settings.

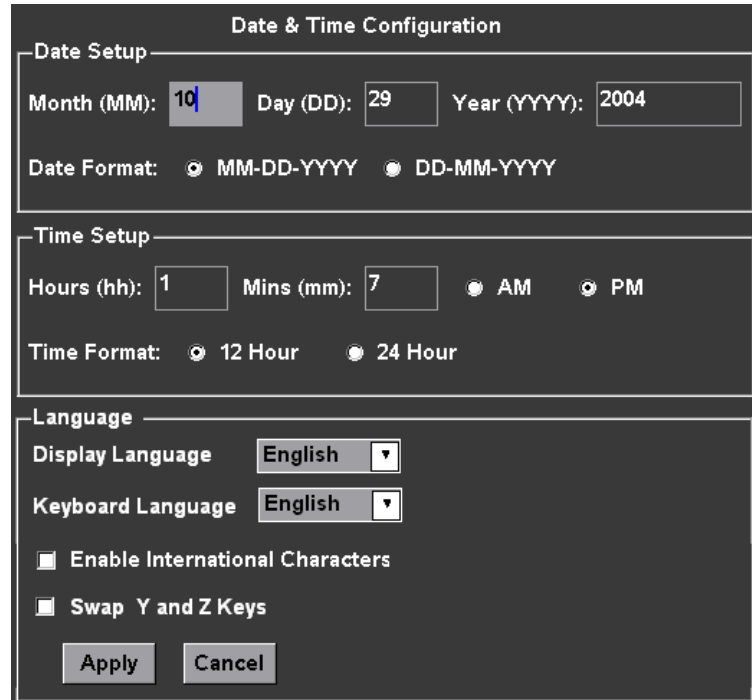
- **Entering “TIME/REGION” Information**


1. Within the **Display** selection, use the Menu Control to backlight **Time/Region** selection, press Select button to bring up this menu.

DISPLAY Sub-Menu



TIME (DATE) Sub-Menu

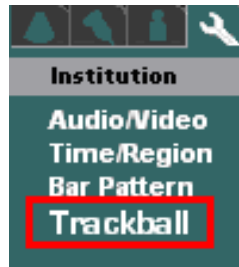
A screenshot of the TIME (DATE) Sub-Menu, titled 'Date & Time Configuration'. It is divided into three sections: 'Date Setup', 'Time Setup', and 'Language'.
The 'Date Setup' section includes fields for 'Month (MM): 10', 'Day (DD): 29', and 'Year (YYYY): 2004'. Below these is a 'Date Format' section with two radio buttons: 'MM-DD-YYYY' (selected) and 'DD-MM-YYYY'.
The 'Time Setup' section includes fields for 'Hours (hh): 1' and 'Mins (mm): 7', followed by radio buttons for 'AM' and 'PM' (selected). Below is a 'Time Format' section with two radio buttons: '12 Hour' (selected) and '24 Hour'.
The 'Language' section includes two dropdown menus: 'Display Language' and 'Keyboard Language', both set to 'English'. Below these are two checkboxes: 'Enable International Characters' and 'Swap Y and Z Keys', both of which are unchecked. At the bottom are 'Apply' and 'Cancel' buttons.

2. Using the alpha-numeric keyboard, enter in the current date/time information. The TAB key on the alpha-numeric keyboard is used for advancing to each successive field.
3. Place the arrow cursor over the **APPLY** soft-button displayed in this menu, and press the **SET** key  to save new settings.

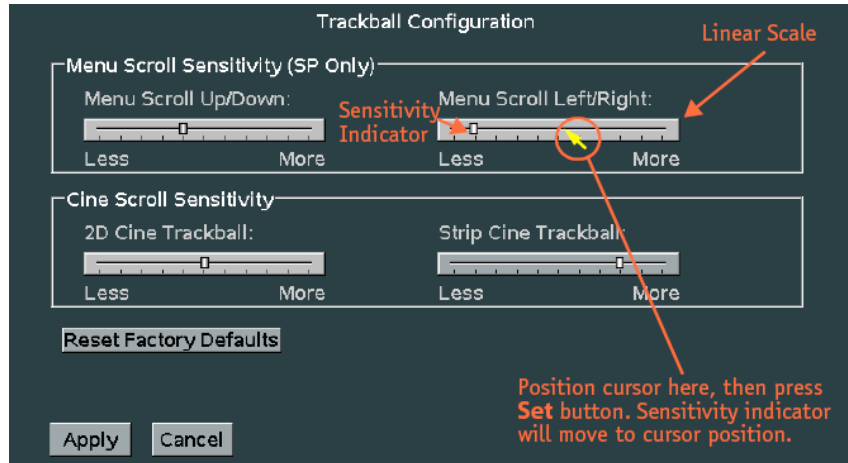
- **Entering “TRACKBALL” Configuration**

1. Within the **Display** selection, use the Menu Control to backlight **Trackball** selection, press Select button to bring up this menu.

DISPLAY Sub-Menu



TRACKBALL Sub-Menu



Cine Trackball Configuration: (Applicable to SmartCart systems ONLY)

This menu allows for configuring the behavior of the trackball to users preferences, independently for a variety of Cine modes. The configurable usages are as listed below:

Menu Scroll Sensitivity

On the **SP Cart (only)**, scrolling through menus and manipulating the settings for selected menu offerings can be performed using the trackball. On the regular SmartCart (full U/I) systems, the left/right-up/down **OMNI** control button is used for this same menu navigation process.

The following two configurable options allow for customizing the sensitivity of the trackball response during those menu operations on the **SP Cart**.

- **Menu Scroll Up/Down:**

Description: Threshold for speed of trackball movement by User when moving **up/down** through offered menu selections.

- **Menu Scroll Left/Right:**

Description: Threshold for speed of trackball movement by User when moving in a **left/right** direction, for altering the setting of a currently selected menu function.

Cine Scroll Sensitivity

- **2D Cine Trackball:** (B-Mode or B-Mode/Color modes)

Description: Controls the number of frames that are advanced in response to each swept trackball movement by the User.


- **Strip Cine Trackball:** (M-Mode or Spectral Doppler modes)

Description: Controls the rate at which the time axis sweep is advanced in response to each sweep of trackball movement by the User.

Reset Factory Defaults::


Description: Restores all trackball setting in this menu, for Cine access, back to factory defaults.

• Configuring “IMAGING” Parameters

1. Using the MENU button , bring up the menu and select **Tools** menu.

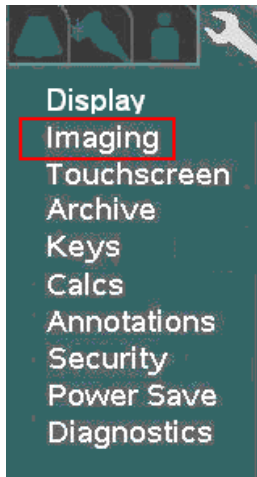
TOOLS Menu



2. Using the Menu Control, arrow down to backlight **SYSTEM SETUP** selection, and press the SELECT button  to bring up this menu, then select **IMAGING** sub-menu.

SYSTEM SETUP Sub-Menu

IMAGING Sub-Menu



Probe Settings

Transducer: L10-5 Category: Small Parts Preset: Thyroid

Acoustic Output Display: MI, TIs

Probe Change: ☒ Preserve exam & preset ☒ Display preset menu

Doppler Settings

PW Update Linear Steer Auto Invert

☒ Update ☒ Linked ☒ On

☒ Simultaneous

Optimize Settings

Regular Extended

☒ Sound Speed ☒ Sound Speed ☒ ZSI Basic ☒ Enable Re-opt

☒ DGC/Gain ☒ DGC/Gain ☒ ZSI Fine

Target Gain Offset:

-25 25


Dual Settings

☒ Enable Simultaneous Presets

TEE Display Settings



☒ Display Temperature

Apply Cancel

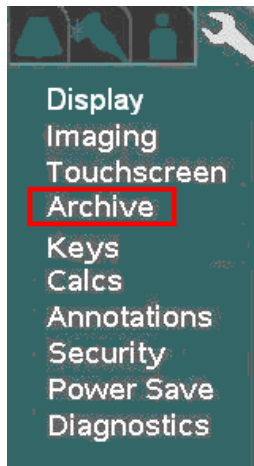
3. For each Transducer type in the pull-down menu, configure the power-up default application type and preset type that are desired.
4. Select the desired default Doppler settings.
5. Select the desired default Auto-Opt/ZST settings
6. Select the desired “DUAL” mode preset behavior setting
7. Place the arrow cursor over the **APPLY** soft-button displayed in this menu, and press the **SET** key  to save new settings.
8. Repeat the process above for all additional transducer types.

7 ARCHIVE MENU FUNCTIONS

7.1 “Media” & “Store/Print” Button Configuration

1. Using the TAB button  advance the menu screen to select **TOOLS**
2. Using the **Menu Control**, arrow down to backlight the **Archive** selection, and press the **SELECT** button  to bring up this menu.

SYSTEM SETUP Sub-Menu



ARCHIVE Sub-Menu



In addition to configuration of the Archive functions, the following operations are also accessed under this menu path.

- LOCATION (site) specific configuration
- Media storage configuration
- Store/Print button configuration
- DICOM setups
- Networking configuration
- Exam management (Archive)
- Serial Port/USB report configuration
- Ejecting of DVD/CD in SmartCart SP

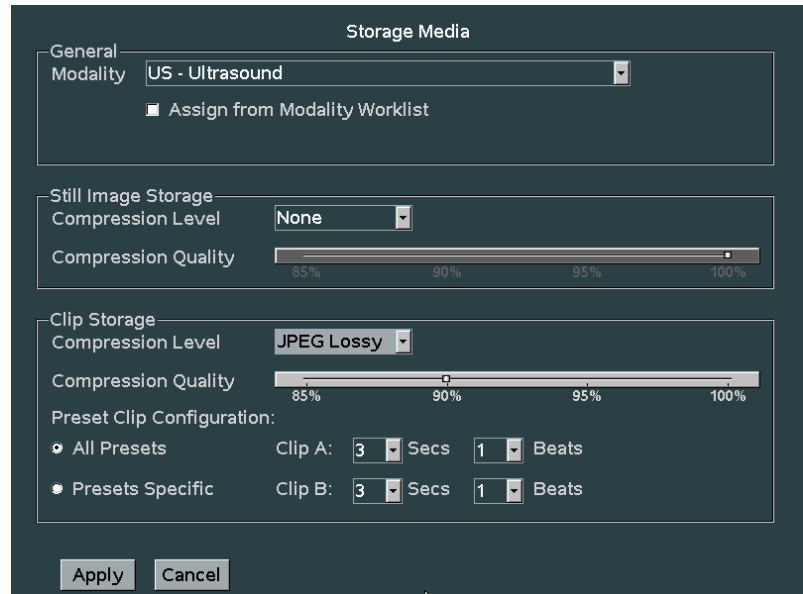
- **“MEDIA” Configuration**


1. Within the **ARCHIVE** selection, use the Menu Control to backlight **Media** selection, press Select button to bring up this menu.

ARCHIVE Sub-Menu



STORAGE MEDIA Sub-Menu



2. Make any changes desired to the settings for still and clip image compression, and defined modality. In most cases using the factory default settings will perform well on a customer system.
3. To save the new settings, select **APPLY** from the main menu, and press the **SET** key  to save new settings.

- **“STORE/PRINT” Button Configuration**

1. Within the **ARCHIVE** menu, use the Menu Control to backlight **Store/Print** selection, press Select button to bring up this menu.

ARCHIVE Sub-Menu

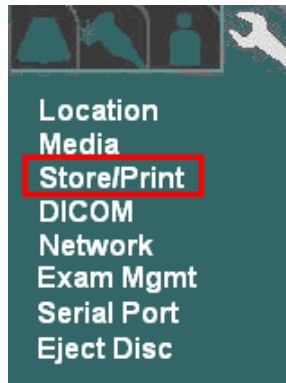
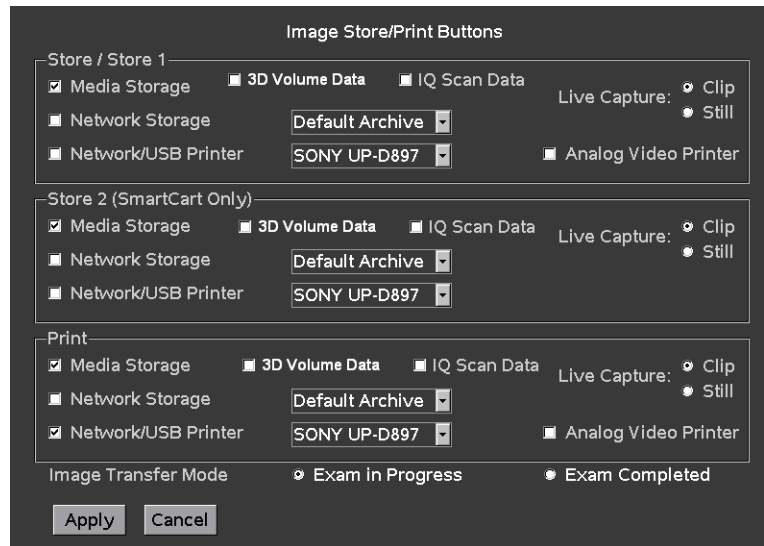





IMAGE STORE/PRINT BUTTONS Sub-Menu




2. Based upon what functions are desired to occur when the PRINT  and STORE  buttons on the **Z.ONE Ultra** are pressed, configure the settings in this menu.
3. In order to have the ability to transfer all aspects of the image data captured using the 3D technology transducer, the **“3D Volume Data”** box must be checked for the corresponding STORE/PRINT button.
4. In order to have the ability to capture raw IQ data images, the **“IQ Scan Data”** box must be checked for the corresponding STORE/PRINT button.
5. Using the **“Live Capture”** option, the STORE/PRINT buttons can be configured to disable capture of **“CLIP”** storage, in the case that the button is pushed while the system is NOT in **“Freeze”** mode.
 - **Clip** If checked, the system will capture live clips when the corresponding STORE/PRINT key is depressed while the system is in live imaging (**“Freeze”** not pressed) mode.
 - **Still** If checked, the system will ONLY grab a single still frame, when the corresponding STORE/PRINT key is depressed while the system is in live imaging (**“Freeze”** not pressed) mode.
6. Configure the **“Image Transfer Mode”** selection to reflect the desired image transfer behavior on the Customer’s system.
 - **Exam in Progress:** Results in each new DICOM image immediately being placed into the DICOM Queue for transfer to the target network/print device, each time the corresponding STORE/PRINT key is depressed.

- **Exam Completed:** Images are buffered during each STORE key depression, and later placed as a group into the DICOM Queue for network/print transfer. The process for beginning the transfer of the images is automatically started when the Operator ends the current exam.

7. To save the new settings, select **APPLY** from the main menu, and press the **SET** key  to save new settings.

7.2 “Exam Management” Menu

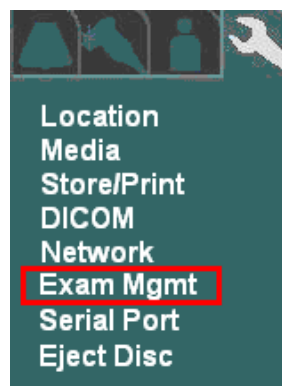
The **EXAM MGMT** menu allows for configuring the functionality of the system when “**Restarting**” exams, and also provides access to low-level service functions for managing a variety of Archive media.


1. Using the page TAB button  to advance menu screen to select **TOOLS** menu; then select **SYSTEM SETUP**, then select **ARCHIVE**.

SYSTEM SETUP Menu



ARCHIVE Menu



2. Using the **Menu Control**, arrow down to backlight **EXAM MGT** selection, and press the **SELECT** button  to bring up this menu.

EXAM MGMT Sub-Menu

The screenshot shows a 'Patient Exam Management' window with a 'Setup' tab. It contains several configuration options for exam restarting. The 'Exams are restarted using:' section has two radio buttons: 'Prior Series' (selected) and 'New Series'. A note below states: 'Note: DICOM MPPS is disabled however enabling DICOM MPPS requires images to be stored in a new series.' The 'Maximum age of exams for restarting:' section has six radio buttons: '1 Day', '2 Days', '1 Week', '1 Month', and 'Unlimited' (selected). The 'Rebuild patient exam database content:' section has two radio buttons: 'Minimum' and 'Complete' (selected). The 'Patient exam database rebuild helper files:' section has two checkboxes: 'Create/Update' and 'Read' (both checked). Below these are three rows, each with a dropdown menu and a button. The first row is 'Rebuild patient exam database:' with a dropdown set to 'Scanner SSD (C:)' and a 'Rebuild' button. The second row is 'Erase all patient data:' with a dropdown set to 'Scanner SSD (C:)' and an 'Erase' button. The third row is 'Format storage media:' with a dropdown set to 'Scanner SSD (C:)' and a 'Format' button. At the bottom are 'Apply' and 'Cancel' buttons.


3. Configure the “**Exams Restarted Using**” selection to reflect the desired grouping of images upon restarting of a previous exam on the Customer’s system.

- **Prior Series:** Appends new images onto the series of images previously captured.

IMPORTANT



“**Prior Series**” selection is **NOT** available (“**New Series**” only) if the system has an active DICOM MPPS server enabled on the DICOM MPPS configuration page.

- **New Series:** Creates a new series of images, utilizing only the Patient info from the earlier exam series.
4. Configure how many days prior to the current date that the Users will be allowed to “**RESTART**” (add/delete images) internally Archived patient exams.
 5. Using the **Menu Control**, arrow down to backlight **Apply** selection in the main menu, and press the SELECT button  to save any exam “**RESTART**” configuration setup changes, and exit

ARCHIVE SERVICE FUNCTIONS:

WARNING



Due to the deletion of the original (assumed corrupted) database file during the “**REBUILD PATIENT EXAM DATABASE**” process, it should be noted that Patient information updates made to initially started exams (i.e. changing Patient name info, etc, after the first image for a study has already been stored) will only be retained in post-rebuilt exam, if the “**READ**” option for the Helper files is “unchecked”.

- **Rebuild Patient Exam Database - Content:**

This option allows for specifying the granularity of the exam database rebuild process that is initiated with the “**REBUILD**” menu selection below.

NOTE: The exam database content granularity selections (described below) does ***not*** have any effect (is not applicable) for rebuilds where the targeted device (via the pull-down selection) is an “External” media (i.e. USB memory sticks, CD/DVD, etc) device.

- **Minimum:** Rebuilds the study/exam table ONLY. Additional rebuilding, of the other tables, will occur later, as each individual study is accessed. (fastest)
- **Complete:** Completely rebuilds all exam database tables, including exam/study table, series table, image/IQ/key image note table. (longer)

- **Patient Exam Database Rebuild “Helper” Files:**

These settings allows for specifying how the database “Helper” files will be affected/utilized, when the “**REBUILD**” operation is performed.

NOTE: Default is both boxes selected (“checked”):

- **Read:**
 - ☒ When **checked:** Tells the system to look for (read) the existence of a valid single “**HELPER**” file (most current patient/exam information for entire study) for each exam, and use its content exclusively for the database rebuild operation (fastest)
 - ☐ When **unchecked:** The system will scan all files in each exam folder, looking for the most current data to be used for creation/update of the “**HELPER**” file. (longer)
- **Create/Update:**
 - ☒ When **checked:** Instructs the system to generate a current “**HELPER**” file for each exam, during the execution of the “Rebuild” process. Once completed, subsequent “Rebuilds” should run much more quickly (as long as the “**READ**” option box is also checked)
 - ☐ When **unchecked:** The system will not create or make any updates to existing “**HELPER**” files, when the “Rebuild” operation is performed.

- **Rebuild Patient Exam Database:**

Clicking on this menu item begins the database “Rebuild” process. The “Rebuild” process is intended to be used in cases where exam access to the patient image ARCHIVE of the internal exam storage of the scan engine, or other archive media (Cart Hard Drive, remote USB media, CD/DVD, etc) becomes problematic.

Selecting the “**REBUILD**” box will regenerate the database’s index file (directory) and potentially resolve the problem. Select the desired media device, using the provided pull-down menu, prior to initiating the “Rebuild” process.

- **Erase All Patient Data:**

WARNING



*Initiating the “**ERASE**” function will completely delete ALL patient exams (all stored images) on the internal ARCHIVE storage of the Scan Engine. **DO NOT** perform this function unless the system’s User has confirmed that all needed exams/images have been exported/transferred to another medium, or are no longer needed.*

*Due to this operation performing individual “deletes”, the “**ERASE**” operation may take an extended period of time to complete if the selected Archive media contains an extensive number of patient exams.*

In extreme cases where the system is totally unable to access the ARCHIVE on either the scan engine or other media (HDD in Cart, etc), selecting the “**ERASE**” function will completely clear (erase) the following:

- All stored patient exams (images)
- All patient exams pending DICOM transfer in DICOM QUEUE (if C drive selected)

Select the desire media device using the provided pull-down menu.

- **Format Storage Media:**

NOTICE



*Initiating the “**FORMAT**” function will result in removing ALL of the target media device. This includes all of the following IF the “C” drive is selected:*

- Patient exams
- System Logs
- DICOM Queue jobs
- Some Transducer file

*To prevent Users from accidentally performing this operation a “Service Password” prompt will appear prior to this “**FORMAT**” operation activating. Contact Zonare Technical Support in order to obtain the service password and assistance on this operation.*

*Due to the erasing of some transducer files, reloading of system software will be required after performing this “**FORMAT**” operation.*

In extreme cases where the system is totally unable to access the internal storage media of the scan engine (“C” drive) or other media (HDD in Cart, etc), selecting the “**FORMAT**” function

will completely reformat the media; erasing all contents. Due to the operation being a complete” **FORMAT**” where no individual files are accessed, it is completed very quickly.

Select the desire media device using the provided pull-down menu.

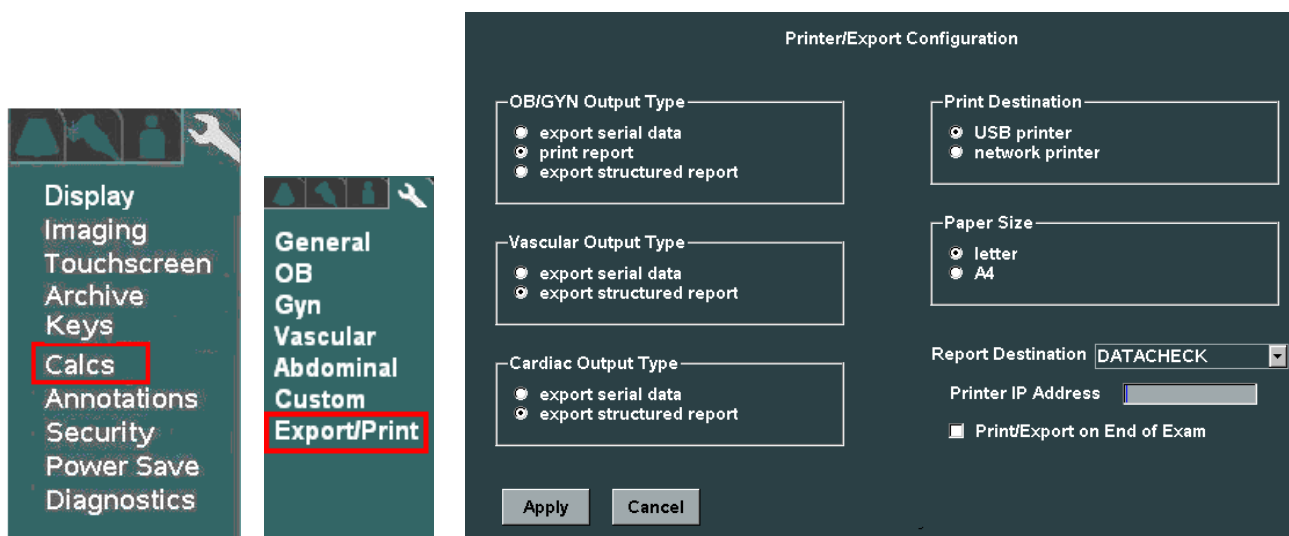
7.3 “Serial Port” Setup - (Export Calc Report Data)


The **SERIAL PORT** configuration menu allows for configuring the system to be able to “EXPORT” report data to 3rd-Party external report generator equipment, via a “USB” port connection on the **ZONEUltra** product (*miniCart/SmartCart*).

The three (3) *types* of Calc report data that can be exported, via the USB port (on a *miniCart/SmartCart*), are as listed below. Configuring which report type(s) will be exported is performed on the **SYSTEM SETUP -> CALCS -> EXPORT/PRINT** menu.

- **OB/GYN** Report Data
- **VASCULAR** Report Data
- **CARDIAC** Report Data

System Setup -> Calc -> Export/Print




6. Using the page TAB button  to advance menu screen to select **TOOLS** menu; then select **SYSTEM SETUP**, then select **ARCHIVE**.

SYSTEM SETUP Menu



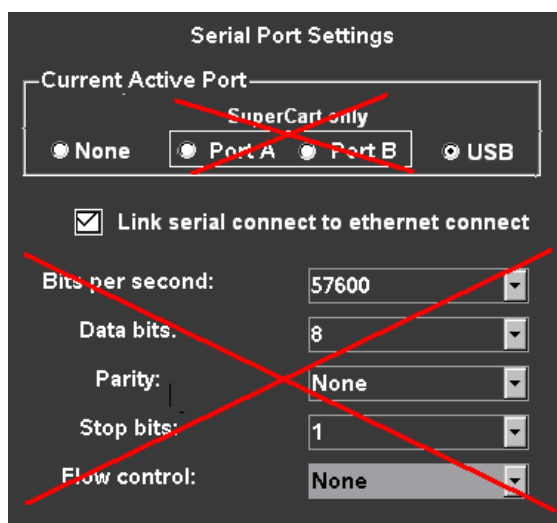
ARCHIVE Menu




7. Using the **Menu Control**, arrow down to backlight **SERIAL PORT** selection, and press the **SELECT** button  to bring up this menu.

NOTE: The serial “*Port A*” and “*Port B*” selections, and all of the serial port setting selections (Bits per second, Parity, etc) in the menu are NOT applicable on the **Z.ONE Ultra** products (*miniCart/SmartCart*). They appear only as a historical function to support the previous generation “*SuperCart*” product.

SERIAL PORT Sub-Menu



8. If desired, check the box to select the **USB** port as the target for EXPORT function of OB/GYN report data.

9. If desired for OB report data to be exported in sync with DICOM image transfers to the PACS system over the network, check the box for “Link Serial Connect to Ethernet Connect”.
10. Using the **Menu Control**, arrow down to backlight **Apply** selection in the main menu, and press the SELECT button  to save the serial port configuration setup, and exit.

8 DICOM CONFIGURATION

8.1 “DICOM” Configuration Overview

Prior to installation of the **Z.ONEULTRA SP** at any medical facility utilizing a **DICOM** network environment, a “Pre-Install Survey Form” (ZONARE P/N: F00044) should have been completed. This form is used for obtaining, in advance, detailed networking and **DICOM** configuration values (IP addresses, AE Titles, etc.) from the *IT/PACS System Administrator* at the facility. These site-specific values/parameters are required prior to programming the entries in the DICOM configuration menus on the **Z.ONEULTRA SP**.

A copy of this “Pre-Install Survey Form” is included on the following pages, as a backup resource.

IMPORTANT



*Once all of the DICOM parameters have been configured into the required DICOM setup menus, it will be necessary to power down and reboot the **Z.ONEULTRA SP** in order to initialize the new network connections with the target devices.*

Z.ONE Network Address Info Requirements:

The following information, defining the **Z.ONEULTRA SP**'s identity on the local network at the medical facility and must be assigned *by the facility's IT/PACS Network Administrator*, prior to beginning the setup of the **DICOM** configuration menus on the **Z.ONEULTRA SP**.

<u>Definition</u>	<u>Assigned Value</u>	<u>Example Only</u>
• Z.ONEULTRA SP (IP Address):	___ . ___ . ___ . ___	10.94.1.105
• Z.ONEULTRA SP (Gateway Address):	___ . ___ . ___ . ___	10.94.1.1
• Z.ONEULTRA SP (Subnet Mask):	___ . ___ . ___ . ___	255.255.255.0

8.2 “DICOM” Configuration Parameter Definitions:

The table below provides some guidance regarding the type of information required for the DICOM configuration of the various menus (“General”, “Printers”, Network Store”, “MPPS” and “Worklist”) on the **Z.ONEULTRA SP**.

DICOM Configuration Parameters:	Definition:
AE Title e.g., “Zonare1”	The official “name” (<i>Application Entity</i>) assigned to the Z.ONEULTRA SP (by the network administrator) to identify it to the network.
Color Model	Defines the method that will be used (Grayscale, RGB color, etc.) by the receiving device (DICOM PACS system) for interpreting the different bit level values of the data, within the transferred images Selections include: - Palette Color - True Color (RGB) - Color by Pixel - True Color (RGB) - Color by Plane - Grayscale (Monochrome2)
Compression - None - RLE Lossless - JPEG Lossy	Enables the ability to compress image files for the purpose of reducing file size and transfer times. RLE Lossless automatically reduces the size of the transferred image, yet retains all source content. Provide the highest level of image file size reduction (compression) of all the options. User selectable “Quality” setting (between 85-100%) determines resultant file size.
Date Range	Specify the number of days back (Today, 2, 7, All) that the DICOM worklist will reference scheduled examinations.
Gateway IP Address	A designated TCP/IP address (i.e 10.1.1.254) that is required in cases where the Z.ONEULTRA SP is to be connected to target devices that are outside the primary host network (FTP remote access, for example).
ICON Image	A sub-sampled (miniature size) version of the image created for each patient image on the Z.ONEULTRA SP . Options are to either <i>retain</i> or <i>remove</i> these images from DICOM image transfers to the target device. (default is “ <i>retain</i> ”)
IP address	Internet Protocol address. A unique Internet address for devices attached to an IP network (TCP/IP network).
Keep Alive Timeout	Specify the duration (in seconds) that an established DICOM connection will be maintained, after completion of the last transfer.
Limit by Modality - None - US (ultrasound) - 50+ additional options: (see list of selections)	Filtering by modality (US, CT, MRI, et cetera) of scheduled patient examination data generated by the Worklist server. Set according to department requirements. None: Show entries for <i>all</i> modalities. US: Show entries for <i>ultrasound</i> exams only. The following additional modality filter (limit) settings are available for selection: Selections – AU, BI, CD, CR, CT, DD, DG, DX, ECG, EPS, ES, FID, GM, HC, HD, IO, IVUA, KO, LS, MG, MR, NM, OP, OT, PR, PT, PX, REG, RF, RG, RTDOSE, RTIMAGE, RTPLAN, RTRECORD, RWV, SM, SMR, SR, ST, TG, US, XA, XC

DICOM Configuration Parameters:	Definition:
Log Level	Defines the level of detail information that will be displayed in the DICOM Queue.
Maximum entries cached Enter a number between 0 and 999	Set according to department requirements. A higher number provides access to more scheduled exams, but increases the time required to search for the exam of interest.
Minimum/Maximum Film Density	For defining Minimum/Maximum density of images on film. Value entered is expressed in hundredths of OD (optical density). A value entered of 150, corresponds with 1.5 OD. Typical acceptable values to be entered are 000-399, with 020 (for "Min") and 300 (for "Max") being a potential starting point.
Network Type	Allows for manual or auto setup of network speed and duplex operational state. Selections include: Auto-Negotiate, 100MB/Full-Duplex, 100MB/Half-Duplex, 10MB/Full-Duplex, 10MB/Half-Duplex
Nickname e.g., "Prep Room Printer"	An informal name to identify the device to users in the department. This name is typically assigned in the department.
Network Usage Type	Defines the interval at which DICOM images will be transferred over the network to the PACS storage device. Either immediately upon each press of STORE ("Exam in Progress"), or at the termination of the current examination ("Exam Completed"). <ul style="list-style-type: none"> - Exam In Progress - Exam Completed
No Color	If selected (checked), images that are captured when the Z.ONEULTRA SP is being operated in modalities where no "Color" is present (B-Mode, PW Doppler, M-Mode), they will be transferred to the receiving DICOM device (Network Store system) as " Grayscale-Monochrome2 ". Despite this " No Color " selection being active, all images captured while in Color Doppler mode will still be transferred to PACS using the color map specified in the <i>Color Model</i> field. If unchecked, all images (regardless of operating mode) will be sent to PACS using the color map specified in the <i>Color Model</i> field.
PDU Receive/Send Size	The size (in bytes) of the basic data packets (PDU: Process Data Unit) that will be transferred during receive and transmit operations. (default is 16384 = 16K)
Pixel Spacing	Adds ability to assign CT/MR-specific pixel spacing to ultrasound images sent to PACS, by assigning non-US pixel spacing from the 2D US region
Polling Interval (minutes) <ul style="list-style-type: none"> - None - choose minutes 	The frequency of automatic updates to the worklist. A short polling interval may impact system performance. Choose a preferred interval; or choose None to update the worklist only on demand.
Port number	The TCP/IP port number that is being used by the DICOM device connected to the Z.ONEULTRA SP . Default port value is 104.
Queue Timeout (sec)	The maximum amount of time that a DICOM job will remain active in the queue, before it times out.
Queue Start Type	Defines whether the start of jobs in the DICOM queue will be performed <i>automatically</i> or started <i>manually</i> .
Reconciliation	For exams NOT YET sent to PACS. Specifies that the system will interrogate the patient information, prior to sending that exam to DICOM PACS device. IF any images in that exam have differing information, the system will reconcile (correct) those values prior to sending.

DICOM Configuration Parameters:	Definition:
Release Association	Specifies whether to release the DICOM association (communications link between the Z.ONEULTRA SP and the DICOM storage device) after each individual image is transferred or maintain it until the entire exam is completed.
Remove Attributes	Specifies any DICOM attributes (i.e. Soft Tissue Thermal Index) that are desired to be removed from the DICOM image header transferred with stored images. This function provided to allow compatibility with all DICOM target devices.
Scheduled Station AE Title	Identity (Application Entity Title) assigned to the Zonare ultrasound system, for use in filtering patient exam scheduling data provided by the Worklist server. Value to be provided by PACs Admin, to meet department requirements.
SR Emulation - (<i>special license req.</i>)	Special feature (license file option required) for forced populating three fields in DICOM header for SR output to enable acceptance by Siemens "SYNGO" PACS <ul style="list-style-type: none"> - (0018,1020) Software Version(s) -- PMS5.1 Ultrasound iU22_4.0.1.1 - (0020,000E) Series Instance UID -- 1.2.840.113663.1500.1.xxx - (0008,0018) SOP Instance UID -- 1.2.840.113663.1500.1.xxx
SR Private Data	Include raw serial calc data as DICOM "Private Element" content, with SR data exported
Station Name	The user-friendly Host name that will be assigned to the Z.ONEULTRA SP for identification on the local network. Should be provided by the Network Administrator.
Subnet Mask	The number of bits (within the 24-bit IP Address) that will be used for defining the "Network" portion vs. the "Host" portion of the TCP/IP address.
TCP Timeout (sec)	The maximum duration (in seconds) of waiting time that will be allowed for completion of transfers over the network. Set according to anticipated network type/ speed.

8.3 ZONEULTRA SP Pre-Install Survey Form (Sample Only)

DICOM Connectivity Type at Customer Site: (Check boxes below, as applicable: *Required*)

DICOM" Network Store"	DICOM" MPPS"	DICOM" Printer Only"	DICOM" Worklist"	No DICOM
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Network Setup Parameters

Level	Parameter Name	User Site Value/Setting	Default / Special Info
<i>Required</i>	TCP/IP Address acquisition method	Obtain Automatically (DHCP) Use Specified	<i>Obtain Automatically</i>
<i>Required</i>	Use Specified (IP Address, if fixed)		
<i>Required</i>	Gateway IP Address (IP Address, if fixed)		
<i>Required</i>	Subnet Mask (IP Address, if fixed)		
<i>Required</i>	Ethernet Media Type (Speed/Duplex)	Auto Select 100MB/Full-Duplex 100MB/Half-Duplex 10MB/Full-Duplex 10MB/Half-Duplex	<i>Auto Select</i>
<i>Service</i>	Wireless Bridge (Service-Support)	<ul style="list-style-type: none"> IP Address: _____ Username: _____ Password: _____ 	<i>Service option</i>

General System / DICOM Setup Parameters

Level	Parameter Name	User Site Value/Setting	Default / Special Info
<i>User option</i>	Application (AE) Title – (Zonare System)		<i>ZONARE</i>
<i>User option</i>	Station Name – (Zonare System)		<i>ZONARE</i>
<i>User option</i>	TCP Timeout (sec.)		<i>30</i>
<i>User option</i>	Queue Timeout (sec.)		<i>120</i>
<i>User option</i>	Queue Start Type	Automatic Manual	<i>Automatic</i>
<i>User option</i>	Keep Alive Timeout (sec.)		<i>3600</i>
<i>User option</i>	Association Acceptor	Port <input type="text" value="104"/> Storage	<i>unchecked</i>
<i>User option</i>	Log Level	Selections: (Normal , None, Debug)	<i>Normal</i>

Printers (DICOM) Setup Parameters (if applicable)

Level	Parameter Name	User Site Value/Setting	Default / Special Info
<i>Required</i>	Nickname - (Printer)		
<i>Required</i>	Application (AE) Title – (Printer)		
<i>Required</i>	IP Address (Printer)		
<i>Required</i>	Port Number		<i>104</i>
<i>User option</i>	Max PDU Receive Size		<i>16384</i>
<i>User option</i>	Max PDU Send Size		<i>16384</i>

User option	Color Mode	Color Grayscale	<i>Color</i>
User option	Number of Copies		1
User option	Print Priority	Low Med High	<i>Med</i>
User option	Image Display Format	Selections: (2x2 , 1x1, 1x2, 2x1, 2x3, 3x2, 3x3, 3x4, 3x5, 4x3, 4x4, 4x5, 4x6, 5x4, 5x5, 5x6, 5x7)	<i>2x2</i>
User option	Medium Type	Default Low Medium High	<i>Medium</i>
User option	Film Orientation	Default Portrait Landscape	<i>Portrait</i>
User option	Film Size	Selections: (Default, 8x10 , 8.5x11, 10x12, 11x14, 11x17, 14x14, 14x17, 24cm x 24cm, 24cm x 30cm, A4, A3)	<i>8x10</i>
User option	Trim	Default Yes No	<i>Yes</i>
User option	Min Film Density	Typical acceptable <i>value range</i> – (000-399)	
User option	Max Film Density	Typical acceptable <i>value range</i> – (000-399)	
User option	Border Density		<i>Black</i>
User option	Empty Image Density		<i>Black</i>
User option	Magnification Type	None Replicate Bilinear Cubic	<i>Cubic</i>
User option	Smoothing Type		

Network Store (DICOM) Setup Parameters (if applicable)

Level	Parameter Name	User Site Value/Setting	Default / Special Info
Required	Nickname - (PACS Server)		
Required	Application (AE) Title - (PACS Server)		
Required	IP Address - (PACS Server)		
Required	Port Number		104
User option	Max PDU Receive Size		16384
User option	Max PDU Send Size		16384
User option	Color Model	Palette Color Grayscale True Color (RGB) – Color-By-Pixel True Color (RGB) – Color-By-Plane	<i>Palette Color</i>
User option	No Color	No Color	<i>unchecked</i>
User option	Remove Attributes	Selections: (iICON Image Sequence, Sequence of Ultrasound Regions, Output Power, Mechanical Index, Bone Thermal Index, Cranial Thermal Index, Soft Tissue Thermal Index, Soft Tissue Focus Thermal Index, Soft Tissue Surface Thermal Index, Depth of Scan Field,	<i>ICON Image Sequence</i>
User option	Pixel Spacing	Assign non-US pixel spacing from 2D US region	<i>unchecked</i>
User option	Reconciliation	Reconcile patient/exam information	<i>unchecked</i>
User option	Object Type	Still/Single-Frame Image Cine/Multi-Frame Image	<i>Always checked (grayed)</i> <i>checked</i>

		IQ Scan/Raw Data SR Document SR Private Data Key Image Note/Key Object Selection Document	<i>unchecked</i> <i>unchecked</i> <i>unchecked</i> <i>unchecked</i>
<i>User option</i>	Release Association	After storing each image in the exam After storing the entire exam	<i>After storing each image</i>

MPPS (*Modality Performed Procedure Step* - DICOM) Setup Parameters (if applicable)

Level	Parameter Name	User Site Value/Setting	Default / Special Info
Required	Nickname - (MPPS Server)		
Required	Application (AE) Title – (MPPS Server)		
Required	IP Address (MPPS Server)		
Required	Port Number		104
<i>User option</i>	Max PDU Receive Size		16384
<i>User option</i>	Max PDU Send Size		16384

Worklist (DICOM) Setup Parameters (if applicable)

Level	Parameter Name	User Site Value/Setting	Default / Special Info
<i>User option</i>	Nickname - (Worklist Server)		
Required	Application (AE) Title - (Worklist Server)		
Required	IP Address – (Worklist Server)		
Required	Port Number		104
<i>User option</i>	Max PDU Receive Size		16384
<i>User option</i>	Max PDU Send Size		16384
<i>User option</i>	Scheduled Start Date	Today Last 2 Days Last 7 Days All	Today
<i>User option</i>	Scheduled Modality	US None Selections – Circle one if desired: (AU, BI, CD, CR, CT, DD, DG, DX, ECG, EPS, ES, FID, GM, HC, HD, IO, IVUA, KO, LS, MG, MR, NM, OP, OT, PR, PT, PX, REG, RF, RG, RTDOSE, RTIMAGE, RTPLAN, RTRECORD, RWV, SM, SMR, SR, ST, TG, US, XA, XC)	US
<i>User option</i>	Scheduled Station AE Title		
<i>User option</i>	Automatic Query Type (Minutes)	Selections: (1, 3, 5 , 10, 15, 30, 60, Disabled)	Every 5 Minutes
<i>User option</i>	Maximum Entries Cached		200
<i>User option</i>	Filter Cached Entries	Filter Cached Entries	On (<i>checked</i>)
<i>User option</i>	Query on Display	Query on Display	Off (<i>unchecked</i>)

Media – Storage Setup Parameters

Level	Parameter Name	User Site Value/Setting	Default / Special Info
User option	General: Modality	Selections – Circle one if desired: (AU, BI, CD, CR, CT, DD, DG, DX, ECG, EPS, ES, FID, GM, HC, HD, IO, IVUA, KO, LS, MG, MR, NM, OP, OT, PR, PT, PX, REG, RF, RG, RTDOSE, RTIMAGE, RTPLAN, RTRECORD, RWV, SM, SMR, SR, ST, TG, US , XA, XC)	<i>US</i>
		Assign from Modality Worklist	<i>unchecked</i>
User option	Still Image Store: Compression Level	None RLE Lossless JPEG Lossy	<i>None</i>
User option	Still Image Store: Compression Quality (active only IF “ JPEG Lossy ” selected)	(85% - 100% selectable)	<i>n/a</i>
User option	Cine Image Store: Compression Level	None RLE Lossless JPEG Lossy	<i>JPEG Lossy</i>
User option	Cine Image Store: Compression Quality (active only IF “ JPEG Lossy ” selected)	(85% - 100% selectable)	<i>90 (%)</i>
User option	Cine Image Store: Duration (Time, in seconds, for Cine Loop Store interval)	(0:03 – 2:00 minutes - <i>m:ss</i>)	<i>0:05</i>

Other DICOM/Network Related Behavior - Settings

Level	Parameter Name	User Site Value/Setting	Default / Special Info
User option	MPPS Destination	Enable Disabled	<i>Disabled</i>
User option	Worklist Destination	Enable Disabled	<i>Disabled</i>
User option	Image Transfer Mode	Exam In Progress Exam Completed	<i>Exam In Progress</i>

8.4 “DICOM” Configuration Procedure - Menus

NOTE: Refer to the “Survey Form” (on the previous pages), for detailed information of all the values that are offered in the **Z.ONEULTRA SP** menus, for selection within the various fields, in each of the following configuration screens.


