



Preva Dental X-ray System



Installation and Service Manual

00-02-1577

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Introduction

The instructions contained in this manual must be read and followed when operating the Preva. Your Midmark Dental dealer will assist you in placing the Preva in operation.

Indications for Use

The Preva Dental X-ray is to be used as an extraoral source of X-ray in dental radiography.

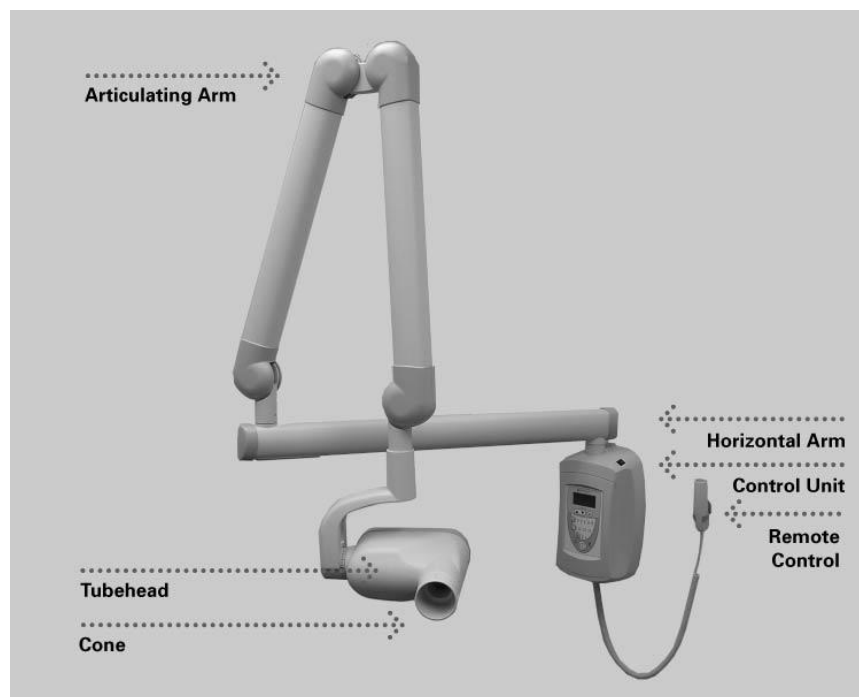
Contra-indications

None known

Product Description

The Preva Dental X-ray System is a state-of-the-art, high-frequency intra-oral X-ray machine. The Preva consists of five components, as shown in Figure 1: the Control Unit, the Tubehead, the Articulating Arm, the Horizontal Arm, the Cone, and the Remote Control option.

Figure 1
Component
Diagram



Control Unit

The Control Unit provides for the input power connection and control of the Tubehead and Operator Panel. It provides automatic line voltage compensation, kVp control, and exposure time control. The Control Unit consists of the mounting base and Operator Panel.

Tubehead

The Tubehead contains the X-ray tube, high voltage circuit, and Cone. The Tubehead is shipped already assembled to the Articulating Arm.



There is a small hole in the plastic handle covering the back of the Tubehead. Under no circumstances should this hole be blocked as it provides an air vent to allow the Tubehead oil to expand and contract as the unit is operated.

Articulating Arm	The Articulating Arm provides the articulation support for the Tubehead and the reach and coverage of the Tubehead to the patient. The Articulating Arm allows smooth movement for precise positioning and does not drift or vibrate when left in position.
Horizontal Arm	The Horizontal Arm helps provide the necessary reach for the Preva. The Horizontal Arm pivots smoothly around a shaft inserted in the top of the Control Unit. The Horizontal Arm contains an access cover to connect the cable from the Horizontal Arm to the Control Unit. The Horizontal Arm is available in four lengths, providing reaches of 56, 66, 76 or 82 inches [142, 167, 193 or 208 cm].
Modular Beam Limiting Device [BLD]	The Cone establishes the distance from the X-ray tube to the patient's skin. It provides positioning assistance and collimates the X-ray beam to within a defined circle at its end. The Preva is shipped with the standard 8 inch [20 cm] Cone ¹ attached to the Tubehead. A 12 inch [30 cm] Cone ² can be ordered as an option.
Remote Control	The remote control switch is used to make exposures in addition to or replacing the use of the exposure button.
Model Configurations	The Preva is available as either a wall-mounted or a mobile unit
Mobile Unit	An optional model, the mobile unit provides room to room mobility for dental radiography. See Appendix A for the installation instructions for the mobile unit.
Installation and Service	The Preva Dental X-ray System should only be installed and serviced by approved Midmark dealer personnel. Contact Midmark Corporation at 800-MIDMARK if you need assistance locating an approved dealer.

¹ Part Number 30-A2195

² Part Number 30-A2200

Cautions

When using lag screws as the method of attachment, it is imperative to consider the full scope of the task. Several factors must be considered for safe, permanent installations. Some of the key issues are:

- Lumber commonly used in construction projects can be different from location to location.
- The grade, age, position, and overall condition can vary greatly.
- The attachment stud may have additional, hidden loads.
- The location of the pilot hole with respect to the center of the stud will affect the load bearing ability.
- The size of the pilot hole required for the lag screw will be different based on the grade, age, and condition of the lumber.
- Never over-tighten the lag screw as this will weaken the mechanical connection.
- Lumber with splits or cracks should not be used for attachment.
- **Plywood, particle board, or similar construction materials, should not be used for attachment.**
- Consider lumber dryness or moisture when attaching to exterior framing studs.
- Midmark mechanical designs will exert up to 920 pounds (418 kilograms) of loading on the supporting structure.
- Midmark provides fasteners for average installations. Based on specific installation conditions, it may be necessary to choose an alternate fastener or fastening methods.
- If the surface of the Installation Guide falls below the surface of the wall, a correspondingly longer fastener must be chosen.
- Seek the advice of a professional structural engineer to clarify any issues before the installation.
- Inspect the attachment method 30 days after the installation and, every 6 months thereafter.
- Lag screws are not intended to be used as an attachment method for metal supports such as those found in center island pass-through cabinets. Midmark provides machine screws, large flat washers and nylock nuts to use when fastening the system to metal supports.

Safe Installation and Operation

The equipment must be installed and operated only in accordance with the safety procedures and operating instructions in this manual and in the Installation Guide and only for the purposes and applications for which it was designed. Modifications or additions to the equipment may be made only by Midmark Corporation or by third parties expressly authorized by Midmark Corporation. Such changes must comply with the rules and legal requirements of the authority having jurisdiction. It is the responsibility of the owner to ensure that existing legal regulations regarding installation of the equipment with respect to the building are observed.

X-Ray Protection

X-ray equipment can cause injury if used improperly.

Do not operate the device in the significant zone of occupancy. The operator of an intraoral dental X-ray device must remain 2 meters (6.6 feet) away from the focal spot and out of the path of the X-ray beam.

The Preva system provides a high degree of protection from unnecessary X-ray radiation. However, no practical design can provide complete protection from radiation or completely prevent operators from exposing themselves or others to unnecessary radiation.

Responsibilities of the Installer and Service Engineer

Verification of machine performance after installation

See the section System Function Checklist.

Verification of machine performance after maintenance or repair

See the section System Function Checklist.

Reach and Coverage

Horizontal Arm Lengths

The reach of the system is measured from the tip of the Cone with the arm fully extended and the Cone pointing back toward the pivot of the wall plate. This measurement method accommodates the normal positioning of the Tubehead to the patient. A patient can, therefore, be positioned without difficulty with the table located within a radius outward from the pivot point to the dimensions shown in the diagrams.

The Preva Horizontal Arm is available in four lengths. Each length gives the system a different reach.

Part number P7015-P with a 30-A2074 Horizontal Arm has a reach of 56 inches.

P/N P7016-P with a 30-A2073 Horizontal Arm has a reach of 66 inches.

P/N P7017-P with a 30-A2071 Horizontal Arm has a reach of 76 inches.

P/N P7018-P with a 30-A2164 Horizontal Arm has a reach of 82 inches.

The diagrams show P/N P7018-P with an 82-inch reach.

For P/N P7017-P with a 76-inch reach, reduce the dimensions by 8 inches.

For P/N P7016-P with a 66-inch reach, reduce the dimensions by 18 inches.

For P/N P7015-P, reduce the dimensions by 28 inches.

Optional 12 Inch [30 cm] Cone

The 82-inch reach for Catalog P7018-P assumes the use of the 8 inch [20 cm] Cone that is supplied with the system. If the optional 12 inch [30 cm] Cone (30-A2200) is used, the reach is reduced by 4 inches.

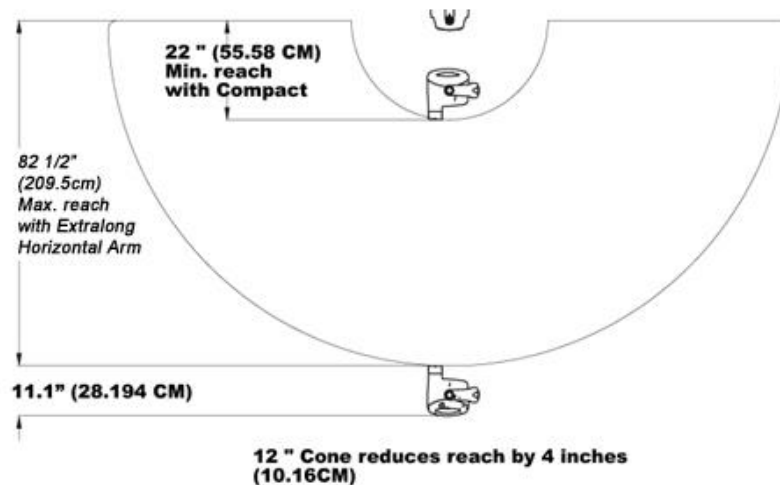


Figure 2 Reach and Coverage Diagram

Figure 3 Cabinet Mounting Dimensions

Note 1	P7015-P 24 5/8" (62.5 cm)
	P7016-P 34 5/8" (88 cm)
	P7017-P 44 5/8" (114 cm)
	P7018-P 50 5/8 (128.5 cm)
	(add 5" (12.7 cm) for Two Stud mount)

82" reach not recommended for cabinet mount

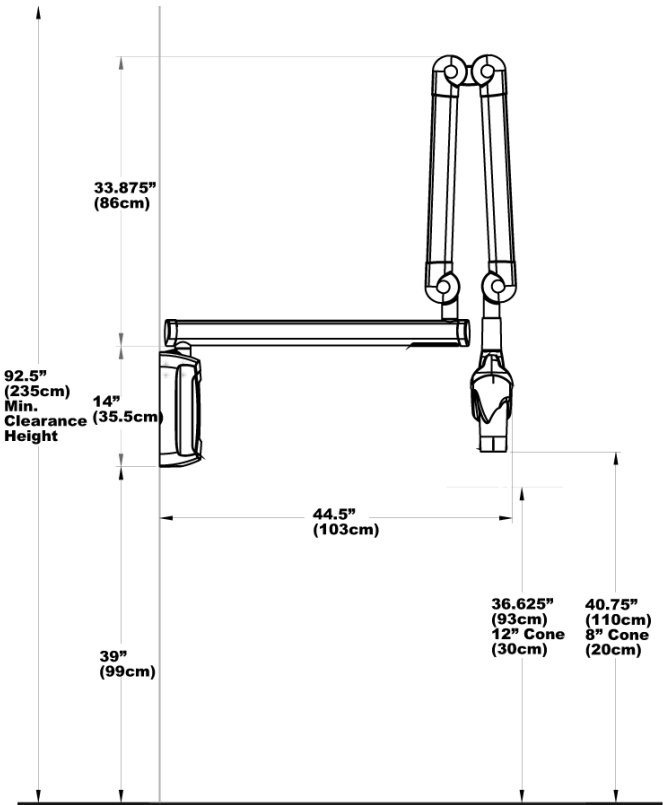


Figure 4
Retracted Wall
Mount

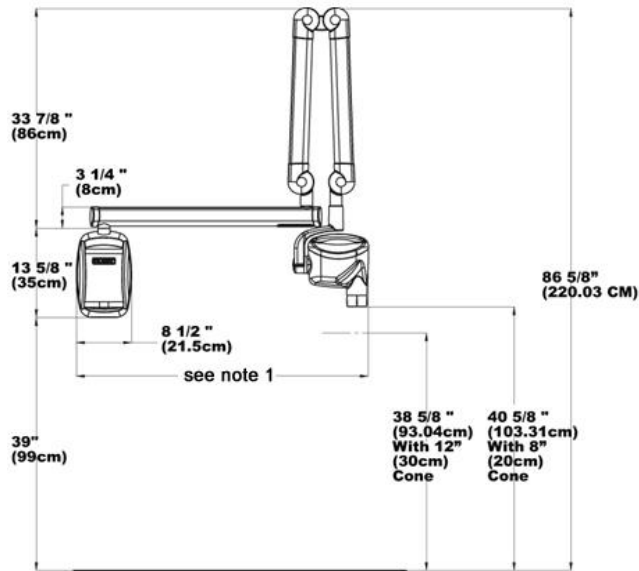
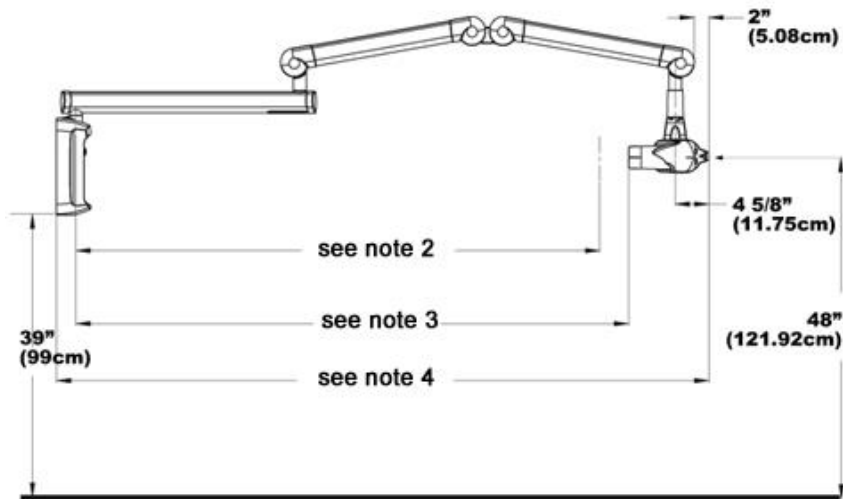


Figure 5 Extended
Position Wall or
Cabinet Mount

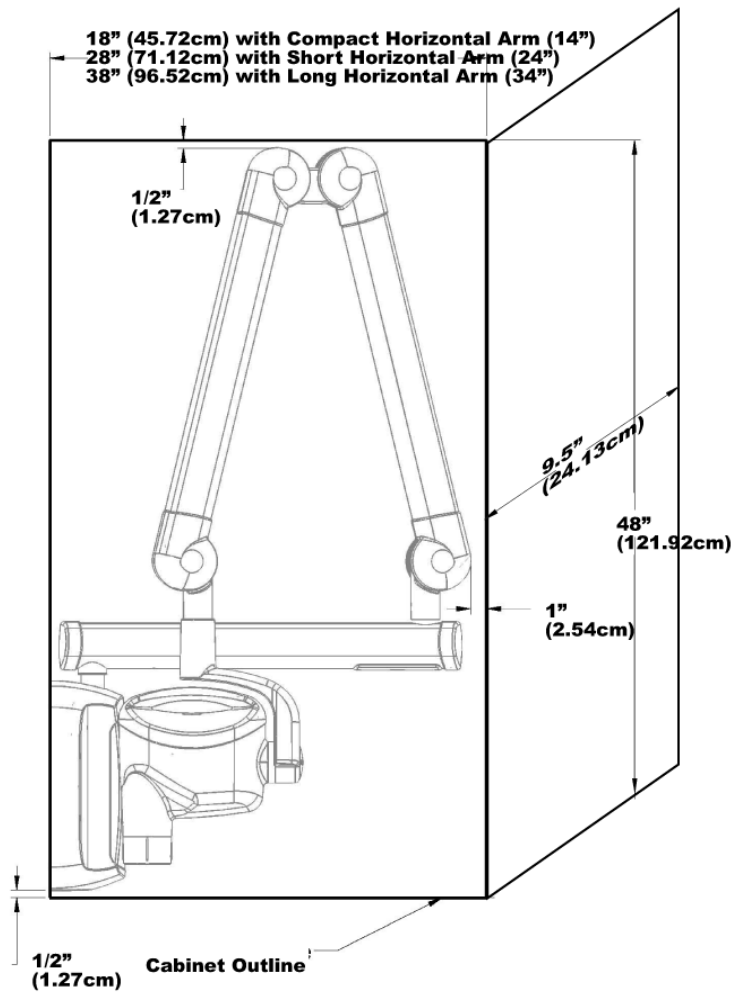


With 12" (30cm) cone	
Note 2	P7015-P 52 1/2" (133 cm)
	P7016-P 62 1/2" (159 cm)
	P7017-P 72 1/2" (184 cm)
	P7018- 78 1/2" (199 cm)

With 8" (20cm) cone	
Note 3	P7015-P 56 1/2" (143.5 cm)
	P7016-P 66 1/2" (169 cm)
	P7017-P 76 1/2" (194.5 cm)
	P7018-P 82 1/2" (209.5 cm)

To handle	
Note 4	P7015-P 70 3/8" (178.5 cm)
	P7016-P 80 3/8" (204 cm)
	P7017-P 90 3/8" (229.5 cm)
	P7018-P 96 3/8" (244.5 cm)
(add 1" (2.5 cm) for Two Stud mount)	

Figure 6
Retracted
Position for a
Cabinet Mount



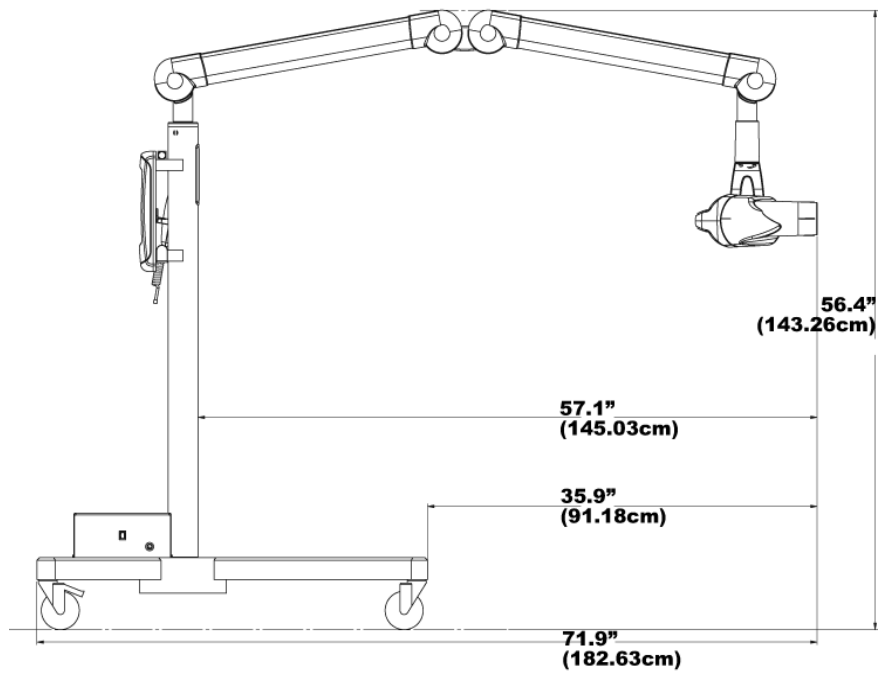
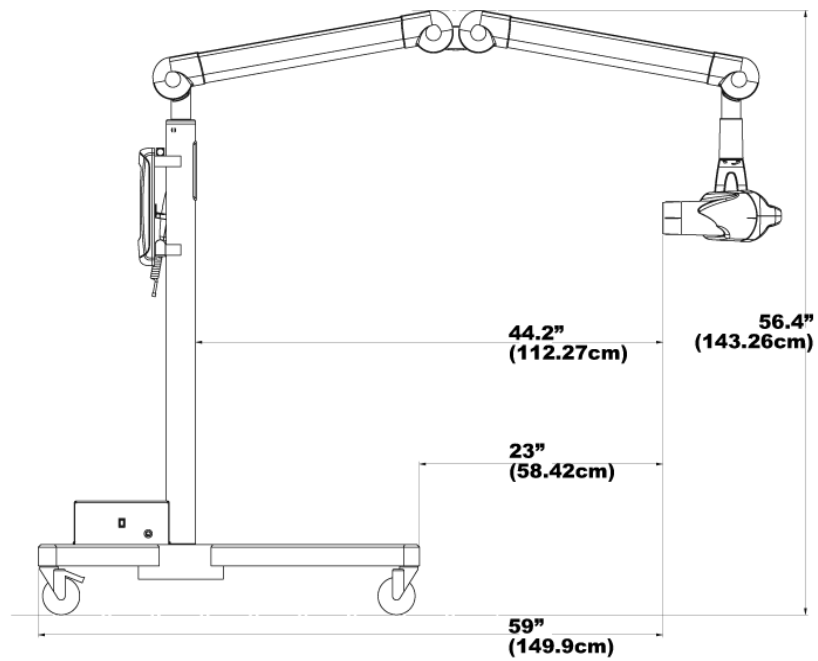


Figure 7
Mobile Unit
Extended

Environmental Factors

Use	The Preva Dental X-ray System is intended for indoor use for normal dental applications at temperatures in the range +10 °C to +35 °C (+50 °F to +95 °F) and at a maximum altitude of 12,000 ft (3657 m). Do not allow humidity to cause condensation to form on the unit. See the Specifications section on page 120 for complete temperature, pressure, and altitude parameters for using, transporting, and storing the Preva system.
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Support Requirements

The Preva Dental X-ray System is designed to mount on a single wood 2x4-inch drywall stud or equivalent wall support. It can also be mounted on concrete or other similar wall construction. **Mounting to a plywood or particle board wall is not acceptable.** Verifying the wall support capability and the selection of the proper mounting hardware is the responsibility of the installer.

Note that a two-stud wall plate assembly (30-A2042) is included to mount on two wooden studs. A metal stud mounting kit (30-A2043) is available.

The wall support and mounting hardware must withstand a 45.4 kg (100 lb.) shear load and a 227 kg (500 lb.) withdrawal force at each of the mounting bolts. The wall fabrication and attachments to the building structure must be capable of withstanding a load moment of 127 kg-m (920 lb-ft).

Electrical Requirements

Mains Power Supply	The Preva Dental X-ray System requires 3-wire single phase AC power mains that contain line conductor, neutral conductor, and protective earth conductor. It is recommended that the unit be installed with a dedicated electrical line connected to a breaker with a minimum 15 amp rating. The wiring must provide for a permanently grounded power line configuration.
Line Cord Use	The installer must determine the suitability of installing the Preva with a line cord. If a line cord is used, the installer must ensure that the unit is properly grounded and has the required line rating.
Line Voltage	AC 100 V to 250 V, 50 Hz or 60 Hz (See complete specifications in section Specifications)
Fuse Rating	5 A, 250 V, UL Recognized (See complete specifications in section Specifications)
Max Line Resistance	For normal function of the Preva Dental X-ray System the resistance of the power line should not exceed 0.4 Ω at nominal line voltage.
Interlock	<div><div>NOTICE</div><div>It is the owner's responsibility to provide any visual interlock indicators required by local ordinances.</div></div>

Compliance with Applicable Standards

Radiation Protection

The certified components of the Preva Dental X-ray System comply with Radiation Performance Standards 21 CFR, Subchapter J, at the time of manufacture.

The certified components of the Preva Dental X-ray System comply with IEC 60601-1-3 Radiation protection/X-ray equipment.

UL 2601-1 File Number: E181750

Classified by Underwriters Laboratories Inc. with respect to electrical shock, fire and mechanical hazards only in accordance with UL 2601-1, and CAN/CSA C22.2 NO, 601.1-M90, and to the following particular standards, IEC60601-2-7, IEC60601-2-28.

EMI/EMC

IEC60601-1-2

Certified Components

Component	Reference Number
Tubehead	30-A1027
Control Unit. Preva	30-A0010
Control Unit. Preva Mobile	30-A0013
Modular BLD, 20 cm Lg., 60 mm Cone, White	30-A2196
Modular BLD, 20 cm Lg., 30x40 mm Cone, White	30-A2198
Modular BLD, 20 cm Lg., 20x30 mm Cone, White	30-A2199
Modular BLD, 20 cm Lg., 35x45 mm Cone, Gray	30-A2221
Modular BLD, 20 cm Lg., 35x45 mm Cone, White	30-A2222
Modular BLD, 30 cm Lg., 35x45 mm Cone, Gray	30-A2223
Modular BLD, 30 cm Lg., 35x45 mm Cone, White	30-A2224
Modular BLD, 20 cm Lg., 60 mm Cone, Gray	30-A2228
Modular BLD, Base, Gray	30-A2205
Modular BLD, Spacer, Gray	30-A2206
Modular BLD, Spacer, White	30-A2208

Note: longer cones and cones with rectangular apertures are available. Contact Midmark Service-Support (see back cover).

Authorized Representatives

North America

Midmark Corporation
1001 Asbury Dr.
Buffalo Grove, Illinois 60089 U.S.A.
Phone: 800-MIDMARK
Fax: 847-415-9801

Typical X-Ray Scatter Dose Rates

For room planning purposes, these illustrations show X-ray scatter dose rates that are typical of the VetPro system. This data was developed using a common, commercially available human head phantom in the normal patient position to produce the required X-ray scatter. A Rad-Cal model 160cc ion-chamber (μRem) meter was used to integrate the doses. Measurements were taken at distances of 1 and 2 meters from the X-ray target, 50 in. (127 cm) from the horizontal plane of the floor.

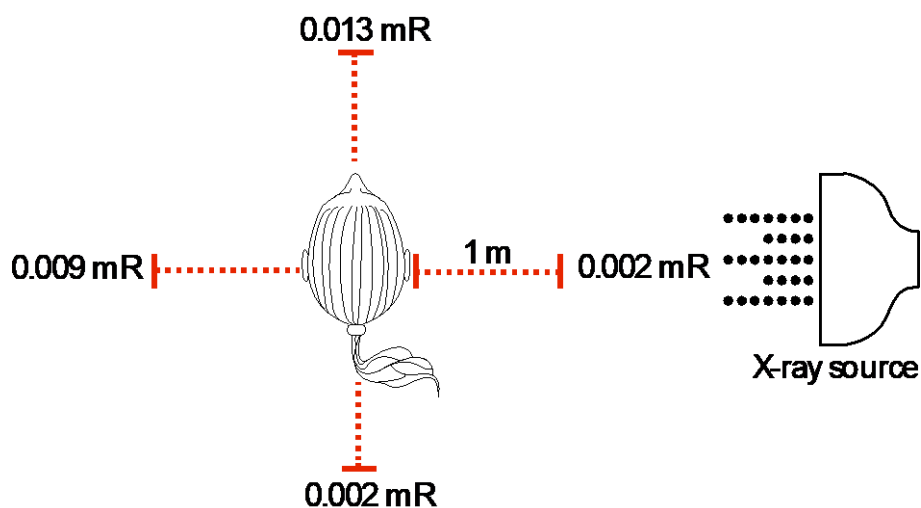


Figure 8: Exposures: molar protocol; 70 kVp, 6 mA, 1 sec.; measurements at 1 meter (39 in.) from the X-ray target.

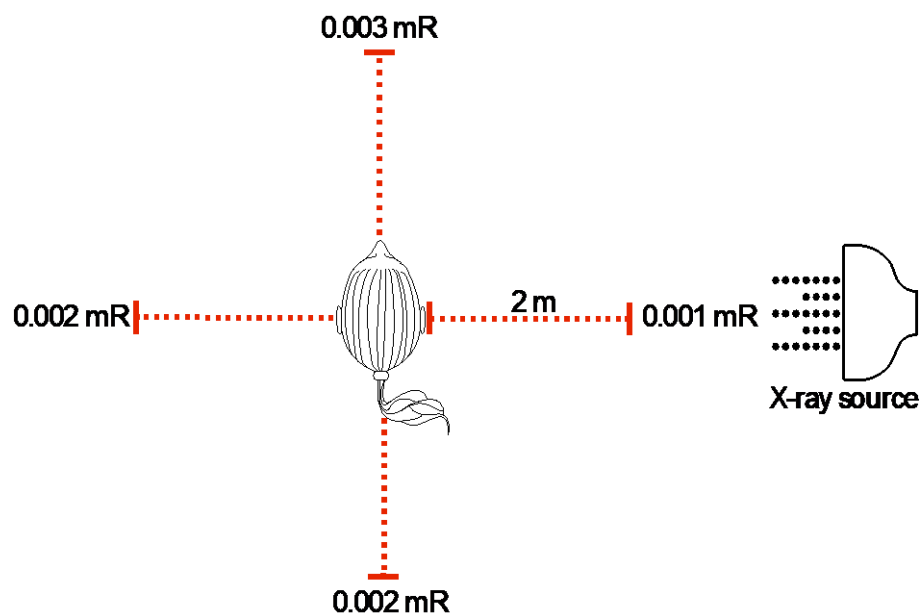


Figure 9: Exposures: molar protocol; 70 kVp, 6 mA, 1 sec.; measurements at 2 meters (79 in.) from the X-ray target.

Safety

Radiation Safety

- Allow only qualified and authorized personnel, observing all laws and regulations concerning radiation protection, to operate this equipment.
- The operator must remain at all times a safe distance from the focal spot and the X-ray beam.
- Utilize all of the equipment's radiation safety features.
- To protect both the patient and the operator from X-ray radiation, employ all available radiation protection devices, accessories, and procedures.

Electrical Safety



To avoid electric shock, connect this equipment only to supply mains with protective earth.

- Because the design of the Preva power supply circuit may momentarily draw high current
- Do not use this device with wall outlets having GFCIs (Ground Fault Circuit Interrupters). Outlets with GFCI are designed to trip when they sense a small amount of current passing from the line to earth ground. Outlets with GFCI can compromise the operation of the intra-oral X-ray device and the GFCI circuit itself.
- Allow only qualified and authorized service personnel to remove equipment covers.
- All maintenance requiring the removal of protective covers must be executed by service personnel only when patients are not present.
- Replace sensors only when a patient is not in contact with the machine or the operator.



Do not touch the USB connector on the articulated arm.

- This equipment must be used only in rooms or areas complying with all applicable laws and recommendations concerning electrical safety in rooms used for medical purposes, e.g., IEC³, NEC⁴, or VDE⁵ standards concerning provisions of an additional protective earth (ground) terminal for power supply connection.
- Before cleaning or disinfecting, this equipment must be disconnected from the main electrical supply.
- The Preva Dental X-ray System is ordinary type medical equipment without protection against ingress of liquids. To protect against short-circuit and corrosion, no water or any other liquid should be allowed to leak inside the equipment.

³ International Electrotechnical Commission

⁴ National Electrical Code

⁵ Verband Deutscher Elektrotechniker (Association of German Electrical Engineers)

Explosion
Safety

This equipment must not be used in the presence of flammable or potentially explosive gases or vapors, which could ignite, causing personal injury and/or damage to the equipment. If such disinfectants are used, the vapor must be allowed to disperse before using the equipment.

Device Disposal

To ensure compliant and safe disposal of waste electrical and electronic equipment, contact the Midmark dealer or local regulatory or public health authorities.



- Mobile RF communications equipment can affect the performance of medical electrical equipment. Midmark advises against using the Preva system adjacent to other devices. If it must be used near other devices, carefully adjust their configuration to ensure that electromagnetic interference (EMI) does not degrade performance. Test both devices for normal operation.
- Use of accessories, transducers, or cables other than those provided by or specified by Midmark can result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment. This can result in improper operation.
- Use portable RF communications equipment (including peripherals such as antenna cables and external antennas, including cables specified by Midmark) no closer than 30 cm (12 in.) to any part of the Preva system. Otherwise, performance of the equipment may be degraded.

Key to Symbols Used



Type B: Protection against electric shock (IEC 60601.1-1)

NOTICE

Information useful to an operator, not related to safety.

