

KaVo

Troubleshooting Guide

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KaVo. Dental Excellence.

Intended as a
guide for:



the technician

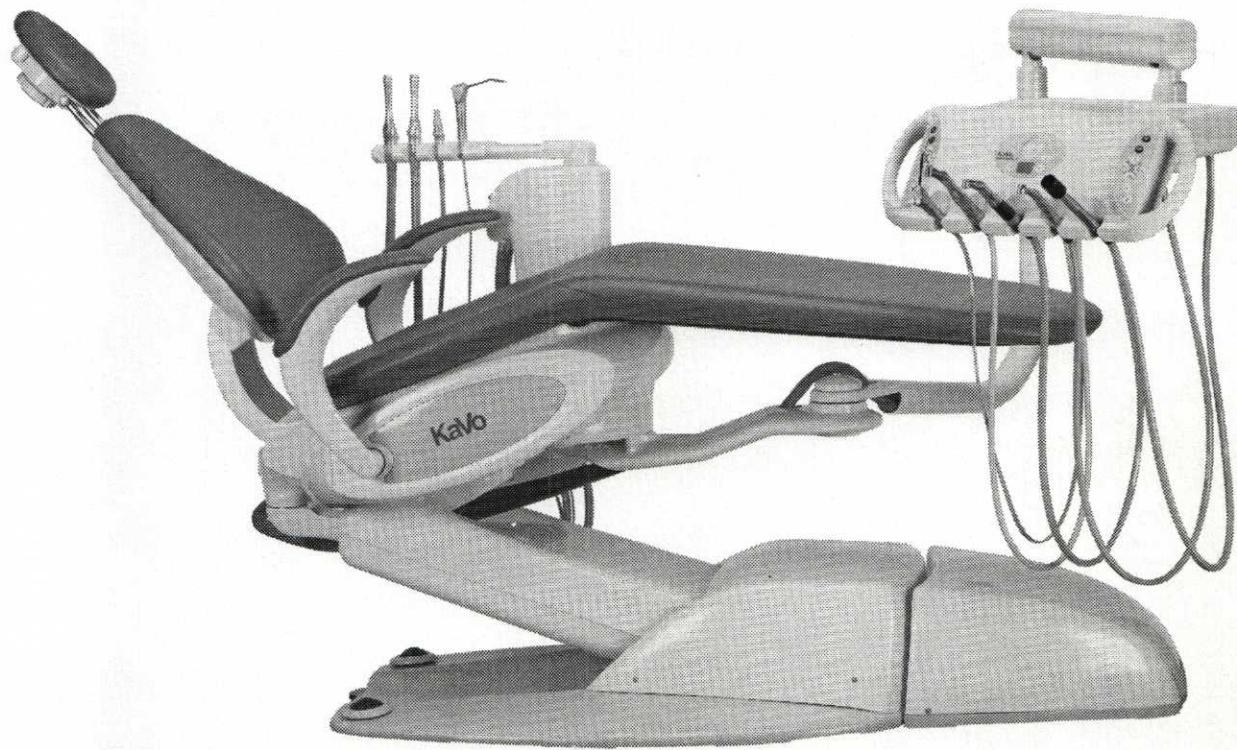


the dentist



the assistant

For all models of:
the environment
Dental Units

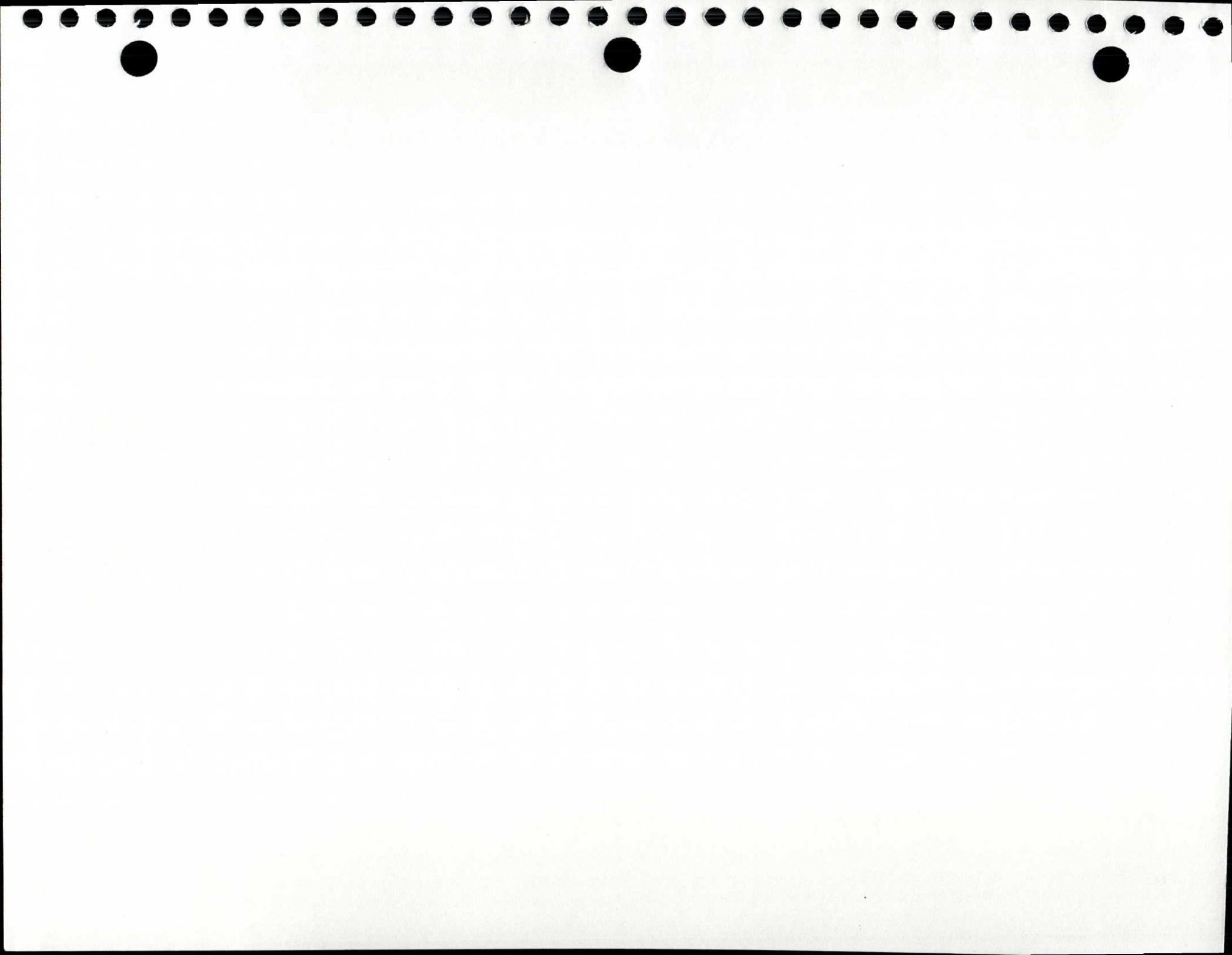


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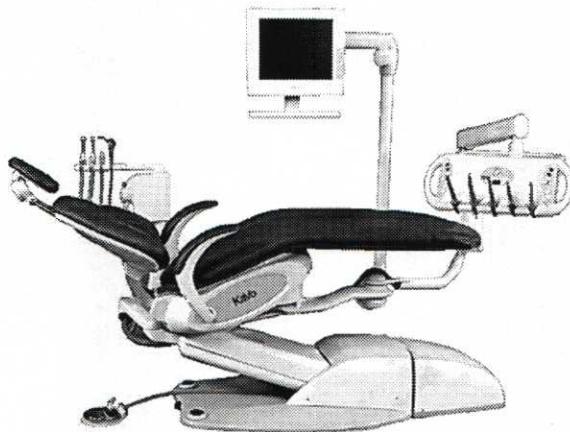
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Section 1: Introduction

Anatomy of the KaVo Environment

KaVo has developed a range of expandable, modular dental units to accommodate the needs of dentists, dental assistants and patients. The units can be configured to suit a variety of operatory layouts, ergonomic preferences and budgetary requirements. These dental systems are designed to integrate comfort, quality and efficiency across an entire family of products called ***the environment***.

KaVo's line of ***environment*** dental equipment is built around a world-class dental chair which allows unparalleled patient comfort, convenience and positionability. Hydraulic lift and tilt cylinders are operated from foot controls in the chair base which include single touch initiation of exit position, last position used and two other programmable positions. Chair motion can also be controlled through optional touchpads on the doctor's delivery, assistant's delivery or through remote hand held touchpads.



(KLR) KaVo left or right handed unit with multimedia

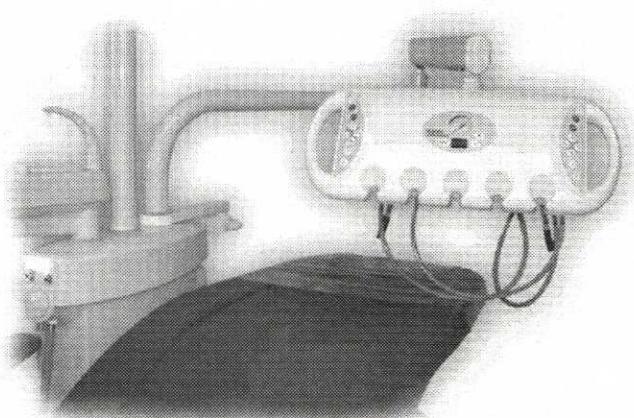
Additional positioning flexibility is achieved through a swivel base which unlocks through an electronic foot switch mounted in the chair base.

KaVo's unique backrest mechanism is designed to recline while simultaneously elevating the patient's feet. The curved backrest guide is ergonomically engineered to pass through its full range of motion without sliding the patient around in the chair or even so much as untucking their shirts. Patient comfort and convenience is further enhanced by the rotating armrests and a unique double articulating, telescopic headrest.

Safety is of paramount importance to KaVo and all their dental units incorporate multiple safety switches which halt hydraulic motion when a unit senses external contact while descending or reclining. The hydraulics are also locked any time a dental handpiece is in motion. This is accomplished through an air-electric switch imbedded in the main circuit board which is activated by air pressure from the handpiece foot control.

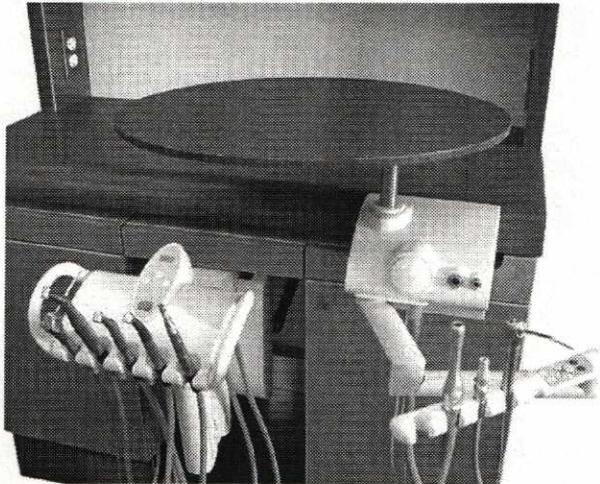
When ordered, a dental unit can be configured with or without a cuspidor and with or without doctor's and assistant's instrumentation deliveries. The doctor's delivery system can be specified in the traditional **KOTP** (KaVo Over the Patient) style mount in which the support arm for the doctor's delivery swings over the patient's legs.

Alternatively, the unit can be configured as a **KLR** (KaVo Left or Right) handed unit, in which the doctor's delivery is mounted to a longer arm, pivoting centrally under the chair, which swings around the feet of the patient to adapt quickly to either a right or a left handed doctor.



(KOTP) KaVo over-the-patient style delivery

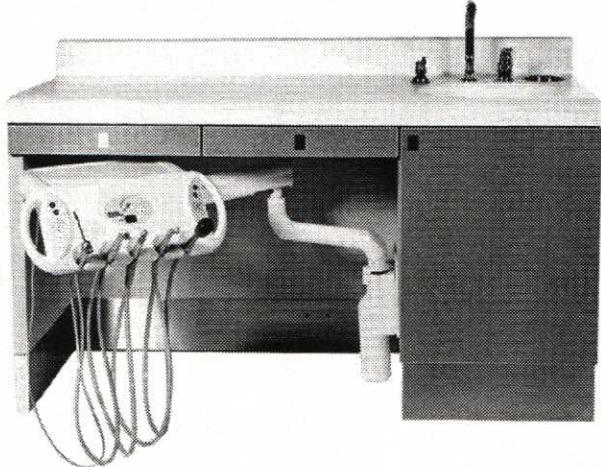
Additionally, doctor's and assistant's deliveries are available in cabinet mounted models. The **KSD** (KaVo Side Delivery) system allows the doctor's instrumentation to swing out from underneath a cabinet, mounted adjacent to the dental chair. This configuration locates the dental handpieces out of the direct line of sight of the patient and helps make a patient feel more at ease before a procedure. It can also help impart a clean, uncluttered appearance to the operatory.



(KRD) KaVo Rear Delivery, Dr.'s and assistant's

The second variation on cabinet mounted instrumentation is the **KRD** (KaVo Rear Delivery) system which can be configured as either doctor's delivery, assistant's delivery or both together, mounted on independent support arms. The KRD system instantly adapts for use by either left or right handed doctors and locates the instrumentation even further out of the line of sight of the patient than the KSD configuration.

Both of these cabinet mounted delivery systems integrate with KaVo's **environment** line of specialized cabinetry which is designed to further enhance the clean, efficient appearance of a well designed operatory. Cabinets can be combined to



(KSD) KaVo Side Delivery built into KaVo cabinet

suit virtually any operatory setting and can be specified in a variety of colors and finishes to suit existing decor or modernize a suite with a fresh new look.

The thorough integration of system options into each dental unit makes it worthwhile for each unit to be built with as many options initially as possible. Chair motion touchpads, the KaVoLUX dental light, the KL700 / KL701 handpiece and KaVo's CCC (Chairside Communication Concept) multimedia imaging system are all options that require integrated plumbing and/or wiring that is much simpler and less costly to route internally at the time of manufacture than to retrofit at a later date.

Warranty

KaVo America Corporation warrants the following products listed against defective materials and workmanship for two years from the date of installation to the original purchaser including: patient chair, doctors and assistants delivery systems, dental operating lights and operator and assistants stools. A five-year warranty applies to the dental chair hydraulic lift and tilt cylinders or cylinder purchased separately. A one-year warranty applies to handpiece tubing, HVE and Saliva Ejector tubing, stool cylinders and upholstery. Light bulbs are not covered under warranty. Handpieces and all other dynamic instruments are covered according to the provisions listed in the manufacturers retail price book. KaVo will provide parts for the warranty repair exclusive of labor. The warranty does not cover damage due to misuse, improper installation or maintenance, and damage resulting from the use of disinfection solutions. Modifications of KaVo products or failure to follow required maintenance procedures listed in the Operation Guide could void the warranty.

Return Policy

Authorized dealers who return products to KaVo America for credit consideration must provide the original invoice number, serial number, reason for return, i.e. warranty, overstock, ordering error, with completed return authorization form signed by your KaVo Sales Representative. A 15% restocking charge will be applied to overstock returns items and unopened merchandise items. If the part or component is being returned under warranty, a copy of the replacement invoice number and original equipment serial number must be provided and supporting service documentation before the part or component is returned. Once approved, KaVo Customer Service will issue a return authorization number to be included with the returned product, along with a shipping address.

Technical Support

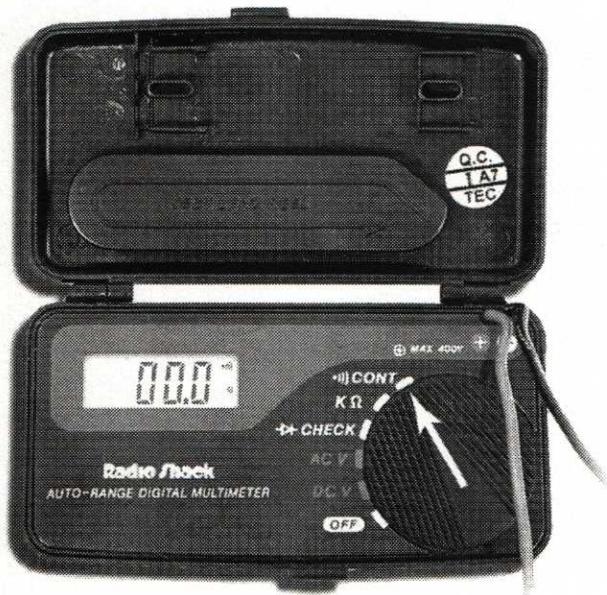
KaVo's staff of trained service technicians are available toll free at 1-800-323-8029 to assist with installation, troubleshooting and parts ordering. Feel free to call for assistance.

Using a Multimeter

The multimeter is an important diagnostic tool for identifying areas of concern and for setting AC and DC voltages in multiple locations around the dental unit. There are many styles of multimeters available with a wide range of features and prices. For working on KaVo dental units, any basic multimeter will be sufficient, however a small digital unit with a setting for continuity is recommended. Multimeters generally have two probes which must make electrical contact (metal to metal) with the wires, terminals or other electronic components being tested. Before touching the probes to any circuit or component, the selector dial on the face of the multimeter must be set for the proper test and the appropriate range of values.

Checking continuity

Checking continuity is simply the technical term for checking to see if a wire is broken or disconnected somewhere between the two test points. Most multimeters have a setting for continuity which



Multimeter set to check continuity

emits a constant tone to signal a continuous electrical path (unbroken wire) when each probe is connected to opposite ends of a wire or circuit. It is important to remember to switch the function selector back to off when the continuity check is complete or the batteries will likely be dead the next time the meter is used. It's good practice to touch the two probes together before checking

continuity to hear the beep. This verifies that the batteries are still good and that the meter is set properly.

Some multimeters, like the one below do not have a dedicated continuity setting. They can still be used to check continuity simply by setting the selector to measure resistance or Ohms. Some multimeters, like the one below, are only labelled with the symbol for Ohms, the Greek letter, "Omega" which resembles a horseshoe. For continuity, any one of the ranges within the Ohm measurement area will work fine; just observe what is in the display when the probes are separated (broken or disconnected wire) vs. the reading when the probes are touched together. If continuity is good through the circuit, the reading will be zero unless the smallest range is used, like in the photo,



Measuring Ohms to check continuity

in which case the reading will be less than .5 Ohms. If there is no continuity through the circuit, the reading will generally default to a "1" over at the far left of the display. Note in the photo that the upper probe can be plugged into two different receptacles but that the top receptacle is only used for measuring DC current, which will not be needed when troubleshooting KaVo dental units.

Measuring DC voltage

DC or direct current is used in several locations on KaVo dental units. All the onboard microprocessors use 5 Volts DC, the KL700 / KL701 handpiece operates on 33 Volts DC, the cooling fan in the KaVoLUX light head runs on 24 Volts DC, the chair motion control systems use 12 Volts DC and the fiber-optic lighting control delivers 3-6 Volts DC.

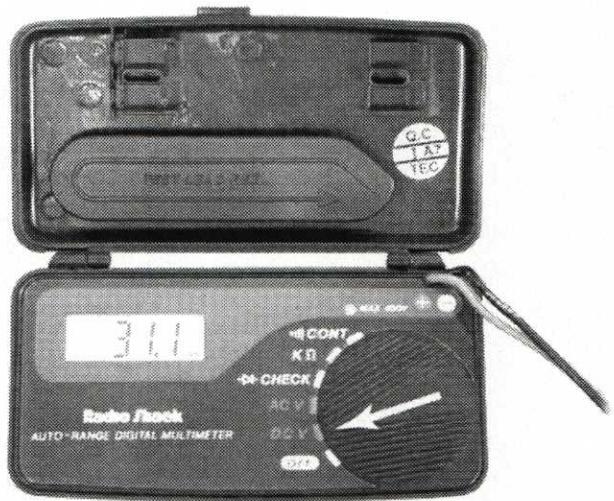
DC voltage is the type of power delivered by a battery; there is always a positive and negative terminal. It is very important that the positive and negative terminals of a DC power supply are properly connected to the components that they operate. Generally, red and black wires are used to carry DC power and red is traditionally connected to the positive terminal of the power supply.

When measuring DC voltage, it is common to occasionally connect the probes backwards to the terminals being measured. On a digital gauge, the reading will be the same either way except it will show the number as a negative value if the probes are reversed. If using an older, analog multimeter, the needle will try to jump backwards against the zero peg if the probes are connected wrong and they must be switched to take a reading. The photos show two different multimeters set to measure 24 Volts DC. Note that the first multimeter is not labelled DC but has a symbol next to the big V which stands for DC. Also note that on the first meter, a range must be selected. The 20 range reads up to a maximum of 20 Volts which means that to measure anything over 20 Volts, the selector switch must be adjusted up one range higher, to read a maximum of 200 Volts.

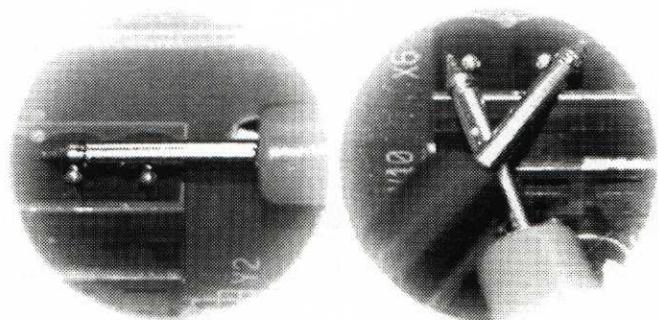
It is very important when measuring voltage to handle the probes carefully to avoid short circuiting components. This is when positive and negative points get directly connected to each other and could occur if trying to take a measurement with the tips of the two probes crossed. This could also occur if a single probe touches two pins at the same time. In either case, a spark may be visible and either a fuse will be blown or circuit board components may be damaged.



Meter set to measure a maximum of 20 Volts DC



No range selection required on this meter



Two accidental short circuits to avoid

Measuring AC Voltage

AC or alternating current is the form in which power is delivered to all commercial and residential receptacles. Instead of having positive and negative terminals like a DC system, AC power uses a neutral wire and a hot wire to transmit power. The term AC comes from the fact that the hot and neutral wires alternate between positive and negative 60 times per second (60 Hertz). When determining whether incoming power is present, it is recommended to measure voltage not current. AC current or Amps can be measured to determine if power is present but most multimeters are not sophisticated enough to measure AC current. Additionally, if the dental unit is standing idle, the current will be very small and possibly difficult to detect or interpret. Current is sometimes described as the flow rate of electricity. Voltage on the other hand is similar to pressure within a pipeline. Regardless of flow, pressure will always be present and therefore easier to detect and measure. To measure AC voltage, turn the multimeter selector switch to AC voltage. On some multimeters, like the one in the photo, AC is not on the label. Instead, a capital V for voltage is followed by the symbol for AC which can be seen in the photo as a wavy minus sign. When measuring AC voltage, probe color (red/black) is unimportant, simply touch one probe to each conductor or wire.

CAUTION! it is important to note the warning in the previous section about accidentally creating a short circuit by crossing probes or contacting both terminals at once with a single probe. If an AC power source gets short-circuited, it will probably throw the circuit breaker in the electrical panel at the wall. Instead of a small spark, a large flash will be visible that could potentially melt one of the probes or damage one of the terminals being probed.

One final note about AC power is that on some common appliances, not KaVo dental units, only one leg of the incoming power gets switched on and off by the power switch. The intention of a polarized plug is to insure that if only one leg is switched that it will be the hot leg. If an appliance does not have a polarized plug or if an outlet has been miswired, it is possible to be shocked or even electrocuted by working on an appliance while it is turned off. This is possible when the neutral wire is



Multimeter set to measure AC voltage

the only one that is switched and the appliance is grounded. If a technician were to accidentally touch an unswitched hot wire and ground simultaneously, it would create a short circuit as well as a serious shock hazard. To eliminate this hazard, either unplug an appliance before working on it or check to make sure that the hot wire is switched. The power switch on newer KaVo dental units breaks both the hot and neutral power wires to eliminate any potential shock hazard when the switch is turned off.

To identify the hot wire on any appliance, measure voltage between one power wire and ground then between the other power wire and ground. There will only be voltage between hot and ground, not between neutral and ground. If the hot wire is not switched then it is unsafe to work on the appliance unless it is unplugged or the circuit breaker is turned off. Always recheck voltage after turning off an appliance with the circuit breaker to make sure that the correct breaker has been turned off. To add an additional margin of safety, it is considered good practice to place one hand in a back pocket while working on live or potentially live components. This reduces the shock zone to one hand and eliminates the risk of cardiac arrest that can occur when an electrical path extends from one hand through the chest and out the other hand.

