

Dental Chair

ADU-10CF

(NSN: 6520-01-456-7170)



Additional information

- Author has included Adec parts theory and information within these slides for training purposes.

Installation

- Requires separate air, water, and dedicated power source
- Fluctuations in line voltage more than 10% causes reduces capability or components to burn out prematurely.
- Electromagnetic interference (EMI) can cause ghosting chair functions or interruption to loss of power within the chairs and lights if OEMs have not installed filters to compensate for this degradation.

Inspection & Operation Verification

- To verify that the ADU-10CF unit is functioning properly, connect the unit to a clean compressed air source providing 60-80 PSI. Switch the master On/Off toggle to the on position. The master pressure gauge and "On" indicator should indicate pressure. When the water system is attached and turned on, water canister should pressurize. Depress foot control and observe drive air pressure from the highspeed line, and lowspeed line when selected. Depress the air/water buttons on the three-way syringe. Syringe should spray both air and water. With vacuum waste containers attached to the system, lift the HVE and Saliva Ejector valve from their auto holders with lock out switch in the on position. Vacuum should switch on, and vacuum generated at each valve.
- While system is pressurized, inspect the unit for air or water leaks that could degrade or eliminate performance. Air filter/water separator drain should be closed, and air filter element inspected. Element should be replaced when pressure drop across the unit exceeds 10psi differential pressure. Water canister should be holding pressure at the lid, and the lid gasket inspected. Gasket may require lubrication or replacement for a proper seal. Inspect the water filter on the water pick-up tube. Water filter requires replacement if it becomes clogged and restricts water flow. Vacuum waste container lids should be sealed and holding a vacuum when in operation. HVE solids collector screen should be inspected for blockage and cleaned or replaced if necessary.
- The above describes a basic inspection & verification of the ADU-10CF system. If the unit still does not perform as required, further diagnosis of settings and components in the system may require service. Use the troubleshooting section as a guide to symptoms and appropriate procedures to fix various problems.

Cleaning and Lubrication

- When servicing the ADU-10CF dental unit, the parts of any component disassembled should be thoroughly cleaned and inspected before re-assembly. A hot detergent solution is an effective cleaner. Flush all parts with clear, hot water. Abrasive cleaners have the potential to damage surface finishes and should be avoided. Any wiping should be done with a soft, lint free cloth.
- Use a silicone base lubricating grease such as Dow Corning No.103 to lubricate internal moving parts, o-rings, oral evacuator valves, and seals in the ADU-10CF unit. Before performing any reassembly of parts that contain o-rings or seals, apply a light coat of silicone grease. This will make installation easier and prevent the o-rings or seals from being damaged.

