Service Guide

A-dec 200

a-dec
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Product Service

For service information, contact your local authorized A-dec dealer. To find your local dealer, go to www.a-dec.com.

Regulatory Information

Regulatory information mandated by agency requirements is provided with A dec dental equipment in the *Instructions for Use* and the separate *Regulatory Information, Specifications, and Warranty* document (p/n 86.0221.00). These documents are also available at www.a dec.com in the Document Library.

The *Regulatory Information, Specifications, and Warranty* document includes:

- Serial number identification
- Software revisions
- Warranty statement
- Deluxe touchpad help messages
- Intended application and use statements
- Identification of symbols
- Environmental specifications
- Classification of equipment
- Electrical rating and electromagnetic information
- Chair load capacity

A-dec 200 Service Guide

Contents

Introduction

This guide provides service information for the A-dec 200 dental system, including the chair, programming, delivery system, cuspidor and support center, assistant's instrumentation, utilities, and dental light. Users of this guide should understand basic operation and maintenance of dental and medical equipment.

CAUTION Possible injury or equipment damage. Service to be performed by trained personnel only.

Get Support

For questions not addressed in this document, contact A-dec Customer Service using contact information for your region.

International Customer Service

2601 Crestview Drive
Newberg, Oregon 97132
Telephone: 1 (50) 538-9471 or 1 (503) 538-7478
Fax: (503) 538-5911
Internet: www.a-dec.com

Other Sources of Information

Service Reference

This document is a companion to the *A-dec 200 Service Reference* (p/n 86.0324.00). The Service Reference contains illustrated parts breakdown content. Circuit board components and flow diagrams are available in both the Service Guide and the Service Reference.

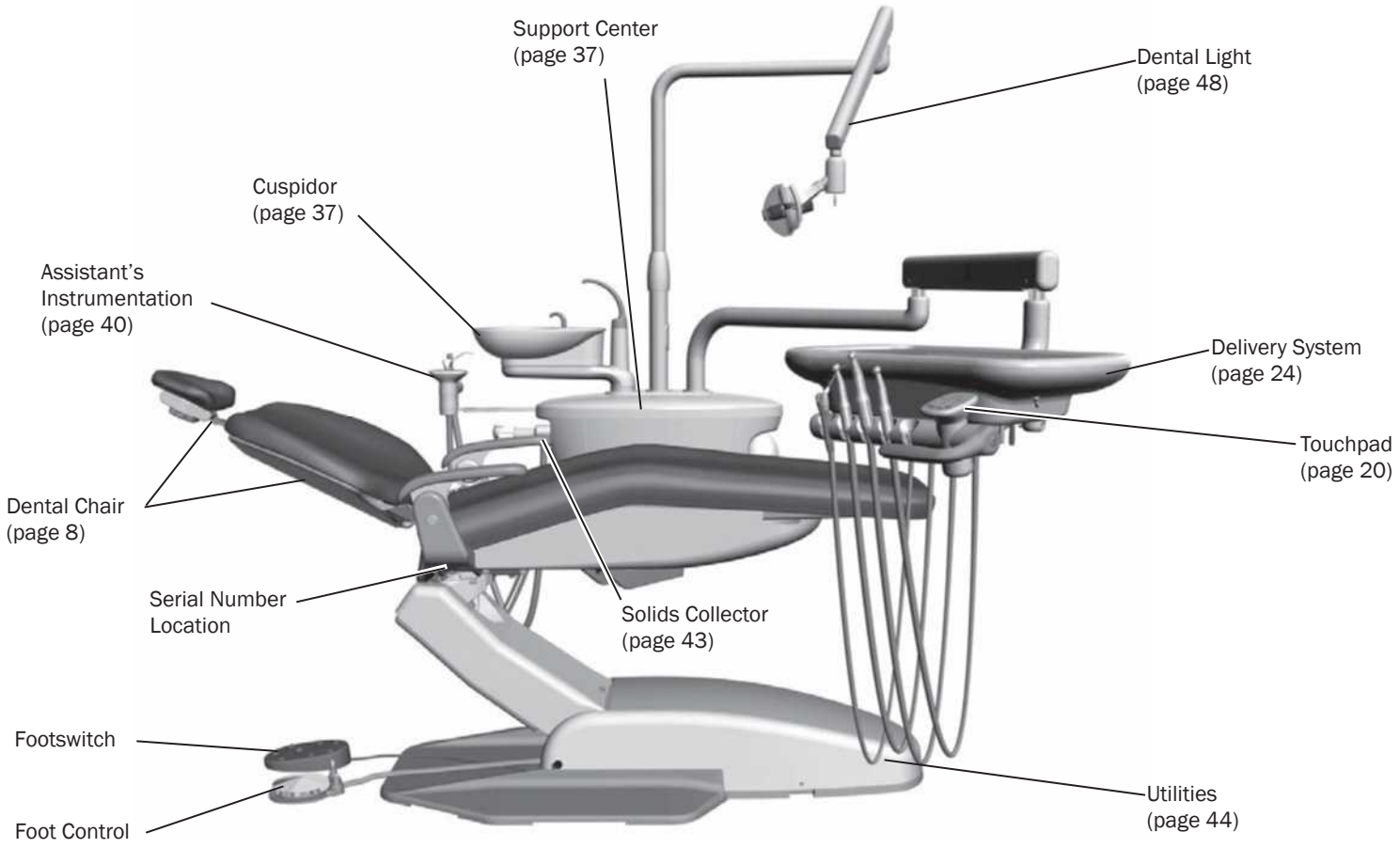
Other A-dec Service Documents

The *A-dec 300, 400, and 500 Delivery Systems Service Guide* (p/n 86.0382.00) contains service, maintenance, and troubleshooting content. The *A-dec 300, 400, and 500 Delivery Systems Service Reference* (p/n 86.0383.00) contains illustrated parts breakdown content. Circuit board components and flow diagrams are in both documents. These documents include cuspidors, floor boxes, and support centers.

The *A-dec Dental Lights and Monitor Mounts Service Guide* (p/n 86.0326.00) contains service, maintenance, and troubleshooting content for A-dec dental lights and monitor mounts. The *A-dec Dental Lights and Monitor Mounts Service Reference* (p/n 86.0328.00) contains illustrated parts breakdown content. Circuit board components and flow diagrams are in both documents.

A-dec 200 System Map

A-dec 200's basic system comes configured as shown below:



Service Tools

This table lists the types of tools available from A-dec and their use in servicing A-dec 200 equipment:

Table 1. Recommended Tools

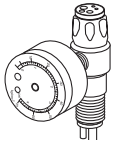
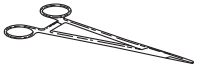
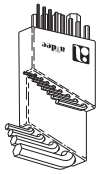
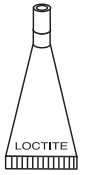
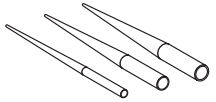
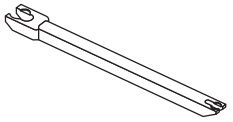
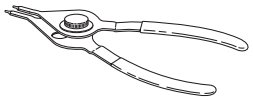
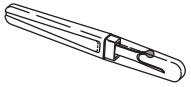
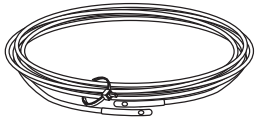
Tool	Task	Part Illustration	Part Number
Drive air pressure gauge	Adjust handpiece drive air pressure, 0-60 psi (4.13 bar). This gauge does not fit the Borden 3-hole coupler		50.0271.00
Hemostat	• Troubleshoot or repairing a unit • Stop air or water flow through tubing		009.008.00
Hex key set	Service or install A-dec equipment (plastic case included)009.008.00		009.008.00
Loctite®	Install threaded fasteners to prevent loosening		060.001.00 (Red 271) 060.002.00 (Blue 242)
O-ring tools	Replace O-rings during quick field repairs (fits the four smallest O-ring sizes)		009.013.00
Panel mount gauge	• Check air/water pressure • Check inline pressure gauge for testing purposes		026.118.00

Table 1. Recommended Tools

Tool	Task	Part Illustration	Part Number
A-dec Silicone lubricant	Lubricate internal moving parts such as O-rings, oral evacuator valves, and bushings **CAUTION** Use only A-dec Silicone lubricant or the O-rings may be damaged.		98.0090.01
Sleeve tool	Aid in secure 1/4" tubing sleeves and 1/8" uni-clamps		98.0072.00
Snap ring tool	Install and remove internal and external snap rings (fits all snap rings used in A-dec equipment)		009.007.00
Tubing stripper	Separate extruded air and water lines in vinyl tubing		009.035.00
Umbilical stringer	Route additional tubing or wiring through existing umbilical assemblies (12' [3.66 meter] stringer with threading holes on both ends)		009.015.00
Valve test syringe	Test pilot operated valves; used to apply a static pressure of 5-75 psi (.34-5.17 bar)		98.0050.01

Dental Chair

This section provides detailed information related to service, maintenance, and adjustment of the A-dec 200 dental chair.

Contents

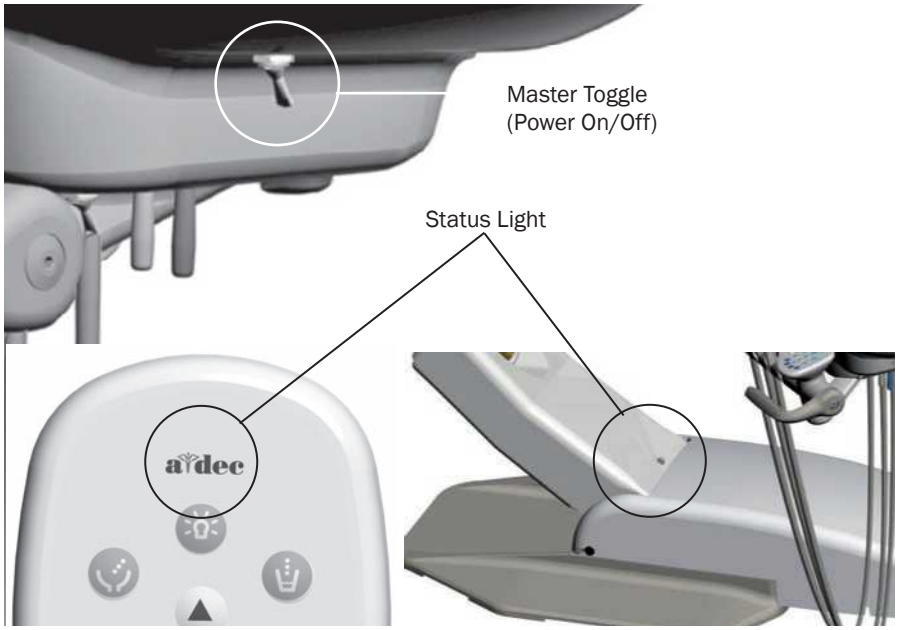
Figure 1. A-dec 200 Dental Chair

Dental Chair Product Overview

Power and Status

The chair and system are controlled by the master toggle on the delivery system. The power should always be turned off for service. When the A-dec logo on the touchpad or the status light on the chair lift arm are illuminated, the system is on and ready for use. If the status light blinks, the limit switch has been activated.

Figure 2. Power and Status

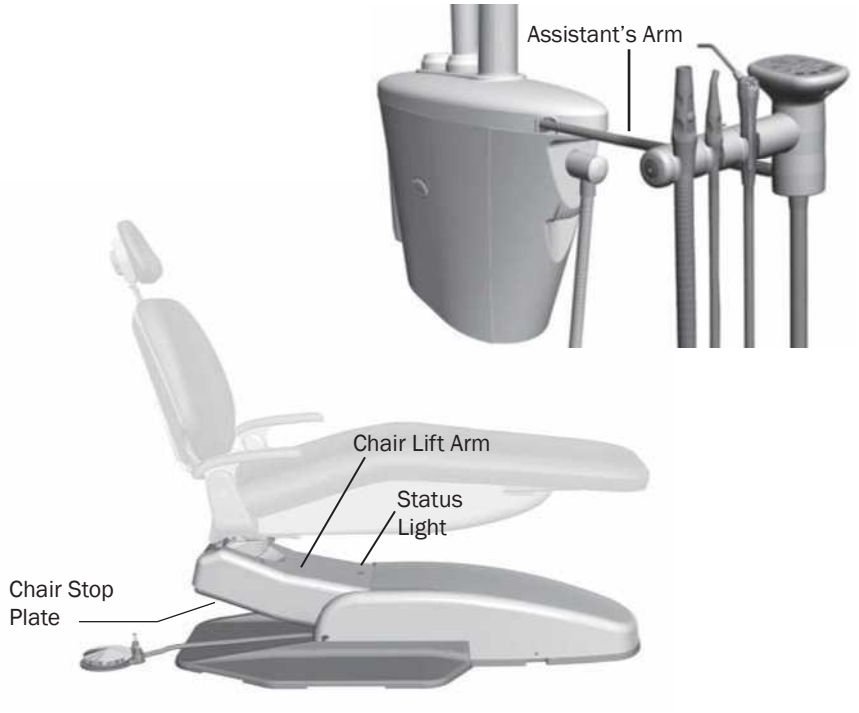


Limit Switch and Chair Lockout

If anything becomes lodged under the chair lift arm or assistant's arm, a limit switch stops the downward motion of the chair. Pressing the chair stop plate or lifting up on the assistant's arm activates the limit switches. Use the footswitch or touchpad to raise the chair, then remove the object.

The optional lockout kit inhibits the operation of the dental chair when a handpiece is removed from its holder and the foot control pressed. When this happens, the chair status light blinks quickly. To resume, replace the handpiece and use the footswitch or touchpad to move the chair.

Figure 3. Chair Lockout Overview

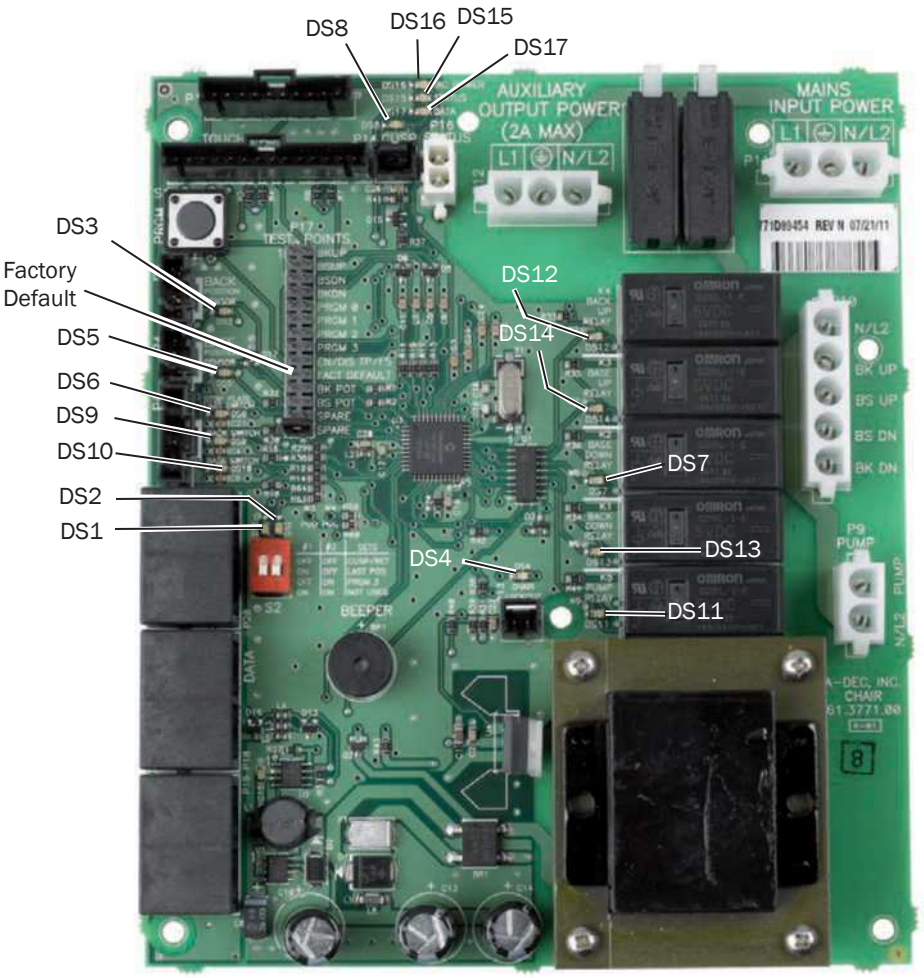


Circuit Board Components

Table 2. LED Identification

LED	Status	Description
DS16 - AC POWER	Off	No 24 VAC power, tripped circuit breaker, power supply turned off, no line voltage
	Green, steady	24 VAC at the terminal strip
DS15 - STATUS	Off	System is not functioning, no power or circuit board has failed
	Green, steady	Normal operation
DS17 - DATA	Off	No DCS communication, not connected to the DCS, or DCS has failed
	Green, steady	Detects active DCS
	Green, blinking	Valid DCS Message
DS6 STOP PLATE LIMIT SWITCH	Off	Closed, (normal)
	Red	Open, (activated)
DS4 - CHAIR LOCKOUT	Off	Open, (normal)
	Red	Closed, (activated)
DS3 Base and DS5 Back-Position sensors	Off	Position sensor is idle
	Yellow, steady	Position sensor is moving correctly
	Yellow, fast blink	Upper end of travel
DS7, DS13, DS12, DS14 - Chair relay LEDs	Off	Relay is off
	On	Relay is on
DS8 - Cuspidor Limit Switch	Off	Limit switch is off (inactive)
	Yellow, steady	Limit switch is on (active) (Hard wired or via DCS)
DS9 - Back and DS10 Base - Limit switch	Off	Limit switch is off (inactive)
	Yellow, steady	Limit switch is on (active)
DS11 - Pump Motor Relay	Off	Pump motor relay is off (inactive)
	Yellow, steady	Pump motor relay is on (active)
DS1, DS2	UP	A switch in UP is on (active)
	DN	A switch in the DN position is off (inactive)

Figure 4. Chair Circuit Board Components



CAUTION: Circuit boards are sensitive to static electricity. Electrostatic Discharge (ESD) precautions are required when touching a circuit board or making connections to or from the circuit board. Circuit boards should be installed only by an electrician or qualified service person.