CAUTION

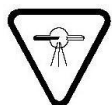
A hazardous situation which, if not avoided, could result in minor or moderate injury.

WARNING

A hazardous situation which, if not avoided, could result in serious injury or death.



Consult written instructions in User's Manual.



ATTENTION RAYONS-X:
OPERATION SEULEMENT PAR DU PERSONNEL AUTORISE. VOIR MANUEL
DE L'OPERATEUR.



WARNING X-RAY
THIS X-RAY UNIT MAY BE DANGEROUS TO PATIENT AND OPERATOR
UNLESS SAFE EXPOSURE FACTORS AND OPERATING INSTRUCTIONS
ARE OBSERVED.



X-RAY EMISSION

L

Mains HOT WIRE

N

Mains NEUTRAL WIRE



Earth Ground

Technical Support



Manufacturer

Midmark
1001 Asbury Drive
Buffalo Grove, Illinois 60089
USA
(847) 415-9800
Fax: (847) 415-9801
www.midmark.com



Technical Library

<https://technicallibrary.midmark.com>

Technical Support

1-800 MIDMARK (1-800-643-6275)
www.midmark.com/service-support
imagingtechsupport@midmark.com

Installation Options

Mounting Configurations

Mounting Template

This section gives instructions for installing the Preva Dental X-ray System in three mounting configurations. Use the mounting template, shown in *Figure 10*, to guide single stud installations. Reverse the template for dual-stud installations.

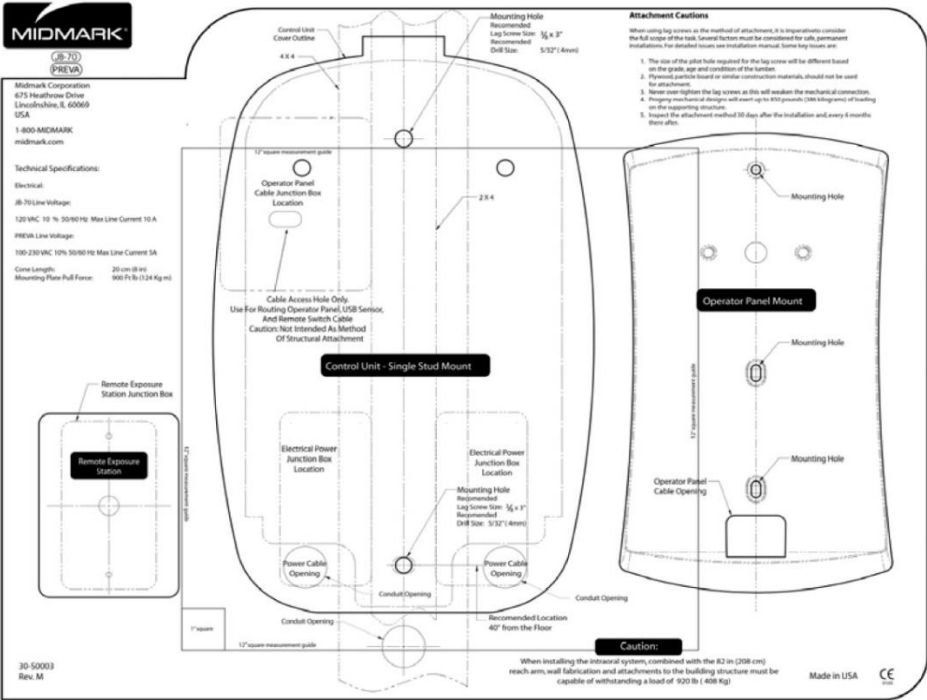


Figure 10
Mounting
Template



1. When installing the intraoral system, combined with the 208 cm (82 in.) reach arm, wall fabrication and attachments to the building structure must be capable of withstanding a load moment of 127 kg-m (920 lb-ft).
2. Do not use lag screws as an attachment method for metal supports such as those found in center island pass-through cabinets. Midmark provides machine screws, large flat washers, and nylock nuts for fastening the system to metal supports.

Single Wood
Stud Wall, Solid
Wall, or
Reinforced
Wood Cabinet

The Control Unit should be located at a height of 39 inches (99 cm) from the floor to the bottom of the control, mounted on the wood stud, as shown in *Figure 11*. The large range of travel of the Articulating Arm provides some flexibility in the vertical position. Two mounting holes are provided. Refer to the supplied mounting template, shown in *Figure 10*, for specific locations.

In order to mount to a solid, masonry type wall, the same mounting holes and mounting template as the single wood wall stud are used. The installer must supply appropriate fasteners.

The power supply 2x4 junction box should be mounted to the left of the mounting stud at the appropriate height, as indicated in the mounting template.

Note: A 4x4 junction box will not be covered by the Control Unit. Refer to the supplied mounting template for specific location.

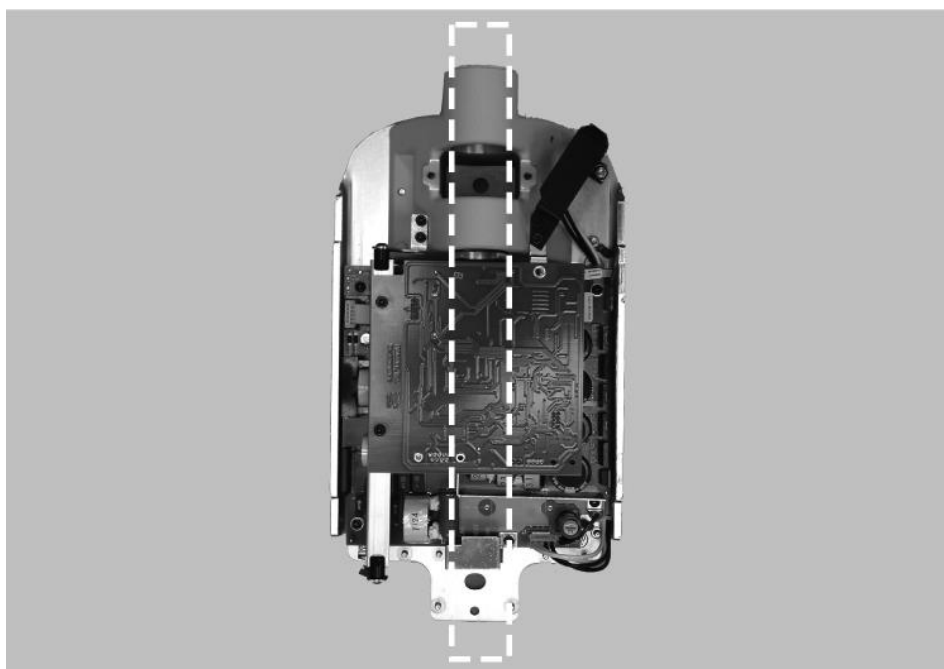


Figure 11
Wood Wall Stud
Mount



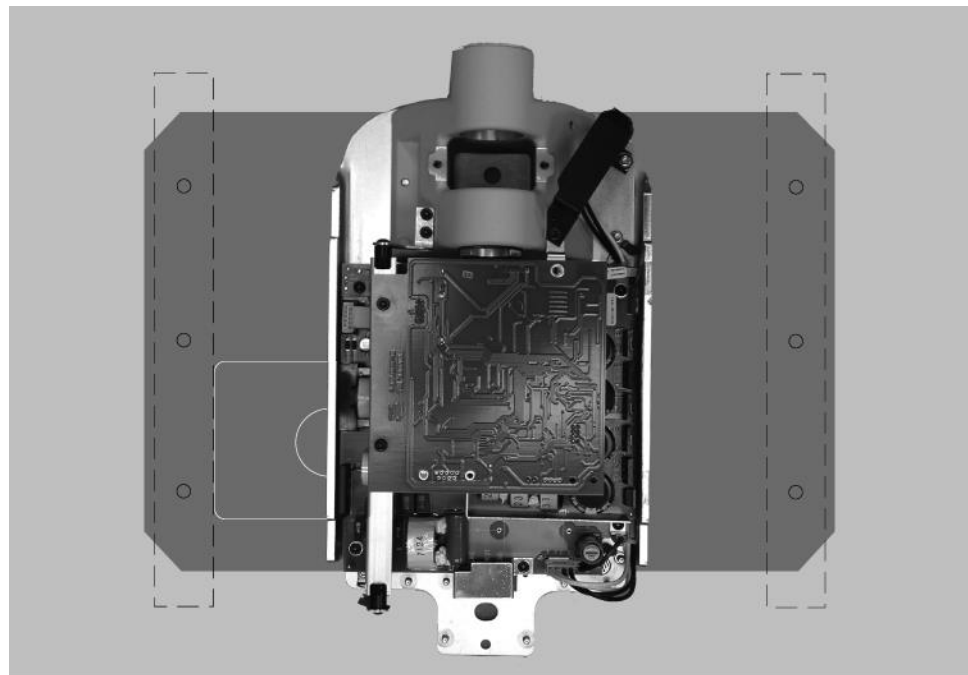
Do not attach the 208 cm (82 in.) reach system to a wall in the single stud configuration. Contact Midmark Technical Support for guidance.

Dual Wood
Stud Wall

When installing the Preva Dental X-ray System on two 16-inch [40 cm] centered wood studs, the Control Unit is mounted to a wall plate (Two Stud Mounting Kit 30-A2042), which mounts to the wood studs, as shown in *Figure 12*. Fasteners are provided with the wall plate.

In mounting configurations using the dual stud wall plate, there are several holes available for incoming line power. This is to provide for various locations of existing power boxes when installing as a replacement unit. Refer to the reverse side of the mounting template, *Figure 10*, for hole locations.

Figure 12
Dual Wood Stud
Mount

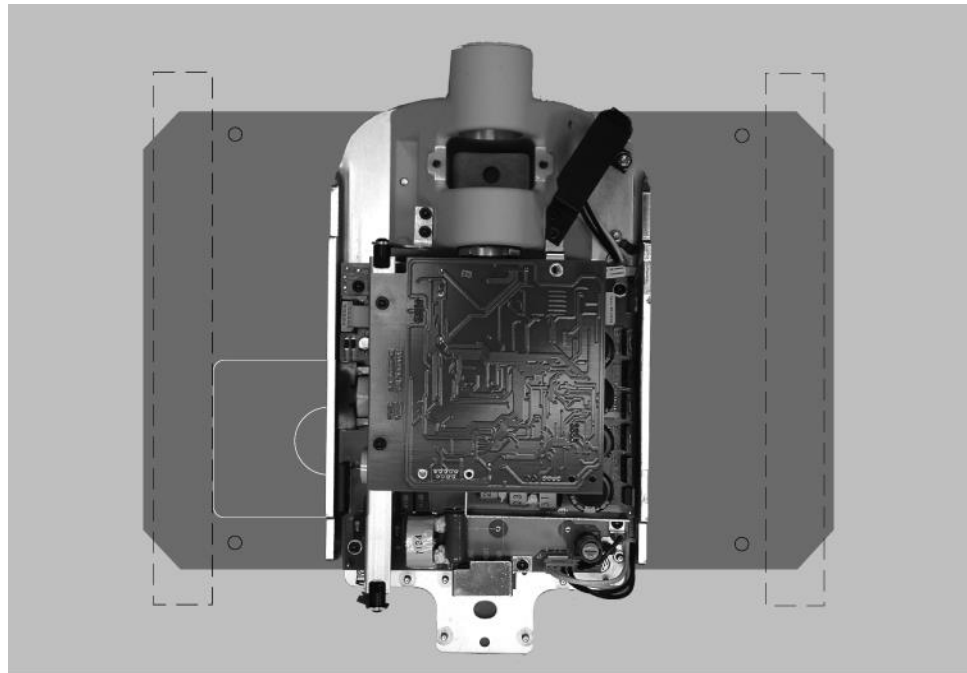


Metal Stud Wall

When installing the Preva Dental X-ray System on a metal stud wall, the Control Unit is mounted to a wall plate (Two Stud Mounting Kit 30-A2042) and uses an additional support plate (Metal Stud Support Plate Kit 30-A2043, purchased as an option) positioned on the back end of the wall. See *Figure 13*. Fasteners are provided with the wall plate and support plate. The wall fabrication and attachments to the building structure must be capable of withstanding a load moment of 118 m-kG (850 lb-ft). If the wall on which the Preva is to be installed does not meet this requirement, it must be reinforced.

In mounting configurations using the dual stud wall plate, there are several holes available for incoming line power. This is to provide for various locations of existing power boxes when installing as a replacement unit. Refer to the mounting template in *Figure 10* for hole locations.

Figure 13
Metal Stud Mount



**Installing the
4x4 Mount**

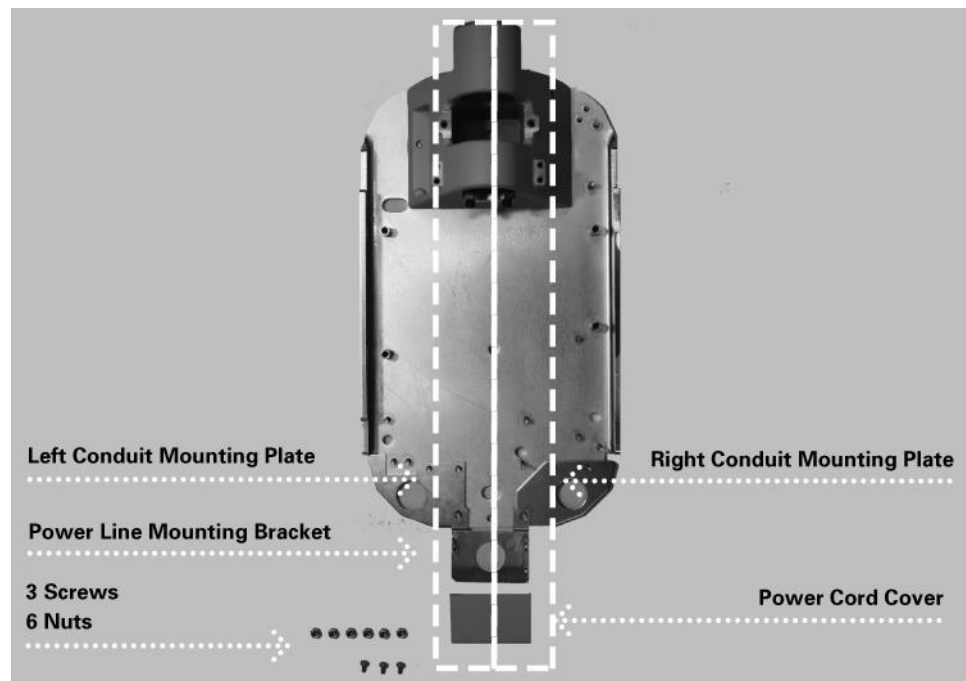
The 4x4 Mount kit (30-A2099), shown in *Figure 14*, contains the items below:

- Power line bracket
- Power cord cover
- Left conduit mounting plate
- Right conduit mounting plate
- 3 Phillips screws
- 6 nuts

Instructions

1. Using the three Phillips screws, secure the power line bracket to the power line cord cover.
2. Place the right and left conduit mounting plates on the control.
3. Place the assembled power line bracket and cord cover on the two bottom-most threaded studs.

Figure 14
4x4 Mount
Cabinet Layout



Operator Panel Locations

	The Operator Panel for the Preva Dental X-ray System can be installed on the Control Unit or mounted remotely on a wall.
On Control Unit	The Operator Panel snaps on to the front of the Control Unit. Installation of the Operator Panel on the Control Unit may require the purchase and use of the coil-cord hand switch option, 30-A2040.
Remote Operator Panel	The Operator Panel is mounted on the wall remote from the Control Unit. If the Operator Panel is mounted separate from the Control Unit, a supplied cable must be run from the Control Panel to the Operator Panel. Where local codes require, a separate 2x4 junction box should be mounted to the left of the mounting stud above the power supply box. Refer to the supplied mounting template for specific location.
Wall Mounting Above a Countertop	When mounting the control unit above a horizontal surface such as a countertop, allow sufficient distance between it and the bottom of the control unit to allow the product label to be read.



Figure 15
Product
Label

Installation Procedures

Preparing to Install the Preva

Check Pre-installation Requirements

Prior to beginning the installation, be sure that all pre-installation requirements have been completed. This includes confirming that the wall support requirements are adequate for mounting the unit and that the electrical power requirements and wire locations are proper.

Note: Midmark recommends that the Preva Dental X-ray System be connected to dedicated wiring and permanently grounded. The installer must determine the suitability of using a line cord at the time of installation, ensuring proper grounding technique.

Gather Tools

Items needed for all types of mounts:

- Stud finder
- Bubble level (torpedo level)
- Masking or other tape for placing the mounting template on the wall
- Awl
- Drill driver and drill bits appropriate to type of wall mounting
- Metric hex key set
- English (inch) hex key set
- Screwdrivers (flat-blade and Phillips)
- Torque wrench, 0-5.5 kg-m (0-40 lb-ft) or equivalent
- Sockets and ratchet driver appropriate to type of wall mounting
- Fluke model 73 DVM equivalent or better
- Small test clips (such as Pomona Electronics Minigrabber Test Clip Model 6248 or Radio Shack Mini-Hook Adapters catalog # 270-334)

Items needed only for the metal stud wall mount:

- 1-inch hole saw
- Dry wall saw
- ¼-inch diameter, 12-inch long drill bit
- Two 4×4 wood studs
- Drywall screws

Installation Time

The Preva Dental X-ray System has been designed to be installed by one person in less than one hour, assuming that all pre-installation requirements have been met.

Open the Shipping Carton

The Preva Dental X-ray System is shipped in a convenient two-level carton, as shown in *Figure 16*. The first level contains the items needed for the first part of the installation, including the Control Unit, Operator Panel, Horizontal Arm, mounting template, documentation, cables, and packets containing the mounting hardware, brake assembly plastic covers, and additional hardware. The Articulating Arm and Tubehead Assembly are in the second level of the shipping carton, where they can remain until installation.

Figure 16 Two-level Carton



Packing List

Part Number	Description	Quantity
30-A1028	Articulating Arm and Tubehead Assembly	1
30-A1025	Control Unit Assembly	1
30-A2076	Operator Panel	1
30-P0029	Operator Panel Mounting Cradle	1
30-A2046	Preva Mounting Hardware Kit	1
30-A2156	Preva Plastic Covers / Brake Kit	1
30-A2077	Two Stud Mount Assembly (Optional)	1
30-A2040	Hand switch Assembly (Optional)	1
E1-13052	Line Cord, 16/3 6' Wide	1
30-A2195	Modular BLD, 70 mm Cone	1
30-A2221	Modular BLD, 35 x 45 Cone	1
E1-13004	Cable, 8 Cond. 0.5 ft.	1
E1-13003	Cable, 8 Cond. 25 ft.	1
30-A2218	Preva Documentation Kit	1

Note: Shipment Contains One of the Following Extension Arms Per Order

30-A2071	Extension Arm, Long	1
30-A2073	Extension Arm, Short	1
30-A2074	Extension Arm, Compact	1
30-A2164	Extension Arm, Extra Long	1

Options

E1-13049	8 Cond. RJ45 to RJ45 50 ft.
30-08101	Doorbell Switch
30-A2044	Lighted Doorbell Switch
30-A2198	8-inch Rectangular Cone
22-11466	8mm Adjustment Wrench
22-11467	Fluorescent Screen
30-A2099	4x4 Mount Kit

Single Stud Installation with the “Installation Guide” (30-P0076).

Mark and Drill Control Unit Mounting Holes

Introduction

The Installation Guide is an aid for positively locating the center of 2x4 wooden studs. The Installation Guide is a necessary part of the installation and must be used whenever single stud installations are performed. It is equipped with side tabs which can be removed if its placement is obstructed by an electrical box. During installations that include attachment to a 4x4 wooden stud, all of the tabs on one side of the guide can be removed to facilitate placement and attachment.



WARNING

- Do not attach the system with the 208 cm (82 in.) reach to a wall in the single stud configuration. Contact Midmark Technical Support for guidance.
- Use the provided machine screws, large flat washers, and nylock nuts to fasten the system to metal supports. Do not use lag screws.

1. Locate the wooden stud.



2. Make a small opening in the wall to positively identify the position of the wooden stud.



3. Draw an outline of the installation guide on the wall, ensuring that the vertical height matches the requirements set forth on the "Wall Mount Template" (30-S0003). Open the wall so that the installation guide will rest directly on the wooden stud.



4. Place the installation guide on the wooden stud. If the surface of the Installation Guide falls below the surface wall, a correspondingly longer fastener must be chosen.



5. Drill two 5/32 inch diameter holes using the installation guide as a drill template.



WARNING

To avoid drilling into electrical wiring behind the drywall, drill only through the installation guide.

6. Attach the wall mounted control, leaving the installation guide in place.



Remove Control Unit Front Cover

1. Open the shipping carton and locate the Control Unit in the first level of the carton.
2. Remove the Phillips screw from the front cover of the Control Unit.
3. Carefully remove the front cover.
4. Place the front cover and the screw in a safe location for later reassembly.

Mount and Level the Control Unit

1. Select the 3/8" x 3" long lag screws [30-H0006] and washers [30-H0008].
2. Note: For concrete walls, the installer must supply the appropriate mounting bolts.
3. Put a lag screw and washer through the upper mounting hole of the Control Unit.
4. Place the Control Unit on the wall and loosely tighten the upper mounting bolt.
5. Put the remaining lag screw and washer through the lower mounting hole of the Control Unit and loosely tighten. Be sure that the power wire extends through the opening at the bottom of the Control Unit.
6. Place a level on the Control Unit bearing parallel to the wall, as shown in *Figure 17*. Level the Control Unit.
7. Tighten the upper and lower lag screws to 14–18 lb-ft (2.0 to 2.5 m-kgs).



Do not over-tighten the lag screws. Over-tightening them will damage the wooden stud and reduce the holding force.

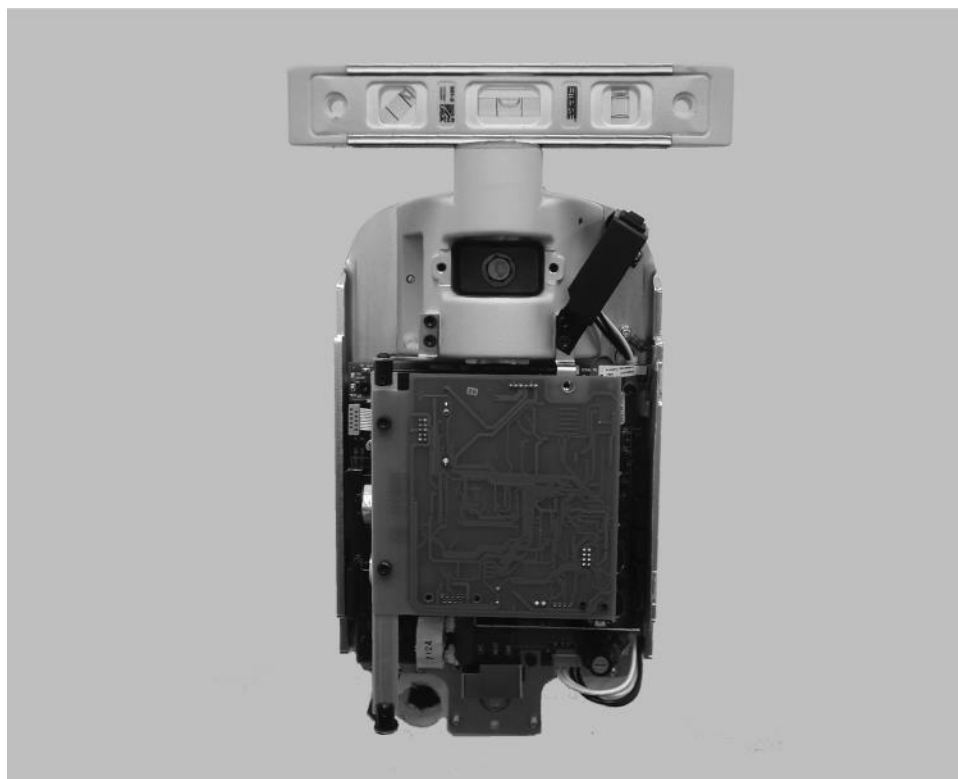


Figure 17
Leveling the
Control Unit

8. Drill a hole for a #12 wood screw below the lower lag screw, as shown in *Figure 18*. Install and tighten the wood screw to prevent the unit from shifting.

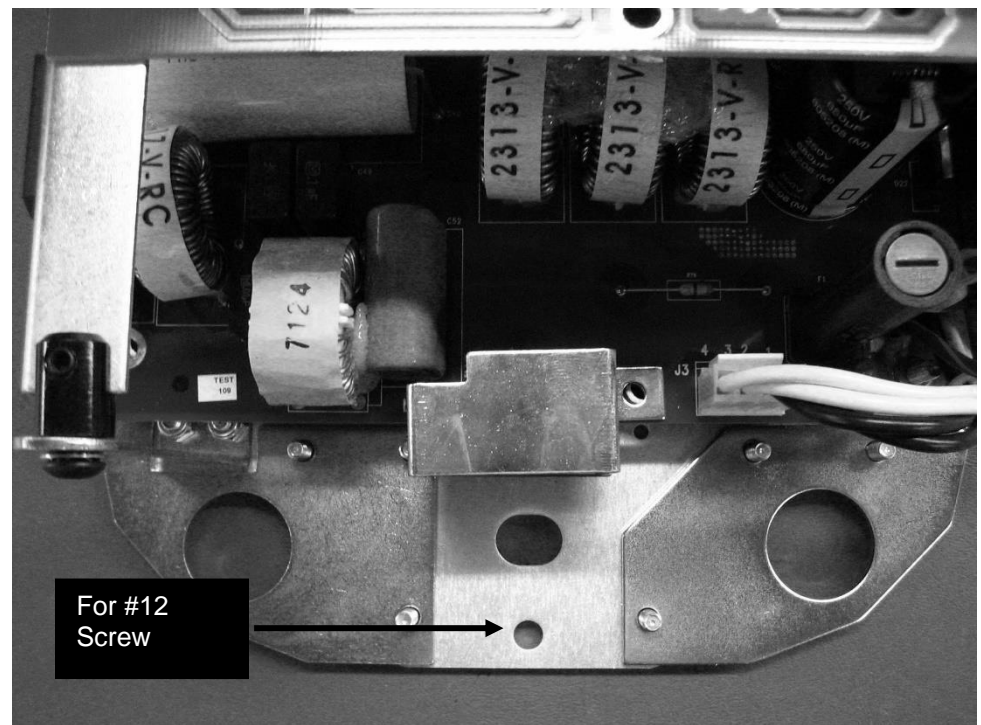


Figure 18

Installing the Control Unit on a Dual Wood Stud Wall

Mark and Drill Wall Plate Mounting Holes

The mounting template [30-S0003] is a guide for locating where to drill the holes used to mount the wall plate to the wall. Carefully placing the mounting template for two stud mount installations on the wall will help ensure correct installation of the mounting plate and, hence, the Control Unit.

1. Using a stud finder, locate the center of the studs on which the wall plate will be mounted.
2. Place the mounting template for the two stud mount on the wall with the lower mounting holes 102 cm (40 in.) above the floor.
3. Place a level parallel to the vertical lines on the mounting template and adjust the mounting template until it is plumb.
4. Tape the mounting template to the wall.
5. Using an awl or other sharp object, punch through the mounting template to mark the location of the mounting holes.
6. Drill 5/32" pilot holes (for common pine studs) at the marked locations.
7. Remove the mounting template from the wall and save for future use.

Install the Wall Plate (30- A2042)

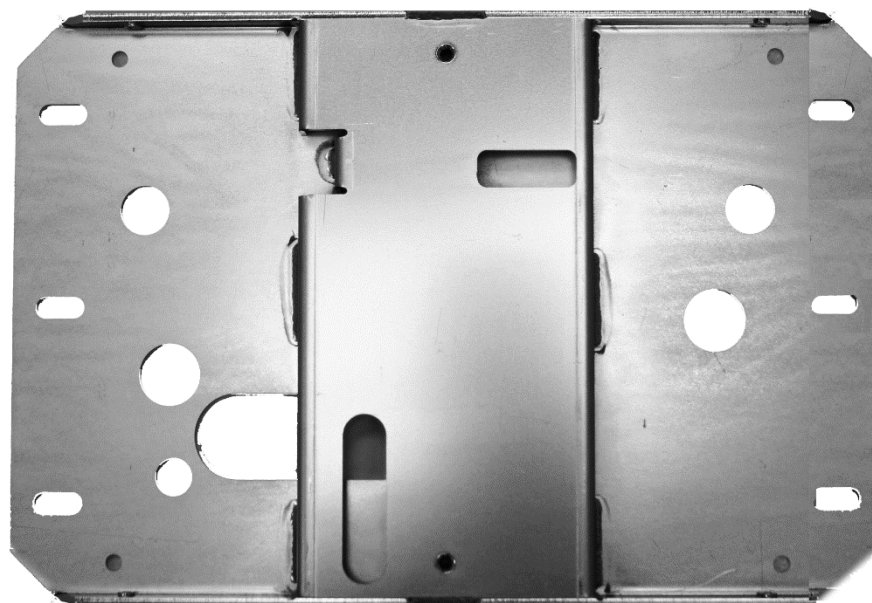
In the dual wood wall stud installation, the Control Unit is bolted to a wall plate that has been installed on two wood studs. The wall plate, shown in *Figure 19*, is packaged separately from the Preva.

1. Select the 3/8" x 3" long lag screws [30-H0006] and washers [30-H0008].
2. Put the lag screws and washers through the mounting holes on the wall plate and loosely tighten. Be sure that the power wire extends through the opening in the wall plate.
3. Level the wall plate.
8. Tighten the lag screws to 2.0-2.5 kg-m (14–18 lb-ft).



Do not over-tighten the lag screws. Over-tightening them will damage the wooden stud and reduce the holding force.

Figure 19
Mounting Plate
for Dual Stud Wall
Mounts



Remove Control
Unit Front
Cover

1. Open the shipping carton and locate the Control Unit in the first level of the carton.
2. Remove the Phillips screw from the front cover of the Control Unit.
3. Carefully remove the front cover.
4. Place the front cover and the screw in a safe location for later reassembly.

Mount the
Control Unit

1. Select the 5/16"-18 x 7/8" long socket cap screws [H1-15-S23088-01] and washers [H1-NA-S12000-01].
2. Put the one screw and washer through the upper mounting hole of the Control Unit.
3. Place the Control Unit on the wall and loosely tighten the upper screw.
4. Put the other screw and washer through the lower mounting hole of the Control Unit and loosely tighten. Be sure that the power wire extends through the opening at the bottom of the Control Unit.
5. Place a level on the Control Unit bearing parallel to the wall. Level the Control Unit.
6. Tighten the upper and lower screws.
7. After the Preva is installed, slide covers on the wall plate and fasten with the provided (8) screws [H1-64-S17050-01].

Installing the Control Unit on a Metal Stud Wall

Mark and Drill Wall Plate and Support Plate Mounting Holes

The mounting template [30-S0003] is a guide for locating where to drill the holes used to mount the wall plate and support plate to the wall. Carefully placing the mounting template on the wall will help ensure correct installation of these plates and, hence, of the Control Unit.

1. Using a stud finder, locate the center of the stud on which the Control Unit will be mounted.
2. Place the mounting template for the dual stud mount on the wall with the lower mounting holes 102 cm (40 in.) above the floor.
3. Place a level parallel to the vertical lines on the mounting template and adjust the mounting template until it is plumb.
4. Tape the mounting template to the wall.
5. Using an awl or other sharp object, punch through the mounting template to mark the location of the mounting holes.
6. Drill ¼-inch pilot holes at marked locations.
7. Drill 1-inch clearance holes.
8. Remove the mounting template from the wall and save for future use.

Reinforce Metal Stud Wall

Filler material is added to the wall to prevent the metal stud wall from being crushed during installation.

1. Cut a 15 cm x 25 cm (6 in. x 10 in.) access hole between the clearance holes.
2. Insert two 4x4 wooden studs in the access hole. Attach the studs to the rear drywall surface with drywall screws.