Vacuum System/Water System



Handpiece Control/Delivery Head

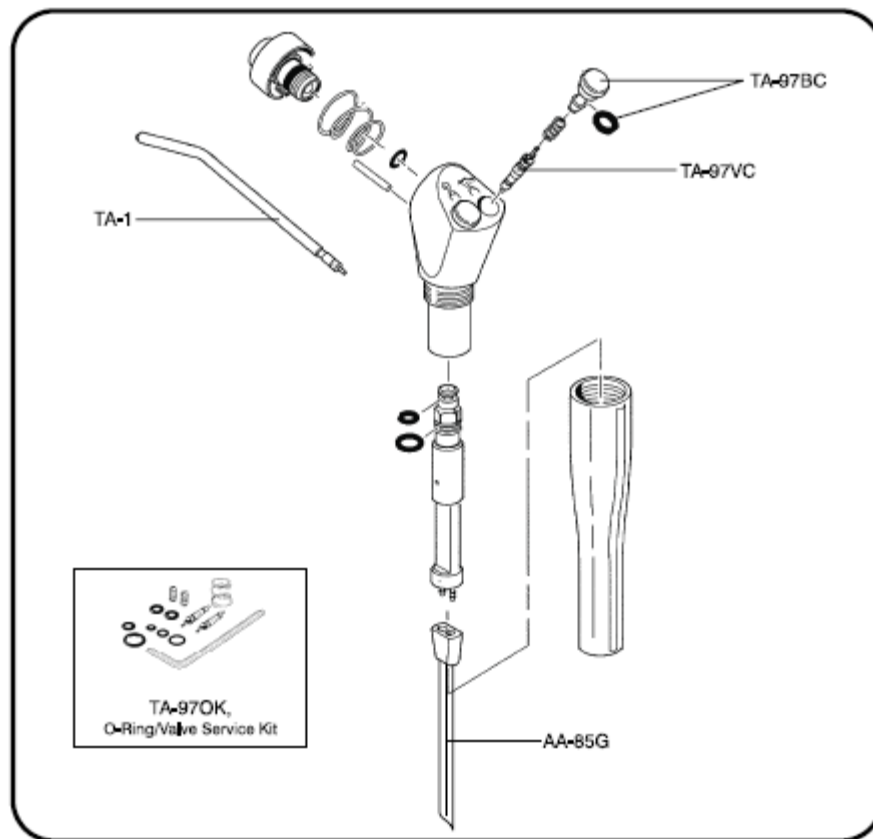


Handpiece Control/Delivery Head With Fiber Optic System



- Remote Intensity Control
- Low Voltage Handpiece
- Tubing Wires
- Remote Intensity Jack
- Fiber Optic Signal Air
- 6-32 Hex Nut, 2 Pl.
- KaVo LCM
- Handpiece Tubing

3-Way Syringe



Components

- Limit switches
- Transformers
- Potentiometers
- Printed circuit boards
- Light emitting diodes
- Solenoids
- Capacitors
- Data communication system

Components

- Data communication system (“The brainbox”)
- This is where all the communication is taking place or where data commands are sent back and forth between the operator to the chair components, such as operator pressing the touchpad to move the chair downward.
- It uses a serial bus with 6-pin data lines.
Various modules require 24VAC power to the PCB

Components

- Solenoids:
 - is a coil wound into a tightly packed helix. In physics, the term **solenoid** refers to a long, thin loop of wire, often wrapped around a metallic core, which produces a magnetic field when an electric current is passed through it.
- Adec dental chair solenoids are used to activate the hydraulic motor and make the chair move up and down.

Components

- Capacitors (Caps):
- (formerly known as **condenser**) is a device for storing electric charge. The forms of practical capacitors vary widely, but all contain at least two conductors separated by a non-conductor.
- Adec dental chair Caps are used power the hydraulic motor on the floor.
- **MAKE Magazine presents: The LED**
<http://www.youtube.com/watch?v=P3PDLsJQcGI>

Components

- Light emitting diodes (LEDs)
 - is a semiconductor light source
- Adec dental chair LEDs are used to provide indication for troubleshooting.
- **MAKE Magazine presents: The LED**
<http://www.youtube.com/watch?v=P3PDLsJQcGI>

Components

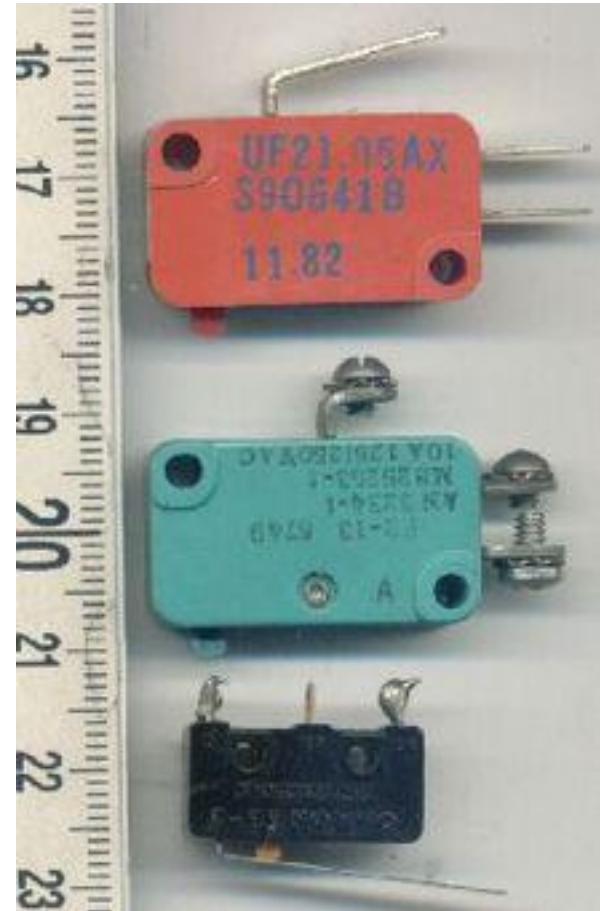
- Printed circuit boards
 - **PCB**, is used to mechanically support and electrically connect electronic components using conductive pathways, tracks or signal traces etched from copper sheets laminated onto a non-conductive *substrate*.