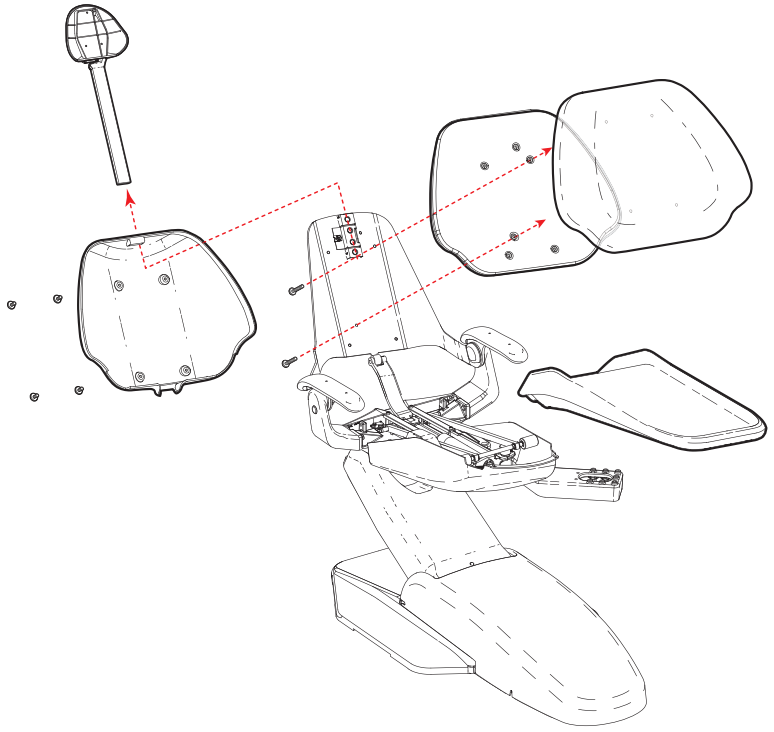
Dental Chair Service, Maintenance, and Adjustments

Contents

Remove Upholstery and Covers

1. Remove the headrest from the chair back.
2. Remove the back cover screws that mount it to the back and back armature, and remove the back cover.
3. Remove the two screws that secure the armature to the chair back pan and remove the back upholstery and armature.
4. Remove the two ball pins from underneath the seat at the rear to remove the seat upholstery.

Figure 5. Remove Chair Upholstery and Back Cover



Factory Default Routine

When a new circuit board is installed in the chair, factory default routine needs to be run to learn the range of motion of the chair. The routine:

- Sets the base and back upper limits
- Calculates new presets based on actual range of motion of the chair
- Verifies that the potentiometers work

To start the factory default routine, place the spare jumper in the factory default position on the P17 test points of the chair circuit board (see "Circuit Board Components" on page 10 for reference).

When running the factory default routine the chair:

1. Moves base down
2. Moves base up
3. Moves back down
4. Moves back up
5. Moves base and back to Position 0
6. Successful factory default beeps three times/failed factory default beeps one time.

NOTE The jumper must remain in the factory default position to complete the factory default routine. The status LEDs on the touchpad and the chair circuit board double blink while the factory default routine is running and after the routine is complete.

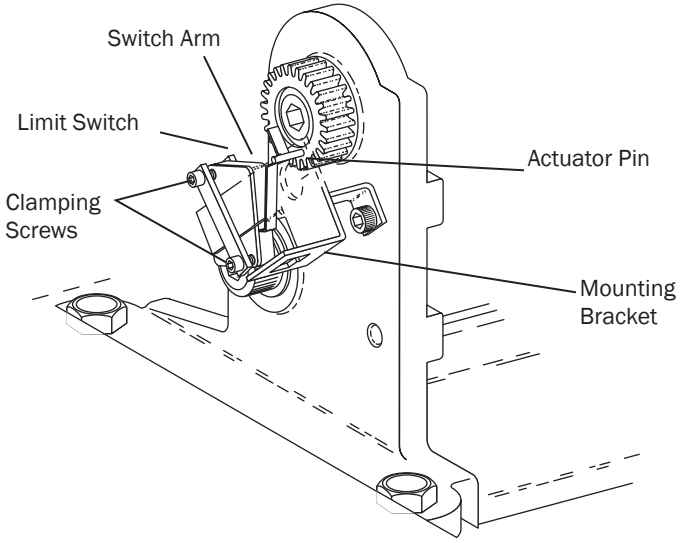
Potentiometers

Potentiometers provide the controller with the chair base and back position values. The controller saves the chair values with current position values for the pre-position and auto-return functions.

Adjust the Base Up Limit Switch:

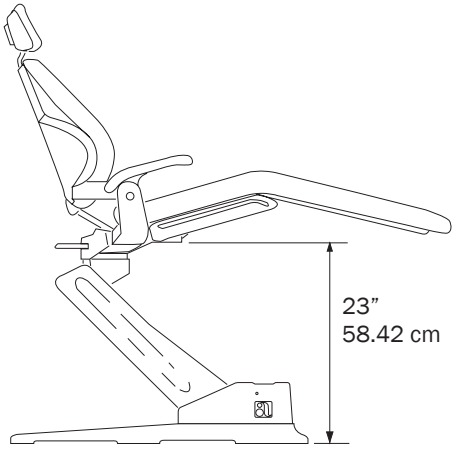
1. Remove the motor pump cover.
2. Loosen the two screws clamping the limit switch to the mounting bracket.

Figure 6. Mounting Bracket



3. Position the chair as shown in Figure 7.

Figure 7. Chair Position



4. Push the limit switch against the actuator on the drive gear until the switch opens (clicks), then tighten the clamping screws.
5. Position the chair base down until the limit switch has closed, then position the chair full base up. Check the distance between the top of the base plate to the flat area around the threaded stud the chair adapter mounts to. If the distance is incorrect, repeat steps 2 through 4.

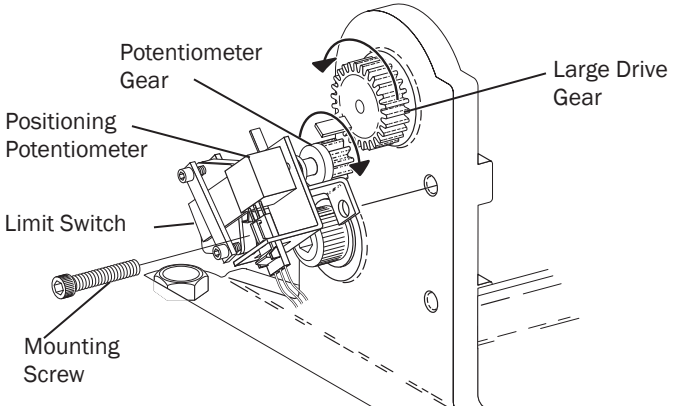
Adjust the Base Positioning Potentiometer

1. Remove the motor pump cover and position the chair base down.
2. Use a 3/16" hex key to remove the limit switch and potentiometer assembly mounting screw.
3. Turn the potentiometer gear counterclockwise until it stops.
4. Align the potentiometer assembly, then turn the potentiometer gear clockwise two teeth.
5. Reinstall the limit switch and potentiometer assembly. Make sure the potentiometer gear does not turn and the two gears mesh properly.
6. Ensure that the electrical connections to the limit switch and positioning potentiometer are property set.
7. While observing the two gears for binding, lower the chair base.

CAUTION Do not raise to the full base up position until after you have checked the base up limit switch for proper adjustment. The chair may go into hydraulic lock if not adjusted properly.

8. Reinstall the cover, and program the auto-positioning functions.

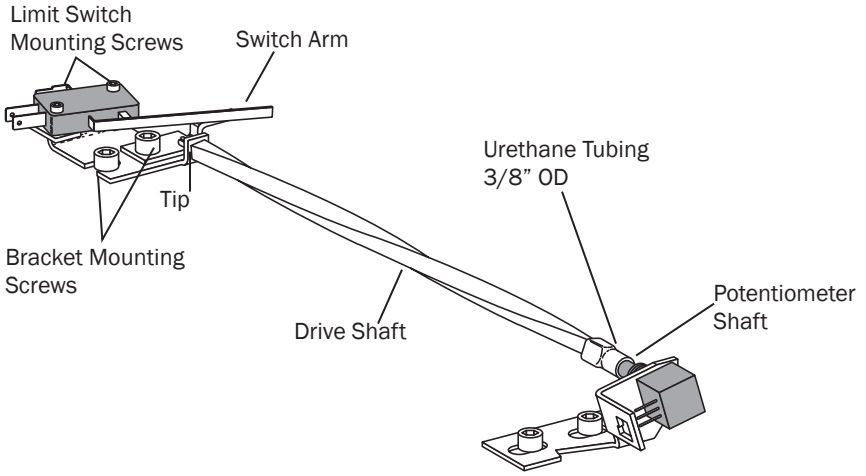
Figure 8. Base Potentiometer



Adjust the Back Potentiometer

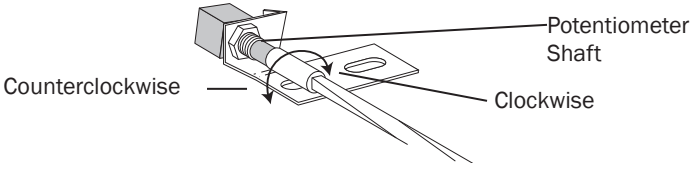
1. Position the chair back to its full up position.
2. Disconnect the limit switch wiring harness from the limit switch.
3. Remove the limit switch mounting screws and limit switch from the bracket. Do not bend the switch arm.
4. Remove the bracket mounting screws.
5. Remove the drive shaft from the potentiometer shaft.
6. Remove the drive shaft from the chair by moving it toward the chair backrest, and slightly to the side to dislodge it from the holder.

Figure 9. Remove Drive Shaft



7. Turn the potentiometer shaft clockwise until it no longer turns, then turn the shaft counterclockwise 1/8" of a turn.

Figure 10. Adjust Back Potentiometer



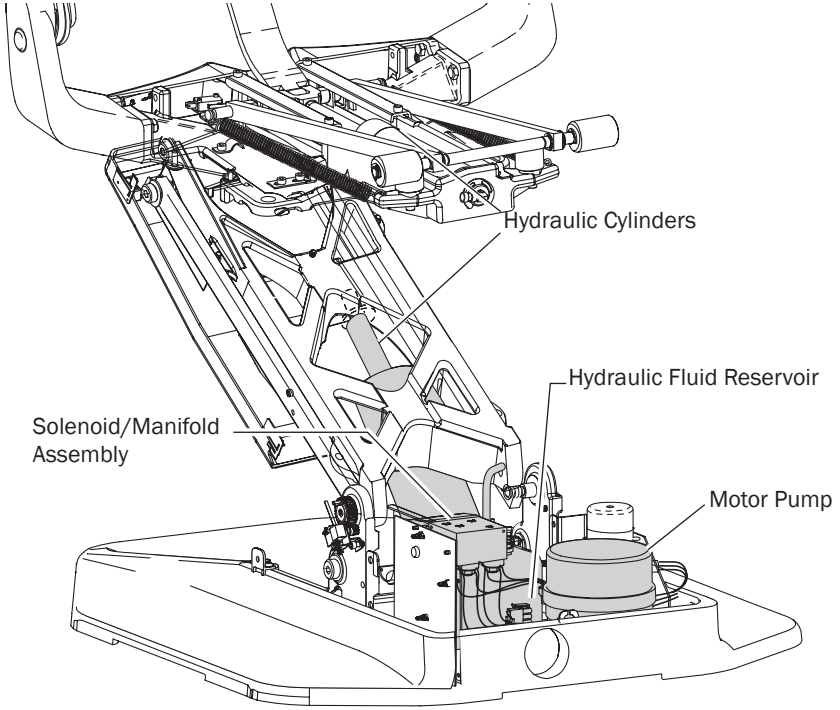
8. Reinstall the shaft.

Hydraulic System

The hydraulic system consists of:

- Hydraulic fluid reservoir: The fluid level in the reservoir can be seen through the sides of the reservoir and is serviced via a top fill cap.
- Hydraulic cylinders: The hydraulic cylinders control the base lift and back functions. Springs and gravity retract the rod during base and back down functions.
- Motor-driven hydraulic pump: The hydraulic pump and the starter capacitor supply hydraulic fluid from the reservoir, under pressure, to the chair lift and tilt hydraulic cylinders for back up and base up functions.
- Solenoid/manifold assembly: This assembly gates hydraulic fluid to and from the two cylinders. Depending on the chair function called for, the controller selects which solenoid-actuated manifold valves are opened or closed. The solenoid/manifold assembly also includes four adjustable needle valves used to restrict or divert the flow of hydraulic fluid to and from the lift and tilt cylinders. These valves provide the rate of travel adjustment for chair base and back movement.

Figure 11. Hydraulic System



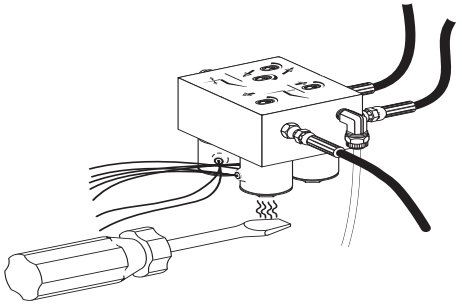
NOTE If cable ties are present in the product and you need to remove them for servicing, make sure to replace the ties after service is completed.

Solenoids

Test the Solenoid

To test the magnetic pull of the solenoid hold the tip of screwdriver near a solenoid and activate the appropriate chair function. You should feel the tug of the magnetic field generated around the solenoid.

Figure 12. Test the Solenoid



Remove and Replace the Solenoid

1. Lower the chair base and back to the full down position. Remove the motor pump cover, then unplug the chair.

> **WARNING** The solenoid coils are powered by line voltage (100, 120, or 240 V). Failure to unplug the chair may result in serious injury from electrical shock.

2. Use a pair of wire cutters, cut the wiring to the faulty solenoid at about mid point between the solenoid and connector P10.
3. Use a 9/16" wrench, remove the solenoid retaining nut and slide the coil off the poppet sleeve.

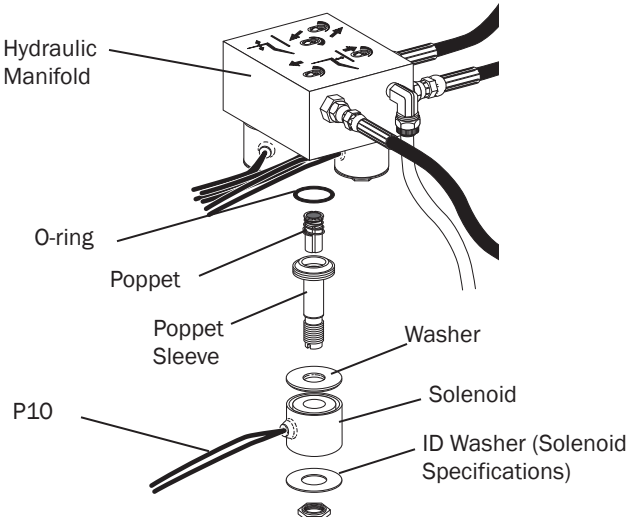
> **CAUTION** Use caution when removing and replacing the coil. The poppet sleeve is easily bent. Even slight bending of the sleeve will result in the malfunction of the solenoid valve.

4. Use a flat-tipped screwdriver, loosen and then remove the sleeve and poppet from the manifold assembly.

> **WARNING** To prevent the possibility of over-heating and failure, replace the entire solenoid assembly.

5. Remove the O-ring from inside the manifold, and install a new O-ring. Wipe any excess off from the manifold.
6. Install a new sleeve and poppet; tighten the poppet sleeve using a flat-tipped screwdriver.
7. Install a new coil on the plunger. Do not overtighten the retaining nut.
8. Strip approximately 1/4" of insulation from the wires cut in step 2, and install a crimp-on butt-type connector on each wire.
9. On the new solenoid, cut the wiring to length allowing enough to reach the crimped-on connectors. Strip approximately 1/4" of insulation from the wires and crimp each wire into a connector.

Figure 13. Remove and Replace Solenoid



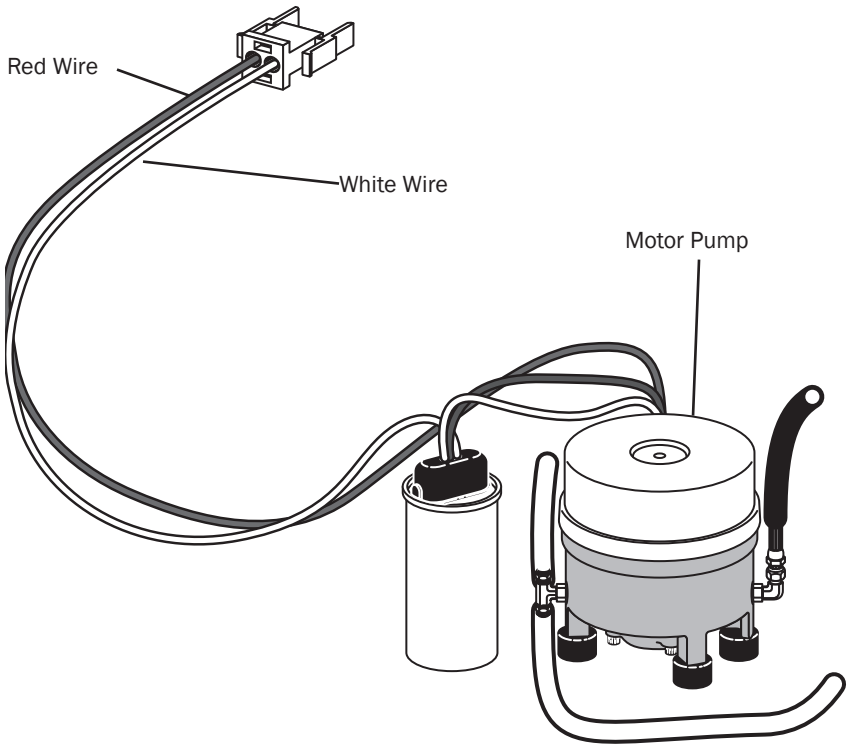
Test the Motor Pump

This test requires the use of a AC Current Probe.

- Clip the probe onto the red wire going to the motor pump.
- Use the footswitch or touchpad to raise the chair.

You should read 5 Amps (maximum) of current for 120 V motor pump, or 2.5 Amps (maximum) of current for 240 V motor pump.

Figure 14. Test Motor Pump



Headrest Adjustments

Turn the locking knob clockwise to lock it into the desired position. Slide the headrest and glide bar up or down to adjust the height.

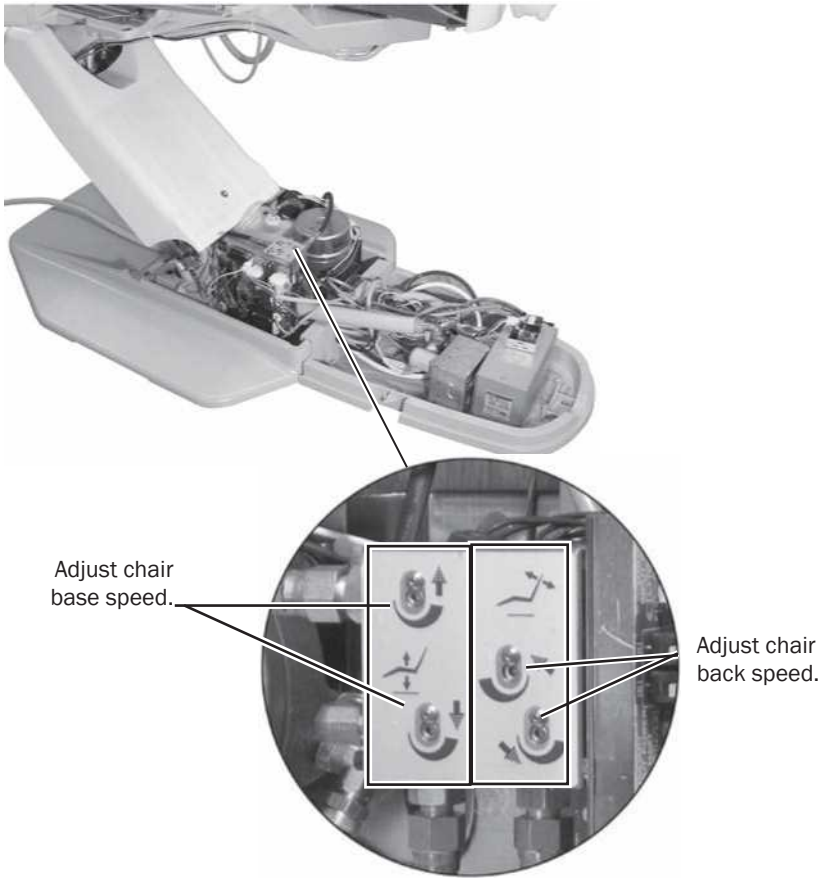
WARNING When the glidebar has reached its maximum recommended working height, a warning will be visible on the patient's side of the glide bar. Do not use the headrest in a position where this warning is visible.