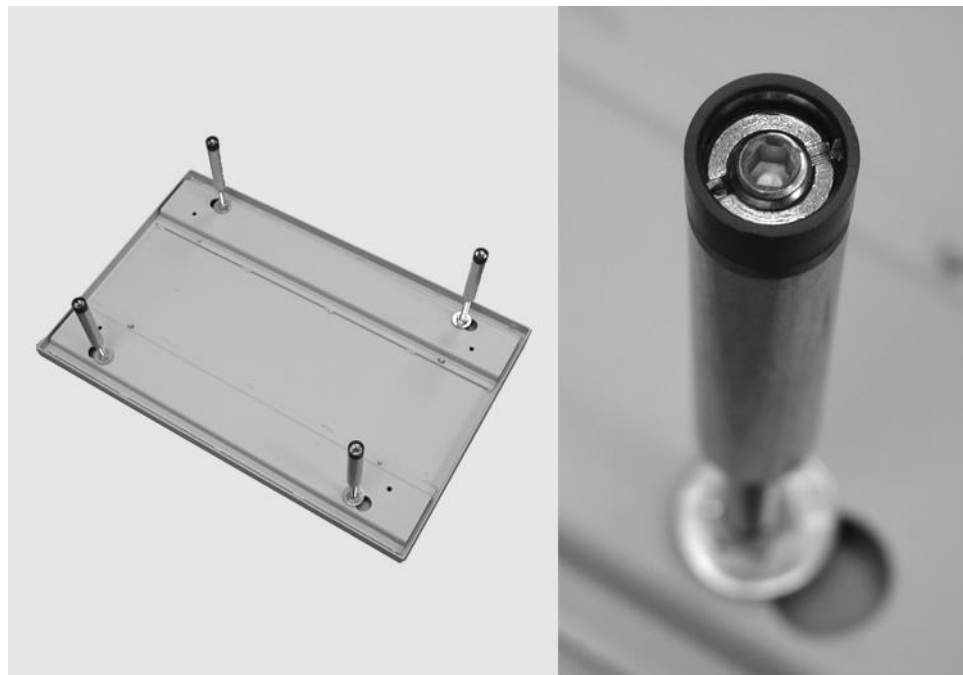
The sheet metal stud wall must be secure to hold a load of 118 kg-m (850 lb-ft).

Assembling and Mounting the Support Plate (30-A2043)

In the metal wall stud installation, the Control Unit is bolted to a wall plate (*Figure 19*) that has been installed to the support plate shown in *Figure 20*. The wall and support plates are shipped in separate cartons from the Preva.

1. Put the small, then the larger washers and nut on each of the four carriage bolts.
2. Insert the carriage bolts into the support plate holes.
3. Screw the threaded standoffs onto the carriage bolts with the slotted ends away from the back plate.
4. Place the plastic sleeve bearings in the slotted ends of the carriage bolts.
5. Using a 5/32 Allen key, insert a set screw into each threaded standoff. Screw the set screw until just below the slot in the threaded standoff, but do not tighten.
6. Using two sheet metal screws mount and level the support plate through the pilot holes on the back side of the wall. Tighten the sheet metal screws with the screwdriver.
7. On the front side of the wall, using a straight blade screw driver, adjust the threaded standoffs until the plastic part is flush with the drywall.
8. Tighten the set screws in the threaded standoffs to lock them in place.

Figure 20
Support Plate for
Metal Stud Wall
Mount



Install the Wall
Plate (30-
A2042)

1. Select the 5/16"-18 x 1" long hex bolts [H1-00-S23100-01].
2. Put the hex bolts through the mounting holes on the wall plate and loosely tighten. Be sure that the power wire extends through the opening in the wall plate.
3. Level the wall plate.
4. Tighten the hex bolts

Remove
Control Unit
Front Cover

1. Open the shipping carton and locate the Control Unit in the first level of the carton.
2. Remove the socket flathead screw from the front cover of the Control Unit.
3. Carefully remove the front cover.
4. Place the front cover and the screw in a safe location for later reassembly.

Mount the
Control Unit

1. Select the 5/16"-18 x 7/8" long socket cap screws [H1-15-S23088-01] and washers [H1-NA-S12000-01].
2. Put the one screw and washer through the upper mounting hole of the Control Unit.
3. Place the Control Unit on the wall and loosely tighten the upper screw.
4. Put the other screw and washer through the lower mounting hole of the Control Unit and loosely tighten. Be sure that the power wire extends through the opening at the bottom of the Control Unit.
5. Place a level on the Control Unit bearing parallel to the wall. Level the Control Unit.
6. Tighten the upper and lower screws.
7. After the Preva is installed, slide covers on the wall plate and fasten with the provided (8) screws [H1-64-S17050-01].

Installing the Horizontal Arm and Brake Assembly

Installing the Horizontal Arm and Brake Assembly

1. Locate the Horizontal Arm in the top level of the shipping carton.
2. Remove the Horizontal Arm from the shipping carton. Do not remove the cardboard tube around the wires but remove the red tag. Insert the cardboard tube snugly into the shaft of the Horizontal Arm.
Note: Do not lubricate the shaft of the Horizontal Arm or bearings in Control Unit.
3. Insert the cardboard tube enclosing the wires into the opening in the top of the Control Unit.
4. Insert the Horizontal Arm completely into the Control Unit, as shown in *Figure 21*. Ensure that the Horizontal Arm is firmly seated in place.
5. Remove the cardboard tube to free the wires. Discard the cardboard tube.
Note: Do not make the wire connections at this time.
6. Locate the brake assembly 30-A2024 in the kit pack (30-A2049 or 30-A2156). As shown in *Figure 22*, install and loosely tighten the brake assembly in order to put a small amount of drag on the rotation of the Horizontal Arm and to keep the Horizontal Arm from lifting out.

Figure 21
Installing the
Horizontal Arm

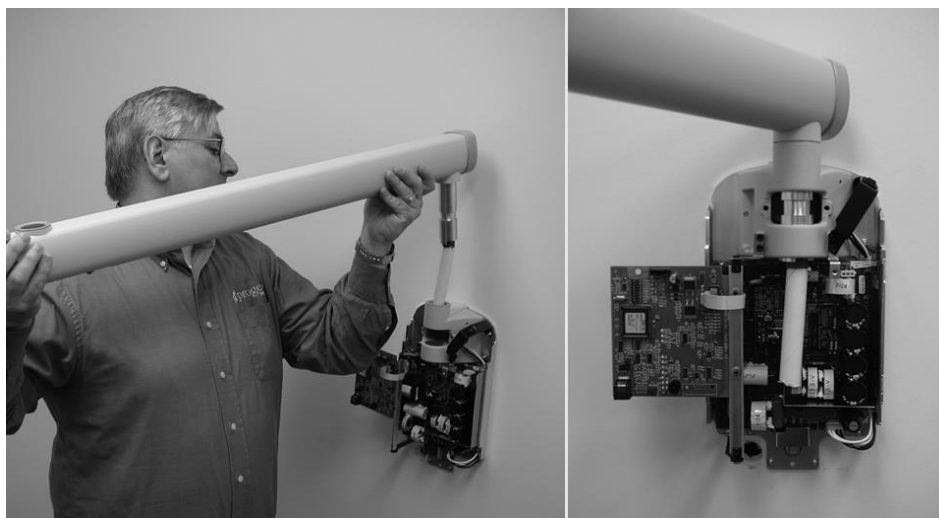
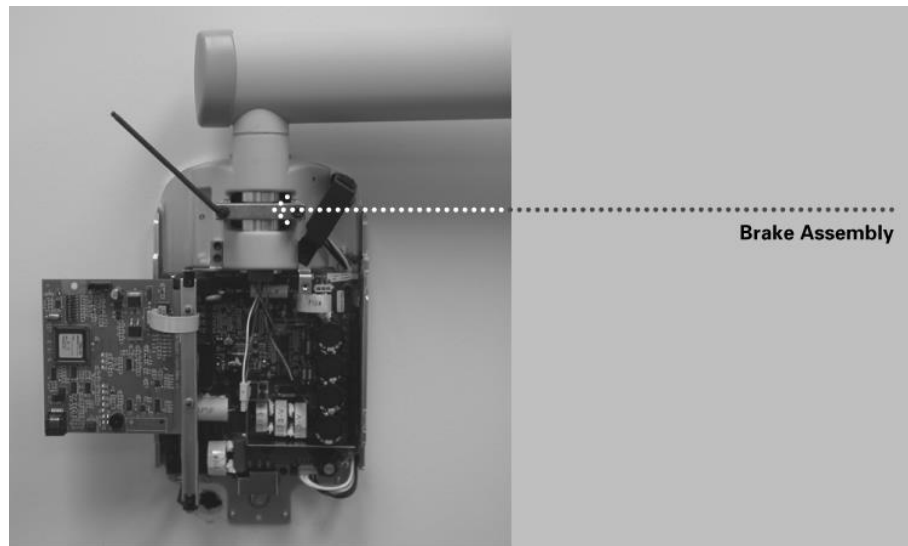


Figure 22
Installing the
Brake Assembly



Installing the Articulating Arm and Tubehead Assembly

Install the Articulating Arm and Tubehead Assembly

The Tubehead and Articulating Arm are installed as a single unit.

1. Remove the top-level packing material from the shipping carton to gain access to the Articulating Arm and Tubehead Assembly. Do not remove the cardboard tube enclosing the cable wires but remove the red tag.
2. Remove the Articulating Arm and Tubehead Assembly from the shipping carton.

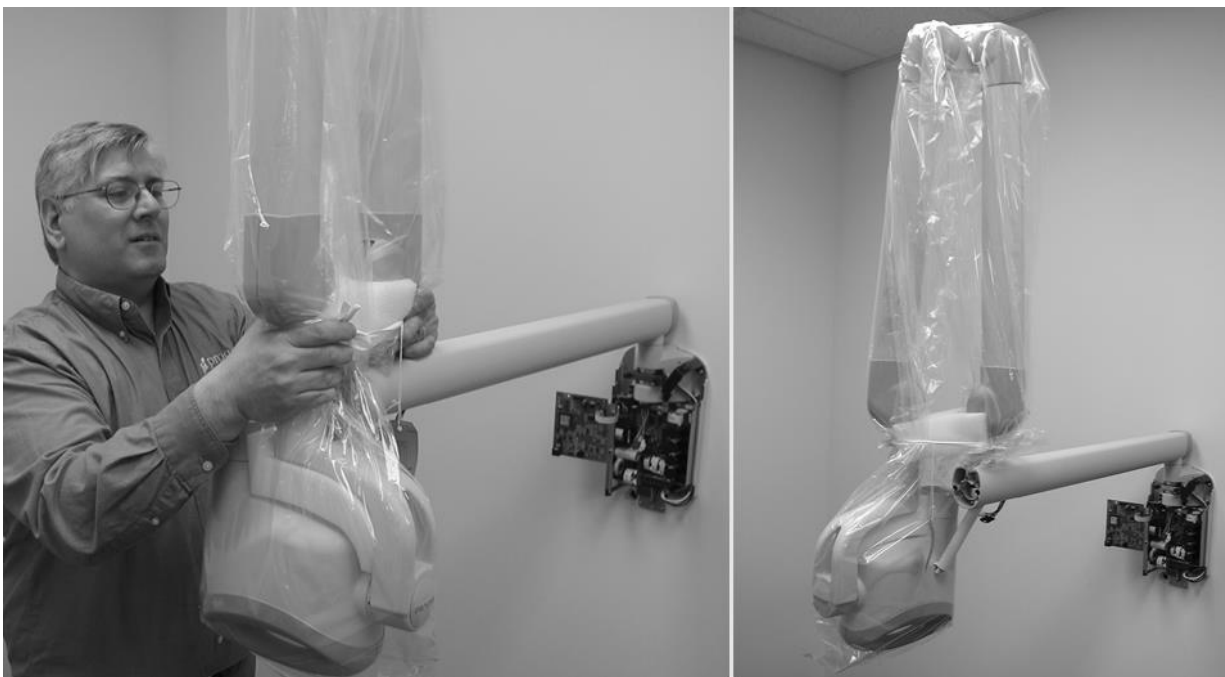


Do not remove the tie holding the articulating arm closed. Removing the tie will cause the articulating arm to spring open, potentially causing personal injury.

Note: Do not lubricate the shaft of the Articulating Arm or the bearings in the Control Unit.

1. Position the Articulating Arm above the Horizontal Arm.
 2. Carefully route the cardboard tube with the arm cable plug through the opening in the Horizontal Arm.
 3. Insert the shaft of the Articulating Arm into the opening in the Horizontal Arm, as shown in *Figure 23*.
 4. Press down until the shaft is completely seated in the Horizontal Arm.
 5. Remove the cardboard tube to free the wires. Discard the cardboard tube.
- Untie the Articulating Arm and remove the plastic covering.

Figure 23 Installing the Articulating Arm and Tubehead Assembly



Install the Articulating Arm Brake Assembly

1. Locate the Articulating Arm brake assembly (30-A2068).
2. Insert the M6 x 25 mm long set screw, as shown in *Figure 24*. Using a 3 mm hex key, tighten the screw fully then back off $\frac{1}{4}$ turn and secure with the hex nut.
3. Using a 3 mm hex key, install the Articulating Arm brake. Tighten screws until the Articulating Arm brake comes into contact with the shaft of the Articulating Arm. If additional friction is required to prevent drifting, turn the two screws evenly $\sim\frac{1}{4}$ turn at a time until drift stops, as shown in *Figure 25*.

Figure 24
Installing the
Hex Nut and
Set Screw

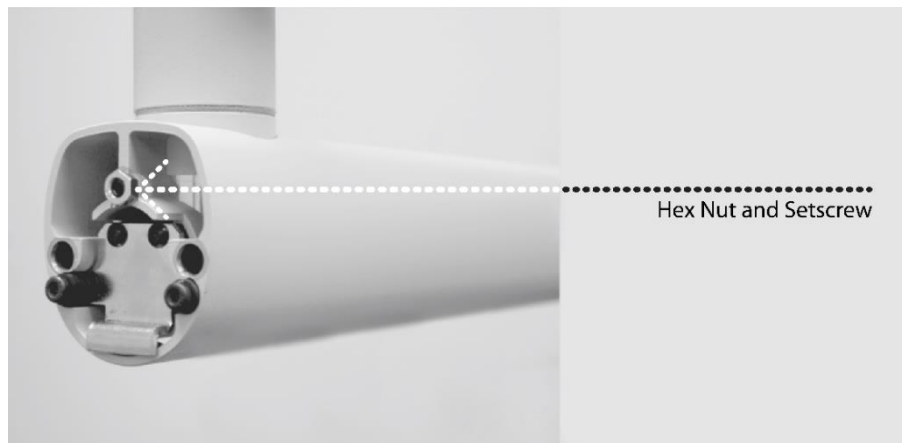
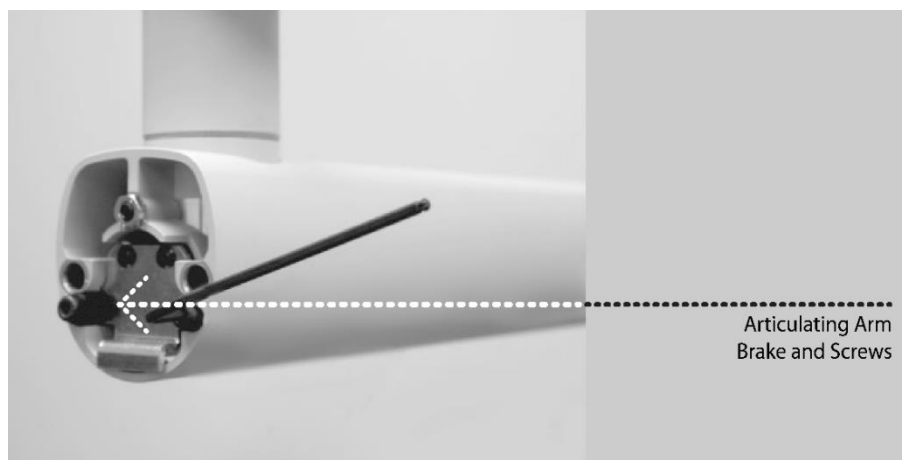


Figure 25
Adjusting the
Articulating
Arm Brake
Assembly



See the section Mechanical Adjustments beginning on page 47 for procedures to correct drift in the articulating arm.

Connecting the Cables

Connecting the Articulating and Horizontal Arm Cables

1. Connect the two Articulating Arm cables to the Horizontal Arm cables, as shown in *Figure 26* and *Figure 27*.
2. Once the connections are made, dress the cables and push them into the opening in the Horizontal Arm.

Figure 26
Connecting the Articulating Arm and Horizontal Arm Cables



Figure 27
Connecting optional Integrated Sensor Cable



Verify that line power is disconnected before proceeding.

Connecting the Horizontal Arm Cables to the Power Supply Board

1. Attach the black connector from the Horizontal Arm to point J201 of the Logic Board [015-11172-00], as shown in *Figure 28*.
Note: The plug must be properly oriented. Be sure that the tabs on the connector are down.
2. Attach the white connector from the Horizontal Arm to point J1 on the Power Supply Board 30-08041, as shown in *Figure 28*.
Note: The plug must be properly oriented. The tab must align with the latch.
3. Attach the ground ring terminal from the horizontal arm to the chassis as shown in Figure 29.
Note: The ring terminal must be secured under both sets of nuts and lock washers.

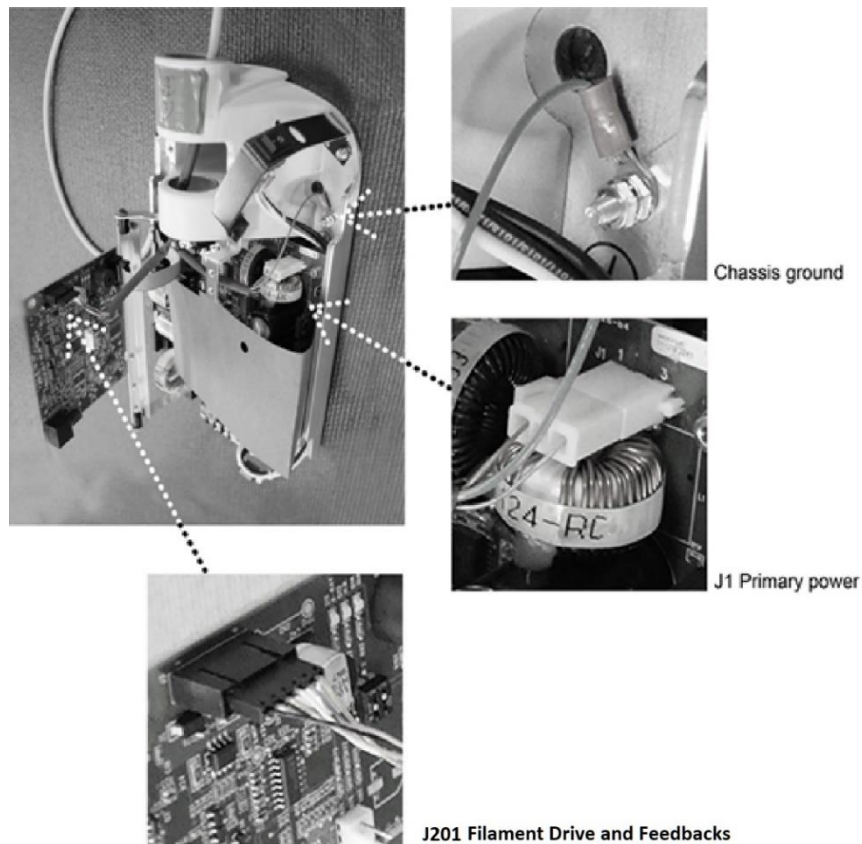


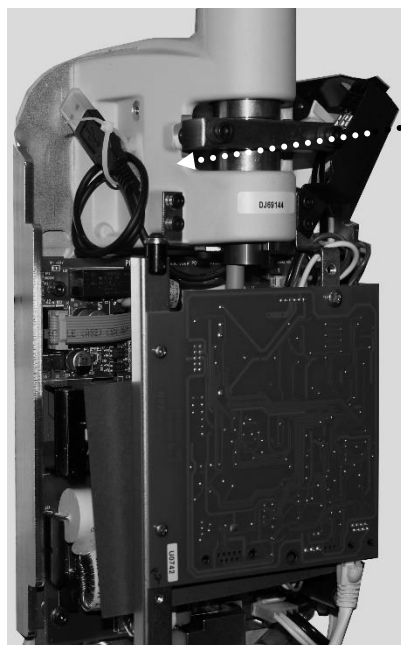
Figure 28
Connecting the Horizontal Arm Cables to the Circuit Boards

Optional Integrated Sensor

4. Optional integrated sensor cable. Tie-wrap the USB cable to the tie block provided as shown in Figure 29.

Figure 29 Tying optional sensor cable out of harms way

Connecting Line Power, Permanently Wired Installation

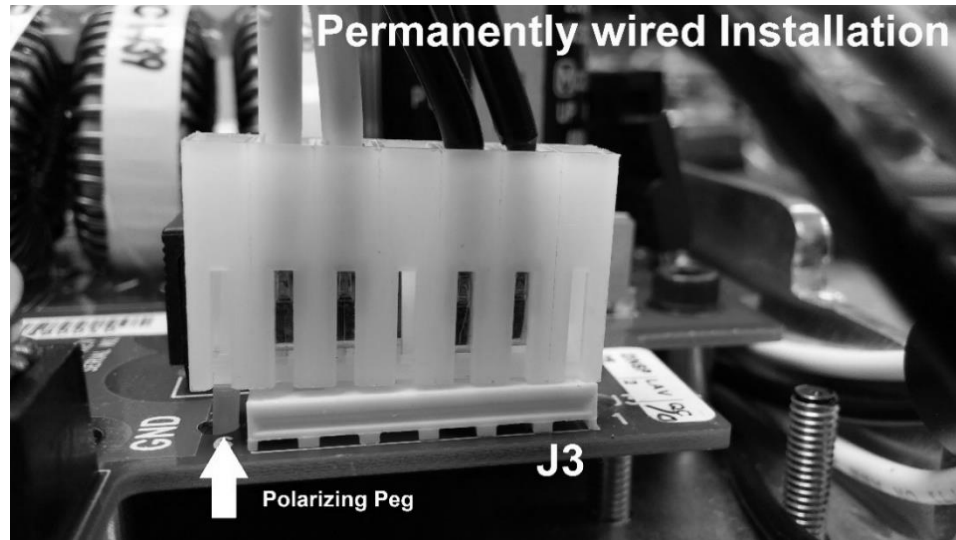


Attach provided tie block here, loop and tie the cable to the tie block.

1. Using a 3 mm hex key, remove the power line terminal strip cover at the base of the Logic Board to gain access to the power line terminal strip, as shown in Figure 33.
2. Attach the hot (black) wire of the mains to the connection identified as LINE on the power strip.
3. Attach the neutral (white) wire of the mains to the connection identified as NEUT on the power strip.
4. Attach the ground (green) wire of the mains to the connection identified as GND on the power strip.
5. The connector from the power switch harness at J3 of the Logic Board should be left in the default position as shown in *Figure 30*.
6. Leave the power line terminal strip cover off until the following electrical verification procedure is complete.

Figure 30
Power Switch
Harness
Configuration for
Permanently
Wired Installation

Connecting
Line Power,
Cord-
Connected
Installation



1. Using a 3 mm hex key, remove the power line terminal strip cover at the base of the Logic Board to gain access to the power line terminal strip, as shown in Figure 33.
2. Connect the flanged spade lug of the hot (black) wire of the power cord to the connection identified as LINE on the power strip.
3. Connect the flanged spade lug of the neutral (white) wire of the power cord to the connection identified as NEUT on the power strip.
4. Connect the flanged spade lug of the ground (green) wire of the power cord to the connection identified as GND on the power strip.
5. Remove the connector from the power switch harness at J3 of the Logic Board.
6. Remove the Polarizing Peg from position 7 of the connector. Use a needle nose plier to rotate the polarizing peg 45 degrees and pull to remove it.
7. Insert the polarizing peg into position 1 of the connector.
8. Reconnect the connector to J3 of the Logic Board. Align the polarizing peg as shown in *Figure 31*.
9. Attach the bracket and strain relief as shown in *Figure 32*.
10. Leave the power line terminal strip cover off until the following electrical verification procedure is complete.

Figure 31
Power Switch
Harness
Configuration for
Cord-Connected
Installation

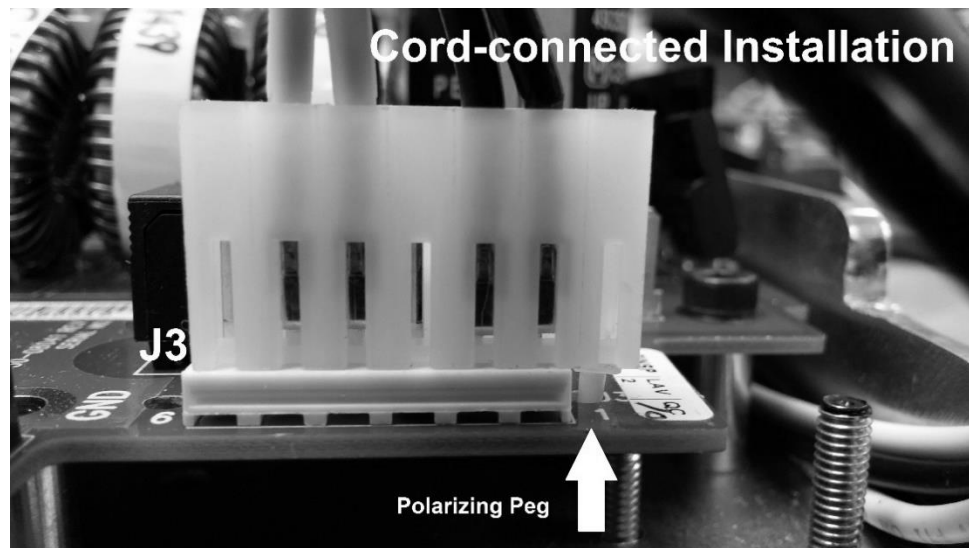


Figure 32
Power Cord
Anchoring

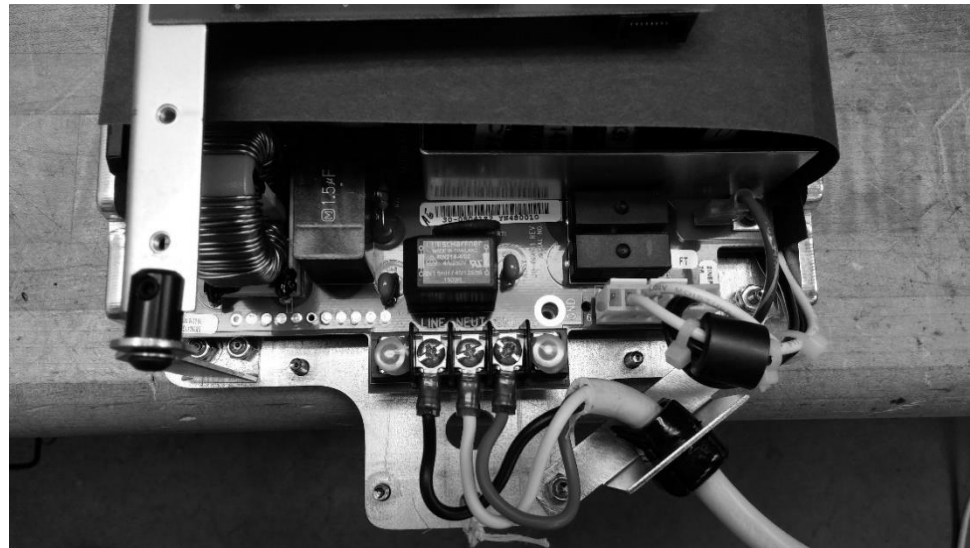
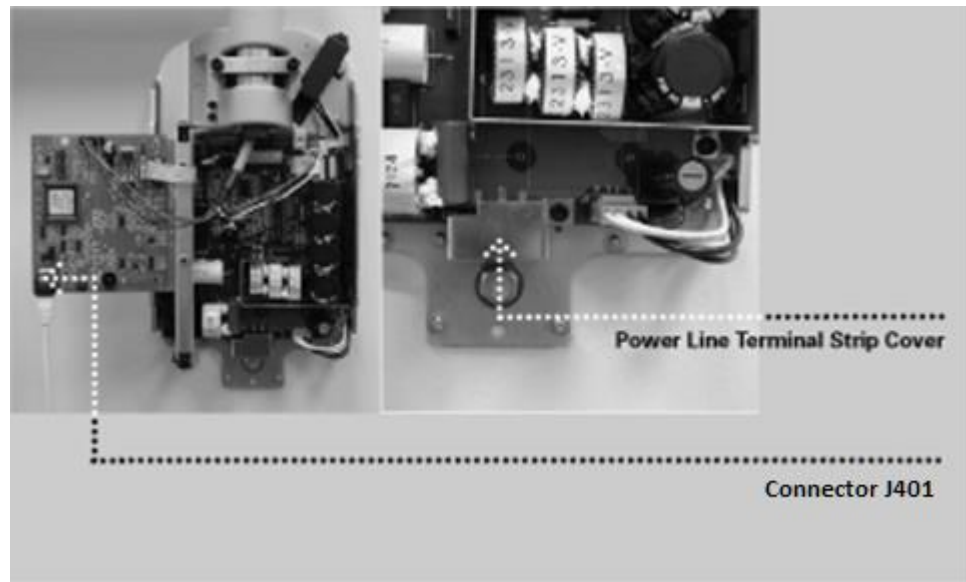


Figure 33
Power Line
Terminal Strip
Cover

Connecting the
Operator Panel
with the 25 ft.
Cable



During initial powerup and verification, the Operator Panel is required. Connect the Operator Panel with the 7.6 m (25 ft.) interconnect cable. Later you will connect the Operator Panel in its final position for use.

1. Identify the Operator Panel and the 7.6 m (25 ft.) interconnect cable.
2. Plug the cable into the left socket at the base of the Operator Panel.
3. Plug the other end of the cable into connector J401 on the Logic Board 015-11172-00, as shown in *Figure 33*.

Electrical Verification

Calibration

Calibration of the Preva Dental X-ray System is preset at the factory and is not required during initial installation. Service replacement of the Logic Board 015-11172-00 or the Tubehead may require calibration. See the Calibration section of this manual.

Verifying Input Voltage and Turning on the System

1. Before turning on the system, verify the input voltage by measuring the voltage at LINE and NEUT, as shown in *Figure 34*. The reading should be within the range of 100–250V.
2. Replace the power line terminal strip cover.
3. Turn on the Preva Dental X-ray System using the power switch, as shown in *Figure 35*. On the Operator Panel, *Figure 36*, you will see the product display screen showing the software version. Then the Operator Panel will display the default technique factors.