Section 2: Mechanical

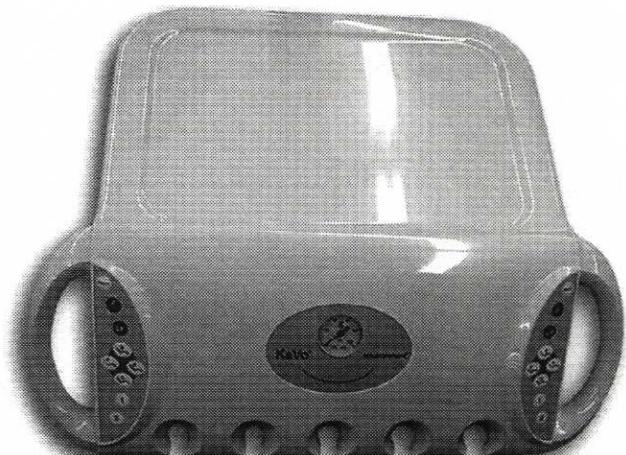
Adjustment of handpiece coolant water

A single needle valve under the control head adjusts coolant air to all the handpieces, while separate needle valves behind each handpiece hanger adjust coolant water to that handpiece. Handpiece coolant water should initially be adjusted with the coolant air turned off. One by one, each handpiece should be adjusted to the point where water just barely reaches a steady flow. Once water is adjusted, coolant air can be turned up until the water is completely atomized as it exits the handpiece. When the foot control is released, water is immediately shut off while coolant air continues for a fraction of a second to blow off the last drops of water coming out of the handpiece. The handpiece may drip once or twice when the foot control is released, however, if it drips more than that, dripping may be reduced by turning water flow up at the handpiece then adjusting it back down with the needle valve under the control head.

Older technology relied upon suck-back valves to eliminate dripping when a handpiece was shut off but federal mandates have outlawed the manufacture of this type of mechanism since it was identified as a potential source of contamination. The time delay currently used to blow off the last drops of water is controlled by a small air bleed screw on the outside of the coolant block in the control head. If all the handpieces seem to drip 3-4 times after the foot control is released, it may be helpful to tighten the air bleed screw just slightly to increase the delay between water shut off and air shut off.

If the coolant water flow seems unstable from one usage to the next and the serial number of the chair is below 10695, the flow settings can best be stabilized by installing the **Needle Valve Retrofit Kit**, item #1002 4411. These older models relied on set screws on the bottom of the handpiece block to adjust coolant water rather than separate needle valves located alongside each handpiece.

If coolant water continuously drips from the handpieces when they are out of their holders, install the **Coolant Block Repair Kit**, item #1002 6640.



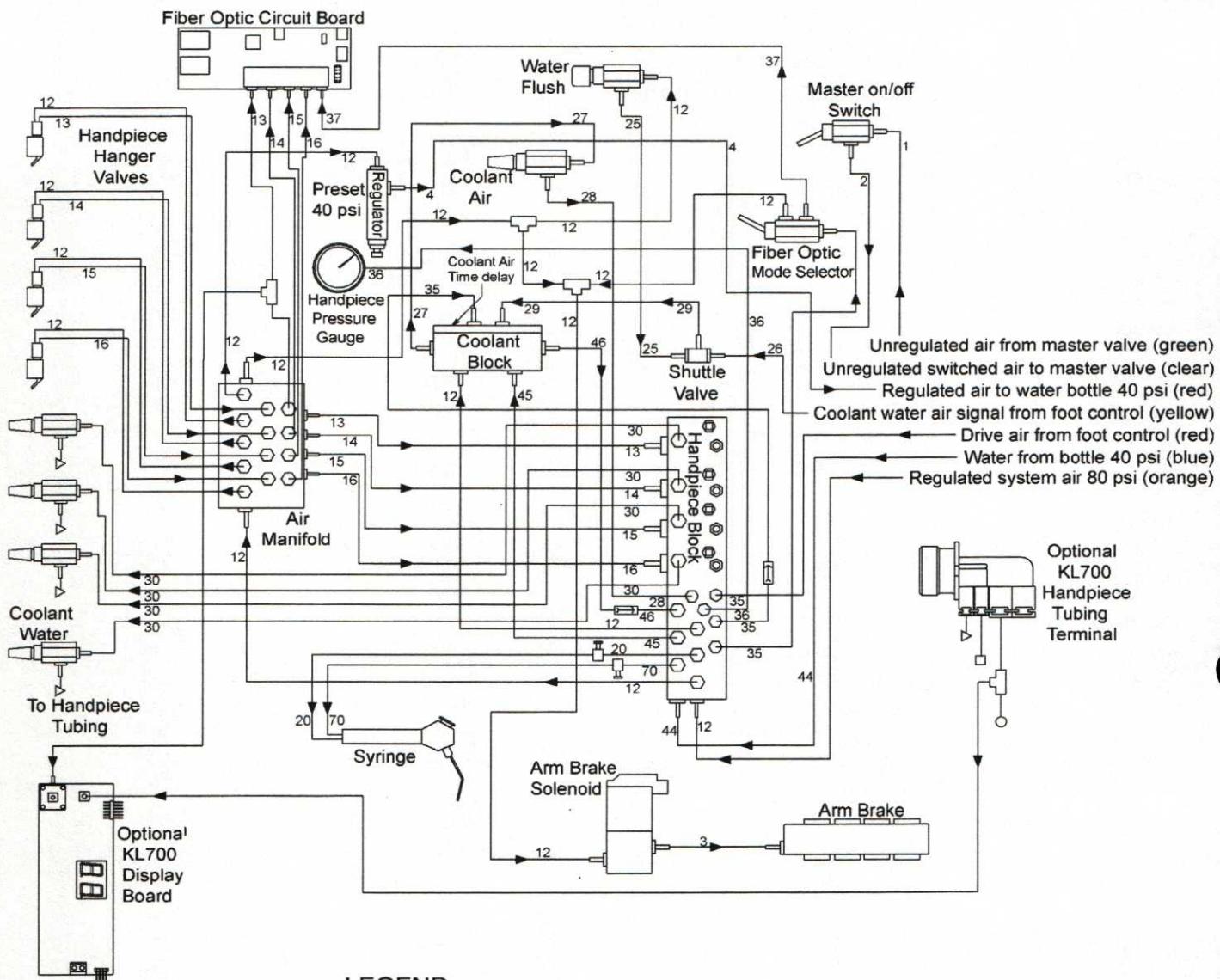
The doctor's delivery, commonly called the, "control head"

If air or water fail to come out of the handpieces it could indicate a blocked check valve, failed diaphragm or a kinked section of tubing. The following page contains a schematic of the air and water lines in the control head to help with troubleshooting.

One popular technique for locating a malfunctioning component is called the 50% rule. If there are 10 components between the source and the point of use, begin by examining a component halfway through the series. If there is no flow present at that component, go halfway back to the source and examine another component. This is a quicker technique than starting at one end and tracing flow from one component to the next until the fault is located. For example, if there is no water coming out of the handpieces, a good starting point may be to pull tube #46 off of the handpiece block. This tube supplies water from the coolant block to the handpiece block. If no flow is present, it can be assumed that the problem is upstream from the handpiece block. If pulling the tube #46 off the coolant block shows that water is coming out of the coolant block, then the problem must be in the only remaining component between the two inspection points, the one-way check valve.

The schematic can be a useful guide for tracing flow paths from one component to the next to locate trouble spots. Studying it can also help develop a better understanding of the pneumatic logic used to control multiple handpieces from a single foot control.

Control Head Air/Water Schematic



Speed adjustment of backrest

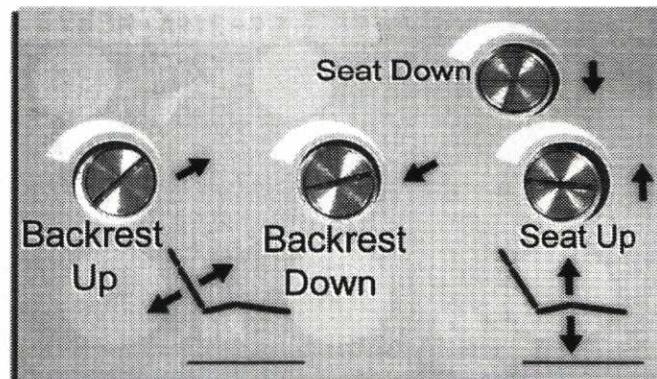
Check the serial number of the chair. If it is below 10572 then the chair was factory equipped with a single acting cylinder and a pair of return springs to aid the chair in reclining. Motion may be improved in both directions through cleaning the glide blocks and lubricating the aluminum curved piece with JAX Dri-Glide silicone spray, available through KaVo customer service. Allow 15-20 minutes for the spray to dry thoroughly before wiping off any excess and reassembling. Spray carefully to avoid getting any JAX spray on the floor as it could create a serious slip hazard. When remounting the upper glide block shaft, do not exceed 15 inch-pounds of torque on the clamping bolts. If the chair fails to recline effectively it may be due to spring fatigue. A new, **robust spring kit** is available, item #1002 3679.

On later model chairs, equipped with the double acting tilt cylinders, motion is rarely a problem, however it is possible for contaminants to work their way into the interface between the glide blocks and the curved aluminum backrest support. Remove the upper glide block shaft and clean the glide blocks and the aluminum curved piece with alcohol to restore smooth operation. Do not use JAX spray on units with double acting cylinders as this may cause the backrest to chatter while reclining.

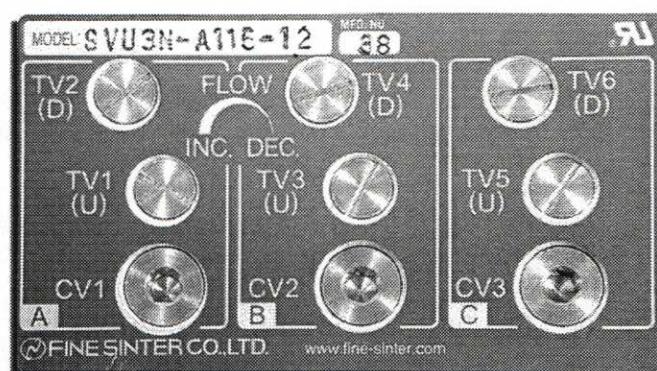
The speed of the hydraulic cylinders is controlled by throttle screws on top of the solenoid actuated valve body mounted behind the main circuit board. A decal indicates the motion direction controlled by each screw. Backing a screw out will open the valve to increase speed but do not back any screw out beyond the point at which the head of the screw sticks out beyond the top surface of the valve body.

In some cases, increasing the speed of the lift cylinder may slow down backrest motion. In such cases, it may be helpful to remove the decal from the top of the valve body and readjust all the control valves to their factory presets.

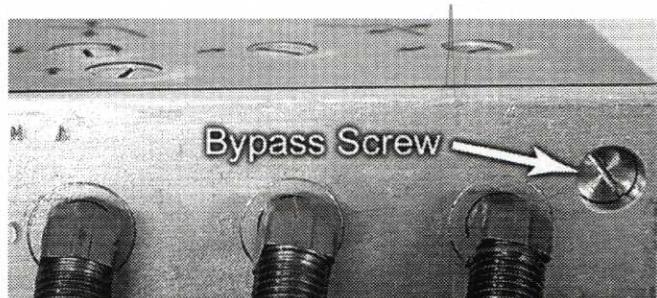
Carefully peel off the top decal and set it aside so that it can be reapplied after the adjustments are made.



Valve body decal with additional labeling



Valve body with top decal removed



Location of pressure bypass adjustment screw

TV1: Close fully then open 1 complete revolution.

TV2: Close fully then open 2 complete revolutions.

TV3: Close fully then open 1 complete revolution.

TV4: Close fully then open 2 complete revolutions.

TV5: Close fully then open 2 complete revolutions.

TV6: Close fully then open 1 1/2 revolutions.

On the end of the valve body is a pressure bypass adjustment screw. The factory setting on this screw is to close it fully and open it two complete revolutions.

City water selector switch

All KaVo dental units are equipped with a pressurized water bottle system for supplying water to the handpieces and syringes. Units with cuspidors come pre-equipped with a water regulator to supply city water to the cuspidor. For doctors who would like the option of running city water to their handpieces, two kits are available for installation; one for dental units *with* cuspidors and one for units *without* cuspidors. Both kits come with a selector switch which allow the doctor to toggle between bottled water and city water supplies.

The kit for units with cuspidors is sold as item #1002 9043 and includes a selector switch to be mounted in the control head along with a variety of hardware and detailed instructions for installation on both KOTP and KLR units. Installation involves tapping into the existing city water supply line running to the cuspidor. Running city water up to the selector switch. Diverting bottled water from the handpiece block to the selector switch and routing switched water back to the handpiece block and over to the assistant's delivery.

The kit for units without cuspidors, item #1002 7944 also includes a water regulator/master valve assembly. Installation is similar with the addition of plumbing city water to the water regulator in the junction box and routing signal-air from the master switch under the control head to the master valve assembled alongside the water regulator.

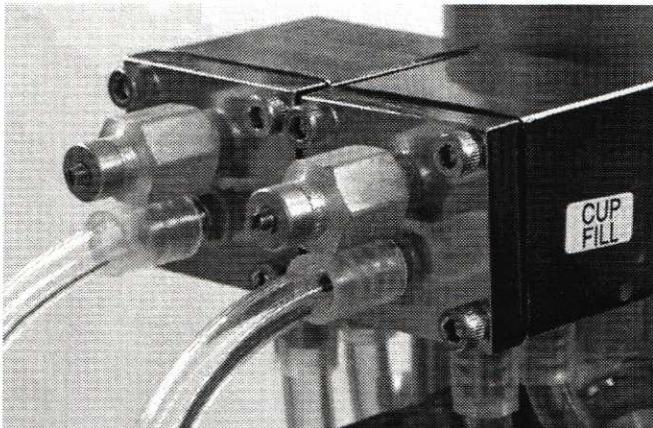
For more detailed installation instructions, please refer to the installation procedures in Section 4.

Cuspidor timing valve adjustment

The cuspidor cup fill and bowl rinse functions are activated by pressing briefly on the desired spout. The length of time that the water runs is controlled by timing valves inside the post box. The valves each have an air bleed screw which can be adjusted. The timing is factory set so that the cup fill spout runs for 5-6 seconds and the bowl rinse runs for 15-20 seconds.

To adjust the timing of either of these valves, remove the side covers from the post box and locate the two side by side valves. They are identical except for the printed labels which identify which spout they operate.

Begin by activating the spout which is to be



Air bleed screws adjust the duration of flow to the cup fill and bowl rinse spouts on the cuspidor

adjusted and recording the length of time that the spout stays on. To increase the on-time, the bleed screw is turned clockwise. These valves are extremely sensitive to adjustments and are easily adjusted too far. Use a small flat blade screwdriver and begin by turning the screw a mere 1-3 degrees in the desired direction. Activate the spout and record the length of time that the water stays on. Repeat this process until satisfied. It may require several attempts to get the timing adjusted to the desired interval.

Section 3: Electrical

Chair motion control

Electronic interference:

It is possible for other equipment within a dental office to produce electronic noise that can feed back into the circuitry of a dental chair, producing a variety of symptoms, including blocked chair motion, random chair motion and loss of preset chair positions from memory. KaVo recommends that dental chairs be connected to a dedicated circuit to eliminate potential interference from other equipment. In cases where it is not possible to power a chair from a dedicated circuit, it may be helpful to route power to the unit through a surge protector. Rerouting the power sources of other noise producing devices like X-ray equipment, compressors, ultrasonic cleaners or vacuums may also eliminate electronic interference. If standard troubleshooting procedures fail to resolve a motion control issue, the presence of electronic interference should be considered.

As an alternative, main power to the chair can be connected to a **Line Filter Kit** available from KaVo by ordering item #1002 5053. If the chair is equipped with a KaVoLUX dental light, additional insulation from electronic interference can be provided through the installation of a **Light Choke Kit**, available as item #1002 5146.

In some cases, the presence of electronic interference related control problems can be detected as an audible tone, similar to the sound of a FAX machine, coming from the chair's main circuit board. If chair functions can be temporarily restored by turning the main power off and back on, then the control issues may be due to electronic interference. If the chair is equipped with an assistant's touch pad and the chair serial number is below 11053, then the addition of a ground wire to the assistant's touchpad should restore full functionality to the unit. The **Assistant's Touchpad Grounding Kit** is available as item #1002 5364.

Main circuit board overview

The main chair circuit board is located under the chair base cover. This board governs chair motion, taking inputs from the foot switches as well as any doctor's or assistant's touchpads installed with the unit.

If the handpiece foot control is activated, it sends a pneumatic signal to an air/electric override switch on the circuit board which instantly disables chair motion from any touchpad or foot switch. Several limit switches are incorporated into flexible portions of the chair to halt downward chair motion when a switch senses external contact with a person or an object. These safety switches are all wired in series and plug into the receptacle in the top left corner of the board labelled, "crush".

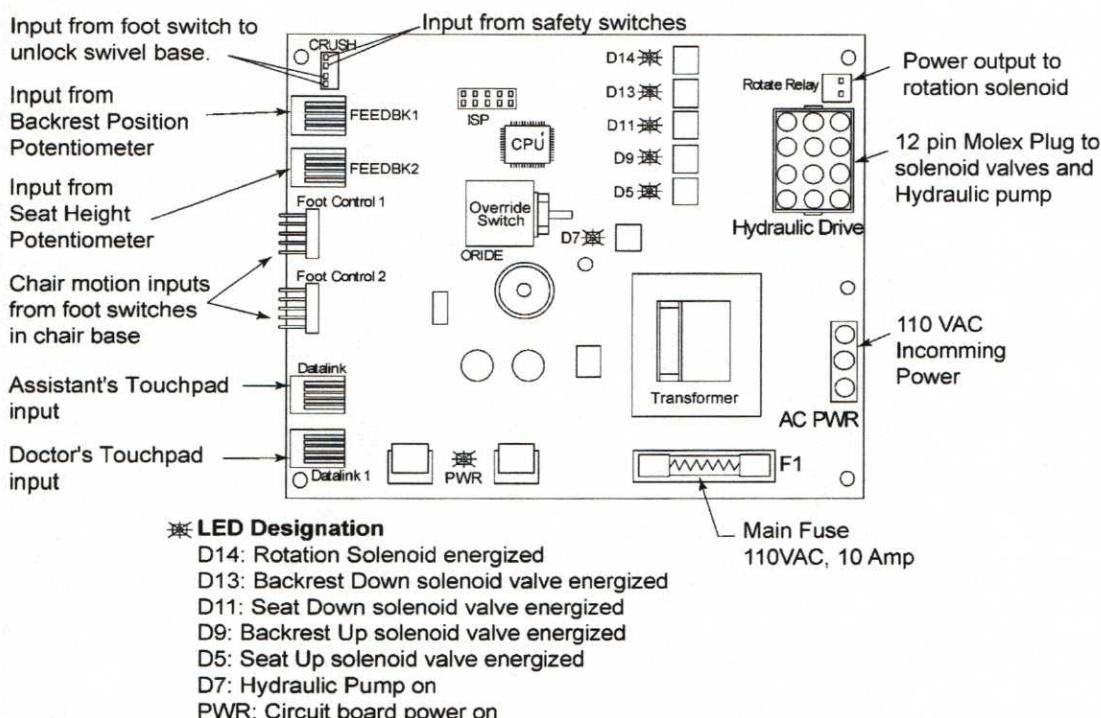
The onboard CPU also monitors chair height and backrest position through two rotary potentiometers mounted on the chair frame along with motion limit sensors. The CPU stores preset chair positions in memory and monitors all available inputs to decide which outputs to turn on. The control logic which governs this decision making is programmed into the CPU and referred

to as firmware. A small decal on the CPU will signify the firmware revision number programmed into the CPU. The firmware revision number can provide valuable troubleshooting insight when communicating with Technical Support.

The outputs from the circuit board are all in the top right corner of the board. The topmost receptacle supplies 110 volts AC to the solenoid which unlocks the swivel base under the seat frame. The rest of the output are also 110 VAC and are supplied through a 12 pin Molex plug to the hydraulic pump and the six-solenoid hydraulic valve body located just behind the circuit board.

Seven red LEDs on the circuit board help give an indication of what the CPU is trying to control. Refer to the schematic below for a detailed list of what each LED signifies. Watching these lights can be a valuable troubleshooting aid because they can help isolate the source of motion control problems. If lights are coming on but the chair is not moving, the problem is most likely failure of a solenoid valve or of the hydraulic pump. If lights do not come on when they should, any problem must be either from an input signal or on the board itself.

Main Chair Circuit Board



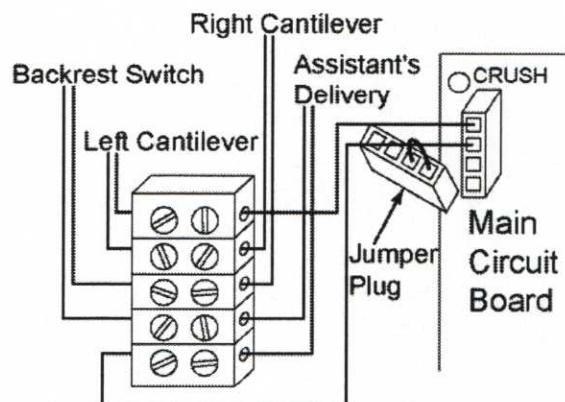
Faulty component isolation

Chair will move up but not down

This is an indication that one of the safety switches is activated or not properly wired up with the other safety switches. To verify that it is a safety switch problem, replace the 4-pin plug in the top left corner of the main circuit board with the jumper plug that is tied to it. If the jumper plug restores downward motion then one of the safety switches is not functioning properly or is miswired to the other safety switches.

The wiring for all the switches comes together in a terminal block just to the left of the main circuit board. These wires are all connected in series on the terminal block so that they form one long continuous wire that plugs into the circuit board. If any switch is pressed or any wire comes loose, continuity will be broken and downward motion will be disabled. Check to make sure none of these wires have come loose from the terminal block. It is important to note that wire color (black/red) makes no difference in how the safety circuit functions; either there is a continuous electrical path through all the switches or the path is broken by an activated switch.

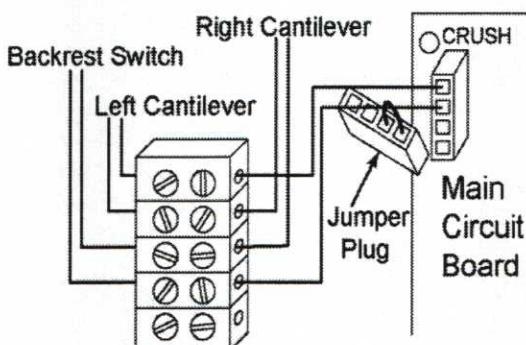
There are two safety switches behind the bottom cantilever cover. It is possible for this cover to get bumped sideways which could activate a switch and not release it. There is also a safety switch in the backrest. It is a different style and does not click but it should pass a continuity check. On units equipped with an assistant's delivery there is a fourth safety switch under the support arm which will click when lifting up on the arm.



Safety switch terminal block configuration for units with assistant's delivery

Chair will not respond to touch pads

- Check to see if the red power LED on the bottom of the main chair circuit board is on. If not, check the fuse at the bottom of the circuit board, the ground wire connection and incoming voltage to the board. Try unplugging the main power and then plugging it back in. If this seems to fix the problem, refer to the previous section on *electronic interference*.
- If equipped with an assistant's touch pad, install the grounding kit referred to in the previous section.
- If the grounding kit is installed, verify continuity of the ground connection. If continuity is verified, replace the circuit board inside the touch pad, item #0800 0697.
- If there is no assistants touchpad installed, make sure that the assistant's touchpad data-cable is unplugged from the main circuit board. Note that the doctor's control data-cable must be plugged into the bottom receptacle on the main circuit board; the doctor's control and the assistant's control cables are not interchangeable at the circuit board like the foot control cables.
- If the previous steps fail to restore motion, replace the main chair circuit board. If the unit is equipped with a single-acting tilt cylinder (with return springs), order the **Single-acting Cylinder Circuit Board**, item #1002 3707. If the unit has the newer double-acting tilt cylinder, order the **Double-acting Cylinder Circuit Board**, item #1001 4243.



Safety switch terminal block configuration for units without assistant's delivery

Chair will not respond to the foot switch:

- Check to see if the red power LED on the bottom of the main chair circuit board is on. If not, check the fuse at the bottom of the circuit board, the ground wire connection and incoming voltage to the board. Try unplugging the main power and then plugging it back in. If this seems to fix the problem, refer to the previous section on *electronic interference*.
- Make sure the control cables are plugged into the main circuit board. If only one foot control is working, try swapping cables on the board. If the same foot control still fails then the circuit board is OK. Try physically swapping the two foot switches in the chair base. This will determine if the foot switch is faulty or if the foot switch data cable is at fault. The **Foot Switch Assembly** is item #1001 8548. The **Foot Switch Ribbon Cable** is item #0800 0806.
- If the previous steps fail to restore motion, replace the main chair circuit board. If the unit is equipped with a single-acting tilt cylinder (with return springs), order the **Single-acting Cylinder Circuit Board**, item #1002 3707. If the unit has the newer double-acting tilt cylinder, order the **Double-acting Cylinder Circuit Board**, item #1001 4243.

Chair will not move to preset positions or exit position:

First make sure that both of the chair position data cables are plugged into the main circuit board and plugged into the limit control circuit boards. The backrest limit circuit board is located just behind the right side seat frame cover. It can be accessed by simply removing the seat upholstery. The seat height limit circuit board is behind the base cover just to the left of the main circuit board. If these

cables are plugged in properly, try substituting jumper cables in place of the originals to rule out defective cables. If the unit still fails to respond properly, it is an indication of a malfunctioning microprocessor which can only be remedied by replacing the main chair circuit board. If the unit is equipped with a single-acting tilt cylinder (with return springs), order the **Single-acting Cylinder Circuit Board**, item #1002 3707. If the unit has the newer double-acting tilt cylinder, order the **Double-acting Cylinder Circuit Board**, item #1001 4243.