Components

- Potentiometers:
 - informally, a **pot**, is a three-terminal resistor with a sliding contact that forms an adjustable voltage divider, current divider or other devices.
- Adec dental chair pots are used to by the microprocessor to sense and interpret the chair back or entire base when being raised or lowered.

Components

- Limit switches (micro switch):
 - is an electric switch that is actuated by very little physical force, through the use of a tipping-point mechanism, sometimes called an "over-center" mechanism.
 - Adec dental chair limit switches are used to prevent damage or injury. These devices are used in the stop plate to stop the chair from coming down onto peoples toes. It also stops the chairs back from lowering completely 360 degrees.



Components

- Transformers:
 - device that transfers electrical energy from one circuit to another through inductively coupled conductors—the transformer's coils.
 - Adec dental chair transformers are used to step down 120/220 VAC to 24VAC.

Syringe Disassembly

- Remove the syringe tip, then use the hex key furnished with the Autoclavable Syringe Valve O-ring Kit to unscrew the tip adapter. Remove the adapter, collar and spring from the syringe body. Use a dental pick or a bent paper clip to remove the tiny O-ring from the bottom of the bore in the syringe body. Be especially careful not to nick or scratch the sealing surfaces. the easiest way to install the replacement is to slip it onto the end of a syringe tip, lubricate the O-ring, then insert it into the bore. The O-ring around the outside of the adapter is thin and fragile, so the new one has to be installed with care.
- Before reinstalling the adapter and collar assembly, look down into the bore in the syringe body and assure that the alignment pin is in place. With the spring in place in the collar, align the slot in the collar with the pin, then push the collar into the syringe body. Use the hex key to carefully screw in the adapter. Tighten the adapter firmly (35 in-lbs torque). If you don't have a torque measuring device, hold the hex key by the short end, with the long end in the adapter. If you tighten the adapter as tight as you can while holding the tool this way, you will have approximately the right torque.

TROUBLESHOOTING

- **SYMPTOM :** Insufficient air supply pressure. Compressor or supply pressure to low. Provide 60-80 PSI air supply.
- **POSSIBLE CAUSE :**
 - Clogged air filter element. Clean or replace element.
 - Air filter drain open. Close drain tight.
 - Air leak in system. Check fittings, connections for leaks.
 - Pinched or crimped supply tubing. Uncrimp or replace pinched tube section.
- **SOLUTION:**
 - Provide 60-80 PSI air supply.
 - Clean or replace element.
 - Close drain tight.
 - Check fittings, connections for leaks.
 - Uncrimp or replace pinched tube section.

TROUBLESHOOTING

- **SYMPTOM :** Inadequate drive air to handpieces
- **POSSIBLE CAUSE :**
 - Drive air adjustment screw improperly adjusted.
 - Handpiece regulator improperly adjusted.
 - Inadequate air flow from foot control.
 - Handpiece coolant air wide open.
 - Sticky shuttle valve at pressure gauge.
- **SOLUTION:**
 - Open drive air adjustment screw.
 - Adjust H.P. regulator to 45 PSI. for leaks.
 - Inspect, lubricate or rebuild drive air valve.
 - Reduce coolant air flow.
 - Inspect, lubricate, or replace shuttle valve.