Figure 15. Headrest Adjustments

Chair Speed Adjustments

The speed for moving the chair seat and back can be adjusted. Use a 3/32" hex key to adjust the chair base speed and back speed on the manifold.

Figure 16. Adjust Manifold for Chair Speed



NOTE If cable ties are present in the product and you need to remove them for servicing, make sure to replace the ties after service is completed.

Programming

The A-dec 200 product offers the option of having a standard touchpad. The touchpad centralizes treatment room controls into one touch surface including the chair, light, cuspidor controls, and auxiliary equipment.

NOTE If a system has a touchpad, it ships with a circuit board for the cuspidor and a dental light relay board. This allows for full functionality with the touchpad. If a system does not have a touchpad, the system ships with only a basic circuit board for the cuspidor.

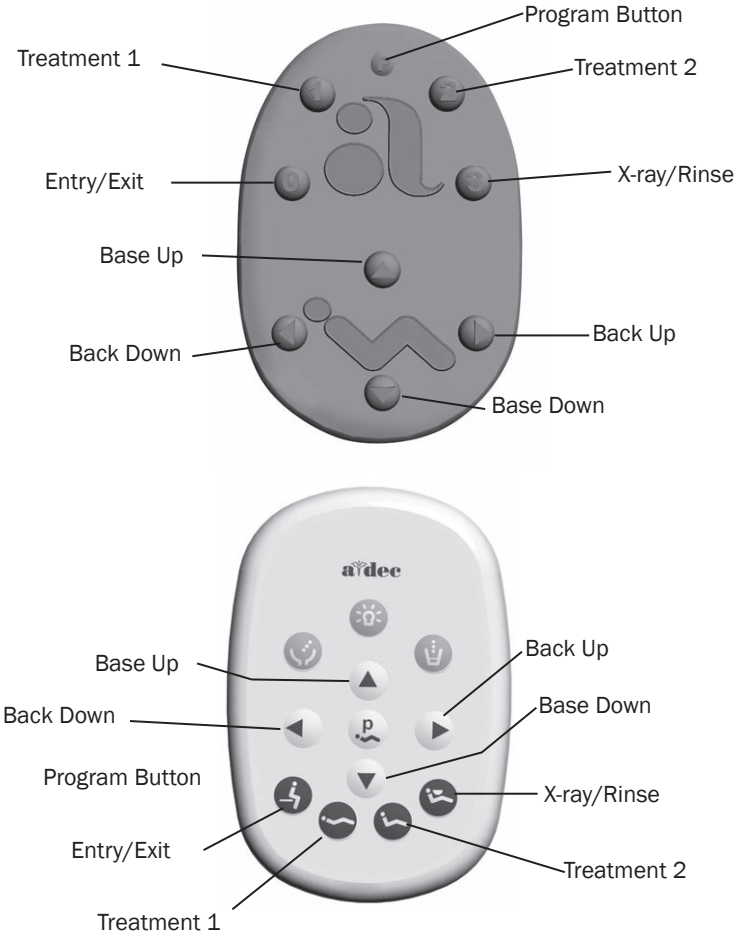
Figure 17. Touchpad or Footswitch Programming

NOTE Touchpad symbols are proprietary to A-dec, Inc.

Chair Positions

Manual direction arrows on the footswitch or touchpad allow you to move the chair base up/down and back up/down. Programmable buttons are factory preset to automatically move the chair.

Figure 18. Chair Manual and Programmable Position Buttons



Chair Preset Buttons

Table 3. Chair Preset Buttons

Footswitch/Touchpad	Description and Action
0 /	Entry/Exit: Positions chair for patient entry/exit; also turns the dental light off.
1 /	Treatment 1: Positions the chair base and back down; also turns the dental light on.
2 /	Treatment 2: Positions the chair base down and back up; also turns the dental light on.
3 /	X-ray/Rinse: Moves the chair for either x-ray or rinse position. Press again to move the chair to the previous position; also turns the dental light off or back on.

Program Chair Preset Buttons

Use the program button to assign and save chair preset positions. To program the chair presets Entry/Exit, Treatment 1, and Treatment 2:

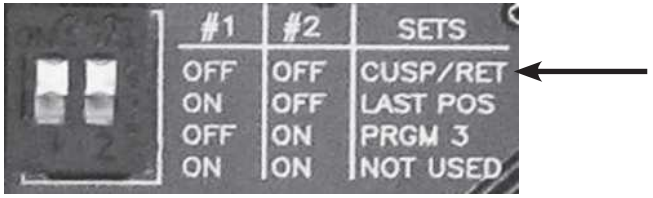
1. Move the chair to the desired position.
2. Press and release the Program button. One beep indicates programming mode is ready.
3. Within five seconds, press the button you want to program and you hear three beeps confirming the button has been set.

X-Ray/Rinse Button Feature

The x-ray/rinse button moves the chair and patient into an upright position for x-rays or cuspidor access. You can reprogram this button using the DIP switch on the 200 Chair circuit board as follows:

1. Set DIP Switch 1 to OFF and Switch 2 to OFF for CUSP/RET.

Figure 19. DIP Switch on 200 Chair Circuit Board



2. Move the chair to the desired position.
3. Press and release the Program button on the touchpad or footswitch. One beep indicates programming mode is ready.
4. Press the x-ray/rinse button. You hear three beeps confirming the program is set.

IMPORTANT If you have further questions about programming chair positions, contact your authorized A-dec dealer.

Dental Light

The dental light can be operated from the manual 3-position switch or the optional touchpad. The dental light is always off when the manual switch is in the center location. To turn the light on from the touchpad, press and hold the dental light button. Press and hold the button to turn the light off.

The dental light features two intensities: high and composite (low). For systems without a touchpad, flip the 3-position switch to either side of center to select the intensity. On the touchpad, press the light button to choose the intensity. When the light is in the composite setting, the LED indicator on the touchpad flashes.

Figure 20. Dental Light Operation

Auto Light Feature

The optional auto light feature turns on the light when the chair back reaches a treatment position. Press or and the dental light turns off.

To deactivate the auto light feature, press and hold and at the same time for three seconds. One beep confirms the auto light feature is off.

To re-activate the auto light feature, press and hold and at the same time for three seconds. Three beeps confirm the dental light auto feature is on.

Cuspidor Cupfill and Bowl Rinse

The cuspidor cupfill and bowl rinse functions depend on your system's configuration.

Standard Cuspidor *(no touchpad)*

Press and hold the cupfill button on the cuspidor for the desired amount of water. Water will continue to flow until the button is released.

Press the bowl rinse button on the cuspidor once for a 15 second rinse. For continuous rinse, hold the button down. When the button is released, the water will continue to flow for 15 additional seconds.

Cuspidor with Optional Touchpad

If your system includes a touchpad, you can use the buttons on the touchpad or the cuspidor to operate and program bowl rinse and cupfill functions:

Table 4. Cupfill and Bowl Rinse Functions

Button	Description
	Cupfill Button: • Press the Cupfill button for a timed operation. The factory preset is a 2.5 second fill. • Press and hold the Cupfill button for manual operation.
•	Bowl Rinse Button: • Press the Bowl Rinse button for a timed operation. The factory preset is a 30 second rinse. • Press and hold the Bowl Rinse button for manual operation.

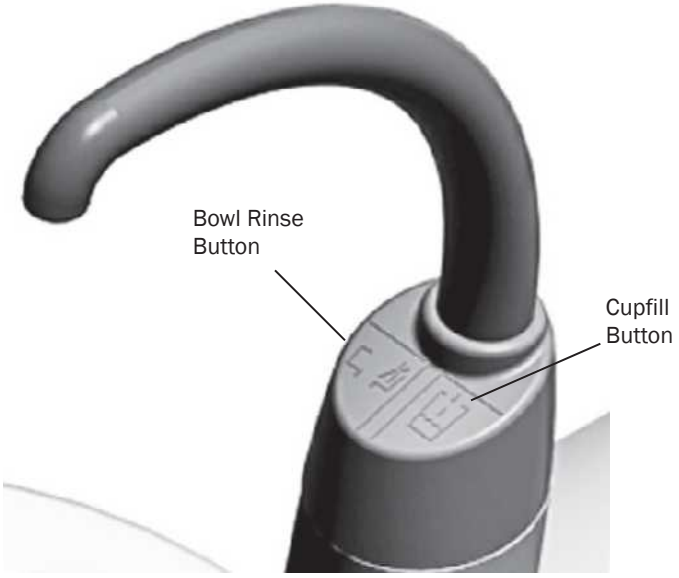
Customize Cupfill and Bowl Rinse Functions

Perform this operation with the doctor's touchpad only.

1. Press on the touchpad or press and hold both the cupfill and bowl rinse buttons on the cuspidor. Release them when you hear one beep.
2. Press and hold the Cupfill ( ) or Bowl Rinse ( ) button for the desired amount of time.
3. Release the button. Three beeps confirm the setting.

TIP Press twice in less than two seconds to activate the continuous operation mode. Press the button once to end the continuous bowl rinse mode.

Figure 21. Cuspidor Tower Cupfill and Bowl Rinse Buttons



Delivery System

This section provides information related to service, maintenance, and adjustments of the A-dec 200 delivery system.

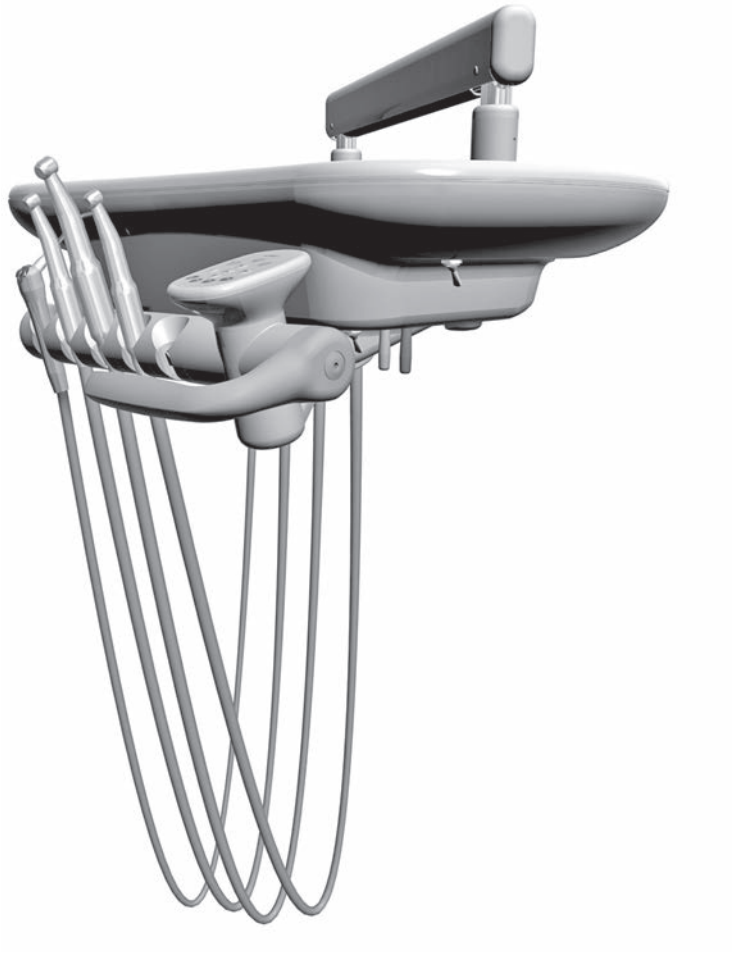
Contents

Delivery System Product Overview

A-dec 200 delivery system has been designed to mount on the A-dec 200 Support Center. The support center mounts to the chair using a post mount. The A-dec 200 delivery system provides the air and water used to operate the handpieces, syringes and accessories, and electrical power and data control of other modules.

The A-dec 200 standard configuration has a balanced flexarm with manual brake, three handpiece control block positions, a control head with room to house integrated accessories, and an autoclavable syringe.

Figure 22. A-dec 200 Delivery System



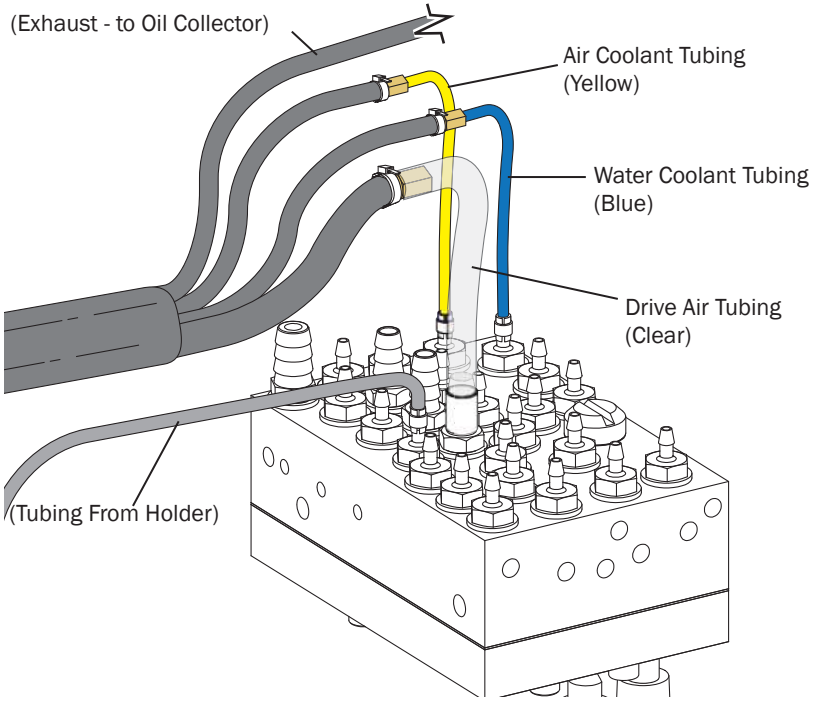
A-dec Tubing

A-dec products use four sizes of outside diameter tubing: 1/8", 1/4", 5/16", and 3/8". The A-dec 200 delivery system uses standard A-dec tubing and vinyl handpiece tubing. See “Handpiece Tubing Replacement” on page 33 for instructions on replacing tubing.

Table 5. A-dec Handpiece Tubing Cross Reference Table

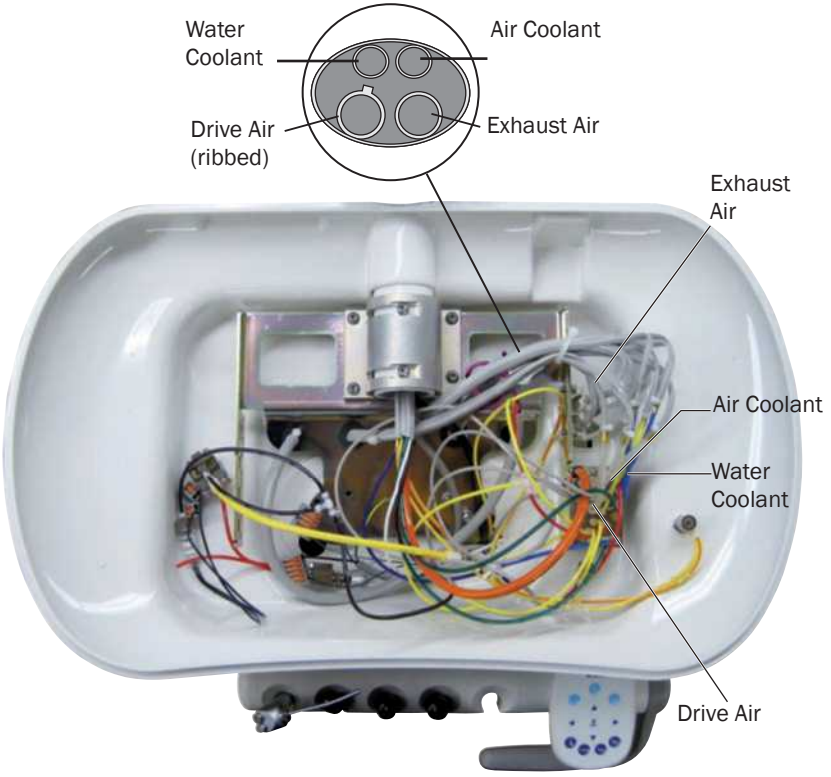
Color	Function
Clear	Drive air
Blue	Water coolant
Yellow	Air coolant

Figure 23. A-dec Handpiece Tubing Identification



The handpiece tubing connects to the control block using tubing connectors and the appropriate A-dec tubing.

Figure 24. Vinyl Handpiece Tubing Control Block Connections



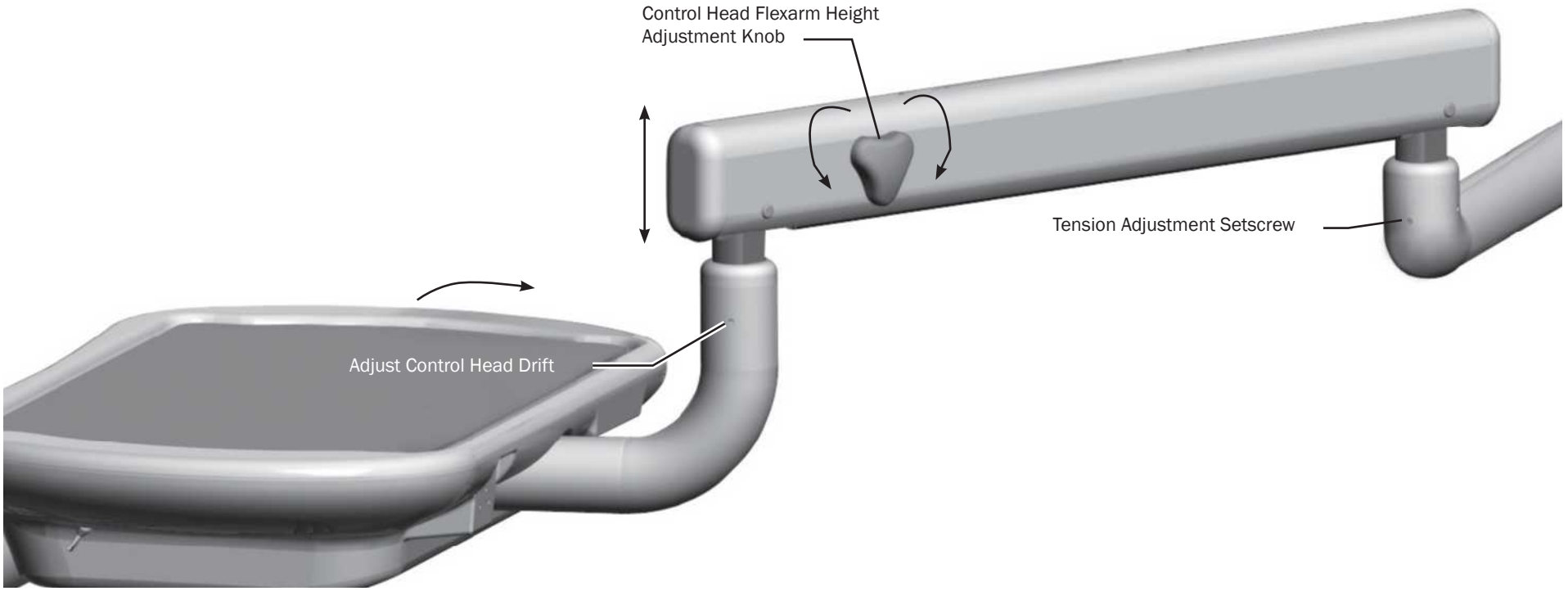
Delivery System Service, Maintenance, and Adjustments

Contents

Flexarm Adjustments

- Tension: If the control head flexarm drifts right or left, use a 3/32" hex key to adjust the tension setscrew. Turn the screw clockwise to tighten or counterclockwise to loosen the tension.
- Height: Turn the knob counterclockwise to disengage the control head flexarm brake and adjust the height. Turn the knob clockwise to lock the position.