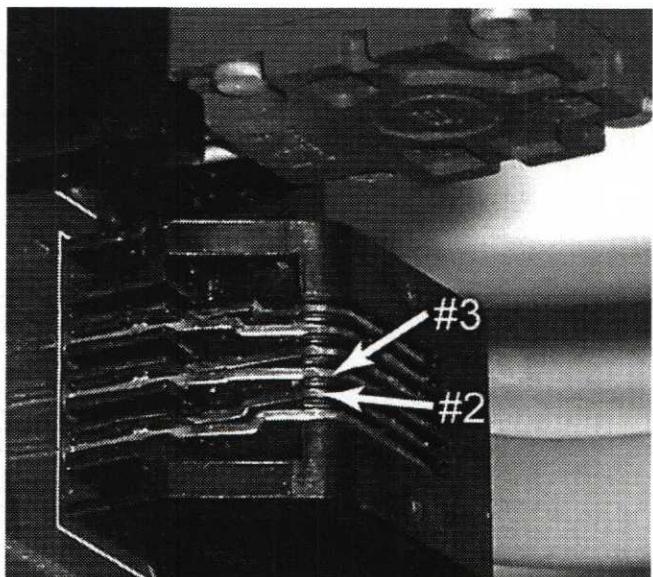
Adjustment of backrest position potentiometer

The position of the backrest is communicated to the main chair circuit board by the potentiometer which rotates as the backrest reclines. If the potentiometer reaches the end of its travel right at the same time that the backrest reaches its travel limit, there may be no change in the voltage signal from the potentiometer near the travel limit of the backrest. This could prevent the backrest from reaching its programmed set point if that set point is close to the travel limit of the backrest. Before resetting the backrest position potentiometer, check it to see if its voltage signal is within the specified range.

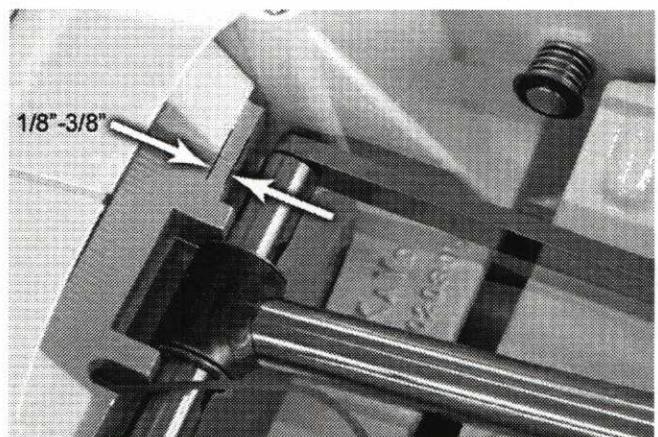
To expose the potentiometer simply remove the seat upholstery. With the backrest tilted all the way forward, measure the DC voltage between pins 2 and 3 on the data cable. Pin 1 is the furthest outboard pin which would be the closest pin to the technician when sitting next to the chair. It is important to be very careful while probing these pins because they are very close together and it is easy to accidentally touch two pins at once with a probe which would short circuit the leads and potentially damage the main circuit board. The voltage between pins 2 and 3 should fall within the range of **3.0 to 4.0 Volts DC**. If potentiometer voltage is out of range, continue with the adjustment procedure.

Before adjusting the potentiometer, remove the right side armrest and side cover for better access.

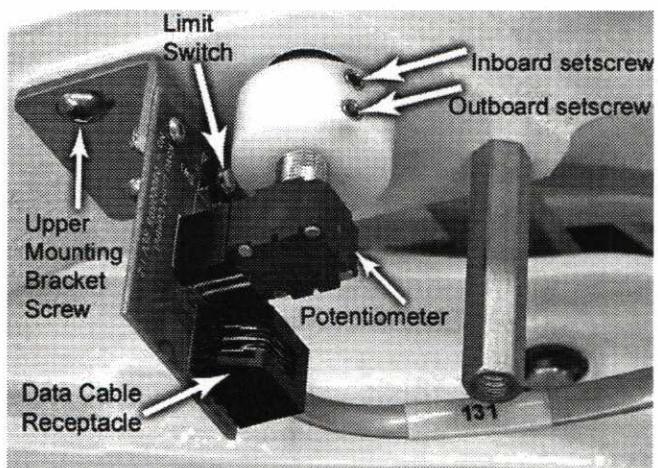
- Loosen the two screws that hold the circuit board mounting bracket to the seat frame.
- Inspect how far the end of the curved aluminum guide rail protrudes beyond the upper glide blocks. When fully upright this dimension should be between 1/8" and 3/8". If necessary, use the foot control to reposition the back rest within these limits.
- There are two set screws, side by side on the white plastic disc attached to the potentiometer shaft. Loosen the inboard set screw. This will disconnect the disc from the shaft which rotates as the backrest reclines. The disc is still affixed to the potentiometer shaft.
- Turn the disc counterclockwise by hand until the potentiometer reaches its internal stop.
- Loosen the outboard set screw and continue to rotate the disc counterclockwise until the set screw is about 15 degrees past top-dead-center. Retighten the outboard set screw on the disc.
- Measure the DC voltage between pins 2 and 3 on the data cable receptacle. Rotate the disc back clockwise until the voltage reads 3.5 volts plus or minus .5 Volts. Tighten the inboard set screw.
- Slide the circuit board mounting bracket so that the limit switch on the circuit board lightly touches the white disc. Tighten the bottom mounting screw but leave the top screw loose.
- Use the foot switch to tilt the backrest back about 10 degrees then forward again until it reaches its limit.
- The upper screw on the mounting bracket is still loose so tapping on the upper edge of the bracket will fine tune the forward limit of the backrest. This is an extremely sensitive adjustment so it may take several attempts to get the bracket position properly adjusted so that only 1/8" to 3/8" of the curved aluminum guide extends beyond the upper glide blocks when the backrest comes to a stop. Tighten the upper mounting screw once the limit has been fine tuned.
- Recheck the voltage between pins 2 and 3. The voltage must be within the range of 3.0-4.0 Volts.



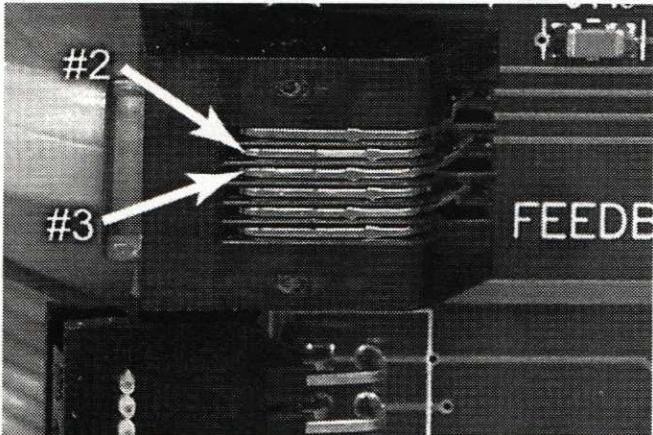
Measure DC voltage between pins 2 and 3



Gauging the upright limit of the backrest



Backrest position potentiometer assembly detail

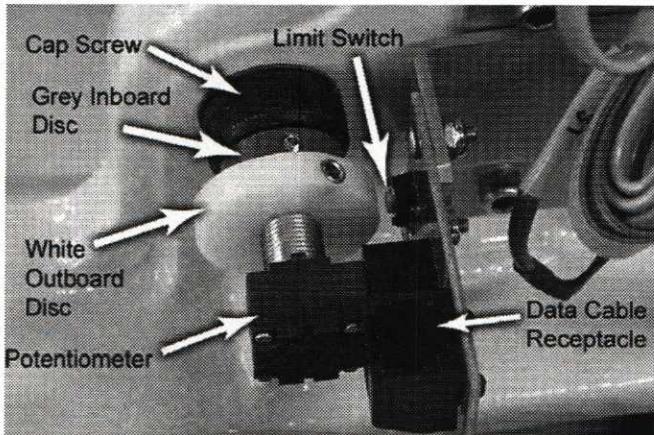


Voltage can also be read off the main circuit board

Adjustment of lift cylinder position potentiometer

The potentiometer which signals the position of the lift cylinder is similar to the one that is used to signal backrest position. If the potentiometer reaches its travel limit too near the maximum height of the chair, it could create a problem. If a programmed chair position is set too close to the travel limit of the lift cylinder, the chair could stop short of its programmed set point. Before resetting the potentiometer, check to see if its voltage signal is within the specified range.

To expose the potentiometer, remove the base cover from the unit. With the chair raised all the way up, measure the DC voltage between pins 2 and 3 on the data cable receptacle. Pin 1 is the furthest outboard pin which would be the closest pin to the technician when seated next to the unit. It is important to be very careful when probing these pins because they are very close together and it would be easy to accidentally touch two pins at once with a probe, creating a potentially damaging short circuit. The voltage between pins 2 and 3 should fall within the range of **2.3 to 3.3 Volts DC**. If the voltage is out of range, continue with the adjustment procedure.



Lift cylinder position potentiometer assembly detail

- Removing the cantilever top cover is not mandatory, however it is recommended to improve access to the necessary hardware.
- Loosen the two screws that hold the circuit board mounting bracket to the cantilever base.
- Use the foot control to adjust the seat height to 24" from the floor to the bottom edge of the seat frame.
- Loosen the set screw on the grey inboard disc. This will release the potentiometer shaft from the large cap screw which rotates slowly as the chair base moves up and down.
- Rotate the white outboard disc clockwise until the potentiometer hits its internal stop.
- Loosen the set screw on the white disc and continue to rotate it clockwise until the set screw comes up to the 12 o'clock position. Retighten the set screw.
- Measure DC voltage between pins 2 and 3 on the data cable receptacle. Rotate the white disc back counterclockwise until the voltage reads 2.8 Volts plus or minus .5 Volts.

- Adjust the position of the circuit board mounting bracket so that the limit switch on the circuit board lightly touches the white disc. Tighten the mounting screws on the bracket.
 - Rotate the white disc slightly until it is just barely making contact with the limit switch on the circuit board. Tighten the set screw in the grey inboard disc to lock the potentiometer to the movement of the chair.
- Note: If the set screw is not accessible in the last step, it may be necessary to unbolt the circuit board mounting bracket, pull the grey disc away from the cap screw socket head to which it mates, rotate it to gain access to the set screw and repeat the two previous steps.
- Use the foot control to drop the chair a few inches then raise it back up to its limit. The bottom edge of the seat frame should stop within 1/4" of the 24" height specification.
 - To adjust the limit up or down, loosen the set screw in the inboard grey disc and rotate the outboard white disc clockwise to lower the stop point or counterclockwise to raise the limit. Retighten the setscrew in the grey disc and re-measure the seat frame height. This adjustment is very sensitive. It may take several tries to get the height adjusted within specifications.
 - With the seat at its maximum height, measure the voltage as a final check. DC voltage between pins 2 and 3 of the data cable receptacle should fall within the range of 2.3 to 3.3 Volts.

Handpiece fiber optic lighting control

Blinking of fiber optic light

If a Star handpiece is being used and the light is blinking, the fiber optic circuit board must be replaced. If another brand of handpiece is blinking, replace the handpiece light bulb and check all wires and connections to the circuit board and handpiece. Verify output voltage to the handpiece at the circuit board. If output voltages do not return to their programmed presets after the power has been turned off and on, the **Fiber Optic Circuit Board** will have to be replaced, item #1001 4244.

Reduced fiber optic bulb life

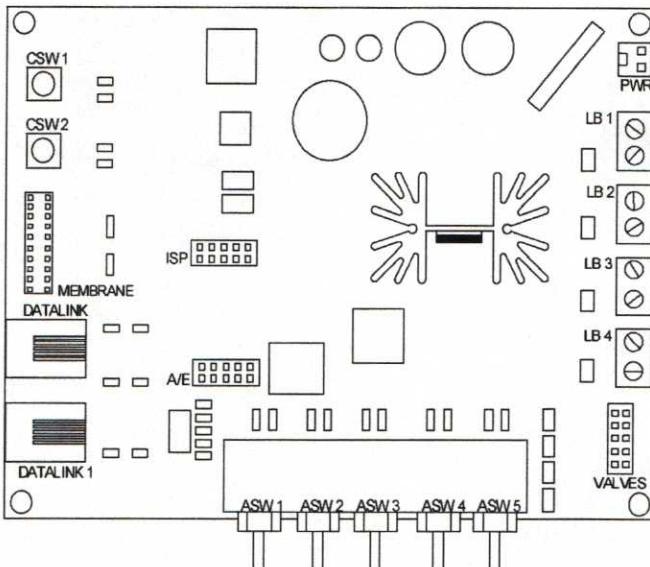
This usually indicates that the preset voltage outputs are not being retained in memory on the circuit board. Reset the voltage outputs and cycle the power on and off five times, waiting at least five seconds before turning the power back on each time. If the voltage outputs do not return to their programmed values, the **Fiber Optic Circuit Board** will have to be replaced, item #1001 4244.

Resetting fiber optic voltages

To reset the voltage to the handpiece fiber optics, remove the cover from the control head to access the fiber optic circuit board. Carefully unplug all ribbon cables from the circuit board before lifting the cover all the way off.

Voltages are set by manipulating the two small push-buttons, CSW1 and CSW2 on the circuit board. CSW1 is used to enter/exit programming mode and to switch from one handpiece to the next. CSW2 is used to step the voltage up incrementally with each press of the button to a maximum of 5.2 Volts, after which the voltage drops back down to 2.6 Volts and begins climbing again.

- Press and hold CSW1 for ten seconds to enter programming mode. Use a multimeter to monitor DC voltage between the two terminals on LB1.



Fiber Optic Circuit Board

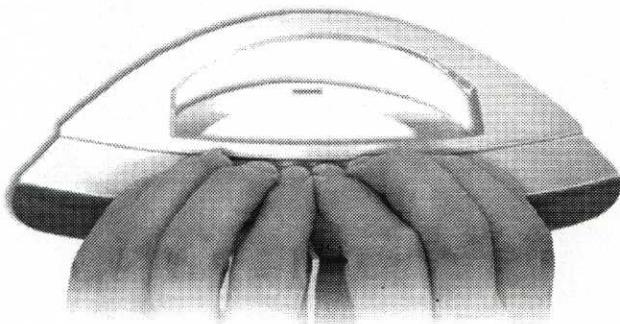
- Press and release CSW2 repeatedly to step the voltage up to the desired setting. It is important to note that there is a .2 volt drop from the circuit board to the light bulb so the voltage should be set slightly high at the board to compensate.
- Press CSW1 once to switch to the next handpiece. Move the multimeter probes to the terminals on LB2.
- Adjust the voltage with CSW2.
- Continue switching (CSW1) and adjusting (CSW2) until the final handpiece (LB4) is adjusted properly. Pressing CSW1 at this point will exit programming mode and return the unit to normal operation.

To verify that the voltages have all been adjusted properly, remove one handpiece at a time from its hanger and measure voltage at each light bulb. It is important to note that voltage must be verified in normal operation mode, not in programming mode.

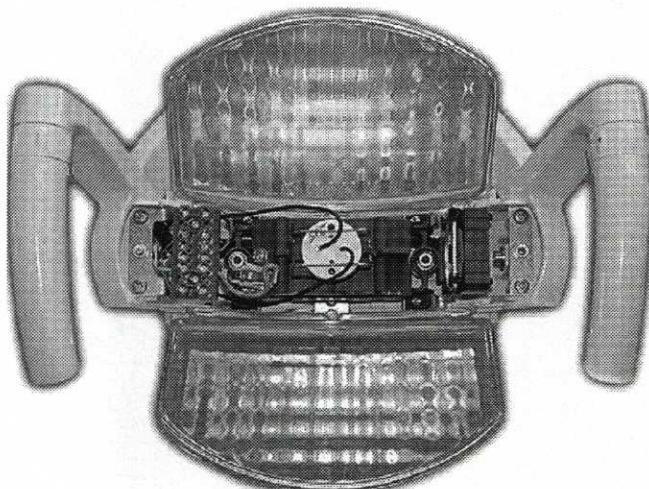
KaVoLUX Dental Light:

The light does not function:

- To inspect the light head, the cover assembly must be removed. Care must be taken when removing the cover to avoid breaking the glass plates. The cover simply snaps on and off but it is a fairly tight fit. The molded-in snaps are located on the ends of the cover and they must be allowed to spread vertically to pop loose. To remove the cover it must be gripped in the center but not over the glass plates. Use both hands as in the photo while bracing your wrists against the handles and firmly pull the cover straight off.

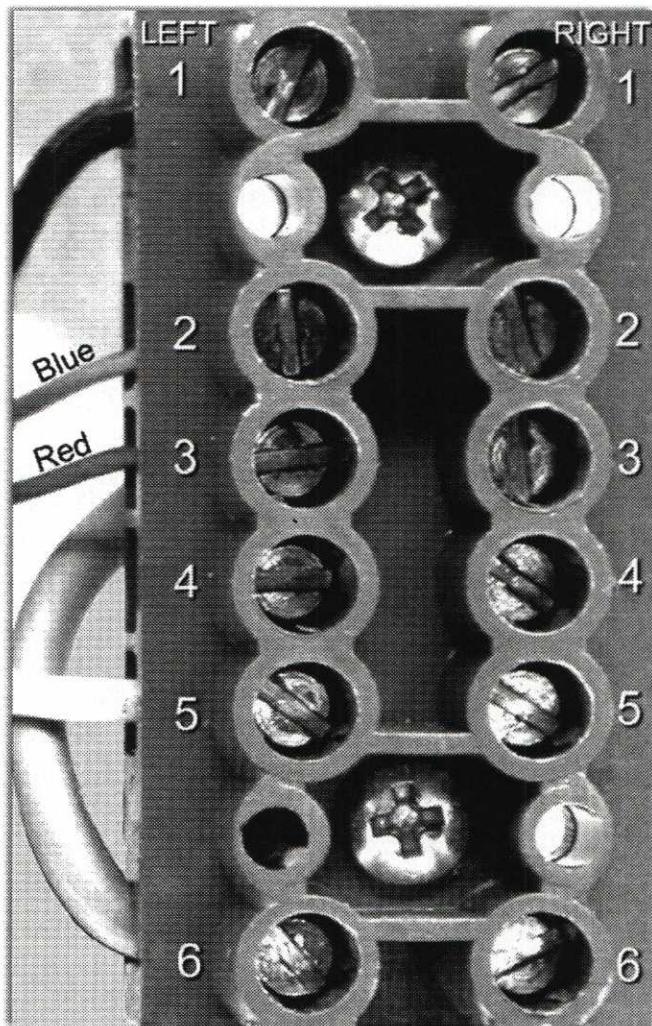


The KaVoLUX "Handshake"

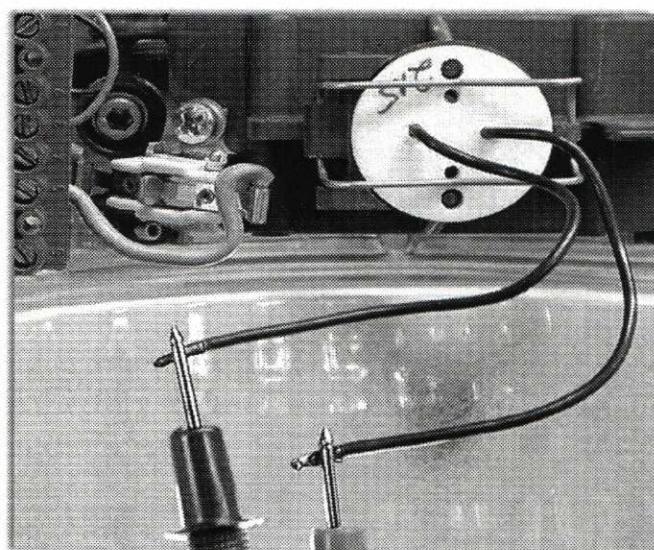


KaVoLUX Light Head with cover removed, exposing the terminal block, circuit breaker, bulb and fan

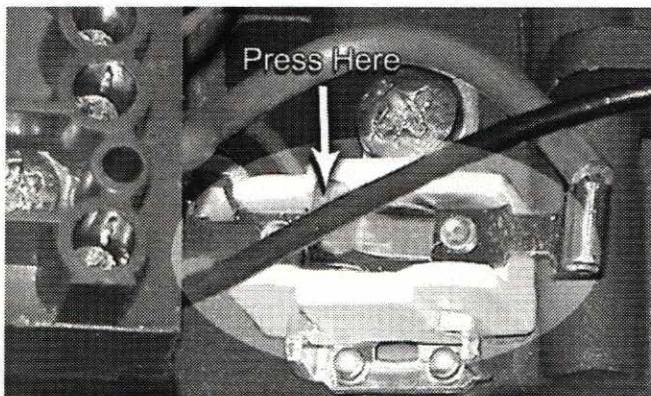
- Check the light bulb. Life expectancy of the bulb is 5000 hours so a bulb rarely burns out. The bulb can be checked by removing the bulb wires from terminals "1 Right" and "6 Right" on the terminal block. Check continuity between the two bulb wires with a multimeter. For instructions on use of a multimeter, please refer to Section 1.



KaVoLUX terminal block located to the left of the light bulb



Checking continuity through the bulb wires

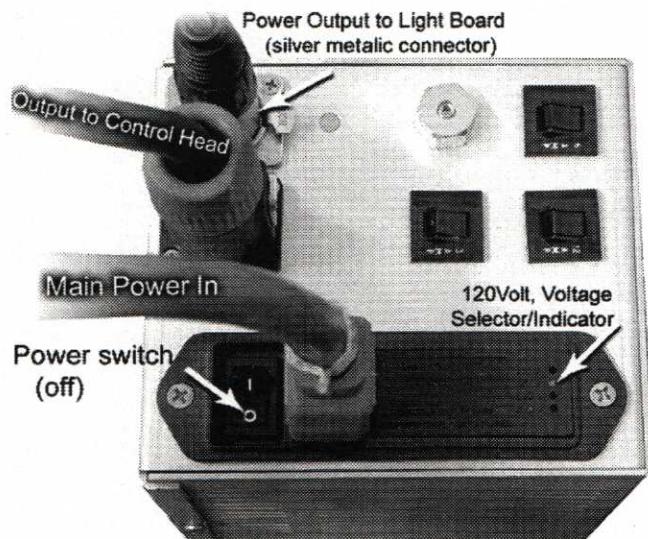


KaVoLUX Circuit Breaker next to Terminal Block

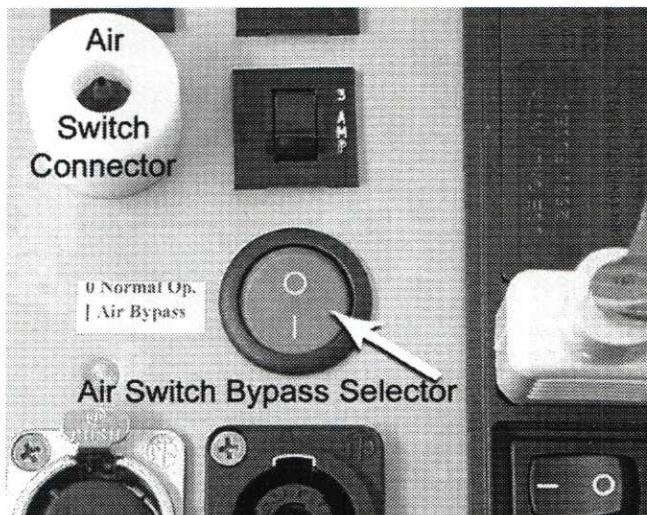
- Check for 12-14 Volts AC coming into the terminal block in the light head. With the switch on, measure between terminals "1 Left" and "5 Left". Note that the "on" position on the switch is symbolized by a circle with a dot in the center. If incoming voltage is present, check for voltage out the other side of the terminal block by measuring between terminals "1 Right" and "6 Right". If there is voltage on the left side of the block but not on the right side then the small white circuit breaker just to the right of the terminal block will need to be reset manually by pressing on the silver tab in the center.
- A thrown circuit breaker may indicate a malfunctioning cooling fan. Check for incoming DC voltage on the terminal block. There should be 24 Volts DC when measuring between terminals "2 left" and "3 left" with the light switch on. This style of DC fan only works when the wires are connected properly, so the red wire in terminal "3 left" connects through the terminal block to the red fan wire in terminal "3 right" and the blue wire in terminal "2 left" corresponds to the black fan wire in terminal "2 right".
- Check that the power supply is plugged in and turned on. The power supply is located under the junction box cover, commonly known as the "J" Box cover.
- Check that the voltage selector on the power supply is set to 120 Volts.
- Check that the silver metallic power output cord is plugged securely into the transformer.