- **Site Specific ” LOCATION” Configuration**

The “**Location**” option supports cases where a User has a need to physically move their **Z.ONEULTRA SP** system from one facility (location) to another on a regular basis. This function addresses cases where this movement includes connecting to a unique network at each location, for sending to DICOM devices, and those network connections consist of different IP addresses and/or target DICOM devices.

The “Location” feature allows for simultaneously having multiple configurations saved on the **Z.ONEULTRA SP**, and the ability to quickly toggle between those settings by merely changing “Locations” in the menu. The parameters that are saved as a unique “Location” using this feature are as listed below:


- **System Setup->Archive->Network** page settings (IP Address, Gateway, Netmask)
- **System Setup->Archive->DICOM->General** page settings (AE Title, etc)
- **System Setup->Archive->DICOM->Worklist** page settings (*Enabled* server selection)
- **System Setup->Archive->Store/Print** page settings for devices using Print/Store buttons
- **System Setup->Archive->Serial Port** page settings (Calc report data via USB port)

1. To setup a new “Location”, first go to the setup pages listed above, and configure all of the settings (IP Addresses, AE Titles, etc) applicable to the new site location.
2. Once all the Network/DICOM/Store-Print settings have been entered in these other menus, perform the following steps to capture those settings as a new “Location”.

-
3. Using the page MENU button  to bring up the menu, then select the **TOOLS** menu

TOOLS Menu

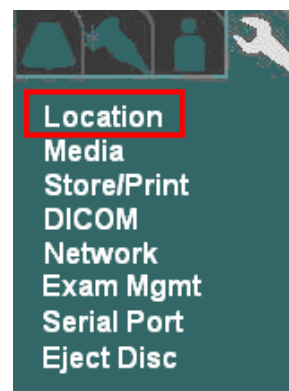



4. Using the **Menu Control**, arrow down to backlight **SYSTEM SETUP** selection, and press the SELECT button  to bring up the main menu, then select the **ARCHIVE** option, followed by the **LOCATION** option.

SYSTEM SETUP Sub-Menu

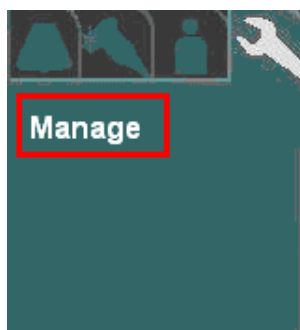


ARCHIVE Sub-Menu

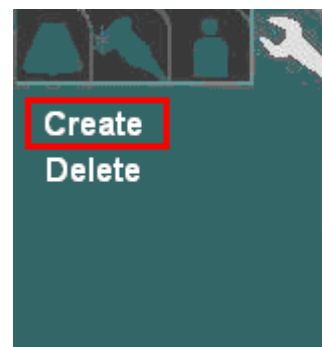



5. Within the **Location** selection, use the Menu Control to backlight **Manage** selection, and press the SELECT button  to bring up this menu.

LOCATION Sub-Menu

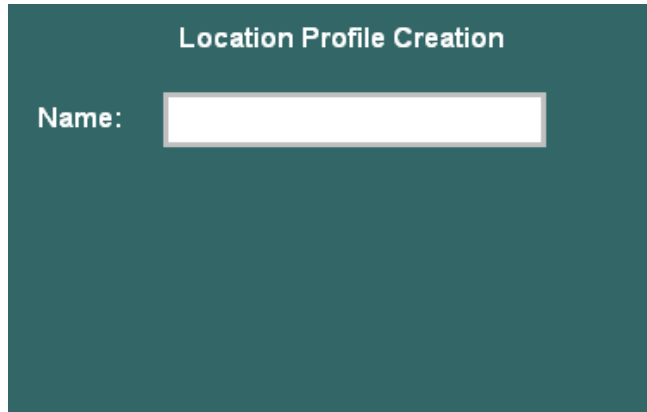



MANAGE Sub-Menu



6. Using the **Menu Control**, arrow down to backlight **CREATE** selection, and press the SELECT button  to bring up the location creation page.


CREATE Sub-Menu



7. Enter in the desired user-defined name to be used for the new “Location”
8. To save the new Location, select **APPLY** from the main menu, and press the **SET** key 
9. Open each of the configuration pages (Network, DICOM General, etc) for parameters that are savable under the Location manager, and enter in the desired settings.


The new settings are automatically saved under the active Location

• DICOM” GENERAL” Configuration

1. Using the page MENU button  to bring up the menu, then select the **TOOLS** menu.

TOOLS Menu

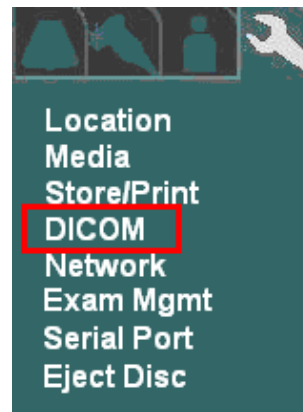



2. Using the **Menu Control**, arrow down to backlight **SYSTEM SETUP** selection, and press the **SELECT** button  to bring up the main menu, then select the **ARCHIVE** option, followed by the **DICOM** option.

SYSTEM SETUP Sub-Menu



DICOM Sub-Menu

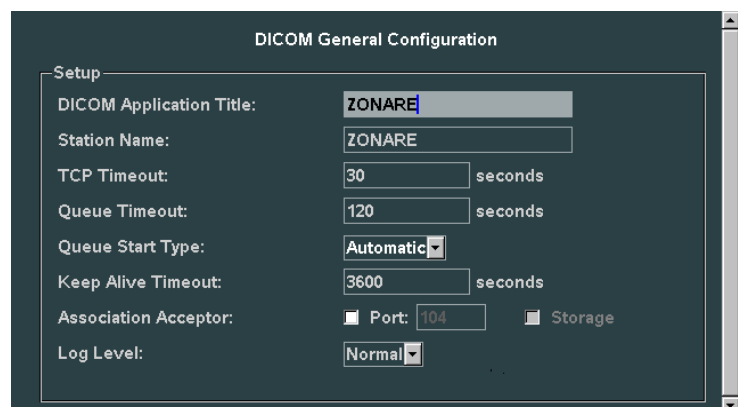



3. Within the **DICOM** selection, use the Menu Control to backlight **GENERAL** selection, and press the SELECT button  to bring up this menu.

DICOM Sub-Menu




DICOM GENERAL Sub-Menu



4. Using the alpha-numeric keyboard, enter in the required **DICOM** configuration values/settings in the appropriate fields, as specified in the information previously provided in the “**Pre-Installation Site Survey Form**”, by the medical facility’s IT System Administrator.
5. To save the new settings, select **APPLY** from the main menu, and press the SET key  to save new settings.

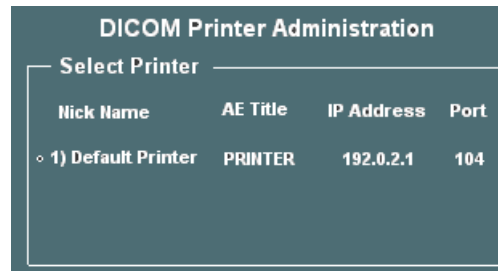
- **DICOM “PRINTERS” Configuration**


1. Within the **DICOM** selection, use the Menu Control to backlight **PRINTERS** selection, and press the SELECT button  to bring up the **DICOM Printer Administration** menu.

DICOM Sub-Menu



PRINTER Administration Sub-Menu

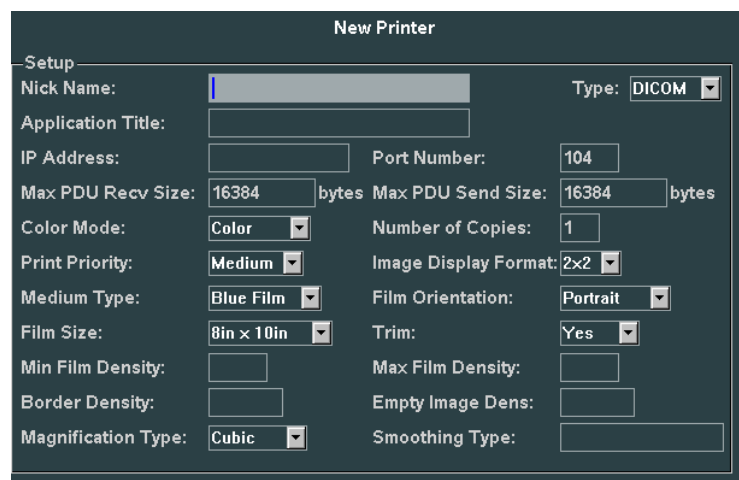


2. To create an entry for a new printer to be added to the DICOM connectivity for the Z.ONE, use the Menu Control to backlight **NEW** from the main menu, and press the SELECT button  to bring up the **DICOM Printer Administration** menu.

DICOM Sub-Menu

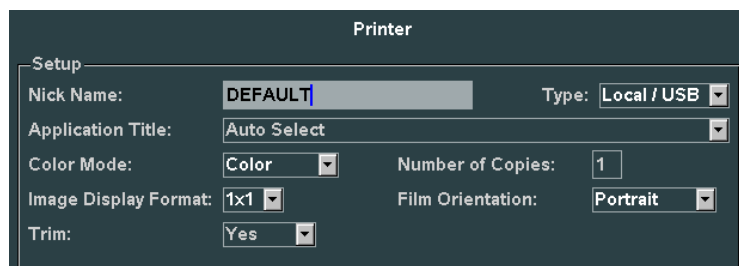


PRINTER New/Edit Sub-Menu




Setup	
Nick Name:	Type: DICOM
Application Title:	
IP Address:	Port Number: 104
Max PDU Recv Size: 16384 bytes	Max PDU Send Size: 16384 bytes
Color Mode: Color	Number of Copies: 1
Print Priority: Medium	Image Display Format: 2x2
Medium Type: Blue Film	Film Orientation: Portrait
Film Size: 8in x 10in	Trim: Yes
Min Film Density:	Max Film Density:
Border Density:	Empty Image Dens:
Magnification Type: Cubic	Smoothing Type:

DICOM Network Printer Setup Page



Printer	
Setup	
Nick Name: DEFAULT	Type: Local / USB
Application Title: Auto Select	
Color Mode: Color	Number of Copies: 1
Image Display Format: 1x1	Film Orientation: Portrait
Trim: Yes	

Local USB Printer Setup Page

- Using the alpha-numeric keyboard, enter in the DICOM configuration values/setting in the appropriate fields, as specified in the information previously provided in the “**Pre-Installation Site Survey Form**”, by the medical facility’s IT System Administrator.
- To save the new settings, select **APPLY** from the main menu, and press the **SET** key  to save new settings.

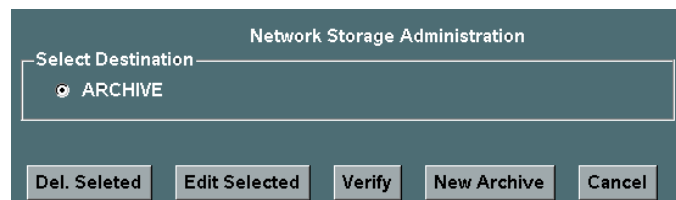
• **DICOM” NETWORK STORE” Configuration**

- Within the **DICOM** selection, use the Menu Control to backlight **Network Store** selection, press Select button to bring up this menu.

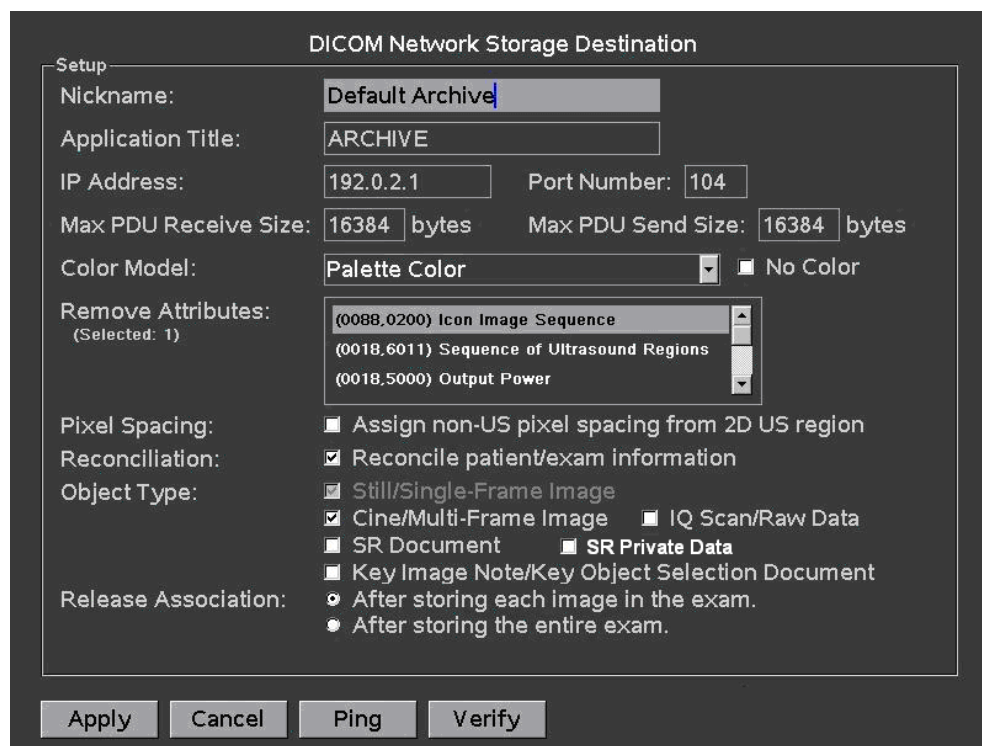
DICOM Sub-Menu



DICOM NETWORK STORE Sub-Menu



- To add a new network store archive, select **NEW** from the main menu, to bring up the following menu.



DICOM Network Storage Destination

Setup

Nickname:

Application Title:

IP Address: Port Number:

Max PDU Receive Size: bytes Max PDU Send Size: bytes

Color Model: ☐ No Color


Remove Attributes: (Selected: 1)

Pixel Spacing: ☐ Assign non-US pixel spacing from 2D US region

Reconciliation: ☒ Reconcile patient/exam information

Object Type: ☒ Still/Single-Frame Image ☐ Cine/Multi-Frame Image ☐ IQ Scan/Raw Data
☐ SR Document ☐ SR Private Data
☐ Key Image Note/Key Object Selection Document

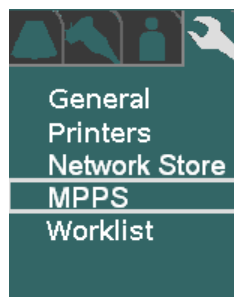
Release Association: ☐ After storing each image in the exam.
☒ After storing the entire exam.

- Using the alpha-numeric keyboard, enter in the DICOM configuration values/setting in the appropriate fields, as specified in the information previously provided in the “**Pre-Installation Site Survey Form**”, by the medical facility’s IT System Administrator.
- To save the new settings, select **APPLY** from the main menu, and press the **SET** key  to save new settings.

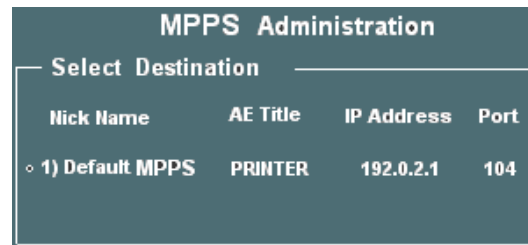
• **DICOM” MPPS” (Modality Performed Procedure Step) Configuration**

- Within the **DICOM** selection, use the Menu Control to backlight **MPPS (Modality Performed Procedure Step)** selection, press **Select** button to bring up this menu.

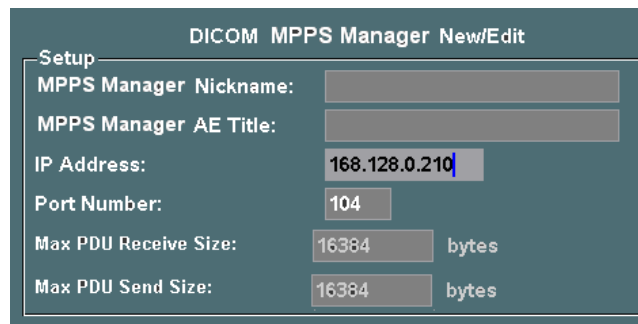
DICOM Sub-Menu




DICOM MPPS Sub-Menu



- To add a new MPPS destination, select the **NEW** from the main menu, to bring up the following sub-menu.



- Using the alpha-numeric keyboard, enter in the DICOM configuration values/setting in the appropriate fields, as specified in the information previously provided in the “**Pre-Installation Site Survey Form**”, by the medical facility’s IT System Administrator.
- To save the new settings, select **APPLY** from the main menu, and press the **SET** key  to save new settings.

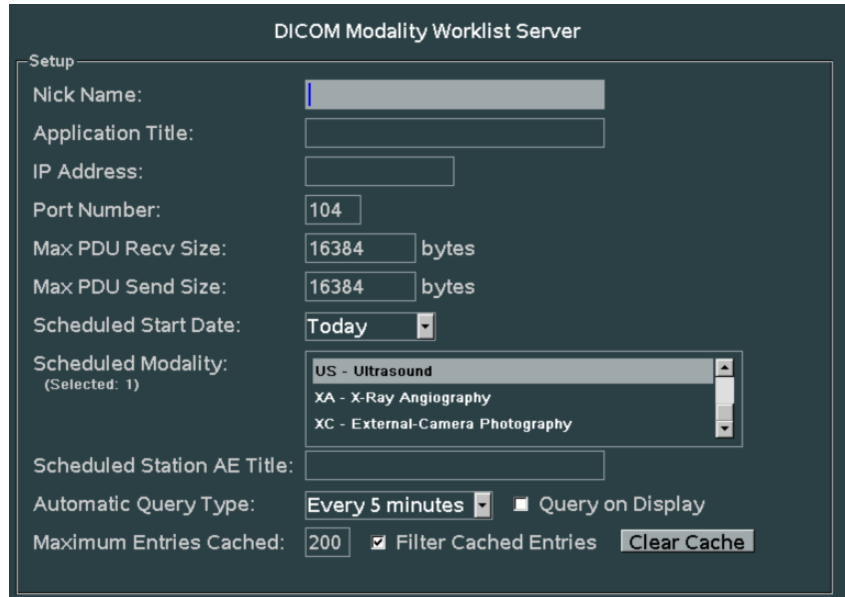
- **DICOM" WORKLIST" Configuration**


1. Within the **DICOM** selection, use the Menu Control to backlight **Worklist** selection, press Select button to bring up this menu.

DICOM Sub-Menu




DICOM WORKLIST CONFIG Sub-Menu

A screenshot of the 'DICOM Modality Worklist Server' setup screen. The title is 'DICOM Modality Worklist Server'. Below it, the word 'Setup' is in a small font. The screen contains several fields for configuration: 'Nick Name:' with a text input field; 'Application Title:' with a text input field; 'IP Address:' with a text input field; 'Port Number:' with a text input field containing '104'; 'Max PDU Recv Size:' with a text input field containing '16384' and the unit 'bytes'; 'Max PDU Send Size:' with a text input field containing '16384' and the unit 'bytes'; 'Scheduled Start Date:' with a dropdown menu showing 'Today'; 'Scheduled Modality:' with a list box showing 'US - Ultrasound' (Selected: 1), 'XA - X-Ray Angiography', and 'XC - External-Camera Photography'; 'Scheduled Station AE Title:' with a text input field; 'Automatic Query Type:' with a dropdown menu showing 'Every 5 minutes' and a checkbox for 'Query on Display'; and 'Maximum Entries Cached:' with a text input field containing '200', a checkbox for 'Filter Cached Entries', and a 'Clear Cache' button.

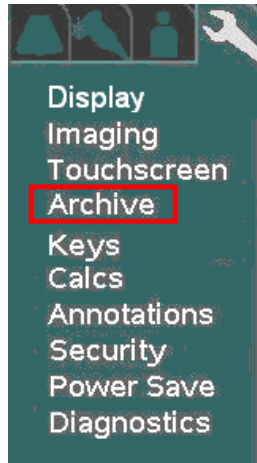
2. Using the alpha-numeric keyboard, enter in the DICOM worklist values/setting in the appropriate fields, as specified in the information previously provided in the “**Pre-Installation Site Survey Form**”, by the medical facility’s IT System Administrator.
3. To save the new settings, select **APPLY** from the main menu, and press the **SET** key  to save new settings.

8.5 “Network” Setup

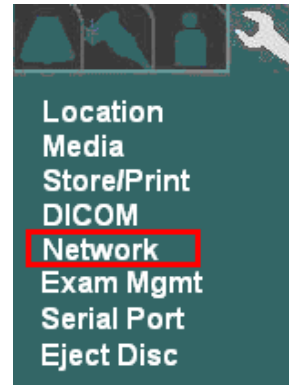
The “NETWORK” configuration menu allows for configuring the TCP/IP networking parameters that will be assigned to define the identity of the Z-ONE on the hospital’s network.



1. Using the page MENU button  to bring up the menu, then select the **TOOLS** menu, then select **SYSTEM SETUP**.

SYSTEM SETUP Menu




NETWORK Menu



2. Using the **Menu Control**, arrow down to backlight **ARCHIVE** selection, and press the **SELECT** button  to bring up this menu.
3. Using the **Menu Control**, arrow down to backlight **NETWORK** selection, and press the **SELECT** button  to bring up this menu.

NETWORK Sub-Menu

The screenshot shows a 'Network Configuration' window with three sections: TCP/IP, Ethernet, and Wireless Bridge. The TCP/IP section has radio buttons for 'Obtain Automatically (use DHCP)' (which is selected) and 'Use Specified:'. The 'Use Specified' option has input fields for IP Address (10.1.100.220), Gateway IP Address (10.1.100.1), and Subnet Mask (255.255.255.0). The Ethernet section has a 'Media Type' dropdown menu set to 'Auto Select'. The Wireless Bridge section has input fields for IP Address, Username, and Password.

4. Using the alpha-numeric keyboard, enter in the required TCP/IP network configuration values/settings in the appropriate fields, as specified in the information previously provided in the **“Pre-Installation Site Survey Form”**, by the medical facility’s IT System Administrator.
5. Using the **Menu Control**, arrow down to backlight **Apply** selection in the main menu, and press the SELECT button  to save the serial port configuration setup, and exit.

8.5.1 “Wireless Network” Equipment - Setup

ZONARE supports wireless connectivity using the **Quatech** (*brand*) **AirborneDirect** (*model*) Wireless Ethernet Bridge (supported model is the ABDG-ET-DP101). This is a plug-and-play wireless networking solution that is compatible with all ZONARE ultrasound systems that support Ethernet connectivity. A special power cable, however, is required to supply power to the **Quatech AirborneDirect** device from a USB port on the ZONARE system, for portable operations.

The **Quatech AirborneDirect** Wireless Ethernet Bridge works with all ZONARE software release revisions; however the 3.5 and subsequent software releases have specific enhancements to provide user feedback for signal strength and wireless connectivity.

The **Quatech AirborneDirect** Wireless Ethernet Bridge supports WiFi 802.11b/g wireless standards and connects to the ZONARE system through a 10 Base-T network interface. This device supports WEP (64/128 bit) and WPA encryption standards, and LEAP for network authentication (LEAP required the Quatech device to be configured with a static 128 bit key; this is known as "migration mode" and is not recommended for longterm use due to the static WEP key requirement). Before using it with the ZONARE system, the **Quatech AirborneDirect** device must

be preconfigured for the user's networking environment – SSID, channel, encryption, and correct addressing scheme (DHCP/static).

Static IP addressing is required in order to be able to display the additional wireless status. When power is applied to a correctly configured **Quatech AirborneDirect** device that is connected to the Ethernet port on the ZONARE system, it will require 30 to 60 seconds to detect and then associate with the user's wireless network. Once a wireless network connection is established, the ZONARE system will reflect the connection state by showing the network ICON on screen, in an uncrossed state.

The configuration of the **Wireless Bridge** is done on the **Network** configuration screen. The source information required for wireless device configuration on the **Z.ONEULTRA SP**, is the static **IP Address** assigned (by the IT Administrator at the install site) to the **Quatech AirborneDirect** device and the **Username** and **Password** for the CLI interface (default is **dpac** for both).

For assistance with the configuration of the local network settings on the **Z.ONEULTRA SP**., to support that aspect of a wireless network installation, contact Zonare Technical Support.

9 ADVANCED SYSTEM SETUP CONFIGURATION

9.1 “Security” Setup Menus

WARNING

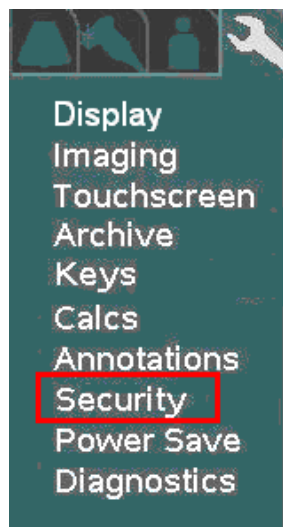



*If the security password is lost or forgotten, there is **NO** master password available to recover system access.*

To restore use of the Z.ONEULTRA SP it will be necessary to perform a complete re-installation of system software. Refer to the “Advanced” Software Installation Procedure information in this manual.

1. Using the page TAB button  to advance menu screen to select **TOOLS** menu.

TOOLS Menu



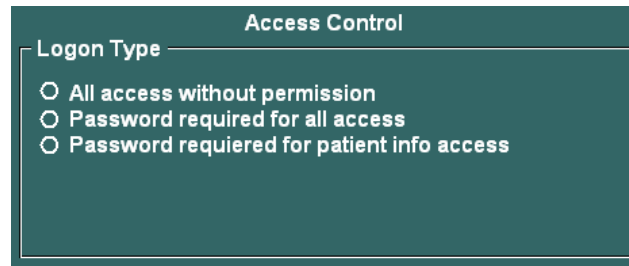
2. Using the **Menu Control**, arrow down to backlight **SECURITY** selection, and press the **SELECT** button  to bring up this menu.

SECURITY Sub-Menu



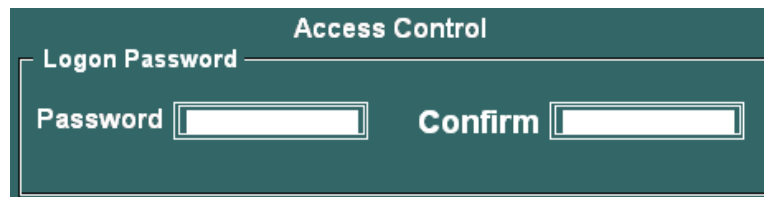
3. Select the desired level of security control, by clicking on the bullet to the left of the desired offering in the menu.

ACCESS CONTROL Sub-Menu



The screenshot shows a dark green rectangular window titled "Access Control". Inside the window, there is a section labeled "Logon Type" with a horizontal line to its right. Below this section, there are three radio button options listed vertically: "All access without permission", "Password required for all access", and "Password required for patient info access".

4. Under the Logon Password field, enter in the desired security access password. (NOTE: You will need to enter it in a second time in the "CONFIRM" field, to ensure accuracy).



The screenshot shows a dark green rectangular window titled "Access Control". Inside the window, there is a section labeled "Logon Password" with a horizontal line to its right. Below this section, there are two input fields. The first field is preceded by the label "Password" and the second field is preceded by the label "Confirm". Both fields are empty text boxes.

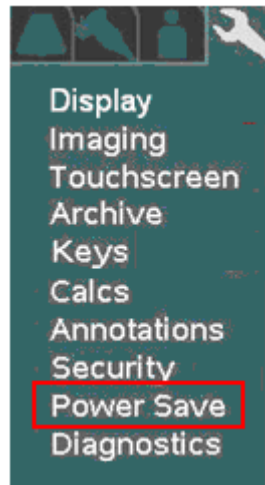
5. To save the new Security settings, select **Apply** on the main menu, and exit.

9.2 “Power Save” Setup Menu

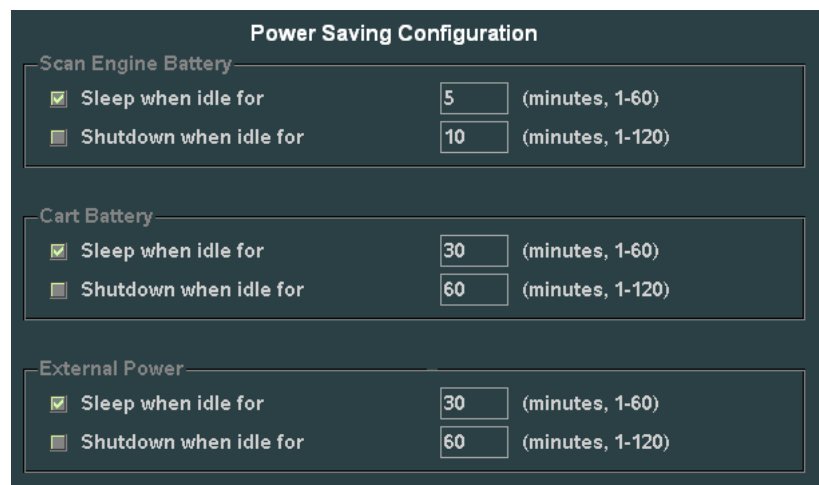
• Configuring “Power Save” Configuration

1. Within the **System Setup** screen, use the Menu Control to backlight **Power Save** selection, press Select button to bring up this menu.

SYSTEM SETUP Sub-Menu



POWER SAVE Sub-Menu



The three different categories of power operation mode configurations in this menu are:


<u>Title</u>	<u>Definition</u>
<i>Scan Engine Battery</i>	Configuration of power saving action when the scan engine is being operated “standalone” (undocked) mode, on its internal battery
<i>Cart Battery</i>	Configuration of power saving action when the system is being operated in a docked mode in a SmartCart SP, without AC power applied. System will be running off the SmartCart SP’s internal Z-PAK battery
<i>External Power</i>	Configuration of power saving action when the system is being operated in a docked mode, running off AC wall power

The two configurable Power Save behaviors offered are:

<u>Title</u>	<u>Function</u>
<i>Sleep when idle</i>	Screen display is “Blanked”, after configured time period has elapsed
<i>Shutdown</i>	Scan Engine performs a complete sequenced “Power-Down” operation, after configured time period has elapsed

2. For each of the power configurations, select the desired power saving option, and enter the desired time interval, from the menu.

NOTE: *Unchecking the “Enabled” box, for either option, disables that time-out function*

3. Place the arrow cursor over the **APPLY** soft-button displayed in this menu, and press the **SET** key  to save new settings.

10 GENERAL PROCEDURES

10.1 Installing USB Memory Stick, into the Scan Engine

STEPS:

1. Open the access cover door, at the rear of the Scan Engine
2. Hold the USB Memory stick properly aligned with the USB port connector on the Scan Engine. Push the USB Memory Stick gently all the way into the connector.

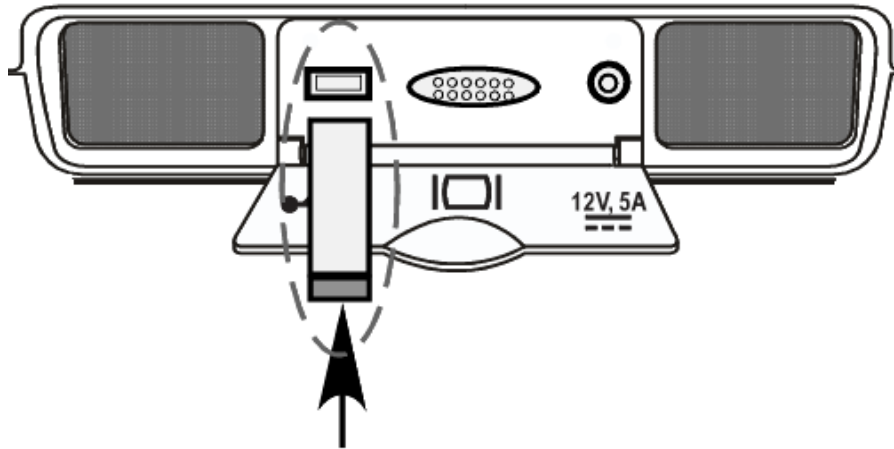


Figure 32: Installing USB Memory Stick

3. For image Importing or Exporting from/to the USB Memory Stick:
 - On the SmartCart SP: Press the *Archive* key
 - On the Scan Engine: using the TOOLS tab, select *View Archive*

11 FUNCTIONAL DESCRIPTIONS

11.1 Overall System

11.1.1 Features Overview

SYSTEM OVERALL:

- 64-hardware - 128/192-synthetic channel system
- Supports B-Mode, M-Mode, Color, Power Doppler, PW, CW modes

SMARTCART SP:

- 19" full-screen, 1280 x 1024 resolution, Display
- Full-sized alpha-numeric user keyboard
- Discrete function user controls
- Software mode assignable user controls
- Two user configurable function (F1-F2) keys
- Trackball
- Integrated stereo speakers (located in display)
- External I/O device connectivity (through SmartCart SP dock interface)
 - DVI digital video out (using HDMI connector)
 - Ethernet 10/100Base-T
 - USB 2.0 Full-speed ports (4)
- Internal hard disk drive (Additional image archive)
- Internal CD/DVD Multi-Recorder
- On-board Z-Pack Battery Module (Option)
- Multi-Transducer Port (MTP) – 3 connectors (Option)

SCAN ENGINE:

- 5.8" diagonal, 800 x 480 resolution, LCD Display
- Touchscreen
- Internal CompactFlash Storage (Primary image archive)
- Discrete function user controls
- Two user configurable function (F1-F2) keys
- Trackball
- Integrated microphone
- Integrated stereo speakers
- Battery status indicator LEDs
- USB 2.0 Full-speed port
- +12V/6A DC power input port
- DVI (HDMI connector) digital video output port

SCAN MODULE:

- Internal CompactFlash Storage (Primary image archive)
- USB 2.0 Full-speed port
- +12V/6A DC power input port
- DVI (HDMI connector) digital video output port

11.1.2 Electronics Overview (Scanner)

- Digitally programmable transmit control
- Pulser - Transmitter
- Analog front end
- Data converter / filters
- Pre-processing digital logic
- Microprocessor-based system control
- DSP pre/post processing
- FPGA connectivity control logic
- Power
 - Lithium-Ion battery pack (Scan Engine only)
 - Smart Battery charger with I²C interface
 - Lithium coin-cell battery backup for RTC (Real Time Controller)
 - Pushbutton induced power-on, with software controlled shutdown
 - Power supply supervision of all supplies
 - Controlled power supply up/down sequencing

11.2 SmartCart SP

11.2.1 FRU Descriptions

1. Cart Main Board AssyZonare P/N: 85080-00

System Functions:

- FPGA Logic for Main Cart control
- USB 2.0 Device Interface
- ATA - DVD/Hard Drive Interface
- Audio/Video Driver & Video Memory
- HSSL Serial Port Interface to/from Scan Engine (Cart Image Data for Display)
- USB Port Interface to/from Scan Engine (Cart U/I Operation)
- Ethernet Controller (networking)



2. Cart Power Module AssyZonare P/N: 85025-00

System Functions:

- VScanner Power Supply - +12V (8A)
- VMain Power Supply - +12V (12A)
- VAux Power Supply - +5 to +24V adjustable
- SmartCart SP Z-PAK battery charging circuitry
- SmartCart SP Z-PAK battery fuel gauge
- PIC Power Supply Controller logic
- External system status LEDs (5)



3. Scanner Deck (Pallet) Assy (w/MTP)Zonare P/N: 85118-00

System Functions:

- Mechanical docking and locking mechanisms
- Optical sensors for scan engine docking detection
 - HSSL serial data connection
 - Scan Engine USB connection
 - +12V VScanner connection
- (3) Multi-Transducer Port (MTP) connections (85118 only)



4. SmartCart SP User Interface Assy.....Zonare P/N: 86454-00

System Functions:

- QWERTY keyboard
- OLED soft-function displays
- Trackball assembly
- DGC controls
- Discrete functional controls



5. OLED Display BoardZonare P/N: 85095-00

System Functions:

- OLED soft-function displays



6. MTP Bolster Plate – Service FRU.....Zonare P/N: 85123-00

System Functions:

- Multi Transducer Port switching relays



11.2.2 Electro and Mechanical Assemblies

1. Brake Mechanism - Wheel

Description:

The SmartCart SP has 3 different swivel/lock positions of the foot pedal on the front wheels. Using the bottom of your shoe to push down, or the top of your shoe under the lever to pull-up, position the foot pedal in the desired position, as listed below:

- In the upper-most position (directional swivel-lock position) of the foot pedal allows the front wheels to lock in a straight inline position and the back wheels to full swivel. This provides a good combination of stability and maneuverability when pushing the system down long corridors.
- The middle position of the foot pedal allows full-swivel of the front wheels, which in creating full four wheel swivel, allows for easy micro-positioning of the system in tight spaces.