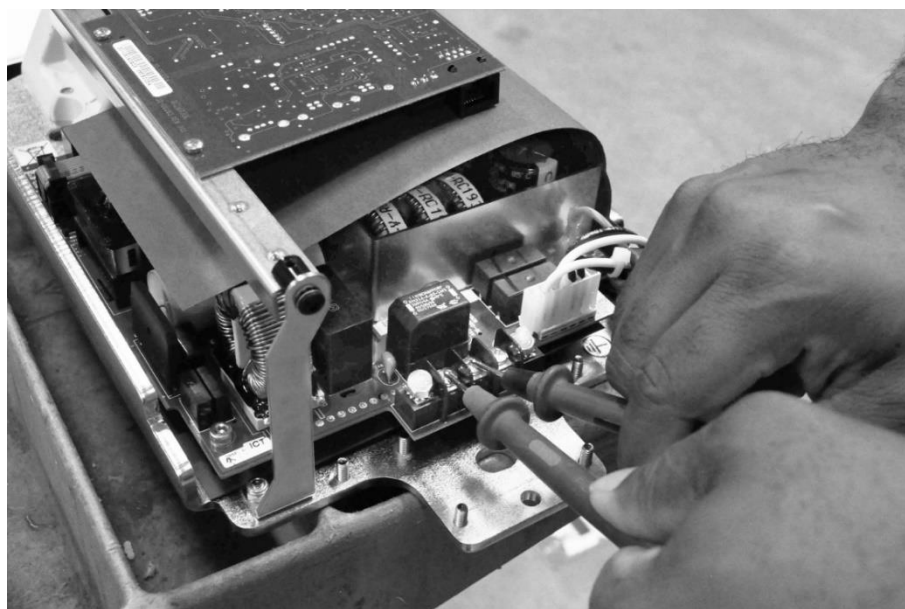


Figure 34
Verifying Input
Voltage at the
Line Input

Figure 35
Turning on the
Power

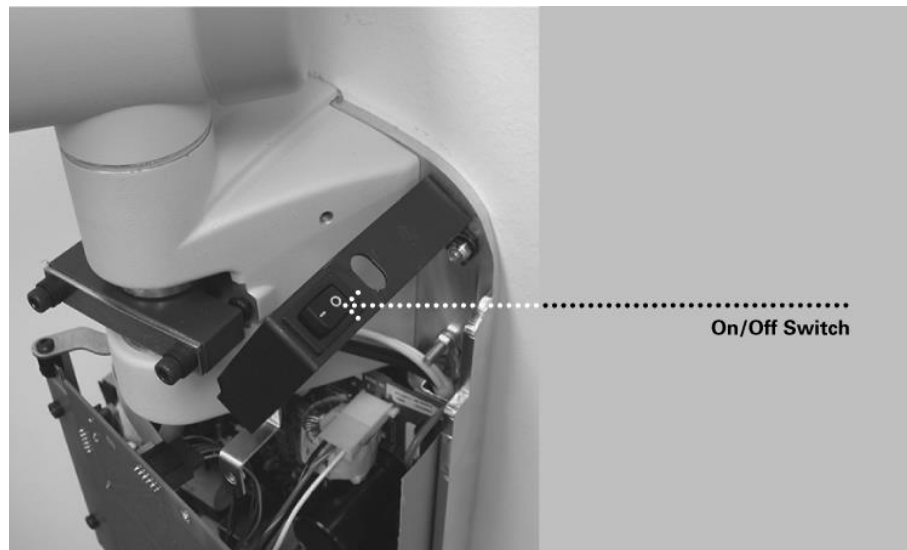


Figure 36
Operator Panel



Circuit Board Verification



The power supply board (30-08041), when energized, contains high electrical energy. Avoid contact with this board. After the system is turned off, electrical energy will remain in the power supply board for several minutes. Before performing any service on this board, first verify that voltage has dissipated.

1. On Power Supply Board 30-08041, shown in Figure 37, verify that LED D11 is illuminated. The illuminated LED verifies that appropriate supply voltages are present.
2. Note: Stored electrical energy is present whenever D11 is illuminated.
3. On the Logic Board 015-11172-00, shown in Figure 37, verify that LED D402 is flashing. If the LED is not flashing, refer to the “No Operator Display but Power Switch is on” procedure in the Troubleshooting on page 75 of this manual.
4. Turn off the Preva Dental X-ray System using the power switch as shown in Figure 35.

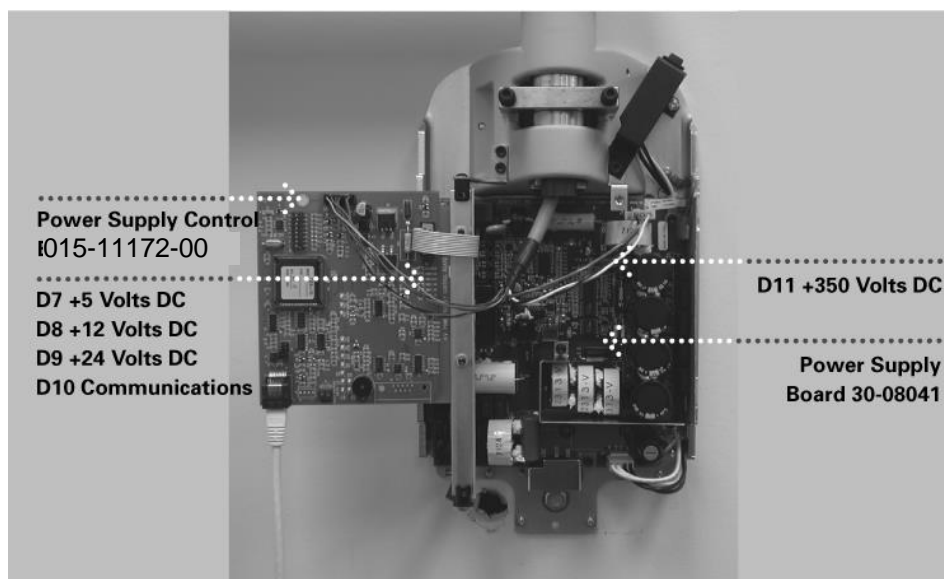


Figure 37
Circuit Board
Verification

Mechanical Adjustments

Horizontal Arm Adjustment

Locate the brake assembly at the top of the Control Unit. The brake assembly has a screw on either side of a clamping bar over the Horizontal Arm pivot post.

Using a 4 mm hex key, as shown in *Figure 38*, tighten the screws equally to apply adequate braking to the pivot post so that Horizontal Arm begins to move after the Articulating Arm.

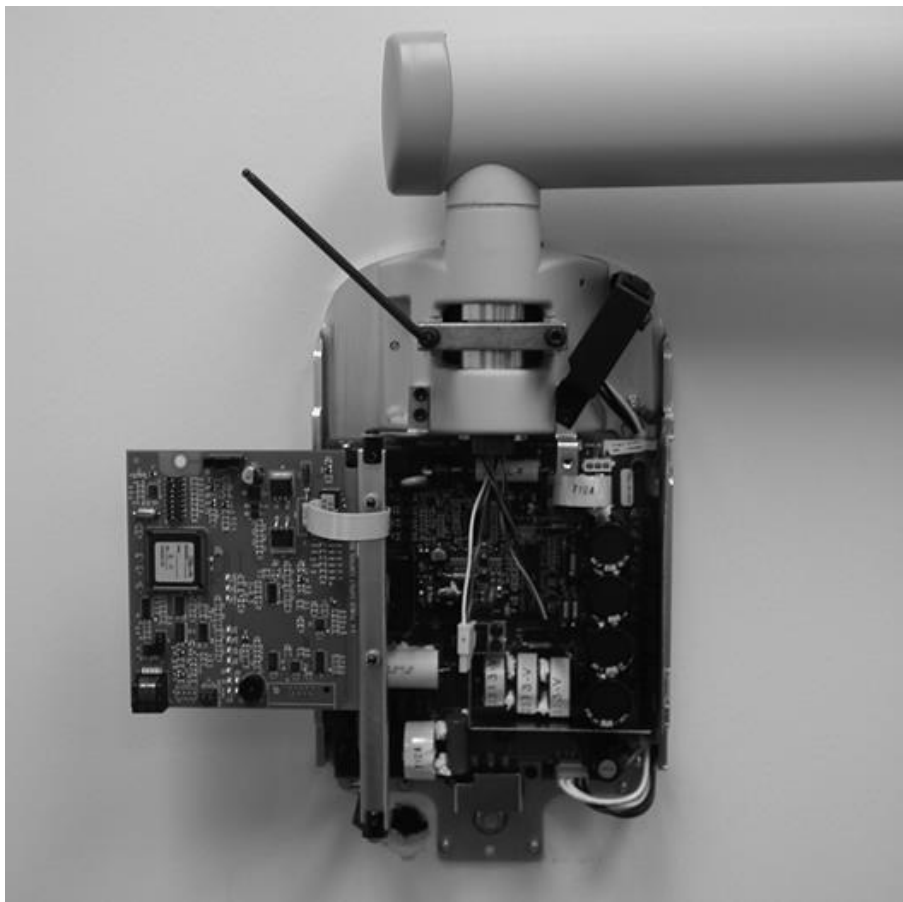


Figure 38
Tightening the
Brake

Additional Adjustments

The balance and friction of the Articulating Arm are preset at the factory. During the installation process, check the balance and friction. When moving the Tubehead, the Articulating Arm should be steady in all positions and move before the Horizontal Arm. If adjustments are necessary, follow the adjustment procedures in the Troubleshooting section on page 76.

Note: Do not use mechanical adjustments to compensate for a system that is not properly leveled on the wall.

Installing the Control Unit Front Cover and the Operator Panel

Important Note

The Operator Panel can be installed on the Control Unit or remote from the Control Unit. Installation of the Operator Panel on the Control Unit may require the purchase and use of the coil-cord hand switch option 30-A2040.

On the Control Unit

In order to comply with the regulations and proper X-ray practices, the Operator Panel must be located where the operator can view both the patient and the technique factors prior to the exposure.

1. Connect the short cable at point J401 on the Logic Board 015-11172-00.
2. Feed the cable through the front cover of the Control Unit.
3. Place the top of the front cover on the Control Unit and pop the bottom of the cover into place, as shown in Figure 39, being careful of the power switch and cover alignment.
4. Replace the screw on the front cover of the Control Unit.
5. Plug the cable into the bottom of the Operator Panel.
6. Snap the Operator Panel into place on the front cover of the Control Unit, as shown in Figure 40.



Figure 39
Placing the Cover
on the Control
Unit

Figure 40
Snapping in the
Operator Panel



**Remote
Operator Panel**

In the remote location, the Operator Panel snaps to the Operator Panel mounting cradle, which is first mounted on the wall.

1. Place and level the mounting template [30-S0003], shown in *Figure 10*, at eye level in the location where the Operator Panel is to be installed. Tape the mounting template to the wall.
2. Using an awl or other sharp object, punch through the mounting template to mark the location for the bolts for the Operator Panel mounting cradle.
3. Drill pilot holes at marked locations. With a drywall knife, cut an opening as shown on the mounting template.
4. Remove the mounting template from the wall.
5. Using the anchors and screws from the mounting hardware packet, install the Operator Panel mounting cradle in the position marked.
6. Locate the 7.6 m (25 ft.) remote control cable.
7. Run the remote control cable, in compliance with local codes, from the intended location of the remote Operator Panel to the back of the Control Unit.

Note: The cable can also be run to an electrical box or opening at the top left of the wall plate assembly. A sufficient length of cable should be left available to bring the remote cable out to the bottom front of the Control Unit.

8. Plug the remote control cable into the bottom of the Logic Board 015-11172-00.
9. Place the top of the front cover on the Control Unit and pop the bottom of the cover into place, as shown in *Figure 39*, being careful of the power switch and cover alignment.
10. Replace the screw on the front cover of the Control Unit.
11. Place the cover plate over the top opening and the small trim cover over the bottom opening on the front cover of the Control Unit.
12. Locate the Operator Panel in the top portion of the shipping carton.
13. Connect the other end of the remote cable to the right plug (as viewed from the back) on the bottom of the Operator Panel.
14. Carefully dress the white cable back into the wall.
15. Snap the Operator Panel to the mounting cradle, as shown in *Figure 41*.

Figure 41
Snapping the
Operator Panel to
the Mounting
Cradle



Installing Plastic Covers

The end cap for the Horizontal Arm is shipped in the packet of plastic parts and is put on as part of the installation procedures. End caps for the Articulating Arm are shipped installed but are removable to perform mechanical adjustments. The cable access cover is placed over the cable connection underneath the Horizontal Arm. Cover locations are shown in *Figure 42*.

1. Place the plastic cover from the packet on the end of the Horizontal Arm.
2. Install the cable access cover over the Horizontal Arm opening using two Phillips flat-head screws.

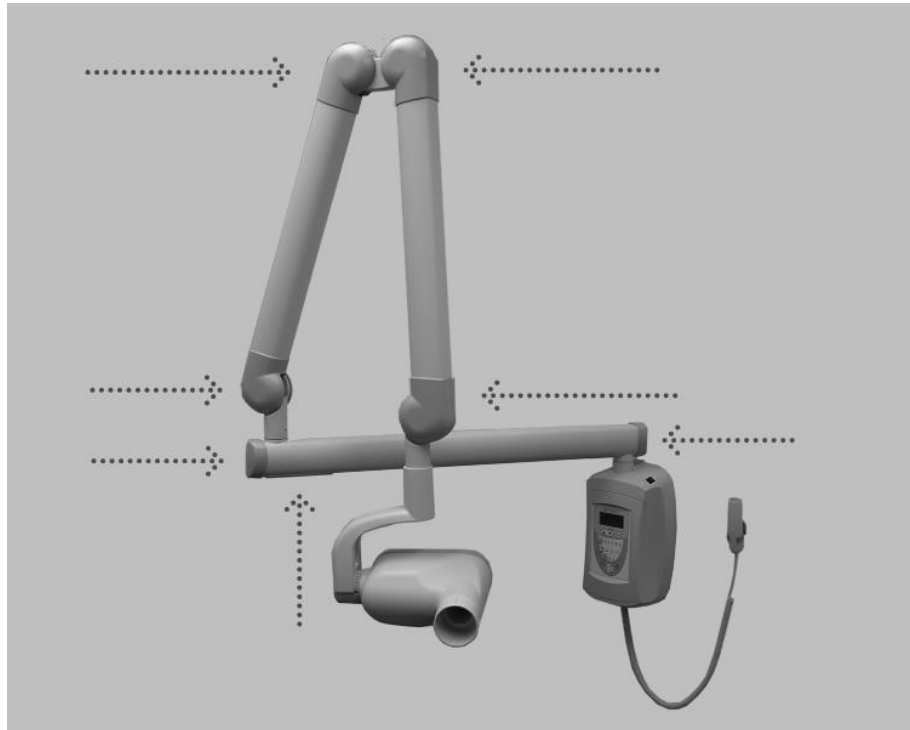


Figure 42
Cover Locations

Transporting the Device

To avoid injury and damage to the tubehead when transporting the device to a different location within the user facility, collapse the articulated arm and secure it with the supplied hook and loop strap⁶. Maneuver the device by grasping the device's two handles. Avoid hitting the tubehead on walls, doorways, etc. and be careful not to damage the cable with the wheels during transport.

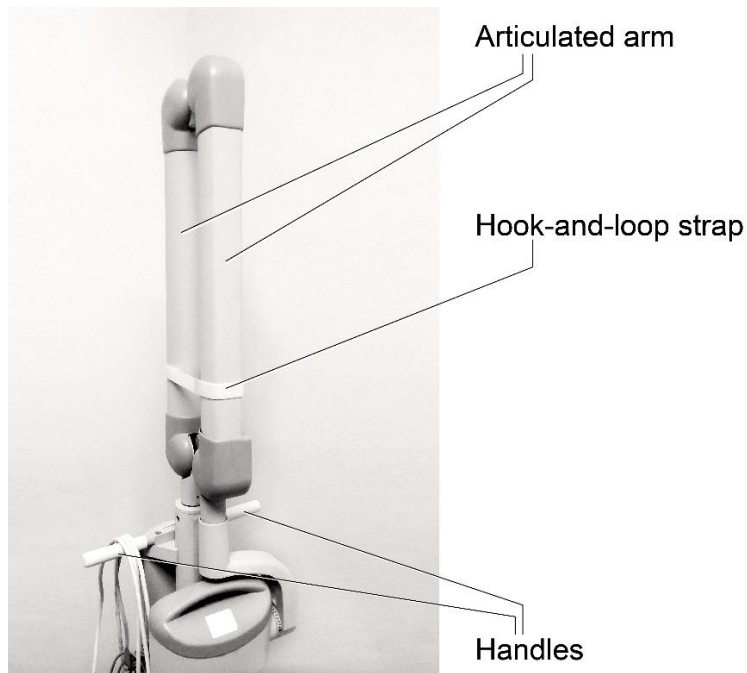


Figure 43
Transporting the
Device

⁶ Part number 30-S0037

Preva Operator Panel

Using the Operator Panel

Power on Settings

When the Preva Dental X-ray System is powered on, the Operator Panel, shown in *Figure 44*, displays the selections that were in use when the system was last powered off.

Exposure Settings

The Operator Panel displays the exposure settings (kV, mA, and seconds) for the currently selected tooth, image receptor type, and patient size. Use the Tooth Selection, Image Receptor Type, and Patient Size buttons to select other exposure settings.

Adjusting Exposure Settings

Preset exposure settings can be adjusted prior to making an exposure. Exposure time can be easily changed by simply using the up and down buttons. To adjust kV and mA, use the right arrow to select the exposure setting to adjust. Then use the up and down arrow buttons to adjust the value. To save new presets, use the System Configuration mode described on page 66 in this manual.

Exposure Button and Ready Indicator

The Exposure button is used to initiate an X-ray exposure. For a complete exposure, the button must be pressed and held until the Radiation Indicator no longer illuminates and the audible signal is no longer heard. Releasing the Exposure button immediately terminates the X-ray exposure.



Figure 44
Preva Operator
Panel

Checking System Functions

The following checks must be performed to complete the installation of the Preva Dental X-ray System and as part of the recommended maintenance as indicated in the User Manual. Failure to perform these checks may result in an installation that does not comply with U.S. Radiation Performance Standards 21 CFR Subchapter J.



If the Preva Dental X-ray System does not perform the functions below, advise the owner that the system is not to be used. See the Troubleshooting section of this manual on page 73 or contact Midmark's Technical Support.

System Function Checklist

Component	Directions	<input checked="" type="checkbox"/>
Wall Mounting	Verify that the wall support is adequate and that the system is properly mounted to the wall.	
Labels	Verify that all certified components bear labels that include the model and serial number, date of manufacture and a statement of certification as noted elsewhere in this manual.	
Tubehead	Check for oil leaks or other evidence that could indicate internal damage. If necessary, replace the Tubehead.	
Tubehead Rotation	Ensure that the Tubehead maintains its position around the horizontal axis while remaining easy to rotate and position. Also check the vertical pivot of the Tubehead for easy movement while remaining in position after moving.	
Suspension	Check that all movements are smooth and quiet. Verify that the Tubehead is properly counterbalanced for vertical drift and that the Horizontal and Articulated Arms do not drift horizontally.	
Power Switch	Verify that the switch is working properly and that the Ready Indicator is illuminated when the power switch is in the ON position.	
Operator Panel Controls	With the power switch in the ON position, verify that technique factors appear on the Operator Panel. Also, check the function of the selection buttons for Tooth Selection, Image Receptor Type, and Patient Size. Pressing a selection button will cause indicator lamps to indicate the selected item.	
Exposure Button	Verify that the Exposure button on the Operator Panel functions properly. To make an exposure, press and hold the Exposure button until the Radiation Indicator goes off and the audible signal stops.	
Exposure Indicators	Make several exposures and verify that the Radiation Indicator illuminates and the audible signal is heard.	
Premature Termination	Select the longest exposure time possible using the up and down arrows. Initiate an exposure but release the Exposure button after a brief period of time (before the timer terminates the exposure). Verify that the display indicates "Pre-termination Error" and returns to normal operating mode.	
Coil-cord Hand Switch Option	If a coil-cord handswitch is used, inspect the switch housing and coil cord for damage or wear. Replace them if there is any evidence of damage.	
User Information	Verify that the owner of the system has received the user manual.	

Tube Seasoning Procedure

Note: Do not use this procedure immediately after Tubehead replacement. Refer to the section Calibration for the Calibration procedure.

X-ray tubes that sit dormant for several months can become electrically unstable. To remedy this condition, it is recommended you perform a "new tube seasoning procedure. This process establishes stable high voltage operation and will ultimately extend the life of the tube. Repeat this procedure before returning to normal operation any time the system has been unused for more than two months.

1. Verify system operation.
2. Energize the system.
3. Select 60 kilovolts [kV], 7 milliamperes [mA], and the exposure time of one second.
4. Make five exposures at this level, observing the normal cooling time.
5. Select 65 kilovolts, 7 milliamperes, and the exposure time of one second.
6. Make five exposures at this level, observing the normal cooling time.
7. Select 70 kilovolts, 6 milliamperes, and the exposure time of one second.
8. Make five exposures at this level, observing the normal cooling time.

Responsibilities of the Installer and Service Engineer

Verification of machine performance after installation must be performed according to the guidelines identified in the System Function Checklist which may be found in the User Manual or, the Installation and Service Manual on page 56.

Verification of machine performance after maintenance or repair must be performed according to the guidelines identified in the System Function Checklist and the Calibration instructions which may be found in the Installation and Service Manual.

Optional Installation Procedures

Installing the Coil-cord Hand Switch Option (30-A2040)

Jumper Configuration for Coil-cord Hand Switch

The Preva Dental X-ray System can be installed with a coil-cord handswitch (30-A2040). The coil-cord handswitch is used to make exposures, in addition to or replacing the use of the exposure button. Installation of the coil-cord hand switch involves connecting the hand switch into the connector on the bottom of the Operator Panel.

If the coil-cord hand switch is used, it may be required to disable the Exposure button on the control panel (consult your local laws). A jumper must be removed on the Operator Panel Board 30-08054, shown in *Figure 45*, to disable the operation of the hand switch.

1. Turn the power off.
2. Remove the Operator Panel from its mounting on the Control Unit or wall plate.
3. Unplug the cable that connects the Operator Panel to the Control Unit.
4. With a Phillips screwdriver, remove the 4 screws from the back of the Operator Panel. Put the screws in a safe location for later use.
5. Remove the back cover from the Operator Panel. Lift out the Operator Panel Board 30-08054.
6. To disable the use of the Exposure button on the Operator Panel, locate point J7 on the Operator Panel Board 30-08054. Then remove the shunt on J7.
7. Put the Operator Panel Board 30-08054 back in position.
8. Put the cover on the back of the Control Panel using the 4 screws.

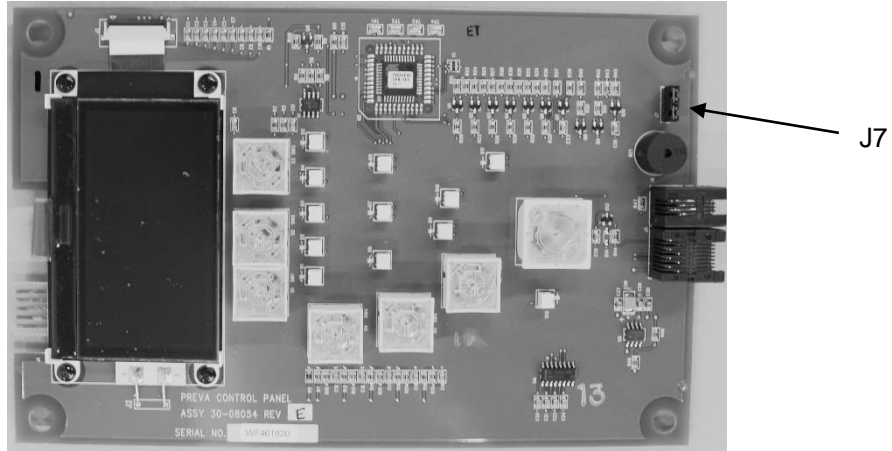
J7 – Exposure Switch Jumper Settings

Jumper Position	Switch Closure Required for Exposure
1-2, 3-4 (default)	Remote Switch or Panel Switch (parallel)
2,3	Remote Switch and Panel Switch (series)
3,4	Remote Switch (panel switch disabled)

Figure 45
Disabling the Use
of the Exposure
Button

Connecting the
Coil-cord Hand
Switch—
Operator Panel
Located on
Control Unit

Connecting the
Coil-cord Hand
Switch—
Operator Panel
in Remote
Location



1. Remove the screw holding the front cover of the Control Unit in place. Place the screw in a safe location for later use.
2. Remove the front cover.
3. Cut out the notch on the base of the Control Unit front cover.
4. Route both the Operator Panel cable and the coil-cord hand switch through the hole in the bottom of the Control Unit front cover.
5. Place a loop of the coil cord into the notch.
6. Carefully reassemble the Control Unit front cover, keeping the coil-cord in the notch. Secure the front cover with the screw that was removed in step 1.
7. Locate the Operator Panel in the top portion of the shipping carton.
8. Connect the coil-cord hand switch to the left plug socket (as viewed from the back) on the bottom of the Operator Panel. Connect the short white cable to the right plug socket.
9. Carefully dress the two cables back into the front cover of the Control Unit.
10. Snap the Operator Panel into place on the front cover of the Control Unit.
11. Mount the bracket for the coil-cord hand switch in a convenient location.
12. Stow the coil-cord hand switch.

1. Route the cable from the coil-cord hand switch through the hole in the wall mounting plate.
2. Place a loop of the coil cord into the notch.
3. Locate the Operator Panel in the top portion of the shipping carton.
4. Connect the coil-cord hand switch to the left plug socket (as viewed from the back) on the bottom of the Operator Panel. Connect the control cable to the right plug socket.
5. Carefully dress the two cables back into the wall.
6. Snap the Operator Panel into place on the wall mounting plate.
7. Mount the bracket for the coil-cord hand switch in a convenient location.
8. Stow the coil-cord hand switch.

Installing the Remote Exposure Station (30-A2044)

Tools

The Remote Exposure Station is an option for the Preva that allows the operator to make the exposure from a fixed location remote from the main unit. As shown in *Figure 46*, a single switch can be used, or two switches can be used in series or in parallel. Two switches in series will require both switches to be pressed simultaneously to make an exposure. If two switches are used in parallel, only one needs to be pressed to make an exposure.

The following tools are required to install the switch:

- Phillips screwdriver
- Flat-blade screwdriver
- Telephone cable stripper (for dual switch configuration only)
- Wire stripper (for dual switch configuration only)

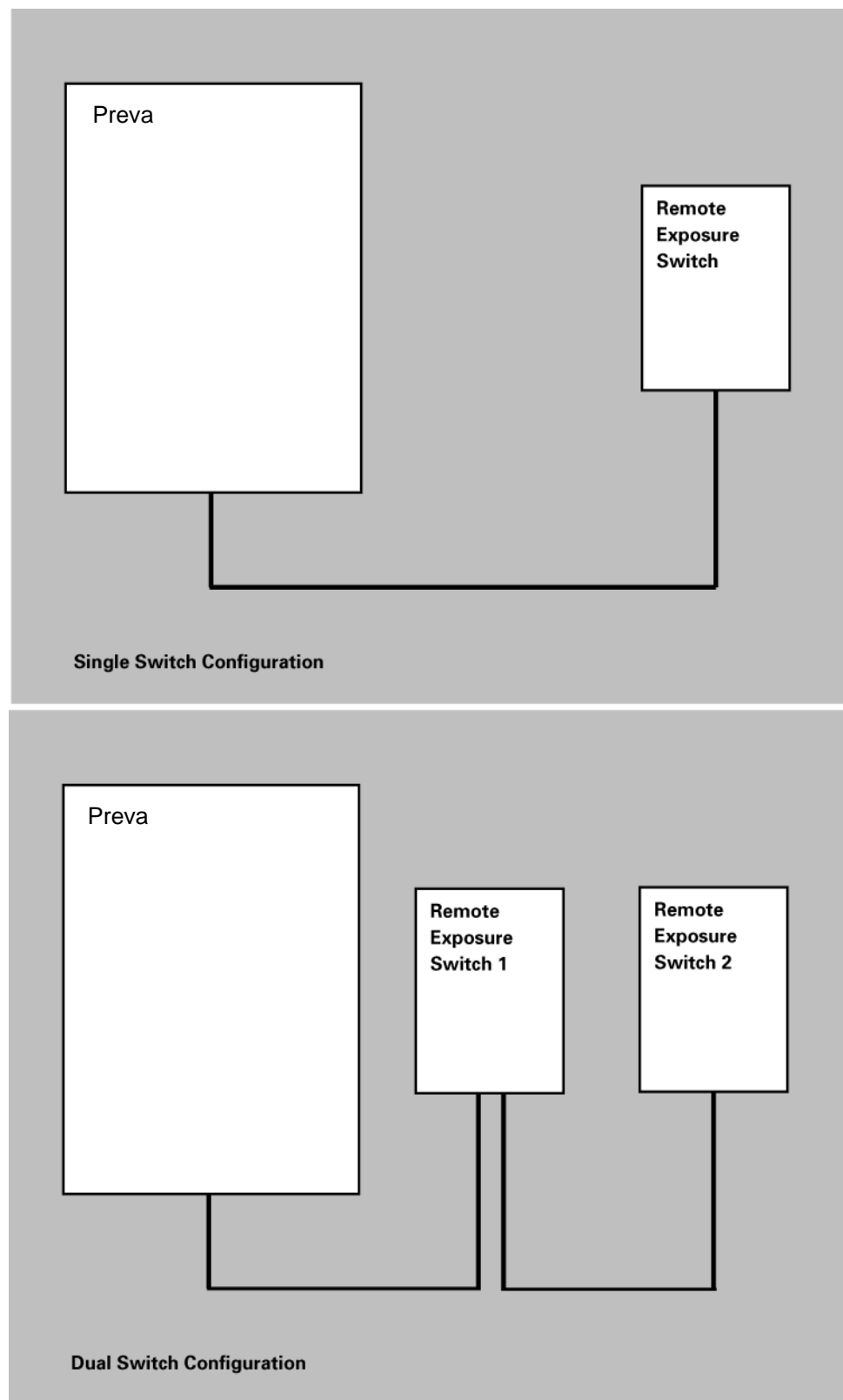


Figure 46
Remote Switch
Configurations

Installing the Single Switch

1. Route the cable for the Remote Exposure Switch from the Preva mounting location to the Remote Exposure Switch mounting location. This can be done through conduit or on the wall surface. For either method, a 2" x 4" junction box should exist where the Remote Exposure Switch is to be mounted.
2. Thread the cable end with the handset connector through the opening in the wall mount cover from the inside and connect it to the Operator Panel. If the cable is routed on the surface of the wall, it should enter the wall mount cover through the notch on the left of the power switch.
3. Connect the cable conductors on the opposite end of the cable to terminal block J1 on the PCB in the switch enclosure as shown in *Figure 47*.

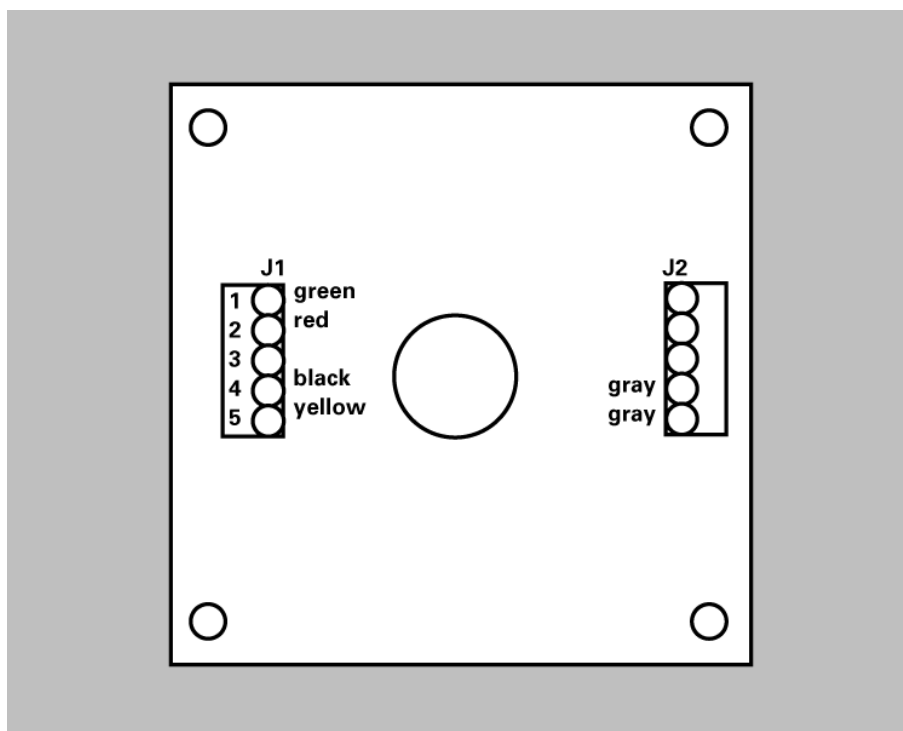


Figure 47
Single Switch
Configuration

Installing the Dual Switch

4. Make sure the two gray wires from the pushbutton switch are connected to terminals 1 and 2 of J2.
5. Screw the inner section of the enclosure to the junction box using the two screws provided. If the cable is routed on the surface of the wall, make sure it sits in the notch on the bottom of the enclosure. Confirm that no wires are being pinched between the junction box and the enclosure.
6. Hook the outer section of the enclosure and fasten the two pieces at the bottom with the 6-32 x 5/16" screw.