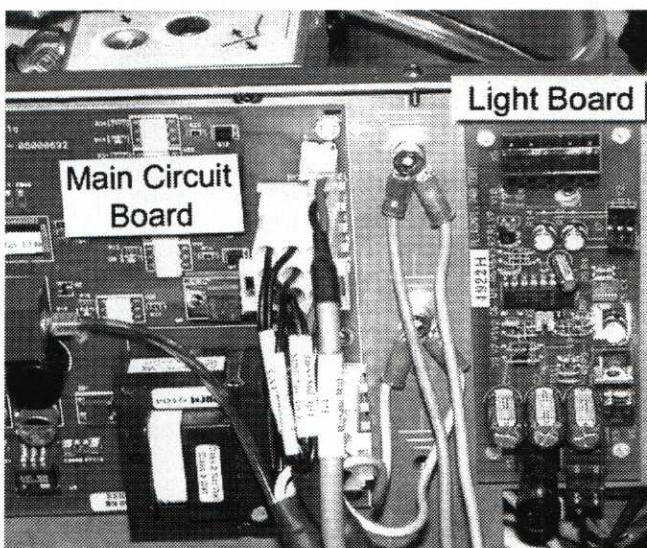
Identification of the two primary covers at the base of the dental unit



Older style power supply without air/electric switch



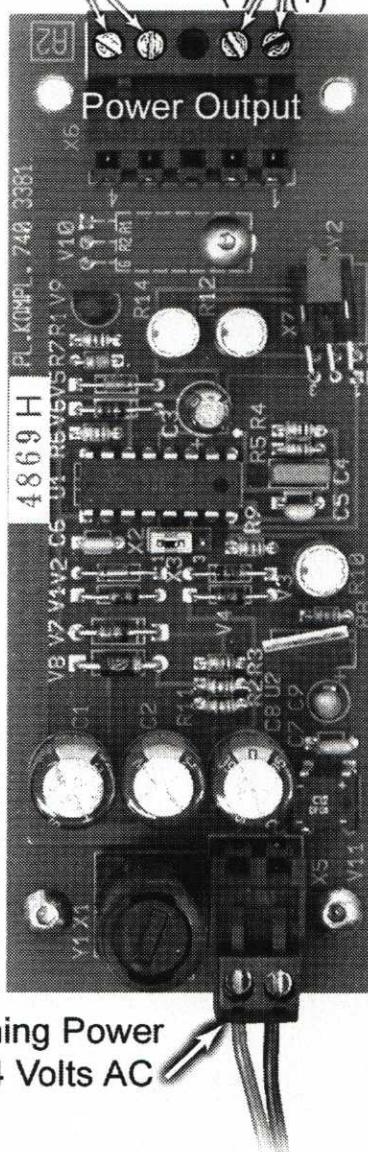
New style power supply with air/electric switch and bypass selector, normally set to "0"



Location of light board next to main circuit board under base cover

- The new style power supply has an air/electric switch built in that shuts off power to the light and the doctor's control head when there is no compressed air to the unit. If the compressed air is shut off or if there is no air line connected to the switch there will be no power to the light. Switch the selector to "1" to bypass the switch and determine if the air/electric switch is plumbed correctly.
- Check that the opposite end of the power cord is connected securely to the light board next to the main chair circuit board.

12.5 Volts AC 24 Volts DC
(-) (+)



Incoming Power
24 Volts AC

Light board detail showing input and output voltages and their locations

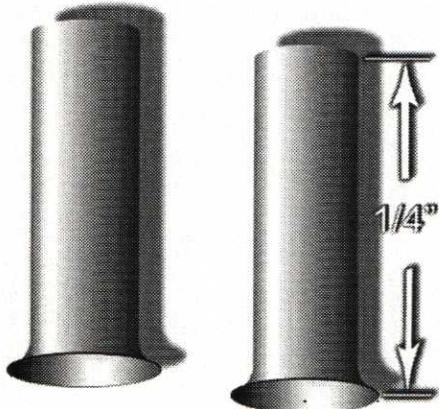
- With the light switch turned on, unplug the wiring harness from receptacle X7. If the light suddenly turns on, it is an indication of a faulty **dimmer switch assembly**, item #0906 7078.
- Test for incoming power to the light board. If no voltage is present, the power supply will need to be replaced. The **Power Supply** is item #0800 0676. Test for output voltage on top of the light board. It should be 12.5 Volts AC between the two terminals on the left side of the receptacle. If no output voltage is present then the **Light Board** will need to be replaced, item #0740 3381.

The light appears dim:

Turn off the power to the chair and to the 24 Volt AC power supply. Disconnect the board power plug from the bottom of the light board.

Loosen the screws securing the wires to the light board plug and pull the wires out of the plug.

Verify that the wire ends are crimped properly with ferrules (thin metal sleeves). Make sure all the wire strands are intact at the base of the ferrules. If not, cut the ferrules off, strip the insulation back and crimp on new ferrules.

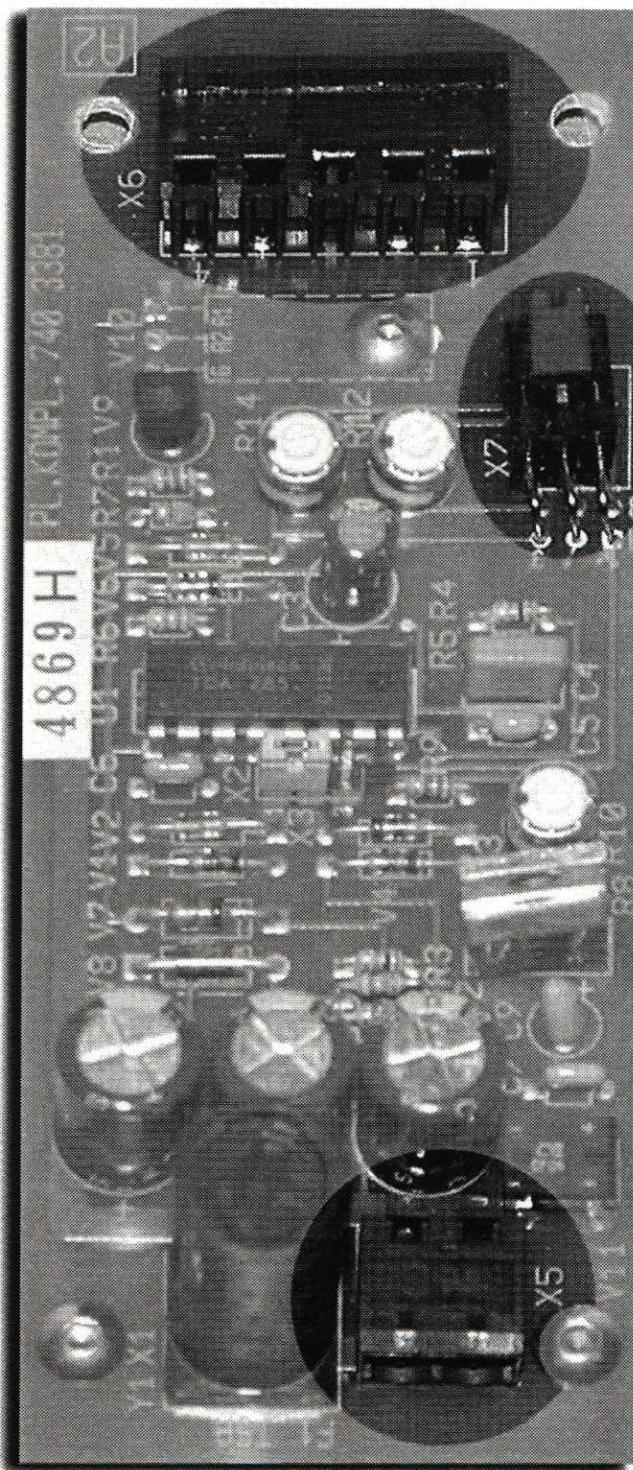


Close-up of 18 gauge ferrules for wire ends

Replace the wires in the connector and secure them by firmly tightening the screws in the connector. Repeat this checking process, stripping and recrimping any wires with damaged strands. Check the wiring leading from the top of the light board (Area X7) to the light bulb and fan. Also check the wiring leading from the light board to the switch/dimmer board (Area X6). If the unit is equipped with a light choke next to the light board, check the wires there too. Carefully inspect the three connection points on the light board, areas X5, X6 and X7. If there is any evidence of arcing or black corrosion on the receptacle pins, replace the Light Board, item #0740 3381.

Adjusting output voltages

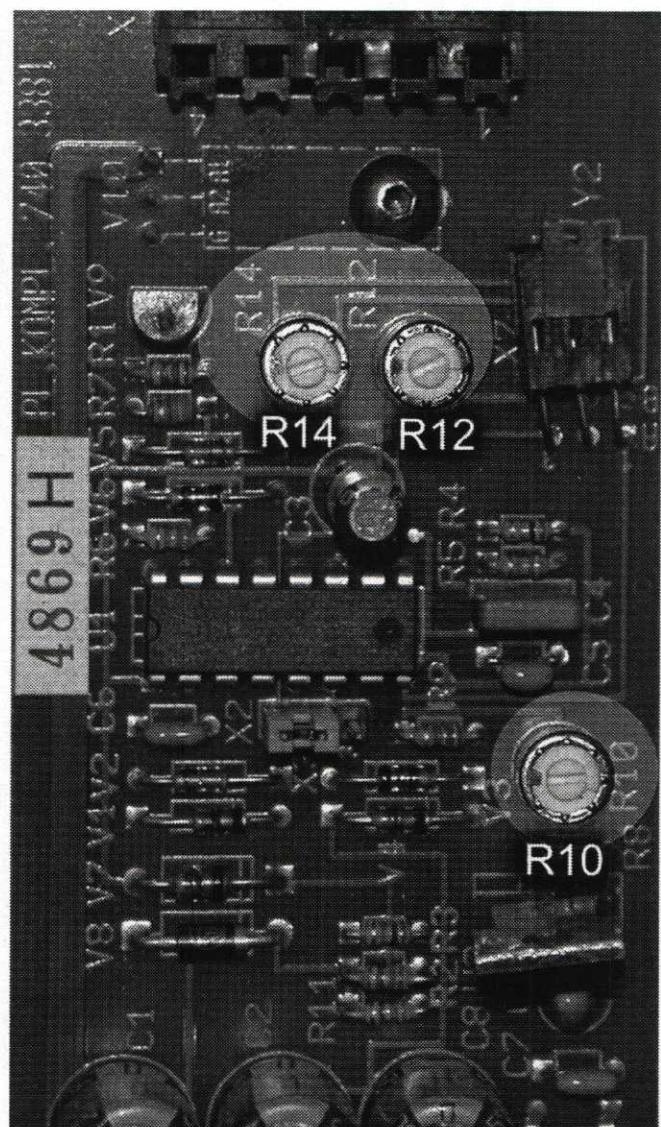
Once the wiring has been inspected/repaired, reconnect the power to the chair and the 24 Volt power supply. Make sure the connectors are all plugged back into the light board. Turn the KaVoLUX light on and turn the dimmer switch all the way up to 10. With a multimeter set to AC voltage, touch the probes to the two left pinch screws on



Light board detail showing inspection areas

the output connector at the top of the board (Area X6) and adjust the R14 potentiometer with a small screwdriver until the voltmeter reads 12.5 Volts AC. It is important not to exceed this voltage in order to maximize bulb life. Next, turn the dimmer under the

light head down all the way and adjust the R12 potentiometer to set the minimum brightness level to suit the doctor's preference. Adjusting the lower voltage limit can sometimes throw off the upper voltage setting so go back and readjust R14 back to 12.5 Volts. With the upper and lower voltage limits set, readjust the output voltage to the cooling fan. Switch the multimeter over to measure DC voltage and probe the two right hand terminal screws on the output connector (X6). Adjust the R10 potentiometer until the output reaches 24 Volts DC.



Light board detail showing input and output voltages and their locations

KL700/KL701 Calibration and Settings

When the main power is first turned on, the KL700 / KL701 display will flash an 8 or a 9 for one second to indicate whether it is running on version 8 or version 9 firmware. Calibration instructions have been broken down into two sections to address each firmware version.

Version 9 firmware calibration

- Turn on the main power switch.
- The display will flash 9 for one second. If the unit flashes an 8, refer to the following section for calibration of KL700 / KL701 units with version 8 firmware installed.
- Adjust the drive air to the KL700 / KL701 on the handpiece block to the maximum position.
(Counterclockwise)
- The KL700 / KL701 display will show a 2.
- Enter calibration mode by simultaneously pressing and holding the **Forward/Reverse** and **Minus** buttons until two bars appear at the bottom of the display.
- Release the two buttons and get ready to press the foot control all the way down.
- When the bars jump up to the top of the display, immediately depress the foot control and release it as soon as the two bars jump down to the center of the display.
- Press the minus key to exit calibration mode.

Version 8 firmware calibration

- Turn on the main power switch.
- The display will flash 8 for one second. If the unit flashes a 9, refer to the previous section for calibration of units equipped with version 9 firmware.
- Adjust the drive air to the KL700 / KL701 on the handpiece block to the maximum position.
(Counterclockwise)
- The KL700 / KL701 display will show a 2.
- Enter calibration mode by simultaneously pressing and holding the **plus** and **minus** buttons until two bars appear at the bottom of the display.
- Release the two buttons and press and hold the foot control all the way down.
- The two bars will jump up to the top of the display. Release the foot control as soon as the two bars jump down to the center of the display.
- Press the **minus** key to exit calibration mode.

Default speed adjustment

When power is turned on to the unit, the maximum speed defaults to 2 out of a maximum of 40. The plus key must be used to increase maximum speed to whatever the doctor desires. This must be done each time the unit is turned on, however, version 9 firmware allows the initial default speed to be adjusted and retained in memory.

- Use the plus and minus buttons to adjust the maximum speed to the desired level.
- Press the **plus** and **minus** keys simultaneously and hold for five seconds. The display will flash PS for preset and return to normal operation mode.

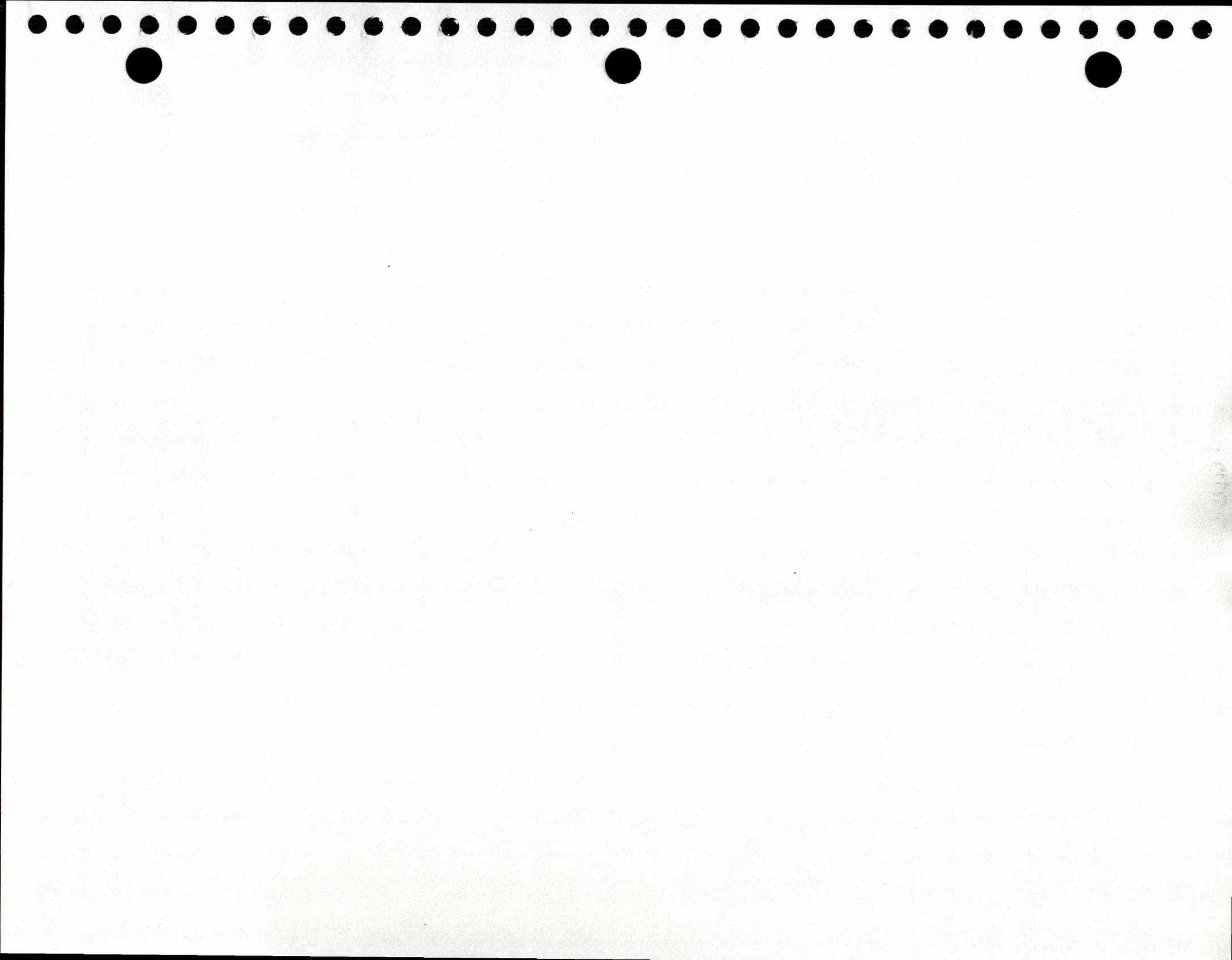
Reverse handpiece direction

Pressing the forward/reverse key will reverse the direction of rotation of the handpiece. Reverse operation mode is signified by a flashing display. Rotation direction cannot be changed while the foot control is depressed.

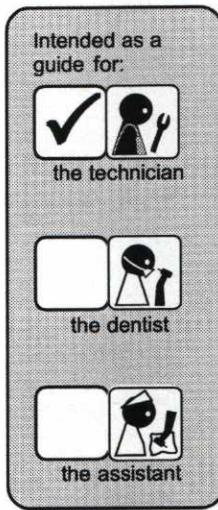
Air pressure display mode

The KL700 / KL701 can be set to display drive air pressure in psi. It is important to note that the handpiece does not operate in pressure display mode. This is strictly a diagnostic mode in which to verify that the pressure transducer on the KL700 / KL701 circuit board is actually reading drive air pressure.

- Press the **forward/reverse** and **plus** keys simultaneously and hold for five seconds.
- The display will show 00 and be set to display drive air pressure.
- Press the **minus** key to return to normal operation.



Installation Procedure



Assistant's Touchpad Grounding Kit Item #1002 5364



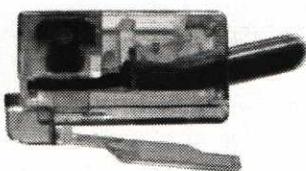
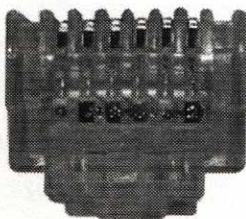
KaVo America Corporation

340 East Main Street, Lake Zurich, IL 60047

1-888-KaVo USA (528-6872) FAX: 1-847-550-6825

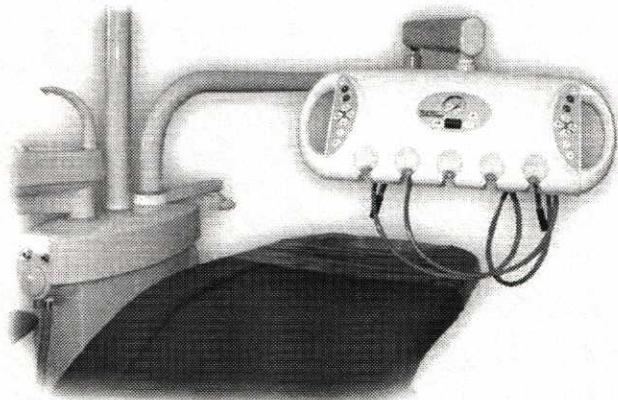
www.kavousa.com

- Carefully inspect the crimped plug to verify that the wires are all separated and fully inserted in the plug. Verify that all six gold blades are equally compressed into the wires and check that the clear cable clamp opposite the locking tab is firmly pinching the cable housing.



Wires separated and fully inserted. Blades evenly compressed and cable clamp latched.

- If the crimped plug fails inspection, simply cut it off and crimp on the spare plug provided.
- Insert the plug into the in-line connector in the cuspidor.
- Plug the unit back in and test the new touchpad.
- Replace the cuspidor bowl and spouts.
- Replace the base cover.



Installation on KOTP style units

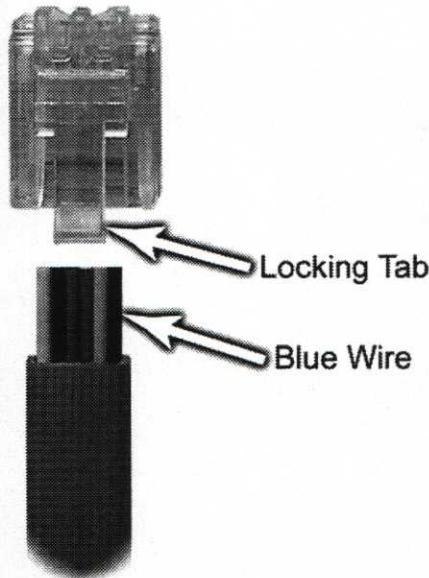
- Unplug the unit.
- Remove the cuspidor bowl by pulling off the two spouts and lifting off the bowl.
- Remove the post box side covers. They are attached from below by two screws.
- In the cuspidor base, disconnect the touchpad data cable from the in-line connector and cut the plug off the end of the cable.



In-line connector in cuspidor base

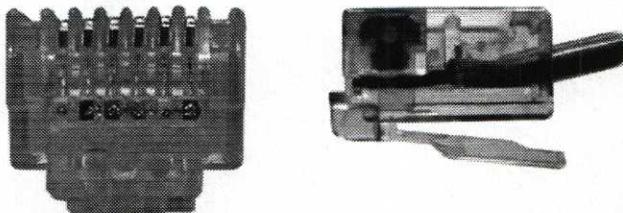
- Unbolt the touchpad from the assistant's arm and remove it along with the data cable.
- Route the cables from the new touchpad through the rear arm to the cuspidor and reattach the new touchpad to the assistant's arm. Use the tube of Loctite 242 provided in the kit.

- Cut the data cable so that it extends 1/2" beyond the centerline of the in-line connector.
- Strip the housing off the data cable and crimp on an RJ11 plug. Hold the plug facing the locking tab with the cable opening pointing down. Insert the data cable into the plug with the **blue** wire on the right. Make sure the wires are all fully inserted into the plug and crimp firmly.



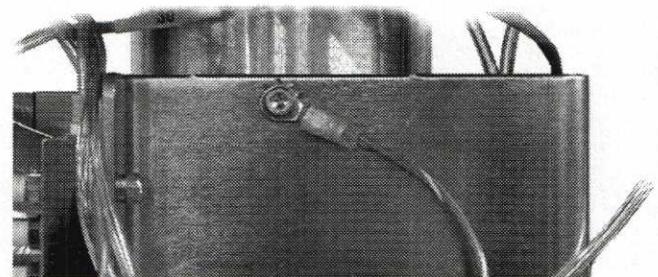
Blue wire on the right hand side

- Carefully inspect the crimped plug to verify that the wires are all separated and fully inserted in the plug. Verify that all six gold blades are equally compressed into the wires and check that the clear cable clamp opposite the locking tab is firmly pinching the cable housing.



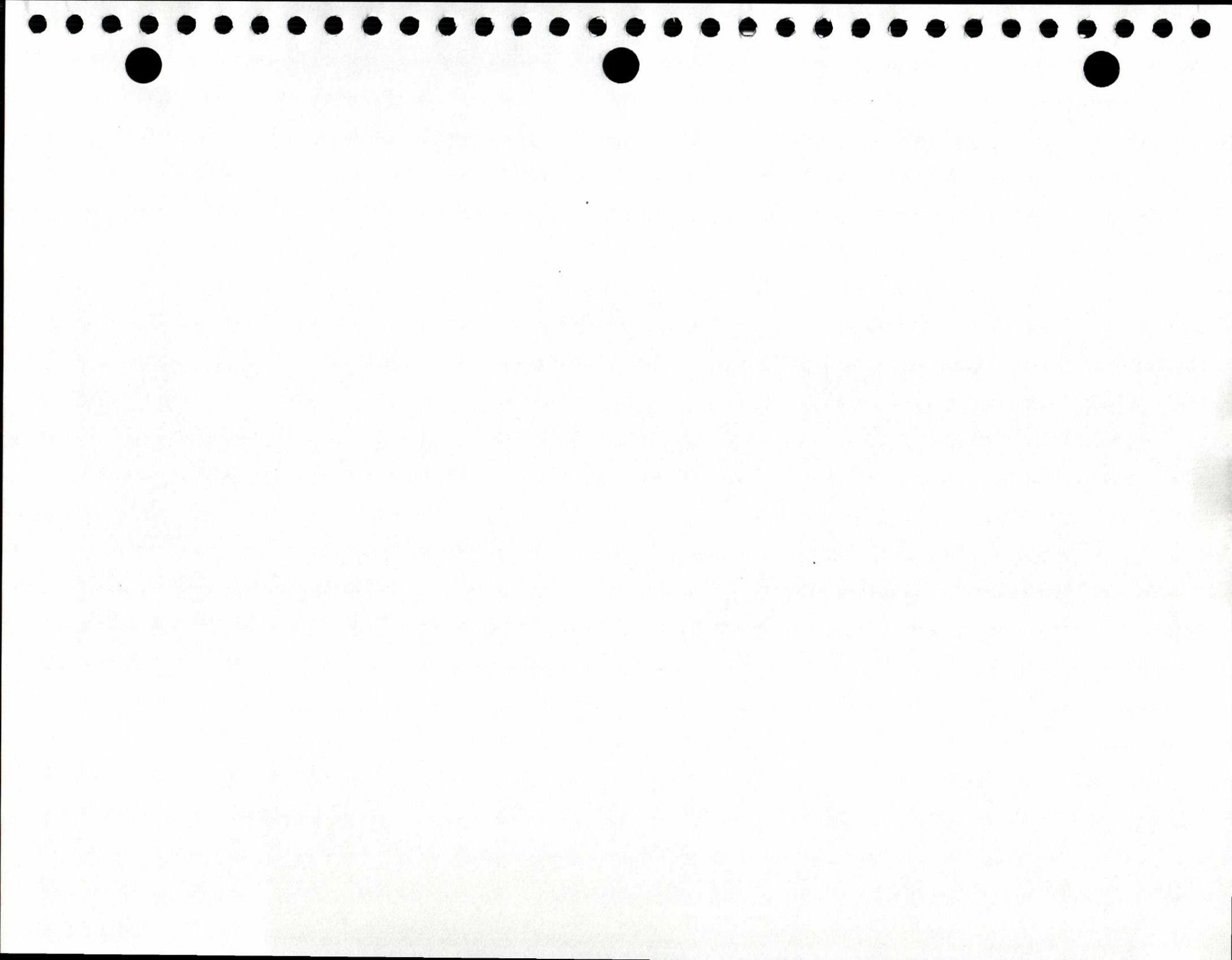
Wires separated and fully inserted. Blades evenly compressed and cable clamp latched.