- In the fully down position of the foot pedal the brake mechanism will lock the front wheels from rotation. This prevents undesired movement of the SmartCart SP during system operation.

In addition to locking the brake, the front wheels may be rotated to a 90-degree angle, prior to locking foot pedal down, to provide additional system stability during shipping.

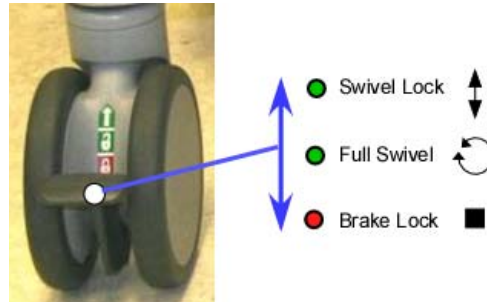


Figure 33: SmartCart SP: Brake Mechanism

2. Height Adjustment Mechanism

Description:

The SmartCart SP utilizes a gas spring mechanism that enables the user to optimize the vertical position (height) of the user interface panel and LCD Display for optimum comfort and viewing during operation.

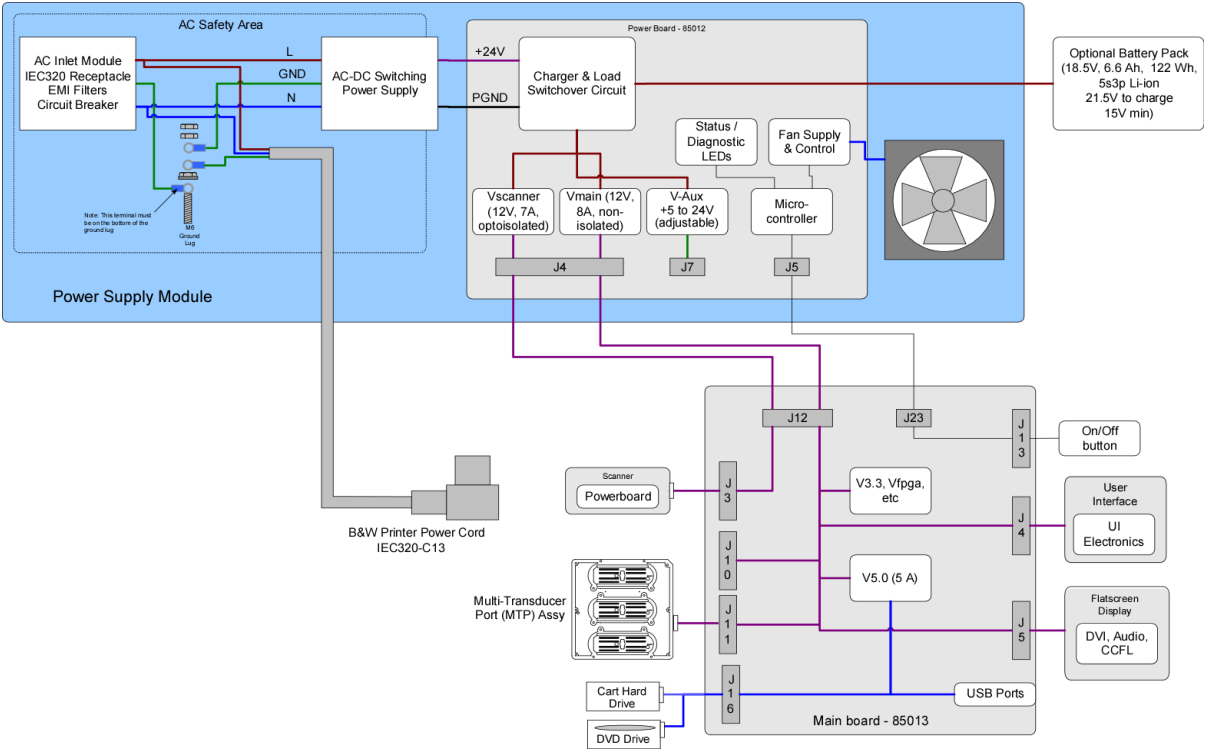
To raise or lower the unit, pull inward on the release lever, located on the inside of the right-front handle assembly on the SmartCart SP. This will allow the height of the SmartCart SP to be adjusted. Releasing the spring-loaded release lever locks the assembly into the current vertical position.



Figure 34: SmartCart SP: Height Adjustment Mechanism

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12.1 SmartCart SP Power Module Block Diagram (Basic)



12.2 SmartCart SP Power Module Block Diagram (Detailed)

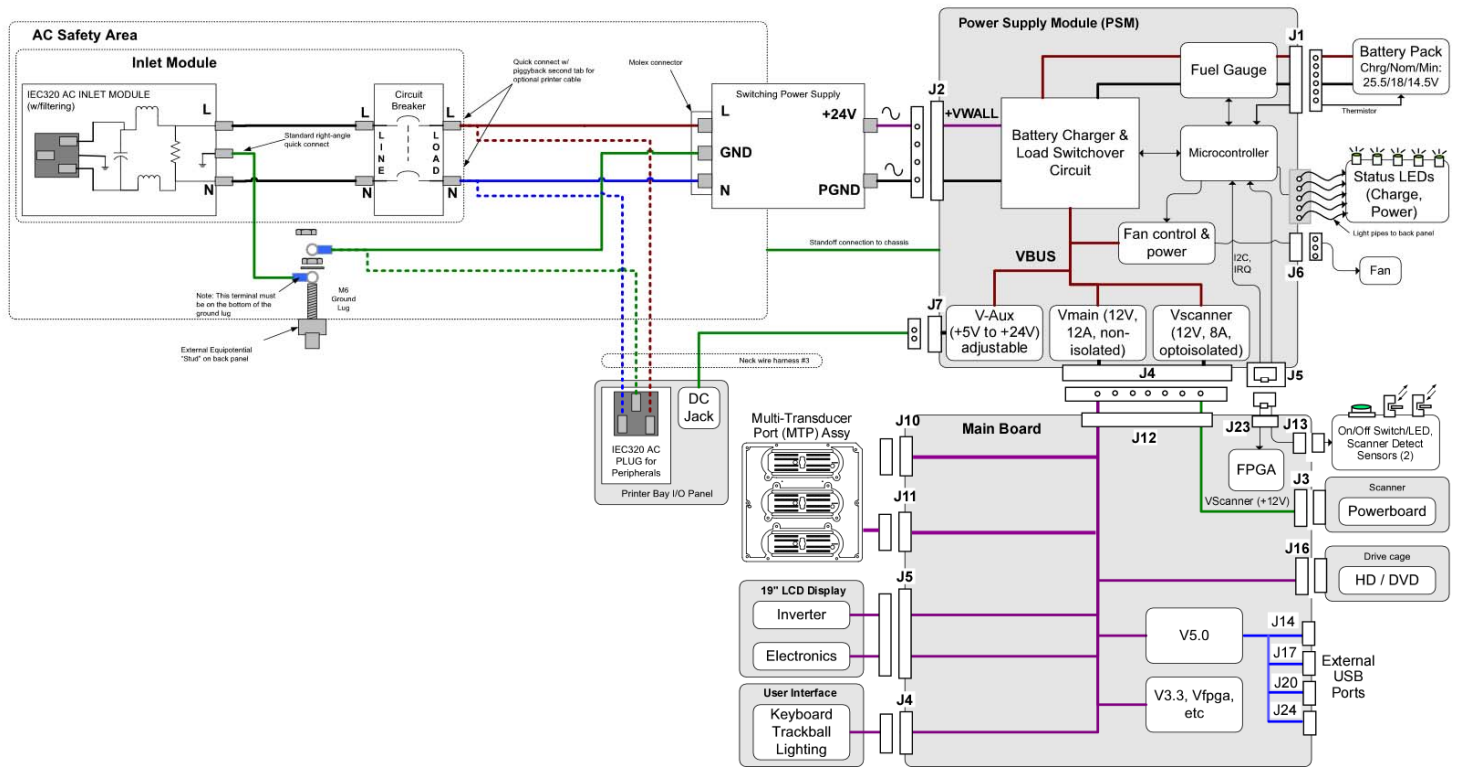


Figure 36: SmartCart SP: Power Module Block Diagram (Detailed)

12.3 SmartCart SP Main Board Cable Connection Diagram (Original DVD Configuration)

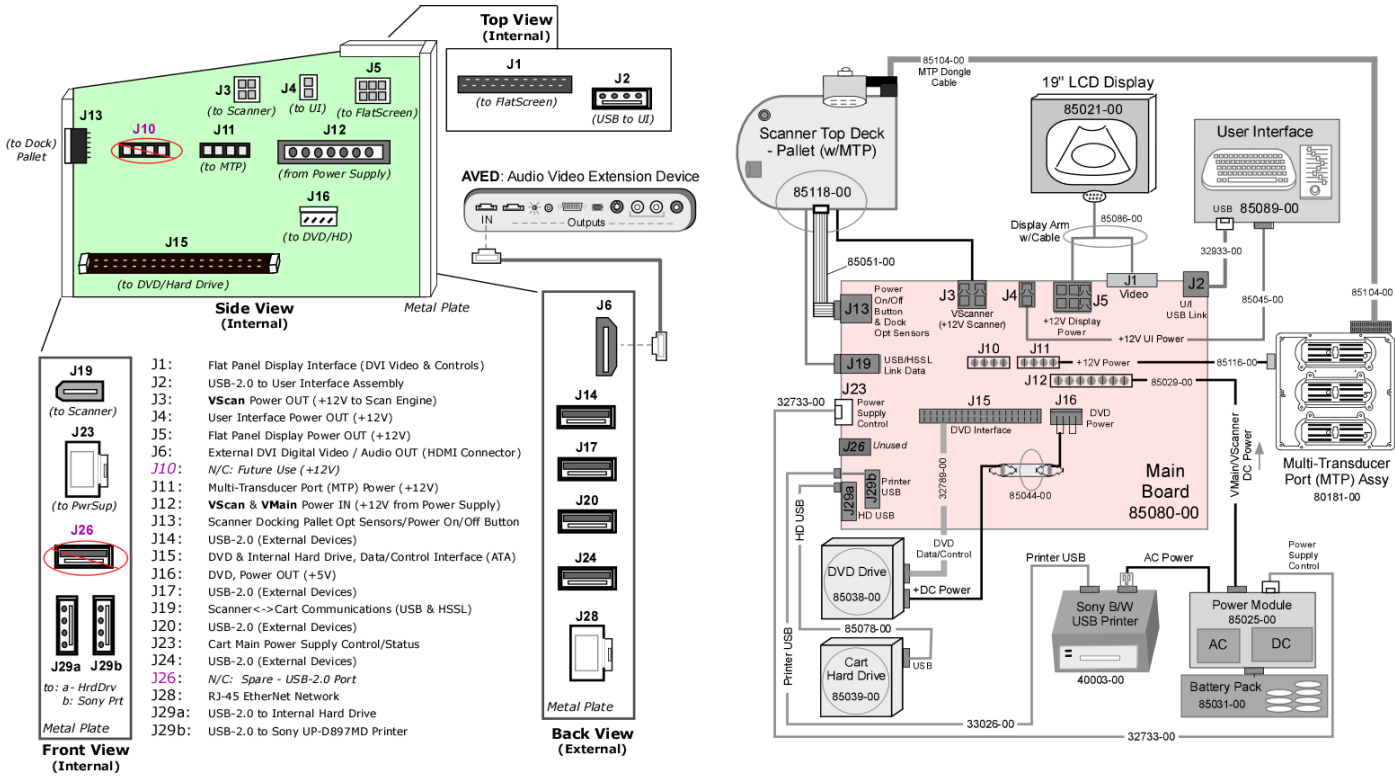


Figure 37: SmartCart: Main Board Cable Connection Diagrams (Original DVD Configuration)

12.4 SmartCart Main Board Cable Connection Diagram (IDE/SATA Adapter DVD Configuration)

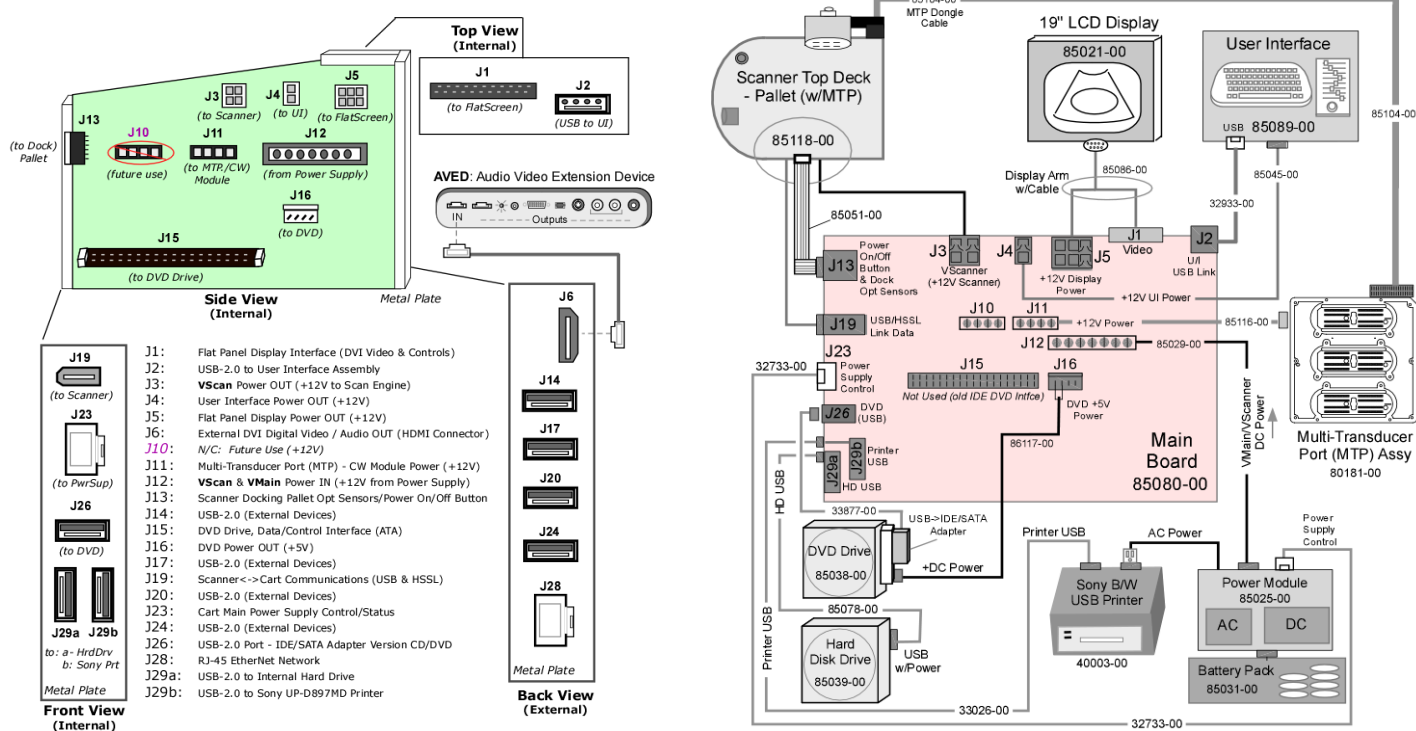


Figure 38: SmartCart: Main Board Cable Connection Diagrams (IDE/SATA Adapter DVD Configuration)

BEGINS ON NEXT PAGE

13.1 SmartCart SP Overall System Block Diagram

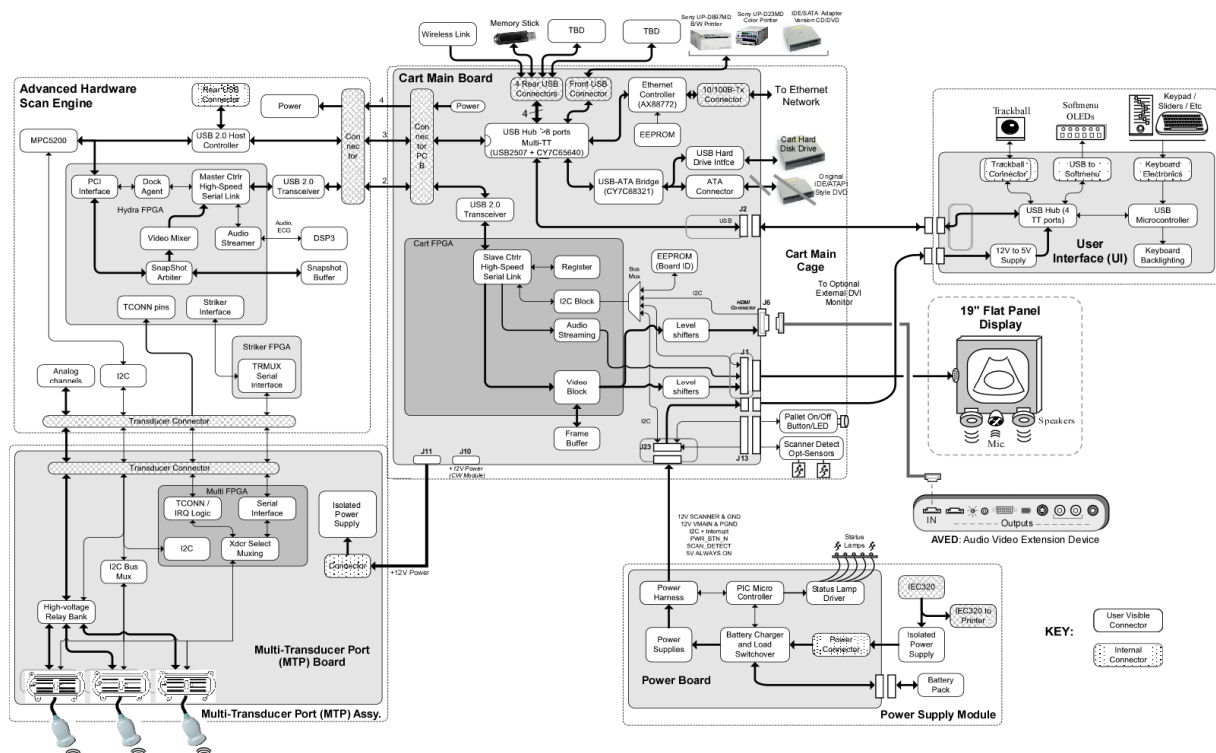


Figure 39: Overall System Block Diagram - ZONEUltra_{8p}

14 ASSEMBLY DIAGRAMS

14.1 SmartCart SP: Power Module Functional Identification

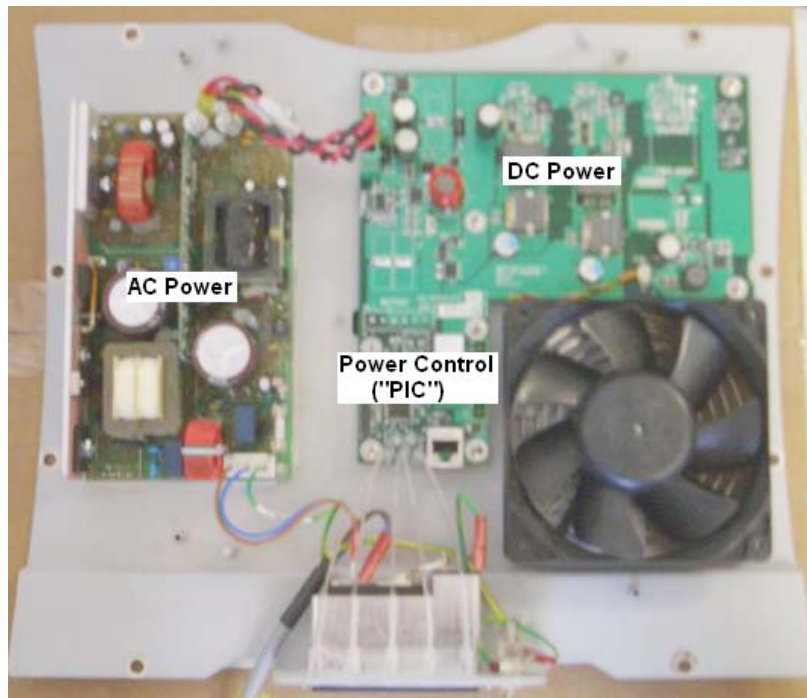


Figure 40: SmartCart SP: Power Module Functions Diagram

15 PERIPHERALS & ACCESSORIES

15.1 DVD/CD Burner - (Internal)"

15.1.1 General Info:



The **Z.ONEULTRA SP** (SmartCart SP) includes an internal **DVD/CD** burner that is used for exporting of ultrasound images. The port for accessing the DVD/CD drive for insertion/removal of media, is located at the front of the SmartCart SP, just below the scan engine docking area.

15.1.2 Media Types:

The **DVD/CD** drive in the **Z.ONEULTRA SP** supports only the following media types. Any other media type inserted into the drive will not be recognized by the **Z.ONEULTRA SP**.


Compatible Media Types:

- DVDs: **DVD+R** or **DVD+RW** (**PLUS ONLY!**)
 - *DVD-R & DVD-W (**MINUS**) not supported*
- CDs: **CD-R** (**MINUS ONLY!**)

SPECIAL NOTE



*If an incompatible type of DVD/CD media is accidentally inserted into the DVD/CD burner on the **Z.ONEULTRA SP**, it will not be recognized by the system, and hence the “EJECT” function in the ARCHIVE menu will not be active (it will be “grayed-out”).*

*In order to eject this type of incompatible media, it will be necessary to perform a manual override “EJECT”. This is accomplished by holding down the “**RECORD**” button  on the user interface panel of the SmartCart SP, until the DVD/CD is ejected.*

15.1.3 Operation:

The exporting/importing of exam data (images) to/from the **DVD/CD** burner on the **Z.ONEULTRA SP** is performed in the **ARCHIVE** review menu (pressing the **ARCHIVE** key). The **DVD/CD** burner is then selected as the target device; the desired exam(s) is highlighted in the Archive menu, and the “**EXPORT**” or “**IMPORT**” softkey function selected to copy the images.

Exam Export

Archive

	NS	NP	Patient's Name	Date-Time*	Patient ID	MB
1			Cone,George	06/15/2006 2:17:38 PM	ID_20060615_141738	0.8
2			Doe,Jane	06/15/2006 2:14:14 PM	549831	0.8
3						
4						
5						
6						

2 entries

Destination

	Name	Label	Total Size	Free Space
1	B:	FTP (12.40.200.87)	N/A	N/A
2	C:\TEMP		75.1 GB	39.7 GB

Export Options Select All Delete Format Cancel

15.2 AVED – Audio Video Extension Device Box - (Option)"

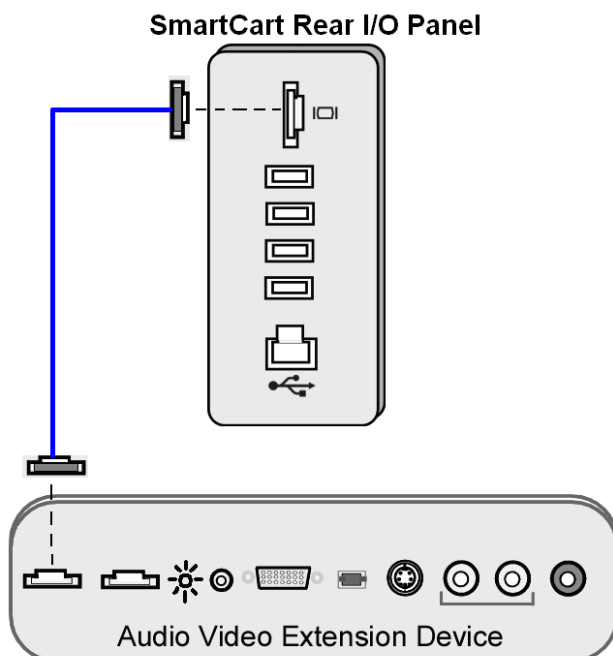
15.2.1 General Info:



Zonare offers an optional AVED (Audio Video Extension Device) box that can be connected remotely to the rear panel of a SmartCart SP. This device enables the **Z.ONEULTRA SP** to produce an extended range of video and audio output formats (primarily analog) to support connection to additional peripheral devices.

The connection of the AVED box and the Zonare **Z.ONEULTRA SP** is made through a single HDMI->HDMI cable. The AVED box receives its operating power (+5V), controls, and digital video and audio information via this single cable that attaches directly between the external HDMI port on the rear of the SmartCart SP, and the HDMI Input port on the AVED box (as shown below).

Only the HDMI->HDMI cable provided by Zonare should be used, as cables of additional length may result in loss of operation of the AVED; due to voltage drop induced by the added impedance.

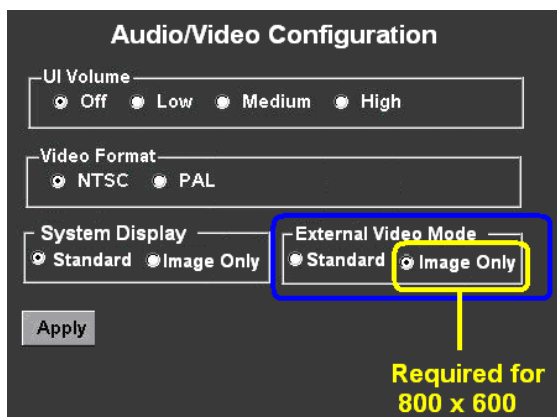


SPECIAL NOTE




The **S-Video** and **Composite** video outputs (output #6 and #9 in the I/O Panel Diagram on the following page) on the AVED box only support video formats of a maximum resolution of 800 x 600.

As a result, video is **ONLY** present on these two outputs of the AVED box when the “External Video Mode” option, on the Audio/Video Configuration page on the **Z.ONEULTRA SP**, is set for “**Image Only**” mode.



In addition it should be noted that if the User is reviewing Archived images in the full **3x3** format, the system automatically(temporarily) switches out of the “Image Only” (800x600) video resolution, to the higher resolution format. As a result, the video output on these same two ports on the AVED box will not be active at those times.

The AVED box converts the digital video and audio information from the SmartCart SP into a variety of analog video formats, and analog and digital audio outputs. The I/O ports, and their functions on the AVED, are listed below.

The VCR CTL remote trigger output is generated by pressing of the “RECORD” key  on the User Interface of the SmartCart SP.

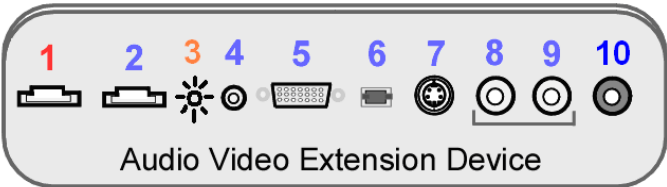







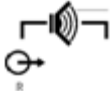
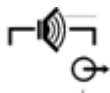


Figure 41: AVED: Audio Video Extension Device I/O Panel Diagram

15.2.2 I/O Connector Functions:

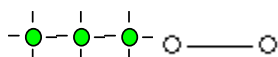


#	Function		Direction
1		DVI Digital Video/Audio (Using HDMI connector)	Input
2		STATUS (LED) – <i>See status code info below</i>	Status
3		DVI Digital Video (Using HDMI Connector)	Output
4	VCR CTL 	VCR/Print Triggers – 2 signals (3.5mm) – “RECORD” key	Output
5		SVGA Video (Analog)	Output
6		TOS LINK Audio (Digital)	Output
7		S-Video (Analog) - (800x600 mode only!)	Output
8		Audio Out – Right (Analog)	Output
9		Audio Out – Left (Analog)	Output



15.2.3 AVED Activity/Status LED – Codes:



There is a single LED on the AVED box that is used to display the current operating status of the I/O activities. The status is indicated via a series of codes of flashing sequences. Below is a listing of the activity code states:

-  3 short “On” – 1 long “Off”:...HDMI attached (power) but box “Idle” (no out)
-  1 long “On” – 1 long “Off”:....AVED initialized – video active, but audio **not**
-  Constant “On”:.....Coded audio detected, video **and** audio active

15.2.4 Microphone Recording: (*SmartCart SP only*)



The **Z.ONEULTRA SP** system includes an on-board **microphone** that is located in the front/center of the 19” display monitor on the SmartCart SP. Voice audio can be captured from the microphone and sent out over the audio channels of the AVED (Audio Video Extension Device) box. This can be used for recording voice audio to an analog VCR device that is connected to the AVED.



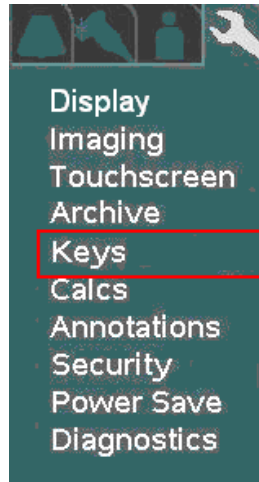
The activating of the **microphone** is a toggle “On”/”Off” function, using one of the **FUNCTION (F1-F4)** keys on the User Interface panel of the SmartCart SP. The desired **FUNCTION** key must be pre-assigned to the “**Microphone**” option, on the Function Key configuration page.




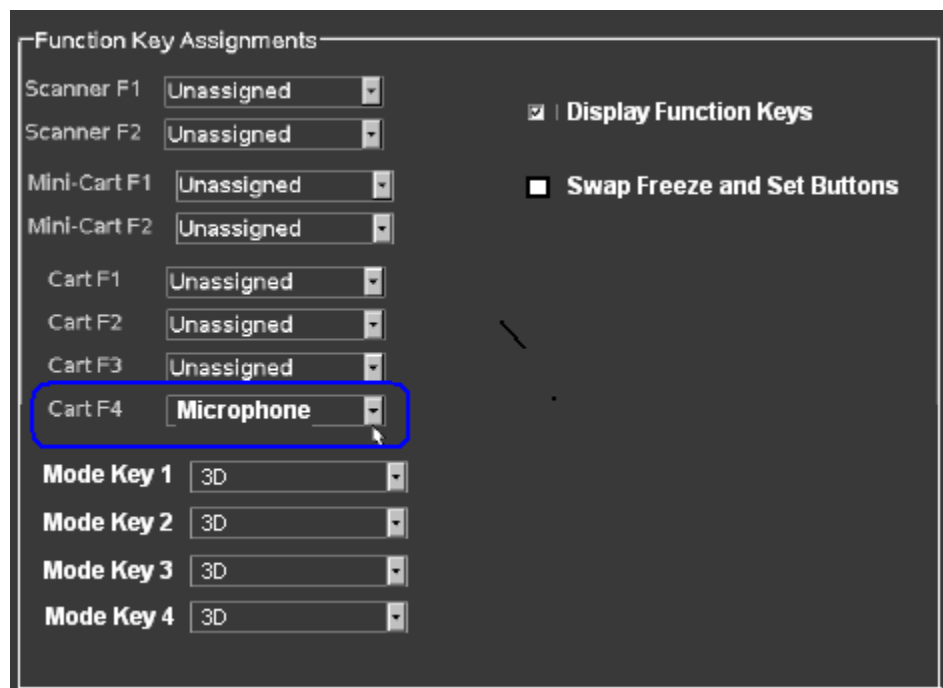
Enabling the “MICROPHONE” function:

1. Using the TAB button  advance the menu screen to select **TOOLS**
2. Using the **Menu Control**, arrow down to backlight the **System Setup** selection, and press the SELECT button  to bring up the main menu.


SYSTEM SETUP Sub-Menu



3. Using the **Menu Control**, arrow down to backlight the **Keys** selection, and press the SELECT button  to bring up the configuration menu.



4. For the desired **Function Key (F1 – F4)** selection, select the **MICROPHONE** function from the *pull-down* menu

5. To save the Function Key assignment, select **APPLY** from the main menu, and press the **SET** key  to save new setting.

15.3 SONY UP-D897 USB Digital Printer

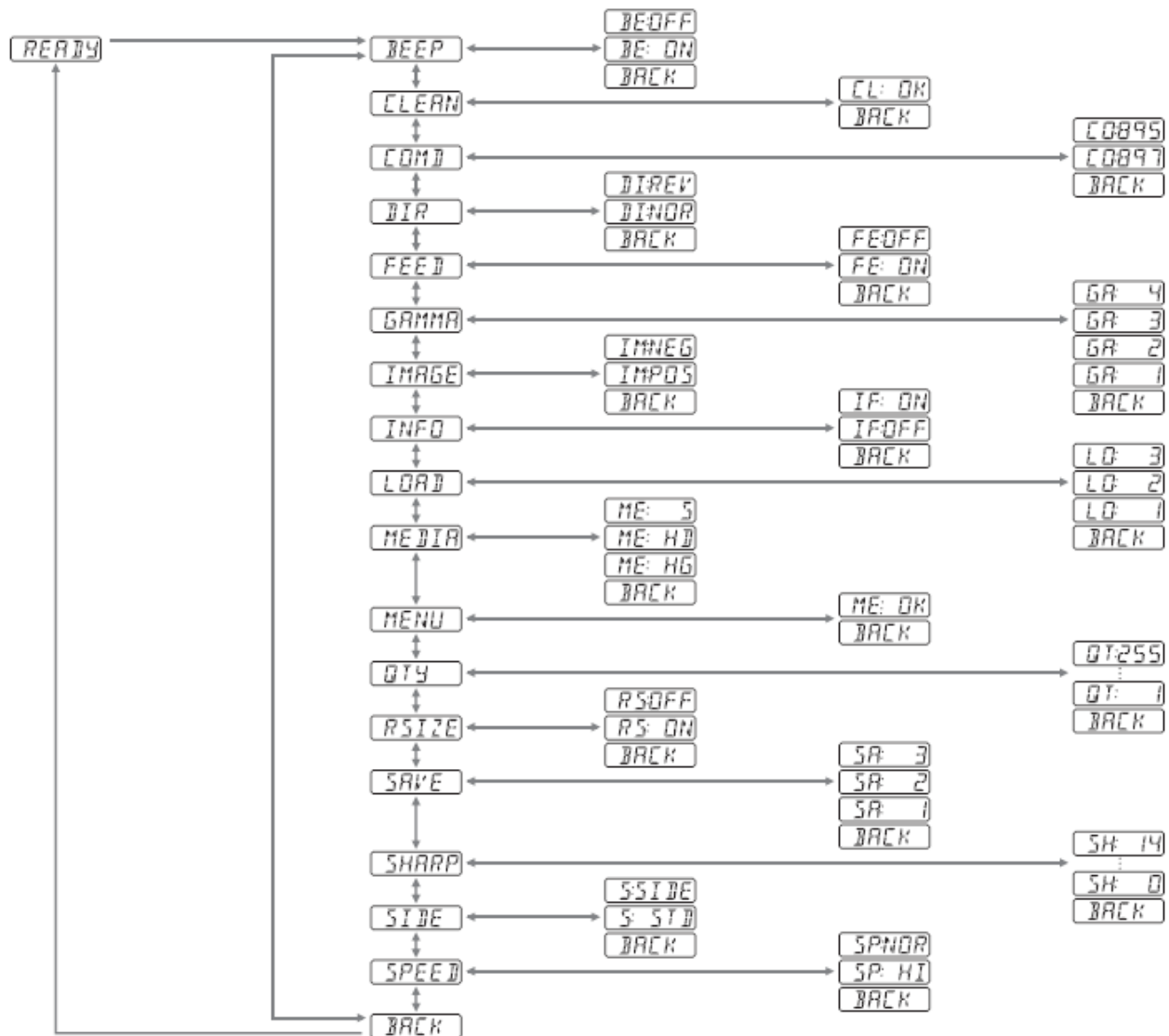
15.3.1 Procedure Notes:



The intent of this procedure is to provide instructions, for use in the field, for the setup of the SONY UP-D897 Digital (USB 2.0) B/W Printer, on a SmartCart SP or *miniCart*.

15.3.2 Installation/Setup Procedure:

Sony UP-D897 Printer Configuration Menu Flowchart



STEPS:

1. Following the steps below, using the front panel display menu and **Jog Dial** control, configure the initial user settings on the UP-D897 printer to match those shown in Figure 1, on the following page.



“LOCK”ALERT



*The MENU operations on the Sony UP-D897MD printer have a special hidden “**LOCK**” function that if active will completely disable making any changes to the menu settings on the printer.*

*IF the printer is currently in a “LOCKED” mode, a message “**LOCK**” will appear in the menu display and an alarm “Beep” will occur, when attempting to make any menu changes.*

To toggle the “LOCK” function on/off, do the following:

- 1) Power OFF the printer
- 2) Press and **Hold** the **Jog Dial** (push/enter) switch
- 3) Power ON the printer, while keeping the Jog Dial switch depressed until one of the two messages listed below appear in the display menu. Repeating this power cycling process will toggle between the lock/unlock state.
 - “**UNLOK**”
 - “**LOCK**”

2. To bring up the setup MENU, “Press” the **jog dial** control (labeled “PUSH ENTER”).
3. Use your finger to “Roll” the **jog dial** control until the desired setting for configuration is shown in the display window.
4. “Press” the **jog dial** control to select the offered setting for modification.
5. “Roll” the **jog dial** control until the desired value is displayed in the window.
6. “Press” the **jog dial** control to store the displayed value as the new setting.
7. Repeat the above “Roll”/“Press” steps for configuring each of the remaining user settings into the UP-D897.

IMPORTANT: To SAVE all of the newly configured settings, it is necessary to do the following steps:

8. “Roll” the **jog dial** until “**SAVE**” is displayed in the setup menu window.
9. “Press” the **jog dial** control, and then “Roll” it to select which one of three possible user setup types (1, 2 or 3) you wish to save.
10. “Press” the **jog dial** to save the desired user settings type
11. To manually exit out of the setup MENU, “Roll” the **jog dial** until “**BACK**” is displayed in the setup menu window, and then “Press” the **jog dial**.

NOTE: The setup menu will exit, and automatically return to the normal “Ready” printer state, when no new user actions are made on the **jog dial** for approximately 20 seconds.

#	Setting Name	Description	Zonare Recommended Value
1	BEEP	Audible Tone	ON
2	CLEAN	<i>Initiate head cleaning operation</i>	<i>n/a – control action in menu</i>
3	COMD	Selects printer driver version	897
4	DIR	Direction (start top or bottom, for printing)	NORMAL
5	FEED	Added gap between prints	ON
6	GAMMA	Gamma curve (print density)	4
7	IMAGE	Positive or Negative printout	POS
8	INFO	Printing of user settings on prints	OFF
9	LOAD	<i>Loads stored settings 1, 2 or 3 into use</i>	<i>n/a – control action in menu</i>
10	MEDIA	Paper type	HG
11	MENU	<i>Prints out current user settings to paper</i>	<i>n/a – control action in menu</i>
12	QTY	Number of copies to print	1
13	RSIZE	<i>Selects image enlargement to paper size</i>	<i>ON</i>
14	SAVE	<i>Saves settings (as user 1, 2 or 3)</i>	<i>n/a – control action in menu</i>
15	SHARP	Sharpness: Image tuning (1-15)	4
16	SIDE	Image rotation (Up or 90 degrees)	SIDE
17	SPEED	Print speed	NORMAL

Figure 42: Menu Settings (UP-D897)

15.3.3 Printer Menu Configuration Process:

STEPS:

1. Access the **New Printer** menu, using the path
System Setup->Archive->DICOM->Printers->New

The 'New Printer' window displays various configuration options for a new printer. The 'Type' dropdown menu is currently set to 'DICOM', but the instructions indicate it should be changed to 'USB'.

2. Using the pull-down menu, under the “TYPE” selection, select the **USB** printer. The menu will change to the limited setup page for a USB style printer (as shown below)

The 'Printer' window shows the configuration options for a USB printer. The 'Type' dropdown menu is now set to 'Local / USB', and the 'Nick Name' field is highlighted in yellow.