Figure 25. Flexarm Adjustments



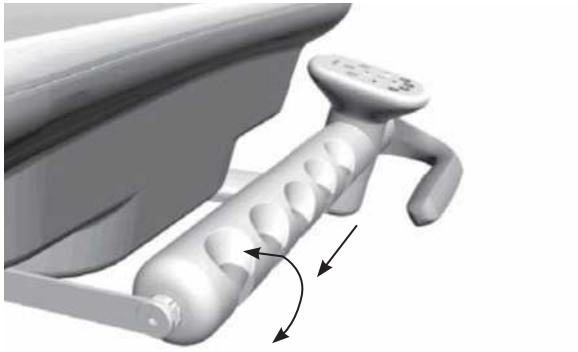
Holder Adjustments

Adjust the Doctor's Holder

Rotate the holders independently. Pull the holder slightly away from the adjacent one, rotate to the desired position, then release.

CAUTION Twisting the holder without pulling it away from the adjacent one will damage the mechanism.

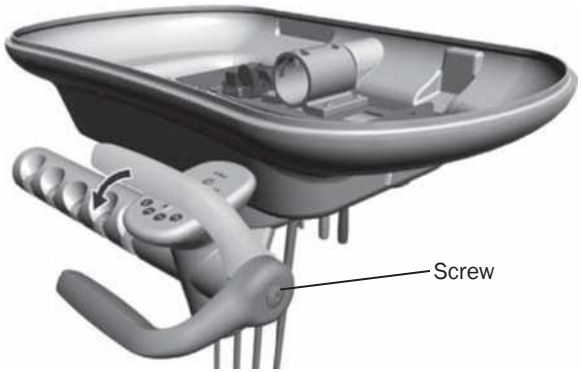
Figure 26. Doctor's Holder Adjustment



Adjust the Handle

To position the handle, remove the screw at the end of the handle, adjust the handle for use, then replace and tighten the screw.

Figure 27. Handle Adjustment



Control Block

The control block might need to be removed to service the control head. For example, you may need to remove the control block to change a diaphragm, to change the cartridge, or to service O-rings.

Remove the Control Block

1. Remove the cover.
2. Loosen the two screws that secure the control block to the control delivery system frame.
3. Lift the control block up from the base of the control center.

Figure 28. Remove Control Top

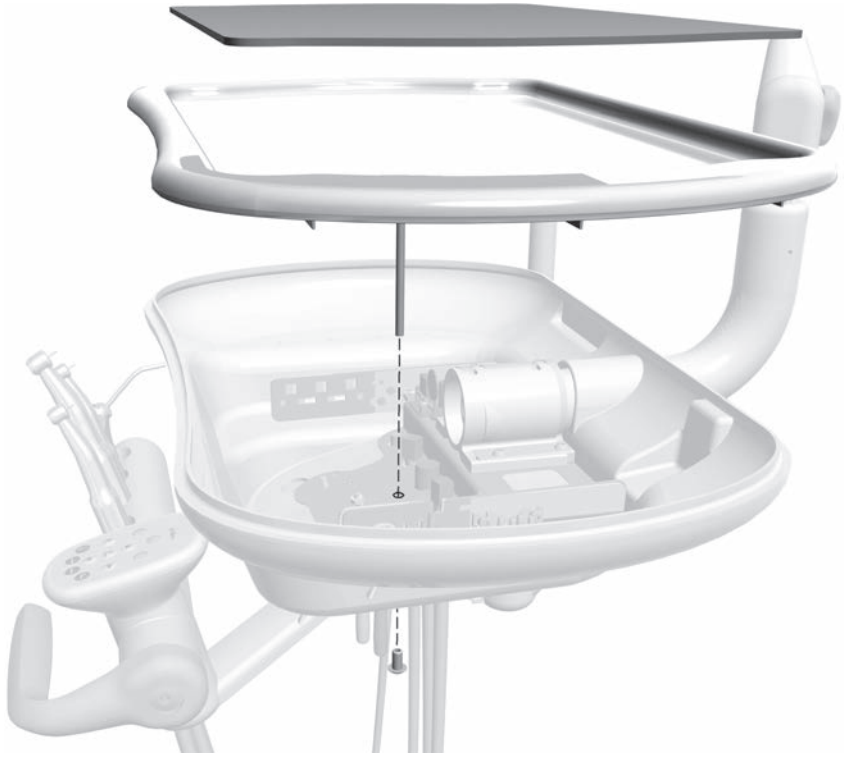
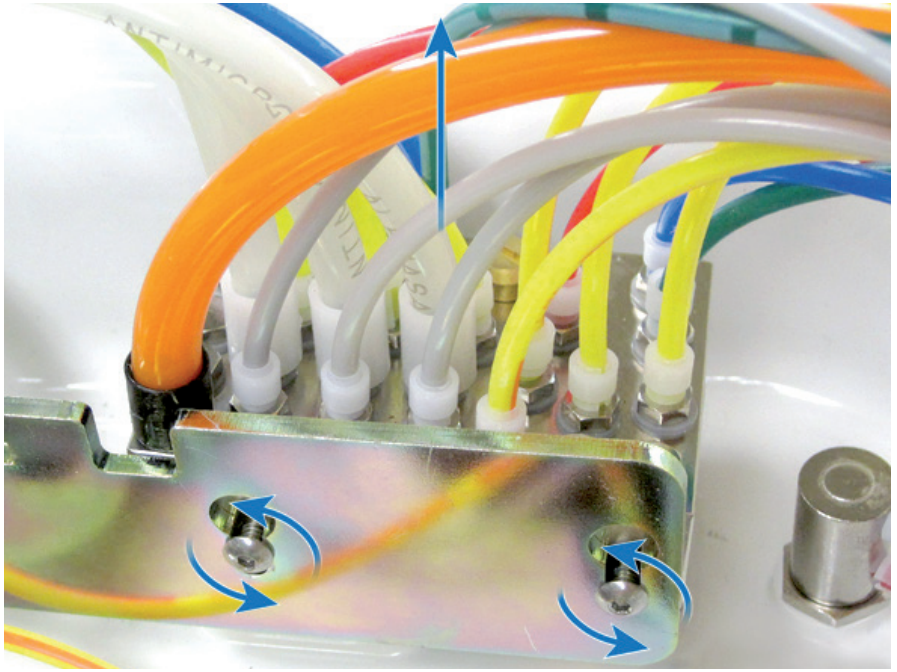


Figure 29. Remove Control Block on Delivery Systems

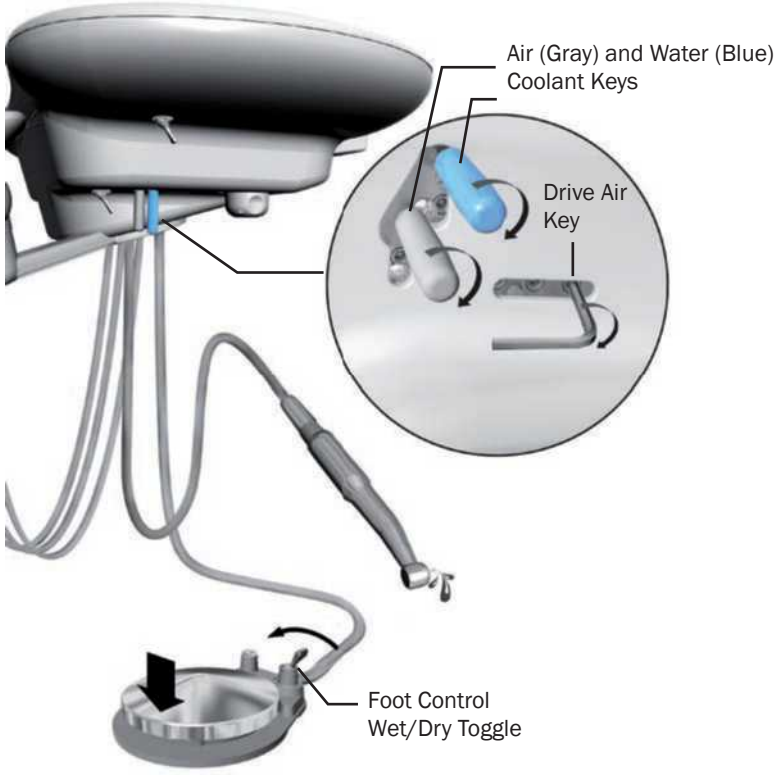


Handpiece Control Adjustments

Adjust the Water Coolant

1. Turn the air coolant, water coolant, and drive air all the way down.
2. Lift a handpiece from the holder, and flip the wet/dry toggle to water (towards the blue dot).
3. Step on the foot control.
4. Adjust the water coolant flow until there is 1 drop every 2 seconds.

Figure 30. Adjust Water Coolant



Adjust the Air Coolant

1. Lift a handpiece from the holder, and step on the foot control.
2. Adjust the air coolant flow until the spray is a fine mist.

Figure 31. Adjust Air Coolant

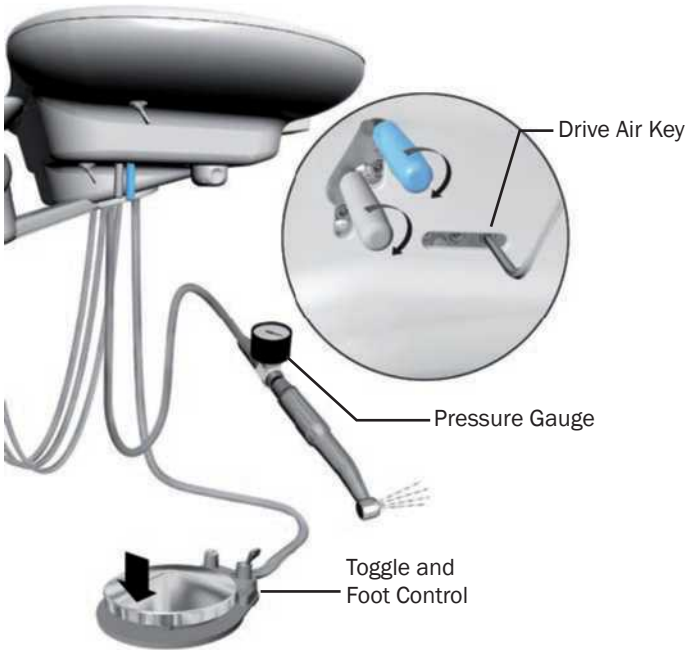
NOTE Contact A-dec Customer Support for information on servicing the foot control or syringe. See "Get Support" on page 4.

Adjust the Drive Air Pressure

NOTE Use a handpiece pressure gauge attached to the handpiece tubing for exact drive air measurement. See the manufacturer's handpiece documentation for the drive air pressure specification.

1. Lift a handpiece from the holder.
2. Install a pressure gauge.
3. Flip the toggle to dry, and step on the foot control.
4. Adjust the drive air pressure according to manufacturer's recommendations.
    - To increase flow, turn the key counterclockwise.
    - To decrease flow, turn the key clockwise.

Figure 32. Adjust Drive Air Pressure



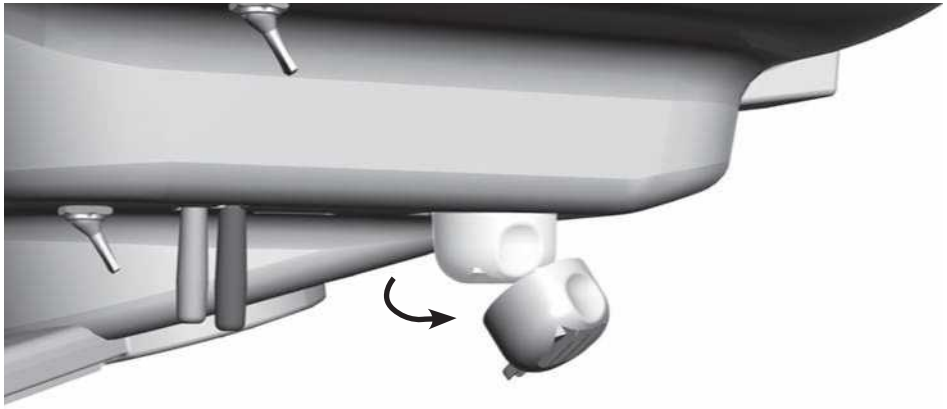
Oil Collector

The oil collector needs to be serviced once a week for normal use and more often for heavier use. To service:

1. Unsnap the oil collector cover located under the control head and discard the old gauze.

CAUTION Do not remove the foam pad located inside the oil collector cover.

Figure 33. Oil Collector Removal



2. Fold a new gauze pad (51 mm x 51 mm [2" x 2"]) into quarters and place inside the cover.
3. Snap the oil collector cover closed.

Handpiece Tubing Replacement

1. Remove the delivery system cover.
2. Cut the handpiece tubing you are replacing from the colored A-dec tubing/ control block.
3. Pull the old handpiece tubing out of the control head.
4. Route the new handpiece tubing through the base of the control head.
5. Connect the new handpiece tubing to the control block using the connectors and colored tubing previously used.

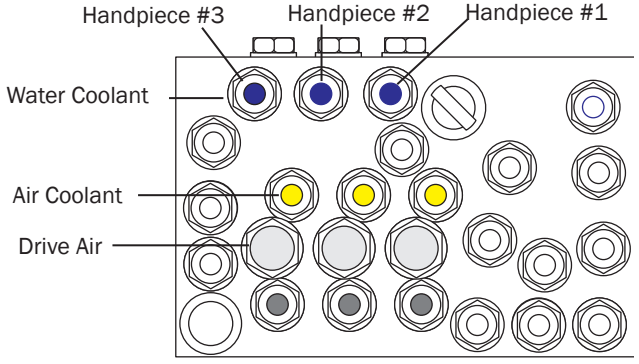
The A-dec colored tubing is identified by its color.

- Yellow tubing to the air coolant port
- Blue tubing to the water coolant port
- Clear tubing to the drive air port

NOTE Vinyl tubing is not color coded. For vinyl tubing identification, see "A-dec Tubing" on page 25.

6. Replace the delivery system cover.

Figure 34. Handpiece Barb Connection



Adjust Tubing Length

1. Adjust the length of the tubing so it drapes with syringe tubing.
2. Insert the tubing in the tubing retainers.

Figure 35. Adjust Length of Handpiece Tubing

Quad Voltage Intraoral Light Source (QVIOLS)

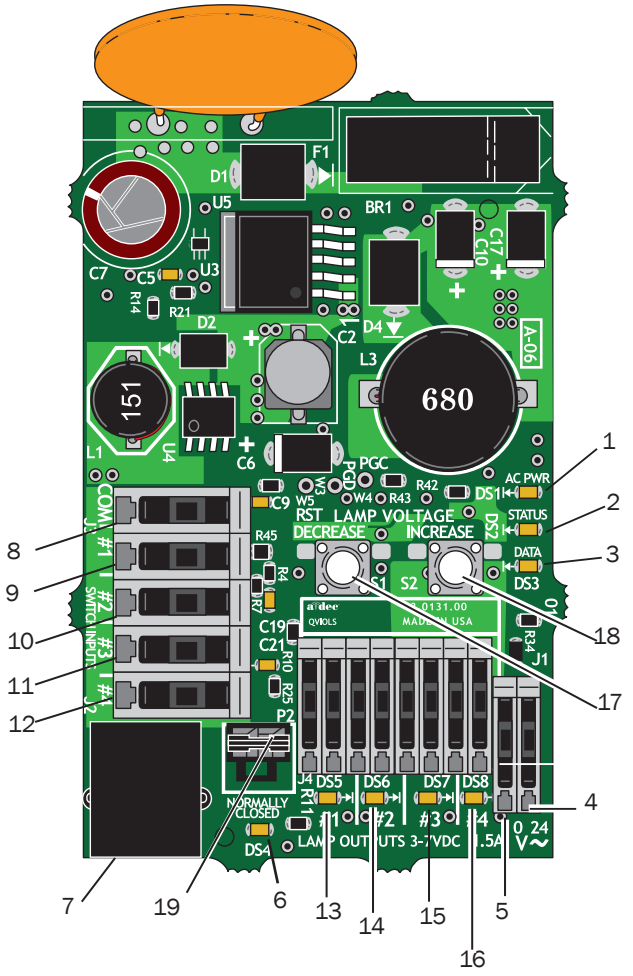
Part Number: 90.1168.00

The quad voltage intraoral light source (QVIOLS) provides four independent fiber optic voltage outputs. Each output is adjustable from 3 VDC to 7 VDC at 1.5 Amps. Only one output can be on at a time. Activating an input on the QVIOLS turns on its respective output.

Table 6. QVIOLS Circuit Board Descriptions

Item	Description
1	DS1 AC Power LED
2	DS2 Status LED
3	DS3 Data LED
4	J1 - 24 VAC Input
5	J1 - 0 VAC Input
6	DS4 - normally closed LED (displays as yellow when P2 jumper is installed)
7	P1 Data Port
8	J3 Switch input Common
9	J3 Switch Input #1
10	J2 Switch Input #2
11	J2 Switch Input #3
12	J2 Switch Input #4
13	J4 Light Source Output #1
14	J4 Light Source Output #2
15	J5 Light Source Output #3
16	J5 Light Source Output #4
17	S1 Decrease Lamp Output
18	S2 Increase Lamp Output
19	P2 normally closed jumper

Figure 36. QVIOLS Circuit Board



NOTE On the A-dec 200 product, a jumper should always be located within P2, and DS4 should be on.

Intraoral Light Source Adjustments

The intraoral light source (IOLS) voltage adjustment on the A-dec 200 doctor's delivery system is located on the QVIOLS circuit board. Each output voltage is preset to 3.2 VDC at the lamp terminals when the lamp is on.