- If the crimped plug fails inspection, simply cut it off and crimp on the spare plug provided.
- Insert the plug into the in-line connector in the cuspidor.
- Route the ground wire down into the post box and attach it to the same grounding point as the other ground wire.



Ground the touchpad inside the post box

- Replace the side covers on the post box.
- Replace the cuspidor bowl and spouts.
- Plug the unit back in and test the new touchpad.



KaVo

Installation Procedure

5146 rev.-



Intended as a
guide for:



the technician



the dentist



the assistant

Light Choke Kit Item #1002 5146



KaVo America Corporation

340 East Main Street, Lake Zurich, IL 60047

1-888-KaVo USA (528-6872) FAX: 1-847-550-6825

www.kavousa.com

Kit Contents

The light choke kit includes the light choke assembled in-line with a new power cord from the power supply to the light board.

Tools Required

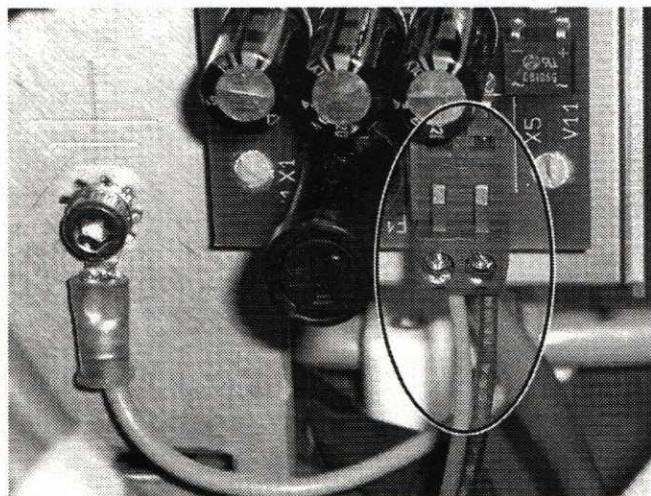
- Set of inch series hex wrenches
- #1 Phillips screwdriver
- Small adjustable open-end wrench

Installation Summary

Installation of the light choke involves mounting the choke to one of the grounding points in the base bracket and routing the new cable from the power supply in the junction box to the bottom of the light board next to the main circuit board.

Installation Procedure

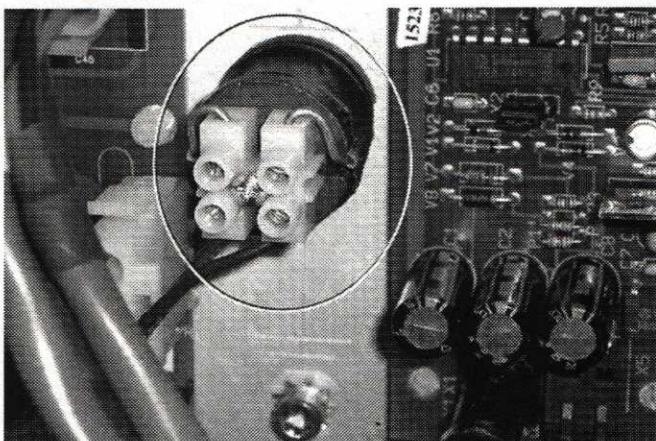
- Remove the junction box cover. It is secured by four screws around its base.
- Remove the base cover. It is secured by four screws around its perimeter.
- Disconnect the silver quick release power plug from the power supply in the junction box
- Disconnect incoming power from the bottom of the light board and remove the power cable.



Power input to the light board

- Connect the plug on the new cable to the incoming power receptacle on the light board.

- Mount the light choke through one of the spare grounding points in the base bracket and secure with the nut provided.



Mount choke between main board and light board

- Route the power cable back to the junction box and plug it into the power supply.
- Test the light.
- Replace the junction box cover.
- Replace the base cover.

KaVo

Installation Procedure

5053 rev.-



Line filter Kit Item #1002 5053



KaVo America Corporation

340 East Main Street, Lake Zurich, IL 60047

1-888-KaVo USA (528-6872) FAX: 1-847-550-6825

www.kavousa.com

Kit Contents

The line filter kit includes the line filter assembly and a small bag with a cap screw, nut and lock washer.

Tools Required

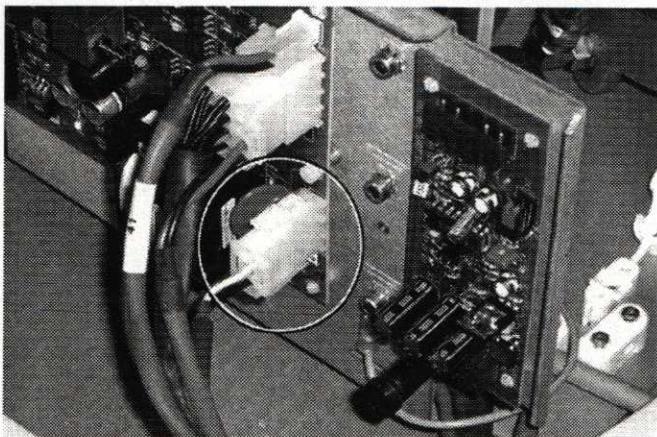
- Set of inch series hex wrenches
- #2 Phillips screwdriver
- 3/8" open-end wrench

Installation Summary

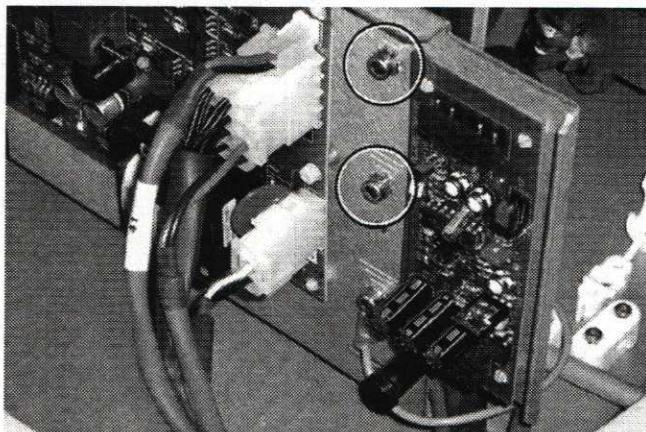
Installation of the line filter involves mounting the unit to the backside of the base bracket and routing incoming power through the filter to the main circuit board. The filter has its own ground wire which must also be attached to the base bracket.

Installation Procedure

- Unplug the unit.
- Remove the base cover. It is secured by four screws around its perimeter.
- Disconnect the power plug from the main circuit board and connect it to the female plug coming off the line filter.

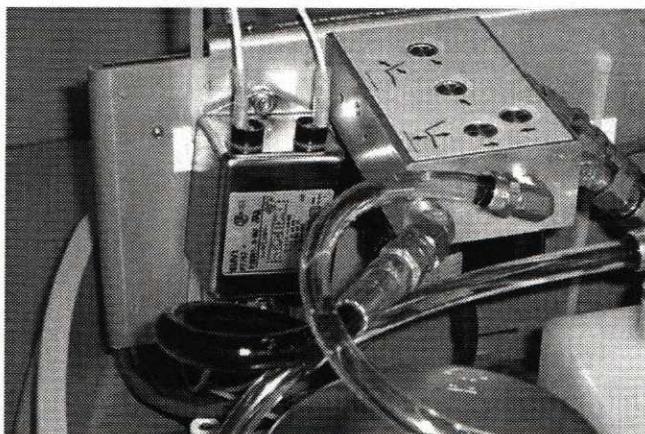


Incoming power to main circuit board



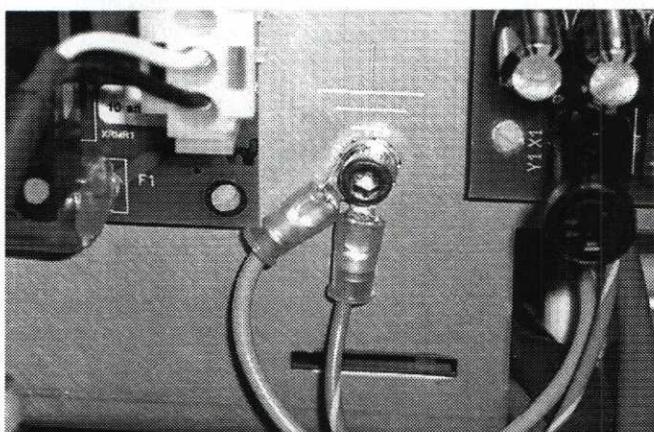
Top two grounding points on base bracket

- Remove all ground wires from the top two grounding points on the base bracket to the right of the main circuit board.
- Install the supplied cap screw in the top grounding point on the base bracket and hang the line filter from this screw on the backside of the bracket so that the ground wire is coming off the bottom of the filter. Secure the line filter with the star washer and nut from the kit.



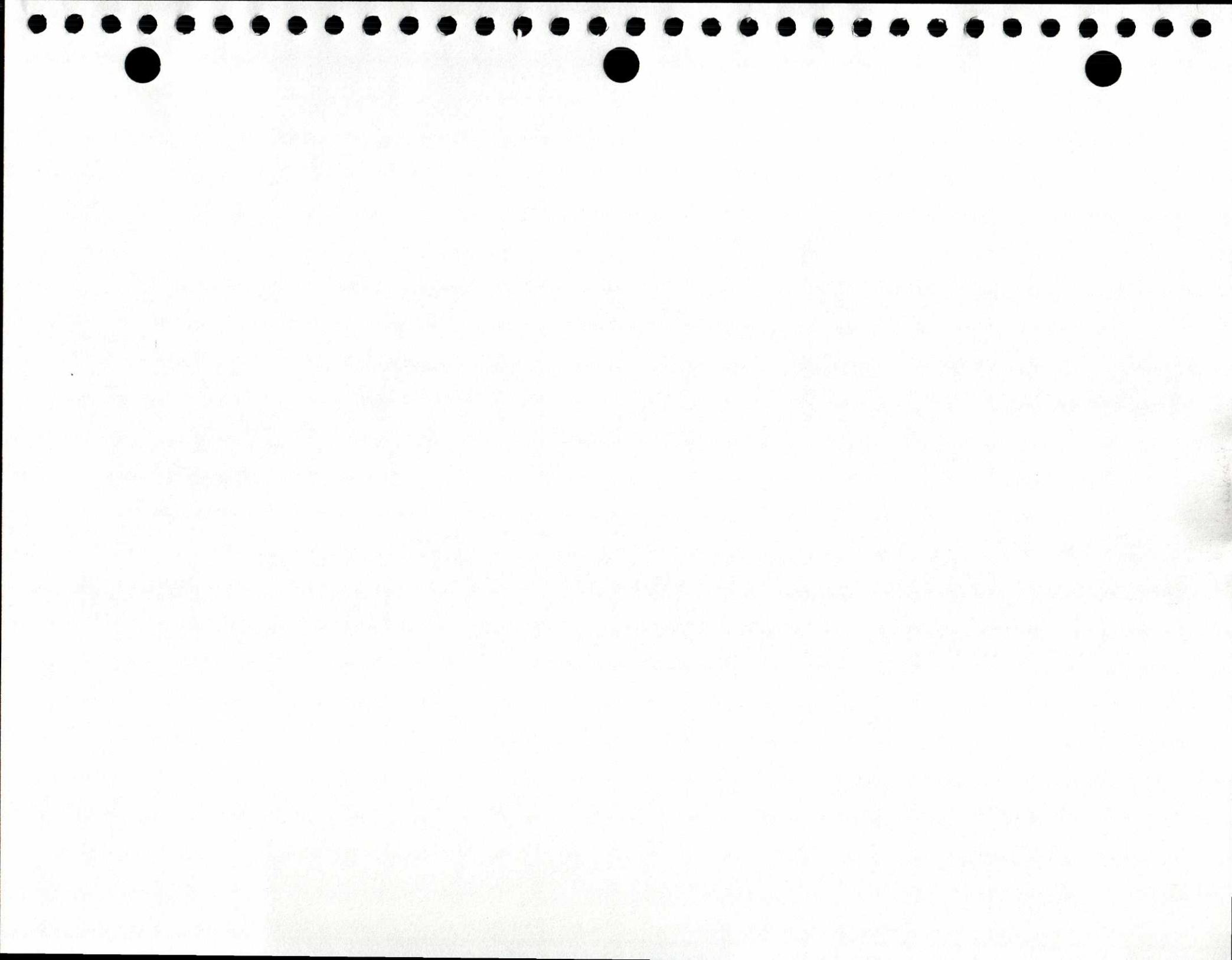
Hang line filter on back side of base bracket

- Route the ground wire from the line filter underneath the base bracket and attach it along with any other removed ground wires to the bottom grounding point on the face of the base bracket.



Relocate all ground wires to lowest point on base bracket

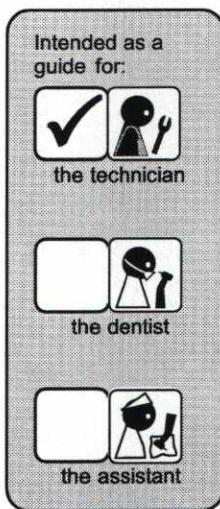
- Route the male plug from the top of the line filter over the top of the base bracket and plug it into the incoming power receptacle on the main circuit board.
- Plug the unit back in.
- Use the foot switch to check that the unit functions.
- Replace the base cover.



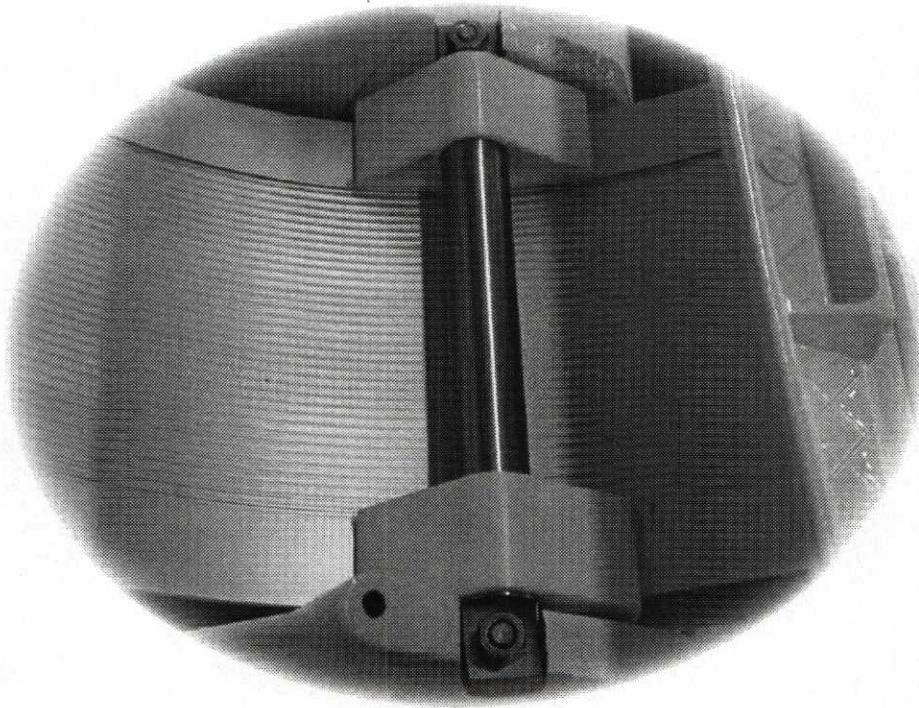
KaVo

1002.9677 Rev. B

Installation Procedure



Backrest Glide Block Kit Item #1002 9676



KaVo America Corporation

340 East Main Street, Lake Zurich, IL 60047

1-888-KaVo USA (528-6872) FAX: 1-847-550-6825

www.kavousa.com

Kit Contents

The replacement glide block kit includes the following parts:

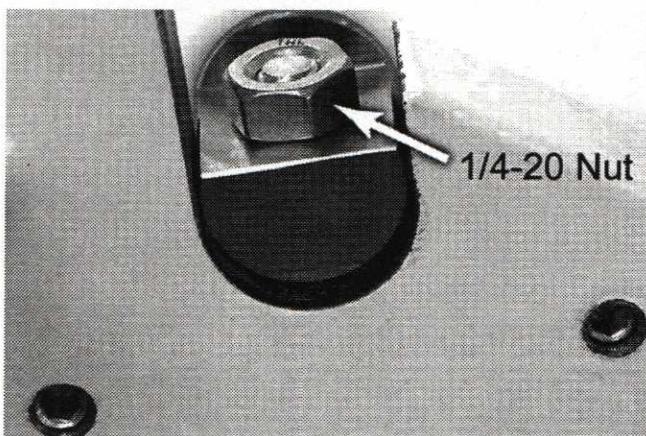
- 2-1002 8134 Lower Glide Blocks
- 2-1002 8135 Upper Glide Blocks
- 1-1002 7700 Glide Block Shaft
- 2-1002 7956 Glide Block Shaft Shims
- 4-1002 8624 Set Screws, 1/4-20 x 3/4"
- 2-1002 7646 Cap Screws, 1/4-20 x 3"
- 2-0800 0136 S.S. Nuts, 1/4-20
- 1-1001 9728 Loctite 242
- 1-1001 9729 Lubriplate Grease

Installation Summary

Glide block installation requires removal of the seat upholstery, armrests and side covers. The upper glide block shaft is removed and discarded. The backrest is tipped forward to remove and replace the lower glide blocks. The new upper glide block shaft is installed with the glide blocks and the glide block shaft shims. The set screws which provide lateral alignment of the upper glide blocks are replaced and adjusted. The upper glide block shaft retaining bolts are torqued properly and locked in place with check nuts from above. Finally, the covers, armrests and upholstery are reinstalled.

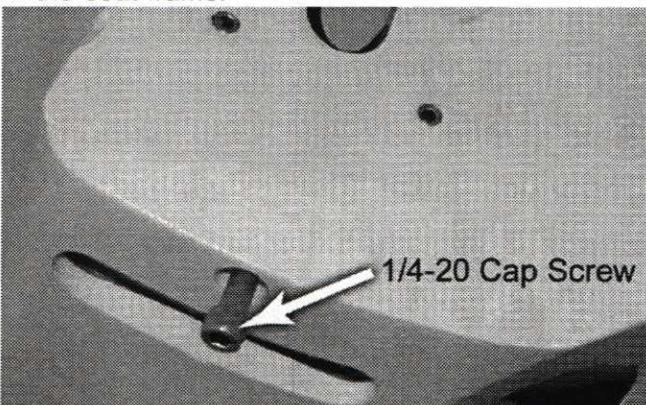
Installation Procedure

- Lift the chair all the way up.
- Tilt the backrest all the way back.
- Unplug the unit.
- Remove the seat upholstery by loosening the seat frame plugs with an Allen wrench.
- Remove the armrests by prying out the retaining rings from inside the seat frame.
- Remove the KaVo nameplates from the side covers. Press on the plastic catches from the inside of the covers.
- Remove the side covers. Each is held in place by four, hex socket screws.



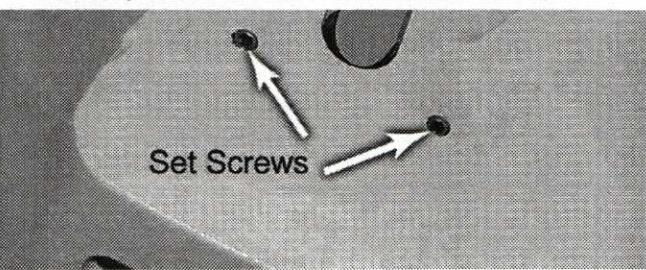
Jam-nut detail on top of upper glide block shaft

- Remove the (2) 1/4-20 nuts from the top of the upper glide block shaft.
- Remove the (2) 1/4-20 cap screws that hold the upper glide block shaft down from underneath the seat frame.



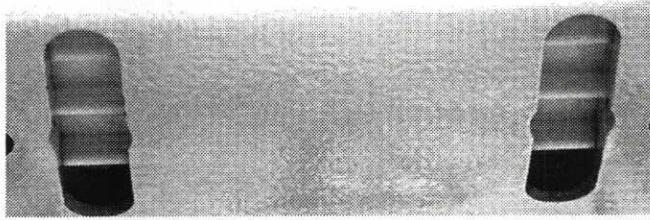
Cap screws underneath seat frame

- Discard the cap screws, upper glide blocks and upper glide block shaft.
- Tip the backrest forward to expose the lower glide blocks and remove them by tapping from below.
- Two set screws on each side of the seat frame hold the upper glide blocks lightly against the curved piece. Remove and discard all four.



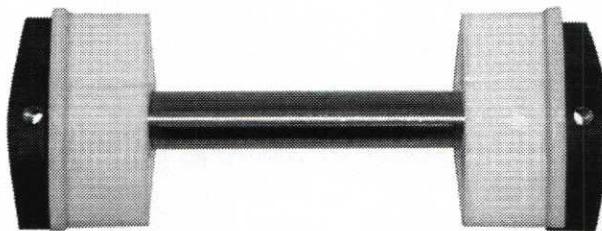
Discard original set screws

- Fit the new lower glide blocks into the recesses in the seat frame and tap them down until they are fully seated. Inspect from below to verify that they are all the way down.



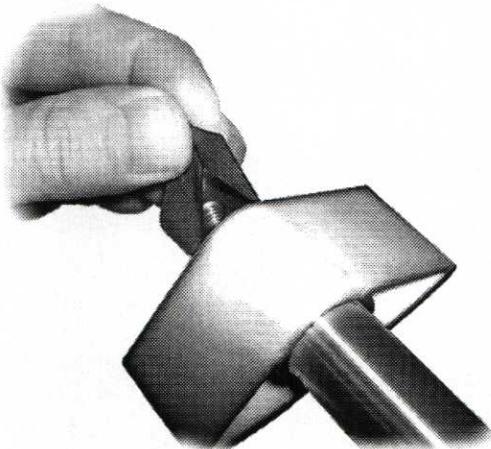
Lower glide blocks fully seated in seat frame

- Wipe down the aluminum curved piece and tip it back down so that it nests in the lower glide blocks.
- Fit the new upper glide blocks onto the new shaft. Place the rubber shims under the ends of the shaft and wipe a thin film of grease on the outside of the shims. The shims are designed to create a nice snug fit between the shaft and the slot in the seat frame.



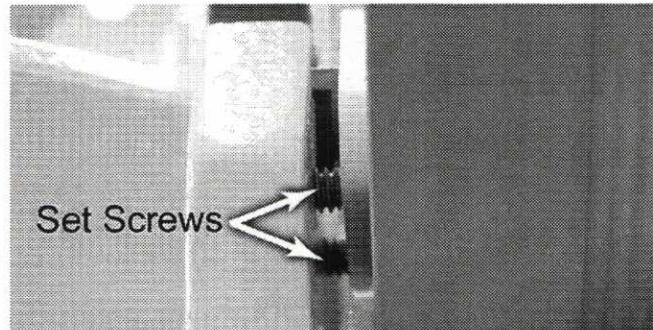
Line up holes in rubber shims with holes in shaft

- Make sure that the punched hole in the shims lines up with the threaded hole in the shaft and lay the shaft into the seat frame slot. The shims are extra long so that they can be held against the shaft during installation by pinching from above.



Hold shims from above while installing in frame

- Lightly grease the threads on the two 1/4-20 cap screws and insert them into the seat frame from below into the shaft and tighten them slowly, working back and fourth between the two so that the shaft is drawn slowly and evenly down into the slot. Stop just before the glide blocks tighten against the curved piece.



Set screws position the upper glide blocks against the curved piece without pinching.

- Install the four new set screws into the seat frame using the loctite provided and carefully adjust them so that they slide the upper glide blocks gently up against the sides of the curved piece.



Gently torque the cap screws to 30 in-lbs

- Tighten the two 1/4-20 cap screws holding the upper glide block shaft down. Back the screws off half a turn then gently torque them to 30 in-lbs. Note that this torque value is in inch-pounds, not foot-pounds. Make sure that the wrench being used is capable of setting torque in this range.
- Install the two 1/4-20 nuts on the ends of the protruding cap screws and tighten against the flats on the glide block shaft. Hold the head of the cap screw with an Allen wrench while tightening the nut. This will preserve the torque setting on the screws while the nuts are

- Recheck the four set screws bearing on the upper glide blocks from the sides. They should be snug against the blocks.
- Reinstall the side covers, nameplates and seat upholstery.
- Plug the unit back in and cycle the backrest 2-3 times while sitting in the chair.