Note: This configuration uses two cables. One connects the Preva to the first switch and the other connects the first switch to the second switch.

1. Route one cable from the Preva to the first switch location either through conduit or on the surface of the wall.
2. Route the other cable from the first switch location to the second switch location either through conduit or on the surface of the wall.
3. Thread the first cable end with the handset connector through the opening in the wall mount cover from the inside and connect it to the Operator Panel. If the cable is routed on the surface of the wall, it should enter the wall mount cover through the notch on the left of the power switch.
4. For a parallel connection, connect the cable conductors of both cables to terminal block J1 on the PCB of switch enclosures #1 as shown in *Figure 48*. The (2) indicates that two green wires will join together in terminal 1 of J1, etc. For a series connection, connect the wires as shown in *Figure 49*.

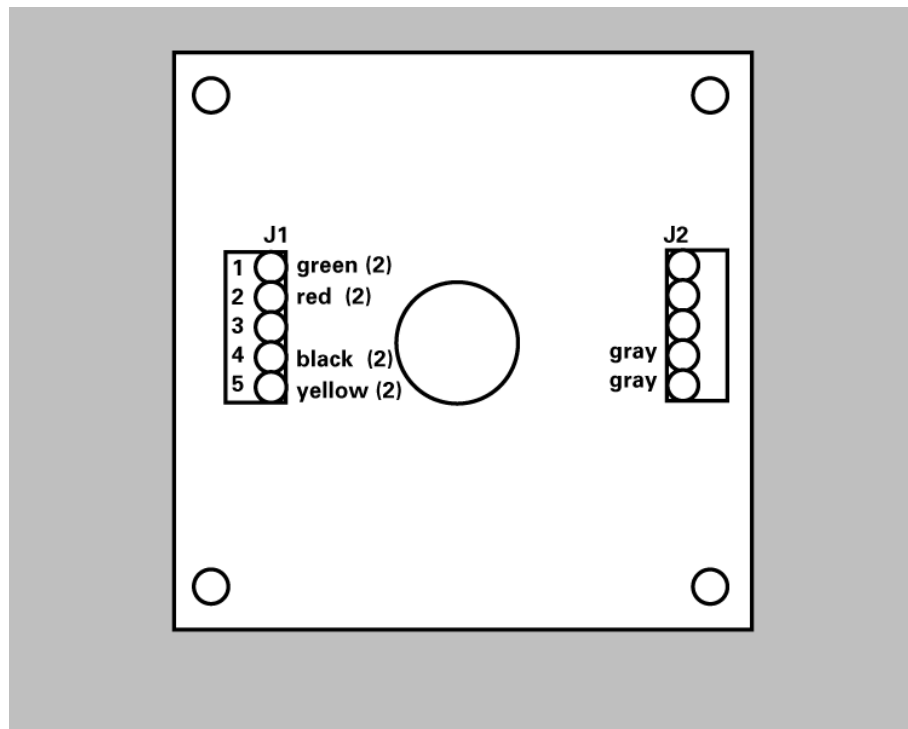
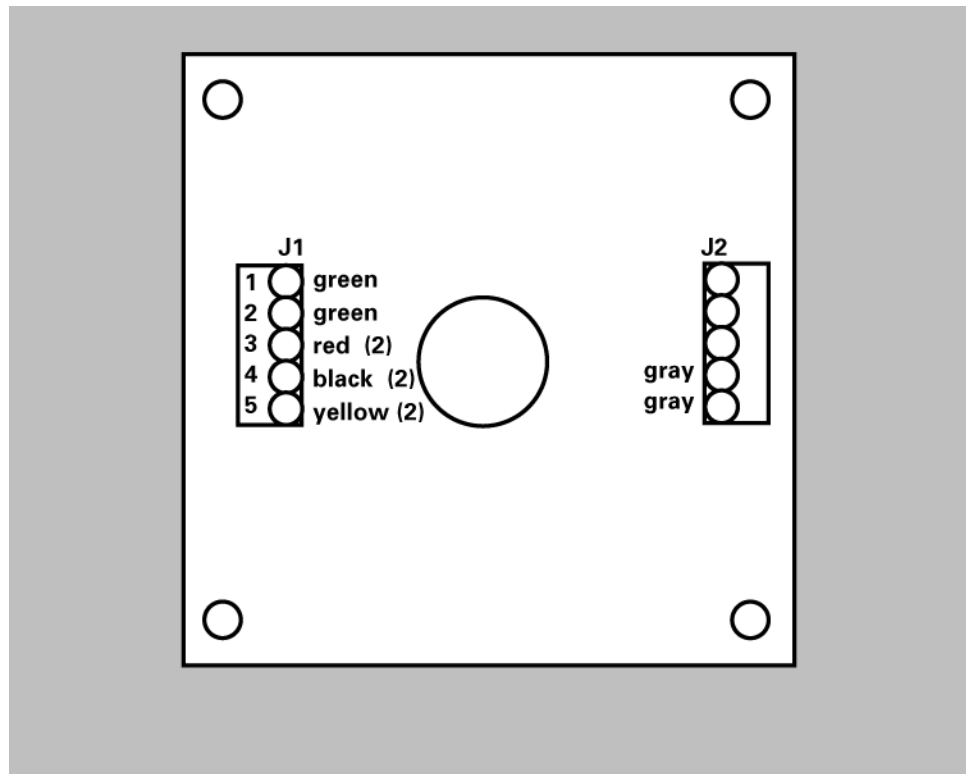


Figure 48
Parallel Switch
Configuration

Figure 49
Series Switch
Configuration



5. Make sure the two gray wires from the pushbutton switch are connected to terminals 1 and 2 of J2.
6. Screw the inner section of enclosure #1 to the junction box using the two screws provided. If the cable is routed on the surface of the wall, make sure it sits in the notch on the bottom of the enclosure. Confirm that no wires are being pinched between the junction box and the enclosure.
7. Hook the outer section of the enclosure onto the inner section at the top. Push the wires all the way into the enclosure and fasten the two pieces at the bottom with the 6-32 x 5/16-inch screw.
8. Cut the handset connector from the end of the cable that will connect to switch enclosure #2 and strip about 1 ½-inch of the white jacket.
9. Strip ¼-inch of insulation from each of the conductors.
10. Connect the cable conductors to terminal block J1 on the PCB of switch enclosure #2 as shown in *Figure 47* (the same as the single switch configuration).
11. Make sure the two gray wires from the pushbutton switch are connected to terminals 1 and 2 of J2.
12. Screw the inner section of enclosure #2 to the junction box using the two screws provided. If the cable is routed on the surface of the wall, make sure it sits in the notch on the bottom of the enclosure. Confirm that no wires are being pinched between the junction box and the enclosure.
13. Hook the outer section of the enclosure onto the inner section at the top. Push the wires all the way into the enclosure and fasten the two pieces at the bottom with the 6-32 x 5/16-inch screw.

Installing a Generic Two-Wire Remote Exposure Switch

1. Strip ¼-inch of insulation from two 28-16 AWG wires.

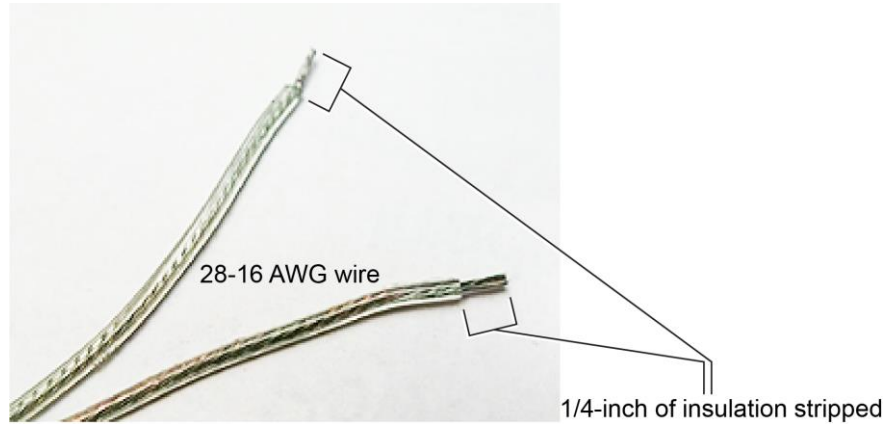
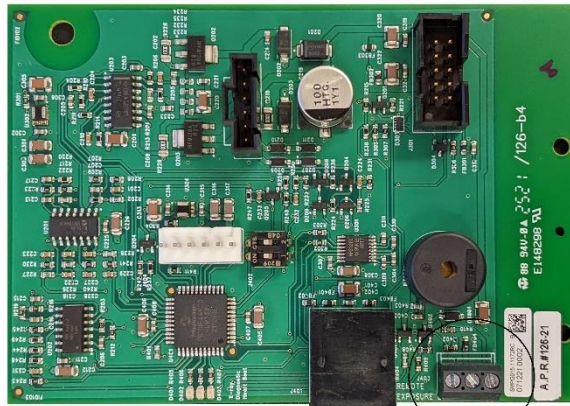


Figure 50
Stripping
insulation from
the wires

2. Remove the control unit cover and the logic board locking screw.
3. Swing open the logic board and locate terminal block J403 on the Logic Board (015-11172-00), as shown in Figure 51.



J403 Remote Exposure Switch Connector

4. Use a small flat-head screwdriver to connect the remote exposure switch wires to the “EXP” and “COM” terminals of terminal block J403. There must be no exposed wire strands outside the terminal block (as shown the photograph on the right).

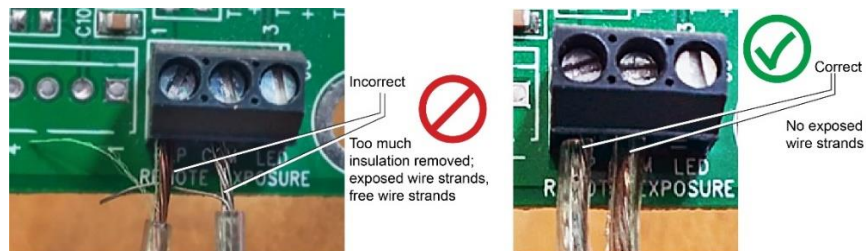


Figure 52
Correctly
connecting wires
to the terminal
block



It is critical that the exposure switch wires be connected to the terminal block with no exposed strands of wire. Exposed wires can short circuit and cause unintended exposure to radiation.

5. Swing the logic board closed and secure it with the locking screw
6. Replace the control unit cover.
7. Follow the manufacturer's directions to connect the two-way switch to the other ends of the wires.

Installing the 12 Inch [30 CM] Cone (30-A2200)

The Preva Dental X-ray System is factory set for use with the standard supplied 8 inch (20 cm) Cone. The 12 inch (30 cm) Cone (30-A2200) is recommended when using parallel film positioning techniques. Using the longer cone requires longer exposure times. See the System Configuration section of this manual on page 66 or setting the system to use the longer cone.

System Configuration

System Configuration Mode

About System Configuration Mode

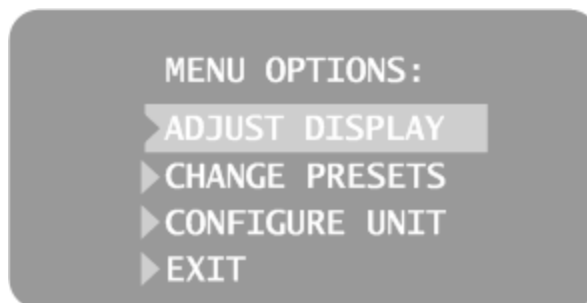
The Preva Dental X-ray System has a software-driven system configuration mode. When the Preva is in system configuration mode, you can perform the following procedures:

- Adjusting the Display
- Changing the Pre-programmed Exposure Settings
- Change the Cone Size
- Showing the Current System Configuration
- Display Diagnostic Data

Using System Configuration Mode

1. To enter system configuration mode, press the Tooth Selection and Patient Size Selection buttons on the Operator Panel simultaneously for 5 seconds. The display shows the Main System Configuration menu, as shown in Figure 54, and the Ready Indicator blinks.
2. To select menu items while in system configuration mode, use the up and down arrows to highlight a menu option. Then use the right arrow button as an "Enter" button to select the highlighted option. When changing presets, the right arrow button is also used to select the technique factor.
3. After selecting a menu option, use the up and down arrows to increase or decrease values.

Figure 53
Main System
Configuration
Menu



Adjusting the Display

The Preva Dental X-ray System allows the operator to adjust the display image.

1. From the Main System Configuration menu, Figure 54, select ADJUST DISPLAY. You will see the Display Options menu shown in Figure 55.
2. Selecting EXIT returns the display to the Main System Configuration menu.

Adjusting Contrast

1. Select ADJUST CONTRAST from the menu. You will see the Progeny® logo.
2. Use the up and down arrows to increase or decrease the contrast between the menu text and the display background.
3. Press the right arrow to save your settings.

Reversing the Image

1. Select REVERSE IMAGE from the menu. The text and display background colors will be swapped.
2. Press the right arrow to save your settings.

Figure 54
Display Options
Menu



Changing Preprogrammed Exposure Settings

The Preva Dental X-ray System allows the operator to increase or decrease image density for all presets for a receptor simultaneously or to change each of the technique factors for a preset individually. You can also restore factory default settings. For charts of the default settings, refer to Preprogrammed Exposure Times on page 21 in the Preva User Manual.

Note: If the 12" [30 cm] cone will be used, configure the Preva for use with the 12" cone before changing preprogrammed exposure settings. Configuring the Preva for use with the 12" cone will reset exposure settings to the default settings used with the 12" cone.

Displaying the Change Presets Menu

1. From the Main System Configuration menu, Figure 53, select CHANGE PRESETS. You will see the Preset Options menu shown in Figure 55.
2. Selecting EXIT returns the display to the Main System Configuration menu.

Changing All Receptor Settings Globally

1. Select ALTER DENSITIES from the Preset Options menu. The first Image Receptor Type illuminates. The display shows the selected Image Receptor Type and current density.
2. Using the Image Receptor Type button, select the image receptor to adjust.
3. Use the up and down arrow buttons to specify a percentage by which densities will be increased or decreased for the selected receptor. Densities can be increased in steps of 25% and decreased in steps of 20%.
4. Press the right arrow to save your settings.

Preprogramming to Digital Sensors

1. Energize the system.
2. Press the Tooth Selection and Patient Size Selection buttons for five full seconds.
3. Select CHANGE PRESETS from the Menu Options screen.
4. Select SELECT RECEPTOR from the Preset Options menu.
5. Press the up or down button to highlight the sensor or phosphor plate to change, and press Enter.
6. Select YES or NO on the Verification screen.
7. Exit the Preset Options menu.

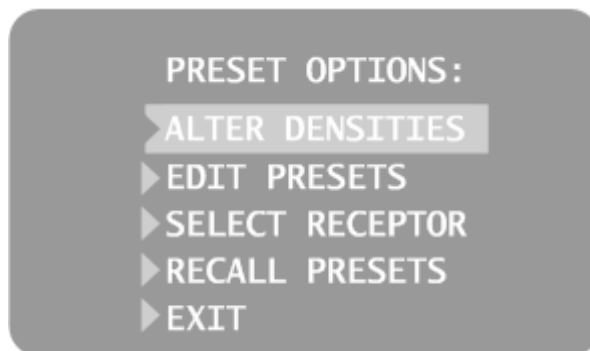
Changing Presets Individually

1. Select EDIT PRESETS from the Preset Options menu. The display notifies you that you are entering Edit Preset Mode, and Tooth Size, Image Receptor Type and Patient Size are illuminated.
2. Use the Tooth Selection, Image Receptor Type and Patient Size Selection buttons to select the preset to change. The display shows the current values for the preset.
3. Use the right arrow button to display the technique factor to change.
4. Use the up and down arrow buttons to set the value for the selected technique factor and preset.
5. Repeat steps 2-4 to change additional presets.
6. When you have completed all changes, press the Tooth Selection and Patient Size Selection buttons simultaneously for 5 seconds to record the change.

Recall Presets

1. To return all presets to factory defaults, select RECALL PRESETS from the Preset Options menu. The menu will ask you to confirm your choice.
2. Select YES using the up arrow button and return all presets to factory default settings. Selecting YES will erase any custom presets that have been set up.
3. Select NO using the down arrow button and retain current presets.

Figure 55
Preset Options
Menu

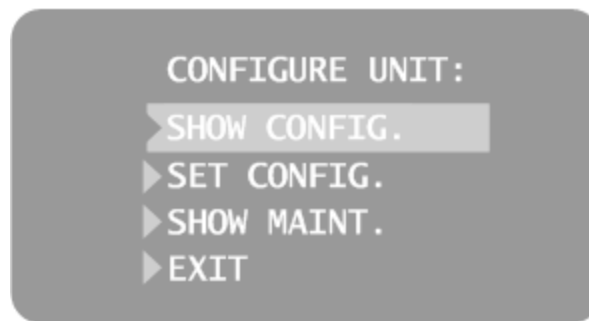


Showing Current System Configuration

The Preva Dental X-ray System displays the current system configuration. This display is informational only.

1. From the Main System Configuration menu, Figure 54, select CONFIGURE UNIT. You will see the Configuration menu shown in Figure 56.
2. Select SHOW CONFIG. The display will show:
 - Current software version
 - Cone size
 - Diagnostic mode on or off
3. Press any button on the Operator Panel to return to the Configuration menu.

Figure 56
Configuration
Menu



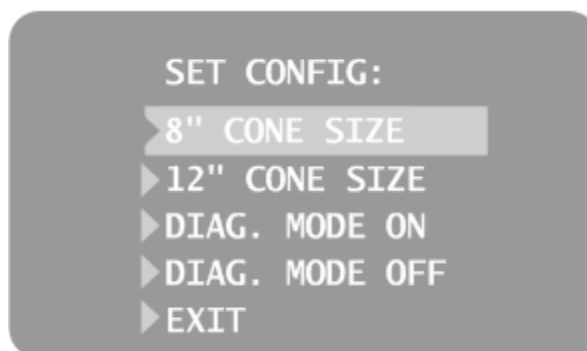
Changing the Cone Size

Using a 12 inch
[30 CM] Cone

Selecting SET CONFIG from the Configuration menu, Figure 56, displays the Set Configuration menu, Figure 57, with options to change the cone size. The Preva Dental X-ray System is preset for use with the standard supplied 8" (20 cm) Cone. The 12" (30 cm) Cone (30-A2033) is available. Using the longer Cone requires longer exposure times, which the Preva automatically selects when you change the Cone size in the Set Configuration menu.

1. From the Main System Configuration menu, Figure 53, select CONFIGURE UNIT. You will see the Configuration menu shown in Figure 56.
2. Select SET CONFIG. You will see the Set Configuration menu, shown in Figure 57.
3. From the Set Configuration menu, use the up and down arrows to highlight the 12" CONE SIZE.
4. Press the right arrow button to select the 12" Cone. The display warns you that selecting the 12" Cone will override custom presets with the default factory settings for the 12" Cone.
5. Using the up arrow, select YES to install presets for the 12" Cone.

Figure 57
Set Configuration
Menu



Diagnostic Mode

About Diagnostic Mode

The Preva Dental X-ray System has a diagnostic mode in which you can display a summary of maintenance data or display feedback values after each exposure.

Showing the Maintenance Summary

1. From the Main System Configuration menu, Figure 53, select CONFIGURE UNIT. You will see the Configuration menu shown in Figure 56.
2. Select SET CONFIG. You will see the Set Configuration menu, shown in Figure 57.
3. To display a summary of maintenance data, highlight select SHOW MAINT. The following maintenance data are displayed:
 - Total KJ (kilojoules—total system heat on the X-ray tube)
 - Exposure Count
 - Reboots (power up cycles)
 - OT Counts (over-threshold counts)
4. Press any button on the Operator Panel to return to the Configuration menu.

Showing Feedback Values After an Exposure

If you take an X-ray while in diagnostic mode, the display shows feedback values for that exposure. Until you exit diagnostic mode, the display will continue to show feedback values after each exposure.

1. From the Main System Configuration menu, Figure 53, select CONFIGURE UNIT. You will see the Configuration menu shown in Figure 56.
2. Select SET CONFIG. You will see the Set Configuration menu, shown in Figure 57.
3. From the Set Configuration menu, use the up and down arrows to highlight DIAG MODE ON. Press the right arrow button to turn on diagnostic mode.
4. Exit System Configuration mode by highlighting and selecting EXIT in the Configuration and Main menus.
5. Make an exposure. The display will show the following feedback values:
 - kV
 - mA
 - Filament current
6. Press any button on the Operator Panel to clear the feedback values from the display.
7. To exit diagnostic mode, press the Tooth Selection and Patient Size Selection buttons simultaneously for 5 seconds to display the Main System Configuration menu. From the Main menu, highlight and select CONFIGURE UNIT. Then highlight and select SET CONFIG. On the Set Configuration menu, highlight and select DIAG MODE OFF.
8. Note: Feedback values are approximate.

Calibration

Calibrating kV

Devices with firmware revision of 5.0 and below will require calibration of the tube current. Please contact Midmark at the number listed in the manual for calibration instructions.

Occasionally, it may be necessary to calibrate kilovoltage (kV). Approximate mA and kV levels can be observed using the Diagnostic Mode feature of the Preva system. If the kV needs calibration, follow these steps.

1. Energize the system.
2. Press and hold the Tooth Selector switch and the Patient Size Selector switch for five seconds.
3. Select the SET CONFIG option. You will see the Set Configuration menu, Figure 56.
4. Press the down arrow to highlight the DIAGNOSTIC MODE ON option, and press Enter. You will see the Configure Unit menu, Figure 57.
5. Press the down arrow to highlight the Exit option, and press Enter. This displays the Menu Option screen, Figure 53.
6. Press the down arrow to highlight the Exit option, and press Enter. This returns the display to operational mode.
7. Press Enter to select the kV to be adjusted.
8. Press Enter to highlight the time to be adjusted.
9. Observe normal radiation protection procedures in preparation for the following steps.
10. Make an exposure.
11. Observe the feedback values.

Adjusting kV during Calibration

To adjust kV:

1. Press the Up switch to activate the Adjust feature. This displays the Current kV Modulation Level screen.
2. Press the Up or Down switch while observing the Counts indicator.
3. Adjust the Counts in small increments.
4. Press Enter to exit and return to operational mode.
5. Make an exposure and observe the feedback.
6. Repeat steps 1 – 5 until the desired kV level is reached.

Deactivating the Calibration Session

Once completed, it is necessary to deactivate the calibration session.

1. Press and hold the Tooth Selector switch and the Patient Size Selector switch for five seconds. You will see the Menu Options screen, Figure 53.
2. Press the down arrow to highlight the CONFIGURE UNIT option, and press Enter. This displays the Configure Unit menu, Figure 56.
3. Press the down arrow to highlight the Set Configuration option, and press Enter. You will see the Set Configuration menu, Figure 57.
4. Press the down arrow to highlight the Diagnostic Mode Off option, and press Enter. This displays the Configure Unit screen.
5. Press the down arrow to highlight the Exit option, and press Enter. This displays the Menu Option screen.
6. Press the down arrow to highlight the Exit option and press Enter. This returns the system to operational mode.

Troubleshooting

Electrical Performance Issues

Contact Support

Questions should be directed to Midmark Technical Support:

Phone: 800-MIDMARK

Fax: 847-415-9801

imagingtechsupport@midmark.com

General Information

Test Equipment

Electrical measurements require specific meter test probes. Use small test clips, such as Pomona Electronics Minigrabber Test Clip Model 6248 or Radio Shack Mini-Hook Adapters catalog # 270-334, or the equivalent.

Replacement Parts

- | | |
|-------------------------------|--------------|
| • Kit, Power Supply Board | 30-A2155 |
| • Kit, Logic Board | 002-10790-00 |
| • Operator Panel Board | 30-08054 |
| • 25 foot Communication Cable | E1-13003 |
| • 6 inch Communication Cable | E1-13004 |
| • Rocker Switch | E1-19026 |
| • Yoke Cable Assembly | 30-08071 |
| • Tubehead Assembly | 30-A1027 |
| • Ribbon Cable Assembly | 30-08072 |

Note:

- If you replace the Operator Panel Board 30-08054, you must re-program any customized technique factors, as explained in the System Configuration section of this manual.
- If you replace the Logic Board 015-11172-00 or the Tubehead, and the firmware revision is 5.0 or less, you must recalibrate the system. Please contact Midmark Technical Support for instructions.



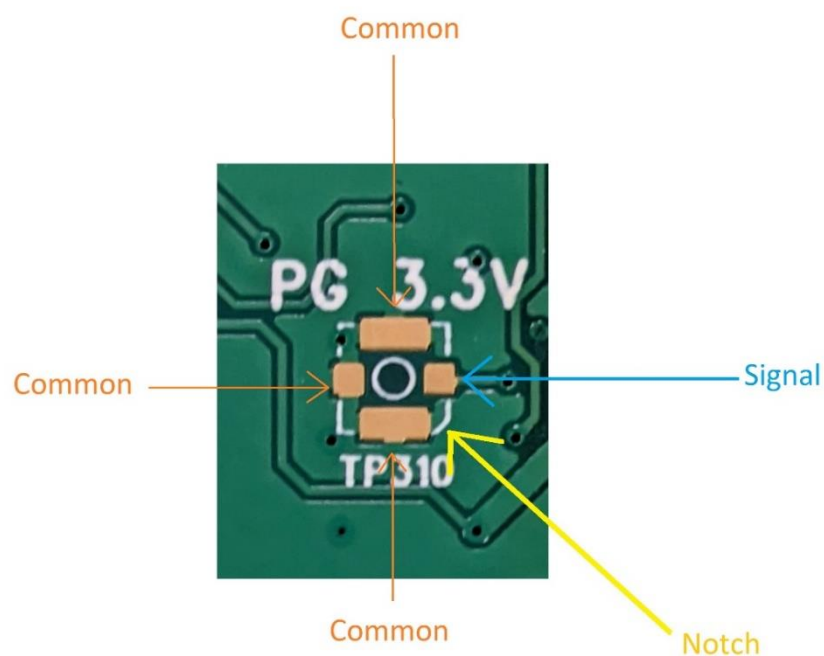
The Preva system has the capacity to store electrical energy during operation and after the system has been turned off.

- The Preva system will store energy for approximately three minutes after removal from power lines.
- Before attempting service within the system, observe the green LED "D11" of the Power Supply Board. Illumination represents the presence of stored energy.
- As an added safety practice, it is recommended to measure for the presence of DC voltage across TP8 and TP5 of the Power Supply Board.

Responsibilities of the Installer and Service Engineer

- **Verification of machine performance after installation** must be performed according to the guidelines identified in the section System Function Checklist.
- **Verification of machine performance after maintenance or repair** must be performed according to the guidelines identified in the section System Function Checklist. Calibration instructions are identified in the section Calibration.
- **Radiation safety practices must be observed** when making exposures for troubleshooting.

Identification of Test Point Pad “Notch”



Each Test Pad contains a "notch" in the corner of the footprint. The smaller pad closest to the "notch" is the signal (in this example, Power Good 3.3V), while the surrounding pads function as common return

Figure 58
Test Point
Identification

No Operator Display but Power Switch is ON

1. On the Power Supply Board 30-08041, check for the presence of 100 to 230 volts AC at J4, the Input Power Terminal Strip, as shown in Figure 59. If power is absent, check that the Preva is connected to line power.
2. On the Power Supply Board 30-08041, measure incoming power at J3, the Line Switch Connector, as shown in Figure 59. Positions 2 and 4 carry the line voltage before the Line Switch, and positions 1 and 3 carry the line voltage after the Line Switch. Voltage at the input side of the switch, but not at the output, requires replacement of the Line Switch E1-19000.
3. Inspect the condition of the communication cable between the Logic Board and the Operator Panel. Midmark includes two communication cables with each Preva system. Should the installed communication cable be suspect, temporarily substitute the other cable as a test tool.
4. If the power switch is on and there is no operator display and a faint buzzing sound is also detected, check the ribbon cable installed between the Power Supply Board and the Logic Board. If the cable is not properly seated, reinsert it. If it is damaged, replace the cable.
5. On the Logic Board, measure voltages at TP312 (+8.1V) and TP313 (+24V) as shown in Figure 60. Use the surrounding pads on the test points as common return (Refer to Figure 58 for measurement instructions). If any of these voltages are not present after power is applied, next check voltages on the Power Supply Board.
6. On the Power Supply Board, use TP2, as a common test point, and check TP1 +24 volts DC and TP3 8.1 volts DC, as shown in Figure 59. Then use TP5 as the common return to check TP4 for the presence of +12 volts DC. Should any of these voltages not be present, replace the Power Supply Board. If each voltage is present, inspect the condition of the ribbon cable between the Power Supply Board and the Logic Board. If the cable is undamaged and seated properly, replace the Logic Board.
7. If the power supply voltages are present, and the ribbon cable and communication cable are found acceptable, open the Operator Panel case and measure for the presence of +5 volts DC across TP1 and TP4 of the Operator Panel Board, as shown in Figure 61. Absence of this voltage indicates the need to reconfirm the power supply voltages and communication cable. Presence of the voltage requires the replacement of the Operator Panel Board.