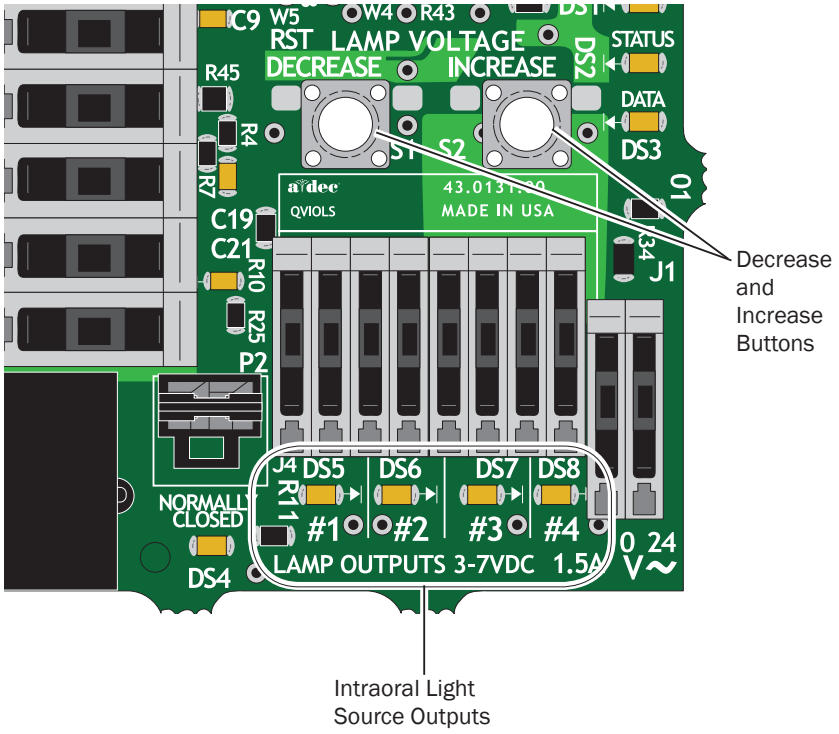
WARNING The Length and Voltage Table, page 36, is only valid for devices rated for 3.5 VDC and 0.75 Amp 26 AWG wires. For devices drawing a different amount of current, requiring a different voltage, or with a different wire gauge, please contact A-dec Customer Service. See "Get Support" on page 4.

1. Use a 7/64" hex key to remove the control head cover.
2. Set the voltmeter to DC voltage and place its probes on the IOLS output terminals for the handpiece you are testing.
3. Lift the handpiece from its holder.

NOTE When the intraoral light source output is on, its respective LED is illuminated. For example, LED DS6 is illuminated when handpiece #2's intraoral light source is activated.

4. Use the buttons behind the terminal to adjust the voltage according to the Length and Voltage Table, page 36.

Figure 37. Intraoral Light Source Voltage



Intraoral Light Source Length and Voltage

Table 7. Length and Voltage Table

Length and Voltage					
Wire length in A-dec tubing		Voltage at terminal strip A-dec/W&H, Bien Air or other bulbs rated at 3.5 V	Wire length in A-dec tubing		Voltage at terminal strip A-dec/W&H, Bien Air or other bulbs rated at 3.5 V
(in)	(cm)	VDC +/- .02	(in)	(cm)	VDC +/- .02
48	122	3.40	108	274	3.69
54	137	3.43	114	290	3.72
60	152	3.46	120	305	3.75
66	168	3.49	126	320	3.78
72	183	3.52	132	335	3.81
78	198	3.55	138	351	3.84
84	213	3.58	144	366	3.87
90	229	3.61	150	381	3.90
96	244	3.64	156	396	3.93
102	259	3.67			

NOTE The above table pertains to fiber-optics powered with 26 AWG wires, 0.75 Amp loads, and a desired bulb voltage of 3.2 VDC. For fiber-optics powered with 26 AWG wires and other ratings, use the equation:

T = (Z x 0.006 x Y) + X where:

T: Terminal strip voltage(VDC)
X: Desired voltage at lamp (VDC)
Y: Rated lamp/load current (in Amps)
Z: Length of 26 AWG wire (inches) from terminal trip to lamp

Cuspidor and Support Center

This section provides detailed information related to service, maintenance, and adjustment of the A-dec 200 cuspidor and support center.

Contents

Cuspidor and Support Center Product Overview

A-dec 200 Support Center provides chair side mounting of the A-dec 200 Delivery System, Cuspidor, A-dec 200 Dental Light, and Assistant's Instrumentation. The support center mounts to the A-dec 200 chair using a post mount.

Figure 38. A-dec 200 Support Center with Cuspidor

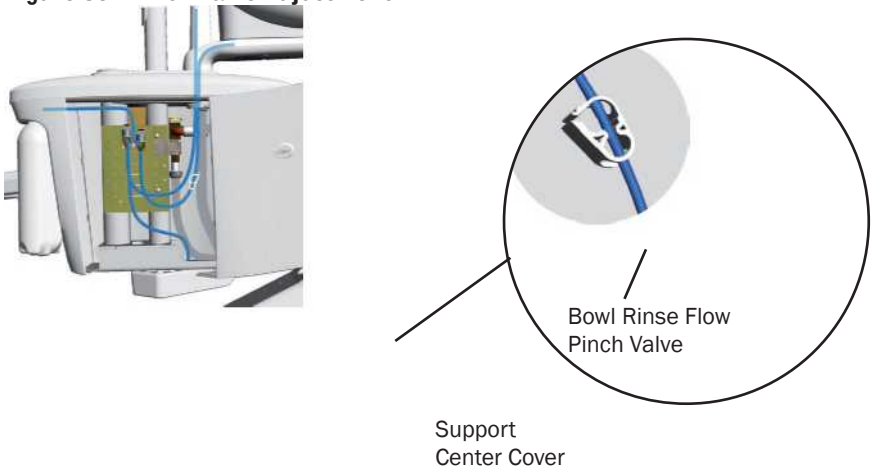
Cuspidor and Support Center Service, Maintenance, and Adjustments

Adjust the Bowl Rinse Flow

Adjustments to the cuspidor bowl rinse flow are made inside the support center. To adjust the flow:

1. Loosen the two thumb screws at the bottom of the support center and carefully pull the cover out.
2. With the cuspidor bowl rinse on, tighten or loosen the pinch valve to adjust the flow.
3. For the best rinsing action, adjust the flow pattern by rotating the bowl rinse.

Figure 39. Pinch Valve Adjustment



Adjusting the Cuspidor Cupfill and Bowl Rinse

For adjustment information, see “Cuspidor Cupfill and Bowl Rinse” on page 23.

Self-Contained Water System

The self-contained water system provides water to the handpieces, syringes, and cuspidor cupfill. The system includes a 2 liter water bottle that mounts to the support center and offers a way to ensure the quality of treatment water.

WARNING Use only A-dec self-contained water bottles. Do not use any other bottles, including glass or plastic beverage bottles. Do not use damaged bottles. These can pose a serious safety hazard while pressurized. A-dec plastic water bottles cannot withstand heat sterilization. Attempting to do so will damage the bottle and your sterilizer.

CAUTION Use caution when using the self-contained water system with accessories that require and uninterrupted water supply (such as scalers) as these could get damaged without a continuous water source. Do not use saline solutions, mouth rinses, or any chemical solutions (not specified in this guide) in your A-dec self-contained water system. These may damage the system components and cause your dental unit to fail.

Figure 40. Self-Contained Water Bottle

Adjust the Water Bottle

To remove the bottle: Turn the bottle counterclockwise.

To install the bottle: Turn the bottle so that the A-dec logo faces away from the chair, then rotate the bottle to the right 1-1/2 turns, taking care not to overtighten.

CAUTION Do not over tighten the water bottle or you can strip its threads. It is normal to hear a hissing sound for up to two minutes while the bottle pressurizes.

Assistant's Instrumentation

This section provides detailed information related to service, maintenance, and adjustment of the A-dec assistant's instrumentation.

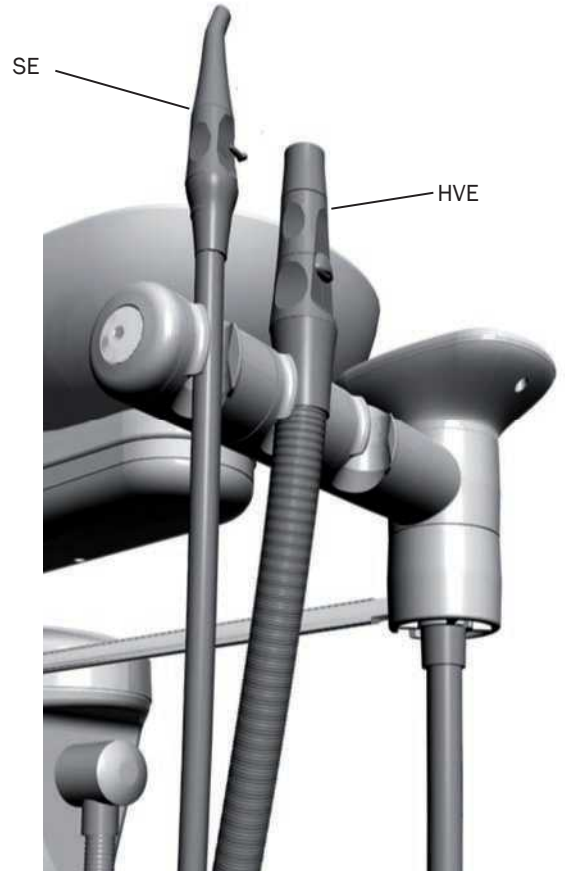
Contents

Assistant's Instrumentation Product Overview

The A-dec 200 assistant's instrumentation is equipped with an autoclavable syringe, high volume evacuator (HVE), and saliva ejector (SE). Some configurations may include an optional dual HVE or instrumentation that supports a chair-side or single-operatory vacuum system. Integrated into the support center is the solids collector, which connects with the HVE and SE to separate solids from the evacuated material.

The assistant's vacuum instruments disconnect from the tubing for easy cleaning, and they are fully autoclavable.

Figure 41. Assistant's Instrumentation



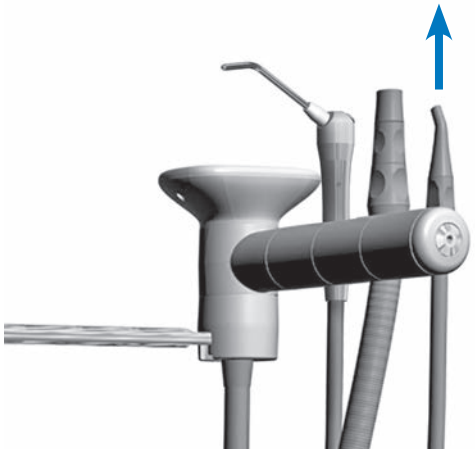
Assistant's Instrumentation Service, Maintenance, and Adjustments

Auto-air Holder

Each handpiece in the holder assembly automatically activates when you lift it from its holder.

Holders provide vacuum On/Off switching for users whose vacuum system requires this functionality. The vacuum pump activates automatically when you lift the HVE or SE from the holder. The vacuum turns off when you place the HVE or SE back into the holder.

Figure 42. Auto-Air Holder



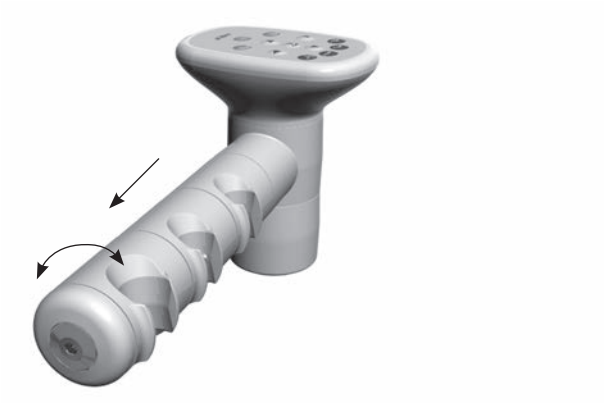
Position the Assistant's Holder

The independently adjustable holders rotate to allow customized positioning for each instrument on the assembly.

To rotate the holder:

1. Pull holder slightly away from the adjacent one.
2. Rotate to the desired position and release.

Figure 43. Rotating Instrument Holders

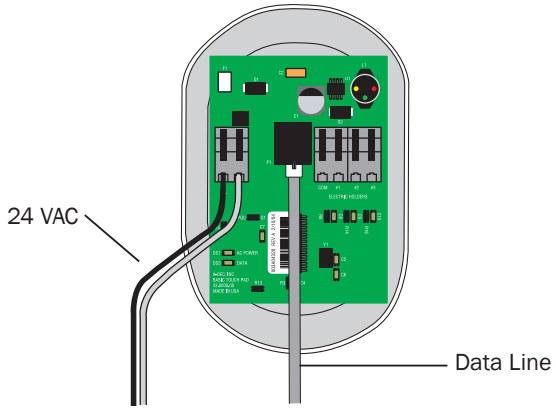


NOTE Auto-air holders rotate together. Standard holders rotate individually.

Assistant's Touchpad Connections

The assistant's instrumentation uses a standard touchpad that serves as a single touch surface for controlling the chair, dental light, and cuspidor. The touchpad can rotate 340° for access and visibility.

Figure 44. Assistant's Touchpad with Standard Holder Connections

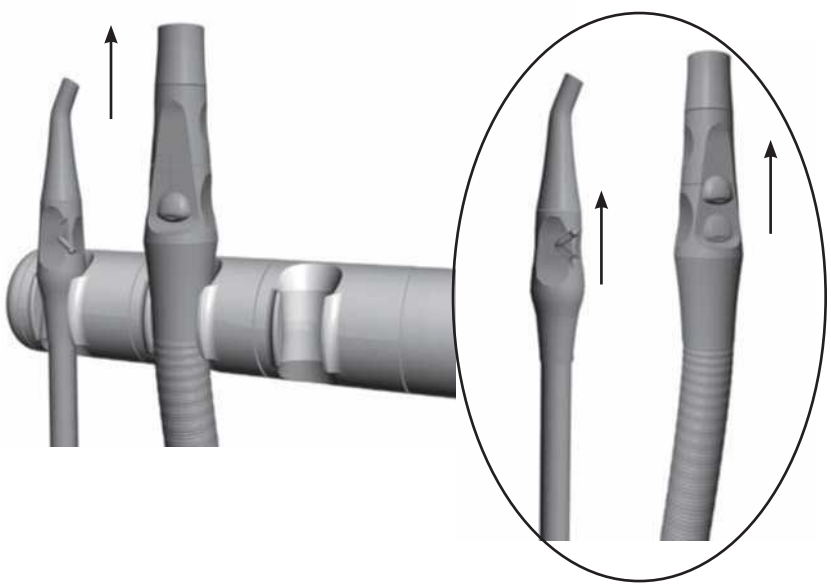


Vacuum Instrumentation

To use the HVE and SE, lift the holder from the valve to activate the vacuum.

NOTE Lifting the handpiece from the holder only activates the vacuum with auto-air switches.

Figure 45. HVE and SE Operation



Solids Collector

The solids collector helps stop solids from entering the central vacuum system.

CAUTION Use appropriate gloves when handling contaminated parts.

Replace Solids Collector Screen

1. Turn off vacuum or open the HVE control valve.
2. Remove the solids collector cap.
3. Remove the solids collector screen.
4. Discard the screen according to your local regulations.

CAUTION Do not empty the screen into the cuspidor. Doing so could plug the drain.

5. Insert the new screen in the collector and replace the cap.

CAUTION Ensure that the solids collector cap is inserted properly. Failure to do so will not allow for proper suction.

Figure 46. Replace Solids Collector Screen

Utilities

This section provides detailed information related to service, maintenance, and adjustment of the A-dec 200 utility area.

Contents

Figure 47. Utilities on A-dec 200 Dental Chair

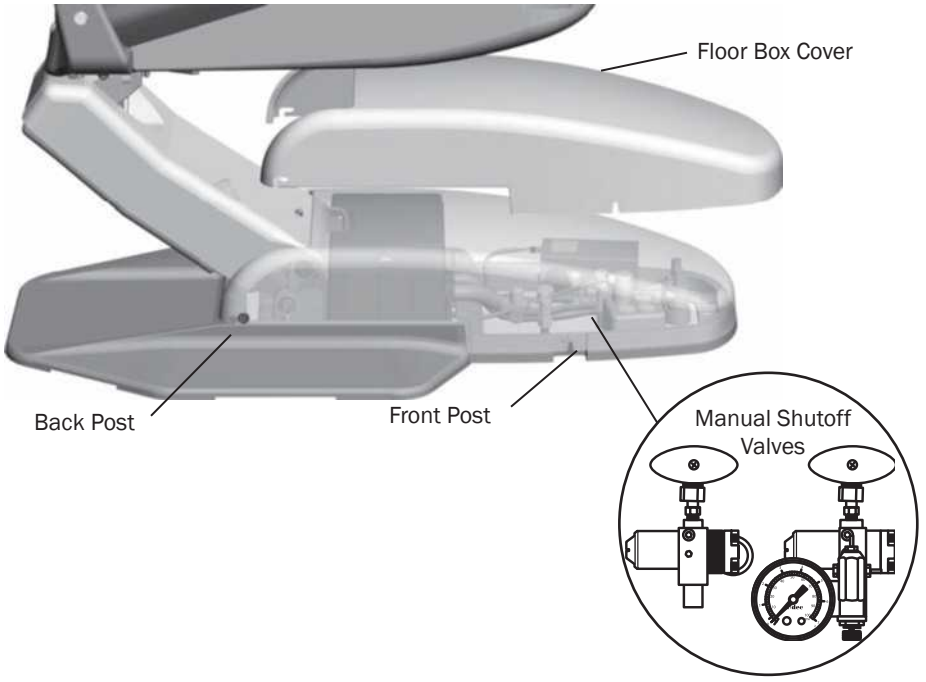
Utilities Product Overview

The utilities for your system are located under the chair floor box. To access the utilities, pull the floor box cover up at the front posts, and then forward and up to slide the cover off the back posts.

Shutoff Valves

Manual shutoff valves control the air and water to the system. To prevent leaks, these valves should remain fully open (turned counterclockwise) except while servicing the system. Air and water pass through separate filters before entering the regulators. Replace these filters when they become clogged and cause restricted flow.

Figure 48. Floor box Cover Removal and Shutoff Valves



NOTE If cable ties are present in the product and you need to remove them for servicing, make sure to replace the ties after service is completed.

Gauge and Pre-Regulator

The pre-regulator controls the air and water pressure in the unit. The gauge displays the unit air pressure.