Maintenance

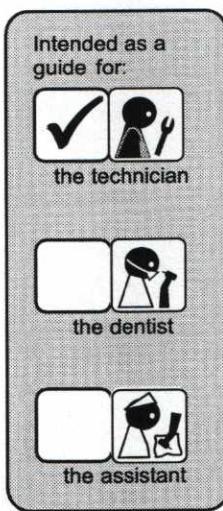
The new glide blocks will wear in over the first month of use. During this time, a white dust may appear on the curved piece. Simply wipe this dust away as a part of normal cleaning.

The curved piece should be wiped down weekly to prevent debris from accumulating and degrading performance. Avoid the use of external lubricants as they can cause foreign material to adhere to the curved piece and contaminate the glide blocks.

KaVo

3679 rev.-

Installation Procedure



Replacement Spring Kit Item #1002 3679

KaVo America Corporation
340 East Main Street, Lake Zurich, IL 60047
1-888-KaVo USA (528-6872) FAX: 1-847-550-6825
www.kavousa.com

Kit Contents

The replacement spring kit includes two extension springs assemblies and a replacement tilt cylinder shaft.

Tools Required

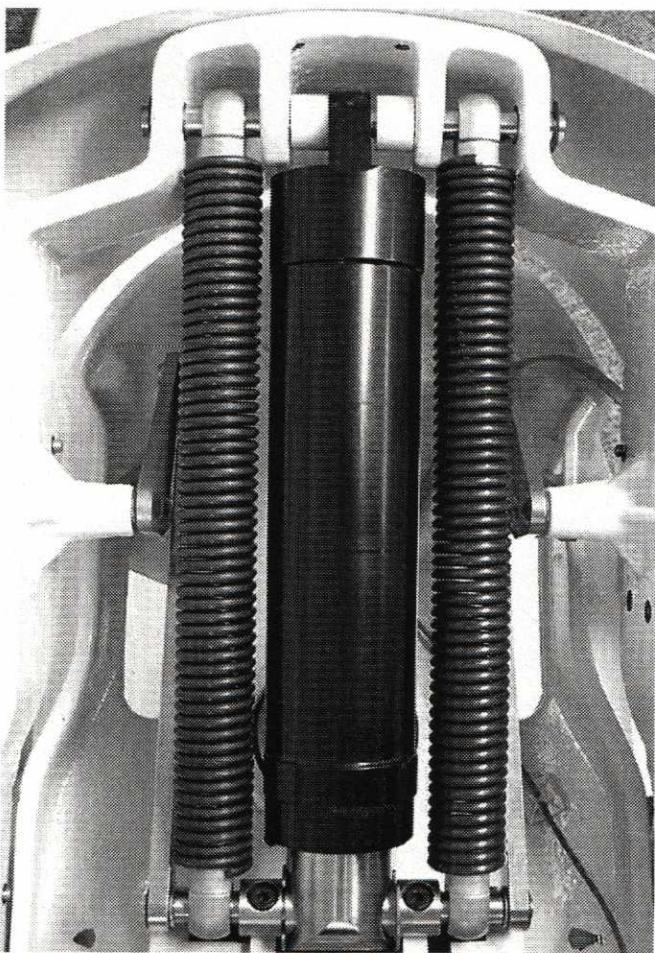
- Set of inch series hex wrenches
- Punch and mallet
- Small and large flat blade screwdrivers
- Work gloves

Installation Summary

Replacement of the backrest return springs in the chair requires removal of the seat upholstery, armrests and side covers. The front of the springs are released by pounding out the front tilt cylinder shaft with a punch and mallet. The link arms are removed from the rear tilt cylinder shaft to finish removing the springs. The new springs are installed at the front along with the replacement shaft. The springs are stretched to fit onto the rear shaft and the link arms reconnected to the shaft as well. The backrest is cycled to settle the springs into position and the covers and upholstery are reinstalled.

Installation Procedure

- Raise the chair all the way up.
- Tilt the backrest all the way back.
- Remove the seat upholstery by loosening the seat frame plugs with an Allen wrench.
- Remove the armrests by prying out the retaining rings from inside the Seat Frame.
- Remove the KaVo nameplates from the inside of the seat frame side covers.
- Remove the side covers. Each is held in place by four, hex socket screws.
- Remove the retaining rings from the **front** tilt cylinder shaft.
- Drive out the front cylinder shaft with a punch



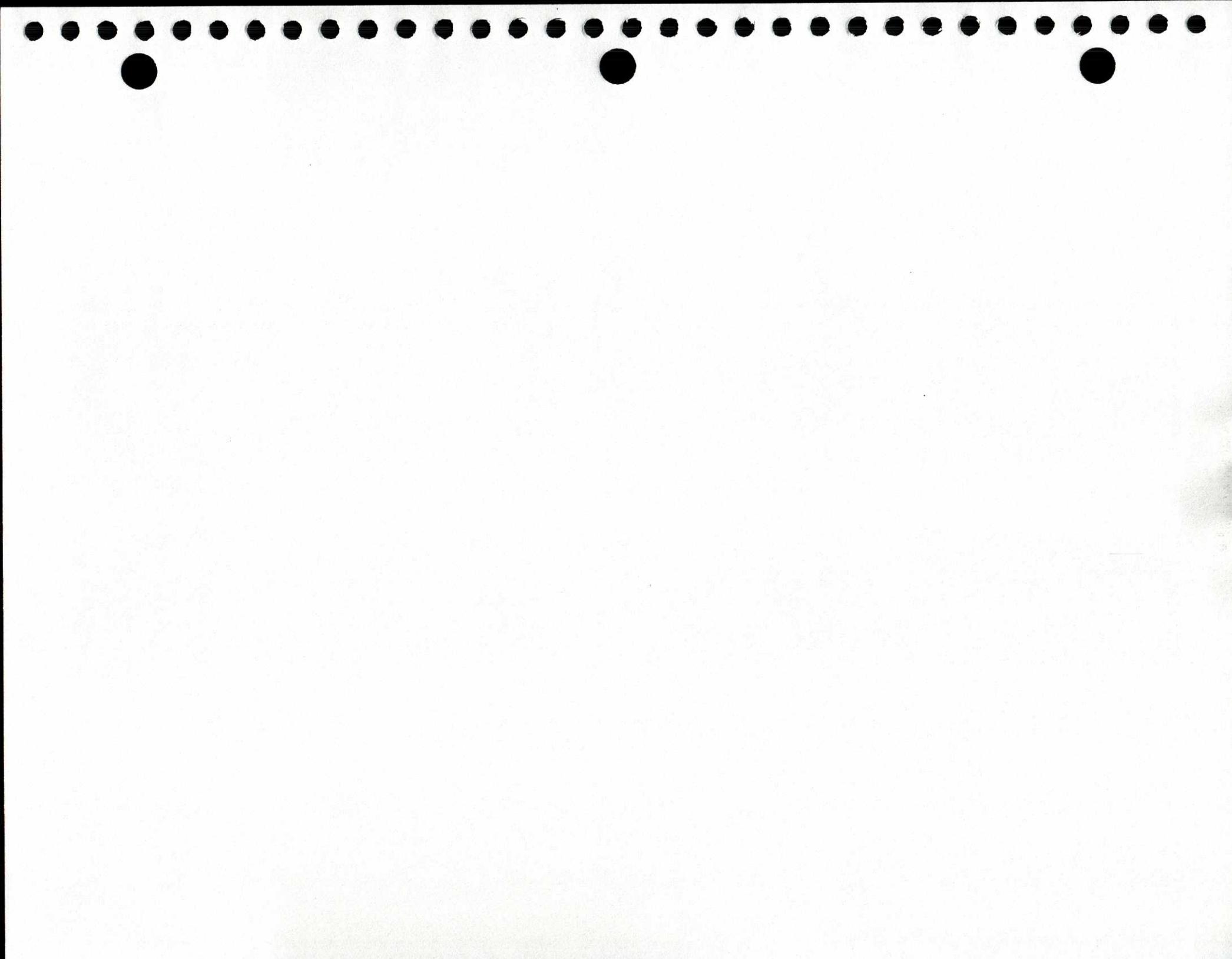
The new springs are allowed to self-center without the aid of shaft spacers.

- and mallet. Pull the punch out to release the springs. ***Do not attempt to hold onto the springs as they are released or injury may occur.*** Catch the front end of the cylinder as it is dropped by the retracting punch. Save the two Nylon spacers on each side of the cylinder for reuse. The other spacers around the old springs may be discarded.
- Drive in the new shaft, installing the first end of the springs and the original two spacers on each side of the tilt cylinder.
 - Install the old retaining rings on each end of the new shaft.
 - Hold up the loose ends of the new springs while tilting the backrest up 20-30 degrees.

- Remove the retaining rings from each end of the rear shaft. Slide the link arms off both ends of the shaft. A screwdriver may be used to pry off the link arms if they are tight. Remove the old springs and Nylon spacers.
- Tilt the backrest all the way back down. Since the springs are disconnected, push down on the backrest with firm steady pressure while retracting the tilt cylinder with the foot switch.
- Sit behind the chair and brace your abdomen against the headrest while stretching the new springs onto the rear shaft, one at a time. Gloves are recommended for improved grip on the springs as well as protection against injury if a spring should slip loose.
- Tilt the backrest back up 20-30 degrees and reconnect both link arms to the rear tilt cylinder shaft and secure with the retaining rings.
- Cycle the backrest up and down once to settle the springs into proper alignment.
- Replace the side covers, KaVo nameplates, armrests and seat upholstery.

Maintenance

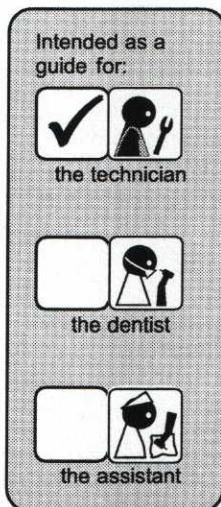
The replacement spring kit requires no maintenance, however, during the first several weeks of use the springs may release a small quantity of black dust which should be wiped up as part of normal cleaning.



KaVo

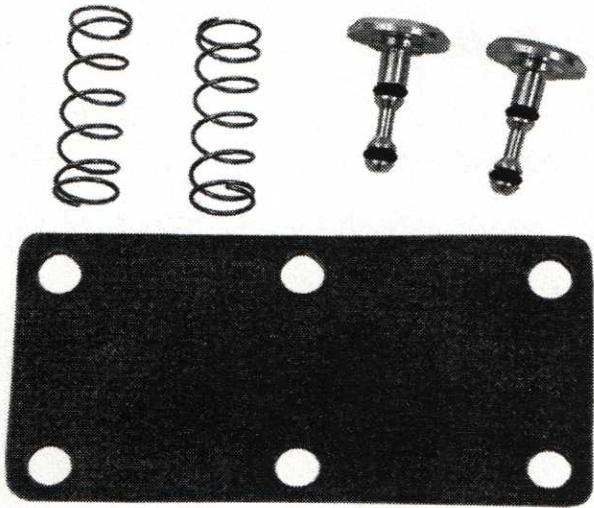
Installation Procedure

6343 rev.-



Coolant Block Repair Kit Item #1001 6343

KaVo America Corporation
340 East Main Street, Lake Zurich, IL 60047
1-888-KaVo USA (528-6872) FAX: 1-847-550-6825
www.kavousa.com



Kit Contents

The coolant block repair kit includes two new pistons and springs along with a new diaphragm.

Tools Required

- Set of inch series hex wrenches
- Nontoxic silicon based O-ring lubricant

Installation Summary

Installation of the coolant block repair kit involves unbolting the block from the control head, removing the cap from the block and replacing the diaphragm, the two pistons and two springs.

Installation Procedure

- Remove the cover from the control head. It is held on by four screws from below. As the cover comes off the control head, the two ribbon cables from the touchpads must be unplugged from the fiber-optic light board before the cover can be completely removed.
- Unbolt the coolant block from underneath the control head. It is held in by two hex socket screws.
- Rotate the block so that the cap is face up and remove the six screws holding it on.
- Remove the cap and discard the rubber diaphragm directly below it.
- Remove and discard the two pistons and springs from the block.
- Wipe the O-rings on the pistons sparingly with a non toxic silicon based O-ring lubricant.
- Place the springs over the pistons and gently insert them into the block.
- Inspect the diaphragm in the kit. Wash or wipe off any residual talcum powder that may be on the diaphragm.
- Place the diaphragm on the face of the cap with the six screws extending through the diaphragm. The diaphragm is symmetrical so it doesn't matter which side is up.
- Carefully lay the cap and diaphragm assembly onto the heads of the two pistons and gently press them down into their bores until the cap is contacting the block. Hold the cap in this position while snugging down all six screws.
- Finish tightening all six screws evenly to approximately 30 inch-pounds which is about the same torque as can be achieved while holding onto the *short arm* of an Allen wrench.
- Reposition the block so that the mounting holes are face down and in alignment with the holes in the bottom of the control head. Reinstall the two mounting screws from below.
- Activate one of the handpieces to confirm proper function and inspect the block for any signs of leakage around the diaphragm.
- Plug the two ribbon cables from the doctor's control touchpads back into the fiber-optic light board and carefully place the cover back onto the control head. Before reinstalling the four screws in the cover, test the two touchpads to make sure the ribbon cables have been reconnected properly.

KaVo

4411 rev.-

Installation Procedure



KaVo. Dental Excellence.

Intended as a
guide for:



the technician

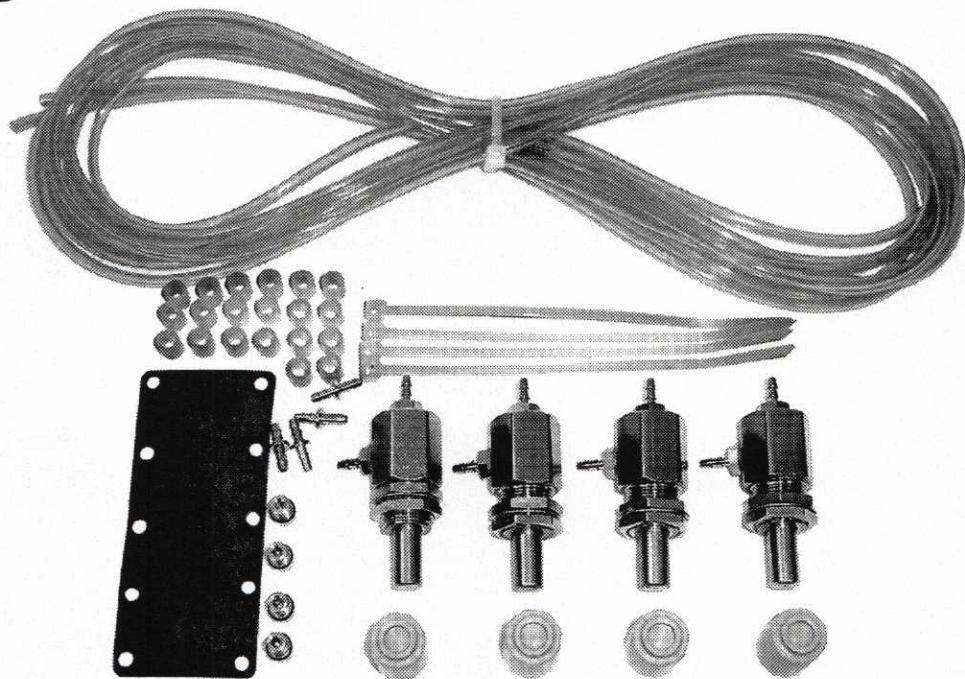


the dentist



the assistant

Needle Valve Retrofit Kit Item #1002 4411



KaVo America Corporation

340 East Main Street, Lake Zurich, IL 60047

1-888-KaVo USA (528-6872) FAX: 1-847-550-6825

www.kavousa.com

Kit Contents

The replacement glide block kit includes the following parts:

- 160" 1/8" Blue Tubing
- 4 Zip Ties
- 20 1/8" Tubing Sleeves
- 4 1/8" In-line Barbed Connectors
- 4 Needle Valves with Barbed Fittings & Knobs
- 4 Threaded Plugs with O-rings
- 1 Handpiece Block Diaphragm

Tools Required

- Set of inch series Allen Wrenches
- 9/16" Open end wrench
- Center Punch
- 1/8" Drill Bit
- 1/2" Drill Bit or Stepped Unibit
- Electric Drill

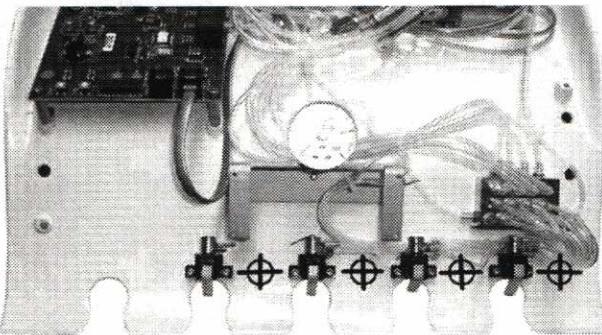
Installation Summary

In order to retrofit the coolant water needle valve kit, four 1/2" holes must be drilled in the lower front portion of the control head to mount the valves. Coolant water is disconnected from the handpiece tubings and redirected to the new needle valves. Additional tubings route coolant water from the needle valves back to the handpiece tubings, which connect via in-line barbed fittings.

Additionally, the handpiece block is separated into two halves so that the original coolant water valves can be removed and replaced with plugs. A new handpiece block diaphragm is included to refresh the service life of the block.

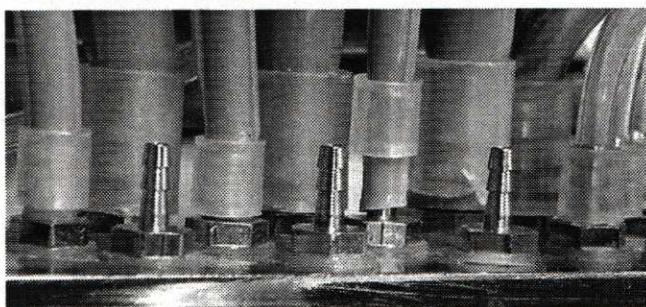
Installation Procedure

- Remove the cover from the control head. It is held on by four screws from below. **CAUTION:** *The two ribbon cables from the touchpads in the cover must be unplugged from the fiber optic circuit board before the cover can come all the way off.*



Mark holes in line with hanger valves

- Mark and center punch the control head for four 1/2" holes to mount the needle valves. Center the marks between handpieces and in-line with the hanger valve mounting hardware.
- Before drilling, swing the control head out, away from the dental unit and rest the control head on a garbage can to act both as a support and to collect aluminum shavings from the drilling operation. If a tall enough garbage can cannot be located, turn on the control head to activate the arm brake and stabilize the head while drilling.
- Drill a small pilot hole to begin with at each marked location. For best results, step the hole size up in 1/8" increments until they reach 1/2". Regular twist drills will work fine, however a stepped "Unibit" will cut easier, faster and leave cleaner rounder holes. Sweep or vacuum up all the shavings before continuing.
- Mount the needle valves in the holes and secure them with a 9/16" wrench. Push the knobs on from below and tighten them to the shafts with 1/16" Allen wrench.
- Cut the blue tubing into 8 sections, 18" long.
- Disconnect the coolant water portion of the handpiece tubing from the handpiece block.



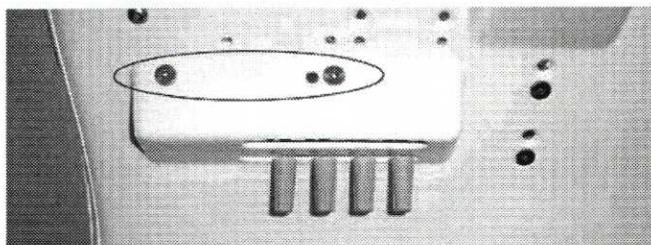
Disconnect handpiece tubing from coolant water

- On each of these empty barbed fittings, connect an 18" length of blue tubing, secured with a plastic sleeve.
- Connect each of these tubings to the corresponding needle valve and secure with a plastic sleeve. Note that flow can be in either direction through the needle valves, however, KaVo typically uses the barb that is in line with the control knob for the sake of consistency.
- Connect each of the four remaining sections of blue tubing to the open barb on each needle valve. Secure them with the plastic sleeves provided.
- Route these final four sections of blue tubing back up toward the handpiece block and connect each one back up to the corresponding section of handpiece tubing. Use the barbed in-line connectors from the kit along with a plastic sleeve over each connection point.



Use in-line connectors to attach to handpiece tubing

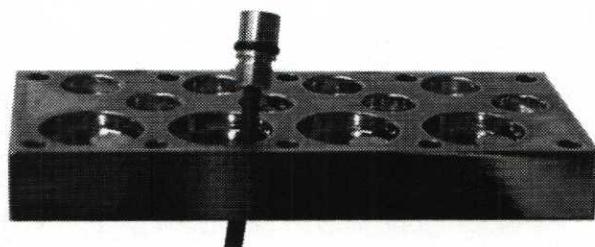
- From below, pry the knobs off the old coolant water valves. They should pull straight off the control shafts.
- Unbolt the handpiece block from the control head. Two screws hold it in place from below.



Pry off old knobs and unbolt handpiece block from below

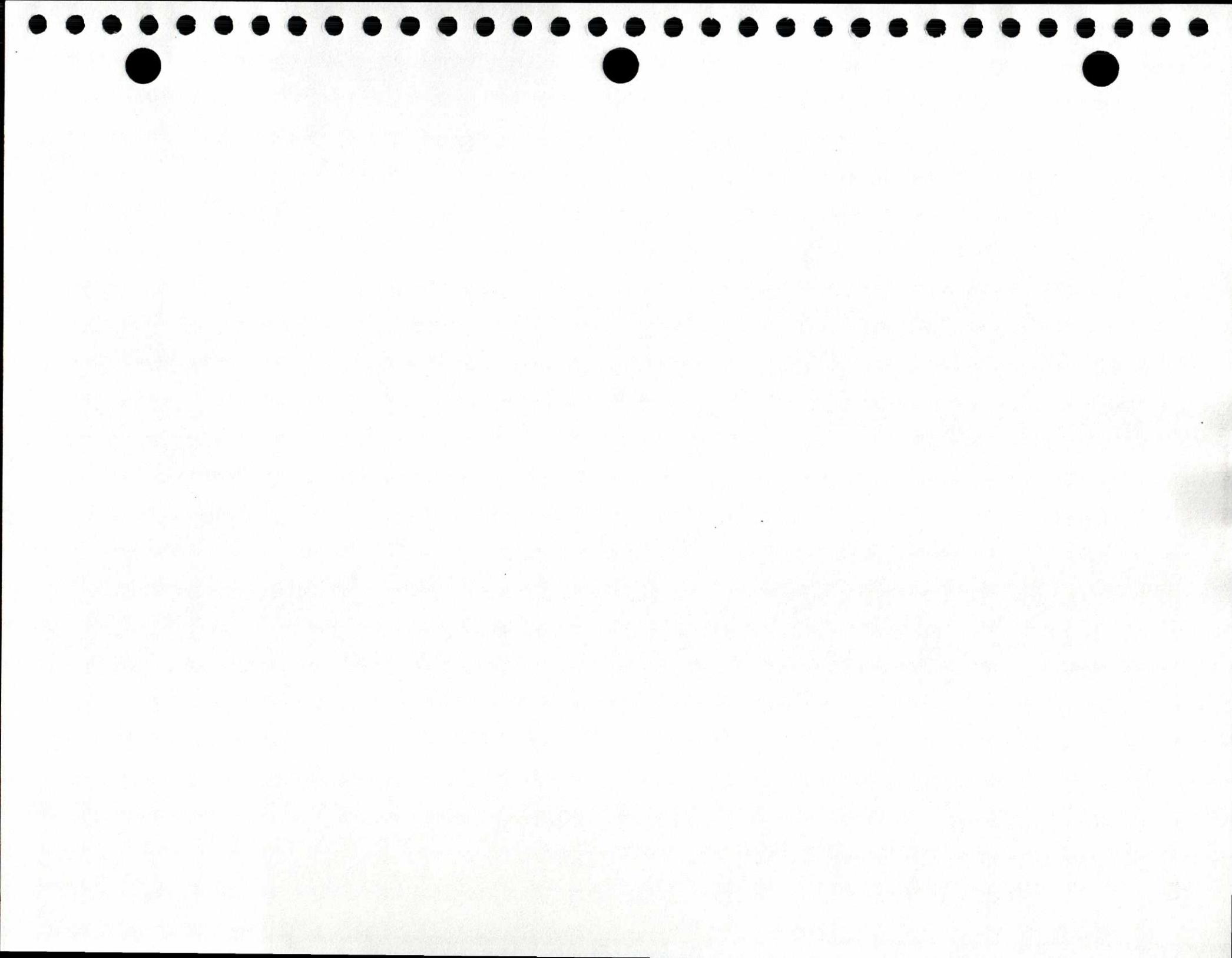
- Rotate the block and remove the ten screws that hold the two halves together. Remove the smaller portion of the block with the old flow valves installed.
- Remove the old valves by screwing them in all the way.