TROUBLESHOOTING

- **SYMPTOM** : Low or no system water pressure.
- **POSSIBLE CAUSE** :
- Leak at water canister lid.
- Clogged water filter.
- Water regulator improperly adjusted.
- Water toggle off.
- **SOLUTION**:
 - Inspect, lubricate, or replace lid gasket.
 - Replace water filter. Reduce coolant air flow.
 - Adjust water regulator to 40-50 PSI output.
 - Connect canister and turn toggle on.

TROUBLESHOOTING

- **SYMPTOM** No handpiece water coolant.
- **POSSIBLE CAUSE :**
- Water On/Off toggle not on or malfunction.
- Water coolant control valve closed or clogged.
- Anti retraction check valve malfunction.
- Faulty water air pilot valve
- No signal to water air pilot valve.
- **SOLUTION:**
 - Turn toggle on, inspect or replace toggle
 - Open water coolant valve, inspect/replace.
 - Inspect or replace check valve.
 - . Apply signal air to open. Replace if stuck.
 - Check drive air signal. Replace shuttle valve.

TROUBLESHOOTING

- **SYMPTOM** No handpiece flush water.
- **POSSIBLE CAUSE :**
- No system air/water pressure.
- Faulty flush toggle valve.
- Faulty shuttle valve.
- **SOLUTION:**
 - Refer to air and water supply pressure symptoms. Open water coolant valve, inspect/replace.
 - Activate toggle & check for air output. Replace
 - Inspect, lubricate, or replace shuttle valve.

TROUBLESHOOTING

- **SYMPTOM** Inadequate or no vacuum.
- **POSSIBLE CAUSE :**
- Vacuum auto holder closed.
- Vacuum regulators improperly adjusted.
- Clogged HVE solids collector screen.
- Vacuum waste bottle lid leak.
- Inadequate vacuum air pilot signal.
- Faulty vacuum air pilot valve.
- **SOLUTION:**
 - Remove valve from holder. Turn on lock-out toggle.
 - Set saliva ejector at 16PSI. Set HVE reg. at 43PSI.
 - Clean or replace solids collector screen.
 - Tighten waste bottle lid firmly.
 - Check signal tube for pinch and pressure.
 - Inspect, lubricate, or replace.

TROUBLESHOOTING

- **SYMPTOM** Air/Water Syringe malfunction.
- **POSSIBLE CAUSE :**
- Refer to Syringe Dis-Assembly section.

SOLUTION:

- Refer to Syringe Dis-Assembly section.

TROUBLESHOOTING

- **SYMPTOM** Hydrostatic lock.
- **POSSIBLE CAUSE :**
- Chair has traveled upward more than 24” from the floor
- **SOLUTION:**
 - Bleed hydraulic oil from motor and determine what potentiometer is the cause.

TROUBLESHOOTING

- **SYMPTOM** constantly reprogramming the memory on the touchpad.
- **POSSIBLE CAUSE :**
 - PCB is defective
 - Chair not correctly programmed
 - Defective base or back potentiometer
- **SOLUTION:**
 - Replace data communication PCB.
 - Reprogram chair

TROUBLESHOOTING

- **SYMPTOM** chair wont go upward.
- **POSSIBLE CAUSE :**
 - Bad touch pad or footswitch
 - Stop plate activated
 - Defective limit switch
 - Defective motor capacitor
- **SOLUTION:**
 - Replace touch pad or footswitch
 - Remove debris under Stop plate
 - Replace limit switch
 - Replace motor capacitor

Reference

- Make magazine - <http://makezine.com/>
- BMETWiki - [http://bmet.wikia.com/wiki/Main Page](http://bmet.wikia.com/wiki/Main_Page)
- Adec service manuals