Figure 49. Utilities Diagram

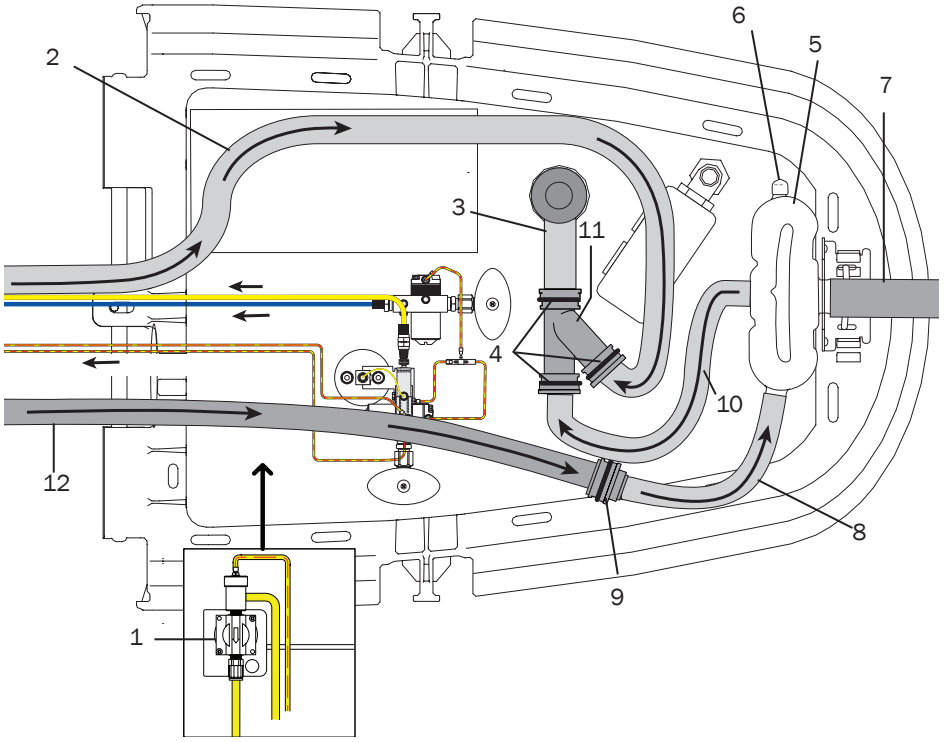


Table 8. Utilities Descriptions

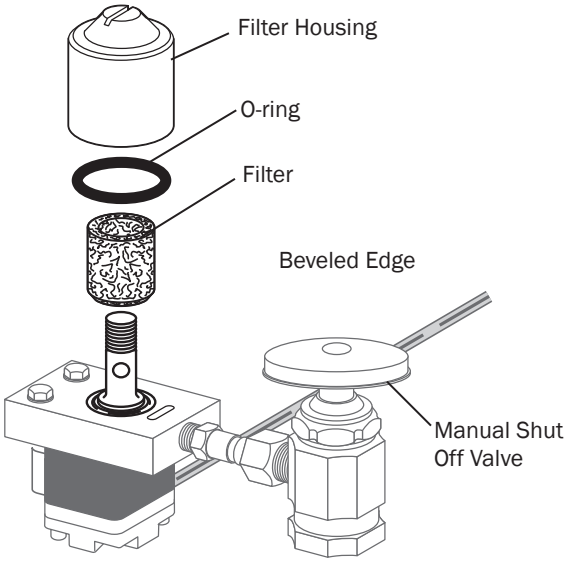
Item	Description	Item	Description
1	Moisture separator (optional)	7	Air exhaust
2	Cuspidor drain tube	8	5/8" exhaust tube
3	20 mm tube to drain	9	Durr adapter
4	Connector clips (four)	10	20 mm tube to liquid separator drain
5	Liquid separator tank	11	Y connector
6	Cap	12	Exhaust tube

Utilities Service, Maintenance, and Adjustments

Replace the Air and Water Filters

Air and water pass through separate filters before entering the regulators. Replace a filter when it becomes clogged and causes restricted flow.

Figure 50. Air and Water the Filter Components



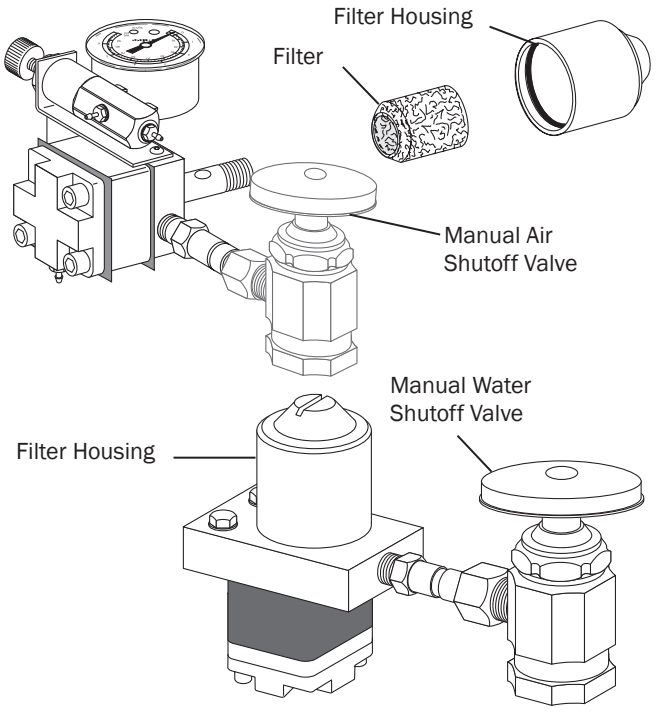
To replace the filter:

1. Turn off the master toggle and close the manual shutoff valves (turn clockwise).
2. Bleed the system of air and water pressure by operating the syringe buttons until air and water no longer flow.
3. Using a standard screwdriver, remove the filter housing from the air or water filter pre-regulator assembly and remove the filter.
4. Replace the filter if it is clogged or discolored. Install the filter with the beveled edge facing the manifold.

CAUTION To ensure proper delivery system operation, install the filter with the beveled edge facing the manifold.

NOTE Turn the pre-regulator knob clockwise to increase pressure and counterclockwise to decrease pressure. Read the pressure gauge while adjusting. Water pressure will increase/decrease by half of the gauge indication.

Figure 51. Replacing Filters



Dental Light

This section provides detailed information related to service, maintenance, and adjustments of the A-dec 200 Dental Light.

Contents

Figure 52. A-dec 200 Dental Light

Figure 53. LED and A-dec 371 Dental Lights*

NOTE * If an A-dec LED or 371 Dental Light is used, refer to the *A-dec Dental Lights and Monitor Mounts Service Guide* (p/n 86.0326.00) for service information.

Dental Light Product Overview

The dental light provides two intensities at the light head and the optional touchpad. On the light head switch, flip the switch to either side of center to select the intensity. On the touchpad, press the light button to choose the intensity.

Dental Light Specifications

- Electrical (Transformer Output):
  - A-dec 200: 12.1/16/17 VAC
- Bulb: Quartz Xenon Halogen, single-end prongs, extended life
- Rating: 17 V/95 watts
- Color temperature: 4800 Kelvin
- Heat output: 325 BTU/Hour
- Light Pattern: 3.9" x 6.7" at 27.6" (100 mm x 170 mm at 700 mm)
- Nominal Light Intensity:
  - Composite: 5,000 lux (465 fc)
  - High 17,000 lux (1579 fc)

On/Off Button

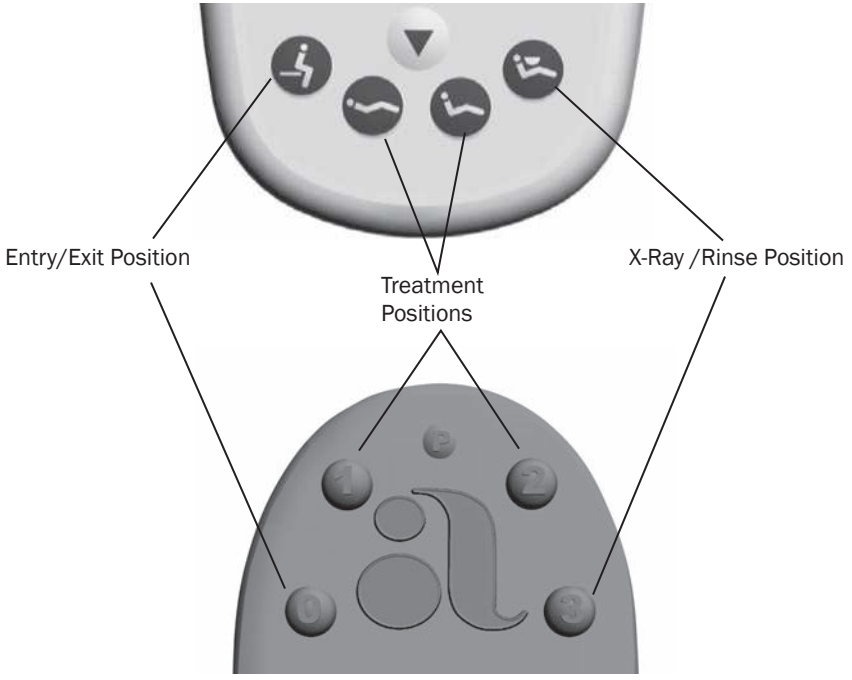
The dental light can be operated from the assistant's or doctor's touchpad. To turn the light on, off, or change intensity, press the dental light button on the touchpad.

Auto On/Off Feature

The optional auto on/off feature turns the light on when the chair back reaches a treatment position. Press or , and the dental light turns off.

To activate/deactivate the auto on/off feature, press and hold the program and dental light buttons simultaneously for three seconds. One beep confirms the auto on/off is off. Three beeps confirm the auto on/off is on.

Figure 54. Touchpad and Footswitch Light Features



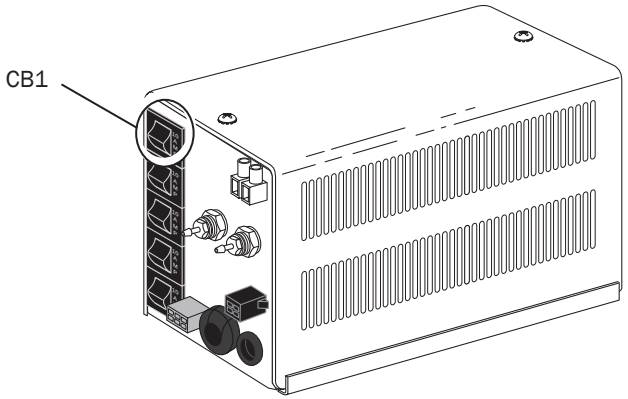
Dental Light Service, Maintenance, and Adjustments

Contents

Circuit Breaker Location

A circuit breaker will interrupt the flow of electricity under abnormal conditions. If the circuit breaker should trip, inspect the wiring to ensure there are no shorts, and reset by pushing the circuit breaker. The circuit breaker for the dental light is located on the power supply.

Figure 55. Circuit Breaker



Intensity Switches

A-dec dental lights can be operated from the manual 3-way switch or the optional touchpad. The dental light is always off when the 2-way switch is in the center location. To turn the light on or off from the touchpad, press and hold the dental light button. The dental light features two intensities: high and composite (low). For systems without a touchpad, flip the 3-way switch either side of center to select the intensity. For systems with a touchpad, ensure that the 2-way switch is in either of the On positions, and press the light button to choose the intensity. When the light is in the composite setting, the LED indicator on the touchpad flashes.

Figure 56. Intensity Switches

Dental Light Wire Connections on the 200 Dental Chair

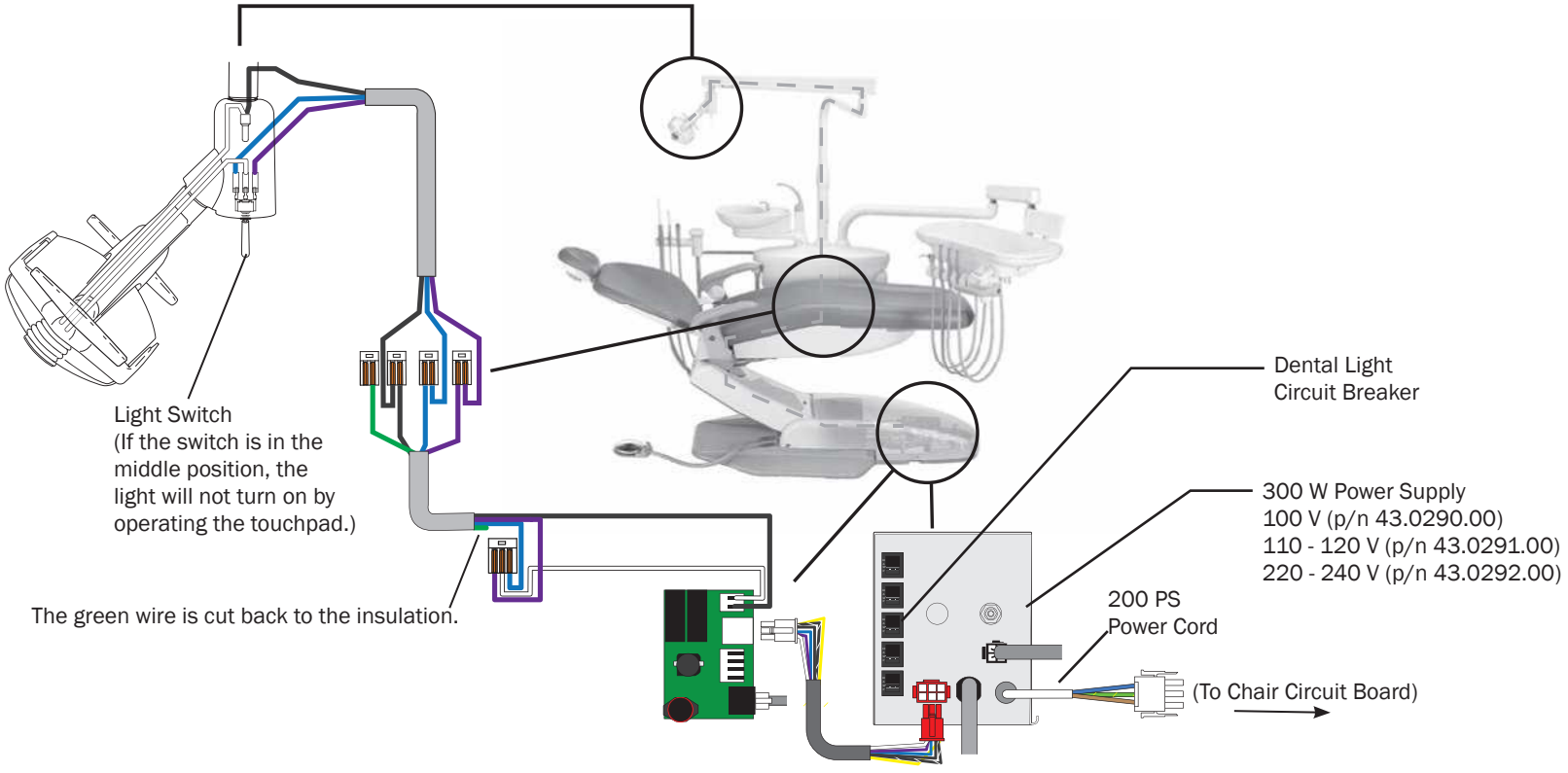
Terminal	Voltage	Terminal Label	Wire
J2	17/12/16 VAC	VIO	Violet
J2	0 VAC	BLK	Black

See “Circuit Board Components” on page 10 to identify dental light connections on the chair circuit board.

NOTE The LED indicator must be connected to the power supply for the dental light circuit board to function correctly.

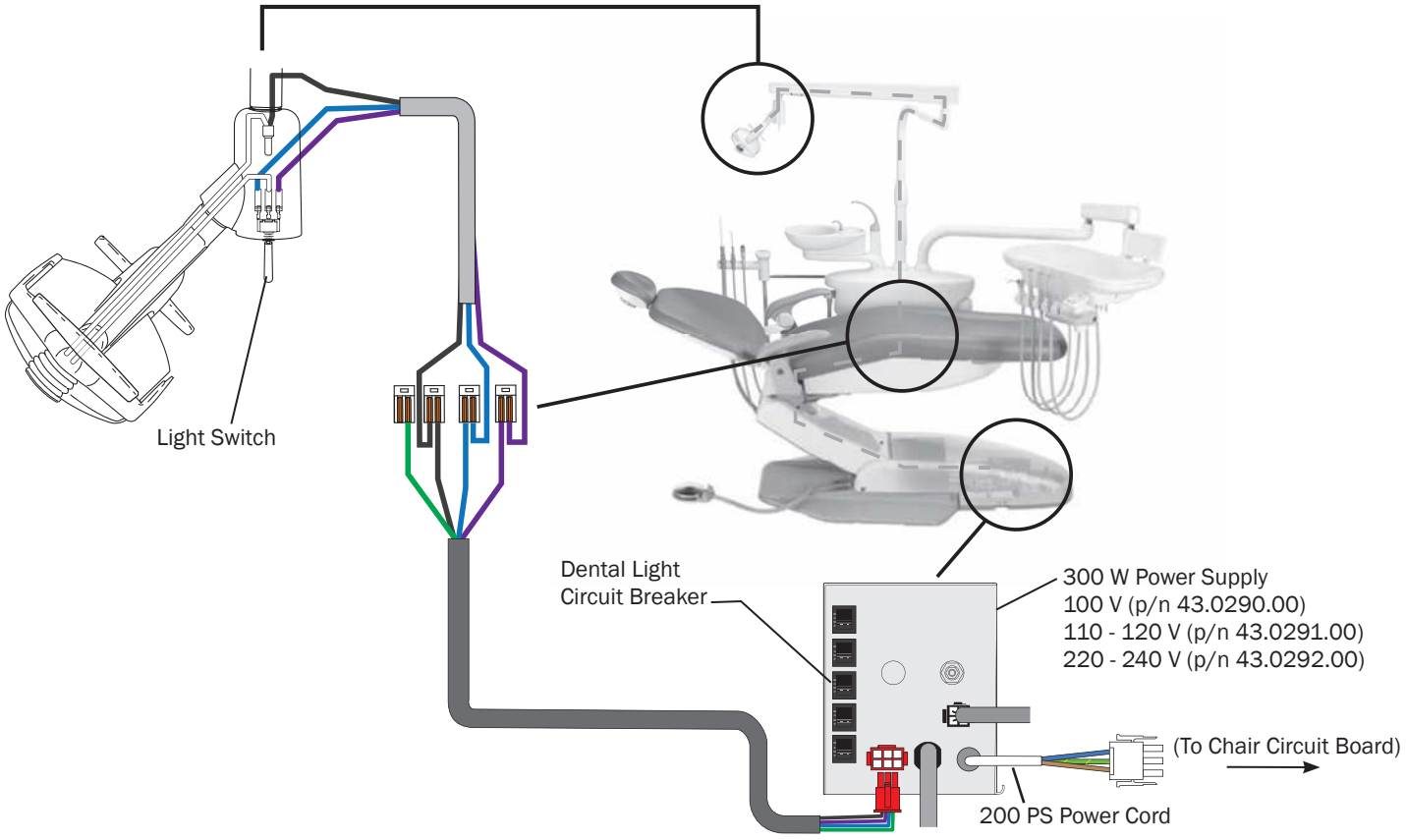
NOTE For field installation of power supply, cut off the existing white connector and strip the wires.