- Prep the threaded plugs by wiping a small dab of nontoxic silicon based O-ring lubricant onto the O-ring at the base of each plug.
- Insert a 1/16" Allen wrench from the outside through one of the empty threaded holes and install a plug by backing it into the hole until tight. Repeat for the other three plugs.



The plugs must be backed in from inside the block

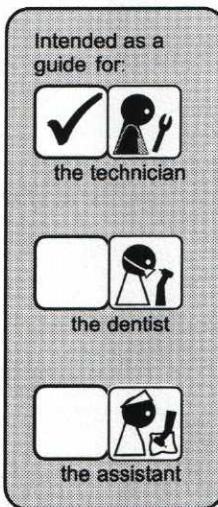
- Prep the new diaphragm by cleaning it thoroughly to remove all traces of talcum powder.
- Install the new diaphragm and screw the two halves of the handpiece block back together. Torque each of the ten screws to 6-10 inch-pounds. This torque can be approximated by firmly tightening the screws while holding onto the short arm of a standard Allen wrench.
- Remount the handpiece block back in the control head.
- Use the four zip ties provided to bundle the new tubing neatly within the control head. Do not over tighten the zip ties or the tubing may become pinched or kinked.
- Turn off the coolant air and activate each handpiece one at a time to adjust coolant water. Turn coolant air back up and briefly recheck the flow of mist from each handpiece. Fine tune water flow if desired.
- Carefully inspect the outside of the handpiece block for any signs of leakage.
- Plug the ribbon cables from the control head touch pads back into the fiber optic circuit board and test to verify proper connection.
- Replace the four screws that secure the cover to the control head.



KaVo

1002 9043

Installation Procedure



City Water Selector Switch for Dental Units *with Cuspidors*



KaVo America Corporation

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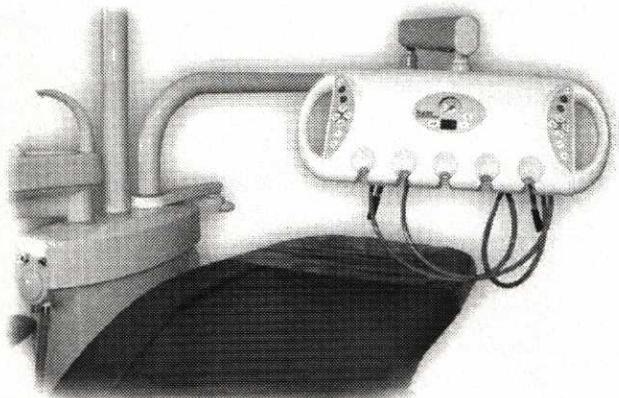
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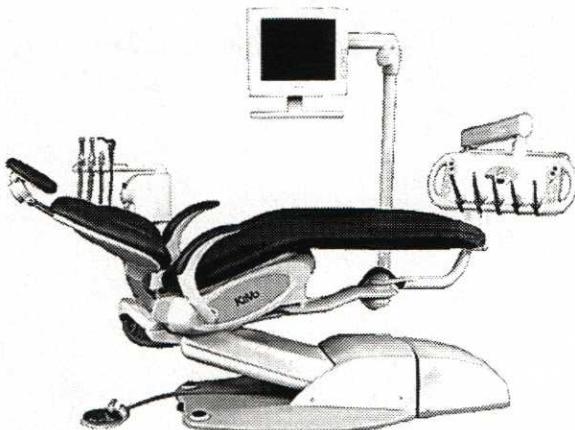
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**(KOTP) KaVo over-the-patient style support arm
for the control head**



**(KLR) KaVo left or right handed unit. Control head
support arm pivots from underneath seat.**

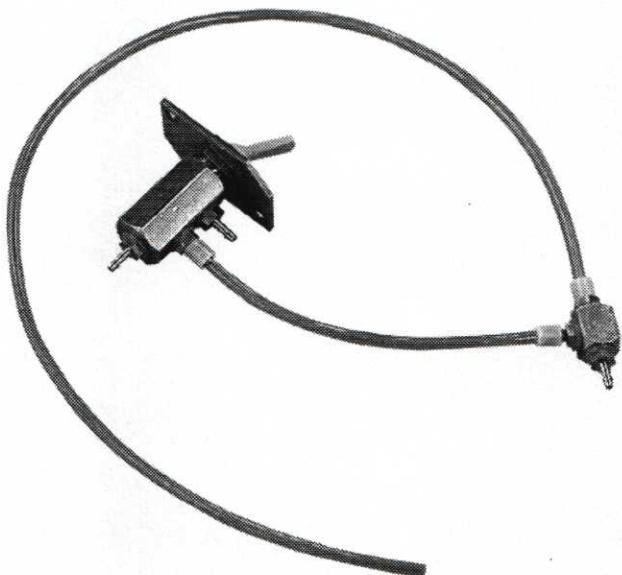
Section 1: Introduction

Kit contents

The city water selector kit for units with cuspidors consists of one small subassembly and a small bag of loose parts.

The subassembly consists of the selector switch connected to a tee fitting by a short length of blue tubing and an additional length of blue tubing extending from the tee fitting.

The small bag of loose parts may be more than actually needed but includes all the necessary parts to cover a variety of installations.



Selector switch and tubing



Small parts included in kit

Tools required

The following tools and supplies will be required for installation of the city water conversion kit:

- Assorted standard open-ended wrenches
- Small wire cutters
- 5/64 Allen wrench
- 5/32 Allen wrench
- 3/32 Allen wrench
- Masking tape (for identifying tubing)
- 1/8" & 1/4" Sleeve installation tools
- 1/4" nut driver
- #2 Phillips screwdriver

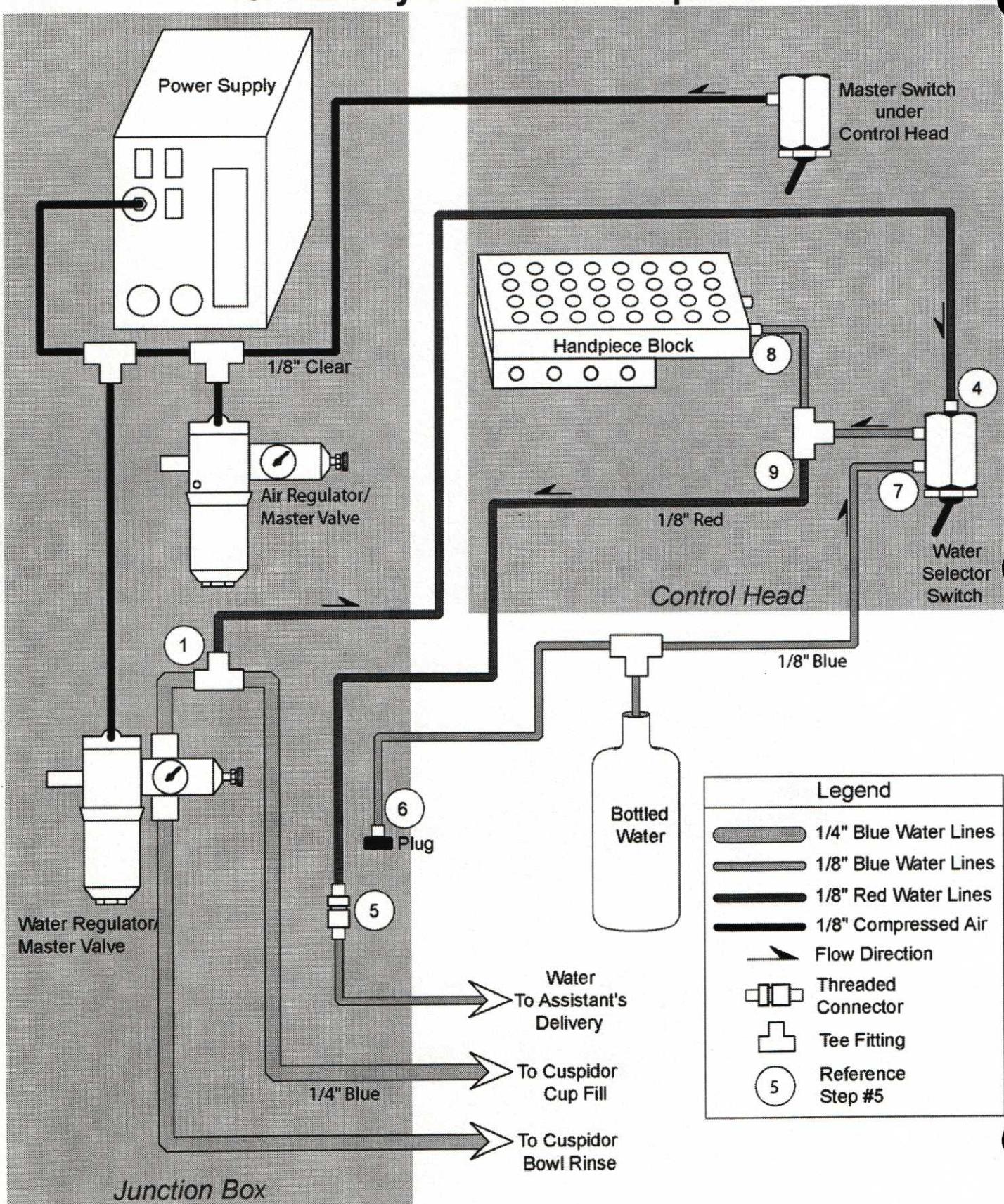


Sleeve Installation Tools

Installation Summary

Installation involves splicing into the existing city water supply line. Running city water up to the selector switch in the control head. Diverting bottled water from the handpiece block to the selector switch and routing switched water back to the handpiece block and out to the assistant's delivery.

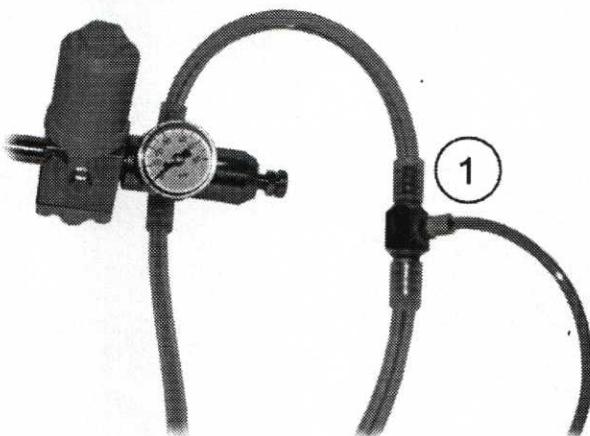
Plumbing Schematic for KLR style units with cuspidors



Section 2: Installation on KLR style units

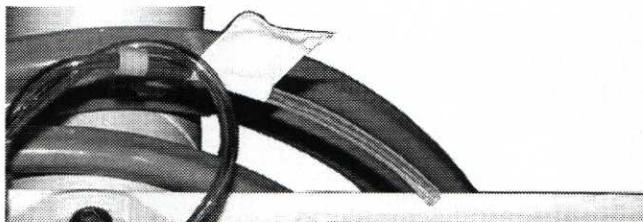
1) Begin by removing the cover on the junction box. The water regulator has two 1/4" blue tubes which supply water to the cuspidor cup fill and bowl rinse. The first step is to cut the cup fill tube and splice in the included tee fitting. To determine which tubing carries water to the cup fill simply kink one tube at a time while the cup fill is running and mark the cup fill tubing with a piece of tape. Once the cup fill tubing has been identified, turn off the city water supply and relieve line pressure in the unit by pressing the cup fill spout.

Cut the cup fill tubing approximately 6-8 inches from the regulator and install the tee fitting along with the plastic sleeves provided. Locate the two unused 1/8" red tubes in the junction box coming from the umbilical. Connect one of them to the remaining barb on the tee fitting and secure with a plastic sleeve.



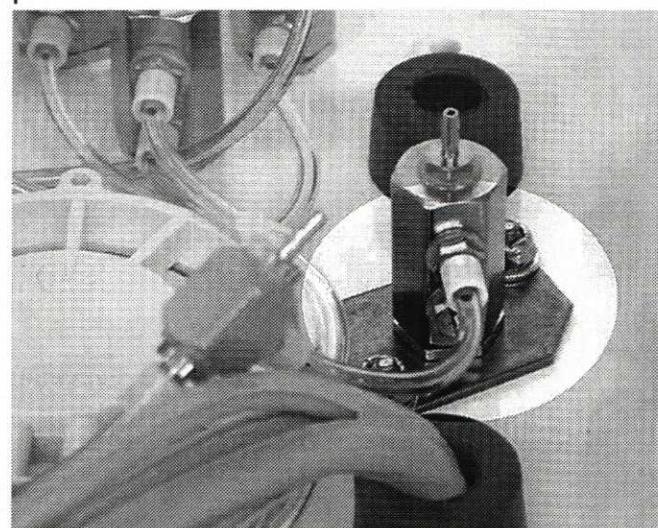
Tee a spare red tube into the blue cup fill tube

2) The spare red tubes lead up to the control head. Remove the control head cover and locate the two red tubes bundled together. Use a syringe to draw air through the tubes to identify the one connected to the regulator and mark it with a piece of tape.



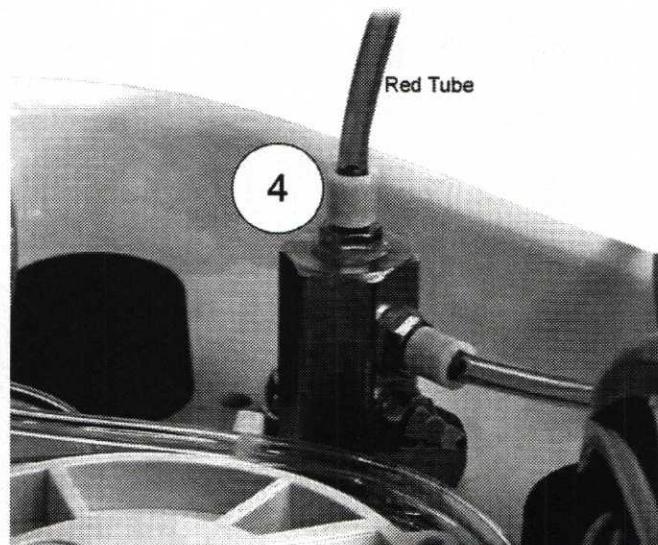
Trace red tube up to control head

3) Mount the selector valve in the control head. The valve can be mounted in any unused handpiece tubing hole at the rear of the control head. Use the two bolts, washers and Nyloc nuts provided.

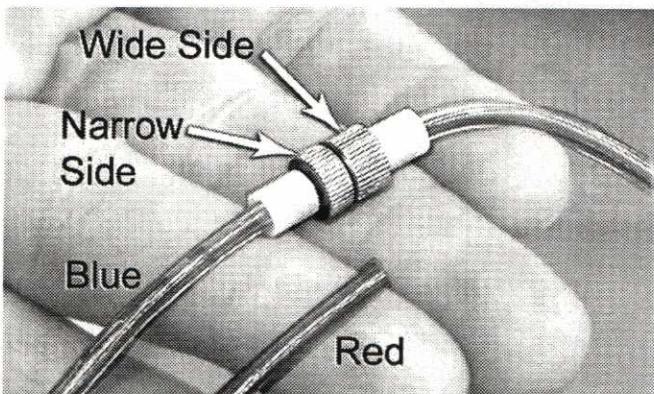


Mount switch in control head

4) Connect the marked spare red tube to the top barb on the selector switch. Secure with a plastic sleeve.



Connect city water to selector switch



Disconnect blue tube from narrow side of coupler

5) *Skip this step if there is no assistant's delivery.*

In the junction box locate the threaded connector with 1/8" blue tubes on each end. Note that the threaded coupler has a narrow end and a wide end. Disconnect the tube from the barbs on the narrow end of the connector and connect the other spare red tube in its place. Secure the tube with a plastic sleeve.



Reconnect the red tube in its place

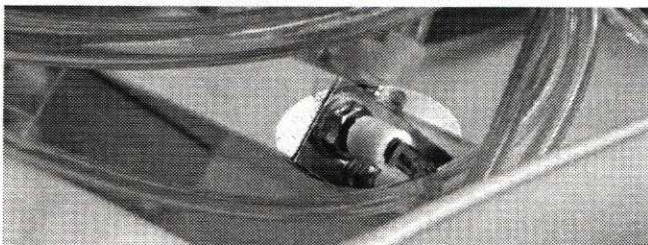
6) *Skip this step if there is no assistant's delivery.*

Trim 1/2" off the blue tube just disconnected from the coupler and plug it with the barbed plug provided. Secure the plug with a plastic sleeve.

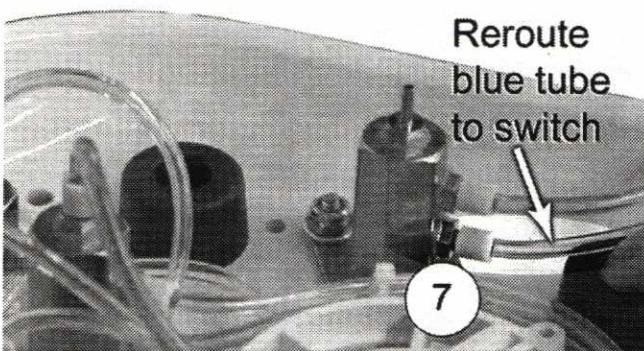


Install plug in disconnected blue tube from water bottle

7) In the control head, disconnect the 1/8" blue tube from the end of the handpiece block and reroute it to the bottom barb on the selector valve, securing it with a plastic sleeve. It may be necessary to back the tube through several zip ties in order to reroute it without kinking. Trim 1/2" off the end of the tube where it was flared by the previous fitting in order to insure a leakproof



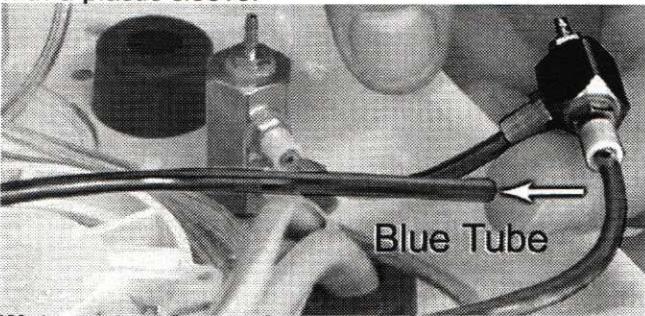
Disconnect blue tube from end of handpiece block



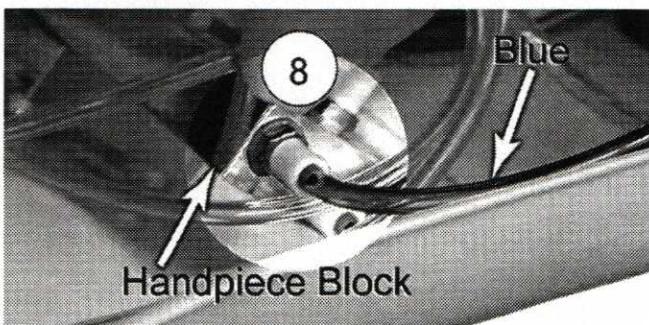
Reroute blue tube to switch

connection.

8) The selector valve comes pre-assembled with a tee fitting and two pieces of blue tubing. Connect the open end of the blue tubing back to the open barb on the end of the handpiece block and secure with a plastic sleeve.



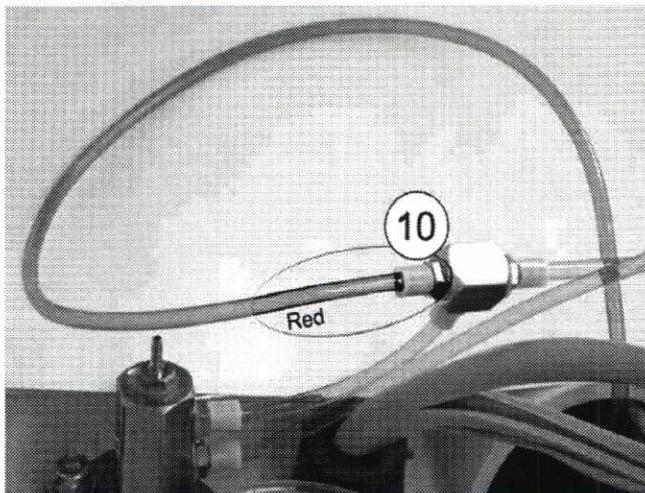
Water output from selector switch



Switched water routed to handpiece block

9) Skip this step if there is no assistant's delivery.

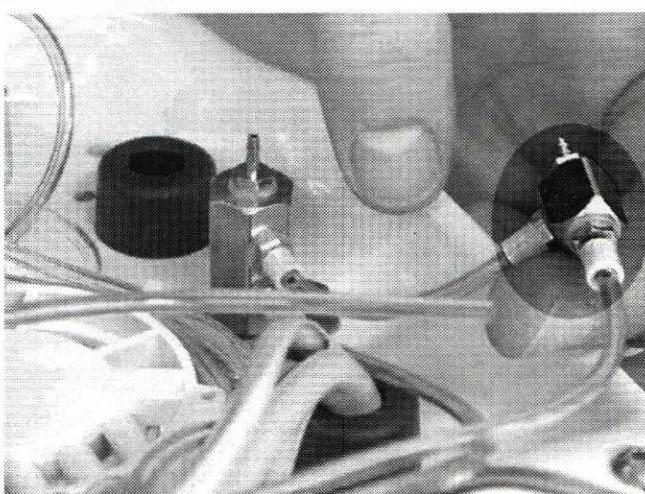
Connect the remaining unused red tube in the control head to the open barb on the tee fitting next to the selector switch.



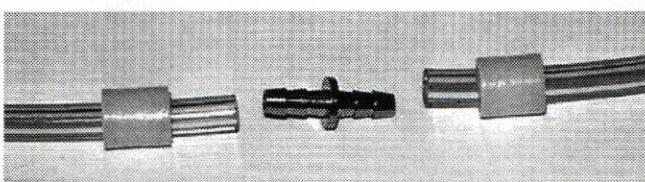
Switched water routed to assistant's delivery

10) Skip this step if the unit has an assistant's delivery.

If there is no assistants delivery, the tee fitting pre-installed next to the selector switch is not needed. Remove the blue tubes from the tee fitting, trim them back 1/2" and reconnect them to each other using the barbed coupler provided. Secure with plastic sleeves.

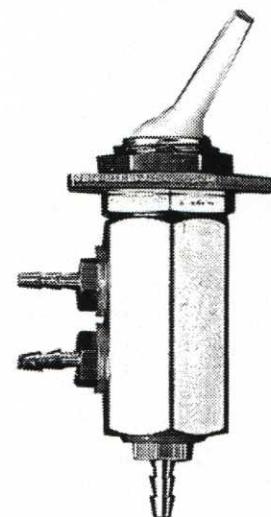


Remove tee fitting if there is no assistant's delivery



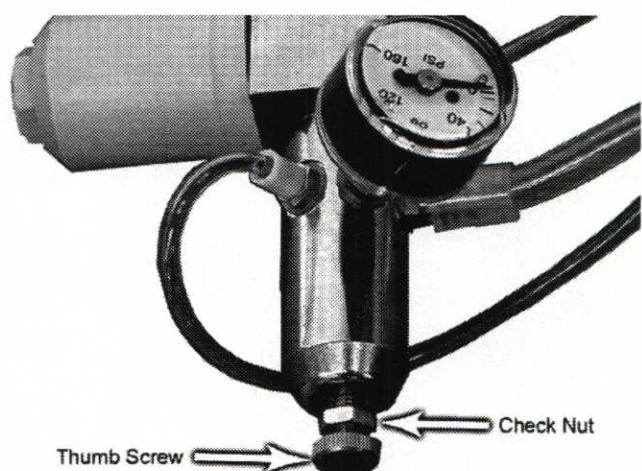
Reconnect blue tubes with barbed coupler

11) Flip the switch on the selector valve so that the toggle is "away" from the side mounted hoses on the valve body. This position selects city water.