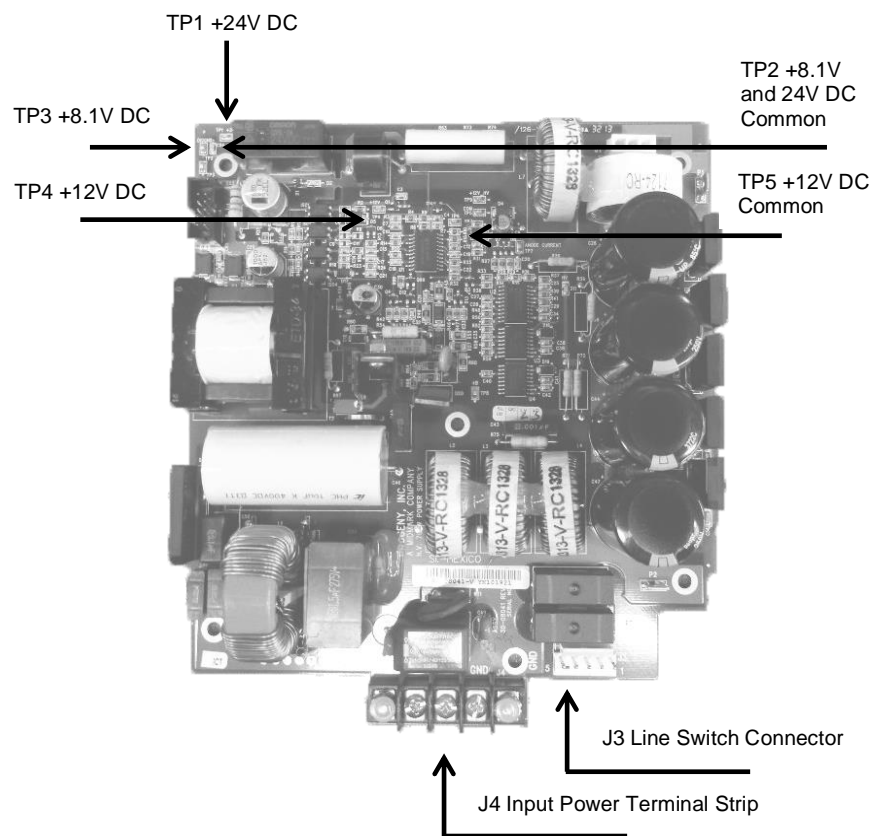


Figure 59 Power Supply Board 30-08041

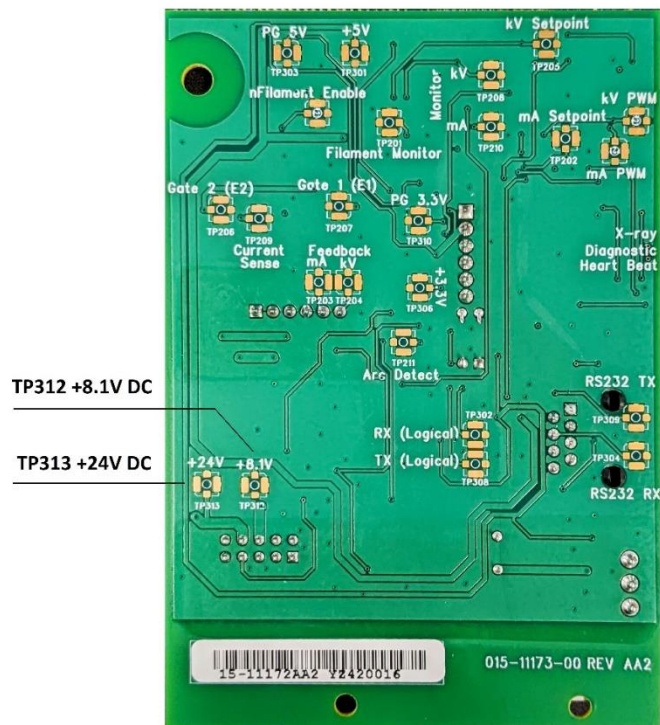
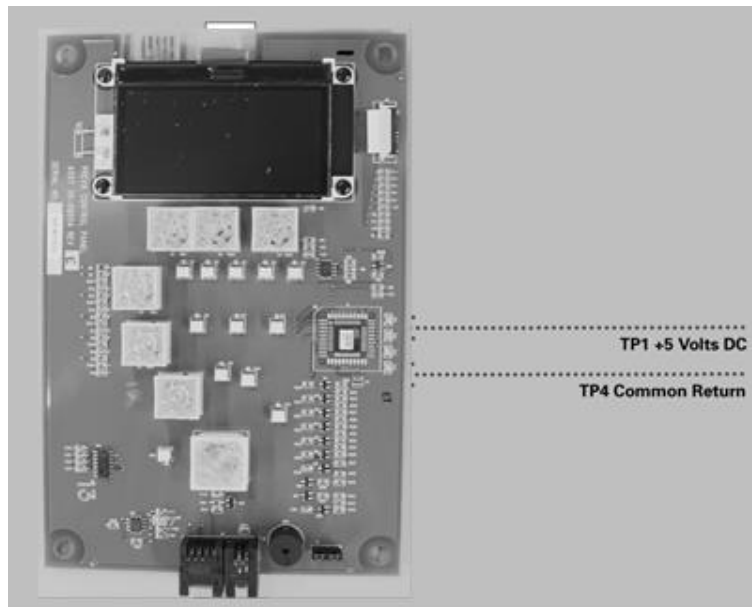


Figure 60
Logic Board
015-11172-00

Use the smaller pad on the side of the footprint with a "notch" in the corner.
Any other surrounding pad can be used as Common Return.

Refer to Figure 58 for measurement instructions

Figure 61
Operator Panel
Board 30-08054



Light or Dark X-ray Images

1. Adjust the selected exposure time, kilovoltage or tube current to produce an acceptable image. If necessary, reprogram the techniques factors, as explained in the System Configuration section of this manual.
2. Verify the kilovoltage and tube current during an exposure using the diagnostic mode, as explained in the System Configuration section of this manual. Alternatively, you may employ a non-invasive meter to evaluate kilovoltage and exposure time.
3. Inspect the condition of the remaining imaging chain components such as the film, chemistry and processor, or the condition of the X-ray sensor and computer.
4. Check for a flickering of the operator panel display during exposure. If this is occurring, replace the Logic Board.
5. Light image can be caused by the Logic Board. This is characterized by a short pulse of exposure as viewed on the display followed by an error. Replace the Logic Board.
6. Full fluorescence with light image may require adjustment of the preprogrammed techniques.

At Power up, the Operator Display Stops at “Preva”

Replace the operator display board.

At Power Up, Continuous Beep, Backlit Display, No Display

Replace the Operator Display Board [30-08054] or the Logic Board [015-11172-00], or both.

At Power Up, Continuous Beep with Normal Display

Replace the Logic Board [015-11172-00].

At Power Up, Buzzing Noise is Heard

Replace the Logic Board [015-11172-00].

X-ray Indicator, No Exposure Termination, No Radiation Produced

1. Check if both audible indicators operate. Check the Operator Panel first, then check the Logic Board second.
2. If only the Operator Panel indicator works, check if diode “D2” on the Power Supply Board and “D401” on the Logic Board illuminate during the exposure request.
3. If “D2” and “D401” do not illuminate, this indicates that the “X-ray backup” conductors in the Cat 5 communication cable are open.
4. Connect a substitute communication cable to test for this condition.
5. If the symptom persists, contact Technical Support.

Display Shows “Error – Serial Communication”

If the Cat 5 communication cable is open between the Logic Board and Operator Panel boards, replace the cable.

Display Shows “Pre-termination Error”, Early Exposure Release Determined Not to be the Cause

This error can be caused by a high voltage breakdown in the head and is characterized by a snapping or popping noise within the Tubehead.

1. Inspect the condition of the feedback cable.
2. Inspect the condition of the communication cable.
3. If used, inspect the remote exposure switch wiring for a loose connection.

Refer to the High-voltage Breakdown information in the Troubleshooting section for detailed instructions.

All X-ray Indicators, But No Voltage Measured at J1 on the Power Supply Board

Replace the Power Supply Board [30-08041].

Very Short Exposures, Regardless of Selected Exposure Time

This condition will exist if the kV or mA produced is out of tolerance. To address this issue:

1. Inspect the condition of the high voltage circuit by operating the Preva in the diagnostic mode. Confirm incorrect kV or mA.
2. Inspect the VetPro®'s internal horizontal and articulated arm wiring. Repair as necessary.
3. If wiring is intact, and the firmware revision is 5.0 or less, attempt system recalibration. If greater, replace logic PCB assy (015-11172-00).
4. If calibration cannot be achieved, the problem may require replacement of the tubehead assembly. Contact Midmark technical support for further assistance.

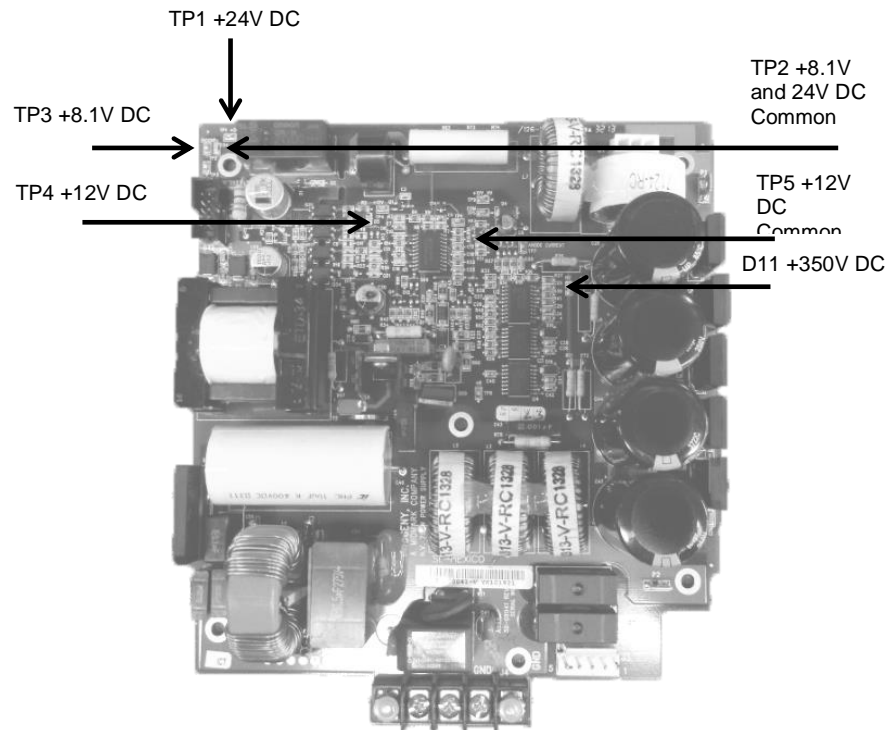
No X-ray Produced but Exposure Indicators Detected

When no X-ray is produced, the Preva may still operate the exposure indicators. The procedure to troubleshoot a no X-ray condition depends on which exposure indicators are detected.

1. Activate diagnostic mode, as explained in the System Configuration Mode section of this manual.
2. Take an exposure.
3. Follow the appropriate procedure below:
 - If no kV is produced, go to the procedure No kV Produced.
 - If no mA is produced, go to the procedure No mA Produced.
 - If no “I” is produced, go to the procedure No (I) Filament Produced.

No kV Produced

1. On the Power Supply Board, observe that the power supply indicator D11 +350volts DC is illuminated, as shown in Figure 62. Illumination represents proper stored energy for an exposure. If this indicator is not illuminated, it will be necessary to replace this board.
2. On the Logic Board, measure voltages at TP312 (+8.1V) and TP313 (+24V) as show in Figure 63. Use the surrounding pads on the test points as common return (Refer to Figure 58for measurement instructions). If any of these voltages are not present after power is applied, next check voltages on the Power Supply Board.
3. On the Power Supply Board, use TP2 as a common test point to check TP1 +24 volts DC and TP3 8.1 volts DC. Then use TP5 as the common return to check TP4 for the presence of +12 volts DC, as shown in Figure 62. Should any of these voltages not be present, replace the Power Supply Board. If each voltage is present, check other voltages on the Logic Board.
4. On the Logic Board, measure between the surrounding test point pads and TP205, kV Setpoint as shown in Figure 63. This voltage should be between 3 and 4 volts DC. If this voltage is not present, replace the Logic Board. If this voltage is correct, inspect the condition of the ribbon cable between the Power Supply Board and the Logic Board. If the cable is undamaged and seated properly, replace the Logic Board.
5. Check the condition of the cables between the Control Unit and the Tubehead assembly. If no X-ray occurs and no errors are displayed, the problem may lie within the conductors of the white connector (which is primary power to the Tubehead Assembly). If no X-ray occurs and the attempt is accompanied by a "snap" sound, the problem may lie with the conductors of the black connector (which is transmitting the feedback signals). Connections for this cable begin with controls at J1 of the Power Supply Board and J201 of the Logic Board. As shown in Figure 64, an internal set of connections will be accessed below the distal side of the horizontal arm and at the inside top of the Tubehead Yoke. The final set of connections is accessed by removing the Pivot Cap located at the attachment point of the Tubehead to the Yoke.
6. If D11 on the Power Supply Board is illuminated, power supplies are in order, and the cable connections are correct, place an AC voltmeter across the Tubehead connector J1 (white connector) on the black and white conductors, turn off error checking (Logic Board J402 in off position), request an exposure time of at least 1.5 seconds, and measure the resulting voltage during the exposure. Presence of 130 volts AC will require the replacement of the Tubehead Assembly. Absence of 130 volts AC will require re-inspection of the interconnect cables for open conductors.



**Figure 62 Power
Supply Board
30-08041**

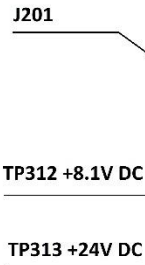
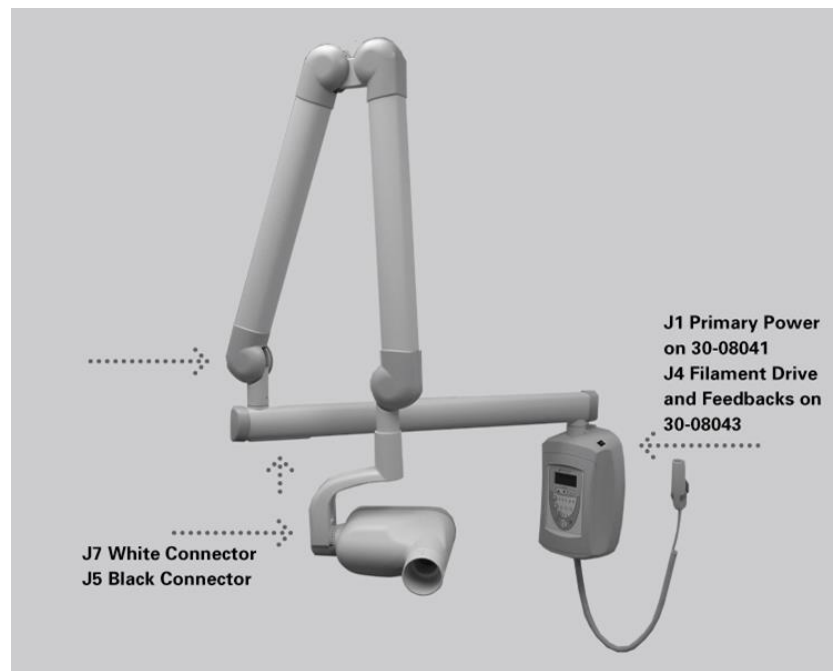


Figure 63 Logic Board 015-11172-00

Use the smaller pad on the side of the footprint with a "notch" in the corner. Any other surrounding pad can be used as Common Return.

Refer to Figure 58 for measurement instructions

Figure 64
Interconnect
Cable Locations



No mA Produced

1. On the Logic Board, measure voltages at TP312 (+8.1V) and TP313 (+24V) as shown in Figure 63. Use the surrounding pads of the test points for common return. Refer to Figure 58 for measurement instructions. If any of these voltages are not present after power is applied, next check voltages on the Power Supply Board.
1. On the Power Supply Board, use TP2 as a common test point to check TP1 +24 volts DC and TP3 8.1 volts DC as shown in Figure 65. Then use TP5 as the common return to check TP4 for the presence of +12 volts DC.
2. Should any of these voltages not be present, replace the Power Supply Board. If these voltages are correct, next check voltages on the Logic Board.
3. On the Logic Board, measure between the surrounding test point pads and TP202, mA Setpoint. This voltage should be between 1 and 2 volts DC. If this voltage is not correct, replace the Logic Board.
4. If this voltage is correct, select 1.5 seconds of exposure time, measure across pin 1 and pin 2 of the Logic Board at the connector J201. During exposures, this value should be 24 volts AC. Also measure across pin 2 and pin 3 of J201. This value should be 24 volts AC. If either voltage is missing, replace the Logic Board.
5. If these voltages are present, measure for the same values at the Tubehead Assembly at the connector J5 (black) on the blue and gray conductors and the blue and brown conductors. If the voltages are not present, inspect the inter-connect cables between the control and Tubehead Assembly.
6. Connections for this cable begin with controls at J1 of the Power Supply Board and J201 of the Logic Board. As shown in Figure 64, an internal set of connections will be accessed below the distal side of the horizontal arm and at the inside top of the Tubehead Yoke. The final set of connections is accessed by removing the Pivot Cap located at the attachment point of the Tubehead to the Yoke.
7. If the voltages are present, replace the Tubehead Assembly.

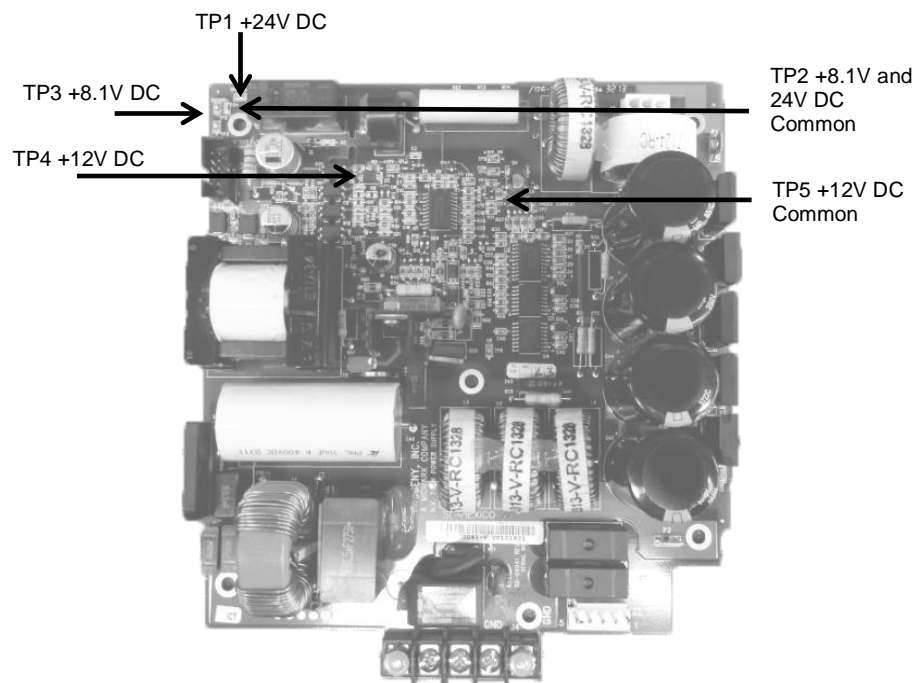


Figure 65
Power Supply
Board 30-08041

No (I) Filament Produced

1. On the Logic Board, measure voltages at TP312 (+8.1V) and TP313 (+24V). Use the surrounding pads of the test points for common return. Refer to Figure 58 for measurement instructions. If any of these voltages are not present after power is applied, next check voltages on the Power Supply Board.
2. On the Power Supply Board use TP2 as a common test point to check TP1 +24 volts DC and TP3 8.1 volts DC. Then, use TP5 as the common return to check TP4 for the presence of +12 volts DC, as shown in Figure 67. Should any of these voltages not be present, replace the Power Supply Board.

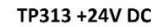


Figure 66
Logic Board 015-
11172-00

Use the smaller pad on the side of the footprint with a "notch" in the corner. Any other surrounding pad can be used as Common Return.

Refer to Figure 58 for measurement instructions

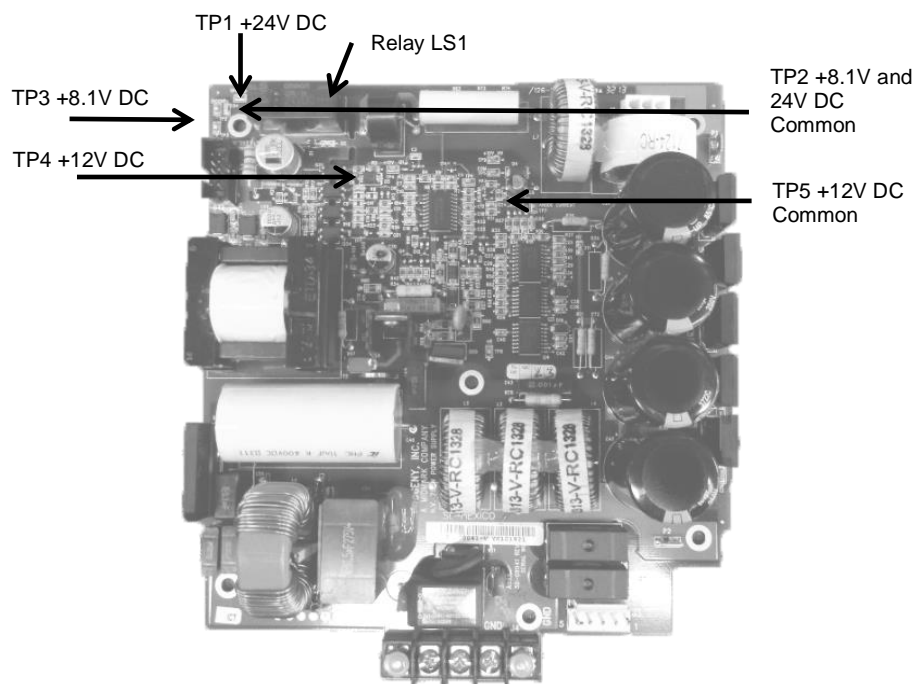


Figure 67
Power Supply
Board 30-08041

No X-ray Produced and No Audible Exposure Indicators

Two different audible exposure indicators are employed within the Preva system. One indicator is embedded in the Operator Panel and will initiate when any exposure switch is pressed. The second audible indicator initiates when the Logic Board begins the exposure sequence. During normal operation, first the Operator Panel indicator will sound followed shortly thereafter by the Logic Board indicator. It is important to recognize the sequence for troubleshooting purposes.

1. If the Operator Panel indicator does not sound, inspect the condition of any remote exposure switches. Substitution is the preferred method to test these switches, although a jumper wire can be applied across the contacts of J403, shown in Figure 68, on the Logic Board momentarily to simulate an exposure switch closure.
2. If the Operator Display indicator sounds, but the Logic Board indicator does not activate, observe LED D2 on the Power Supply Board, and listen for the relay LS1 to activate on this same board (Figure 67). LED D2 should illuminate during the exposure request. If not, inspect the condition of the ribbon cable between the Power Supply and the Logic Boards. If the ribbon cable is acceptable, replace the Logic Board.

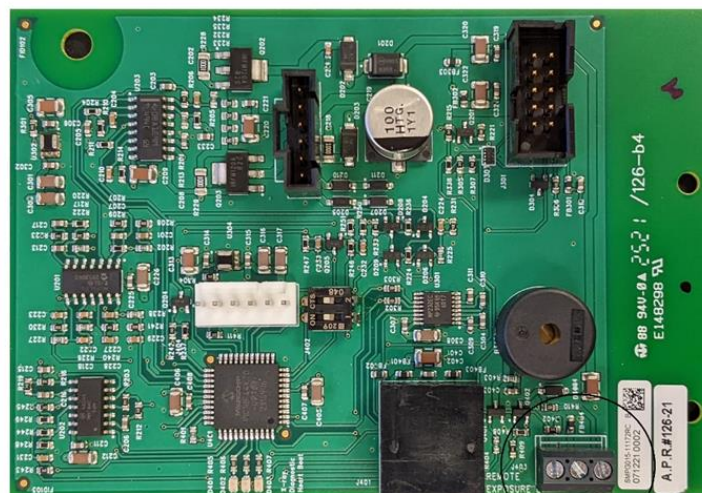


Figure 68
Logic Board
015-11172-00

J403 Remote Exposure Switch Connector

High-voltage Breakdown

High-voltage breakdown is characterized by a loud snap sound during an exposure request.

1. On the Power Supply Board, measure the voltage across TP5, the Common Return, and TP8, +350 volts DC, as shown in Figure 69. This voltage will be acceptable if measured between 330 and 390 volts DC. Values above or below this number indicate the need to replace the Power Supply Board.
2. If the voltage is correct, inspect the condition of the cabling between the Power Supply Board, Logic Board, and Tubehead Assembly.



High voltage present.

Of particular importance are the conductors held by the black connectors. These conductors transmit the feedback values from the Tubehead Assembly and directly affect the control of power to the Tubehead Assembly. Connections for this cable begin with controls at J1 of the Power Supply Board and J201 of the Logic Board. As shown in Figure 64, an internal set of connections will be accessed below the distal side of the horizontal arm and at the inside top of the Tubehead Yoke. The final set of connections is accessed by removing the Pivot Cap located at the attachment point of the Tubehead to the Yoke.

3. If the cabling is found acceptable, select 1.5 seconds of exposure time, and placing a DC voltmeter on the surrounding pads of the test points, measure the feedback values at TP210 mA Monitor and TP208 kV Monitor, as shown in Figure 70. Refer to Figure 58 for measurement instructions. Look for the following values:
 - TP210 – mA Monitor. This voltage should be between 1.5 and 3.5 volts DC during exposure attempts. The voltage should not oscillate between 1.5 and 3.5; instead the measurement should come to a specific value and stabilize. Oscillating values or absent values will indicate the need to replace the Tubehead Assembly.
 - TP208 – kV Monitor. This voltage should be between 3 and 4 volts DC during exposure attempts. The voltage should not oscillate between 3 and 4; instead, the measurement should come to a specific value and stabilize. Oscillating values or absent values will indicate the need to replace the Tubehead Assembly. If the feedback voltages are present and stable, replace the Logic Board.

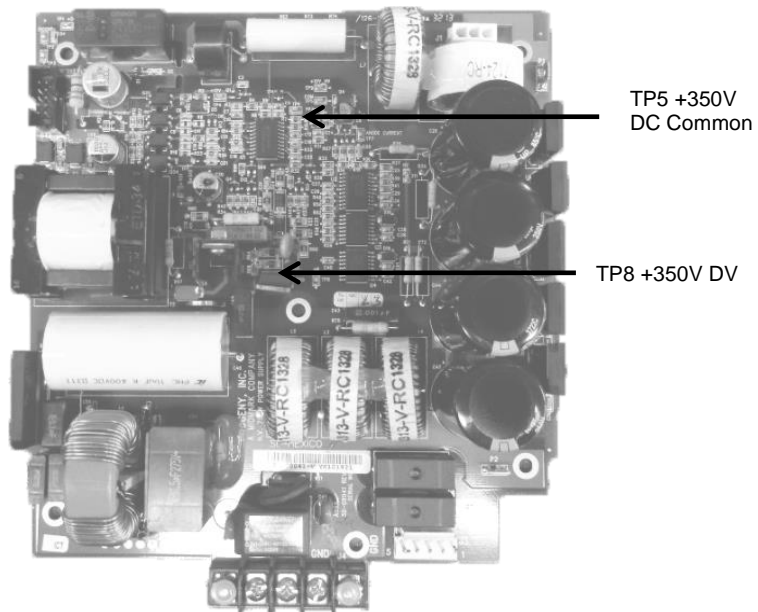


Figure 69
Power Supply
Board 30-08041

Incorrect kV

At times, non-invasive measurement of an otherwise fully functional system indicates that kilovoltages may be incorrect. Kilovoltage [kV] is controlled by the microprocessor and is not adjustable. The Preva generates kilovoltage by first establishing a reference voltage and then comparing the feedback voltage to the reference. Follow these steps to establish proper operation of the kV controls

1. On the Logic Board, place a voltmeter on the surrounding pads of the test point and TP205, kV Setpoint, as shown in Figure 70. Compare measurements to the following chart (volts DC). Refer to Figure 58 for measurement instructions.

	60 kV	65 kV	70 kV
4 mA	3.1	3.4	3.7
5 mA	3.2	3.5	3.75
6 mA	3.3	3.8	3.8
7 mA	3.4	3.7	N/A

2. To evaluate the feedback voltages that represent the measured kV within the system, compare the observed values in the table below. To properly observe these values, select 1.5 seconds of exposure time and measure the DC voltages during the exposure only. This measurement is made across surrounding pads of the test point and TP208, the kV Monitor as shown in Figure 70. Refer to Figure 58 for measurement instructions.

	60 kV	65 kV	70 kV
4 mA	3.1	3.4	3.7
5 mA	3.2	3.5	3.75
6 mA	3.3	3.6	3.8
7 mA	3.3	3.65	N/A

Values that approximately match the above tables represent a correctly operating system. Other values may indicate that boards need to be replaced. Additional assistance can be obtained from Midmark Technical Support.

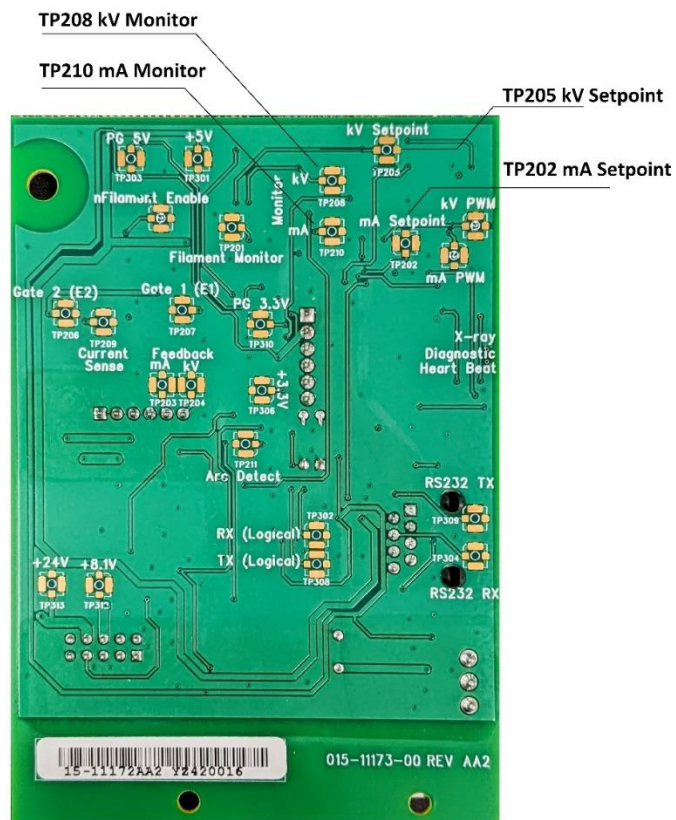


Figure 70
Logic Board 015-11172-00

Use the smaller pad on the side of the footprint with a "notch" in the corner.
Any other surrounding pad can be used as Common Return

Refer to Figure 58 for measurement instructions

Incorrect mA

At times, various measurements of an otherwise fully functional system indicate that milliamperage may be incorrect. Milliamperage [mA] is controlled by the microprocessor and is not adjustable. The Preva generates milliamperage by first establishing a reference voltage and then comparing the feedback voltage to the reference. Follow these steps to establish proper operation of the mA controls.

1. On the Logic Board, place a voltmeter on surrounding pads of the test point and TP202, mA Setpoint, as shown in Figure 70. Compare measurements to the following chart (volts DC). Refer to Figure 58 for measurement instructions.

	60 kV	65 kV	70 kV
4 mA	3.1	3.4	3.7
5 mA	3.2	3.5	3.75
6 mA	3.3	3.8	3.8
7 mA	3.4	3.7	N/A

2. To evaluate the feedback voltages which represent the measured mA within the system, refer to the table below; select 1.5 seconds of exposure time and measure the DC voltages during the exposure only. This measurement is made across the surrounding pads of the test point and TP201, the mA Monitor, as shown in Figure 70. Refer to Figure 58 for measurement instructions.

	Volts DC
4 mA	2
5 mA	2.4
6 mA	2.9
7 mA	3.4

Values which approximately match the above tables represent a correctly operating system. Other values may indicate that boards need to be replaced. Further assistance can be obtained from Midmark Technical Support.

Maintenance

Preva Tubehead Removal Instructions

Overview

Tubeheads are shipped with the yoke cable assembly already premounted to the tubehead. This guide provides instructions for the installation technician on how to remove the original head, install the replacement tubehead and, how to calibrate the replacement tubehead.



Do not remove the tubehead until the articulating arm assembly has been secured with the provided cable tie and foam insert. The spring tension is adjusted to account for the weight of the tubehead. The articulating arm will spring open and can cause serious injury if it is not secured.