Figure 57. Dental Light Wire Connections With Touchpad



Dental Light Wire Connections on the 200 Dental Chair

Figure 58. Dental Light Wire Connections Without Touchpad



Dental Light Relay Circuit Board

Figure 59. Dental Light Relay Circuit Board

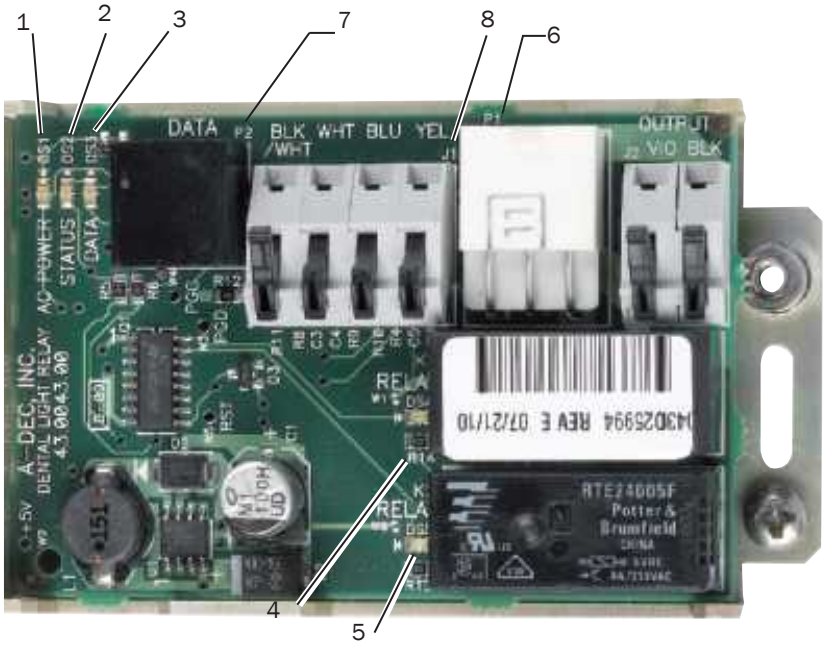


Table 9. Dental Light Relay Circuit Board Descriptions

Item	Description
1	DS1 - AC POWER
2	DS2- STATUS
3	DS3 - DATA
4	DS4 - RELAY
5	DS5 - RELAY
6	P1 - Input Power
7	P2 - DATA
8	J1 - Toggle Switch Inputs

Table 10. Dental Light Output Settings

Function	K1 (DS4)	K2 (DS5)	Output
Off	Off	Off	0 VAC
High intensity	On	Off	17 VAC
Composite intensity	Off	On	12 VAC
Medium Intensity	On	On	16 VAC

LED Identification

Table 11. LED Status and Descriptions

LED	Status	Description
DS1 - AC POWER	Off	No 24 VAC power, tripped circuit breaker, power supply turned off, no line voltage
	Green, steady	24 VAC at the terminal strip
DS2 - STATUS	Off	System is not functioning, no power or circuit board has failed
	Green, steady	Normal operation
DS3 - DATA	Off	No DCS communication, not connected to the DCS, or DCS has failed
	Green, steady	Detects active DCS
	Green, blinking	Valid DCS message
DS4, DS5 - Dental Light Relay	Off, Off	Dental light off
	On, Off	High intensity
	Off, On	Composite intensity
	On, On	Medium intensity

Flexarm Adjustments

Remove the screw and cover from the flexarm. Turn the tension adjustment nut inside the flexarm using a 1/2" open end wrench. Tighten the nut by turning it clockwise, if the flexarm moves too easily, or tends to drift down by itself. Loosen the nut by turning it counterclockwise, if the arm drifts up.

NOTE The weight of the flex arm cover affects the flex arm counter balance. Set cover on flex arm to test tension adjustment.

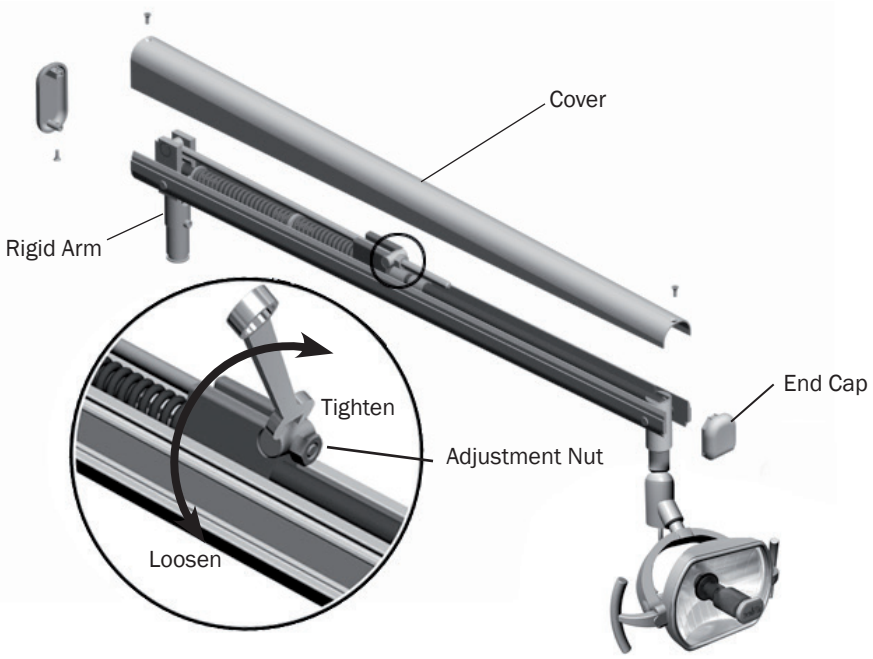
If the dental light drifts up or down, complete the following steps to adjust the flexarm counterbalance.

1. Remove the flexarm end caps.
2. Lift and separate the cover from the arm.

TIP To get a better grip on the cover, use a Phillips head screw driver to remove the retainer on the end of the rigid arm towards the light and slide the cover toward the light.

3. Slide the cover up and rest it on the rigid arm.
4. Use a 1/2" combination wrench to adjust the nut on the end of the spring.
5. If the dental light drifts up, turn the nut to the left. If the dental light drifts down, turn the nut to the right.
6. Slide the cover back onto the flexarm (but do not reattach it yet), and check for drift.
7. Repeat steps 3 through 5 until the drift is eliminated.

Figure 60. Dental Light Flexarm Adjustment



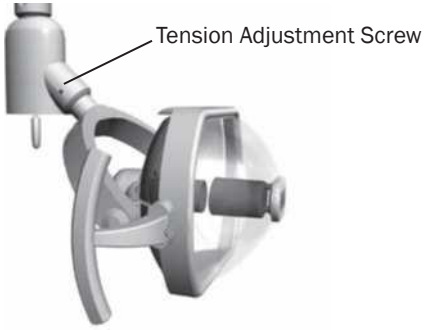
A-dec 200 Dental Light Rotation Adjustments

If the light head is difficult to position, moves too easily, or tends to slip out of position, the rotation tension can be adjusted diagonally and vertically.

Adjust Diagonal Rotation

Use a 5/64" hex key to adjust the setscrew on the pivot housing. Turn the screw clockwise to increase tension; counterclockwise to decrease tension.

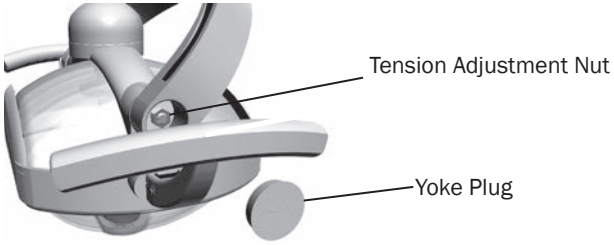
Figure 61. Diagonal Adjustment



Adjustment Vertical Rotation

1. Remove the yoke plug on one side of the light.
2. Using a 5/16" nut driver, turn the adjustment nut clockwise to increase tension; counterclockwise to decrease tension.
3. Reinstall the yoke plug.

Figure 62. Vertical Adjustment



Replace the Dental Light Bulb

Follow these steps when replacing the dental light bulb:

1. Turn the light off and allow it to cool.

> **WARNING** To avoid burning your fingers, allow the bulb to cool before removing. Never operate the dental light with the light shield removed. The clear shield contains UV blocking additives and is also your protection in the unlikely event that the bulb shatters.

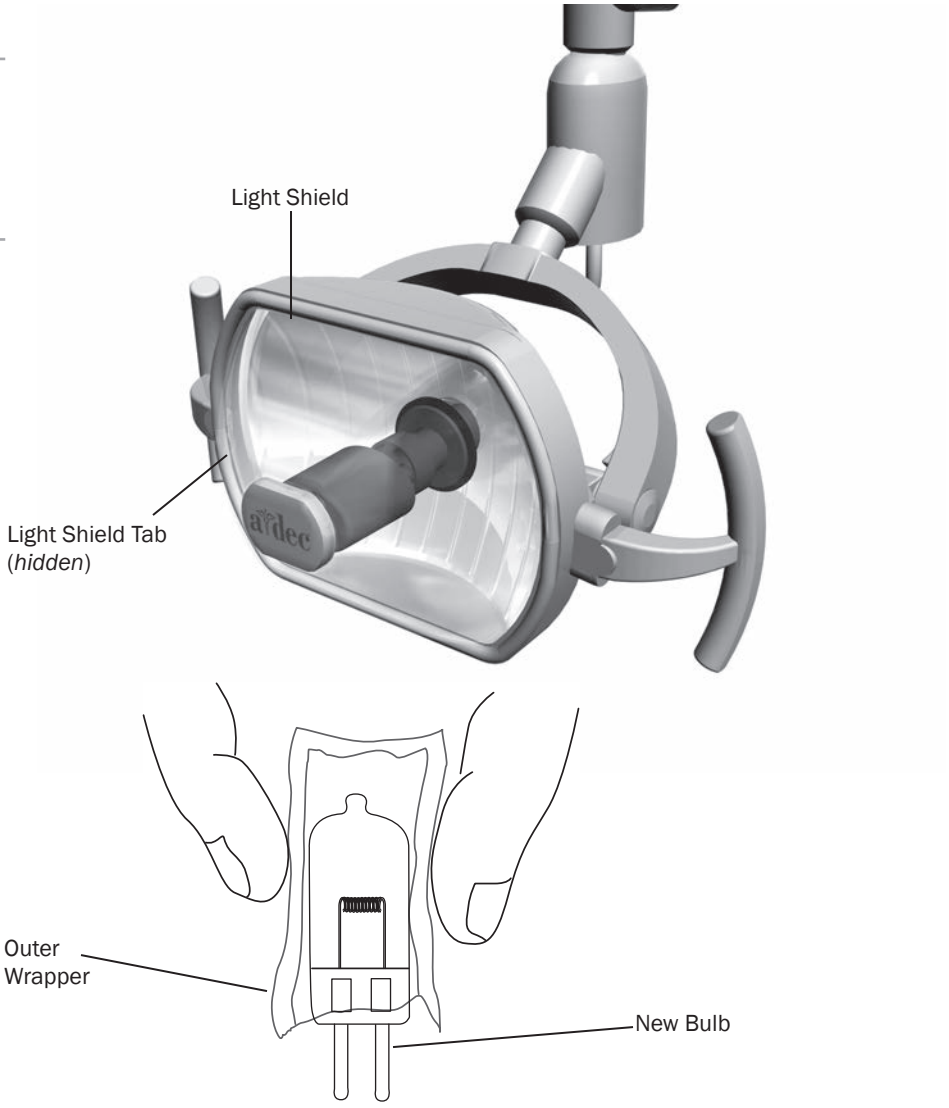
2. Hold the light shield and gently squeeze one side while pulling the shield away from the dental light. Set the light shield aside.
3. Using a gauze pad or cloth to protect your fingers, carefully pull the old bulb from its socket. Discard the bulb.
4. Holding the new bulb in its outer wrapper, carefully insert the bulb pins into the socket. A small section of each pin is still visible when the bulb is fully seated.

> **CAUTION** Take care when handling the bulb. The bulb base is fragile and can break under excessive pressure. Do not remove the outer wrapper when handling the new bulb. Finger oils can affect light performance and severely limit bulb life. If you should inadvertently touch the bulb, gently clean it with cotton dampened with isopropyl or ethyl alcohol.

> **CAUTION** Do not attempt to install the light shield if it has a broken tab. Contact your authorized A-dec dealer for a replacement shield and install it before operating the light.

5. Remove and discard the outer wrapper, then reinstall the light shield.
6. Verify the operation of the light by turning it on and operating it at each intensity setting.

Figure 63. Bulb Replacement



Troubleshooting

The troubleshooting tables contain tips and troubleshooting information to assist in diagnosing problems. This content is not intended to cover every situation, but includes the most common problems that you may encounter.

Dental Chair

Dental Chair Troubleshooting

Problem	Possible Cause	Action
Factory default test halts during the Base Up test, and the circuit board beeps one time	Input voltage could be low or outside the required range.	Verify that the input voltage and voltage selection resistors (100 - 120 VAC = R72) and R74 (220 - 240 VAC = R 73). If Base limit switch is activated, verify switch operation. If the motor thermal limiter is open, and the motor is hot, wait for the motor to cool off.
	Motor capacitor or Base Up solenoid are defective	Replace the motor capacitor or Base Up solenoid.
	Potentiometer is not changing voltage.	Verify the potentiometer LED illuminates when the base is moving. Check the potentiometer mechanical drive and electrical connections.
Chair base or back is stuck in full up position The limit switch is not activated, or Down solenoid poppet is unable to open based on excess hydraulic pressure	Hydraulic lock has occurred	Correct Hydraulic Lock **1.** Remove the motor/pump cover from the chair. **2.** Fit a 5/8" open end wrench to the high pressure outlet port (either lift or tilt, whichever is in hydrostatic lock) of the hydraulic manifold. **3.** Wrap a rag around both the fitting and the end of the wrench. The rag will absorb the small amount of fluid vented from the fitting. **4.** Carefully loosen the fitting about one-half turn, counterclockwise, and re-tighten. **5.** Cycle the chair a couple of times to verify it is no longer in hydraulic lock.
Factory default test halts during the Back Down test, and the circuit board beeps one time	Stop plate limit switch is activated	Verify switch operation
	Stop plate is jammed	Remove and reinstall the stop plate.
	Back Down solenoid is defective	Test the solenoid and replace if needed.
	Back is in hydrostatic lock	See Correct Hydraulic Lock, above.
	Potentiometer is not changing voltage	Verify that the potentiometer LED is illuminated when the back is moving. Check the potentiometer mechanical drive and electrical connections.

Dental Chair Troubleshooting

Problem	Possible Cause	Action
Factory default test halts during the Back Up test	Back up limit switch is activated	Verify switch operation.
	Back Up solenoid is defective	Test solenoid and replace if needed.
	Back is in hydrostatic lock	See Correct Hydraulic Lock, page 58.
	Potentiometer is not changing voltage.	Verify potentiometer LED is illuminated when base is moving. Check potentiometer mechanical drive and electrical connections.
Factory default test halts during the Base Down test	Stop plate limit switch is activated	Verify switch operation
	Base Down solenoid is defective	Test solenoid and replace if needed.
	Base is in hydrostatic lock	See Correct Hydraulic Lock, page 58.
	Potentiometer is not changing voltage	Verify that the potentiometer LED is illuminated when the back is moving. Check the potentiometer mechanical drive and electrical connections.
Chair moves by itself when power is turned on	The jumper is in FACT DEFAULT position	Verify that the jumper is in the SPARE position
	Short circuit in the touchpad or footswitch	Unplug the touchpad and footswitch; reset the circuit breaker. If the problem isn't repeated, the touchpad or footswitch may have shorted.
	Short circuit on the circuit board	Replace the circuit board.
No power to chair or unit. Office still has power.	The chair is unplugged.	**1.** Verify power is available at the outlet. **2.** Plug chair in to power source.
	The Mains on/off button is in the off position.	Press the Mains On/Off button.
No power to chair or unit. Office still has power.	Power supply circuit breakers CB1, CB2, CB3, CB4, CB5, or CB6 have tripped.	Refer to Circuit Board Components, page 10, for component identification. DS14 and DS15 on the chair circuit board indicate that 24 VAC power is present for distributed power. The AC Power LED, DS1, on the chair board indicates 24 VAC is present for the chair board and back motor. If DS1, DS14, or DS15 are off, verify that the respective circuit breaker is not tripped and reset if it is tripped.

Dental Chair Troubleshooting

Problem	Possible Cause	Action
No base up function. The motor relay clicks. Base LED (DS11) turns on. The chair back functions work.	Disconnected capacitor.	**1.** Verify the base up relay clicks and the LED (DS11) on the chair circuit board is illuminated. **2.** Turn power off if connected. **3.** Check capacitor connections. **4.** Reconnect cables.  **WARNING** The hydraulic system must be depressurized before removing the solenoid. To depressurize the hydraulic system, remove the failed solenoid coil and replace with the operating solenoid coil. Lower the chair base and back.  **NOTE** When replacing a solenoid, wipe up any oil, and replace existing O-rings on the solenoid base.
	Chair base thermal limiter has been tripped.	The chair base motor should be limited to a 5 percent duty cycle. If the duty cycle is exceeded for a period of time, a thermal limiter will trip. The thermal limiter is located inside the base pump motor and will auto-reset after a few minutes.
	Chair base motor is disconnected.	Verify the motor is connected into the base motor connection (P11 on the circuit board). When base up is activated, the base motor relay should click and DS11 should be on. Verify that P12 is connected to the chair board (mains power from the power supply).
	Failed capacitor.	Replace the capacitor with one of correct voltage.
No base down. Relay clicks and DS12 LED illuminates	Failed base down solenoid coil.	**1.** Check for magnetic pull while operating base down function. **2.** Check for correct resistance value at solenoid connector: 38 Ohms (Ω) ± 4 Ohms (Ω). **3.** Replace solenoid.  **WARNING** The hydraulic system must be depressurized before removing the solenoid. To depressurize the hydraulic system, remove the failed solenoid coil and replace with the operating solenoid coil. Lower the chair base and back.  **NOTE** When replacing a solenoid, wipe up any oil, and replace existing O-rings on the solenoid base.

Dental Chair Troubleshooting

Problem	Possible Cause	Action
Base or back moves up for only one second, no preset buttons work (limp-along feature) DS5 (back) not illuminated DS6 (base) not illuminated	The position sensor for that movement is disconnected.	**1.** Check position sensor connections to the chair circuit board. **2.** Reconnect if disconnected. **3.** Verify that the position sensor is connected correctly: Back position sensor into P1, base into P2.
	Failed position sensor.	**1.** Verify that the board's yellow LED is on. If not, make sure the board is connected. **2.** Replace the position sensor as a complete assembly.
No chair movement from a touchpad, and the touchpad status A-dec logo icon and chair circuit board status LED (DS2) are illuminated, and the footswitch operates the chair	Touchpad DCS is interrupted.	• Connect a known good data line between the touchpad and the chair circuit board. • If the chair circuit board data LED comes on and the chair operates normally with the touchpad, check each data line in the system with the known good line until the bad DCS line is found. • If the chair circuit board data LED stays off, call customer service. See "Get Support" on page 4. **NOTE** The data and power to the control head mounted touchpad are routed via the control head. Power is supplied using black/gray wires.
No chair movement from the touchpad, status icon is not illuminated	Faulty touchpad.	If the LED, DS1 on the touchpad is on, and DS2 (blue status LED) is off, cycle power to the board. If DS1 remains illuminated and DS2 is off, replace the touchpad. If at any time the DS2 is on, do not replace the touchpad.
	Faulty touchpad power cable or wires.	If the LED, DS1 on the touchpad is off, verify wires to the touchpad are connected to the WAGOs in the delivery system. Verify 24 VAC at the WAGOs. If 24 VAC is not present at the WAGOs in the delivery system, verify wiring to and from the post box and chair board. Verify that the circuit breaker is not tripped.
Base up or Base down does not travel the full distance	Position sensor connections (P1 and P2) on the chair circuit board are switched.	Verify that the position sensors are connected to correct chair circuit board locations: P1 — Back position sensor P2 — Base position sensor
Back does not move but base moves as normal	Chair back motor is disconnected.	Verify that the motor is connected into the BACK MOTOR connection (P8 on the circuit board). **NOTE** When back up is activated, DS9 and DS17 should be on. When back down is activated, DS10 and DS17 should be on.
Back up and base down movements do not move, and back down and base up movements move as normal	Jumper not installed on cuspidor circuit board limit switch jumper.	Place and leave a jumper into the cuspidor circuit board limit switch connector, P4.