3. Type into the “Nick Name” field, the name of the printer: “SONY UP-D897”
4. Set other print parameters as desired.
5. Select “APPLY” from the main menu, to save the changed settings

15.3.4 Print Button Configuration (Trigger):

STEPS:

1. Access the Print/Store Button configuration screen, using the path
System Setup->Archive-> Store/Print

Image Store/Print Buttons

Store / Store 1			
<input checked="" type="checkbox"/> Local Storage	<input type="checkbox"/> IQ Scan	Live Capture: <input checked="" type="radio"/> Clip <input type="radio"/> Still	
<input type="checkbox"/> Network Storage	Default Archive ▼		
<input type="checkbox"/> Network/USB Printer	Default Printer ▼		
		<input type="checkbox"/> Analog Video Printer (SuperCart Only)	
Store 2 (SmartCart Only)			
<input checked="" type="checkbox"/> Local Storage	<input type="checkbox"/> IQ Scan	Live Capture: <input checked="" type="radio"/> Clip <input type="radio"/> Still	
<input type="checkbox"/> Network Storage	Default Archive ▼		
<input type="checkbox"/> Network/USB Printer	Default Printer ▼		
		<input type="checkbox"/> Analog Video Printer (SuperCart Only)	
Print			
<input checked="" type="checkbox"/> Local Storage	<input type="checkbox"/> IQ Scan	Live Capture: <input checked="" type="radio"/> Clip <input type="radio"/> Still	
<input type="checkbox"/> Network Storage	Default Archive ▼		
<input checked="" type="checkbox"/> Network/USB Printer	Sony UP-D897 ▼		
		<input type="checkbox"/> Analog Video Printer (SuperCart Only)	
Image Transfer Mode <input checked="" type="radio"/> Exam in Progress <input type="radio"/> Exam Completed			
<input type="button" value="Apply"/> <input type="button" value="Cancel"/>			

2. Under the “**Network/USB Printer**” function for the “**Print**” button, check the box to the left of the drop-down menu, enable this function
3. In the drop-down menu for this function, select the “**SONY UP-D897**” selection
4. Select “**APPLY**” from the main menu, to save the changed settings

Operator Controls

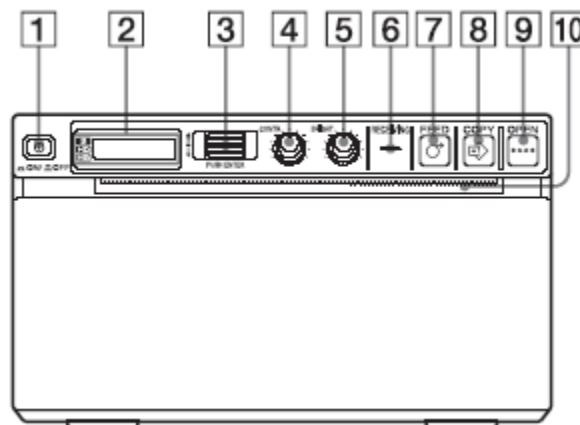



Figure 43: Operator Controls (UP-D897)

- 1 Power ON/OFF Switch
- 2 Printer Window LCD Display

- 3 JOG Dial (menu control)
- 4 CONTRAST
- 5 BRIGHTNESS
- 6 RECEIVING (indicates active print data transfer)
- 7 FEED (one-time push feeds paper, or holding during print cancels job)
- 8 COPY (prints another copy of previously transferred image)
- 9 OPEN (one-time push opens paper door, or holding during print cancels job)
- 10 CUT (cuts paper after image is printed)

15.3.5 Print Verification:

STEPS:

1. Power on the Cart, and the UP-D897, and connect a transducer.
2. **FREEZE** the image. Verify a printed image is produced when the “**Print**”  key on the Scan Engine is depressed.

NOTE: Refer to the SONY UP-D897 Operators Manual, for detailed information on proper operation of this device.

15.3.6 Printer Status Message Decoding:

SONY UP-D897:

Message	Status	Action
DOOR	- The paper door is open	- Close paper door until it is locked securely
EMPTY	- Out of paper	- Add paper
COOL	- Print head thermal limit reached	- Allow the printer to cool. Normal printing will resume when message disappears, and thermal print head has cooled.
WAIT	- Printer is busy	- Wait of internal processing to complete

15.4 SONY UP-D23MD Color Printer

15.4.1 Installation Notes:



SPECIAL NOTE




*The Sony UP-D23MD Color Printer is oversize and is therefore not a peripheral that can be “mounted” within the chassis of the **Z.ONEULTRA SP**. A separate external location (rolling cart, tabletop, etc) must be made available for storing of this printer.*


The system software on the **Z.ONEULTRA SP** system contains the necessary drivers to support operation and printing to the Sony UP-D23MD Color Printer.

The information provided below covers the basic menu setup on the **Z.ONEULTRA SP** , to enable printing to this device.

15.4.2 Setup Procedure:

STEPS:

1. Identify the dedicated work area, within reach of the **Z.ONEULTRA SP**, for placement of the Sony UP-D23MD printer and setup the printer in that location.
2. Power off the Scanner and Cart.
3. Attach the USB cable between the Sony UP-D23MD Color Printer and one of the USB ports on the rear of the **Z.ONEULTRA SP**.
4. Connect the AC power cable to the rear panel power plug of the UP-D23MD labeled “AC IN.”
5. Apply power to the system and printer.
6. Under the **ARCHIVE -> DICOM -> PRINTERS** page, create a new “**Local/USB**” type printer entry for the Sony UP-23MD printer
7. Enter in “**Sony UP-D23MD**” to the *Nick Name* field of the printer configuration page
8. Enter in the desired printer settings, from those offered in the on-screen menu, and then select “**APPLY**” to save.
9. Under the **ARCHIVE -> STORE/PRINT** page, configure the **Z.ONEULTRA SP** “**Print**”  button for triggering a print to the Sony UP-23MD printer.
3. Connect a transducer to the **Z.ONEULTRA SP**. Wait for startup to complete and image to be shown.
4. Press the “**FREEZE**” key to capture an ultrasound image.

5. Verify a printed image is produced on the UP-D23MD when the “**Print**”  key on the SmartCart SP is depressed.

NOTE: Refer to the SONY UP-D23MD Operators Manual, for detailed information on proper operation of this device.

15.5 HP LaserJet Network (REPORT) Printer

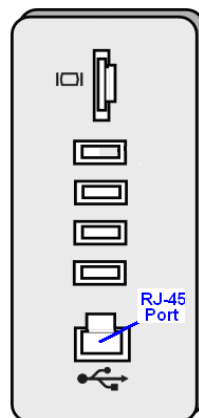


15.5.1 Procedure Notes:

The intent of this procedure is to provide instructions, for use in the field, for setup and use of a Post Script-3, **PS3** (or above) style, HP LaserJet Network Printer, for **Report** printing, on a **Z.ONEULTRA SP**.

NOTE: The following key limitations regarding the use of the HP LaserJet Color Printer on the **Z.ONEULTRA SP** product should be noted.

- The HP LaserJet color printer is **ONLY** used for reporting of OB/GYN report pages (NO ultrasound image printing).
- The HP LaserJet printer is NOT a device that is mountable to either the SmartCart or miniCart units. It will require a remote cart or remote shelf for use.



SmartCart Cable Connection

- **Initial Setup – Network Connection Method:**

STEPS:

Q00180 Rev B

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"Note: Copies are uncontrolled documents - For revision verification see the Master Documentation List"

1. Connect the AC power cord to the printer, and the other end to an active AC Power outlet
2. Connect one end of the network crossover cable to the HP LaserJet printer, and the other end to the Ethernet (RJ-45) port on the **Z.ONEULTRA SP**.
3. Power on the HP LaserJet printer
4. Open the paper tray on the printer, and install the desired paper.
5. Power on the **Z.ONEULTRA SP**

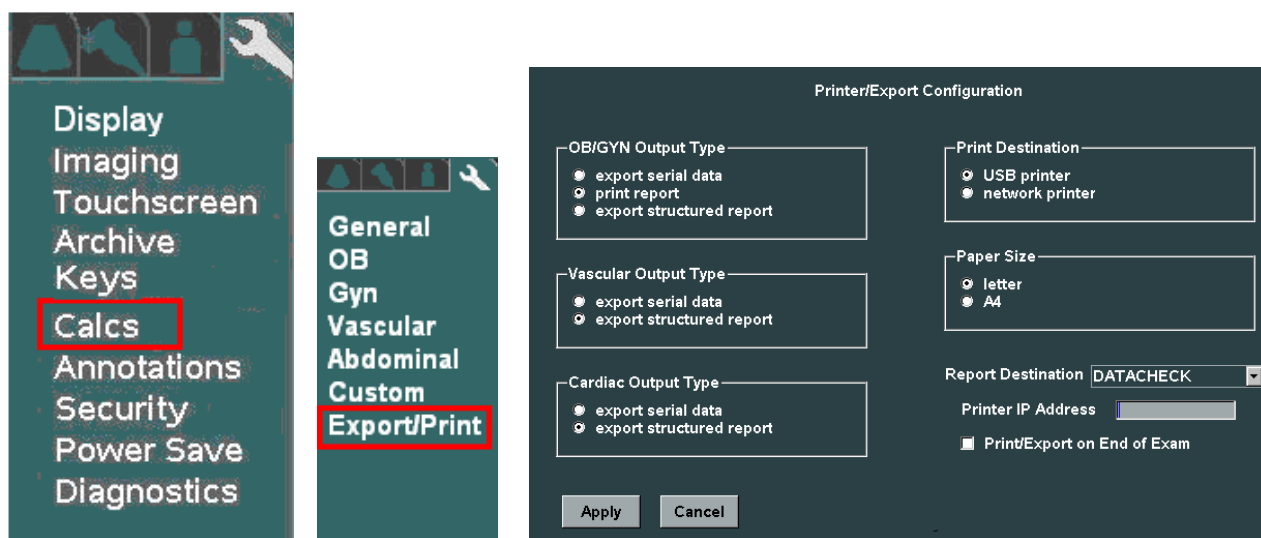
- **Report Printing Configuration – on Z.ONEULTRA SP**

In order to utilize this Report printing capability, it is necessary to pre-configure the Export/Print setup parameters, within the “CALCS” sub-menu, as part of the System Setup operations. The following steps and menus are used for the setup of this OB Report Exporting/Printing function.

STEPS:

6. Go to the Printer/Export configuration screen, by selecting the following sequence:

System Setup -> Calc -> Export/Print



Printer/Export Configuration (Calc Reporting)

7. To configure the system for printing of reports to the HP LaserJet , select the following:
 - Output Type (for applicable report type(s):**PRINT REPORT**
 - Printer Destination:**NETWORK PRINTER**
 - Paper Size:**LETTER**
 - Printer IP Address: Enter printer’s assigned IP (potentially 192.168.1.1)

- Print/Export on End of Exam: (as desired by User)
- Select “APPLY” in the menu, to save the settings

NETWORK Installations Only:

To meet regulatory requirements for user safety, Ethernet “Network” connectivity is the only method recommended for attaching the HP LaserJet printer to the **Z.ONEULTRA SP**.

In this configuration a direct cable connection will be used between the printer and the **Z.ONEULTRA SP** (using a “crossover cable”). The generic IP Address setup in the printer will need to be entered into the corresponding report printer configuration page on the **Z.ONEULTRA SP**.

To find out the IP Address currently setup as a factory default in the HP LaserJet printer, perform the following steps:

STEPS:

8. With the printer powered ON, the **Z.ONE Ultra** powered ON, and the crossover cable connected between the two devices, perform the following step.
9. On the HP printer, press and **hold** (for 5 seconds), the “**GO**” button
10. A series of pages of internal configuration information about the printer should print out.
11. Check the **IP Address** value that appears on the Networking Info page
12. Enter this value into the **PRINTER IP ADDRESS** field, on the Export/Report Configuration page on the **Z.ONEULTRA SP**

NOTE: *For configurations where printer is being attached to an existing DICOM network that is running on the **Z.ONEULTRA SP**, the IP Address assigned by the IT Administrator of the network at the site will need to provide this IP Address. This IP Address will need to be setup using the HP Toolbox setup software on a PC, that is temporarily connected to the HP LaserJet printer. That IP Address will also have to be entered in the Export/Print configuration page on the **Z.ONEULTRA SP***

In order for the Z.ONEUltra to communicate with the HP LaserJet printer, it must be on the same subnet. This is accomplished by programming an IP Address into the **Z.ONEULTRA SP** (on the **System Setup** -> **Network** page) that is one value greater then the IP Address of the HP LaserJet printer.

To configure this IP Address into the **Z.ONEULTRA SP**, follow the steps below.

13. Go to the “**NETWORK CONFIGURATION**” page on the Z.ONEUltra by executing the following sequence:

System Setup ->Archive-> Network

Network Configuration Page

14. Using the arrow cursor and SET key, check the box for ***“USE SPECIFIED”***
15. In the data entry box to the right of the ***“USE SPECIFIED”*** checkbox, enter in an IP Address that is one greater then the value of the HP LaserJet printer (i.e printer: **192.168.1.1**, **Z.ONEULTRA SP: 192.168.1.2**)
16. Select **“APPLY”**, to save the settings

Printing Reports:

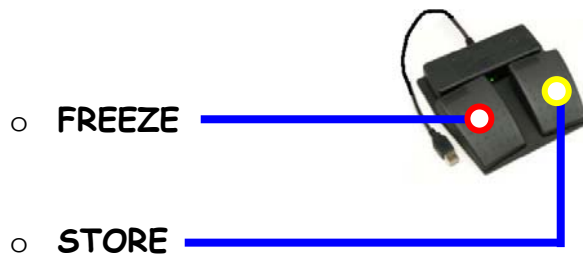
17. Perform the desired calculations and measurements on the **Z.ONEULTRA SP**.
 18. At the conclusion of the measurement process, to manually trigger the print of an OB Report, select the **“PRINT”** softkey, in the **Calculations->Report** page
 19. IF the Report printing was configured for **“Print at end of exam”**, the Report will automatically be output to the HP LaserJet, upon ending the current exam.
-

15.6 2- Pedal Footswitch

15.6.1 Information:



An optional USB-style remote footswitch is available for use on the system, to enable the User to initiate several normal user operations, while their hands are previously occupied in the scanning of the patient. The two normal user interface buttons/functions that are assigned (not programmable) for optional footswitch control; are as follows:



The footswitch connects to the system using a USB port on the rear of the Cart, and is a “plug-n-play” device that does not require any menu configuration on the system to operate.

16 SOFTWARE PROCEDURES

16.1 Standard Software Installation/Upgrade Procedure

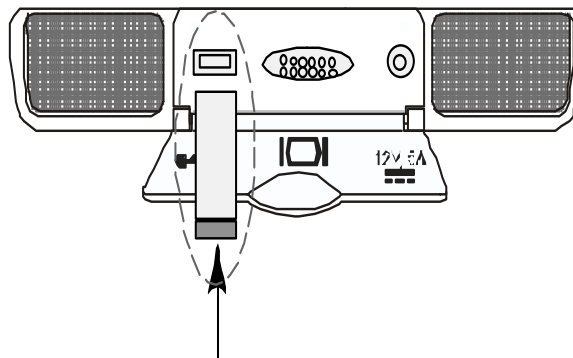
CAUTION





If performing software upgrades with the Scan Engine out of the Cart (un-docked) it is extremely important to ensure that the battery has a minimum of 50% charge capacity, PRIOR to beginning this software upgrade procedure.

If the charge is too low, either replace the existing battery with a properly charged one, or temporarily dock the Scan Engine in the Cart, (with the Cart's having AC power applied and the circuit breaker in the "On" position) long enough to achieve a fully charged state.

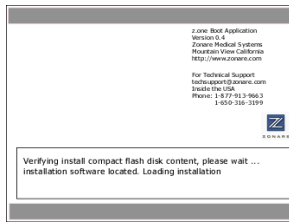
1. Connect a transducer to the Scan Engine (if not currently attached)
2. Press the Power On/Off button to power the system on
3. Allow the system to complete a normal boot operation (less than 1 minute)
4. Open the rear access door on the Scan Engine, and insert the USB Memory Stick (containing system software installer files) into the USB port, pressing lightly to ensure it is seated in the connector



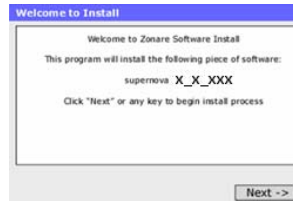
5. An initial software install alert message screen should appear on the LCD display
6. To begin the software install process, at each of the two (2) alert screens, press the "SELECT"  key


NOTE: *If it is determined that the software revision of the USB Memory Stick is not the desired version for installation, and it is desired to abort (select the "NO" option) the install operation (or abort it for any other reason), press the "BACK"  key, then manually remove the USB Memory Stick..*

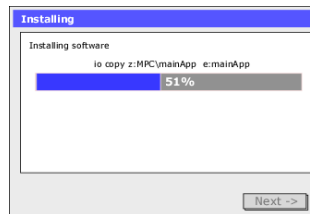
6. The following initial software installation screen should appear, and be displayed for a few seconds on the LCD Display



7. A final “**Welcome to Install**” screen should appear

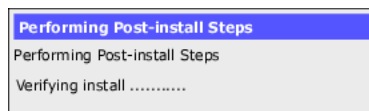


8. Press the “SELECT”  key again to begin the software installation process.
9. The in-process installing status screen should appear, with a bar graph indicating a dynamic percent completion status

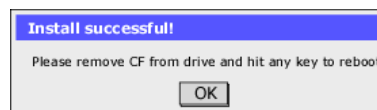


NOTE: *The main application install process should complete in approximately 5 minutes.*


10. After file installation is completed, the system will run a brief install verification process. The following screen will appear during this verification



11. At the completion of a successful software installation/verification process, a dialogue box with the following message should appear on the LCD Display screen



12. Remove the USB Memory Stick from the Scan Engine.

13. Press the “SELECT”  key again to finalize the software installation. The Scan Engine should perform an automatic reboot, powering back up in a fully operational condition.

16.2 “Advanced” Software Installation Procedure


SPECIAL INFO




- In cases where the revision level of the software on the **Z.ONEULTRA SP** is being transitioned in a non-standard fashion, or has become corrupted and the system will not boot to perform a normal software installation process, the following advanced software installation steps should be used.

16.2.1 Interrupting the normal boot sequence (“Alternate Boot Options”):

1. Connect a transducer to the Scan Engine (if not currently attached)
2. Press the green power button, on the left-rear of the Scan Engine, and then IMMEDIATELY abort

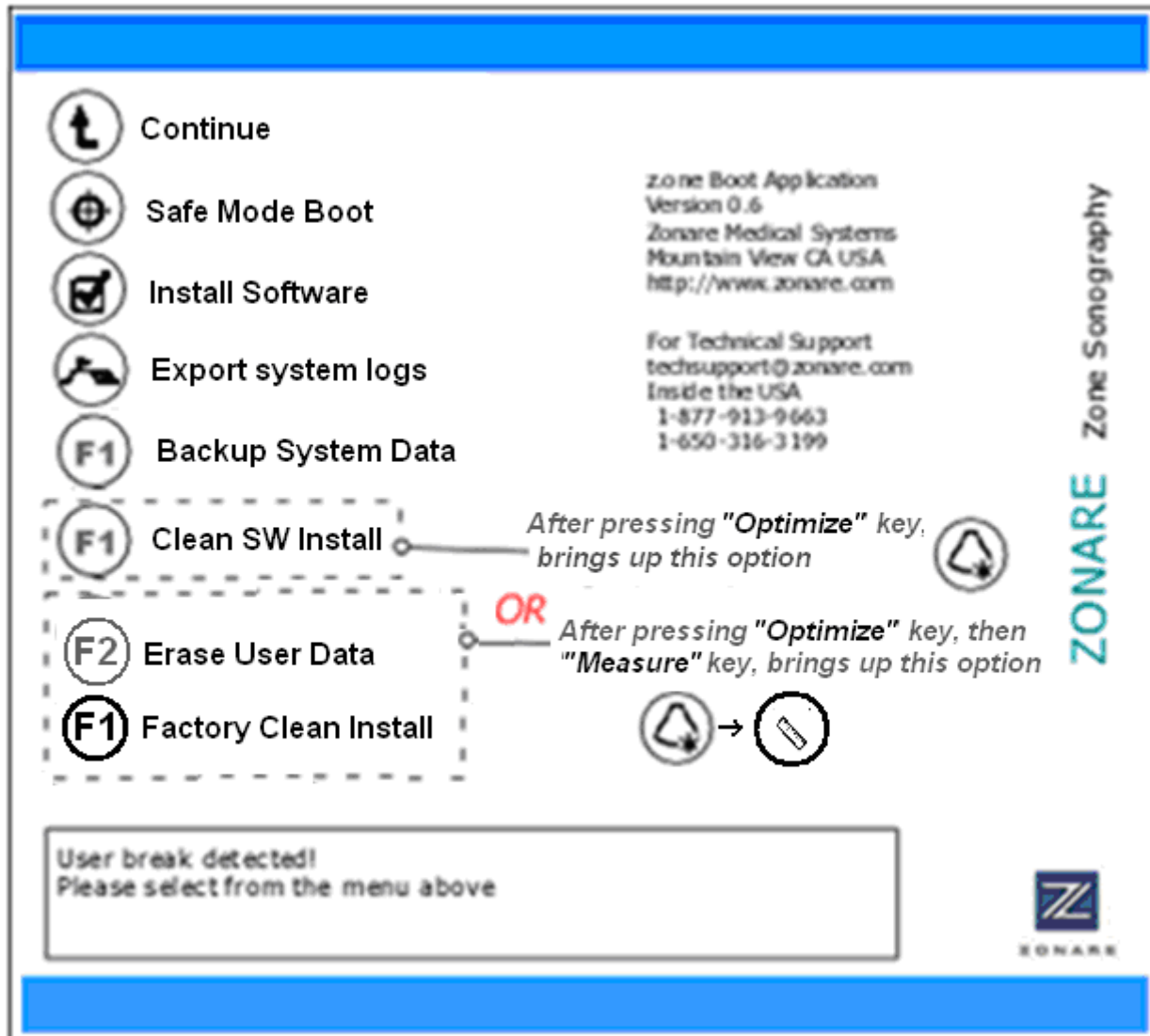
the normal boot sequence by pressing the “Freeze”  key, within a few seconds after pressing the power button, and the start-up splashscreen first appearing.

NOTE: The “Back”  key also performs this function, if it is accessible due to the Scan Engine being undocked or docked in a Cart







3. The Scan Engine should abort the normal boot, and display a screen (shown below) offering a variety of options.






16.2.2 Advanced Install Operations:











SPECIAL NOTE: Pressing one of the following keys on the keyboard of the Scan Engine (or SmartCart SP if Scan Engine is “docked”), will bring up additional key functions into the on-screen menu (as shown above)

- Pressing the **OPTIMIZE** key  will assign **F1** to: “*Clean SW Install*”
- Pressing the **OPTIMIZE** key , then pressing the **MEASURE** key , will assign the **F2** key  to: “*Erase System Data*”

Description of Key Functions

Key	Function	Operation Performed
Back 	Continue	Pressing this key results in the Z.ONEULTRA SP exiting the user break menu, and performing a normal system boot operation.
Set 	Safe Mode Boot	<i>Not implemented at this time</i>
Select 	Install Software	Installs software from USB Memory Stick, retaining all existing User Presets and System (configuration) Presets (by automatically backing up to USB Memory Stick, prior to installing new software).
Tab 	Export system logs	Copies content of internally stored system LOG files, to externally inserted USB memory stick
	Backup System Data	Moves the contents of the internal exam archive storage (Patient Exams) to the currently attached USB Memory Stick.

Description of Optional Hidden Functions – (4.x Software)


Key	Function	Operation Performed	Access Key(s)
	Clean SW Install	Installs software from USB Memory Stick, over-writing (erasing) existing User Presets and System (configuration) Presets, with Zonare default values. NO formatting of the media is performed.	<i>Optimize</i> 
	Factory Clean Install	The “C” and “D” partitions of the internal media of the Scan Engine are completely reformatted (all content erased), as a precursor to installing system software from USB Memory Stick. As in the normal Clean Install, this process erases all existing User Presets and System (configuration) Presets; replacing them with Zonare default values..	<i>Optimize -> Measure</i>  -> 
	Erase User Data	Completely erases ALL stored patient exams (Image ARCHIVE). Additionally erases all entries in the DICOM Queue and LOG file directory, on the internal CompactFlash media inside the Scan Engine.	<i>Optimize -> Measure</i>  -> 


16.3 SCAN MODULE: Standard Software Installation/Upgrade Procedure

ATTENTION



*The Scan Module **MUST** be docked in the Cart in order to perform a Standard (user setting auto backed-up/restored). Any software install performed with the Scan Module undocked, will execute as a “Clean” install process (no user settings retained).*

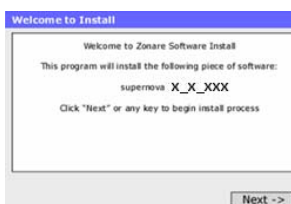
1. Connect a transducer to the Scan Engine (if not currently attached)
2. Press the Power On/Off button to power the system on
3. Allow the system to complete a normal boot operation (less then 1 minute)
4. Insert the USB Memory Stick (containing system software installer files) into any one of the four USB ports at the rear of the SmartCart, pressing lightly to ensure it is seated in the connector
5. An initial software install alert message screen should appear on the LCD display
6. To begin the software install process, at each of the two (2) alert screens, press the “SELECT”  key


NOTE: *If it is determined that the software revision of the USB Memory Stick is not the desired version for installation, and it is desired to abort (select the “NO” option) the install operation (or abort it for any other reason), press the “BACK”  key, then manually remove the USB Memory Stick..*

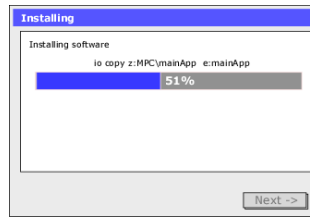
14. The following initial software installation screen should appear, and be displayed for a few seconds on the LCD Display



15. A final “**Welcome to Install**” screen should appear

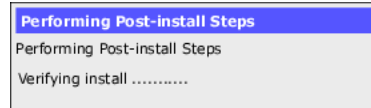


16. Press the “SELECT”  key again to begin the software installation process.
17. The in-process installing status screen should appear, with a bar graph indicating a dynamic percent completion status

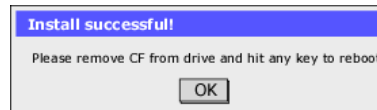


NOTE: *The main application install process should complete in approximately 5 minutes.*


18. After file installation is completed, the system will run a brief install verification process. The following screen will appear during this verification



19. At the completion of a successful software installation/verification process, a dialogue box with the following message should appear on the LCD Display screen




20. Remove the USB Memory Stick from the Scan Engine.


21. Press the “SELECT”  key again to finalize the software installation. The Scan Engine should perform an automatic reboot, powering back up in a fully operational condition.


16.4 SCAN MODULE: “Clean” Software Install Procedure (“Docked”)

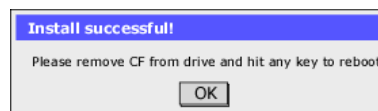
1. Press the Power On/Off button to power the system on
2. Allow the system to complete a normal boot operation (less than 1 minute)
3. Insert the USB Memory Stick (containing system software installer files) into any one of the four USB ports at the rear of the SmartCart, pressing lightly to ensure it is seated in the connector
4. Pressing the “**SERVICE**” key, on the upper row of the QWERTY keyboard on the SmartCart, will immediately bring up the main **User Diagnostic Panel** page.




5. Select the “**MAINTENANCE**” softkey option, to bring up that page.
6. Select the “**SERVICE REBOOT**” softkey. The system will shutdown, and reboot into the special BOOT-APP option screen
7. Press the “**OPTIMIZE**” key, to enable the “**CLEAN INSTALL**” option to appear in the menu.
8. Press the “**F1**” key, to begin the Clean software install process.
9. At each of the two (2) alert screens, press the “**SELECT**”  key to continue through the install operation to completion.

NOTE: *If it is determined that the software revision of the USB Memory Stick is not the desired version for installation, and it is desired to abort (select the “NO” option) the install operation (or abort it for any other reason), press the “**BACK**”  key, then manually remove the USB Memory Stick..*

10. At each of the two (2) alert screens, press the “**SELECT**”  key to continue through the install operation to completion.
11. At the completion of a successful software installation/verification process, a dialogue box with the following message should appear on the LCD Display screen



12. Remove the USB Memory Stick, and press the “SELECT”  key again to finalize the software installation. The system should perform an automatic reboot, powering back up in a fully operational condition

16.5 SCAN MODULE: “Clean” Software Install Procedure (“Undocked”)

ATTENTION



The Scan Module requires connection to an (optional) AC Power Adapter in order to be operated for software installation while in an “undocked” (outside of the Cart) condition.

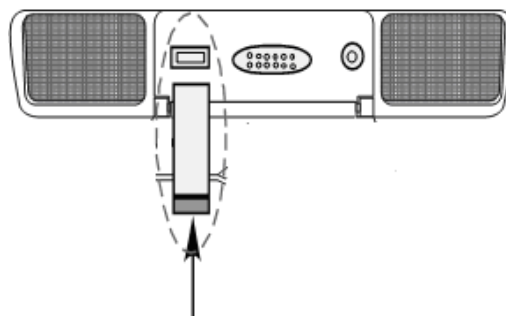
*All software installations performed while in a “standalone” mode, will be automatically be executed as a “Clean” install (no user settings backed-up/restored). All user Presets and System settings **MUST** have been backed-up to USB Memory Stick, **PRIOR** to performing this form of software installation on the Scan Module.*

1. Attach a Zonare AC Power Adapter (option) to the DC power input port on the rear of the Scan Module, or have the Scan Module physically docked on Scanner Deck of SmartCart.
2. IF Scan Module is being powered by docking it in the SmartCart, make sure that AC is power present at rear of Cart, and the circuit breaker in the “1” / ON position (or Z-PAK battery pack is installed in system)

NOTE: The Cart will NOT be actively “turned on” (power button on Scanner Deck will **NOT** be pushed) during this direct Scan Module “Clean” software installation.

3. Insert the USB Memory Stick (containing system software installer files) into the USB port at the rear of the Scan Module, pressing lightly to ensure it is seated in the connector

NOTE: IF the USB Memory Stick type being used is too long to fit in the clearance between the back of the Scan Module and the gray plastic rear panel on the Cart, place a flat-blade screwdriver under the sliding panel, to raise it up a sufficient distance to allow clearance.



4. Press the Power ON/OFF button on the Scan Module, and allow it to power up.

5. The LED on the USB Memory Stick will begin flashing, to indicate the start of the software installation process.
6. The LED will intermittently continue to flash during the entire duration of the software installation
 - Total install time: **Approx 4 minutes**

The Scan Module will automatically power off, to indicate the completion of the software installation.

16.6 FTP Site Access: Software/File Downloads from Zonare

SPECIAL INFO



- Zonare's "TECH SUPPORT" FTP site area is provided to enable global access by Customers, Distributors, and Service personnel.
- This tool is intended to allow direct access for downloading of file provided by Zonare Tech Support, (like downloads of new System Software).
- The TECH SUPPORT FTP area is also provided as a repository for transferring (uploading) files to Zonare Tech Support (i.e. image files for review).
- To ensure security, a User Name and Password are required.

For Customers/Distributors/Service:

1. Go to the START box at the bottom of the screen of your PC and start up **Wiindows** "Explorer".
 2. Enter the following URL information into the "ADDRESS" box of Windows "Explorer":
Address: <ftp://12.40.200.87>
 3. Enter the following User Name and Password information:
User Name: (call Tech Support for current login information)
Password: (call Tech Support for current login information)
 4. Tech Support window should now be displayed, enabling uploading or downloading of files
-

16.7 "DIAGNOSTIC" Panel Operations

16.7.1 Foreword

The **User Diagnostics Panel** allows service personnel access to important system information and the ability to perform service support processes.

16.7.2 Accessing the basic "Diagnostic" Panel

SERVICE Key- Quick Method:

1. Pressing the **SERVICE** key, on the upper row of the QWERTY keyboard on the SmartCart SP, will immediately bring up the main **User Diagnostic Panel** page.



NOTE




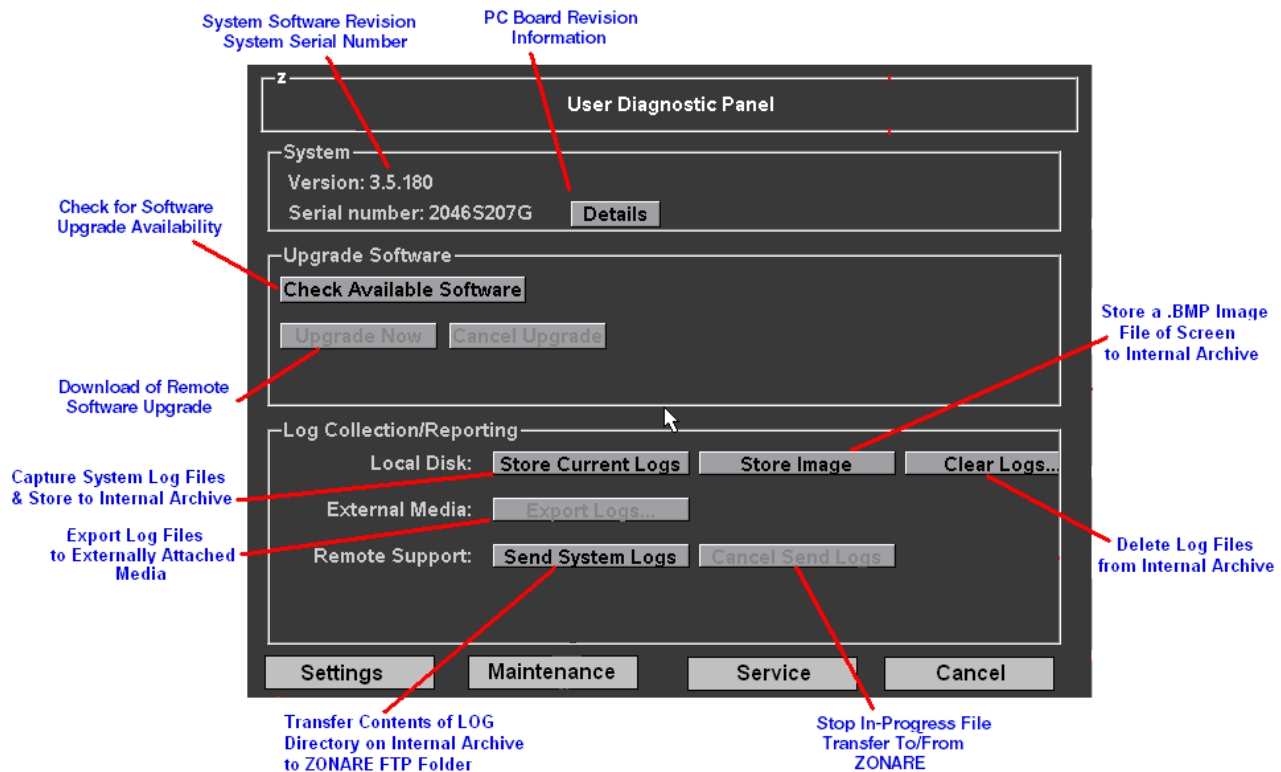
- EXTENDED “**Service**” key press will initiate an immediate manual capture of system “LOG” files.

Normal Menu Path Method:

1. Using the “**Tab**” button and **Menu Control** on the Scan Engine (or SmartCart SP) user interface, advance to the “**Tools**” menu and then sequence through the following selection:

Tools tab --> System Setup --> Diagnostics

2. Press the “**SELECT**”  button on the user interface to access to the basic “**Diagnostic**” page



The three (3) sub-menus offered from **User Diagnostic Panel** are as listed below:

- **SETTINGS**FTP Site Access Setup
 - **MAINTENANCE**Firmware Upgrades / Battery Maintenance
 - **SERVICE**Service-Key Password Entry
-

Functions provided within the **User Diagnostic Panel** are as listed below:

- Remote System Software Upgrades
 - System Log file collection/reporting
 - Checking of system software revision level
 - Checking system serial number
 - Checking revision levels of major PC boards in **Z.ONEULTRA SP**
 - Reconditioning of the Z-PAK Battery in the SmartCart
 - Upgrading of the firmware on the PIC in the power supply of the SmartCart
 - Upgrading of the firmware of the FPGA on the Main Board of the SmartCart
 - Upgrading of the firmware of the CW Module within the SmartCart
 - Capturing of system status to a “LOG” files
 - Exporting of “LOG” files from internal storage to the externally attached media device
 - Capturing current image screen, and storing as a .BMP file to internal Archive
 - FTP transferring the contents of the internal “LOG” directory (via an internet connection) to ZONARE
 - Checking for availability of software upgrades from remote ZONARE FTP site
 - Remote (over the internet) software upgrade of the **Z.ONEULTRA SP** from the ZONARE FTP site
 - Forcing a system REBOOT, to the BOOT-APP screen (for Scan Module “Clean SW Installs”)
-

The additional functions available beyond the main page of the User Diagnostic Panel, in these three sub-menus, are as defined below:

- **SETTINGS**

- FTP Access Setup – (IP Addressing)
 - Software Upgrades
 - Log File Transfer
- Auto-Log File Reporting Configuration

Remote Support Settings for System upgrades; User name and Password supplied by ZONARE Service

Remote Support Settings for System logs; User name and Password supplied by ZONARE Service

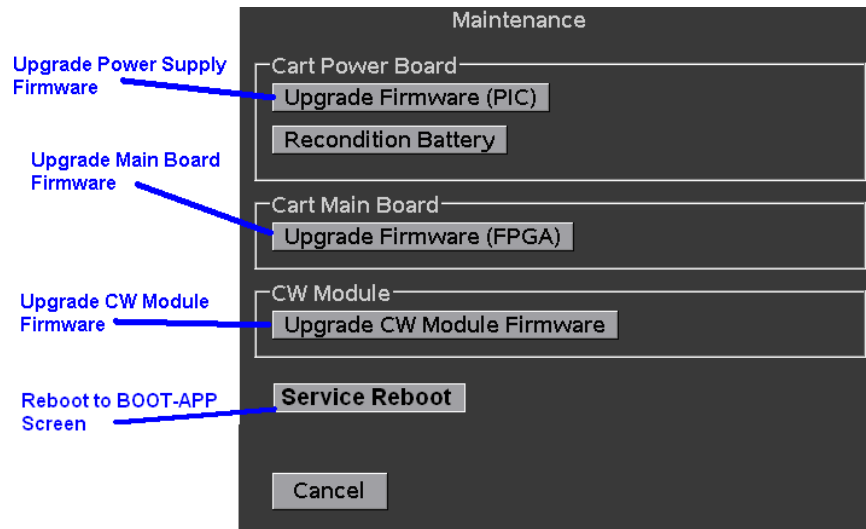
Auto Logging can be set by User; schedules when System logs and errors are sent to ZONARE Service. Factory default: Auto and Error Logging are OFF

The screenshot shows a 'Settings' window with two main sections: 'Software Upgrade Options' and 'Log Reporting Options'. In the 'Software Upgrade Options' section, the 'FTP IP Address' is set to '12.40.200.87', 'User Name' is '35SW', and 'Password' is masked with asterisks. There is a 'Ping' button and a checkbox for 'Auto notify of software updates' which is checked, with a reminder every 1 day. The 'Log Reporting Options' section has a checked checkbox for 'Enable sending logs to remote FTP site'. It also shows 'FTP IP Address' as '12.40.200.87', 'User Name' as 'LOGS', and 'Password' as masked. Under 'Auto Logging', 'Daily' is selected. There are also options for 'Every 1 Weeks on Monday' and a 'None' option. 'Auto Log Time' is set to Hour 0 and Minutes 0. 'Error Logging' has a checked checkbox for 'Send logs on error'. At the bottom, 'FTP Data Transfer Mode' has 'Active' selected over 'Passive'.