Models Affected

All Prevas

Required tools

- Spanner wrench (30-T0055)
- Needle nose pliers
- Metric hex keys
- #2 Phillips head screw driver
- #1 Small Phillips head screw driver
- Fluorescent screen (22-11467)

Instructions

1. Remove the end cap from the side of the tubehead.



Figure 71

2. Remove the small Phillips head screw that holds the cable restraint and remove the restraint.

Figure 72



3. Remove the larger Phillips head screw.

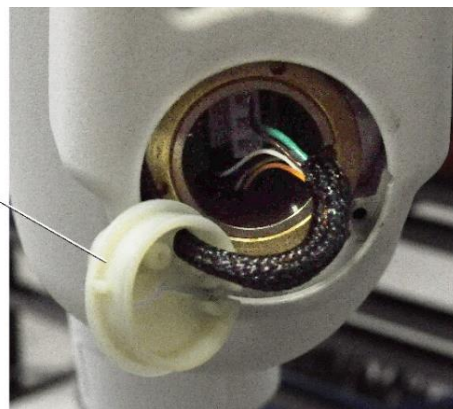
Figure 73



4. Remove the retaining ring by pulling it out with a pair of needle nose pliers.

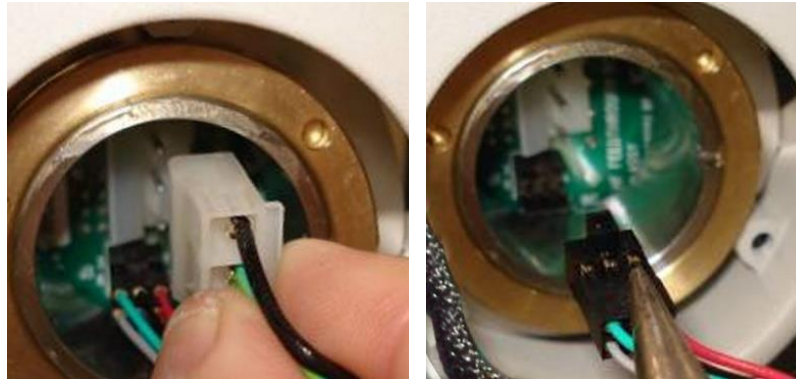
Figure 74

Retaining ring



5. Unplug the white and black connectors located inside the tubehead.

Figure 75

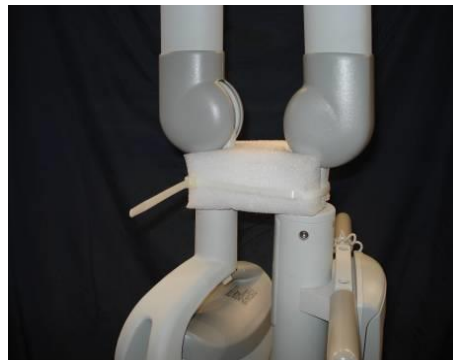


6. Secure the scissor arm with the provided cable tie and foam separator before removing both spanner rings.



Do not remove the tubehead until this step has been completed. The spring tension is adjusted to include its weight so the articulating arm will spring open and can cause serious injury if it is not secured.

Figure 76



7. Assemble the spanner wrench by threading the two leverage arms into the base of the spanner wrench.



Figure 77

8. Align the three pins on the spanner tool with the alignment holes in the brass spanner nut.

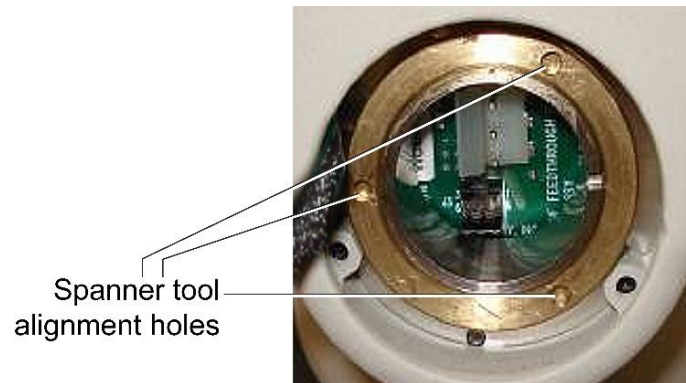


Figure 78

9. Break loose the spanner ring by turning the spanner wrench counter-clockwise.



Figure 79

10. Repeat steps 8 and 9 to remove the second spanner ring.
11. Carefully remove the tubehead from the yoke.

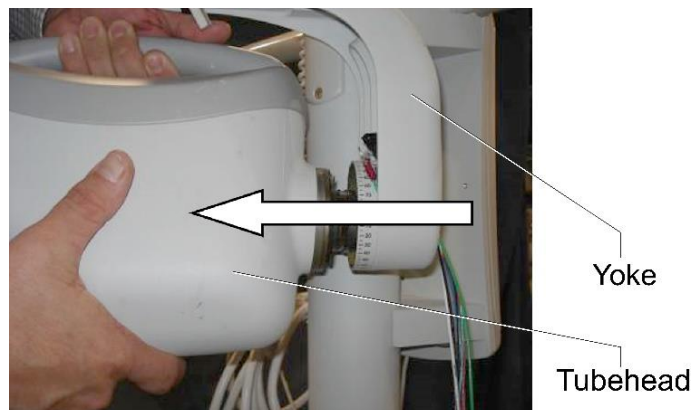


Figure 80

12. The black and white connectors and the yoke collar will remain with the yoke.

Black and white connectors



Yoke

Yoke collar

Figure 81

13. Insert the new tubehead into the yoke collar.

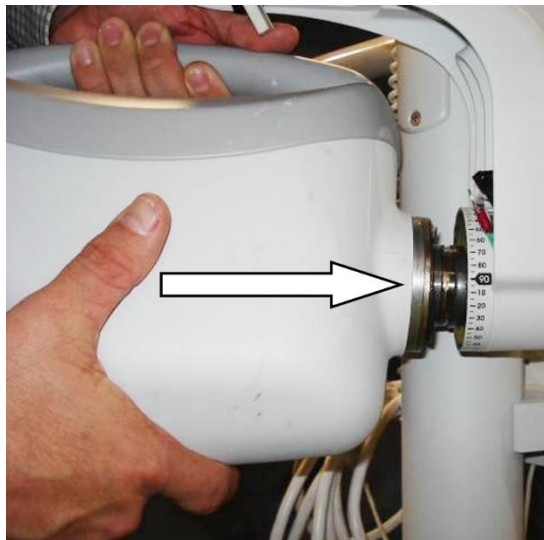


Figure 82

14. Manually thread the spanner nut on the tubehead shaft. Insert a small screwdriver into one of the alignment holes to finish tightening the spanner ring.



Figure 83

NOTE: Take care not to pinch or cut the cable.

15. Align the three pins on the spanner wrench with the three holes in the spanner nut.

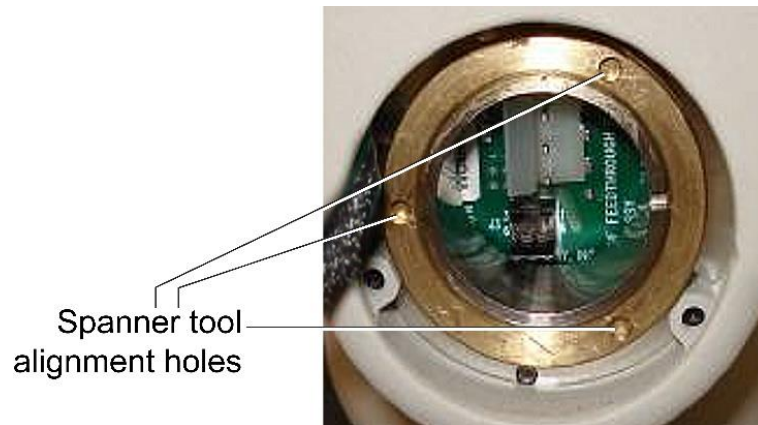


Figure 84

16. Tighten the spanner nut.

Figure 85



17. Repeat steps 13 through 16 for the second spanner nut.
18. Note that the black and white connectors are tabbed so they can be connected in only one orientation.

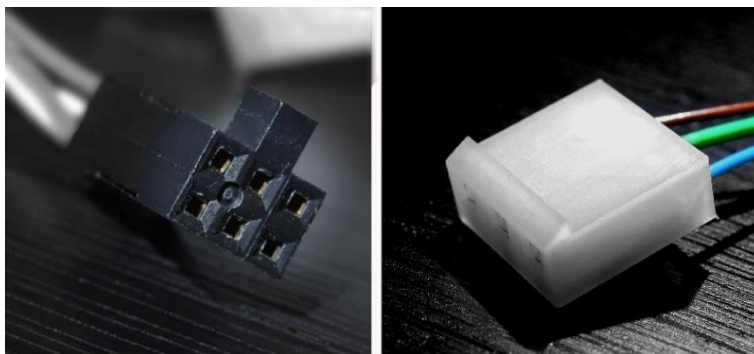


Figure 86

19. Reconnect both connectors (disconnected in step 5).



Figure 87

Figure 88

20. Snap the retaining ring into the center of the spanner nut. Orient the retaining ring with the larger screw hole at the 9:00 o'clock position.



Figure 89

21. Secure the retaining ring with the larger Phillips head screw.



Figure 90

22. Place the cap back on the tubehead.



Figure 91

23. Proceed with the automated calibration found in section Calibration if Logic PCB firmware revision is 5.0 or lower.

Mechanical Adjustments

Determining the Necessary Adjustment

The balance and friction of the Articulating Arm and the friction of the Tubehead are initially set at the factory. During the installation process, check the balance and friction. When moving the Tubehead, the Articulating Arm should be steady in all positions and move before the Horizontal Arm.

Tubehead Movement Horizontal Arm Adjustment

Note: The mechanical adjustments should not be used to compensate for a system that is not properly leveled on the wall.

Note: If performing this adjustment as part of the initial installation of the Preva, omit steps 1-3.

1. Remove the screw from the Control Unit front cover.
2. Carefully remove the front cover.
3. Note: If the Operator Panel is installed on the Control Unit, carefully keep the Operator Panel together with the front cover.
4. Unplug the cable connectors and set the front cover aside.
5. Locate the brake assembly at the top of the Control Unit. The brake assembly has a screw on either side of a clamping bar over the Horizontal Arm pivot post.
6. Using a 4 mm hex key, as shown in Figure 92, tighten the screws equally to apply adequate braking to the pivot post so that Horizontal Arm begins to move after the Articulating Arm.
7. Replace and re-connect the front cover of the Control Unit. Replace the screw on the front cover.

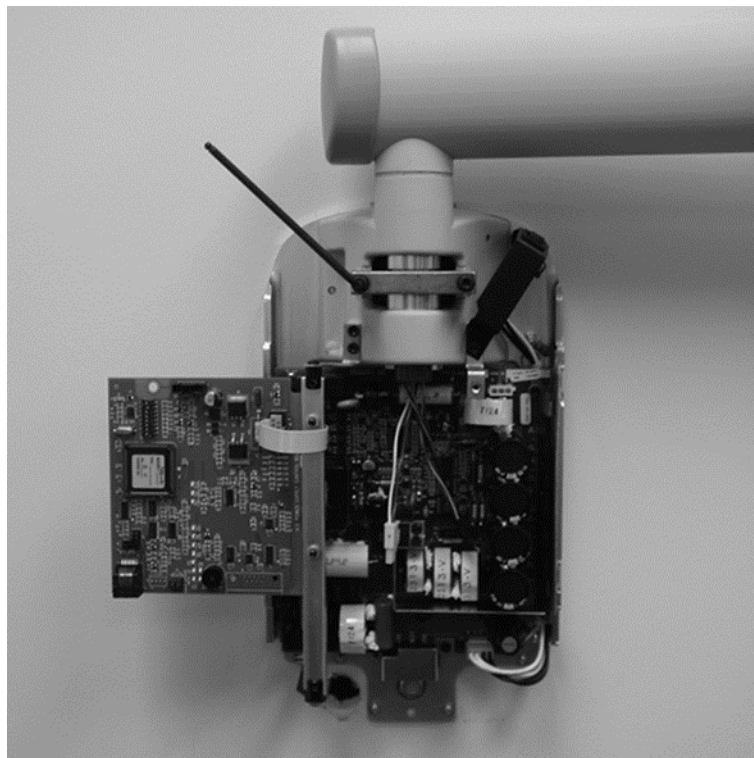


Figure 92
Tightening the
Brake

Adjusting the Horizontal Arm Brake Assembly

Locate the friction assembly screws. Using a 3 mm hex key, as shown in Figure 93, tighten or loosen screws as necessary to get proper movement without unwanted horizontal movement of the Articulating Arm.



Do not attempt to adjust any other screws in the horizontal arm.

Figure 93
Adjusting the Articulating Arm Brake Assembly

Adjusting the Articulating Arm

Follow this procedure **ONLY** if the yoke assembly does not stop on its own and makes contact with the horizontal arm. Refer to Figure 94 while following the procedure below.

1. Loosen the two set screws highlighted in the figure but do not remove them completely.
2. Loosen the two straight-slotted screws highlighted in the figure (it shows only one of the two screws – the other is located on the opposite side of the arm), but do not remove them completely.
3. Move the articulating arm into the position where you want it to stop before it makes contact with the horizontal arm.
4. Tighten the two straight-slotted screws.
5. Tighten the two set screws.

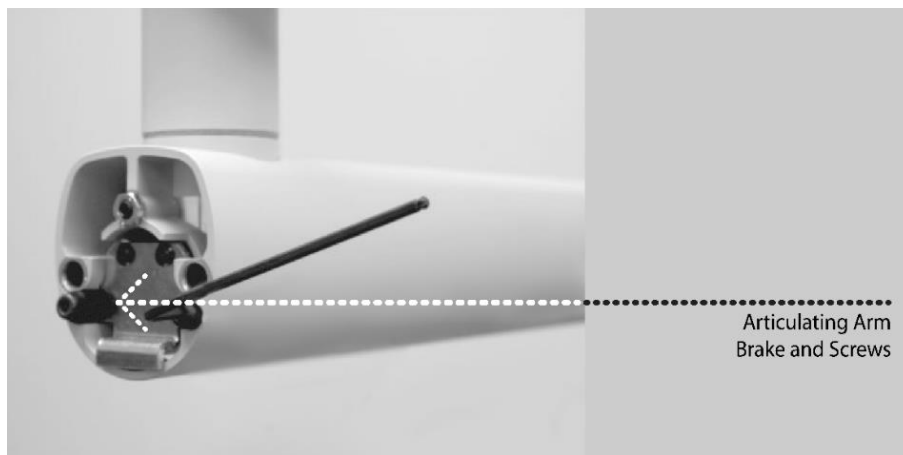
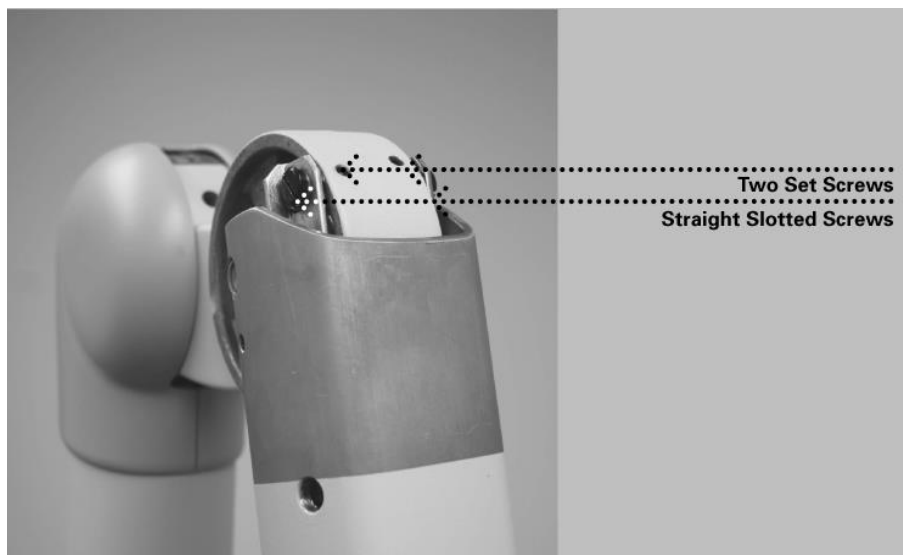


Figure 94
Adjusting the Articulating Arm



Outside Articulating Arm Vertical Movement

1. Remove the plastic trim covers from the end of the Articulating Arm nearest to the Tubehead.
2. Position the Articulating Arm with the arm nearest the Tubehead fully upward.
3. Insert a 9" [23 cm] long 8 mm hex key (T-handle) into the adjustment nut, as shown in Figure 95. Turning the wrench clockwise will cause the Control Unit side of the Articulating Arm to lift. Turning it counterclockwise will cause it to drop.
4. Adjust as necessary until the Control Unit side of the Articulating Arm no longer drifts.
5. Replace the plastic covers on the end of the Articulating Arm.



Figure 95
Adjusting Vertical
Movement of the
Articulating Arm

Control Unit Side of Articulating Arm Balance Adjustment

1. Remove the plastic covers at the top of the Articulating Arm.
2. Position the Articulating Arm at a 45-degree angle.
3. Place a 9" [23 cm] long 8 mm hex key (T-handle) into the adjustment nut inside the Articulating Arm, as shown in Figure 97. Turning the wrench clockwise will cause the Control Unit side of the Articulating Arm to lift. Turning it counterclockwise will cause it to drop.
4. Adjust as necessary until the Control Unit side of the Articulating Arm no longer drifts.
5. Replace the plastic covers on top of the Articulating Arm.

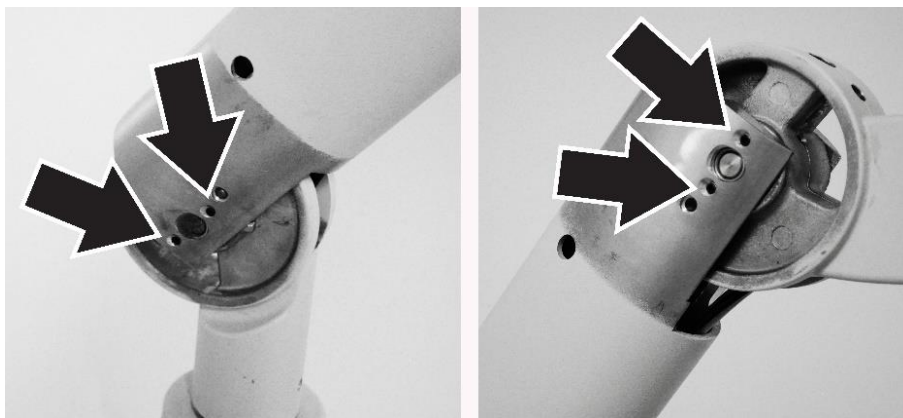


Figure 96
Articulating Arm,
Inner Section
Friction Screws

Figure 97
Adjusting
Articulating Arm
Balance

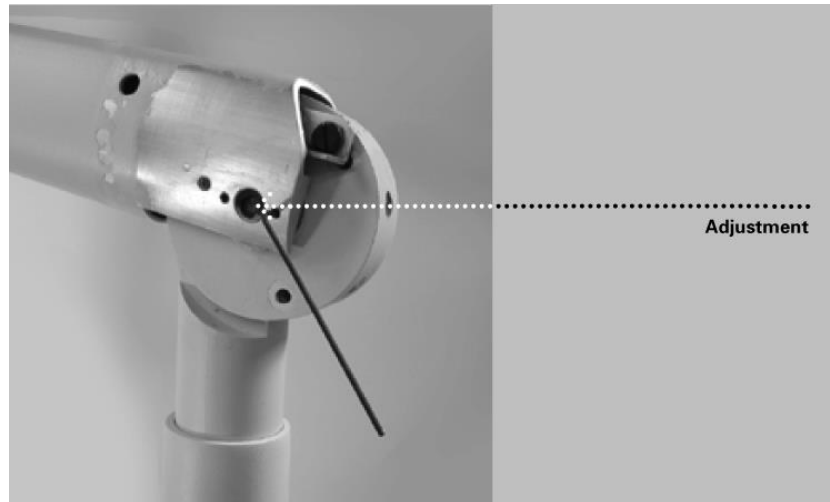
Articulating Arm
Friction
Adjustments



The Preva has four friction adjustment points located at the four pivot points of the Articulating Arm. These friction points can be adjusted to reduce or increase the force needed to position the Articulating Arm.

1. Remove the plastic covers on the Articulating Arm to reveal the adjustment points.
2. Using a 2 mm hex key, as shown in Figure 98, tighten both screws evenly at each adjustment point until the movement of the Articulating Arm is as desired. Do not loosen adjustment points so far as to allow the Articulating Arm to drift.

Figure 98
Friction
Adjustments

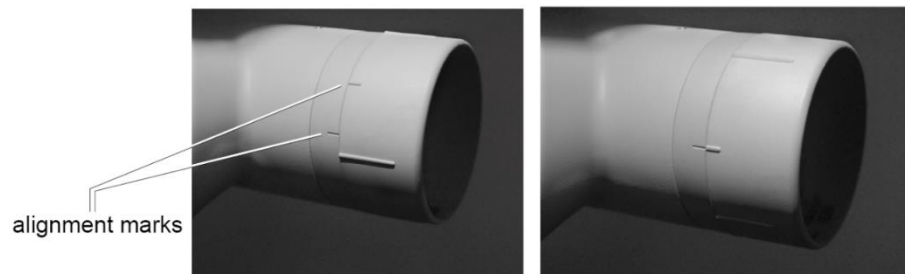


Replacing a Cone

The Preva system has a variety of cone options (see Certified Components on page 12). Follow this procedure to replace a cone:

1. To remove a cone, rotate it until the marks on the tubehead and the cone align.

Figure 99
Alignment Marks



2. Remove the cone. The parts are magnetized so there will be a slight resistance.

Figure 100
Removing the
Cone



3. Reverse the steps to attach the new cone. Secure it by rotating it clockwise about 30° clockwise until the first detent is felt.

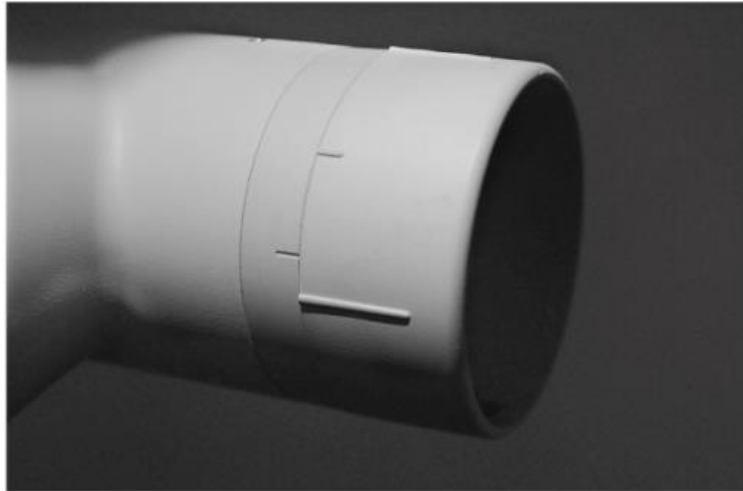


Figure 101
Attaching the new
cone

Default Exposure Times

These tables show the default exposure settings for each combination of Tooth, Image Receptor Type, and Patient Size on the Operator Panel. These exposure settings can be modified using the System Configuration mode. See the System Configuration section for details.

8" Cone Setting		Progeny		Schick		Dexis		Kodak		Sirona		PSP		D Speed		E/F Speed	
		Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small
Upper Canine	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.100	0.080	0.080	0.050	0.125	0.080	0.100	0.064	0.080	0.050	0.125	0.080	0.250	0.160	0.125	0.080
Lower Canine	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.080	0.064	0.064	0.040	0.100	0.080	0.080	0.064	0.064	0.040	0.100	0.080	0.200	0.160	0.100	0.080
Incisors	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.100	0.080	0.064	0.040	0.100	0.080	0.080	0.064	0.064	0.040	0.100	0.080	0.200	0.160	0.100	0.080
Premolars	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.100	0.080	0.064	0.040	0.100	0.080	0.080	0.064	0.064	0.040	0.100	0.080	0.200	0.160	0.100	0.080
Molars	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.125	0.080	0.080	0.050	0.125	0.080	0.100	0.064	0.080	0.050	0.125	0.080	0.250	0.160	0.125	0.080

12" Cone Setting		Progeny		Schick		Dexis		Kodak		Sirona		PSP		D Speed		E/F Speed	
		Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small
Upper Canine	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.200	0.160	0.160	0.100	0.250	0.160	0.200	0.125	0.160	0.100	0.250	0.160	0.500	0.320	0.250	0.160
Lower Canine	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.160	0.125	0.125	0.080	0.200	0.160	0.160	0.125	0.125	0.080	0.200	0.160	0.400	0.320	0.200	0.160
Incisors	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.200	0.160	0.125	0.080	0.200	0.160	0.160	0.125	0.125	0.080	0.200	0.160	0.400	0.320	0.200	0.160
Premolars	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.200	0.160	0.125	0.080	0.200	0.160	0.160	0.125	0.125	0.080	0.200	0.160	0.400	0.320	0.200	0.160
Molars	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.250	0.160	0.160	0.100	0.250	0.160	0.200	0.125	0.160	0.100	0.250	0.160	0.500	0.320	0.250	0.160