Dental Chair Troubleshooting

Problem	Possible Cause	Action
No chair movements	Power may not be present on the circuit board.	**1.** Verify that power is present on the chair circuit board. If DS1 is off, follow instructions for verifying power connections. **2.** If DS1 is illuminated, use the Testpoint header, P3, to activate chair movements. **3.** If using the Testpoint header, P3, does not activate chair movements, verify that the chair lockout is not activated (DS13 should be off). **4.** Verify the foot control is not in use. **5.** If DS13 is illuminated, verify the wiring and plumbing to any local air electric switch connected to J4.
Unable to change or use chair presets	Position sensor connections (P1 and P2) on the chair circuit board are switched.	Connect position sensor to correct board locations: P1 — Back position sensor P2 — Base position sensor
	Position sensor for that movement is disconnected.	**1.** Check position sensor connections to the chair circuit board. **2.** Reconnect if disconnected.
	Failed position sensor.	**1.** Check that the LED on the position sensor circuit board is on, showing connection. **NOTE** The LED is only on when the chair is moving. **2.** If the LED on the position sensor is off, and it is connected to the chair board that is on, replace the position sensor as a complete assembly.
No or limited chair functions from footswitch	Footswitch connector/wiring is damaged.	Verify chair operates from a touchpad or the Testpoint header, P3. Replace the footswitch connector and/or wiring assembly.
	Footswitch membrane is damaged.	Check footswitch connectors and membrane, replace as necessary.

Dental Chair Troubleshooting

Problem	Possible Cause	Action
The chair makes a growling noise when base up is pressed	Hydraulic hose from reservoir to pump is pinched.	**1.** Inspect all hydraulic hoses, ensure they are not being pinched in any position. **2.** If the supply tube between the pump and the reservoir is kinked, order and install kit.
	Chair is low on hydraulic fluid.	Add hydraulic fluid.  **CAUTION** Use only A-dec hydraulic fluid, p/n 61.0197.00.
	Motor pump has an obstruction or is damaged.	If chair continues to growl, replace the motor assembly.
A button on a touchpad does not work. Function works from other location(s)	Faulty touchpad.	**1.** Verify the function works from other locations (footswitch, chair Testpoint header, P3, and cuspidor buttons). **2.** Verify the touchpad circuit board is snapped into the plastic cover correctly. **3.** If the function still does not work, replace the touchpad.
The automatic positions do not work, the A-dec logo is flashing, double blinks	The jumper is in the factory default position on the chair circuit board Testpoint header, P3.	Move the jumper from the factory default position to the “spare” position on the Testpoint header, P3.
Double-articulating headrest does not lock or is difficult to unlock	The headrest needs adjustment or needs replacing.	Adjust the headrest. If the headrest still does not work correctly, replace it as an assembly. No field service to locking components.
A double-articulating headrest may be difficult to move or may drift downward	Glidebar needs tension adjustment.	To adjust the tension, use a 1/8" hex key and turn the tension adjustment screw to the right increase friction to the left to decrease friction.
Circuit breaker 1 or 2 opens	Electrical short in a module.	**1.** Disconnect the identified modules from the power supply. **2.** Reset the circuit breaker. **3.** Reconnect modules one at a time until circuit breaker trips. Refer to troubleshooting for that module.

Delivery Systems

Delivery System Troubleshooting

Problem	Possible Cause	Action
No water to all handpieces	Empty water bottle	Fill the water bottle with treatment water.
	Kinked air or water tubing	Check the water and air tubings for kinks or obstructions.
No water coolant to all the handpieces	Empty water bottle	Fill the water bottle with treatment water.
	The wet/dry toggle on the foot control is in the dry position	Pick up a wet handpiece, and move the wet/dry toggle to the wet (blue dot) position.
	No water coolant air signal from the foot control wet/dry toggle	Check the clear tubing from the foot control for kinks or obstructions: **1.** Disconnect the green short-dash (water coolant air signal) tubing from the in-line barb in the support center. **2.** With the wet/dry toggle in the wet position (toward blue dot), step on the foot control. There should be ~80 psi (5.52 bar) of air at the tubing end. **3.** If no air is present, check: • Wet/dry toggle • Plugged barbs • Adequate air supply
	Water coolant flow controls require adjustment	See “Handpiece Control Adjustments” on page 30.
No water coolant to one handpiece	Water coolant adjustment stem closed or requires adjustment	See “Handpiece Control Adjustments” on page 30.
	Water coolant not activated	**1.** Activate handpiece. **2.** Flip the foot control wet/dry toggle toward the blue dot. **3.** Verify the handpiece has water coolant.
	Plugged handpiece tubing, terminal or coupler	**1.** Remove handpiece and coupler from tubing. **2.** Operate foot control with water coolant in the on position. **3.** Check to see if water is coming out of the handpiece tubing. **4.** If no water, check for water coolant at the handpiece position on the control block.
	Failed water coolant cartridge.	Exchange the failed cartridge with known good cartridge and test the handpiece position.

Delivery System Troubleshooting

Problem	Possible Cause	Action
Sputtering water from handpieces	Faulty or dirty O-ring on barb of water bottle pickup tube.	Replace the O-ring. Apply a thin application of silicone grease to the new O-ring.
	Damaged pick-up tube.	Replace pick-up tube.
Intermittent water coolant to handpiece	Faulty or dirty O-ring on barb of water bottle pickup tube.	Replace the O-ring. Apply a thin application of silicone grease to the new O-ring.
	Water coolant pressure too low, or air coolant pressure too high.	Adjust water and air coolant as required. See “Handpiece Control Adjustments” on page 30.
	Water bottle pickup tube too long.	Shorten the pickup tube with a diagonal cut at the end.
Water leaks from vent hole in control block when a wet handpiece is in use	Faulty water coolant cartridge.	**1.** Replace water coolant cartridge with known good cartridge. **2.** If water continues to leak from vent hole, inspect the control block for debris or scratches. **3.** Replace if necessary.
A wet handpiece drips water while in its holder	Faulty water coolant cartridge.	**1.** Replace water coolant cartridge with known good cartridge. **2.** If water continues to leak from handpiece, inspect the control block for debris or scratches. **3.** Replace if necessary.
	Faulty handpiece or coupler.	Remove handpiece and coupler, and retest water coolant flow.
	Faulty control block diaphragm.	Replace the diaphragm.
Water continues to flow after foot control is released	Restricted water coolant tube in the handpiece or coupler.	**1.** Remove handpiece and coupler. **2.** Retest water coolant flow.
	Pinched tubing in the foot control.	Check that the green tube with the short dash is not pinched between the foot control and the control head.
	Water coolant flow set too high.	See “Handpiece Control Adjustments” on page 30.
	The foot control relay valve sticks.	Install a foot control field service kit in the foot control.
Buttons on touchpad do not work, but status icon LED is illuminated	Faulty data line from touchpad to the data board or from the data board to other boards.	Replace data line with known good data line.

Delivery System Troubleshooting

Problem	Possible Cause	Action
Touchpad does not operate chair, cuspidor or light functions	Faulty data line from data port circuit board in the control head to the data port board in post box.	Replace data line with known good data line.
Touchpad status icon does not light when the master toggle is in the on position	No power to chair.	Verify the chair is plugged in, the power is on, and the pilot tubing is connected to the power supply air-electric switch.
	No power to touchpad.	Verify that DS1 is illuminated on the touchpad system circuit board. If DS1 is not illuminated, check for 24 VAC across WAGO connections in the control head. Check for an open circuit breaker on the 300 W power supply.
Low air pressure to syringe or handpieces when in use	Plugged filter on air filter regulator.	Replace the filter.
Handpiece holder valve leaking air	Faulty holder valve.	Verify the holder valve is not plumbed backward. Replace holder valve. Replace holder valve.
Handpiece holder valve not exhausting	Holder valve locked.	Verify the holder valve is active (unlocked).
	Faulty holder valve.	Replace holder valve.
Fiber-optics does not work but touchpad screen changes when handpiece is removed	Bulb has failed.	Replace the bulb.
	Connected to incorrect handpiece output on QVIOLS.	Verify that the intraoral light source is connected to the correct output, and verify that the respective output LED is illuminated on the QVIOLS.
Bulb is too dim or bright	Incorrect fiber-optic voltage set.	Adjust fiber-optic to correct voltage, current, and wire length per manufacturer specification.

Holders

Problem	Possible Cause	Action
Handpiece does not operate	Handpiece was lifted too soon.	When the handpiece is set back in its holder, there is a three second delay before the handpiece will start again.

Utilities

Problem	Possible Cause	Action
Unit air pressure drops when unit is in use	Plugged filter element in air filter/ regulator	**1.** Flip the master toggle to the on position and remove the floor box cover. **2.** Locate and observe the air pressure gauge in the floor box while pressing the syringe air button. If the air pressure drops more than 15 psi, the air filter is clogged. Replace filter.

Cuspidor

Cuspidor Troubleshooting

Problem	Possible Cause	Action
DS1 - AC Power LED	Off	No 24 VAC power, tripped circuit breaker, power supply turned off, no line voltage.
	Green, steady	24 VAC at terminal strip.
DS2 - Status LED	Off	System is not functioning, no power or circuit board has failed.
	Green, steady	Normal condition.
DS3 - Data LED	Off	No DCS communication, not connected to the data communication system, the DCS has failed.
	Green, steady	Active DCS detected.
	Green, blinking	Valid DCS message.
DS4 - Auxiliary relay LED	Off	Auxiliary relay is off.
	Yellow	Auxiliary relay is on.
DS5, DS6 - Bowl rinse/cupfill relays	Off	Relay is off.
	Yellow	Relay is on.
DS7 - Cuspidor limit switch LED	Off	Limit switch is not activated (closed).
	Red	Limit switch is activated (open).
Water drips from the cupfill spout	The cupfill solenoid has failed.	**1.** Using the master on/off toggle, turn the unit to the off position. **2.** Use a syringe to bleed the dental unit water pressure. **3.** Remove the cupfill solenoid and replace.
Water drips from the bowl rinse spout	The bowl rinse solenoid has failed.	**1.** Flip the master on/off toggle to the off position. **2.** Use a syringe to bleed the dental unit water pressure. **3.** Replace the bowl rinse water solenoid.
Cupfill and bowl rinse functions are switched	The cuspidor water solenoid connectors are reversed on the cuspidor circuit board.	Switch water solenoid connections at P6 and P7.
Cupfill and bowl rinse functions are switched at the tower buttons only (touchpads operate normally)	The cuspidor tower switch connectors are reversed on the cuspidor circuit board.	Switch tower switch connections at P2 and P3.

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Water runs constantly from either the cupfill or bowl rinse spout, and the red LED (DS7) is illuminated on the cuspidor circuit board	The cuspidor stop switch connector is reversed with one of the cuspidor tower switch connectors.	The red LED (DS7) on the cuspidor circuit board is illuminated. **1.** Disconnect all three switch connectors from the cuspidor circuit board. One at a time, connect each of the switch connectors to the cuspidor circuit board until the red LED goes out. **2.** Connect one of the remaining switch connectors to P3 on the cuspidor circuit board, and the other switch connector to P2. **3.** Verify that a cupfill cycle runs when requested from the cuspidor tower cupfill button. **4.** If the bowl rinse runs, swap the two switch connections to the cuspidor circuit board.
Cupfill spout sputters air/water	The self-contained water bottle is empty or nearly empty.	Refill the bottle.
Cuspidor works but the red LED (DS7) on the cuspidor circuit board is illuminated	The cuspidor stop switch is activated or the wiring is faulty.	**1.** Remove any obstacles from under the cuspidor bowl. **2.** Disconnect the cuspidor stop switch from P4 on the cuspidor circuit board; install the jumper from P1 on the cuspidor circuit board. **3.** If the red LED on the cuspidor circuit board goes out, the cuspidor stop switch or wiring is faulty and must be replaced.
Bowl rinse button on the cuspidor tower does not work, and the function does work from the touchpad	Cuspidor tower bowl rinse button assembly is faulty or is disconnected from the cuspidor circuit board P2 connector.	Visually inspect the cuspidor circuit board. Ensure that the cuspidor tower switches are connected. • P2 - Bowl rinse switch • P3 - Cupfill switch If the switches are connected, check the continuity of the bowl rinse switch with an Ohm meter. With the bowl rinse switch held down (closed), it should measure less than ten Ohms. If it measures “open” across the closed switch, remove and replace the bowl rinse switch assembly **NOTE** Switching switch assemblies at P2 and P3 allows verification that the switch assembly is defective.
Cupfill button on the cuspidor tower does not work, and the function does work from the touchpad	Cuspidor tower cupfill button assembly is faulty or is disconnected from the cuspidor circuit board P3 connector.	Visually inspect the cuspidor circuit board, ensure that the cuspidor tower switches are connected: • P2 - Bowl Rinse Switch • P3 - Cupfill Switch If the switches are connected, check the continuity of the cupfill switch with an Ohm meter. With the cupfill switch held down (closed), it should measure less than ten Ohms. If it measures “open” across the closed switch, remove and replace the cupfill switch assembly. **NOTE** Switching switch assemblies at P2 and P3 allows verification that the switch assembly is defective.

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Problem	Possible Cause	Action
Inadequate bowl rinse water flow.	The bowl rinse water flow must be adjusted.	Adjust the bowl rinse flow clockwise to increase water flow, or counterclockwise to decrease flow, (one full turn from minimum to maximum).
	The water filter element is partially plugged.	Check for plugged water regulator filter element. **1.** Close the city water manual shut-off valve in the floor box and bleed the cuspidor bowl rinse water pressure, using the bowl rinse function. **2.** Turn the dental unit off using the master on/off toggle on the delivery system and remove the water regulator filter element cap. Remove and discard the filter element. **3.** Install a new filter element on the water regulator and reinstall the filter cap. **4.** Open the city water manual shut-off valve. Turn the dental unit on using the master on/off toggle, and test the bowl rinse function for adequate water flow.
	There is a kinked hose.	Check for a restriction downstream from the filter. Locate and eliminate any kinks in the blue 5/16” bowl rinse water tube.
Bowl rinse function does not work from the cuspidor tower and/or the touchpad bowl rinse button, and the cupfill function does work	The bowl rinse relay on the cuspidor circuit board has failed.	At the cuspidor circuit board, swap the water solenoid connectors at P6 and P7. Press the cupfill button on any touchpad or the cupfill switch on the cuspidor tower, if the bowl rinse runs, remove and replace the cuspidor circuit board.
	The cuspidor data line is damaged.	Ensure that the cuspidor tower switches are connected: • P2 – Bowl rinse switch • P3 – Cupfill switch Disconnect the data line from the cuspidor and press the bowl rinse switch on the cuspidor tower. If the bowl rinse runs, remove and replace the cuspidor data line.
	The bowl rinse solenoid has failed.	Remove and replace the bowl rinse water solenoid.
Cupfill function does not work from the cuspidor tower and/or from any touchpad cupfill button, and the bowl rinse function does work	The cupfill relay on the cuspidor circuit board has failed.	Swap the water solenoid connectors at P6 and P7, at the cuspidor circuit board. Press Bowl Rinse on any touchpad or the bowl rinse switch on the cuspidor tower. If the cupfill runs, remove and replace the cuspidor circuit board.
	The cuspidor data line is damaged.	Ensure that the cuspidor tower switches are connected correctly: • P2 – Bowl rinse switch • P3 – Cupfill switch Disconnect the data line from the cuspidor and press the cupfill switch on the cuspidor tower. If the cupfill runs, remove and replace the cuspidor data line.
	The cupfill water solenoid has failed.	Remove and replace the cupfill water solenoid.

Dental Light

Dental Light Troubleshooting

Problem	Possible Cause	Action
Light does not work (light connected to 200 dental light relay board)	The bulb has failed.	Check for voltage at the bulb socket, if voltage is present, replace the bulb.
		Check the color of the bulb, replace if discolored.
	The dental light circuit breaker, CB6, has been tripped or the power supply has failed.	• Check the circuit breaker and reset it. If the circuit breaker trips again, disconnect P4, J5, and J6 on the 200 chair board. If the circuit breaker trips again, replace the power supply. • If the circuit breaker does not trip, reconnect P4. If the circuit breaker now trips, replace the 200 chair circuit board. • If the circuit breaker does not trip, reconnect the connections to J5. If the circuit breaker trips, replace the dental light.
		The dental light circuit breaker is near the power transformer. If the breaker is tripped, disconnect the dental light wiring harness from the transformer and reset the breaker. If the breaker trips again, replace the circuit breaker. If the breaker does not trip, the dental wiring harness or a switch is faulty.
	The bulb socket is faulty.	Replace the socket.
	Light switch is not in one of the on positions	Turn the light switch to either on position.
Light works from the dental light switches but not from a touchpad	Faulty data line from the touchpad to the circuit board.	Temporarily substitute a known good data line from the touchpad to the circuit board, if the light works from the touchpad, determine and replace any bad bypassed data lines.
	Light cable is plugged directly into power supply.	See page 53 for instructions on correctly connecting the light cable to the dental light relay board.
Light head is loose or difficult to position	Rotation tension screws are too loose or tight.	Adjust the appropriate axis tension.
Flexarm drifts	Tension adjustment nut inside the flexarm is too loose or tight.	Adjust the flexarm counterbalance.

Dental Light Troubleshooting

Problem	Possible Cause	Action
Light intensity is dim, inconsistent, or the color is distorted	Reflector or light shield may be damaged.	Inspect the dental light shield and reflector for damage or contamination. Replace or clean as necessary.  **CAUTION** Abrasives, disinfectants or chlorine damage the shield and reflector. Refer to the Instructions for Use for cleaning instructions.
	The mains voltage is low.	Verify the mains voltage is within specifications: 100/110-120/220-240 VAC
Unsatisfactory light pattern	Light is out of focus, reflector or light shield may be damaged.	**1.** Focus the light. **2.** Check the light shield for severe abrasions, and replace if necessary. **3.** Clean the reflector and light shield
Light switch does not turn the light on (no relay board)	No mains voltage/unit is off	Verify that the unit is turned on
	Light cable is not connected or connected incorrectly	Verify that the cable is connected correctly
	Faulty light switch	Replace the switch
	Faulty bulb/socket	Replace the bulb or socket

A-dec Headquarters
2601 Crestview Drive
Newberg, OR 97132 USA
Tel: 1.800.547.1883 Within USA/Canada
Tel: 1.503.538.7478 Outside USA/Canada
Fax:1.503.538.0276
www.a-dec.com

International Distribution Centers

A-dec United Kingdom
EU Authorized Representative
Austin House, 11 Liberty Way
Nuneaton, Warwickshire CV11 6RZ
England
Tel: 0800 ADECUK (233285) Within UK
Tel: +44 (0) 24 7635 0901 Outside UK
www.a-dec.co.uk

A-dec Australia
Unit 8
5-9 Ricketty Street
Mascot, NSW 2020
Australia
Tel: 1.800.225.010 Within Australia
Tel: +61 (0)2 8332 4000 Outside Australia
www.a-dec.com.au

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