Section	Option	Value
Software Upgrade Options	FTP IP Address	12.40.200.87
	User Name	35SW
	Password	*****
	Auto notify of software updates	<input checked="" type="checkbox"/>
	Remind every	1 days
Log Reporting Options	Enable sending logs to remote FTP site	<input checked="" type="checkbox"/>
	FTP IP Address	12.40.200.87
	User Name	LOGS
	Password	*****
	Auto Logging	<input checked="" type="radio"/> Daily
		<input type="radio"/> Every 1 Weeks on Monday
		<input type="radio"/> None
	Auto Log Time	Hour (0-23): 0 Minutes (0-59): 0
Error Logging	<input checked="" type="checkbox"/> Send logs on error	
FTP Data Transfer Mode		<input checked="" type="radio"/> Active <input type="radio"/> Passive

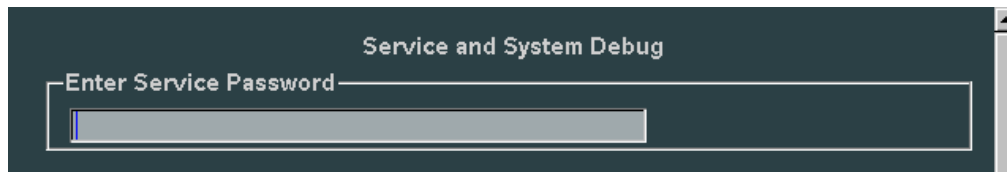
- **MAINTENANCE**

- Firmware Upgrades – Z-PAK Maintenance – Scan Module SW Load (*Service Reboot*)




- **SERVICE**

- Service Password (Enable Proprietary Function Access)



16.7.3 PC Board Version Information

1. Using the trackball, position the arrow cursor over the **DETAILS** box
2. Press the “SET”  button on the user interface
3. A “**Details**” menu (similar to the one shown below) should appear, displaying current revision values programmed into the various PC boards in the **Z.ONEULTRA SP**

Details		
BOOTAPP		4.02
USB_CONTROLLER		ISP11562
CART_FPGA	22	3.6.0.6
MONITOR_FIRMWARE	1	2.0
DIGITAL_BOARD	80250	REV-2
POWER_BOARD	80021	REV-2B
PIC		44
VOLT_SUP		4
STRIKER		3.8.9
PIC_CART		9
HYDRA		2.0.58
DOCK_BOARD	85013	REV-3F
CF_MODEL_VERS	INC 2G	241-0230
XDCR_BOARD	84002	con_A Mux_A
ANALOG_BOARD	80057	REV-4B


OK

4. Press the “BACK”  button to hide the “Details” menu


16.7.4 FTP Remote Access Configuration:

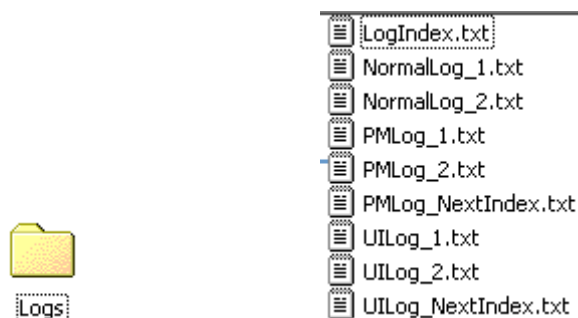
NOTE: Normally these three parameters (IP Address, User Name, and Password) will already be configured properly into the entry boxes, as this is automatically setup at the time of initial software installation on the Scan Engine. You may therefore bypass this step initially, and only return to the configuration process IF it is found that the values entered are not allowing FTP access.


FTP IP Address:	12.40.200.87	Ping
User Name:	LOGS	Password: *****

- On the Diagnostic page, in the “ZONARE SUPPORT” area on the screen, ensure that the following FTP remote access parameters are configured for the proper serial number of the Scan Engine in the **Z.ONE**.
 - IP Address: (for Zonare FTP Site) **12.40.200.87**
 - User Name: **42SW** or **LOGS**
 - **42SW** for software upgrade field
 - **LOGS** for log reporting field
 - Password:..... **support**
- Using the **Menu Control** scroll down to backlight the **APPLY** selection, then press the “SELECT”  button to save the updated settings

16.7.5 MANUAL Log File Capture (Store) – Download to ZONARE

1. Using the trackball, position the arrow cursor over the **Store Current Logs** box
2. Press the “SET”  button to initiate the creation of the LOG directory and the writing (“Capture”) of the log files to the internal CompactFlash storage media. The directory and files will look similar to that shown below:



3. Using the trackball, position the arrow cursor over the **Send System Logs** box, and Press the “SET”  button to initiate the system log transfer

16.7.6 BRUTE-FORCE Log File Capture – (System Problem Condition)

1. Holding down (extended press for approx 5+ seconds) the “**SERVICE**” key, on the upper row of the QWERTY keyboard on the SmartCart SP, will result in manually generating the capture of a set of internal “LOG” files,




16.7.7 MANUAL Image File Capture (Store) – Download to ZONARE


NOTE: The following process is used for capturing (and storing) an ultrasound image screen snapshot as a .BMP file to the “LOG” directory of the internal storage inside the Scan Engine. The intent is for capturing, and then sending (via an FTP transfer) digital images to Zonare for evaluation

Operate the system normally until the desired ultrasound image event has occurred, at which time press “Freeze” to retain the image on the screen.

1. Go to the Diagnostic page.

2. Place the cursor over the top of the **Store Image** selection and press the “SET”  button to initiate the capture of the current ultrasound image screen.
3. Place the cursor over the top of the **Store Logs** selection and press the “SET” button again, to ensure there is log file content to enable sending to the FTP site.
4. To download the log folder contents (which also contains the stored .BMP Image file) to the ZONARE Tech Support, enter the proper IP Address, User Name, and Password values in the entry boxes on the screen (values as provided by ZONARE Tech Support)

NOTE: *The Scan Engine must be docked in the SmartCart SP and the **Z.ONEULTRA SP** must be connected and properly configured on a local IT network that WWW internet access, in order to perform the remote system log file transfer to ZONARE.*

Using the trackball, position the arrow cursor over the **Send System Logs** box, and press the “SET”  button to initiate the system log transfer

16.7.8 Remote Software Upgrade (download) from ZONARE site

NOTES: ***PRIOR** to beginning a remote software download/installation process, it is necessary to contact Zonare Technical Support, for assistance in setting up the necessary software files on the FTP site, for each remote software upgrade session.*

*The **Z.ONEULTRA SP** will need to be attached to an active direct internet accessible networked connection, at the install site, in order to perform this remote software upgrade procedure.*

1. Dock the Scan Engine in the SmartCart SP, and ensure the network port on the Rear I/O panel of the SmartCart SP is connected to an active internet connection.
2. Insert the USB Memory Stick to be targeted for downloading of the software installer files, into one of the USB ports on the back of the SmartCart SP.
3. Power on the system and allow it to fully boot.
4. Using the “**Tab**” button and **Menu Control** on the SmartCart SP user interface, advance to the “**Tools**” menu and then sequence through the following selection:

Tools tab --> System Setup --> Diagnostics

5. Click on the **CHECK AVAILABLE SOFTWARE** softkey to open remote communications for determining the available software for upgrade on the remote FTP site. A message should appear on the screen, indicating the available software for download, and specifying the software revision level that is posted.
6. To begin the remote software downloading process, click on the **UPGRADE** softkey.

NOTE: The time required for downloading the complete software installer files to the USB Memory Stick will be determined by the network speed at the facility. Typically the download time is about 10 minutes.

7. At the completion of the downloading of the software installation files to the local USB Memory Stick, the system will put up a prompt on the screen. The prompt will offer the User the option of performing installation of the new software on the scan engine.
8. In order to start the software installation process, accept the offered prompt. The software installation should begin, and will typically take less than 10 minutes to complete.

For information on the specific steps that will occur during the software install, refer to the section on software installation elsewhere in this manual.

17 CLEANING AND DISINFECTING PROCEDURES

17.1 SmartCart SP

17.1.1 Cleaning SmartCart SP LCD Display

CAUTION



- *Take care not to damage or scratch the glass or LCD panel.*
- *Do not apply pressure on the glass or LCD panel.*
- *Do not apply or spray liquid directly to the glass, panel or cabinet as excess liquid may cause damage to internal electronics. Instead, apply the liquid to the cleaning cloth.*
- *Do **NOT** use any of the following:*
 - *Lye or cleaning solutions containing lye**
 - *Acid*
 - *Detergents with fluoride*
 - *Detergents with ammonia*
 - *Detergents with abrasives*
 - *Steel wool*
 - *Sponge with abrasives*
 - *Cloth with thread made of steel*
 - *Other coarse tools*

- **CLEANING**

Front Glass:

1. Power down the **Z.ONEULTRA SP** ultrasound system
 2. Clean the glass using a soft cotton cloth, lightly moistened with a watery solution or a mild commercial glass-cleaning product suited for coated glass surfaces
 3. Wipe dry with a clean, dry, soft, lint-free cloth
-

External Case:

CAUTION



- Do **NOT** expose the external case to any of the following:
 - Cidex
 - Betadine
 - Alcohol (Isopropyl and Ethyl)
 - Ammonia based cleaners (Windex)
 - Aquasonic Gel
1. Power down the **Z.ONEULTRA SP** ultrasound system
 2. Clean the external case of the display using a soft cotton cloth, lightly moistened with a mild cleaning product recognized for safe use on medical equipment
 3. Repeat with water only
 4. Wipe dry with a clean, dry, soft cloth

17.1.2 Cleaning the SmartCart SP exterior surfaces

CAUTION



- Do not use disinfectants (such as gluteraldehyde or hydrogen peroxide), or acetone, to clean any surfaces on the **Z.ONEULTRA SP**, or its accessories:
1. Power down the **Z.ONEULTRA SP** ultrasound system
 2. Using a soft cloth, only dampened with mild soap and water, clean the exterior surfaces.
 3. Thoroughly dry all cleaned surfaces with a soft cloth

17.2 Scan Engine

17.2.1 Cleaning LCD Display

1. Power down the **Z.ONEULTRA SP** ultrasound system
2. Spray a mild cleaner onto a soft, clean cloth, and wipe the screen clear of dust, fingerprints, etc.
3. Thoroughly dry all cleaned surfaces with a soft cloth

17.3 Transducers

17.3.1 Cleaning – Care of Transducers

17.3.1.1 Approved disinfectants

CAUTION



- *The disinfecting products listed below apply to all Zonare transducers EXCEPT the P8-3TEE transducer. Follow manufacturer's specified instructions for that specialized transducer to prevent damage. :*

• Immersion Solutions

Only disinfectants listed below are tested and approved for use on the ZONARE transducers specified above. No other products should be used, as damage to the transducer may result.

- **CIDEX**
- **CIDEX PLUS**
- **CIDEX OPA**
- **T-SPRAY / T-SPRAY II**
- **METRICIDE (14-Day)**
- **OMNICIDE**
- **GIGASEPT**
- **VIRKON**

Figure 44: Approved Disinfectants Table (Immersion-Method)

• Wipe Solutions

Only disinfectant listed below are tested and approved for use in wipe-method cleaning on the ZONARE transducers specified above. No other products should be used, as damage to the transducer may result.

- **T-SPRAY / T-SPRAY II**
- **SaniCloth**
- **Isopropyl 50% alcohol**

Figure 45: Approved Disinfectants Table (Wipe-Method)

17.3.2 Cleaning – Disinfecting Procedures

There are two methods of cleaning and disinfection available for the **Z.ONE Ultra** transducers.

- For external-use transducers (CLA and LA), ZONARE recommends performing the “wipe method” (described next) after each exam. In addition, ZONARE recommends performing the immersion method disinfection weekly.
- For internal probe (EV), ZONARE recommends performing the “immersion method” disinfection after each exam.

The **Z.ONE Ultra** transducers cannot be sterilized. When sterility is required, use a sterile transducer cover/sheath and sterile ultrasound/coupling transducer gel. Follow all prescribed sterility techniques.

WARNING



*To avoid electrical shock, prior to cleaning any transducer, fully disconnect it from the Scan Engine. If cleaning of the transducer is being performed near the **Z.ONE Ultra**, ZONARE also recommends disconnecting the AC power from the SmartCart or miniCart..*

CAUTIONS



Always use protective eyewear and clothing when cleaning or disinfecting the transducers. Do not allow the disinfectant to come in contact with metal surfaces (transducer connector). Use a soft cloth and warm soapy water to remove any disinfectant that remains on metal surfaces. If using a brush, only use a very soft brush when cleaning transducers, because even a soft brush may cause transducer damage. Use only a soft cloth

17.3.2.1 Wipe Method

1. Disconnect the transducer from the **Z.ONE Ultra**.
2. Remove the transducer cover/sheath and discard.
3. Clean the surface of the transducer, using a soft cloth dampened with mild soap (or isopropyl alcohol) to remove particulate, ultrasound coupling gel, or body fluids. Apply the cleaning solution to the cloth, and then use to wipe down the transducer.
4. After cleaning, wipe the transducer again with a cloth soaked with clean water to remove solution.

Mix the disinfectant solution following the disinfectant label instructions for solution strengths and disinfectant contact duration.

5. Air dry the transducer or towel dry it with a clean cloth.
6. After disinfecting, wipe the transducer again with a cloth soaked with clean water to remove any residual solution prior to use on patients.
7. Examine the transducer for damage, such as cracks, splitting, holes, or fluid leaks. If damage is evident, discontinue use of the transducer and contact Tech Support.

17.3.2.2 Immersion Method

CAUTIONS



During immersion disinfection, never immerse the transducers longer than the maximum specified time (as per the Operator Manual instructions) of 45 minutes. Damage may occur to the transducer housing and/or components if disinfection times exceed these recommended limits.

Using a non-recommended cleaning or disinfectant solution, incorrect solution strength, or immersing the transducer deeper or longer than indicated can damage the transducer.

To prevent possible damage to the electronics of the transducer, never immerse the transducer beyond the point (10mm below the top edge of the transducer housing), as shown in the figure below.

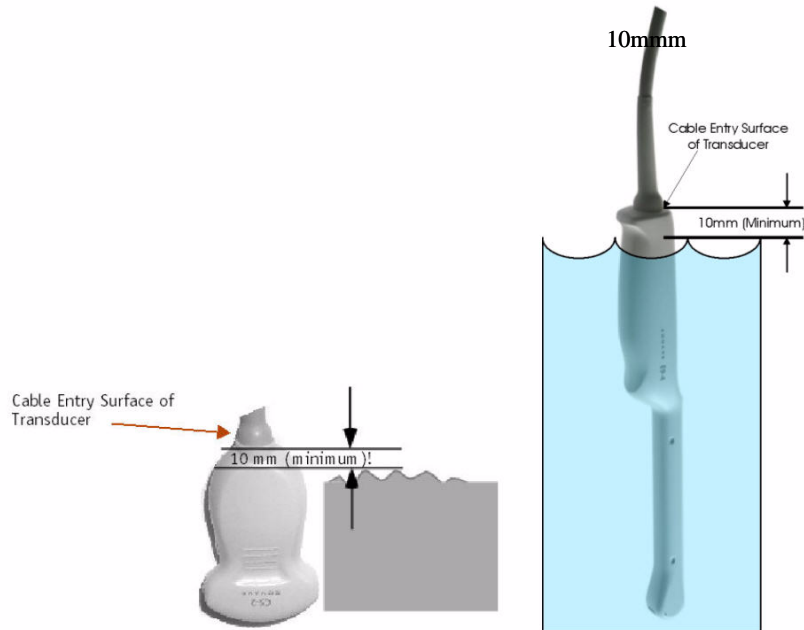


Figure 46: Transducer immersion limits

1. Disconnect the transducer from the **Z.ONE Ultra**.
2. Remove the transducer cover/sheath and discard.
3. Clean the surface of the transducer, using a soft cloth dampened with mild soap (or isopropyl alcohol) to remove particulate, ultrasound coupling gel, or body fluids. Apply the cleaning solution to the cloth, and then use to wipe down transducer.
4. After cleaning, wipe the transducer again with a cloth soaked with clean water to remove solution.
5. Mix the disinfectant solution, following the disinfectant label instructions for solution strengths and disinfectant contact duration (Refer to Error! Reference source not found.)
6. Immerse the transducer into the disinfecting solution, ensuring it is not immersed below the depth indicated in the figure (Refer to **Figure 46: Transducer immersion limits**)

7. Follow the instructions on the disinfectant label for the duration of transducer immersion; do NOT exceed the 1 hour maximum ZONARE-specified limit.
8. Following the instructions on the disinfectant label, thoroughly rinse all areas of the transducer below the immersion level.
9. Air dry, or towel dry, the transducer with a clean cloth.
10. Examine the transducer for damage, such as cracks, splitting, holes, or fluid leaks. If damage is evident, discontinue use of the transducer and contact Tech Support.

18 MAINTENANCE – CALIBRATION PROCEDURES

18.1 Foreword

Being a digital front-end imaging system, and non-mechanical device, the **Z.ONEULTRA SP** has a very limited number of routine maintenance and calibration procedures that will be required. The maintenance procedures currently described in this manual, are very basic in nature, and may therefore be performed by the Operator, as well as normal Service personnel.

18.2 List: Maintenance Procedures

The basic maintenance procedures to be performed on the **Z.ONEULTRA SP**, consists of the following:

- Adjustment of UI Lift Release, cable adjustment
- Cleaning of accumulated dust from air inlet screens on Scan Engine
- General wipe-down cleaning of all User contact surfaces

18.3 List: Calibration Procedures

The basic maintenance procedures to be performed on the **Z.ONEULTRA SP**, consists of the following:

- Calibration of the Touchscreen function on the Scan Engine

18.4 Z-PAK "RECONDITION" Procedure - (SmartCartSP)

STEPS:

9. Ensure the AC circuit breaker, at the rear of the SmartCart, is in the On ("1" pressed IN) position.
10. Fully boot up the system and then press the "**SERVICE**" key (third key from top-right) on the SmartCart, to bring up the DIAGNOSTIC page.
11. Select the "**MAINTENANCE**" option at the bottom of the screen.
12. Select the "**RECONDITION BATTERY**" option on the screen, to start the Z-PAK Battery Pack recondition process. The ICON for the Z-PAK (in the upper-left corner of the display monitor on the Cart) should appear as shown below:



13. Leave the system attached to AC Power, with a posted note on the monitor to warn other users to not disturb the process until completed.
14. A message of "***Cart Battery Recondition Complete***" will appear on the screen, and the red cross ICON will be removed, at the conclusion of the initial phase of the recondition process.

NOTE: The Z-PAK is at a fully DISCHARGED state at this moment where the battery fuel gauge recalibration phase is completed. The additional steps below must be performed, allowing an additional 3-4 hours of recharging time for the Z-PAK, prior to attempted battery-based Cart use.

15. To restart the normal Z-PAK recharging sequence, first completely **power-down** the system.
16. Power the system back on again. The Z-PAK ICON should appear as shown below (indicating a *charging* state is in progress), and remain on the screen during the entire recharging interval (usually about 3-4 hours).



17. Completion of the recharge process can be identified by the Z-PAK ICON changing to a green color with the AC power plug icon inside (as shown below).



18. At this time the recharging process is complete, the Z-PAK battery is at a full **100% charge state**, and the system is ready for battery-based standalone Cart use.

18.5 UI Lift (Gas spring) Release Cable Adjustment - (SmartCart SP)

18.5.1 Gaining access to cable adjuster

STEPS:

1. Ensure the **Z.ONEULTRA SP** is powered “OFF”.
1. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “OFF” position.
2. Disconnect the main AC power cord from the rear of the SmartCart SP or unplug from the wall source.
3. Using the side of the hand – firmly knock the side of the chassis cosmetic sleeve loose. There are 3 spring clips that retain it at the top. If it does not come free – gently use the flat blade screwdriver to pry the cosmetics loose (use tape on the blade to avoid marring the chassis surface).



18.5.2 Cable adjustment (Barrel adjuster)

1. While holding tension off the cable adjuster, rotate the silver barrel adjuster in the direction required for correcting the current type of release issue (see notes below).



NOTE 1: If the cable has **too much** slack (the lift is not adequately releasing), rotate the adjuster barrel in the **counter-clockwise** (as viewed from the top) direction, a sufficient amount to reduce cable slack, and provide an optimum release point on the release lever handle.

NOTE 2: If the cable is **too tight** (the lift is not staying locked in position when the release lever handle is fully released – aka “drifting”), rotate the adjuster barrel in the **clockwise** (opposite to what is shown in the illustration above) direction just far enough to resolve the “drifting” condition.

2. Reverse cable access process above, to complete this procedure


18.6 Touchscreen Calibration - (Scan Engine)

IMPORTANT




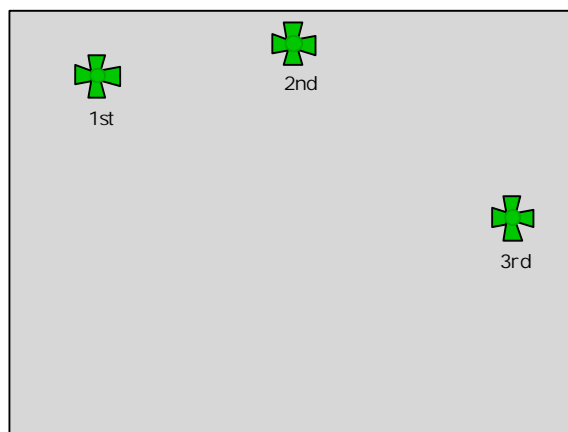
The touchscreen is very sensitive to the “technique” used by the Operator in making contact at each of the calibration points with the stylus. It is very important that only a single discrete (and firm) contact be made at each of the green splash graphics calibration points. Any excessive debounce, when pressing the stylus to the screen, will likely result in a failure of the calibration process.

18.6.1 Calibration Procedure

1. Remove the Scan Engine from the SmartCart SP
2. Press the On/Off switch on the Scan Engine, to power-on the **Z.ONEULTRA SP**
3. Using the “**Tab**” button and **Menu Control** on the Scan Engine user interface, advance to the “**Tools**” menu  and then sequence through the following selection:



Tools tab --> SYSTEM SETUP --> Touchscreen

4. Press the “**SELECT**”  button on the user interface. The Touchscreen calibration screen should appear, with the first (of 3) green “splash” target points being should now be displayed




2. In a **single-firm contact motion**, touch (and hold) the stylus to the center of the 1st target point until the **Z.ONEULTRA SP** detects this contact, and moves the calibration target point graphic to the next (2nd) calibration position.
 3. Repeat the same single-firm touch (and hold) procedure for the remaining two calibration points.
 4. If successful, the **Z.ONEULTRA SP** should return to the *System Setup* menu. If calibration failed message appears, repeat the process being very attentive to the method of (single point) stylus contact with the LCD display for contact.
-

18.6.2 Verifying Calibration

1. Using the *Menu Control*, advance to the “*Annotations*” selection.
5. Press the “SELECT”  button to bring up the Annotations screen.
6. Press the “SELECT”  button to bring up the **VKB** (Virtual “Keyboard”).




7. Using the trackball, position the arrow cursor in the “New Item” entry box on the screen and press the “SET”  key.
 8. Using the stylus to touch within the virtual keys on the **VKB**, verify that the desired text characters appear in the text entry box on the screen.
-

18.7 Display Monitor Adjustment – User Settings

18.7.1 SmartCart SP Display User Settings Adjustment

There are no local adjustment knobs on the LCD Display used on the SmartCart SP. The display settings of the monitor are controlled remotely (via the DVI video cable connection), by an on-screen Audio/Video control menu on the system.

To access the Audio/Video setup menu, use the “**Tab**” button and **Menu Control** on the user interface, advance to the “**Tools**” menu  and then sequence through the following selection:

Tools tab --> SYSTEM SETUP --> DISPLAY --> AUDIO/VIDEO

The adjustable settings are:

- Brightness
- Contrast
- Color Temperature (Red, Green, Blue)

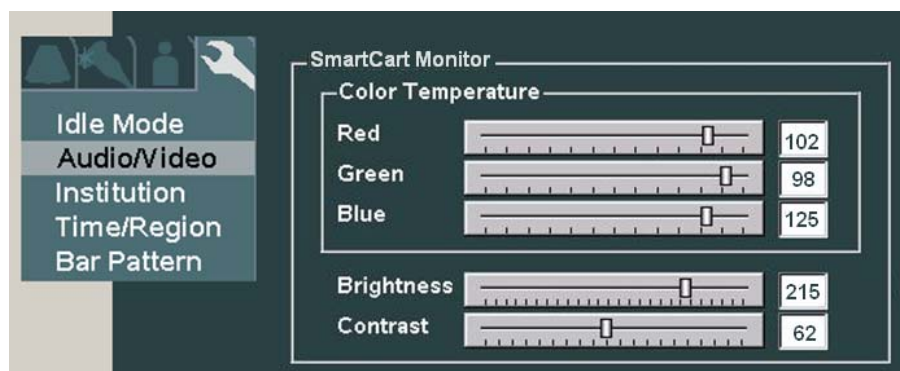


Figure 47: SmartCart SP 19" Display: Recommended Settings

The adjustment of the video settings on the LCD Display, are accomplished by performing the following steps.

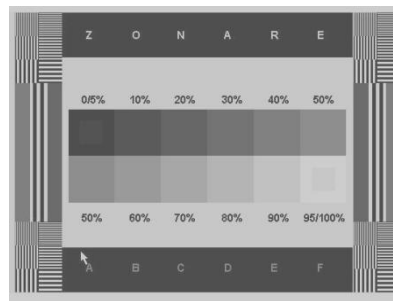
1. Power on the **Z.ONEULTRA SP** and allow it to fully boot
2. Using the onscreen menus of the Scan Engine, select **Tools | System Setup | Display | Audio/Video**, to access the audio/video configuration menu
3. Using the trackball, place the cursor arrow to the desired position on the sliding bar scale (of the desired display control), and press the **SET** key to mark the setting.
4. Repeat the steps above for any additional display settings that are desired for change.
5. To save the new settings and exit, select **Apply** from the menu, to save the configuration and return to the Audio/Video menu.


6. Visually inspect the output of the LCD Display, to confirm the desired video levels are achieved. Repeat the above steps, if required

Grayscale Test Pattern:

1. Using the “**Tab**” button and **Menu Control** on the user interface, advance to the “**Tools**” menu
2. Sequence through the following selections to bring a grayscale test pattern (called “**Bar Pattern**” in the menu) onto the SmartCart SP display.

TOOLS tab --> SYSTEM SETUP --> DISPLAY --> BAR PATTERN



3. To remove the bar pattern from the display; push the “**BACK**” button  on the user interface.

19 SYSTEM TROUBLESHOOTING

19.1 Foreword

Many **Z.ONEULTRA SP** malfunctions are caused by a routine problem, such as power disconnection or the maladjustment of basic imaging or peripheral device (LCD display) controls. Before calling Tech Support, please perform the following troubleshooting procedures on the affected component(s).

The troubleshooting information in this section is intended to assist in diagnosing potential causes of a variety of system problems. It should be noted that as a result of the advanced level of integration in the electronic circuitry of the **Z.ONEULTRA SP** diagnostic ultrasound system, the amount service/repair that can be performed in the field, is limited to a specific number of FRU's (Field Replaceable Units).

19.2 Technical Support Contact Information

- **USA, Canada and Asia**

ZONARE Medical Systems Inc
420 N. Bernardo Avenue
Mountain View, CA 94043

Toll-free live-phone support: **1-877-913-9663** (5:00AM – 5:00PM, Pacific Standard Time)

Tech Support FAX line **1-650-230-2817**

Tech Support e-mail techsupport@zonare.com

Corporate web site..... www.zonare.com

FTP site (Tech Support Window):

– URL <ftp://12.40.200.87>

- Enter the following User Name and Password information:

User Name: (call Tech Support for current login information)

Password: (call Tech Support for current login information)

- **Europe**

ZONARE Medical Systems GmbH
Henkestrasse 91
91052 Erlangen, Germany

Tech Support Phone (+49) 9131-974 94-0 (8:00AM – 5:00PM)

Tech Support e-mail info@zonare.de

Corporate web site..... www.zonare.com

FTP site (Tech Support Window):

– URL <ftp://12.40.200.87>

- Enter the following User Name and Password information:

User Name: (call Tech Support for current login information)

Password: (call Tech Support for current login information)

19.3 Troubleshooting

19.3.1 Transducer Problems

CAUTIONS



Bent, broken, or missing pins on the transducer connector may cause poor image quality, including possible mirror image artifact. Be sure to check pins before connecting transducer to the ZONARE ultrasound system. If pins are bent, broken, or missing, do not use the transducer and call ZONARE Technical Support.



Figure 48: Transducer Connector Pin Damage - (Example)

Inspection of Transducers

1. Routinely inspect transducers for the following problems.
 - Signs of wear or damage to the housing, cable, etc.
 - Cracks in case or transducer face
 - Cuts or gouges on any part of the transducer, including transducer face, case, cable, and connector
 - Buckling or bulging of the lens material on the transducer face
 - Damage to the transducer connector, including bent, broken, deformed, or missing pins
2. Immediately replace a transducer that exhibits any of the above damage symptoms

19.3.2 Power-On Problems

SmartCart SP (with docked Scan Engine) fails to power on

1. Ensure that the AC power is connected to a wall outlet.
2. Ensure that the circuit breaker (located in the lower-left of the rear panel) is pressed down in the "1" (On) position.

3. Ensure that the “**PIC**” alive status LED (left-most/#1 LED, as viewed from the rear), at the back of the SmartCart SP, is flashing.
4. After docking Scan Engine, ensure that the “**PIC**” alive status LED begins flashing quickly, and “**VSCANNER**” power LED (right-most/#6, as viewed from the rear), is solid green.
5. If the status LEDs do not match this status, remove the Scan Engine from the scanner deck on the SmartCart SP and inspect for any damage to Scan Engine and SmartCart SP docking connectors; check for any debris/obstructions in docking area or on connectors.
6. Re-dock the Scan Engine on the SmartCart SP, ensuring proper alignment, and then repeat checking procedure.
7. Press the Power On/Off button (on the Scan Engine Scanner Deck of the SmartCart SP). Ensure that the “**VMAIN**” power LED (2nd from right) at the back of the SmartCart SP, is solid green.
8. If the SmartCart SP still does not power on, remove the Scan Engine and attempt to operate it in the stand-alone mode to determine if the problem is with the SmartCart SP or the Scan Engine.
9. If either component fails to start up after these steps, contact ZONARE Tech Support.

SmartCart SP – System Power-Up Sequence

1. Turn off system (circuit breaker off or unplug), remove Scanner from SmartCart SP
 NON Z-PAK (Cart battery pack) equipped systems:
 - No LEDs on system status panel at rear of SmartCart SP should be lit
 Z-PAK (Cart battery pack) equipped systems:
 - LED #1 should be flashing on system status panel at rear of SmartCart SP
2. Connect AC power to SmartCart SP and turn ON (1) circuit breaker
 - LED #1 (PIC status) should be blinking. If blinking (Should be slow since system turned off), indicates PIC on the Power Supply Module is up and running and probably has valid firmware
 - If not blinking, PIC is either not getting power (AC wall, circuit breaker, AC-DC switcher) or PIC is in BootLoad mode
3. Testing for Power Supply Module being in BootLoad mode:
 - Undock the scanner from the SmartCart SP
 - Press Power On/Off button on the SmartCart SP
 - If UI lights kick on and green light inside On/Off button starts slow blinking, PIC on Power Supply Module is probably in BootLoad mode

NOTE: BootLoad mode results in inability for system to check for scanner docking present, and does not illuminate any of the five system status LEDs on the rear panel of the SmartCart SP

- Turn off the SmartCart SP with another push of the On/Off button
5. Correcting Power Supply Module out of BootLoad mode:
- Dock the scanner on the SmartCart SP
 - Manually press the power button directly on the scanner, to turn its power on
 - Press Power On/Off button on scanner Scanner Deck, to turn the SmartCart SP on
 - Go to the System Setup->Diagnostic page, and perform the “Upgrade PIC” operation

SmartCart SP – System Power-Up Testing & PIC “Reset”

1. Testing On/Off power button operation, and forcing a “PIC Reset” on Power Supply Module:
 - Undock the scanner from the SmartCart SP
 - Press, and hold (for approx. 10 seconds) the Power On/Off button on SmartCart SP
 - LED #1 should blink rapidly and LED #2 should blink at a slower rate, to indicate the PIC is “Resetting”
- 1) IF LED #1 does not blink rapidly, a problem with the Power On/Off button or cabling is indicated

SmartCart SP – Verifying Basic Power Supply Functionality

- Verifying for VSCANNER power supply output:
 1. Eject the battery pack from the Scan Engine, and dock scan engine on SmartCart SP
 2. All four of the battery charge LEDs on the Scan Engine should illuminate for approx 5 seconds, and then go out.
 3. LED #5 (VSCANNER) on back of SmartCart SP should be illuminated
-
- If LED #5 does **NOT** turn on, problem is likely w/Scanner detect circuit or power supply
 1. Press the Power On/Off button on SmartCart SP to check response. If Scan Engine is not detected, VMAIN (LED #4) won't illuminate. If VMAIN (LED #4) does turn on, VSCANNER voltage is defective.
-
- If LED #5 **DOES** turn on:
 1. Press Scanner's (not Cart's) Power “On/Off button. Scan Engine (with internal battery still removed) should boot up, verifying that VSCANNER supply is OK.

Scan Engine (undocked) fails to power on

- Remove the battery from the Scan Engine, and then press the battery charge status button to ensure that a charge of greater than 25% is available. If the battery charge is insufficient, replace the battery or dock the Scan Engine in a powered-on SmartCart SP and allow time to recharge the battery.
- Disconnect the transducer from the Scan Engine (if attached), and then repeat the attempt at powering on the unit.
- Dock the Scan Engine in the SmartCart SP and attempt to power on the system. If the system powers on, the problem is likely the Scan Engine battery. Replace the battery.
- If the Scan Engine still fails to power on, contact ZONARE Tech Support.

19.3.3 System Start-Up Problems

Scan Engine (undocked) fails to properly boot

- Install a bootable (system software files present) USB Memory Stick into the USB port at the rear of the Scan Engine, and then try to power on the **Z.ONEULTRA SP** again (selecting the “boot from USB Memory Stick option)
- If the system boots OK, perform software re-install procedure on the Scan Engine, from the source USB Memory Stick
- If the Scan Engine still fails to power on, contact ZONARE Tech Support.

19.3.4 Peripheral Problems

19” Display monitor on SmartCart SP, no video

- Power down the Scan Engine, then switch off circuit breaker (at rear of SmartCart SP) to remove power to SmartCart SP electronics. Reverse process to power back on to reinitialize handshaking between the Cart and Scan Engine, and see if display becomes active.
- Remove cover on back of monitor, and inspect/verify the cable connection.
- Open up the CEE bay (under the Scan Engine Scanner Deck), to access the Cart Main Board, and check the power and video cables for proper connection.

External printer/recorder peripheral(s) fails to power on

- Check the AC power cord connections.
- Temporarily connect the AC power cord of the peripheral to a local AC receptacle, and test for operation of the peripheral.
- If the peripheral fails to power on after these steps, contact ZONARE Tech Support.

Local printer fails to print

- Check that the printer has paper available.
- Verify power button on printer has been activated.
- Ensure that the USB cable is properly connected on the peripheral device, and connected internally to the USB port on the Main Board in the SmartCart SP.
- Ensure the AC power cable is securely connected at the rear of the printer.
- If the printer fails to print after these steps, contact ZONARE Tech Support.

19.3.5 Transducer Problems

Transducer not recognized by system (no B-mode imaging)

- To ensure a positive connection, disconnect the transducer and reconnect it.
- To determine a problem with the transducer or system, attach a different transducer to the Scan Engine.
- Disconnect the transducer. Power down the Scan Engine. Power the Scan Engine back on, and reinsert the transducer to test for functionality.
- Remove the Scan Engine from the SmartCart SP, and repeat the transducer removal/installation process.
- If system still fails to operate any transducers, contact ZONARE Tech Support.

19.3.6 Battery Charging Problems

Battery does not charge in Scan Engine, when docked in SmartCart SP

- Ensure AC power is present at SmartCart SP
- Ensure circuit breaker at the rear of the SmartCart SP is in the up (“ON”) position
- Verify DC voltages are present, by checking illumination of top 3 green LEDs at right/rear of Main/IO board (at rear of SmartCart SP).
- Battery discharge level may be too low (0%), to power internal battery intelligent electronics. Perform the following sequence to achieve sufficient trickle charging to return battery to workable state:
 - Undock Scan Engine from SmartCart SP, then re-dock again, leaving it for 30 seconds
 - Repeat this above dock/un-dock process (and delay), 3 more times
 - After third cycle, leave Scan Engine docked for 5 minutes to begin charging.
 - After 5 minutes, un-dock Scan Engine and remove battery to check charge state to verify charging process is now operational. If charging, re-dock Scan Engine and allow

1 hour for fully charging of the battery. If not, repeat previous dock/un-docking cycle sequence.

19.3.7 Imaging Problems

No/poor B-mode image

- Ensure that the brightness and/or contrast settings of the LCD display are set close to factory default levels on the SmartCart SP. Default settings are indicated by the asterisk (*) in the pop-up menu.
- To ensure the quality of the grayscale resolution of the LCD display, use the grayscale test pattern (via the Diagnostic menu) that is available on the SmartCart SP. Ensure that all shades can be visualized, making small adjustments to brightness and contrast from factory defaults, as required, to see all intensities.
- Adjust the B-mode **gain** control.
- In the on-screen menu, adjust the **A Output** (acoustic power) level.
- In the on-screen menu, under the **Preset** tab, select one of the factory default settings (General, etc.) to determine possible maladjustment of user presets.
- Ensure an adequate supply of acoustic coupling gel and good patient/ transducer contact.
- Switch to a different transducer to determine the problem.

No/poor Color Mode image or PW Doppler

- Ensure that the brightness and/or contrast settings of the LCD display are set close to factory default levels on the SmartCart SP. Default settings are indicated by the asterisk (*) in the pop-up menu.
- To ensure the quality of the grayscale resolution of the LCD display, use the grayscale test pattern (via the Diagnostic menu) that is available on the SmartCart SP. Ensure that all shades can be visualized, making small adjustments to brightness and contrast from factory defaults, as required, to see all intensities.
- Make adjustments to the various Doppler controls (**gain, filter, scale**) to attempt to resolve problem.
- Ensure that the scanning angle between the transducer face and the direction of blood flow is optimized.
- In the on-screen menu, under the **Preset** tab, select one of the factory default settings (General, etc.) to determine possible maladjustment of user presets.
- Ensure that there is an adequate supply of acoustic coupling gel and good patient/transducer contact.
- Switch to a different transducer to determine the problem.

19.3.8 General Operation Problems

Function (F1-F2) key(s) do not operate


- Using the on-screen menu, follow the path: **TOOLS | SYSTEM SETUP | FUNCTION KEYS**) to access the menu for the user configuration of the assignments of the function keys.
- The function keys (F-keys) on the SmartCart SP (F1-F2) must be configured independently from the function keys on the standalone Scan Engine (F1-F2)

Unable to modify existing User Preset (shown as *grayed out* on screen)

- Ensure that the desired user preset has been previously (prior to attempting to modify it) selected as the active preset.

19.3.9 DICOM Connectivity/Communications Problems

Z.ONE will not communicate with target DICOM” Store” or “Print” device

- Check Networking ICON  on upper/left corner of main imaging screen, to verify hardware connection is active (no “X” over ICON). Check hardware cabling, network equipment, and/or configuration, as necessary.
- Power cycle (AC circuit breaker) the SmartCart SP, and the Scan Engine, then retest for connectivity/transfer functionality.
- Press the **DICOM Queue** key, and inspect for any pending jobs in the Queue. If any jobs pending, delete them and then power cycle the Scan Engine and Cart, and then re-test network state.
- In “**General**” and “**Network**” configuration pages, verify DICOM Application Title, and IP address/gateway/netmask parameters are entered correctly, and correspond with those assigned to **Z.ONEULTRA SP** ultrasound system by the IT Admin at the install site.
- In the DICOM” “**Network Store**” and “**Printer**” configuration pages, verify AE Title, IP Address, and Port Number parameters are entered correctly, and match those assigned to the corresponding device by the IT Admin for facility, at install site.
- Using the “PING” and “VERIFY” selection in the DICOM configuration menus, for the Network Storage or Printer Administration screens (as applicable to device attempting to be connected), test for successful handshaking of connection.
- Using another device (PC, etc.) on same domain on hospital network, perform a “PING” operation to the IP address assigned for the **Z.ONEULTRA SP**, in the “Network” configuration page, to test for TCP/IP connectivity.















19.4 System Status LED & Error Code Definitions















19.4.1 SmartCart SP





19.4.1.1 On-Screen “Dashboard” System Status ICONs

NOTE: If the SmartCart SP is equipped with the on-board battery option, two (2) battery icons will displayed on the upper-lefthand corner of the LCD display of the SmartCart SP. If there are two battery icons, the icon on the **LEFT** represents the **SmartCart SP** main battery and the icon on the **RIGHT** represents the **Scan Engine** battery (if present).