Arm and Tubehead

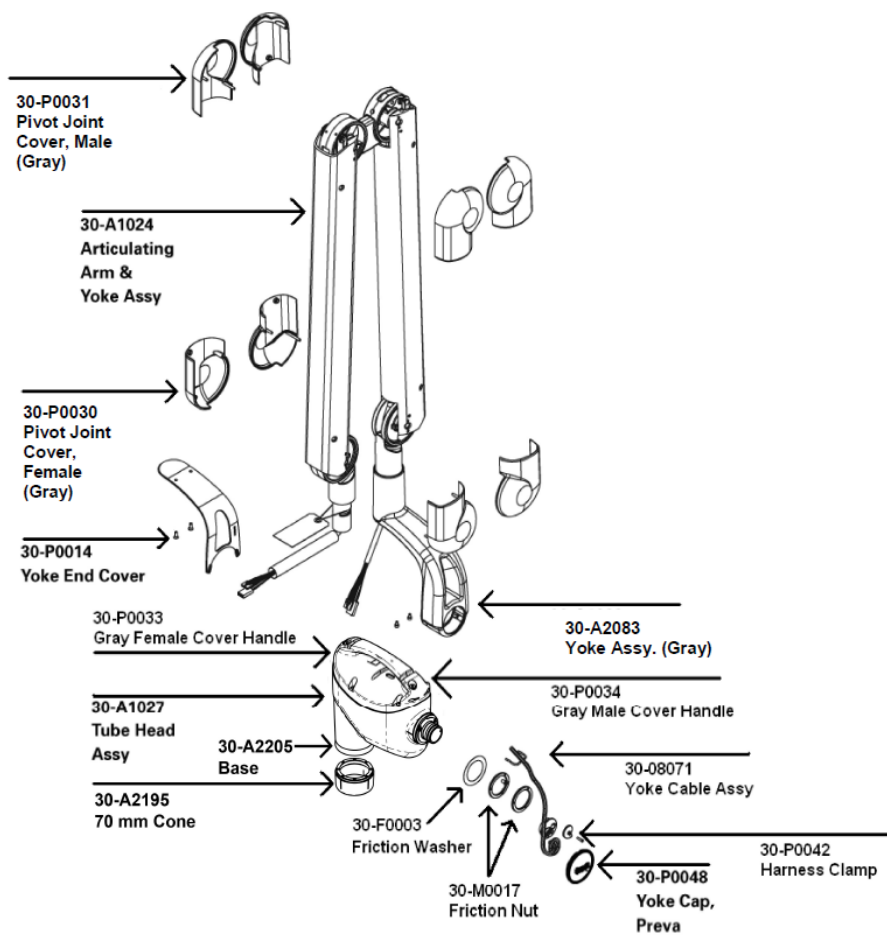


Figure 102
Arm and
Tubehead

Horizontal Arm

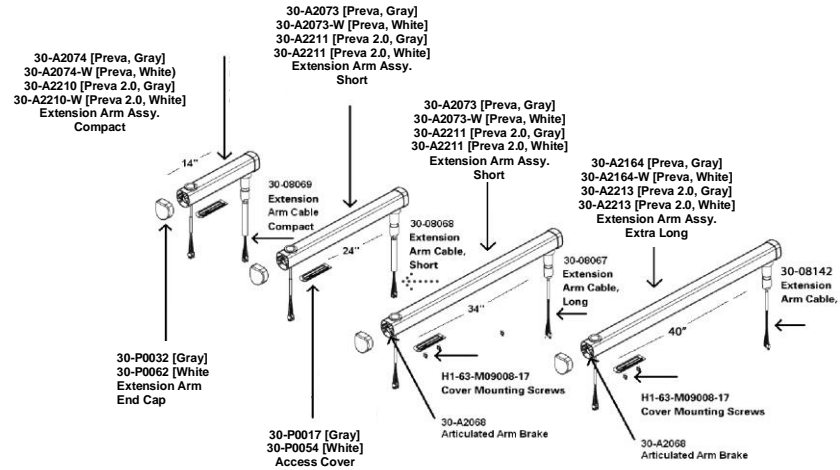


Figure 103
Horizontal Arm

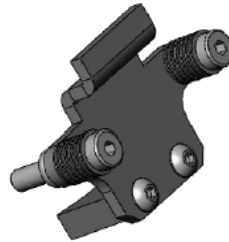


Figure 104 Art.
Arm Brake 30-
A2068

Mounting Plates

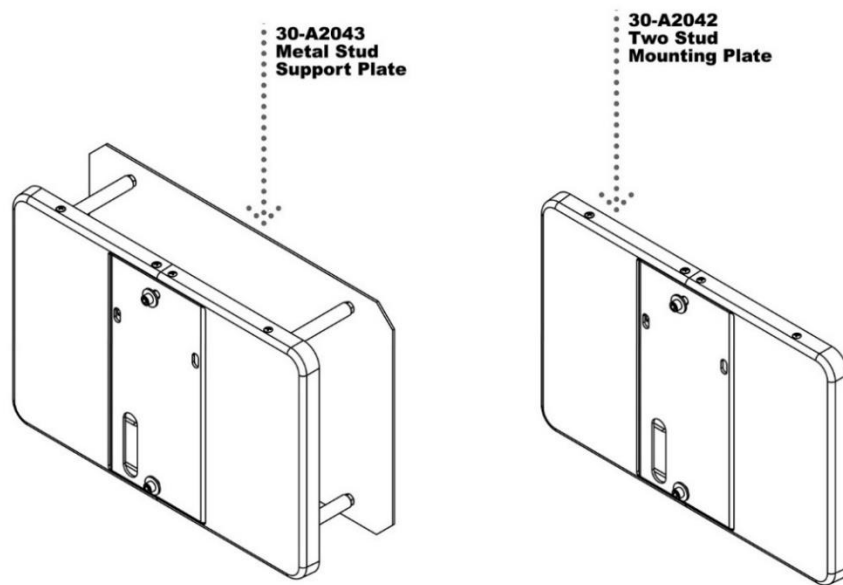


Figure 105
Mounting Plates

Operator Panel

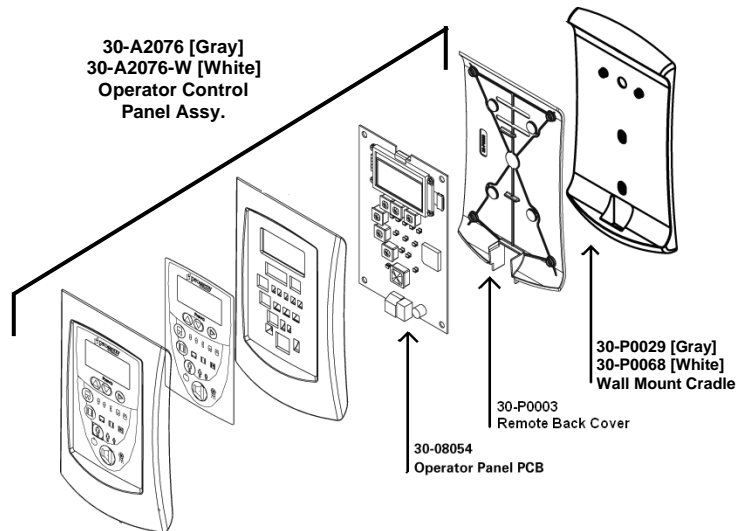


Figure 106
Operator Panel

Cables

Cat 5 50ft
E1-13034

Cat 5 25ft.
E1-13003

Cat 5 6-inch
E1-13004

Exposure Cord
Pigtail 30-08035



Control Unit

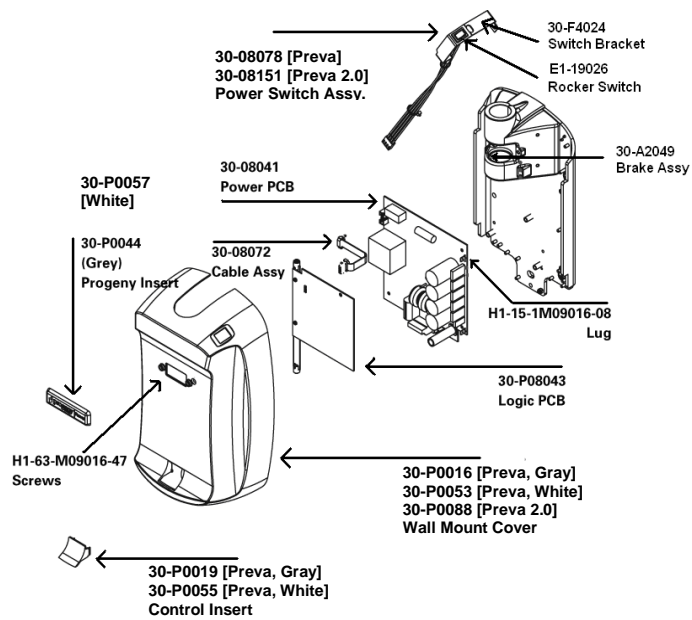


Figure 107
Control Unit
Assembly

For Vetpro Complete

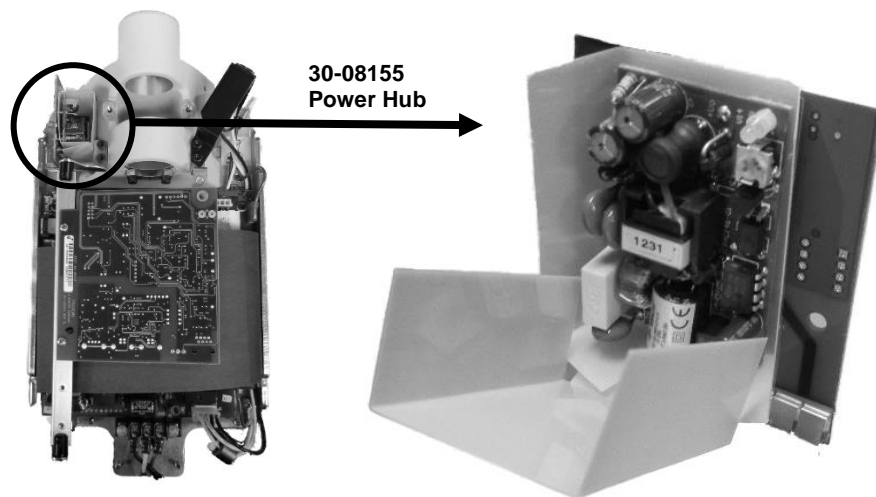
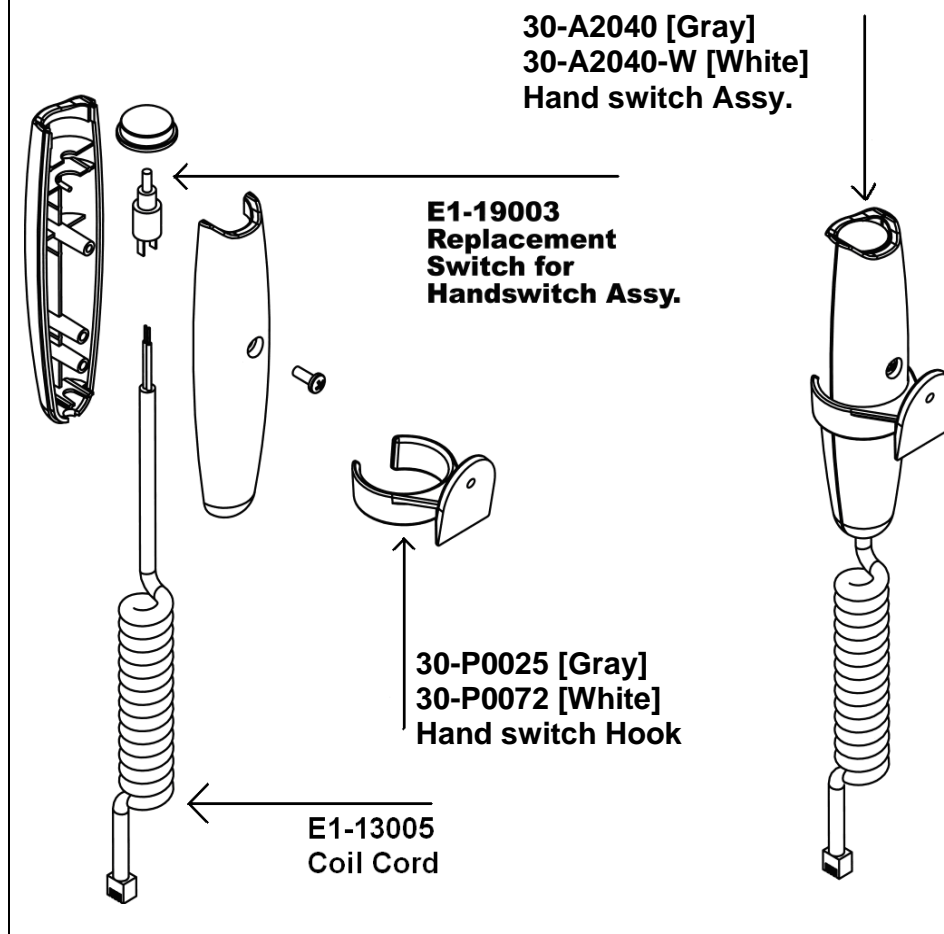


Figure 108
USB Hub

Hand Switch

Figure 109
Hand Switch



Specifications

This chart contains information required to be provided to the user by 21 CFR.

Parameter	Description
Line Voltage	AC 110 V to 230 V, 50 Hz or 60 Hz
Line Load	250 V, UL Recognized –branch circuits must not exceed 15A
Fuse Rating	5 amp
Tube Potential	60 kV, 65 kV or 70 kV
Tube Potential Accuracy	5% of selected value
Tube Current	4 mA to 7 mA
Tube Current Accuracy	±1 mA
Irradiation Time	20 ms through 2 s
Irradiation Time Accuracy	1 ms + 5% of indicated value
Minimum Source to Skin Distance	8 inch (20 cm) 12 inch (30 cm)
Minimum Inherent Filtration	2 mm Al equivalent @ 70 kV
Focal Spot	0.4 mm (per IEC 60336)
Tube Cooling Time	Automatic wait time is 15x the exposure time.
Target Angle	12.5 degrees
Temperatures	
Operating	+10 °C to +35 °C (+50 °F to +95 °F)
Storage	-35 °C to +66 °C (-31 °F to +151 °F)
Transport	0 °C to +50 °C (+32 °F to +122 °F)
Atmospheric Pressures	
Operating	70 kPa to 106 kPa
Storage	70 kPa to 106 kPa
Transport	70 kPa to 106 kPa
Humidity Range	
Operating	10 to 80% non-condensing
Storage	10 to 80% non-condensing
Maximum Altitude	3,000 m (9,843 ft.)
Cone Focal Length	8 inch (20 cm) for bisecting angle technique 12 inch (30 cm) for paralleling technique
X-ray Beam Dimension	Diameter of 6 cm (2.36 in.) at the end of the 8-inch cone. Cones with smaller diameter or rectangular beams are available.
U.S. Patents	D470237, D469182, D470589, and 6,837,468

Appendix A – Assembling the DC Mobile Unit

Tools Required

- 3/8" square drive hex key 10 mm
- 3/8" square drive hex key x 6-inch extension
- 3/8" square drive ratchet
- No. 1 Phillips screwdriver
- 7 mm nut driver
- Small flat-blade screwdriver
- 4 mm hex key
- 5 mm hex key
- Utility Knife
- Portable Power Drill

1. Open the box from the top side.

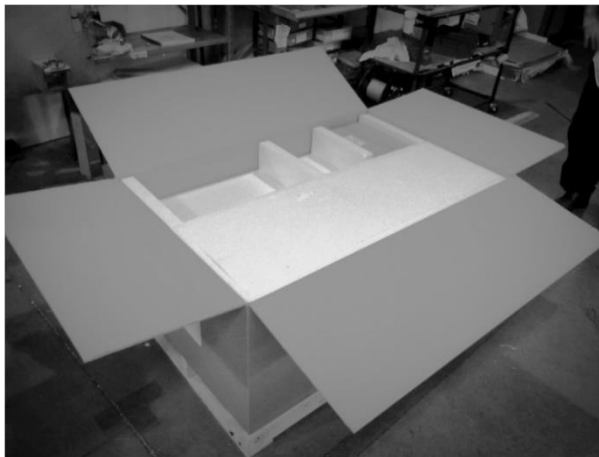


Figure 110

2. Remove all transportation screws from the base of the crate (Qty. 10)

Figure 111



3. Lift the shipping box and separate from the crate. There are two layers of parts. Separate the top layer and place on the floor or remove each piece individually.

NOTE: This is a two-person job. Take extra care when handling the articulating arm assembly to avoid any damage to the tubehead.

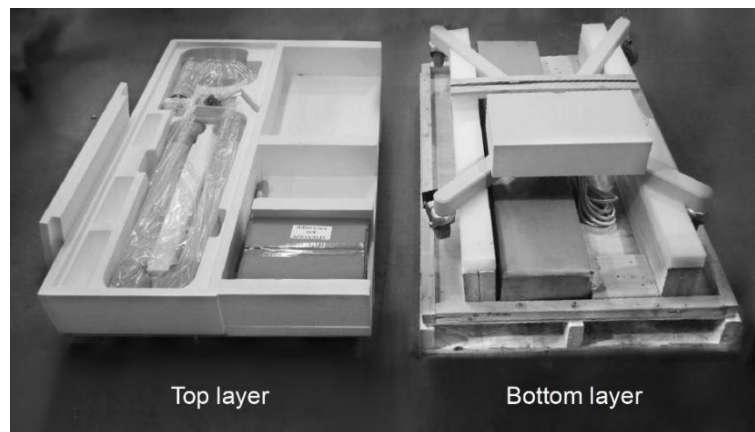


Observe proper lifting precautions while doing this. The base is heavy and requires two people to lift.



To prevent damage to the tubehead, take care when handling the articulating arm assembly.

Figure 112



4. Cut the transportation band from the lower layer that holds the mobile base.

Figure 113



5. Remove top cover of control unit by removing screws located at the base of the cover.



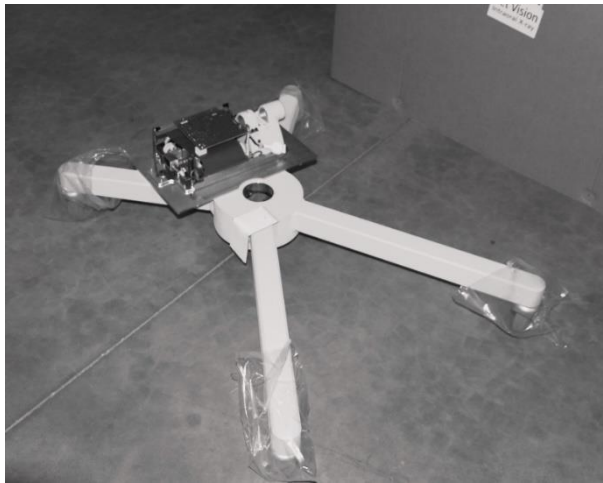
Figure 114

6. Separate the mobile unit base from the pallet.



Observe proper lifting precautions while doing this. The base is heavy and requires two people to lift.

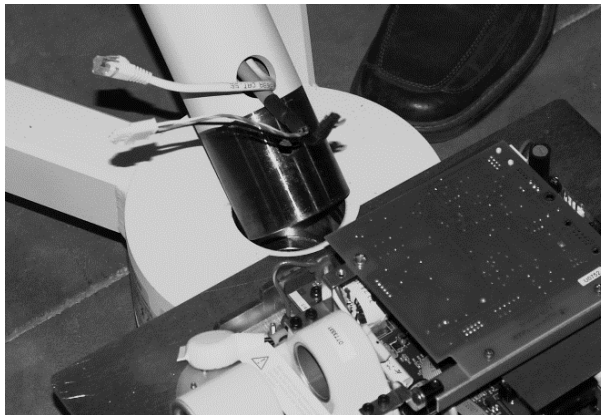
Figure 115



7. Locate the mobile unit post (located in the top layer of parts removed in step 3) and insert into the mobile base as shown.

Note: Take care not to pinch the Cat 5 cable or the tubehead connectors.

Figure 116



8. In the "Kit, Mobile Stand" package (Part #30-A2098). Locate and insert the bolt used to secure the post to the mobile base. (Requires 10mm hex key.)

Figure 117

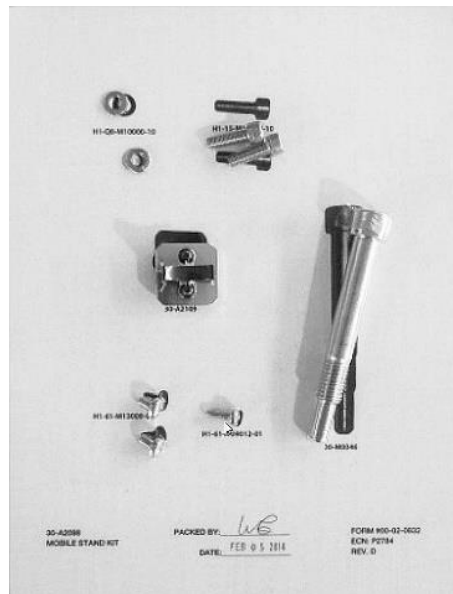
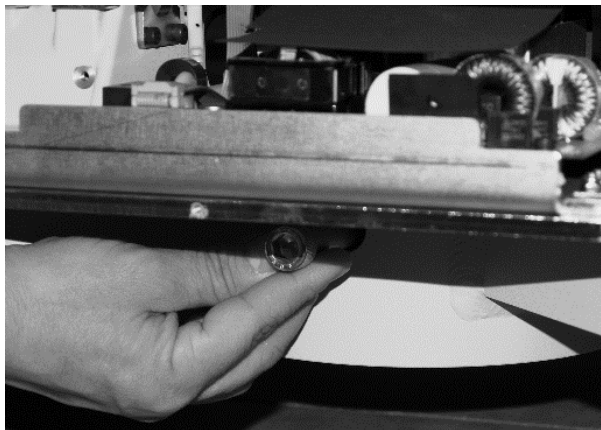


Figure 118



9. Back out the Allen bolts used to secure the articulated arm to the post. (QTY 2). This allows the articulating arm to be inserted completely into post.

Figure 119



10. Locate the Articulated Arm/Tubehead assembly. Remove the red transportation label. Pull back the plastic packaging to expose shaft and remove paper tube protecting cables and connectors.
11. Lift the arm/tubehead carefully and guide the cables through the top off the post. Carefully insert the articulated arm and take care not to pinch or damage the connectors.



Figure 120

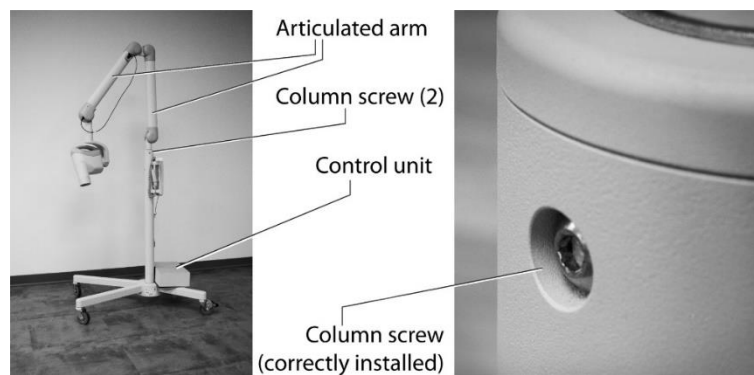


Figure 121

12. Secure the articulated arm assembly to the post with the two Allen bolts that were backed out in step 9.

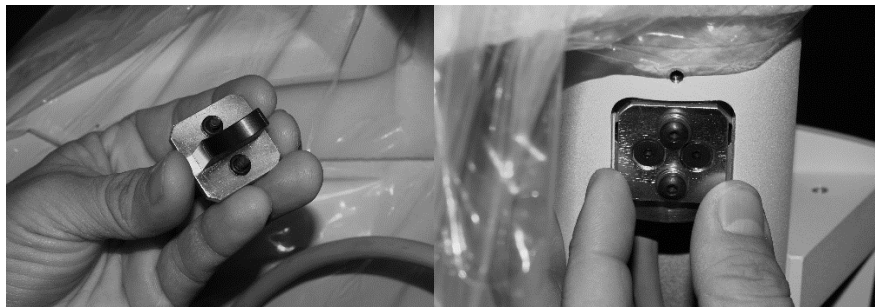
Figure 122



13. Locate and install the articulating arm brake assembly. Install and adjust by tightening to the point where the articulating arm does not drift when you lightly push the arm.

Figure 123

Figure 124



14. Connect the tube head cables (gray and black connectors).



Figure 125

15. If the unit is a VetPro Complete (Sensor ready), connect the USB cables (black connectors).



Figure 126

16. Insert cables into the post.



Figure 127

17. Install the cover plate.

Figure 128



18. Remove the screw that locks down the Logic board. Swing out the Logic Board and connect the three connections as shown below.
 - A) Black connector (Feedback from tubehead)
 - B) White connector (Power to tubehead)
 - C) Cat5 (network cable)
 - D) USB (for Sensor ready units)

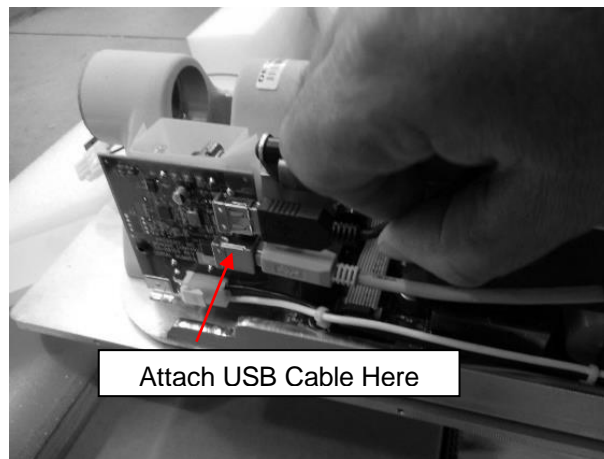
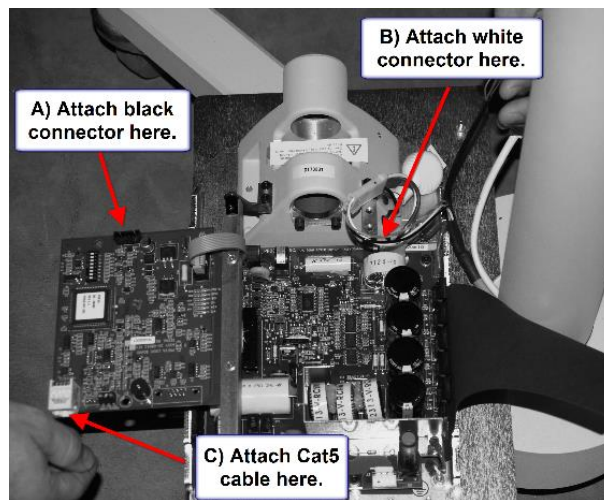


Figure 129
Figure 130

19. Attach the control unit cover.



Figure 131

20. Feed the Cat5 cable through the Operators panel cradle. Feed remote exposure cable through the bottom of cradle.

NOTE: Allow a few coils of slack inside for strain relief. Attach the cradle with supplied hardware.

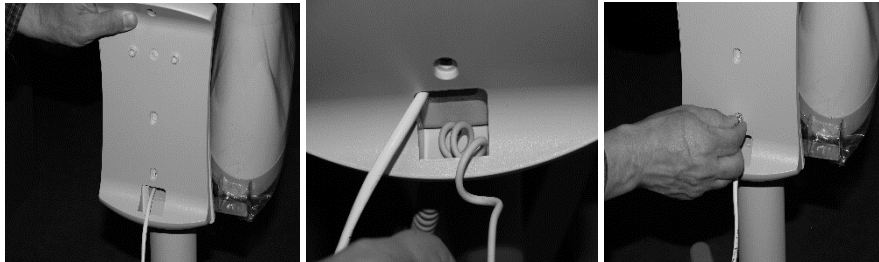


Figure 132
Figure 133
Figure 134

21. Connect Cat5 cable and remote switch cable to the Operators Panel. Mount the Operators Panel into cradle.



Figure 135

22. Install the mobile unit handle with the supplied hardware.



Figure 136

23. Attach the remote switch holster by removing the adhesive backer and attaching to the frame.



Figure 137

Appendix B – Replacing the Power Cord

Tools Required

Phillips screwdriver, 3 mm hex key, needle nose pliers

1. Remove the six screws that secure the control unit cover.



Figure 138

2. Remove the terminal block cover.

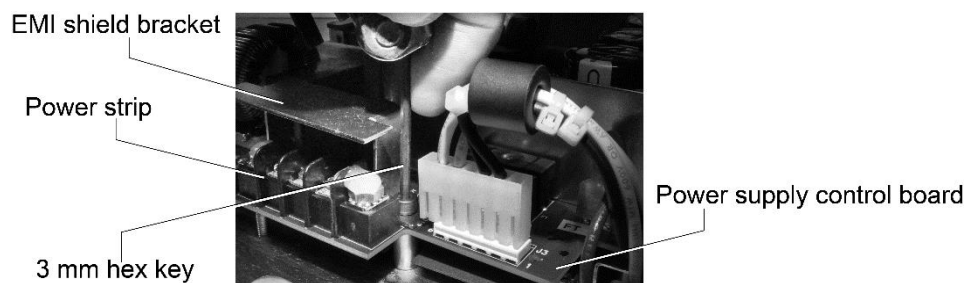


Figure 139

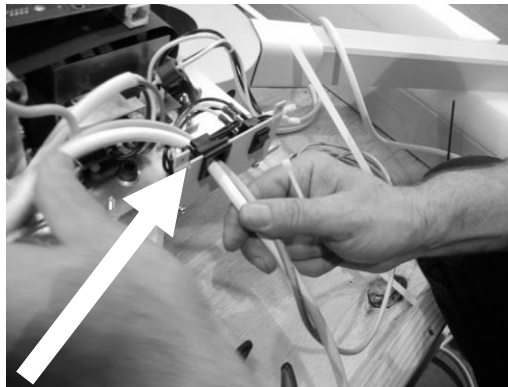
3. Loosen the three screws that secure the power cord (Part# E1-13028).



Figure 140

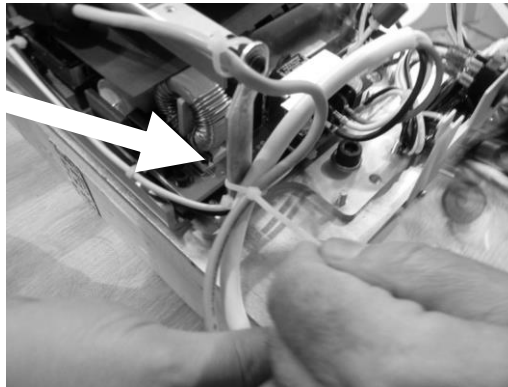
4. Slide the strain relief (Part# E1-22031) out of its slot.

Figure 141



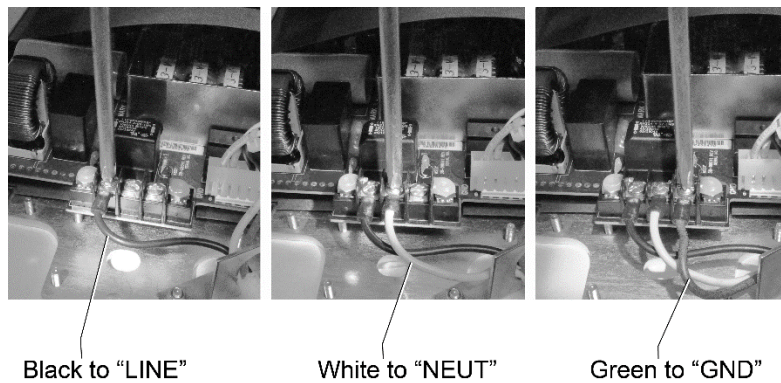
5. Cut the tie wrap to free the power cord for removal.

Figure 142



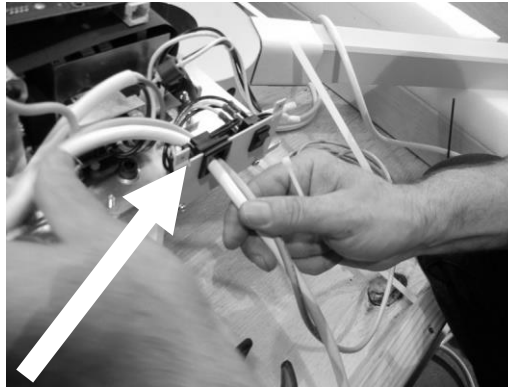
6. Connect the spade lugs of the three power cord wires to the terminal block.

Figure 143



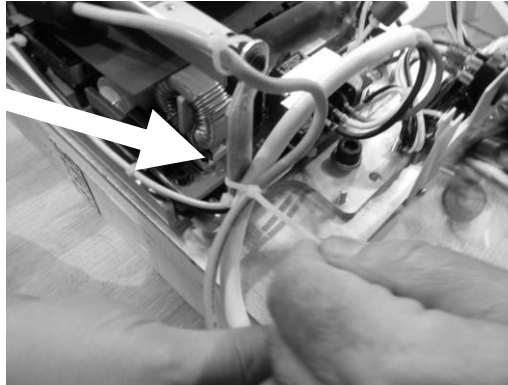
7. Snap the strain relief onto the new power cord.
8. Slide the strain relief into the bracket slot.

Figure 144



9. Bundle the cords with tie wrap.

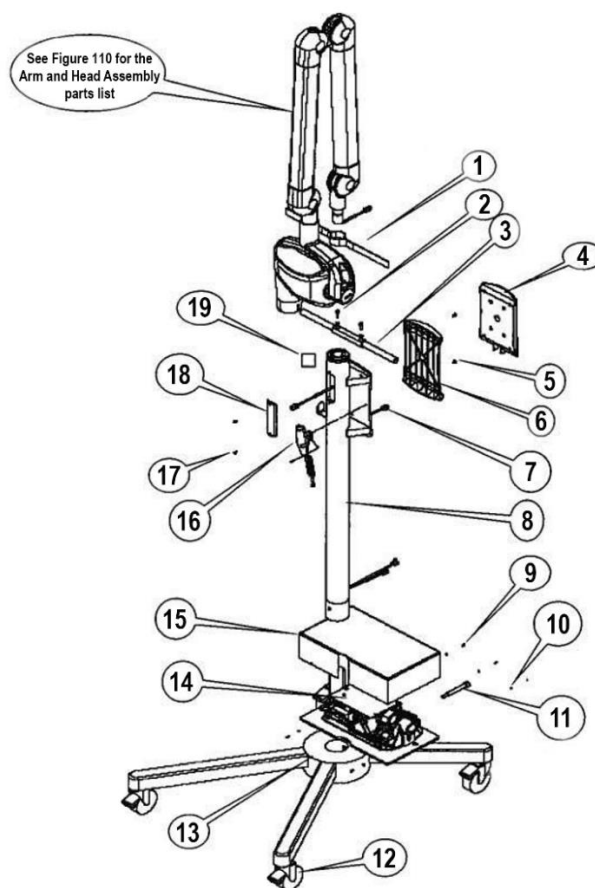
Figure 145



10. Reinstall the terminal block cover.
11. Reinstall the control unit cover.
12. Plug the power cord into a wall outlet and test the system for normal operation.

Appendix C – Mobile Assembly Parts List

Figure 146 Mobile Unit Assembly



Mobile Assembly Parts List			
Item	Description	Part Number	Quantity
1	Velcro Strap	30-A2093	1
2	Screw	H1-15-M16020-10	2
3	Mobile Stand Handle w/Grips	30-A2111	1
4	Operator Panel, Vet (see Figure 106)	30-A2123	1
5	Screw	H1-61-M13008-01	2
6	Cradle	30-M3010	1
7	8 Conductor RJ45 to RJ45 Cable, 2 m	E1-13029	1
8	Column	30-M0045	1
9	Screw	H1-61-M05008-01	5
10	Washer	H1-P2-M04000-01	5
11	Column Screw	30-M0046	1
12	Caster, Swivel w/Brake	30-S0036	4
13	Mobile Stand Base	30-A2078	1
14	Control (see Figure 107)	30-A1032	1
15	Switch Assembly, Preva Mobile Stand	30-08098	1
16	Remote Control Switch Assembly	30-A2040	1
17	Screw	H1-63-M09008-17	2
18	Access Cover	30-P0017	1
19	Brake	30-A2109	1
20	Line Cord (not shown)	E1-13028	1

Appendix D – Electronics Block Diagram

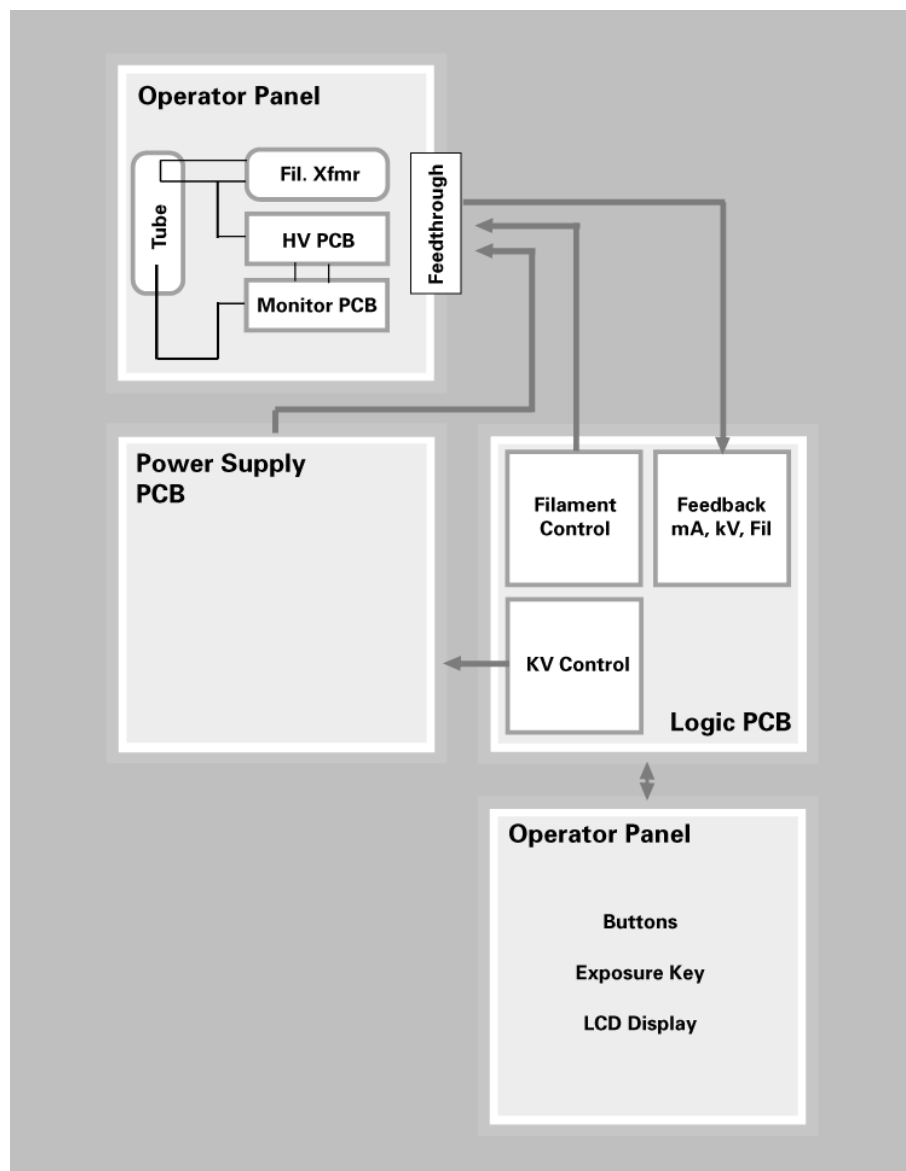


Figure 147
Electronic Block
Diagram



Manufacturer

Midmark
1001 Asbury Drive
Buffalo Grove, Illinois 60089
USA
(847) 415-9800
Fax: (847) 415-9801
www.midmark.com



Technical Library

<https://technicallibrary.midmark.com>

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