Icon	Function	Status Description
	Battery: SmartCart SP (Left) Scanner: (Right)	System running on AC Power, and Battery is fully charged .
	Battery: SmartCart SP (Left) Scanner: (Right)	System running on AC Power, and Battery is currently charging .
	Battery: SmartCart SP (Left) Scanner: (Right)	Battery is currently undergoing a “ Reconditioning ” process (approx 12 hours)
	Battery: SmartCart SP (Left) Scanner: (Right)	Battery status is currently unknown
	Battery: SmartCart SP (Left) Scanner: (Right)	System running on Battery source power (more than 25% remaining charge)
	Battery: SmartCart SP (Left) Scanner: (Right)	System running on Battery source power (10%-25% remaining charge)
	Battery: SmartCart SP (Left) Scanner: (Right)	System running on Battery source power (less than 10% remaining charge)
	Scan Engine Internal Media	Scan Engine internal media is not available for storage
	Scan Engine Internal Media	Scan Engine internal media is initializing, in preparation for storage

	Scan Engine Internal Media	Image storage is occurring to the Scan Engine internal media
	Scan Engine Internal Media	>20% of Scan Engine internal media storage capacity remaining
	Scan Engine Internal Media	5-20% of Scan Engine internal media storage capacity remaining
	Scan Engine Internal Media	<5% of Scan Engine internal media storage capacity remaining
	SmartCart SP Hard Drive Media	SmartCart SP hard drive is initializing for image storage
	SmartCart SP Hard Drive Media	SmartCart SP hard drive is storing images
	SmartCart SP Hard Drive Media	>20% of SmartCart SP hard drive storage capacity remaining
	SmartCart SP Hard Drive Media	>5% - <20% of SmartCart SP hard drive storage capacity remaining
	SmartCart SP Hard Drive Media	<5% of SmartCart SP hard drive storage capacity remaining
	SmartCart SP DVD Media	SmartCart SP DVD media inserted, but <u>not</u> available for image storage
	SmartCart SP DVD Media	SmartCart SP DVD media inserted and is available for image storage
	SmartCart SP DVD Media	Image storage to SmartCart SP DVD media is occurring
	SmartCart SP DVD Media	SmartCart SP DVD is inserted but is FULL
	Scan Engine or Cart Removable Media (USB)	Removable storage media (USB) is being initialized

	Scan Engine or Cart Removable Media (USB)	Storage operation is actively in-process to removable storage media (USB)
	Scan Engine or Cart Removable Media (USB)	>20% of capacity of removable storage media (USB) still remains
	Scan Engine or Cart Removable Media (USB)	5-20% of capacity of removable storage media (USB) still remains
	Scan Engine or Cart Removable Media (USB)	<5% of capacity of removable storage media (USB) still remains
	USB Local Printer	Local USB printer is connected/active
	USB Local Printer	Local USB printer has a printing job in progress
	USB Local Printer	Local USB printer has an error condition (job will not print)
	Network	Network connected and active
	Network	Network <i>disconnected</i>
	Network	Network transfer has an <i>error</i> (Re-Queuing of job, etc) preventing transfer
	Wireless Network	Wireless network connected and active
	Wireless Network	Wireless Network <i>disconnected</i>
	Wireless Network	Wireless Network transfer has an <i>error</i> (Re-Queuing of job, etc) preventing transfer
	Wireless Network	Wireless signal strength: 1% – 20%

	Wireless Network	Wireless Network Wireless signal strength: 21% – 40%
	Wireless Network	Wireless Network Wireless signal strength: 41% – 60%
	Wireless Network	Wireless Network Wireless signal strength: 61% – 80%
	Wireless Network	Wireless Network Wireless signal strength: 81% – 100%

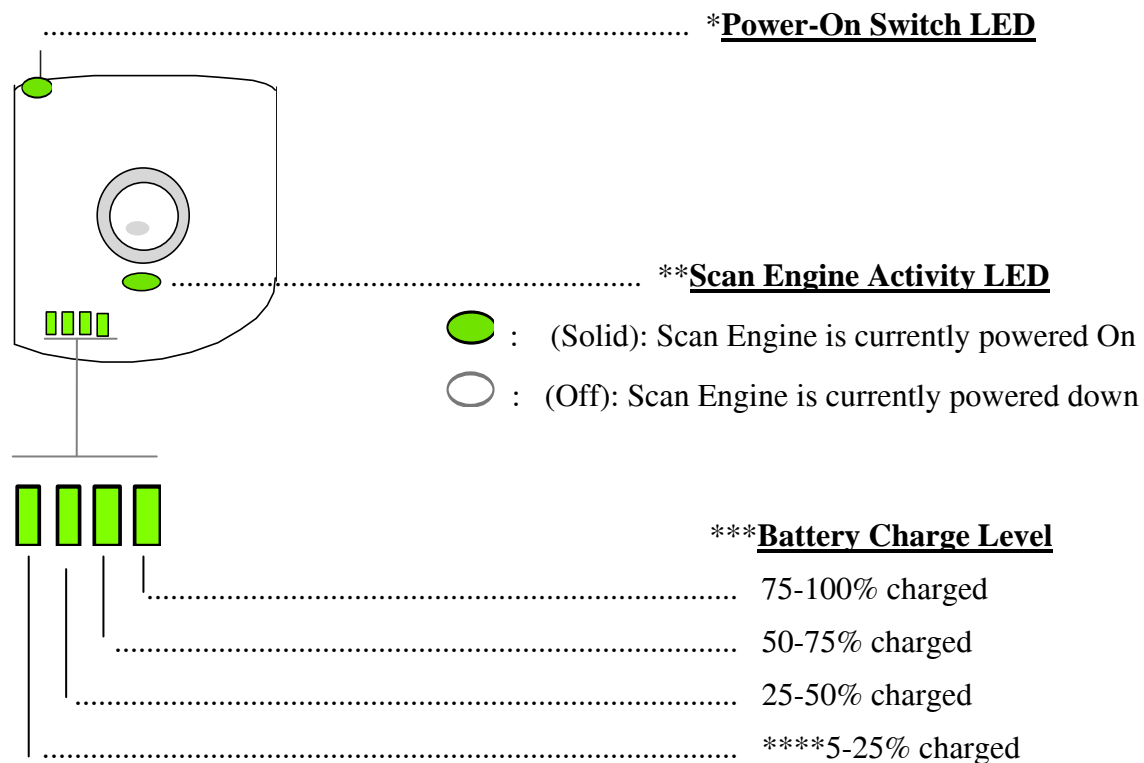
19.4.1.2 Rear I/O Panel – System Status Lamps

The five (5) system status indicator lamps located on rear of the SmartCart SP (panel just above the main AC circuit breaker) can be used to assist in troubleshooting problems with the system. The definition of the each lamp is as shown in the table below:



LED #	LED	STATUS	Definition
1		“PIC”	Slow Blinking: System in “Standby” mode (Scan Engine <u>NOT</u> docked)
			Fast Blinking: Scan Engine <i>docked</i> (Scan Engine powered “ON” or “OFF”)
2		“Battery”	OFF: No battery installed, or completely depleted
			Blinking: Battery charging (or reconditioning) in-process
			Solid: Battery is fully charged
3		“VAux”	Solid: VAux – DC power for possible “ <i>FUTURE USE</i> ” for peripherals. Currently <u>not</u> used. - LED is currently always “ON” (when AC in power)
4		“VMain”	Solid: +12V VMain power - Power On/Off button pressed or Scan Engine and System fully “ON”
			OFF: Power On/Off button not yet pressed
5		“VScanner”	Solid: +12V VScanner power - Scan Engine <i>docked</i> (Scan Engine powered “ON” or “OFF”)
			OFF: Scan Engine <i>un-docked</i>

19.4.2 Scan Engine



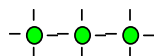
*POWER-ON SWITCH LED – STATUS INFORMATION:

The Power-On Switch LED is directly activated by the PIC (Controller) device on the Power Board in the Scan Engine, upon detection of the pressing of the Power On/Off switch. Lack of illumination of this LED (in conjunction with the Scanner not powering on), indicates one of the following:

1. Total loss of source power (8.4V) to the Scan Engine, due to a completely depleted battery power, or no power from SmartCart SP - if docked.
2. Power On/Off switch on Scan Engine is defective
3. “Always On” power output from Power Board in Scan Engine has failed
4. Low-level *Bootloader* software is corrupted (requires Scan Engine replacement in field)

****SCAN ENGINE ACTIVITY LED – ERROR CODES:**

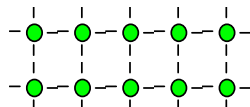
The MPC (Controller) in the Scan Engine blinks this LED at a 1Hz. Rate, formulating an error code (prior to initiating a system shutdown) if any of the following hardware error conditions occurs:



3 Blinks: Low voltage power fault



5 Blinks: Internal RAM or Internal Flash memory fault



10 Blinks: Video system failure (FPGA device)

*****BATTERY CHARGE LEDS - BASIC NOTES:**

Note 1:

Battery charge level LEDs are **ONLY** illuminated momentarily (approximately 5 seconds) and then go out, when one of the following conditions occurs:

1. The battery pack is initially inserted into the Scan Engine
2. The Scan Engine is initially powered-on

Note 2:

The Scan Engine will alert the User (message on LCD display and flashing charge level LED), and automatically begin a controlled shutdown sequence, when the battery charge level diminishes to 5%. All current settings will be saved to flash memory, prior to the automatic shutdown sequence.

******BATTERY CHARGE LEDS - SPECIAL NOTE:**

When battery voltage is depleted down to the levels listed below, the battery power status indicator, displayed on the LCD Monitor of the Scan Engine, will do the following:

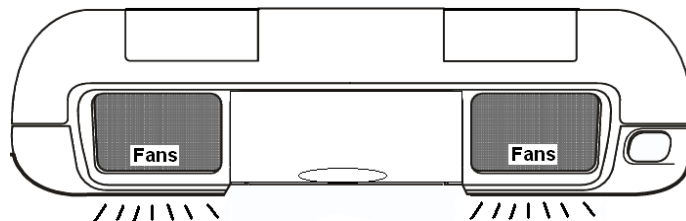
1. <10%: Status display will be **AMBER** and “flash”
2. =5%: Status display will turn **RED**, an impending shutdown warning message will be displayed on the Monitor, and after 1 minute, the system will begin a shutdown sequence.

19.4.3 System Error Message Codes

Error Code	Subsystem	Message for Error Log	User Error Message	Action On Error
0xa0060402	I2C	ThermalControl Sensor Error	"Thermal Sensor Error: Please shutdown system."	STOP
0xa0060403	I2C	System Overhead Warning	"System Overheat Warning: Finish exam and shutdown."	CONTINUE
0xa0060405	I2C	Battery Overheat Warning	"Battery Overheat Warning: finish exam replace battery"	CONTINUE
0xe0004005	n/a	Fatal Error due to NVASSERT	"Internal System Error has occurred"	RESTART
0xe0060401	I2C	Fan is stuck.	"System fan Error: Please shutdown system."	SHUTDOWN
0xe0060404	I2C	Exceeded maximum system error count.	"System Temperature Limit exceeded."	SHUTDOWN
0xe0060406	I2C	Battery temperature error	"Battery Temperature Limit Exceeded. Replace battery."	SHUTDOWN
0xe0080001	Display	DVI configuration failed	"Internal System Error has occurred"	SHUTDOWN
0xe0090401	FE Power	Low Voltage failure occurred.	"Internal System Error has occurred"	SHUTDOWN
0xe00a0401	HV	PIC is Invalid, No HV support);	"Internal System Error has occurred"	RESTART
0xe00a0403	HV	Invalid the power up parameters);	"Internal System Error has occurred"	RESTART
0xe00a0404	HV	Failed to reset the PIC HV task);	"Internal System Error has occurred"	RESTART
0xe00a0405	HV	Failed to set HV limits to PIC)	"Internal System Error has occurred"	RESTART
0xe00a0406	HV	Failed to set QDAC voltage to target);	"Internal System Error has occurred"	RESTART
0xe00a0407	HV	<i>Obsolete - See more granual messages</i>	<i>n/a</i>	<i>n/a</i>
0xe00a0408	HV	Can't Read voltage from PIC);	"Internal System Error has occurred"	RESTART
0xe00a0409	HV	HighVoltage not dumped prior to power up);	"Internal System Error has occurred"	RESTART
0xe00a040a	HV	VBoost error);	"Internal System Error has occurred"	RESTART
0xe00a040b	HV	PFE HW Fault Error);	"Internal System Error has occurred"	RESTART
0xe00a040c	HV	PIC version is invalid, No HV support);	"Internal System Error has occurred"	RESTART
0xe00a040e	HV	Power Errors (Over Limit)	"Internal System Error has occurred"	RESTART
0xe00a040f	HV	HV Under Voltage	"Internal System Error has occurred"	RESTART
0xe00a0410	HV	HV Over Voltage	"Internal System Error has occurred"	RESTART
0xe00a0411	HV	HV Imbalance	"Internal System Error has occurred"	RESTART
0xe00a0412	HV	HV Power-Up Failed	"Internal System Error has occurred"	RESTART
0xe00a0413	HV	HV Unknown State	"Internal System Error has occurred"	RESTART

Error Code	Subsystem	Message for Error Log	User Error Message	Action On Error
0xe00a0414	HV	HV's Crossed	"Internal System Error has occurred"	RESTART
0xe00a0415	HV	High Voltage	"Internal System Error has occurred"	RESTART
0xe00d0000	Imaging	Pipeline Fault Event Occured.	"Internal System Error has occurred"	RESTART
0xe0100401	Router	Video Memory Test Failed	"Internal System Error has occurred"	SHUTDOWN
0xe0100402	Router	DCM LOCK Fault has occurred);	"Internal System Error has occurred"	RESTART
0xe0110401	AcquisCntrl	Post Power on check indicates faulty power circuit	"Internal System Error has occurred"	RESTART
0xe0110402	AcquisCntrl	Failed to complete programming sequence	"Internal System Error has occurred"	RESTART
0xe0110403	AcquisCntrl	Failed to complete programming sequence	"Internal System Error has occurred"	RESTART

19.5 Scan Engine Fan Operation



The operating speeds of the two (2) fans on the Scan Engine are variable; driven by the dynamic changes in cooling requirements within the Scan Engine. Four (4) dedicated thermal sensor devices, strategically located at various locations inside the Scan Engine, provide constant temperature status information to the Processor (PIC device).

In the case where a temperature sensor error condition occurs, both fans will be set to run at MAXIMUM speed by the Processor.

19.6 SmartCart SP LCD Display Troubleshooting

19.6.1 Image display quality problems

Symptom	Solution
Images look too bright or saturated	Check the BRIGHTNESS , CONTRAST and LUMINANCE settings, using SmartCart SP display's pop-up menu. Verify they are set at (or close to) the factory default setting (indicated by an asterisk * in the menu)
Completely blank display	Check cable connection at back of LCD display

19.7 Battery Performance – Charge Times - Reconditioning

19.7.1 Foreword:

The following information is intended to provide an overview on the battery-driven system operation times and charging intervals for the Z-PAK battery pack in the SmartCart, and the removable battery pack used inside the Scan Engine. There are a number of variables that impact both the operating time and charge time, that must be taken into consideration when anticipating the performance of a specific battery.

Both battery packs are "consumable" items, and as such should be expected to have a gradual drop-off in performance (system operating time) over their life span. The system operating time numbers listed in this document are in reference to a "new" (optimum) battery.

Charging times will be significantly impacted by the temperature of the battery pack at the time of the start of the charging cycle. The intelligent PIC device that manages the charging process will disable, or reduce the rate of charge, as dictated by the battery pack's current temperature.

The total time that will be required for a battery to reach a full state of charge is impacted by a number of variables. These include:

- 1) Operating state of system (transducer in use: HV active)
- 2) Temperature of battery pack
- 3) Initial first-charge for Z-PAK:

- Z-PAK: (SmartCart battery)

Performance:

Typical system operation interval (on full charge):.....**2.5 - 3.0 Hours**

Charging:

Fast Charge Rate (5A):.....**5.0 hours** (total)

Step #1:.....**3.0 hours** – main charge

Step #2:.....**2.0 hours** – final top-off charge

Trickle-Charge Rate (i.e., hot battery state)**16.0 Hours** (worst-case)

Recondition & Full Charge State:

Optimum (battery in cool state, and initial charge level near full).....**8.0 Hours** (total)

Step #1:.....**0 to 5 hours** - to charge to full

Step #2:.....2-3 hours - to fully discharge

Step #3:.....4-6 hours - to fully recharge

Worst-case (battery in hot state, and initial charge level near zero) **13.0 Hours**

- Scan Engine Removable Battery Pack (4400mAh)

Performance:

Typical system operation interval (from full charge): **25-35 minutes**

Charging:

Fast-Charge Rate (3A) – HV not active (no transducer in use) **2.0 Hours** (approx)

Trickle-Charge Rate (1A) – HV active (transducer in use)..... **5.0 Hours** (approx)

20 REPAIR PROCEDURES

20.1 Foreword

The repair procedures described in this portion of the Service Manual should be performed ONLY by a ZONARE trained service personnel (Service Engineer, Bio-Med, etc.).

20.2 Recommended Tools

Tool Description	Size	Qty.	Where used
Screwdriver, flat blade, small tip, extra-long	3mm blade, 12” shaft, thin blade	1	SmartCart SP Display Monitor
Screwdriver, flat blade, medium tip, std. length	3mm blade, 6” shaft, std. thick	1	General use
Screwdriver, Phillips, large tip, std length	#3, 6” shaft	1	Power supply module
Screwdriver, Phillips, med. tip std length	#2, 6” shaft	1	SmartCart SP Assy general
Screwdriver, Phillips, large tip, std length	#3, 6” shaft	1	Power supply module
Pliers, Needle Nose, Standard jaws	3” long jaws	1	miscellaneous
Pliers, Diagonal Cutters, small	Small jaws	1	General cutting of tie wraps, etc.
Nut-Driver Set (U.S.)	Multi-sizes	1 set	SmartCart SP Display Monitor

Socket Wrench Set, (10mm, 13mm)	Multi-sizes	1 set	SmartCart SP gas spring (13mm)
Combination Wrench Set (Metric)	19mm	1	miscellaneous
Allen Wrench Set (Metric)	2.5mm, 5mm	1	SmartCart SP gas spring
Flashlight, Mini-Mag	6" size	1	Illuminating tight access areas
Magnetic pick-up tool	Telescoping	1	Retrieval of hardware

20.3 Hardware Service/Replacement Procedures (SmartCart SP)

20.3.1 Casters - Removal/Replacement (SmartCart SP)

Required Parts

- P/N: 32865-00Caster, 5 Inch, Dual Wheel, Directional/Brake Lock (Front)
- P/N: 32867-00Caster, 5 Inch, Dual Wheel, Full Swivel (Rear)

Required Tools/Equipment

- Medium-tip flatblade screwdriver

Overview of Procedure

- Remove Caster
- Set Brake and/or Swivel Lock position
- Install Caster

Removal of the Caster:

STEPS:

1. Ensure the **Z.ONEULTRA SP** is powered "OFF".
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the "0" (Off) position.
3. Disconnect the main AC power cord from the rear of the SmartCart SP.
4. Undock the scan engine from the Cart, and set aside.
5. Fold the LCD display screen down to a horizontal position, for protection from moving during tilting of Cart.
6. Lock the brake mechanism (front wheels) to keep the Cart from rolling.

7. While supporting the display/display arm from swinging to the side, on a soft surface (carpet, etc.) tilt the Cart forward, until it is horizontal, resting on the two front push handles for support

CAUTION

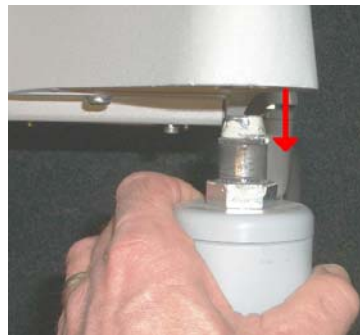


The Cart may be heavy and care should be taken while tilting forward, use two people if necessary to avoid injury.

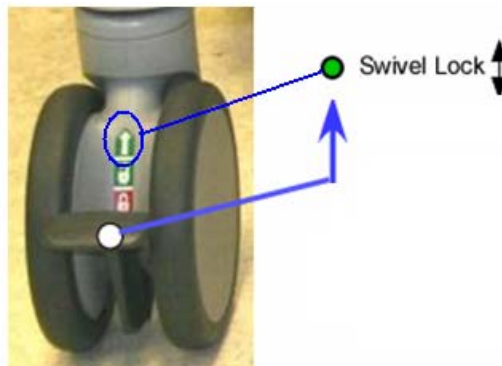
8. Using a flatblade screwdriver, gently wedge it between the cosmetic sleeve and the wheel mating surface at the bottom of the SmartCart SP.



9. Using the screwdriver tip as a wedge, work the screwdriver to extract the wheel from the socket, and pull it directly away from the SmartCart SP for removal. (Note: the wheel installation is a “press-fit”).



10. For front wheels: Place the locking lever into the full up (wheel locked into straight ahead) position.



11. For front wheels: Align the replacement wheel such that the corresponding flat side of the hex nut on the wheel shaft aligns with the flat edge at the front of the mounting point on the frame of the SmartCart SP.
12. Firmly “press” the wheel into place, for re-installation.

13. Once installation is complete, Tilt the Cart back up onto its wheels, and release the brake mechanism.
14. Verify smooth operation and pivoting of the Cart through all movements.
15. Verify that the brake functions correctly and that each caster locks and the brake functions when it is set.

20.3.2 19" Flatpanel Display - Removal/Replacement (SmartCart SP)

Required Parts

- 85021-00 Display Assy, SmartCart SP
- 32856-00 Overlay, SmartCart SP Display
- Aluminum tape (EMC insulation)

Overview of Procedure

- Removal of Display Assy
- Installation of Display Assy
- Verification of LCD Display, Speakers, and Microphone

Required Tools/Equipment

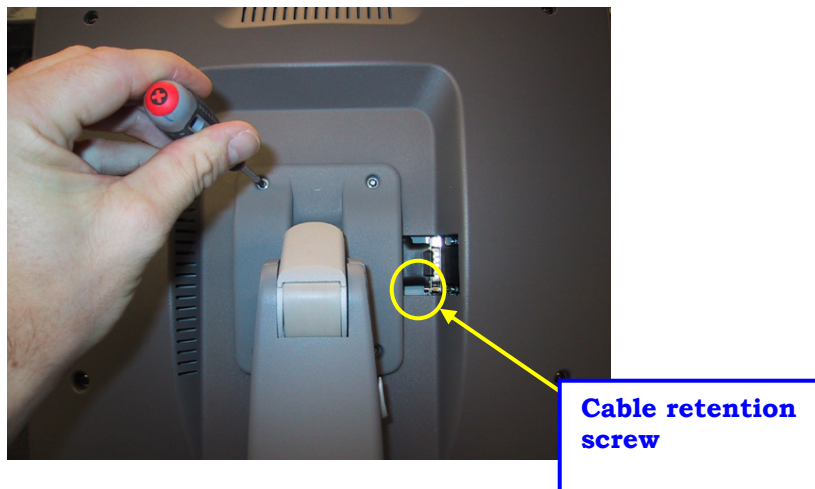
- Long handled flat-blade screwdriver (3mm width blade, 12" shaft, thin blade)
- 9/32" Nut Driver or wrench
- #1 Phillips Screwdriver

Procedure

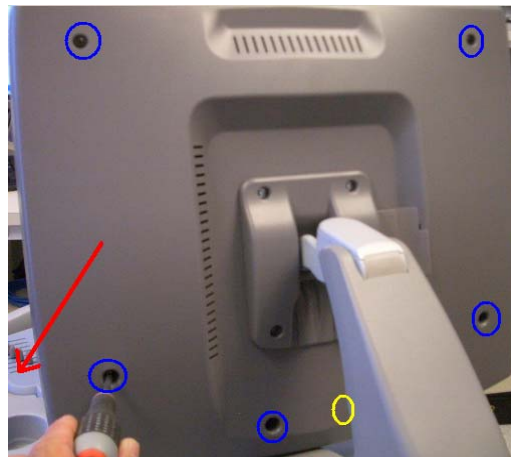
Removal:

STEPS:

1. Ensure the **Z.ONEULTRA SP** is powered "OFF".
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the "0" (OFF) position.
3. Disconnect the main AC power cord from the rear of the SmartCart SP, or unplug from the wall source.
4. Remove the four (4) Phillips-head screws that are retaining the plastic display hinge back cover, and remove back cover and center insert sleeve.



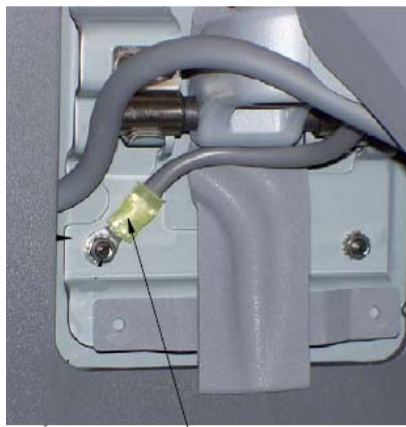
5. Remove the (6) Phillips-head screws that are retaining the plastic display hinge back cover, and remove back cover and insert.



6. Remove the aluminum tape securing the video cable to the display.



7. Using the long straight slot screwdriver – loosen the display cable retention screw.
8. Remove the four (4) 9/32" Nuts with captive washers that attach the display to the metal hinge assembly, removing the display arm ground cable from the bottom-left threaded stud.



Display Arm Ground Cable

9. Tilt the top of the display towards the rear of the cart to support the LCD Display while removing the last screw.
10. Taking weight off the display, slide it off the threaded studs on the metal hinge assy.
11. While still supporting the display, gently remove the video cable from the display (this may need to be gently pried away with a screwdriver)
12. Once the cable is free, set the display aside and prepare for installation.

Installation:

STEPS:

1. Reconnect the Display Cable to the connector on the display.
2. Slide the excess cable under the plastics and route in the same fashion prior to removal
3. Align the display (4 threaded shafts) with the metal hinge assy. Route the display cable carefully in the notch on the left of the hinge to avoid cable damage.
4. Reattach the display arm ground cable to the bottom-left stud
5. Reinstall the four 9/32" nuts and tighten. Ensure that the display cable and ground cable are not pinched.
6. Using the long straight slot screwdriver – tighten the display cable retention screw. (See Figure 1 – Location A)
7. Reinsert the display hinge plastic cover –
 - Insert the bottom piece first, aligning the screw holes and cable
 - Slide the top cover down
8. Tighten the four (4) Phillips-head screws that are retaining the plastic display hinge back cover, and remove cover and insert.

System Verification:

STEPS:

1. Reconnect the main AC power cord from the rear of the SmartCart SP or plug into the wall source.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “1” (On) position.



3. Ensure the scan engine is docked in the SmartCart SP. LED 1 will blink quickly and LED 5 will remain on.
4. Power on the system.
5. Verify that the LCD display is functioning correctly by watching the boot and verifying that normal imaging is displayed after fully booted.
6. Attach a transducer (if not already connected) and enable Doppler (PW) mode.
13. Turn PW Gain up to obtain a filled in spectral trace with excess noise (this will generate white noise for the speakers)
14. Turn the Volume up (Clockwise) and verify that the white noise is audible from both speakers.
15. If possible – scanning with actual Doppler flow is ideal, but not required.
16. Verification of microphone
11. Verification is complete – return system to normal operation.

20.3.3 Display Arm w/Cables - Removal/Replacement (SmartCart SP)

Required Parts

- 85086-00 Display Arm w/Cable
- Small tie-wraps (2)

Overview of Procedure

- 19” Flatpanel Display - Removal/Replacement
- Removal of the Display ARM
- Installation of Display ARM
- Verification of LCD Display, Speakers, and Microphone

Required Tools/Equipment

- Long handled flat-blade screwdriver (3mm width blade, 12” shaft, thin blade)

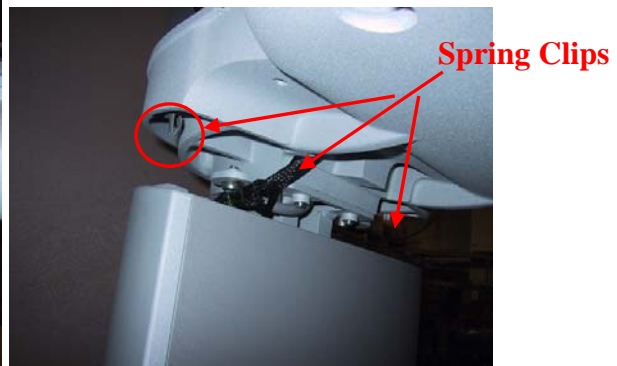
- #2 Phillips Screwdriver – Stubby
- #1 Phillips Screwdriver
- 9/32” Nut Driver or wrench
- 7/64” Allen Wrench
- Wire Cutters

Procedure

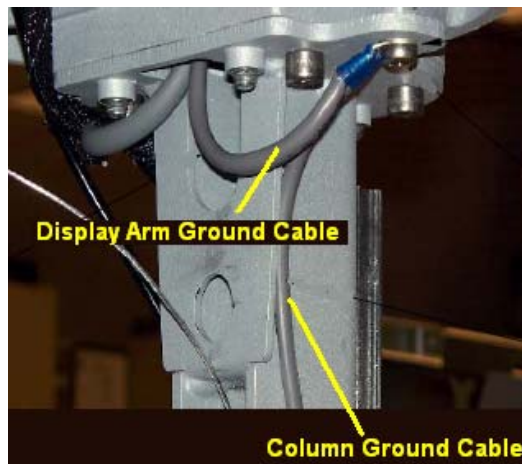
Opening Chassis Cosmetics:

STEPS:

1. Ensure the **Z.ONEULTRA SP** is powered “OFF”.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “OFF” position.
3. Disconnect the main AC power cord from the rear of the SmartCart SP or unplug from the wall source.
4. Using the side of the hand – firmly knock the side of the chassis cosmetic sleeve loose. There are 3 spring clips that retain it at the top. If it does not come free – gently use the flat blade screwdriver to pry the cosmetics loose (use tape on the blade to avoid marring the chassis surface).



5. Remove the retaining screw, and disconnect the display arm ground cable from its mounting point on the bottom of the upper support plate.



6. Slide the outer cosmetic chassis sleeve down and grab the inner sleeve front panel along with the outer sleeve at the same time from above.
7. Lift both the Inner and Outer sleeve to gain access to the Scanner Deck retention screws. There is one spring clip in the center which holds the inner panel down.



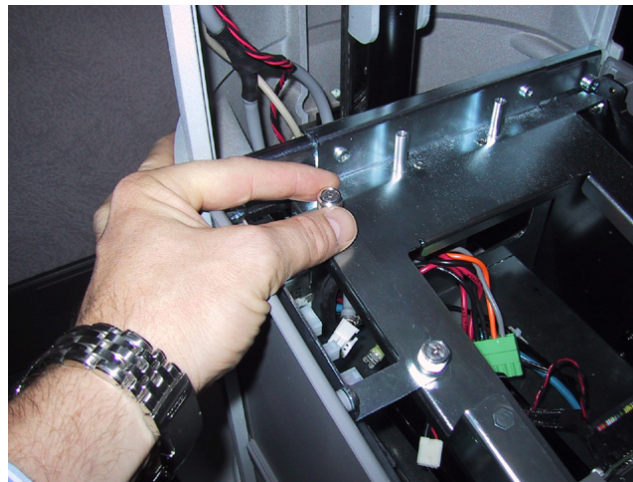
5.2 Removing Scanner Deck & Removal of Display Cables at Main Board:

STEPS:

1. Ensure the **Z.ONEULTRA SP** is powered "OFF".
2. Remove the two (2) Phillips screws on top Scanner Deck.
3. Remove the two (2) Phillips screws on bottom front CEE cosmetics to the Scanner Deck.



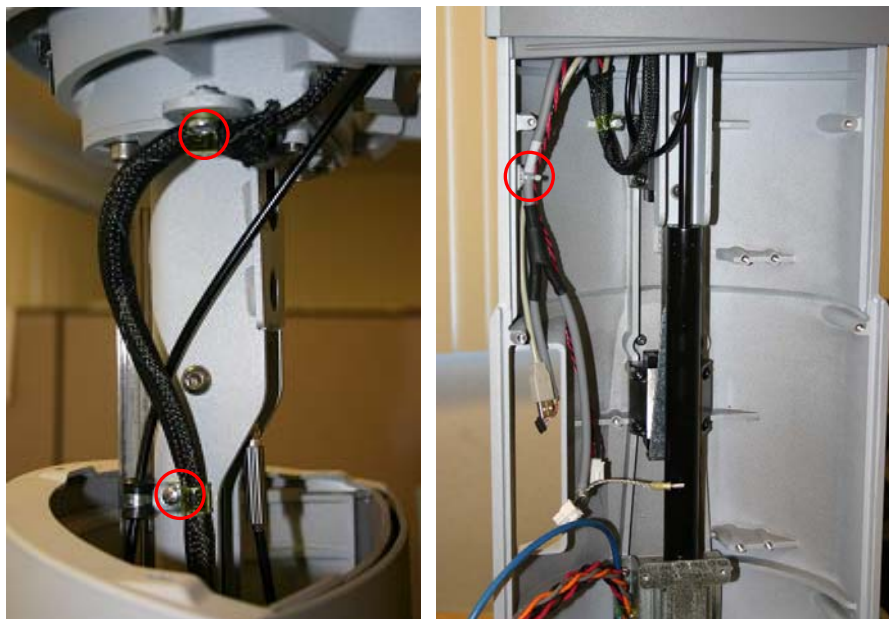
4. Partially lift the Scanner Deck off the Electronics Enclosure and move to the right side.
5. Remove the Left CEE Cosmetic panel by the Main Board – loosen the two thumbscrews and lift straight up to remove.



6. Disconnect the Scanner Deck wiring from the Main Board – taking note of the connector locations for reassembly. You may need to cut ty-wraps securing cables to chassis
7. Set the Scanner Deck aside.
8. Disconnect the two (2) connectors for the Cart Display Monitor, at the power (J5) and video signal (J1) connectors on the Main Board.

IMPORTANT NOTE: Be very careful when removing the video cable connector (J1), as the wires are very fragile!

9. Remove the two p-clamps and ty-wrap securing the cable bundle within the center column.



10. To remove the display cable from the netted stretch shielding through which it is routed (with other system cables) slide the netted stretch shielding together down its length, to cause the shielding to expand in diameter sufficiently to slide the Main Board end connectors out of the shielding.
11. Pay special attention to the routing (looping) and retention (cable tie) of the display cable, within the upper area of the main column of the SmartCart SP, in order to reproduce this layout during re-assembly.

Display Removal:

STEPS:

1. Remove the four (4) Phillips-head screws that are retaining the plastic display hinge back cover, and remove cover and insert.

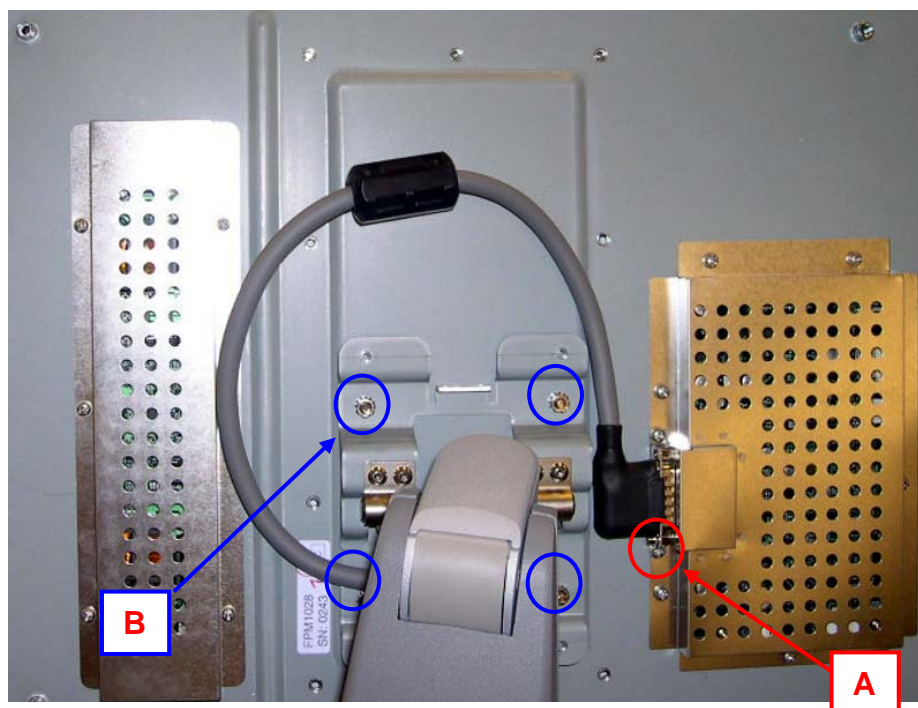


2. Remove the (6) Phillips-head screws that are retaining the plastic display hinge back cover, and remove cover and insert.

3. Remove the tape securing the video cable to the display.



4. Using the long straight slot screwdriver – loosen the display cable retention screw (See Location A).



5. Remove the four (4) 9/32" Nuts with captive washers that attach the display to the metal hinge assembly. Tilt the top of the display towards the rear of the cart to support the LCD Display while removing the last screw (See Location B).

6. Tilt the top of the display towards the rear of the cart to support the LCD Display while removing the last screw.
7. Slowly lift the Display off the metal hinge assy – while supporting it, gently remove the display cable from the display (this may need to be gently pried away with a screwdriver)
8. Once the cable is free, set the display aside and prepare for installation

Display Arm Removal:

STEPS:

1. Remove the four (4) 6mm Allen Head Bolts which hold the display arm to the chassis.



2. While gently pulling the video cable free from the system, remove arm assembly.

Display Arm Installation:

STEPS:

1. Route the display cables and ground cable down into the chassis of the SmartCart SP, allowing adequate slack in the required areas.
2. Secure the cables with tie-wraps, as per locations removed previously during the disassembly process.
3. Reinstall the four (4) 6mm Allen Head screws to secure the display arm to the chassis.

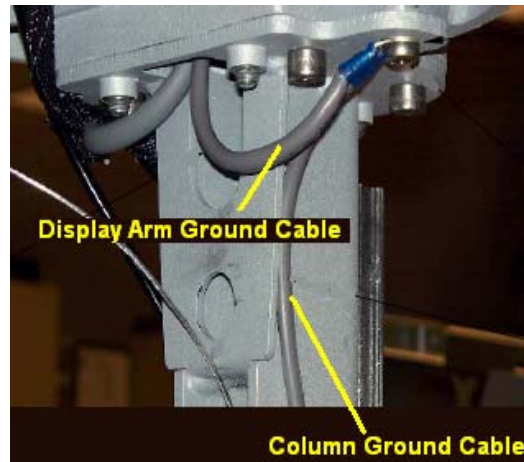
Display Assy Installation:

STEPS:

1. Reverse the steps performed in the removal process, for installation.

Display Cables Reconnection & Scanner Deck Installation:

STEPS:



- 1) Reattach the display arm ground cable, and column ground cables to their mounting point on the bottom of the upper support plate, using the retaining screw.
- 2) Reconnect the Display's power and video cables to the appropriate connectors on the Main Board.

CAUTION



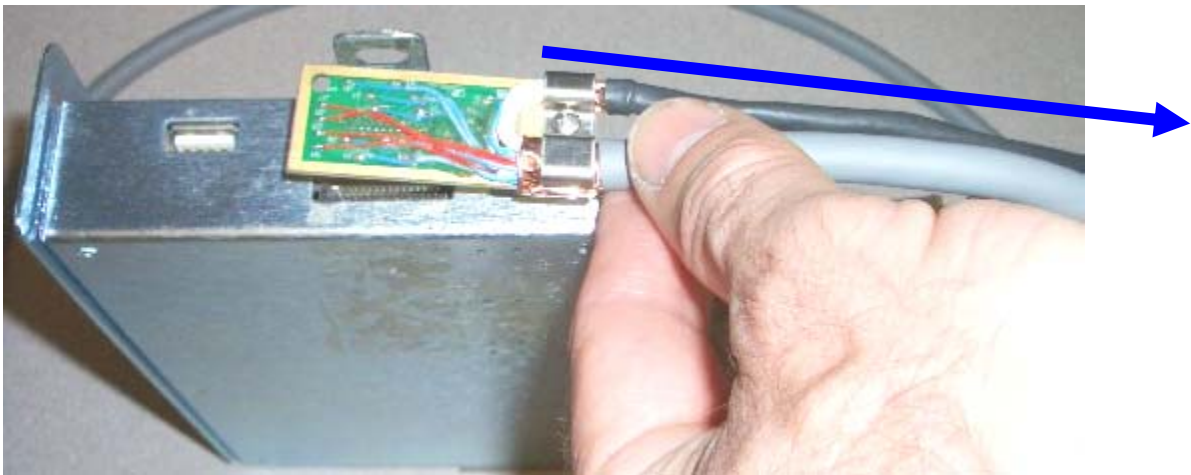
The J1 video connector on the Main Board is a VERY high-precision style connector, with very fine/fragile pins, and is surface-mounted to the PC board.

As such, extreme care MUST be observed to ensure proper alignment of the cable prior to pressing into place, and only light pressure should be required for fully seating cable in connector receptacle.

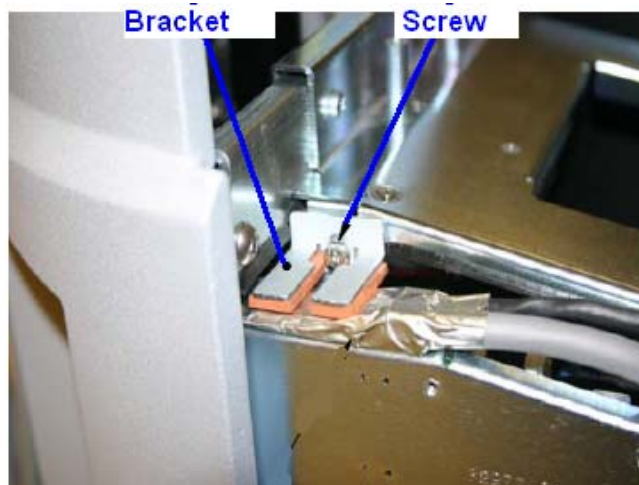
Failure to do so may result in permanent damage to the connector; requiring replacement of the entire Main Board assembly.

- 3) **IMPORTANT:** IF the existing video cable and connector that was in the "old" display arm was the previous generation design, it will look significantly different then the "new" cable design that is in the replacement arm.

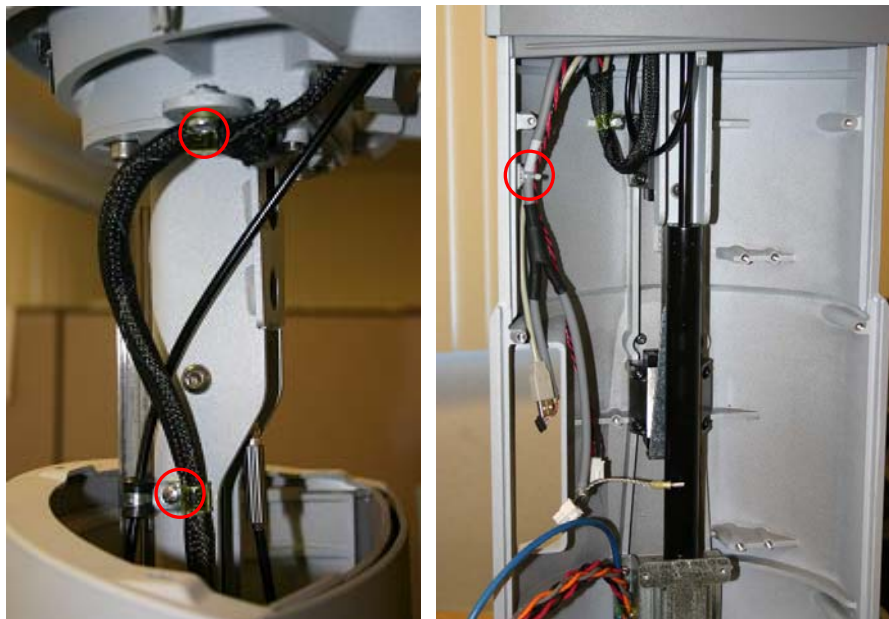
The direction of the main cable orientation at the time the connector on the cable is installed in the mating connector on the Main Board, is facing in the opposite direction (toward the front of the system), and is installed as shown below:



NOTE: IF the video connector on the replacement display arm assembly is of a different “type” (flat PC board type) then the original cable, install the “Cable Hold Down Bracket” P/N 33383-00 (provided with the new display arm kit) in the location as shown in the illustration below. The bracket is secured using the upper mounting screw for the Main Board assembly



- 4) Secure the connector/cable with tape to the chassis, to ensure it does not come lose.
- 5) Secure cables in center column as shown below.

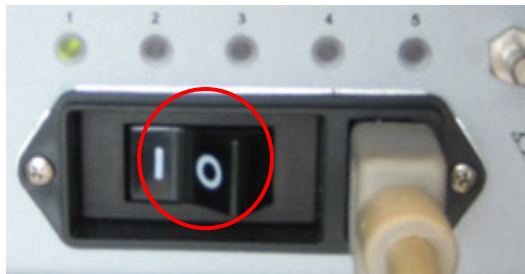


- 6) Reassemble the Scanner Deck area, by reversing the removal procedure.
- 7) Slide the chassis cosmetic sleeve and insert panel back into place on their respective spring clips.

Verification of Display, Speakers, and Microphone:

STEPS:

- 1) Reconnect the main AC power cord from the rear of the SmartCart SP or plug into the wall source.
- 2) Place AC circuit breaker, located at the rear of the SmartCart SP, in the “ON” position.



- 3) Ensure the **z.ome** is docked in the SmartCart SP.
- 4) Energize the SmartCart SP (*Ultra* System).
- 5) Verify that the LCD display is functioning correctly by watching the boot and verifying that normal imaging is displayed after fully booted.
- 6) Attach a transducer (if not already connected) and enable PW mode.
- 7) Turn PW Gain up to obtain a filled in spectral trace with excess noise (this will generate white noise for the speakers)
- 8) Turn the Volume up (Clockwise) and verify that the white noise is audible from both speakers.
- 9) If possible – scanning with actual Doppler flow is ideal, but not required.

10) Verification of microphone – TBD.

11) Verification is complete – return system to normal operation.

20.3.4 Z-PAK Battery - Removal/Replacement (SmartCart SP)

Required Parts

- P/N: 85031-00 Assy, Battery Pack, Gen II Cart

Required Tools/Equipment

- #2 Phillips Screwdriver
- #3 Phillips Screwdriver

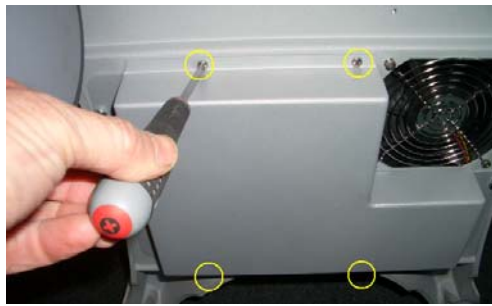
Overview of Procedure

- Removal Battery Pack
- Re-installation of Battery Pack
- Verification of system operation

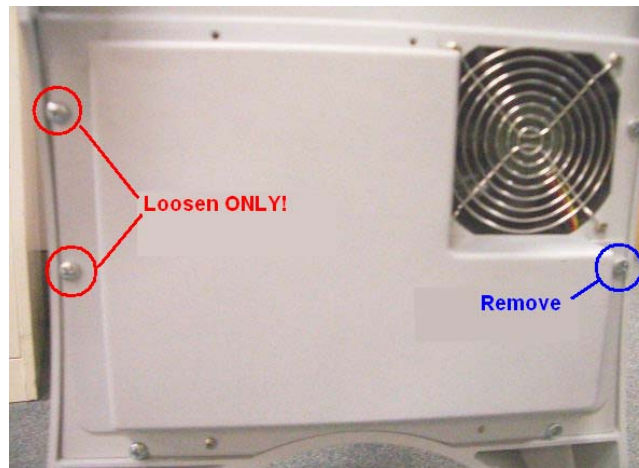
Battery Pack Removal:

STEPS:

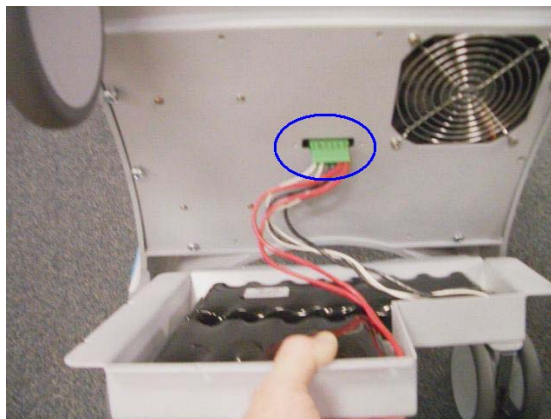
1. Ensure no Scan Engine/Module is docked
2. Place AC circuit breaker, located at the rear of the SmartCart, in the “OFF” position.
3. Disconnect the main AC power cord from the rear of the SmartCart.
4. Put the User Interface in the highest position.
5. Set the front caster brakes to prevent system from rolling.
6. Undock the scan engine from the Cart, and set aside.
7. The Battery Pack is located under the system. For the easiest access, tilt the entire system forward until is in horizontal position, resting on the front-side handles.
8. Remove the four (4) smaller #2 Phillips-head screws that are retaining the Battery Pack to the bottom of the SmartCart.



9. Remove the larger #3 Phillips-head screw, located on the right side of the mounting of the Battery Pack to the bottom of the SmartCart (leaving the last two (2) #3 Phillips-head screws, on the left side of the battery pack, still in place).



10. Remove the larger #3 Phillips-head screw, located on the right side of the mounting of the Battery Pack to the bottom of the SmartCart (leaving the last two (2) #3 Phillips-head screws, on the left side of the battery pack, still in place).
11. Slightly **loosen** (but DO NOT REMOVE) the remaining two (2) large #3 Phillips-head screws (on the left side of the battery pack), while supporting the weight of the battery pack with your hand.
12. While still supporting the weight of the battery pack, slide it to the right to enable the slotted holes in the cover to come free from the last two mounting screws,



13. Remove the larger #3 Phillips-head screw, located on the right side of the mounting of the Battery Pack to the bottom of the SmartCart (leaving the last two (2) #3 Phillips-head screws, on the left side of the battery pack, still in place).
14. Lower the battery pack slightly to enable access to the connector at the end of the battery pack power cable, and unplug the connector from the power supply on the SmartCart.
15. Remove the battery pack.



Battery Pack Re-Installation:

CAUTION



*AC Power **MUST** be present and the circuit breaker **MUST** be in the “ON” (power applied to the power supply of the SmartCart), at the time the Z-PAK is connector is plugged back into the power supply connector.*

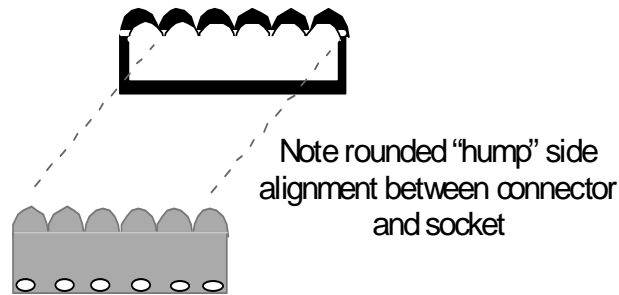
Failure to do so may result in a high enough potential arcing during connection, that may damage components on the power supply!

STEPS:

1. Connect the main AC power cord to the rear of the SmartCart and a wall source.
2. Place AC circuit breaker, located at the rear of the SmartCart, in the “ON” (“1” pushed in) position.
3. While holding the battery pack in position, plug the power connector into the receptacle on the bottom of the power supply.
7. While still supporting the weight of the battery pack attach the power cable to the mating connector on the bottom side of the power supply module on the SmartCart.



Warning: Be very careful to have the proper connector to socket orientation (note the rounded humps on one side, as shown below) when installing this cable. **DO NOT FORCE** connection, as this will damage connector and internal electronics.



NOTE: An arc may occur during connection. This is normal and due to the local capacitance connected directly to the battery terminals. Battery charging will not occur until AC power is cycled and is indicated by flashing LED 2, on the rear panel of the power supply.

8. While still supporting the weight of the battery pack, slide the slotted holes in the left side of the cover onto the two (2) loosened mounting screws on the left side of the power supply module.
4. Reinstall all mounting hardware to complete the installation.

System Verification:

STEPS:

1. Power on the SmartCart and perform a series of basic user operations, to verify normal system functionality.
9. Verify that the battery status ICON, on the upper-left corner of the display of the SmartCart, shows a current status.
10. Verification is complete – return system to normal operation.
11. .

20.3.5 Main Power Supply Module - Removal/Replacement (SmartCart SP)

Required Parts

- P/N: 85025-00 Power Supply Module, SmartCart SP

Overview of Procedure

- Removal/Re-installation Z-PAK Battery Plate
- Removal/Replacement of Power Supply Module
- System verification

Required Tools

- 9/32" Nut Driver or wrench

- #2 Phillips Screwdriver

Procedure

Battery Pack Removal:

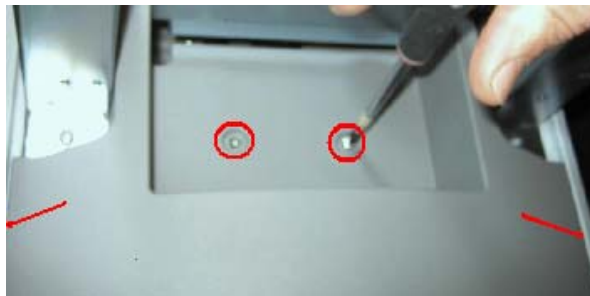
STEPS:

1. Perform removal process as described in Z-PAK Battery Plate removal procedure (included previously in this section of the manual).

Power Supply Module Removal:

STEPS:

1. Ensure the **Z.ONEULTRA SP** is powered “OFF”.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “0” (OFF) position.
3. Disconnect the main AC power cord from the rear of the SmartCart SP or unplug from the wall source.
4. Undock the scan engine from the Cart, and set aside.
5. Put the User Interface in the highest position.
6. Set the front caster brakes to prevent system from rolling.
7. To allow for removal of the AC power cable (used to power an on-board USB printer device, and an item that is included with the complete Power Supply Module) from the SmartCart SP, the lower access cover panel will need to be removed.
8. Remove the two Phillips-head screws that retain the lower access cover panel, in the printer mounting bay area. This panel is located under the scanner Scanner Deck, at the front of the SmartCart SP.



9. Cut any plastic tie-wraps that retain the AC power cable to the chassis, and free it from its mounting for later removal with the Power Supply Module.
10. The Power Supply Module is located under the system. For the easiest access, tilt the system so it rests on the front handles, exposing the bottom of the unit.
11. Remove the eight (8) Phillips-head screws retaining the power supply module to the bottom of the SmartCart SP and remove module.

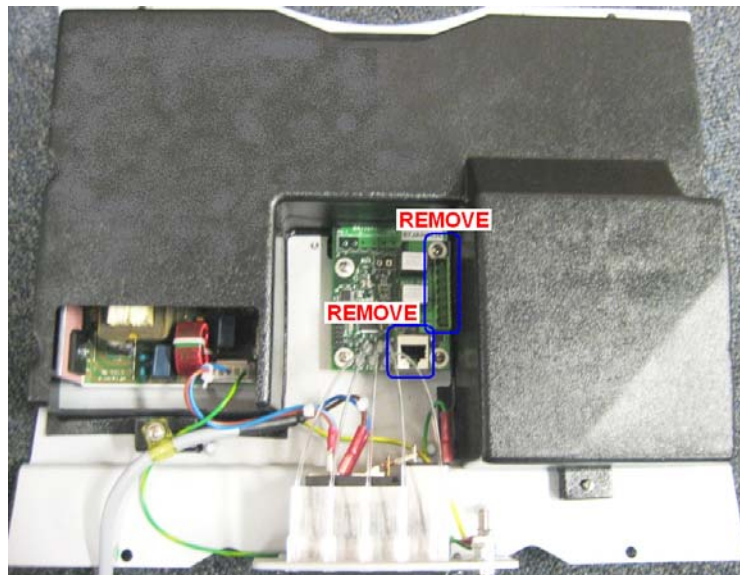
NOTE: Support the weight of the power supply with your free hand, while removing the final screw.



12. Gradually lower the Power Supply Module approximately 3" to provide access for disconnecting the cabling.

13. Reach in and disconnect the following cable connections.

- a. Disconnect the following two (2) cables
 - Main DC Power Out – Molex
 - Blue-colored, RJ-45 quick-disconnect



14. Once the cables are free, set the Power Supply Module aside and prepare for installation.

Installation:

STEPS:

1. Reconnect the Cables to the replacement Power Supply Module.
2. Route the printer AC power cable into the chassis, and out the front access panel.
3. Tuck cables back into chassis and position Power Supply Module for installation.
4. Reinstall the eight (8) Philips head screws. Ensure that the Power Supply Module is securely connected.
5. Tilt system back onto the casters.

System Verification:

STEPS:

1. Reconnect the main AC power cord from the rear of the SmartCart SP or plug into the wall source.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “1” (ON) position.



3. Ensure the scan engine is docked in the SmartCart SP. LED 1 will blink quickly and LED 5 will remain on.
 4. Energize the SmartCart SP.
 5. Verify that the LCD display is functioning correctly by watching the boot and verifying that normal imaging is displayed after fully booted.
 6. Attach a transducer (if not already connected) and enable PW mode.
 7. Turn PW Gain up to obtain a filled in spectral trace with excess noise (this will generate white noise for the speakers)
 8. Turn the Volume up (Clockwise) and verify that the white noise is audible from both speakers.
 9. If possible – scanning with actual Doppler flow is ideal, but not required.
 10. Verification is complete – return system to normal operation.
-

20.3.6 Scanner Deck, w/Cables - Removal/Replacement (SmartCart SP)



Required Parts

- P/N: 85076-00 Assy, Scanner Deck, w/Cables – w/o MTP Option
- P/N: 85118-00 Assy, Scanner Deck, w/Cables – w MTP Option
- Small Cable Tie-wraps (Qty. 3)

Required Tools/Equipment

- #2 Phillips Screwdriver

Overview of Procedure

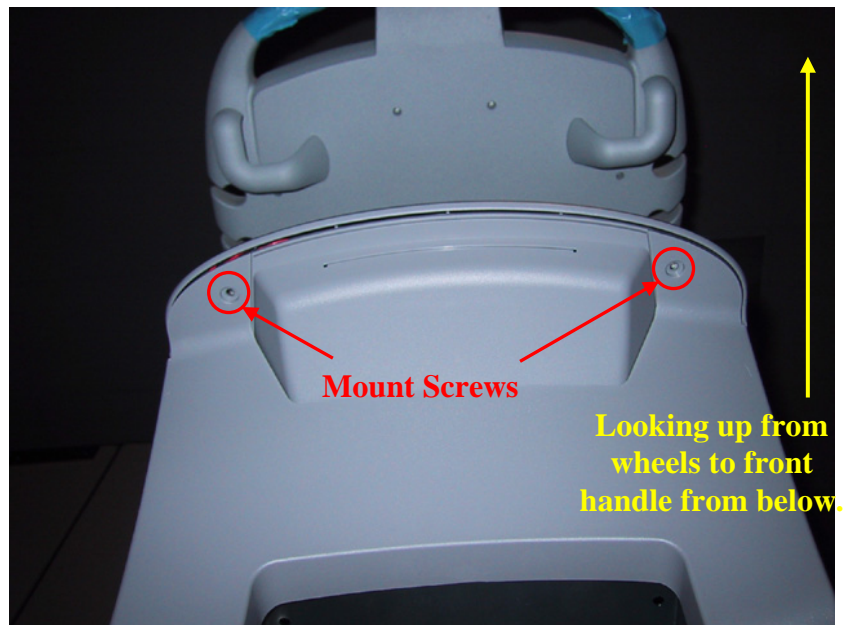
- Removal and replacement of Scanner Deck, w/Cables
- System verification

STEPS:

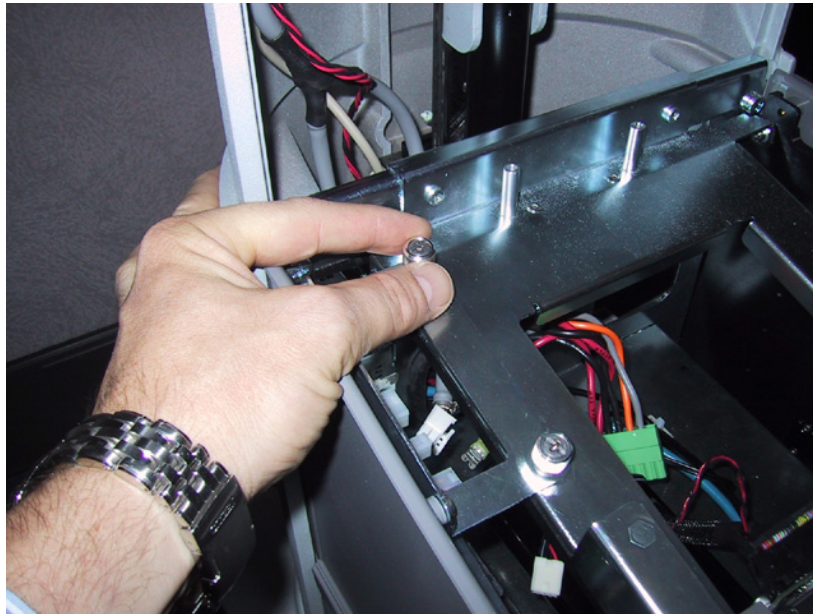
1. Ensure the **Z.ONEULTRA SP** is powered “OFF”.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “0” (OFF) position.



3. Disconnect the main AC power cord from the rear of the SmartCart SP or unplug from the wall source.
4. Undock the scan engine for the Scanner Deck, and set scan engine aside.
5. Remove the two (2) Phillips screws on top Scanner Deck.
6. Remove the two (2) Phillips screws on bottom front CEE cosmetics to the Scanner Deck.



7. Partially lift the Scanner Deck off the Electronics Enclosure and move to the right side.
8. Remove the Left CEE Cosmetic panel by the Main Board – loosen the two thumbscrews and lift straight up to remove.



9. Disconnect the Scanner Deck wiring from the Main Board – taking note of the connector locations for reassembly. Cut any tie-wraps that are retaining cables to the chassis.
10. Set the old Scanner Deck aside, and reverse removal steps for installing replacement Scanner Deck. Install new tie-wraps securing cables in same locations as were previously removed.

System Verification:

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STEPS:

1. Reconnect the main AC power cord from the rear of the SmartCart SP or plug into the wall source.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “1” (ON) position.
3. Dock the scan engine on the SmartCart SP, and ensure it latches securely.
4. Press the power button on the Scanner Deck to energize the SmartCart SP, and allow it to fully boot.
5. Attach a transducer (if not already connected), and ensure basic imaging operation.
6. Verification is complete – return system to normal operation.

20.3.7 OLED Display Board (User Interface Assy)- Removal/Replacement (SmartCart SP)

Required Parts

- 85095-00..... Assy, OLED Display Board

Overview of Procedure

- Removal and re-installation of User Interface Assy
- Replacement of OLED Display Board
- System verification

Required Tools/Equipment

- #1 Phillips Screwdriver

Procedure

UI Removal:

STEPS:

1. Ensure the **Z.ONEULTRA SP** is powered “OFF”.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “0” (OFF) position.
3. Disconnect the main AC power cord from the rear of the SmartCart SP or unplug from the wall source.
4. Remove the eight (8) Phillips screws that secure the UI to the cast UI base. This will need to be accomplished from below using a Phillips screwdriver.

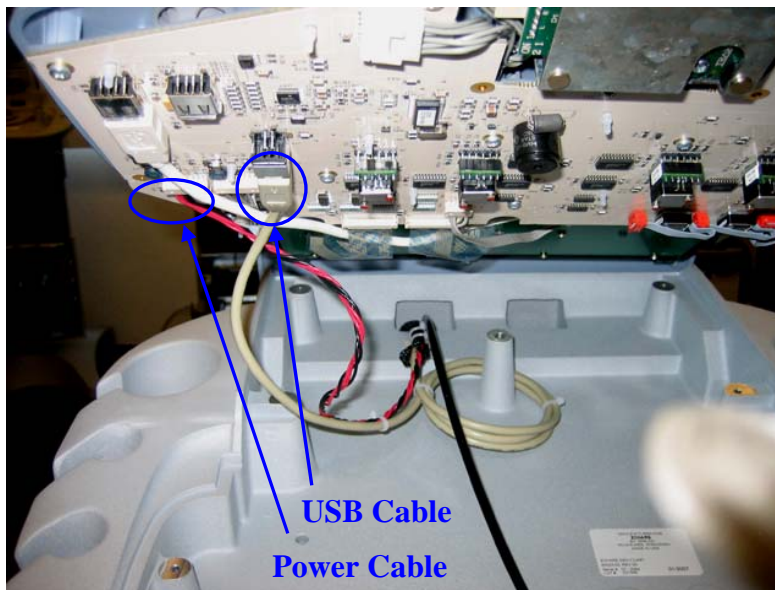
IMPORTANT NOTE



There are two open holes (shown in the figure below with a red “X”) in the bottom of the UI panel that do NOT have screws inside. Be careful to NOT attempt to insert screws in these two holes, as the screw will fall up inside the UI housing



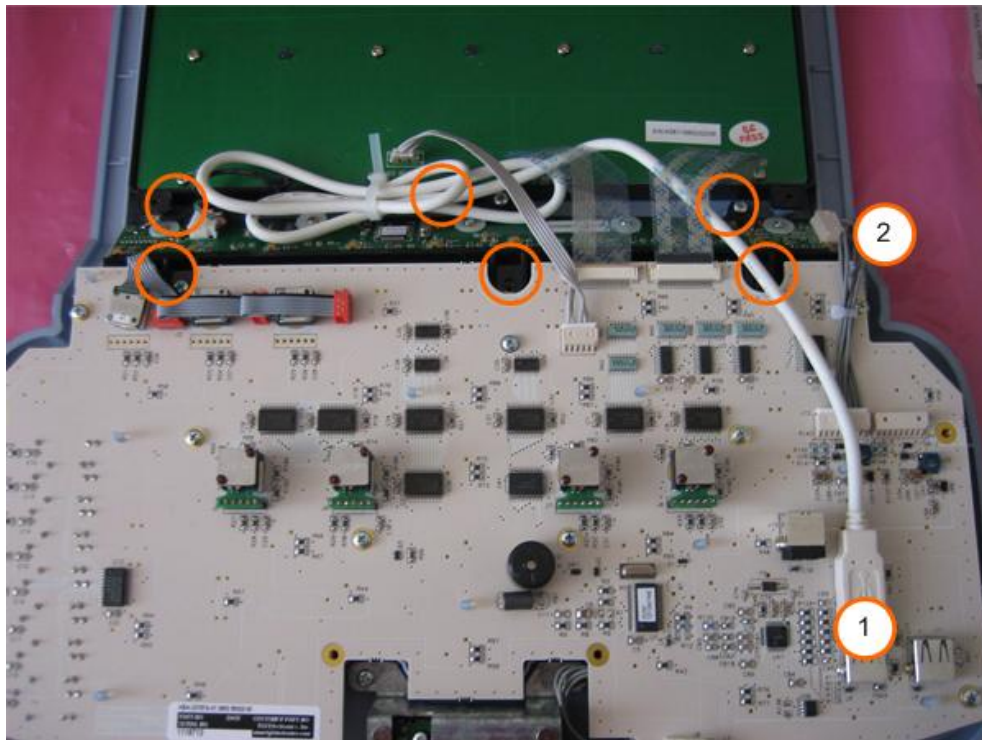
5. While lifting the front of the User Interface up and exposing the underside of the UI, disconnect the USB and power cable from the UI assy.



OLED Display Board Removal/Replacement:

STEPS:

1. Ensure the User Interface is removed per steps 1 thru 5 of User Interface Removal Procedure above.
2. Set the user interface (keys facing down) on a surface that will not damage the surface of the User Interface.
3. Disconnect the USB cable from the User Interface assembly (location 1, shown below)
4. Disconnect the power cable from the OLED Display Board Assembly (location 2, shown below)
5. Remove the six (6) Phillips screws that retain the OLED assembly



6. Slide the OLED Display Board Assembly out to the left (it is NOT necessary to disconnect the two flex cables going to the QWERTY keyboard, as the OLED assembly can be slid underneath for removal)
7. Reinstall OLED Display Board Assembly in the reverse order. Make sure to connect both cables.
8. Reinstall the User Interface Assy, by executing the earlier steps in reverse order, and proceed to System Verification.

System Verification:

STEPS:

1. Reconnect the main AC power cord from the rear of the SmartCart SP or plug into the wall source.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “1” (ON) position.



3. Ensure the scan engine is docked in the SmartCart SP. LED 1 will blink quickly and LED 5 will remain on.
4. Energize the SmartCart SP
5. Attach a transducer (if not already connected)
6. Verify that the System is functioning correctly by performing a basic test. This test is comprised of the following:
7. Verify that the User Interface keys are functioning correctly by testing each of the keys.
8. Verify that the Softkey OLED displays are correct and functioning correctly based on the selected mode.
9. Verify the trackball functions correctly – testing both the horizontal and vertical axis.
10. Verification is complete – return system to normal operation.

20.3.8 User Interface Assembly - Removal/Replacement (SmartCart SP)

Required Parts

- 85089-00..... Assy, User Interface, SmartCart SP w/Trackball
 - 85026-00..... Trackball Assy (if replaced separately)
 - 32854-00..... QWERTY Keyboard Assy (if replaced separately)

Overview of Procedure

- Removal and replacement of User Interface Assy
- System verification

Required Tools/Equipment

- #1 Phillips Screwdriver

Procedure

UI Removal/Replacement:

STEPS:

1. Ensure the **Z.ONEULTRA SP** is powered “OFF”.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “**0**” (OFF) position.
3. Disconnect the main AC power cord from the rear of the SmartCart SP or unplug from the wall source.
4. Remove the eight (8) Phillips screws that secure the UI to the cast UI base. This will need to be accomplished from below using a Phillips screwdriver.

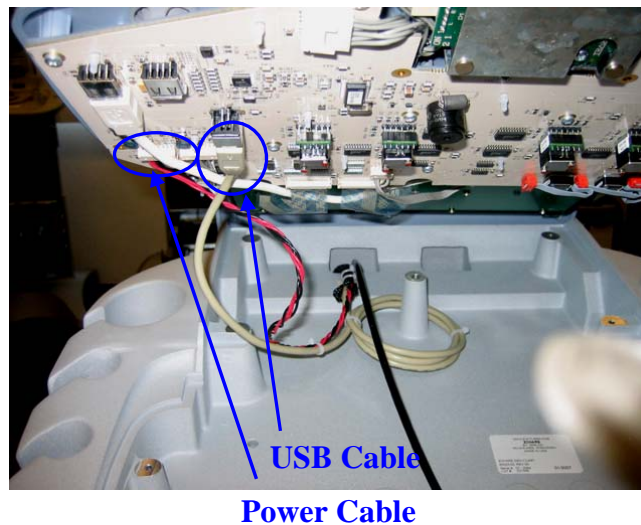
IMPORTANT NOTE



There are two open holes (shown in the figure below with a red “X”) in the bottom of the UI panel that do NOT have screws inside. Be careful to NOT attempt to insert screws in these two holes, as the screw will fall up inside the UI housing



5. While lifting the front of the User Interface up and exposing the underside of the UI, disconnect the USB and power cable from the UI assy.

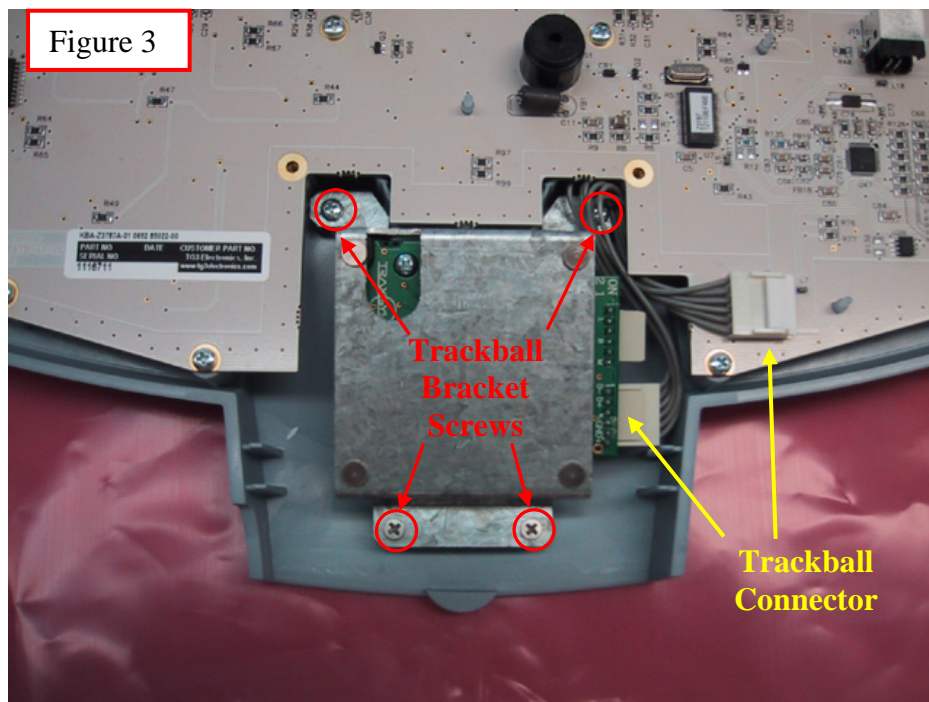


6. Reverse the steps above to install the replacement User Interface.
 - ⇒ If replacement of the trackball is required, proceed to Trackball Replacement steps **prior** to re-installing the User Interface (Refer to section below).
 - ⇒ If replacement of the QWERTY keyboard is required, proceed to QWERTY Replacement steps **prior** to re-installing the User Interface (Refer to section below).

Trackball Removal/Replacement: (if changed separately)

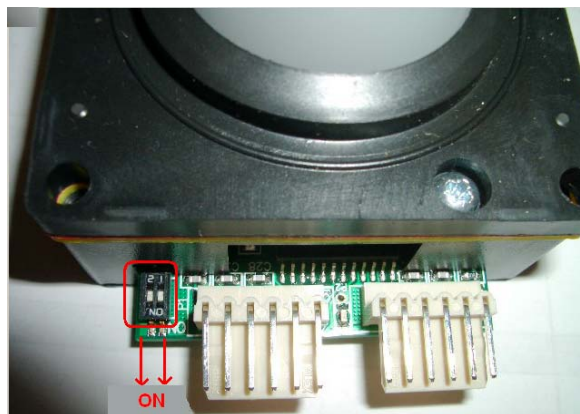
STEPS:

1. Ensure the User Interface is removed per steps 1 thru 5 of User Interface Removal Procedure above.
2. Set the user interface (keys facing down) on a surface that will not damage the surface of the User Interface.
3. Disconnect the trackball from the trackball cable (on the UI side of the cable) and leave the other end connected to the Trackball. Pull the cable free so that the top-right screw is visible. (for connector location - See Figure 3)
4. Remove the four (4) Phillips screws that retain the Trackball (See Figure 3)



5. Pull the trackball straight up and remove (do not lose the spacers for each of the trackball bracket screws – 4 total)

NOTE: Check the two (2) small white DIP switches on the new trackball, prior to installation, to ensure they are BOTH in the “ON” (**away** from the trackball) position (as shown below). Improper position of these switches can result in reversal (up/down vs. left/right) of operation.

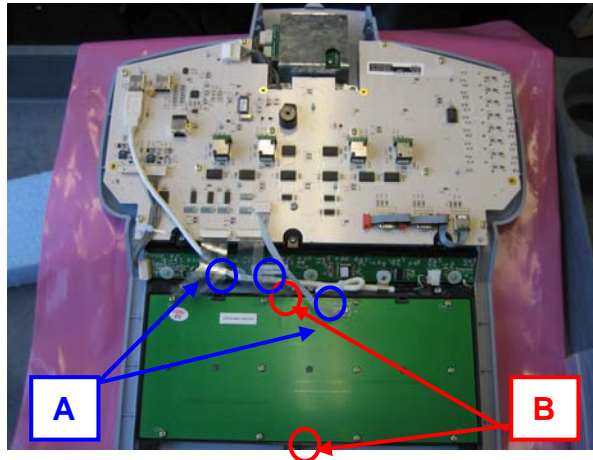


6. Reinstall in the reverse order, taking care not to lose the trackball bracket spacers (these can be adhered to the bracket if necessary to ease replacement)
7. Reinstall the User Interface assembly in reverse order of the removal steps listed above and proceed to System Verification.

QWERTY Keyboard Removal/Replacement: (if changed separately)

STEPS:

1. Ensure the User Interface is removed per previous steps of User Interface Removal Procedure above.
2. Set the user interface (keys facing down) on a surface that will not damage the surface of the User Interface.
3. Disconnect the two (2) flex cables and single (1) LED driver cable from the QWERTY assembly (See Locations A).
4. Remove the two (2) Phillips screws that retain the QWERTY assembly (See Location B).



5. Pull the QWERTY straight up and remove.
6. Reinstall in the QWERTY in reverse order.
7. Reinstall the User Interface Assy in reverse order of the removal steps listed above and proceed to System Verification.

System Verification:

STEPS:

1. Reconnect the main AC power cord from the rear of the SmartCart SP or plug into the wall source.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “1” (ON) position.



3. Ensure the scan engine is docked in the SmartCart SP. LED 1 will blink quickly and LED 5 will remain on.
4. Energize the SmartCart SP
5. Attach a transducer (if not already connected)

6. Verify that the System is functioning correctly by performing a basic test. This test is comprised of the following:
 - Verify that the User Interface keys are functioning correctly by testing each of the keys.
 - Verify that the Softkey OLED displays are correct and functioning correctly based on the selected mode.
 - Verify the trackball functions correctly – testing both the horizontal and vertical axis.
 7. Verification is complete – return system to normal operation.
-

20.3.9 Main Board Assembly - Removal/Replacement (SmartCart SP)

Required Parts

- P/N: 85080-00 Assy, PCB Main Board, Gen II Cart
- Non-conductive (Kapton) tape
- Three strips of aluminum tape
- Small Cable Tie-wraps (Qty. 5)

Required Tools/Equipment

- #2 Phillips Screwdriver – Stubby
- #1 Phillips Screwdriver
- Flat Blade Screwdriver

Overview of Procedure

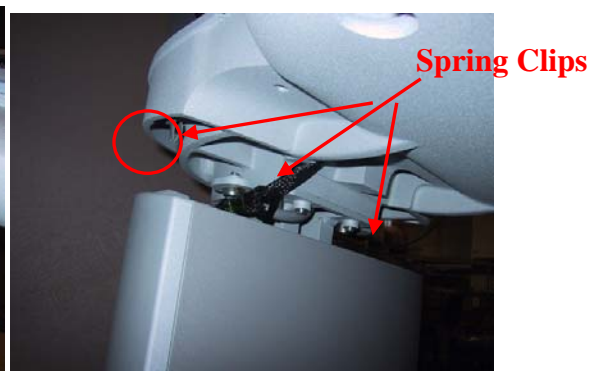
- Open Cosmetics (for chassis access)
- Remove Scan Engine Scanner Deck \ Left CEE (Cart Electronics Enclosure) Plastic Panel
- Remove / Replace Main Board
- System Verification

General Disassembly:

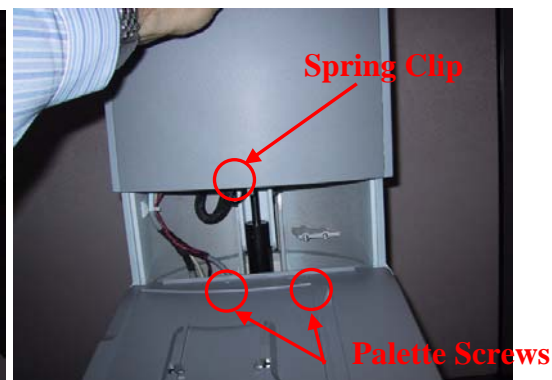
STEPS:

1. Ensure the **Z.ONEULTRA SP** is powered “OFF”.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “**0**” (OFF) position.
3. Disconnect the main AC power cord from the rear of the SmartCart SP or unplug from the wall source.

4. Using the side of the hand – firmly knock the side of the chassis cosmetic sleeve loose. There are 3 spring clips that retain it at the top. If it does not come free – gently use the flat blade screwdriver to pry the cosmetics loose (use tape on the blade to avoid marring the chassis surface).



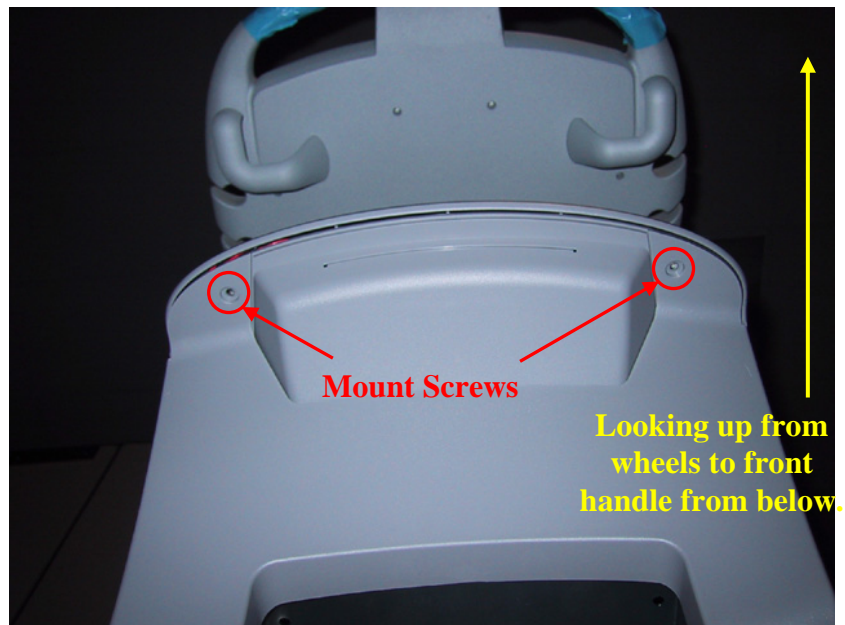
5. Slide the outer cosmetic chassis sleeve down and grab the inner sleeve front panel along with the outer sleeve at the same time from above.
6. Lift both the Inner and Outer sleeve to gain access to the Scanner Deck retention screws. There is one spring clip in the center which holds the inner panel down.



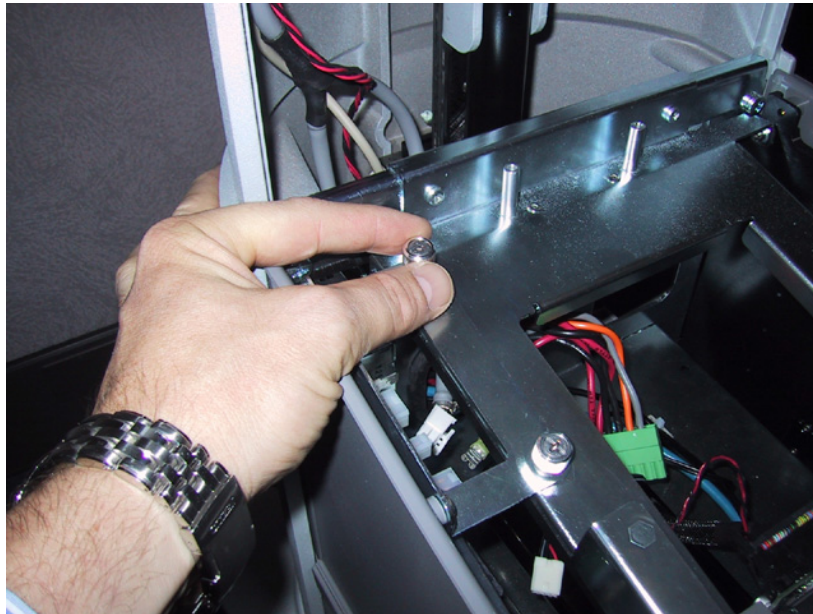
Removal of Scan Engine Scanner Deck:

STEPS:

7. Remove the two (2) Phillips screws on top Scanner Deck.
8. Remove the two (2) Phillips screws on bottom front CEE cosmetics to the Scanner Deck.



9. Partially lift the Scanner Deck off the Electronics Enclosure and move to the right side.
10. Remove the Left CEE Cosmetic panel by the Main Board – loosen the two thumbscrews and lift straight up to remove.

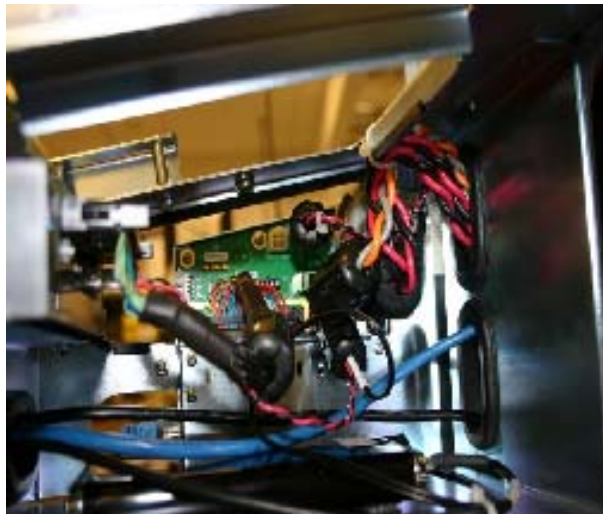
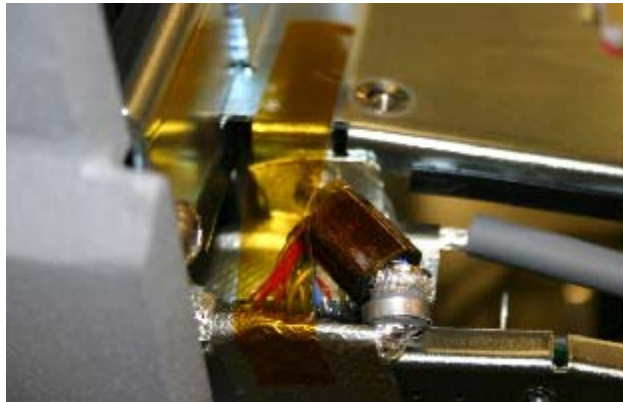
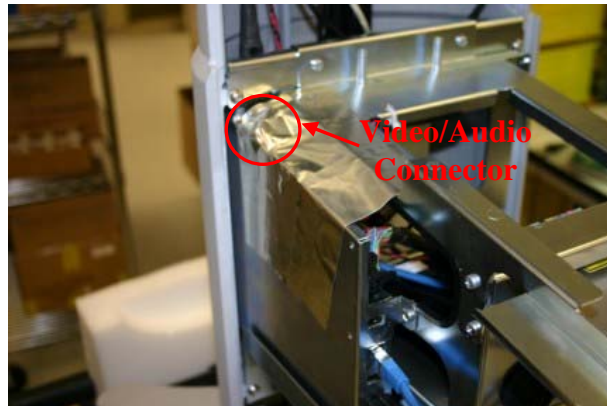


11. Disconnect the Scanner Deck wiring from the Main Board – taking note of the connector locations for reassembly. Cut any tie-wraps securing cables to the chassis.
12. Set the Scanner Deck aside.

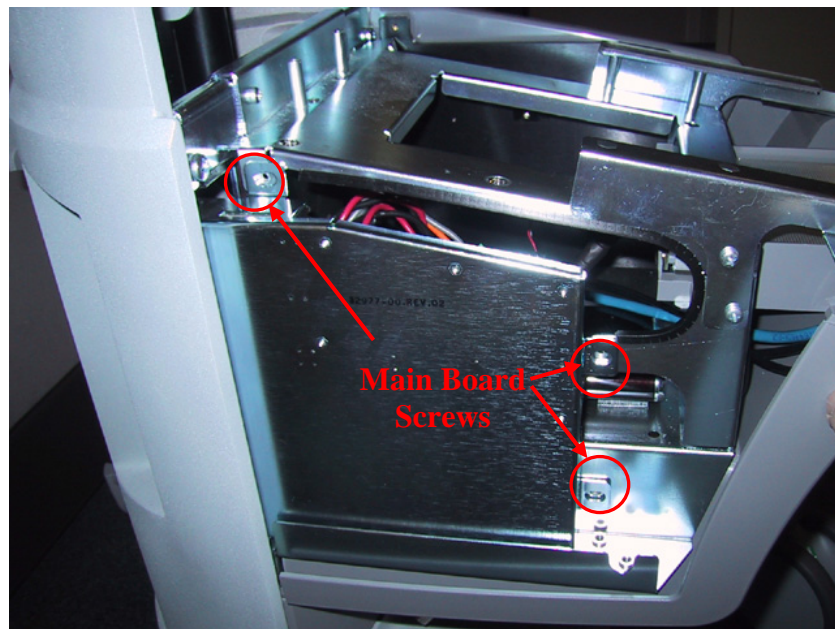
Removal of the Main Board:

STEPS:

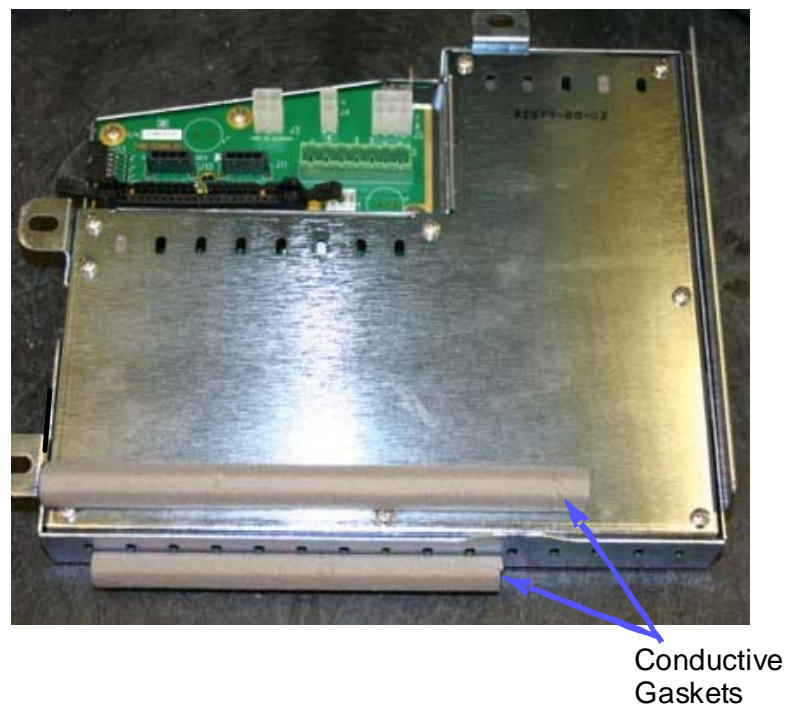
13. Disconnect the cables attached to the Main Board – some may require the flat blade screwdriver to unlock the locking tab.



14. Once all the cables have been disconnected, ensure they are moved out of the way. Cut any tie-wraps that may have been retaining cables to the chassis.
15. Remove the three (3) Phillips head screws mounting the Main Board to the Cart Electronic Enclosure (CEE).

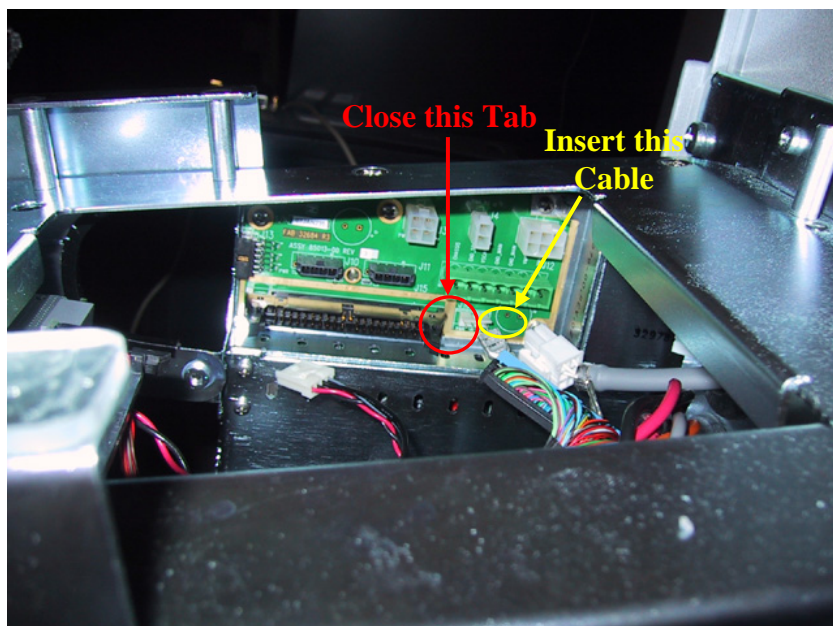


16. Slide the Main Board towards the front of the cart and remove from the chassis.
17. Ensure that conductive gasket strips (moved from old Main Board, if necessary) are installed in the locations as shown, on the outside surface of the metal case of the Main Board Assy.

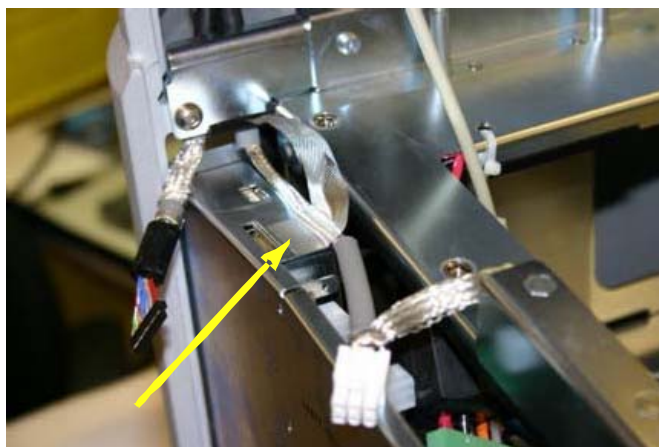


18. Reinsert the new Main Board in the same fashion and secure the upper screw (near the Video/Audio connector jack). Ensure the rear of the Main Board sits flush with the exit on the Smart Cart chassis.
19. Reinsert and tighten the two remaining screws for the Main Board.

20. Reconnect the cables removed in Step 1 – figure below shows ribbon cable retaining tab position for adjacent cable installation. (Tab must be closed to get cable inserted)
21. Secure cables to the chassis with tie-wraps, in the same locations where they were originally removed.



22. Apply tape to top of Cart Main Module, in location shown. Ensure front end of tape does not cover video connector opening. Continue pressing tape over the shield of the video power cable end, continuing up to the mounting flange of the Cart Main module.



23. Using sharp knife or scissors, cut slices in tape so that it can be wrapped around the mounting flange.
- 8) Reconnect the Display's power cable to the appropriate connector (J5) on the rear of the Main Board.
- 9) Reconnect the Video signal cable into J1 connector on the Cart Main Module.

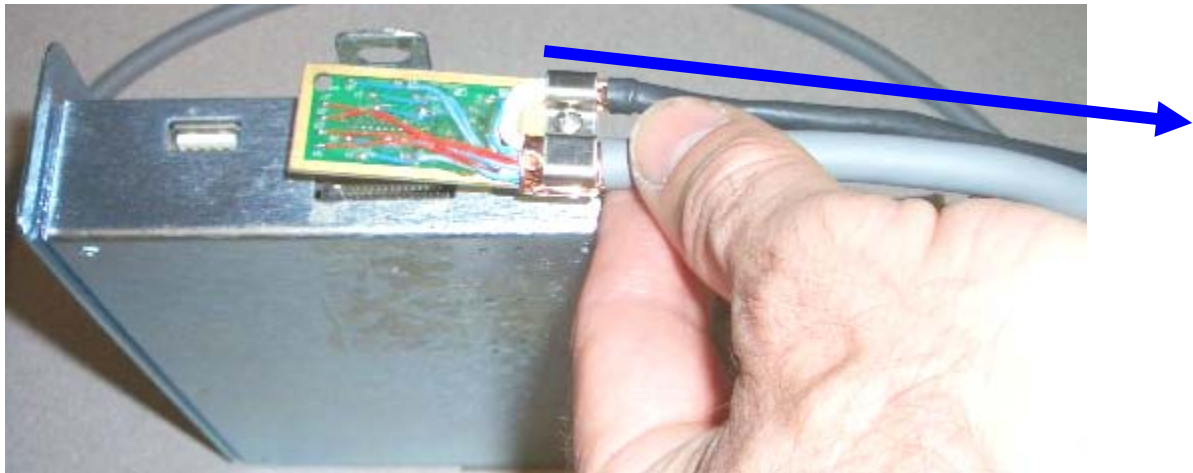
CAUTION

The J1 video connector on the Main Board is a VERY high-precision style connector, with very fine/fragile pins, and is surface-mounted to the PC board.

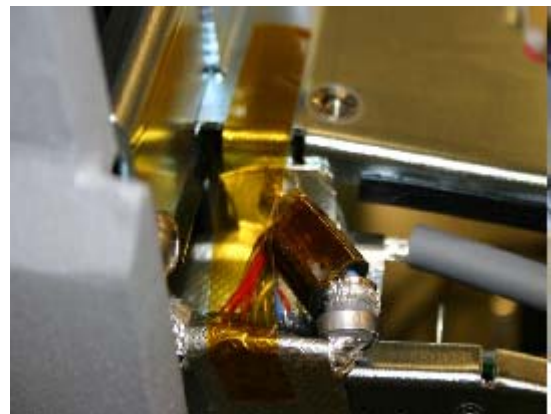
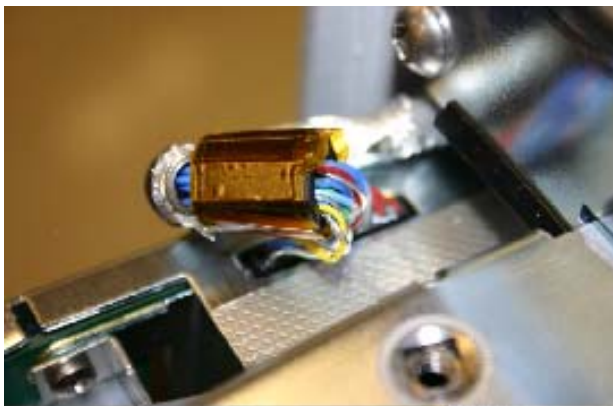
As such, extreme care MUST be observed to ensure proper alignment of the cable prior to pressing into place, and only light pressure should be required for fully seating cable in connector receptacle.

Failure to do so may result in permanent damage to the connector; requiring replacement of the entire Main Board assembly.

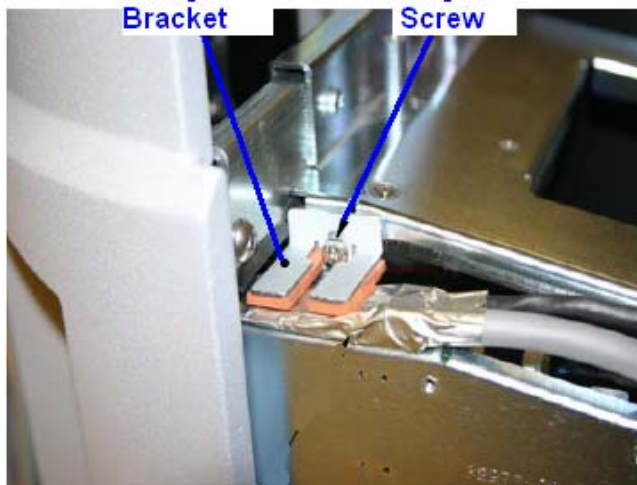
IMPORTANT: The direction of the main cable orientation at the time the connector on the cable is installed in the mating connector on the Main Board, is facing in the direction (towards the front of the system) as shown below:



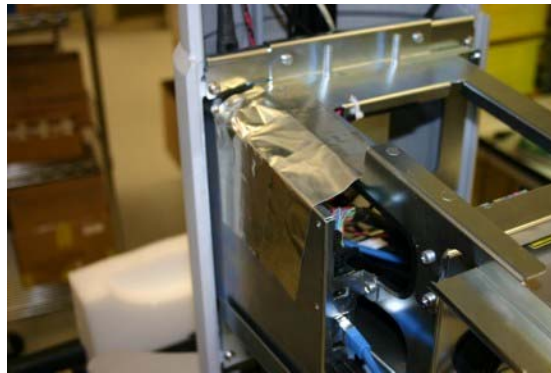
- 10) Route the cable in an S shape (shown in the left figure below). Then apply enough tape to cover any exposed wires between connector and ferrite (as shown in the right figure below). This will also help to strain relief the assembly



- 11) Install the "Cable Hold-down Bracket" in the location as shown in the illustration below. The bracket is secured using the upper mounting screw for the Main Board assembly



24. Apply three strips of conductive adhesive backed tape to connect cover of Cart Main Module to the metal of the CEE Metal Framework. Note that each strip of tape is overlapping the previous strip



25. Reassemble the cosmetic panels in reverse order of removal and proceed to System Verification.

System Verification:

STEPS:

1. Reconnect the main AC power cord from the rear of the SmartCart SP or plug into the wall source.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “1” (ON) position.



3. Ensure the scan engine is docked in the SmartCart SP. LED 1 will blink quickly and LED 5 will remain on.
4. Energize the SmartCart SP
5. Attach a transducer (if not already connected)

6. Verify that the System is functioning correctly by performing a basic test. This test is comprised of the following:
 - Verify LCD display is functioning correctly by watching the boot and verifying that normal imaging is displayed after fully booted.
 - Verify Audio from the Display Assy – Enter PW, turn up the PW Gain and increase Volume
 - Verify that the User Interface keys are functioning correctly
 - Test USB ports on Main Board panel
 - Test and Verify Network Connectivity (if applicable)
 - Test and Verify USB Peripheral Connectivity and Functionality (if applicable)
 7. Verification is complete – return system to normal operation.
-

20.3.10 MTP Bolster Plate Assembly - Removal/Replacement (SmartCart SP)

Required Parts

- P/N: 85123-00 Assy, MTP Bolster Plate

Required Tools/Equipment

- #2 Phillips Screwdriver – Stubby
- #1 Phillips Screwdriver
- Wire cutters
- Long handled flat-blade screwdriver (3mm width blade, 12” shaft, thin blade)
- 9/32” Nut Driver or wrench
- 5mm Nut Driver, or wrench
- #1 Phillips Screwdriver

Prerequisite Procedures to Be Performed:

- Scanner Deck Procedure (Loosen by screw removal only)

Overview of Procedure

- Open Cosmetics (for chassis access)
- Loosen Scanner Deck Assembly
- Remove / Replace MTP/CW Module
- Re-install Removed Assemblies

- System Verification

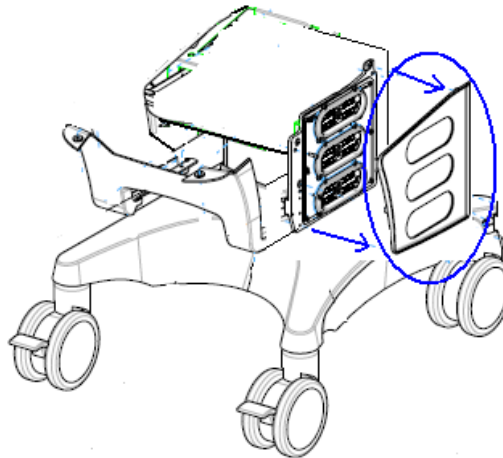
MTP Bolster Plate Access/Removal-Replacement:

STEPS:

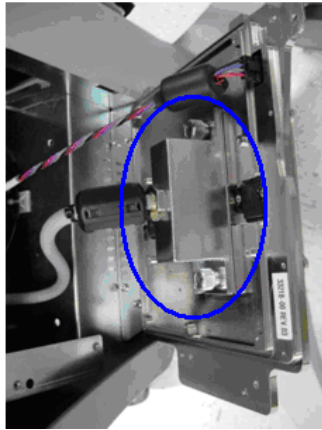
1. Remove the two (2) Phillips head screws securing the right side of the lower cosmetic cover. The screws are located on the right side next to the printer mounting bay



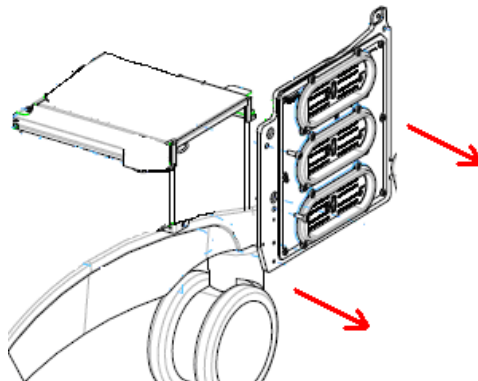
2. With the right side lower cosmetic cover loosened, grasp the gray plastic Right CEE cosmetic panel (that surrounds the mock transducer storage ports) and remove it



3. Remove the three (3) Phillips screws securing the MTP Bolster Plate to the cart
4. Disconnect the Power cable at the rear of the MTP Bolster Plate.
5. Disconnect the MTP dongle cable from the rear of the MTP Bolster Plate.



6. Remove MTP Bolster Plate from the system



7. Reverse all previous disassembly steps for completing installation

System Verification:

STEPS:

1. Reconnect the main AC power cord from the rear of the SmartCart SP or plug into the wall source.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “**1**” (ON) position.
3. Attach transducers to each of the MTP ports and verify full system operation in all modes
4. Verification is complete – return system to normal operation.

20.3.11 Gas spring - Removal/Replacement (SmartCart SP)

Required Parts

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- P/N: 33073-00 Assy, Gas Spring, Gen II Cart

Required Tools/Equipment

- #2 Phillips Screwdriver
- 5mm Allen Hex wrench
- 13mm socket, used on a ratcheting wrench
- 9/32" Nut Driver or wrench

Prerequisite Procedures to Be Performed:

- Main Power Supply Module - Removal

Overview of Procedure

- Removal of gas spring
- Re-installation of above items
- Verification of system operation

Main Power Supply Removal:

- Perform Main Power Supply Module Removal

(NOTE: Refer to Main Power Supply Replacement Procedure in this manual)

Gas Spring Removal:

STEPS:

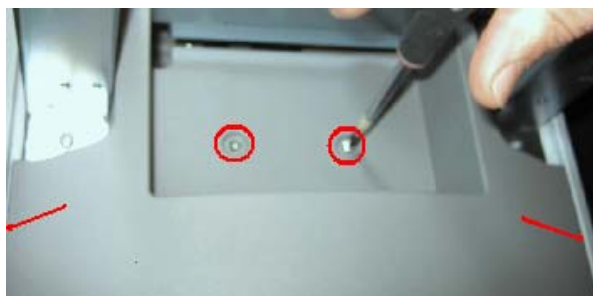
1. Using the side of the hand – firmly knock the side of the plastic cosmetic sleeve loose. There are 3 spring clips that retain it at the top. If it does not come free – gently use the flat blade screwdriver to pry the cosmetics loose (use tape on the blade to avoid marring the chassis surface).



2. Slide the plastic cosmetic sleeve downward as far as it will go, letting it slide over the bottom panel insert.



3. Pull the lift release lever and position the User Interface lift to its LOWEST position.
4. Remove the two Phillips-head screws that retain the lower access cover panel.



5. Remove the lower access panel cover by pulling inward on the edges to allow the ridges to clear the frame, and then removing panel.
6. In combination of accessing from the top and through the access holes in the bottom of the SmartCart SP chassis, using the 5mm hex Allen wrench and 13mm socket, remove the lower mounting hardware (bolt, nut and 2 spacers) that attaches the gas stock to the base bracket.



7. Grasp the handles on the User Interface housing, and slide (lift) the upper portion of the SmartCart SP to its most fully extended position to expose (above the top edge of the plastic cosmetic sleeve) the top mounting point for the gas spring.

NOTE: *DO NOT pull the lift release handle while sliding (lifting) the User Interface housing upward, as the bottom gas spring point is currently disconnected, and should raise free of its mounting)*

Raising the User Interface to this position should also allow the bottom of the gas spring to raise clear (outside) of the attachment bracket.



8. At the top of the gas spring, disconnect the release cable from the actuating mechanism, by first lifting the barrel adjuster out of the mounting slot, and then removing the cable end from its recess in the actuating lever.



9. Remove the upper mounting hardware (bolt, nut and 2 spacers) that attaches the gas stock to the frame of the SmartCart SP.
10. Lift the top portion of the gas spring upward as far as possible, out of the recess channel, and then shift its position to the left as far as possible. The goal being to angle the gas spring for removal via the exit hole on the right-hand hole at the bottom of the base assembly of the SmartCart SP.
11. Reaching through the power supply module cavity in the SmartCart SP, extract the gas spring downward and out through the right-hand access hole.



Gas spring & Power Supply Module Re-Installation:

STEPS:

1. Reverse all of the previous steps for installing the replacement gas spring, and re-installing the power supply module.

System Verification:

STEPS:

1. Reconnect the main AC power cord from the rear of the SmartCart SP or plug into the wall source.
 2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the “1” (ON) position.
 3. Operate the lift mechanism through its full range to ensure proper gas spring operation.
 4. Power on the SmartCart SP and perform a series of basic user operations, to verify normal system functionality.
 5. Verification is complete – return system to normal operation.
-

20.3.12 DVD/CD Drive Replacement (SmartCart SP)

Required Parts

- P/N 85136-00 Assy, DVD/CD Drive w/Connector
- Small ty-wraps (3)

Required Tools/Equipment

- #2 Phillips Screwdriver – Stubby
- T10 Torx Screwdriver
- Small flat blade screwdriver

Prerequisite Procedures to Be Performed:

- Scanner Deck Removal

Overview of Procedure

- *Remove Scanner Deck (reference procedure elsewhere in this chapter)*
- Remove and replace DVD Drive
- System Verification

DVD Drive Replacement:

STEPS:

1. Disconnect the main interface ribbon cable, and DC power cable, from their connectors at the rear of the DVD Drive.
2. Remove the two (2) Torx screws that secure the upper-mount brace that retains the DVD drive in position within the chassis



3. Slide the DVD drive out from under the metal framework of the CEE chassis, and remove the drive from the system.
4. Position the replacement DVD drive into its mounting position in the chassis.
5. Secure the DVD drive in place by reinstalling the upper-mount brace, using the two (2) Torx screws.

CAUTION



***DO NOT** over-tighten these two screws, as it may result in putting excessive downforce on the top/front of the DVD drive and cause the DVD media to not properly load into the drive.*

6. Reconnect the DVD interface and DC power cables.
7. Reverse removal steps for installing replacement Scanner Deck. Note: cables need to be secured to chassis using ty-wraps, upon re-assembly

IMPORTANT NOTE!

ONLY the following two types of media can be used in the DVD drive on the Z.ONEULTRA SP:

- DVD: DVD "+R" or "+RW" Type (Not - type)
- CD: CD "-R" Type (Not + type)

System Verification:

STEPS:

1. Reconnect the main AC power cord from the rear of the SmartCart SP or plug into the wall source.
2. Place AC circuit breaker, located at the rear of the SmartCart SP, in the "1" (ON) position.
3. Dock the scan engine on the SmartCart SP, and ensure it latches securely.

4. Press the power button on the Scanner Deck to energize the SmartCart SP, and allow it to fully boot.
 5. Attach a transducer (if not already connected), and ensure basic imaging operation.
 6. Insert a blank DVD or CD (*type* as discussed in Note at top of this section) disk (label facing up) into the drive. After 3-4 seconds a green disk icon will appear on the top left corner of the cart display.
 7. Go to system archive and export study to the CD. Upon completion, the disk will automatically be ejected.
 8. Verification is complete – return system to normal operation.
-

20.4 Hardware Service/Replacement Procedures (Scan Engine)

20.4.1 Rear I/O Door Assembly - Removal/Replacement (Scan Engine)

Required Parts

- P/N: 80255-00 Rear I/O Door Assembly (Zonare)

Required Tools

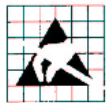
- ESD protection equipment (wrist grounding strap, anti-static surface)
- #2 Philips-head screwdriver

Procedure

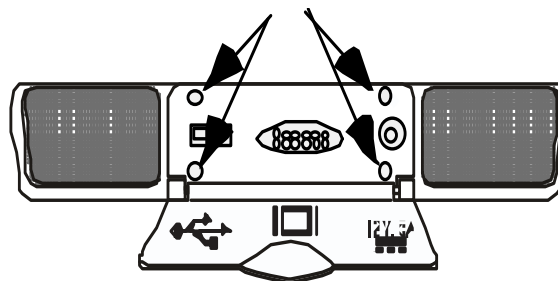
STEPS:

1. Ensure the **Z.ONEULTRA SP** is powered “OFF”
2. Remove the Scan Engine from the Cart (if currently docked)
3. Lay Scan Engine face-down
4. Remove battery pack from the Scan Engine

CAUTION



4. *To prevent potential static shock damage to sensitive electrical components in the Scan Engine, use of all proper ESD (Electro Static Discharge) protection (wearing grounded wrist strap) and avoid direct contact with electronics during replacement of the Rear I/O Access door.*



5. Completely loosen the four (4) Philips-head screws, retaining the door to the Scan Engine
6. Grasping the hinged door, lift the door assembly out of the Scan Engine
7. Reverse above procedure for reinstallation, ensuring that the rubber boot (located inside the doorway) is properly positioned prior to door installation

20.5 Service Software Procedures

20.5.1 Accessing the “Diagnostics” Menu

The **Diagnostics** menu on the **Z.ONEULTRA SP** offers (or will offer in subsequent software/hardware releases) the following functionality:

BASIC Menu Functions:

- Displays the **Z.ONEULTRA SP** Scan Engine serial number
- Displays the currently installed system software level
- Displays the firmware revision level of major PC boards in the Scan Engine
- Configuration of the IP address, user name, and password for contact with Zonare FTP server
- Capturing, Exporting, and Sending of system log files

ADVANCED Menu Functions added: (*ZONARE trained service personnel ONLY*)

- Bring up a System Console screen
- Advanced system firmware upgrades

The Diagnostic page can be accessed using one of the following two methods:

SERVICE Key- Quick Method:

1. Pressing the “**SERVICE**” key, on the upper row of the QWERTY keyboard on the SmartCart SP, will immediately bring up the main **User Diagnostic Panel** page.



NOTE




- *EXTENDED “**Service**” key press will initiate an immediate manual capture of system “LOG” files.*

Diagnostic Menu Path Method:

1. Using the “**Tab**” button and *Menu Control* on the Scan Engine (or SmartCart SP) user interface, advance to the “**Tools**” menu and then sequence through the following selection:

Tools tab --> System Setup --> Diagnostics

2. Press the “SELECT”  button on the user interface to access to the basic “**Diagnostic**” page

For detailed information on use of the “**Diagnostic Panel**” screen, refer to Section [16.7](#) of this manual.

21 PART NUMBER INFORMATION

21.1 SmartCart SP



21.1.1 Major FRU Assemblies

Number	Part Number	Description
1	86001-00	SmartCart SP, Top Level
2	85113-00	Display, 19" Flatscreen w/Overlay
3	86454-00	Assy, User Interface SP, w/Trackball
4	86XXX-00	Assy, User Interface SP, without Trackball
7	85095-00	Assy, OLED Display Board (for User Interface)
8	32854-00	Assy, QWERTY Keyboard (for User Interface)
9	85026-00	Assy, Trackball Only (for User Interface)
10	85080-00	Assy, Main Board w/enclosure
11	85076-00	Assy, Scanner Deck w/Cables – w/o MTP Option
12	85118-00	Assy, Scanner Deck w/Cables – with MTP Option
13	85123-00	Assy, Bolster Plate, MTP Panel (w/o CW)

15	85025-00	Assy, Power Supply Module (complete)
16	85039-00	Assy, Hard Disk, 80/120GB
17	85136-00	Assy, DVD Drive (w/connector)
18	85086-00	Display arm, w/cables
19	85031-00	Z-PAK Battery Pack Assy (Option)

*xx::..... - 00 ENGLISH language overlay

..... - 03 GERMAN language overlay

21.1.2 Cables

Number	Part Number	Description
1	85029-00	Assy, Cable, Main Power, SmartCart
3	85044-00	Assy, Cable, Disk Drive Power, Main Bd J16 to Drives
4	85045-00	Assy, Cable, UI Power, Main Bd J2/J4 to UI
5	85078-00	Assy, Cable, USB, Main Bd. J29 to HD
5	33026-00	Assy, Cable, USB, Main Bd. J29 to Sony printer
7	32733-00	Assy, Cable, CAT-5, Main Bd. J23 to Pwr Module
8	32879-00	Assy, Cable, ATAPI (Parallel), Main Bd. J15 to DVD
9	33877-00	Assy, Cable/Adapter, USB->SATA/IDE, J29a to DVD
10	86117-00	Assy, Cable, DVD Drive Power
11	85104-00	Assy, Cable, Dongle (MTP)
12	85116-00	Assy, Cable, Accessory +12V Power (MTP)
13	85051-00	Assy, Cable, CEE Signals (Scanner Deck)

14	85135-00	Assy, Cable, CW Power Patch, SmartCart
15	33522-00	Assy, Cable, CW to ECG, Power & Control



21.1.3 SmartCart SP Miscellaneous Items

Number	Part Number	Description
1	32865-00	Caster, 5 Inch, Dual Wheel, Directional/Brake Lock (Front)
2	32867-00	Caster, 5 Inch, Dual Wheel, Full Swivel (Rear)
3	32870-00	Gas Spring, SmartCart SP

21.2 Scan Engine





21.2.1 Major FRU Assemblies & Miscellaneous

Item	Part #	Description
1	82001-xx*	Assy, Complete, Scan Engine (Advanced Hardware)
2	80044-00	Battery Pack (1 st -Gen, 4400 mAh version) 
3	80269-00	Battery Pack (2 nd -Gen, 5200 mAh version) 

*xx::..... - 00 512MB Internal Archive Storage (baseline)

..... - 20 2GB Internal Archive Storage (upgrade option)

21.2.2 Scan Engine Accessories

Item	Part #	Description
1	80056	Battery Charger, 2-Bay - (w/o AC power cable) 
2	31638	AC Power Cable (for Battery Charger) 120 VAC
3	31808	AC Power Cable (for Battery Charger) 220 VAC
4	Z316 (Sales #)	AC Power Adapter, AdvHdwe - (w/110 VAC Cable) 



5	Z317 (Sales #)	AC Power Adapter, AdvHdwe - (w/220 VAC Cable)
6	50001	Scan Engine Carrying Bag

21.2.3 Scan Engine Miscellaneous Items

Item	Part #	Description
1	80206	Stylus
2	31232	Feet, Rubber (3 used)
3	80068	Handle
4	31167	Cover, Trackball
5	80255-00	Rear Door Assembly (Zonare)
6	32666-00	256MB, USB Memory Stick
7	32669-00	2GB, USB Memory Stick

21.3 Scan Module



21.3.1 Major FRU Assemblies & Miscellaneous



Item	Part #	Description
1	82001M-xx*	Assy, Complete, Scan Engine (Advanced Hardware)







*xx::..... - 00 512MB Internal Archive Storage (baseline)

..... - 20 2GB Internal Archive Storage (upgrade option)

21.4 Transducers

21.4.1 Transducers (Complete Assemblies)

Item	Part #	Description	
<i>(Sales) : Service</i>			
1	(Z101) : 84001-00	C5-2 - Convex Array	
2	(Z102) : 84003-00	L10-5 - Linear Array	
3	(Z103) : 84002-00	EV9-4 – Endo Vaginal	
4	(Z104) : 84005	P4-1 - Phased Array	
5	(Z106) : 84007	L8-3 - Linear Array	
6	(Z108) : 84004-00	P4-1c - Phased Array	
7	(Z107) : 84008-00	L14-5sp - Linear Array	
8	(Z111) : 84009-00	C6-2 - Convex Array	
9	(Z109) : 85795-00	C9-3 - Convex Array	

10	(Z116-00) : 86000-00	A2CW – CW Doppler	
11	(Z118-00) : 86111-00	A5CW – CW Doppler	
12	(Z119-00) : 86333-00	C4-1 – Convex Array	
13	(Z114-00) : 86444-00	C9-4t – Specialty	
14	(Z121-00) : 85999-00	C8-3 _{3D} – 3D Imaging	
15	(Z110-00) : 85333-00	LV14-5w - WALA	
16	(Z117-00) : 86555-00	LV12-4V - Veterinary	tbd

21.4.2 Transducers Accessories

Item	Part #	Description
1	Z153	Biopsy Kit, 16 gauge
2	Z154	Biopsy Kit, 18 gauge
3	Z155	Biopsy Kit, 22 gauge

21.5 Peripherals

Item	Part #	Description
------	--------	-------------

1 (Z409-00) : 40005-00 SONY, UP-D897, USB (Digital) B/W Printer



2 (Z412-00) : 40006-00 OLYMPUS, P-11, USB (Digital) Color Printer



3 (Z415-00) : 40008-00 SONY, UP-D23MD, USB (Digital) Color Printer



4 (Z336-00) : 33064-00 2-Pedal Footswitch



5 85105-00 Audio Video Extension Device (AVED) Box



6 (Z345-00) : 85787-00 Audio Video Extension Device (AVED) w/Kit



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