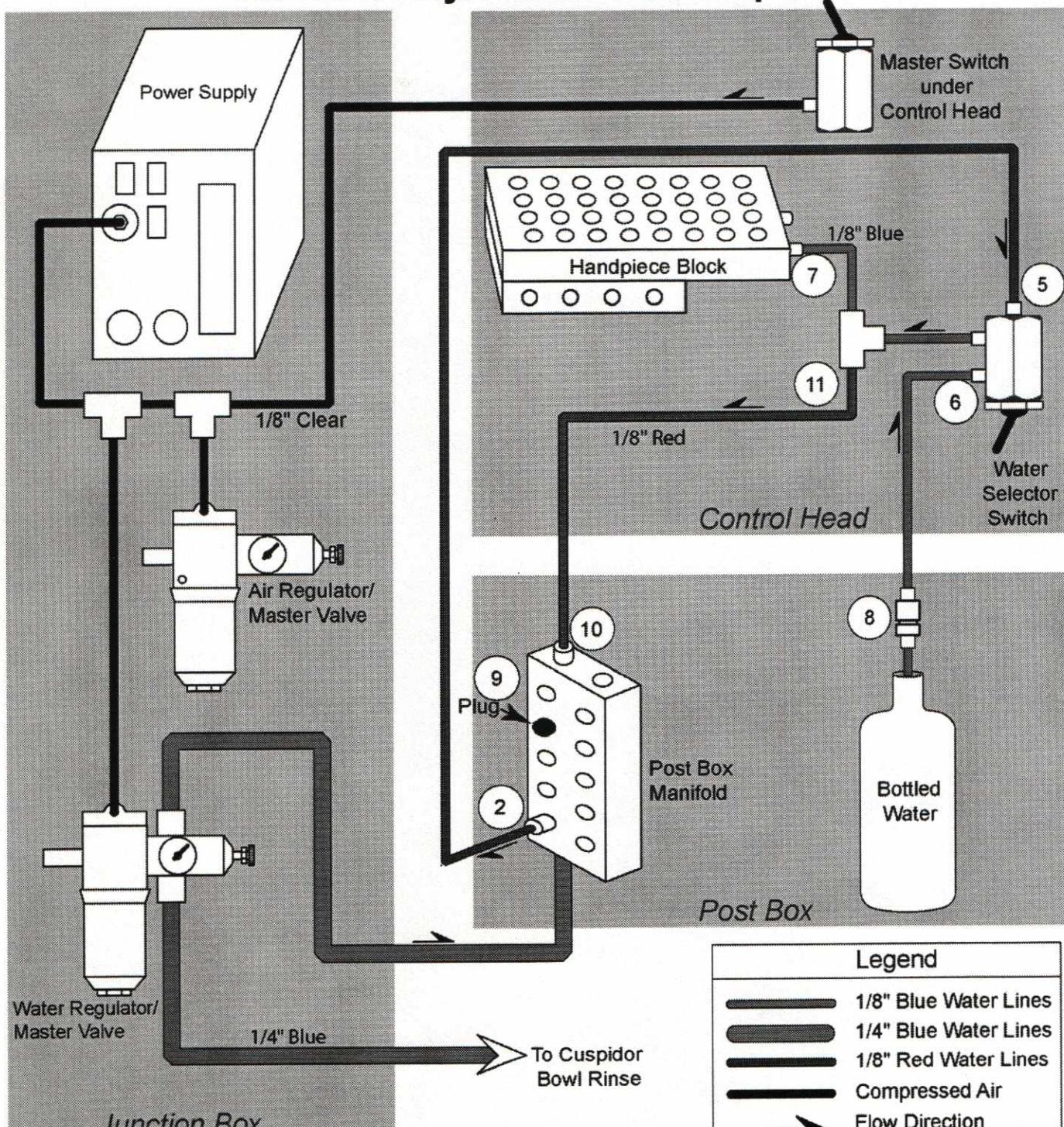
Selector switch in the city water position

12) Turn the city water supply valve back on and adjust the water pressure to 40 PSI by turning the thumbscrew on the end of the regulator. Water must be flowing to adjust the pressure so activate the bowl rinse while adjusting. Once set, snug the check nut against the regulator body.



Set water pressure to 40 PSI

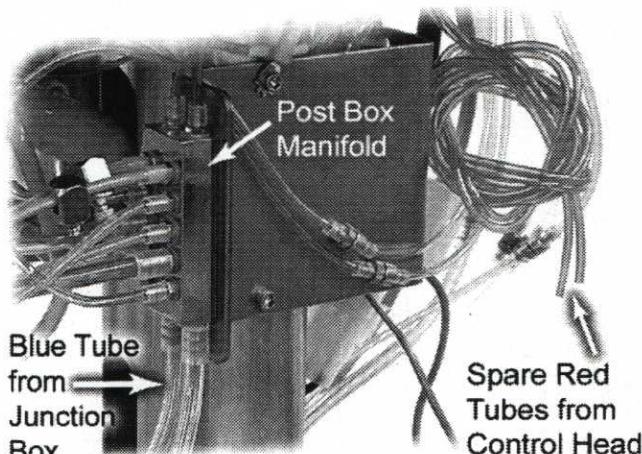
Plumbing Schematic for KOTP style units with cuspidors



Legend	
	1/8" Blue Water Lines
	1/4" Blue Water Lines
	1/8" Red Water Lines
	Compressed Air
	Flow Direction
	Threaded Connector
	Tee Fitting
	Reference Step #5

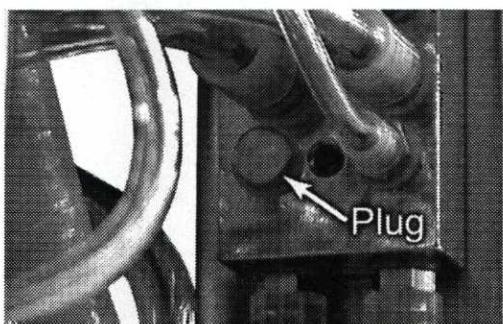
Section 3: Installation on KOTP style units

1) Remove the covers from the post box under the cuspidor and locate the post box manifold and the two spare 1/8" red tubes in the umbilical leading to the control head. City water is the 1/4" blue tube entering the bottom left fitting on the manifold. Cut off water pressure by flipping the master switch under the control head and pressing the cup fill spout to relieve system pressure.

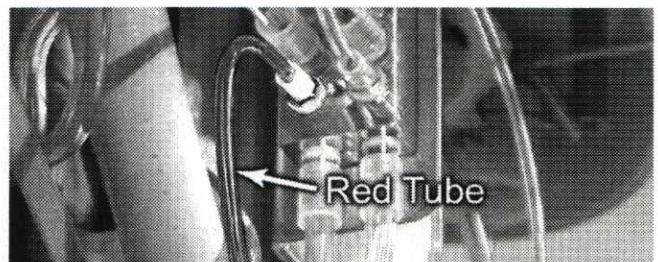


Post box detail with side covers removed

2) The face of the manifold has 10 ports in two columns of five. The first stage of the installation is to connect one of the spare red tubes to the lower left port on the face of the manifold. This port is plugged from the factory so unscrew the plug with a 1/4" nut driver and be prepared to catch a little water as the plug comes out. Save the plug for a later step and install an 1/8" barbed fitting in the open port, using a new plastic washer to create a good seal. Install the spare red tube onto the barbed fitting, using a sleeve to secure it in place.

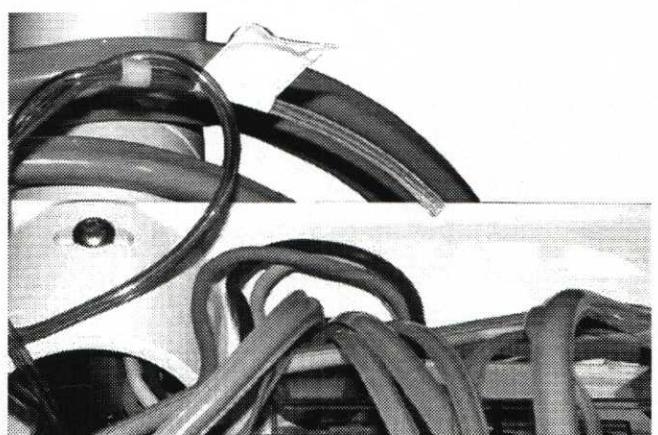


Remove plug from post box manifold



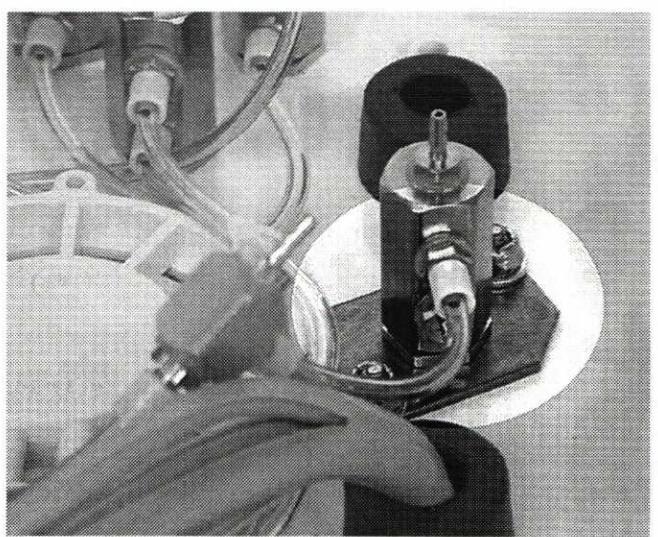
Install barbed fitting and spare red tube in manifold

3) Remove the cover from the control head and locate the two spare 1/8" red tubes. Use a syringe to draw air through them to identify the one connected to the post box manifold and mark it with tape.



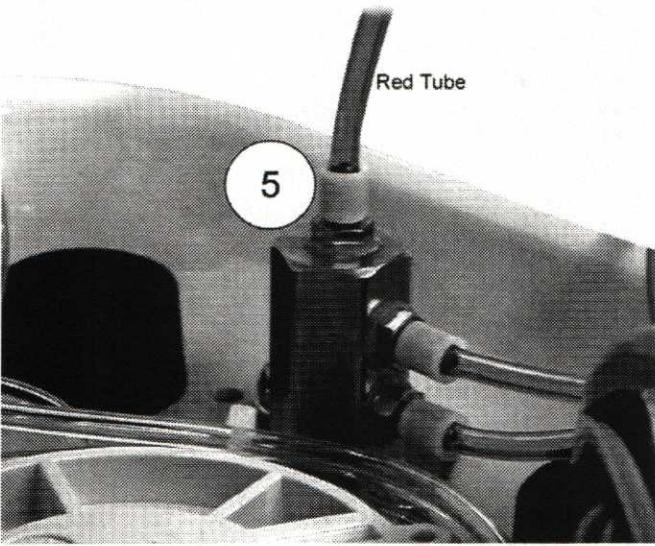
Trace red tube from manifold to control head

4) Mount the selector switch in the control head. The valve can be mounted in any unused handpiece tubing hole at the rear of the control head. Use the two bolts, washers and Nyloc nuts provided.



Mount selector switch in control head

- 5) Connect the marked red tube in the control head to the top barb on the selector valve and secure it with a plastic sleeve.

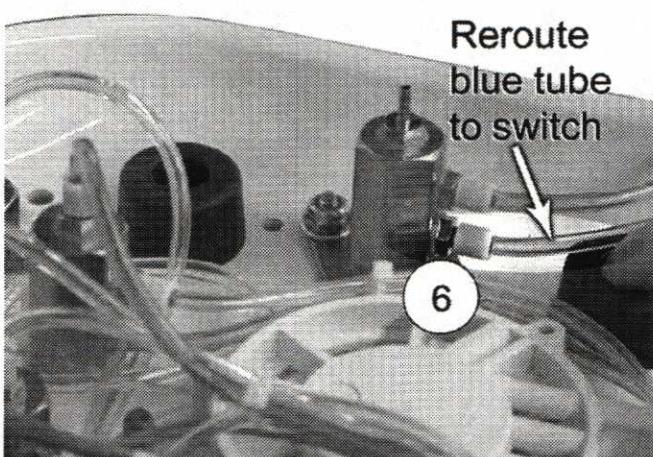


Connect city water to selector switch

- 6) Disconnect the blue tube from the end of the handpiece block and reconnect it to the lowest barbed fitting on the selector valve. The blue tube will need to be pulled back through a several zip ties so that it can be rerouted to the selector switch without kinking. Trim 1/2" off the end of the tube and use a plastic sleeve to secure it to the fitting. This tubing brings bottled water to the selector switch.

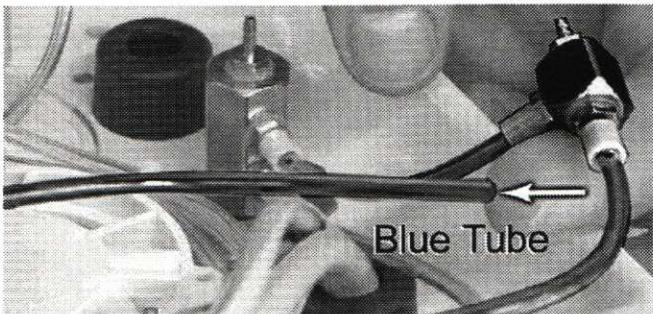


Disconnect bottled water from handpiece block

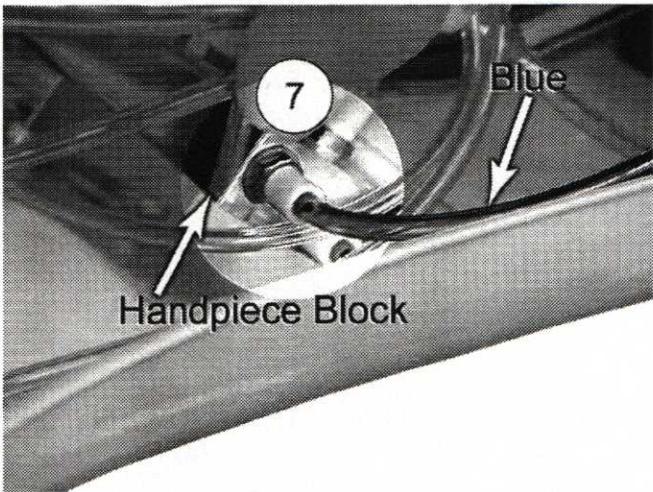


Connect bottled water to selector switch

- 7) Connect the open end of the blue tubing from the tee fitting back to the open barb on the handpiece block and secure it with a sleeve. This tubing carries switched water to the handpieces.



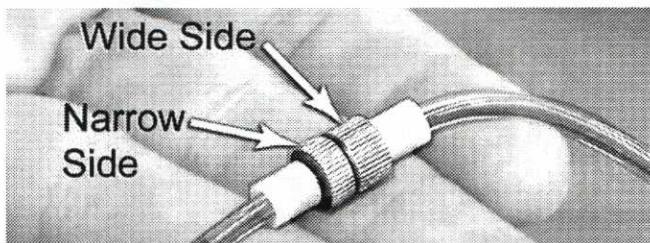
Output from selector switch



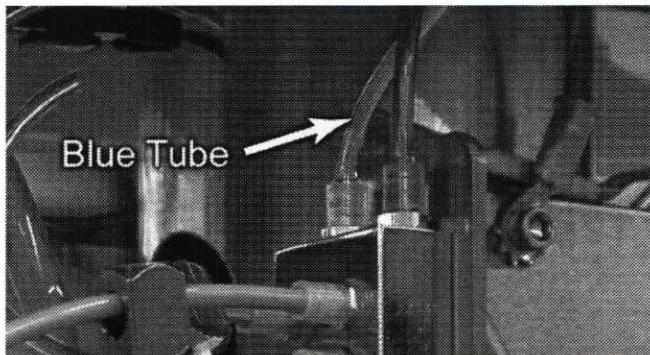
Connected to handpiece block

Skip steps 8-11 if there is no assistant's delivery installed on the unit.

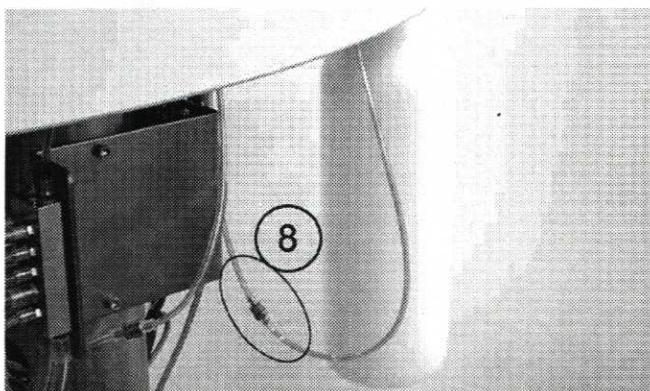
8) In the post box locate the 1/8" blue tubes connected by a threaded coupler. Disconnect the tube from the barb on the narrow side of the coupler. Also disconnect the blue tube from the top barb on the post box manifold. Trim 1/2" off the end of this second tube and connect it to the threaded coupler using a sleeve to secure it in place. Bottled water now bypasses the manifold and proceeds directly to the selector switch.



Disconnect blue tube from narrow side of coupler

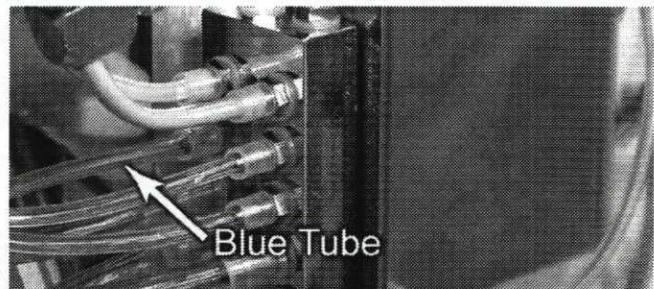


Reroute blue tube from manifold to coupler

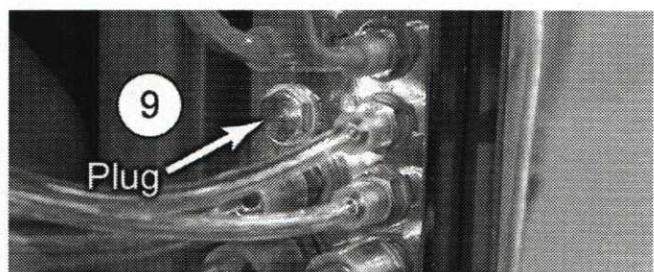


Bottled water now bypasses manifold and proceeds to selector switch

9) The blue tube that was just disconnected from the threaded coupler must be removed from the post box manifold. Disconnect it from the barbed fitting, remove the barbed fitting and install the plug taken out in step 2. Use a fresh plastic washer from the kit to insure that the manifold does not leak.

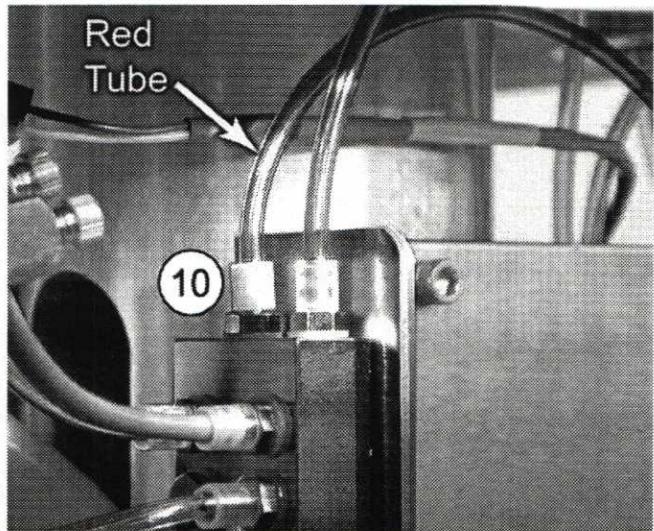


Finish disconnecting blue tube



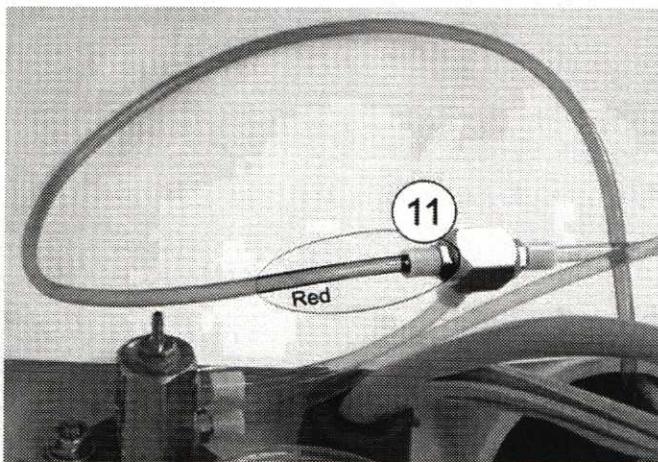
Install plug in place of barbed fitting

10) In the post box, connect the remaining spare red tube to the open barb on top of the manifold. Secure it with a sleeve. This tube supplies switched water to the assistant's delivery.



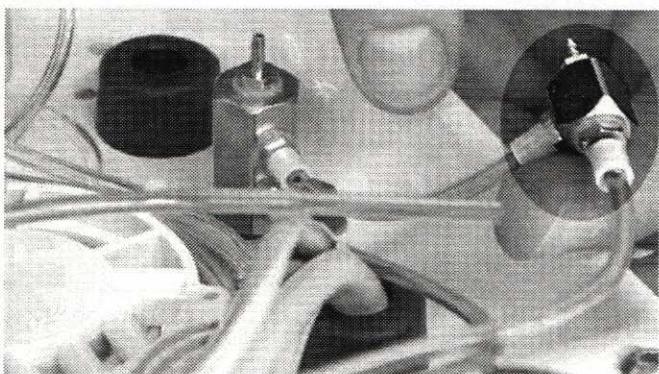
Connect spare red tube to post box manifold

11) In the control head, connect the spare red tube to the open barb on the tee fitting adjacent to the selector switch and secure it with a sleeve.



Connect switched water to the assistant's delivery

12) If there is no assistant's delivery installed on the unit, then the tee fitting between the selector switch and the handpiece block must be removed. Disconnect the blue tubes from the barbed ends of the tee fitting, trim 1/2" off the ends and reconnect them using the barbed coupler and sleeves in the kit.

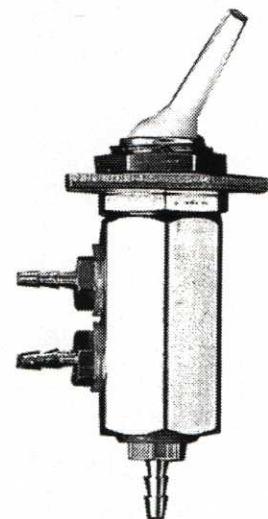


Remove tee fitting from assembly



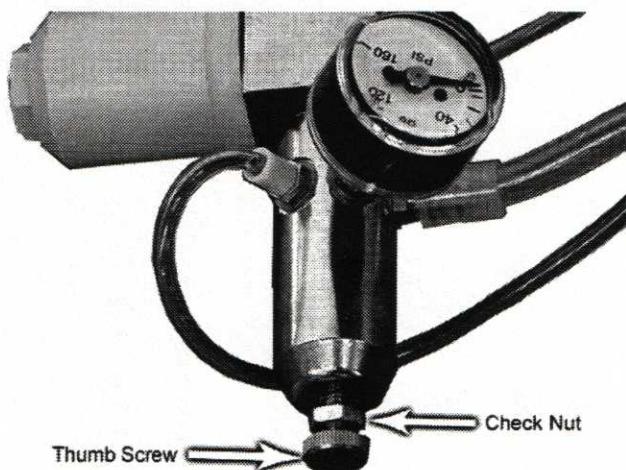
Splice blue tubes together

13) Flip the switch on the selector valve so that the toggle is "away" from the side mounted hoses on the valve body. This position selects city water.



Switch in the city water position

14) Activate the water regulator by flipping the master switch under the control head. Remove the lid from the junction box and adjust the water regulator to 40 PSI. Pressure can only be adjusted while water is running so activate the bowl rinse while adjusting pressure. Snug the check nut against the regulator body to lock the pressure setting.

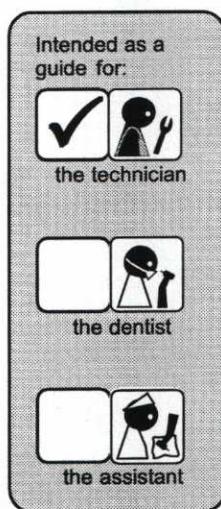


Water pressure adjustment

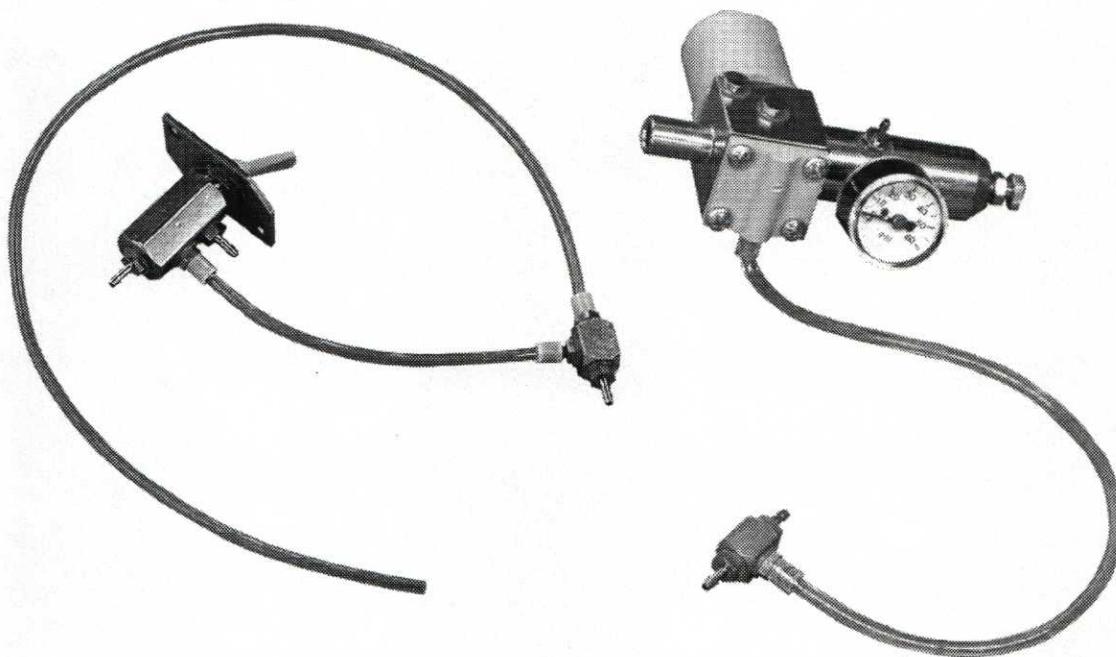
KaVo

1002 7944

Installation Procedure



City Water Selector Switch for KaVo Units *without* Cuspidors



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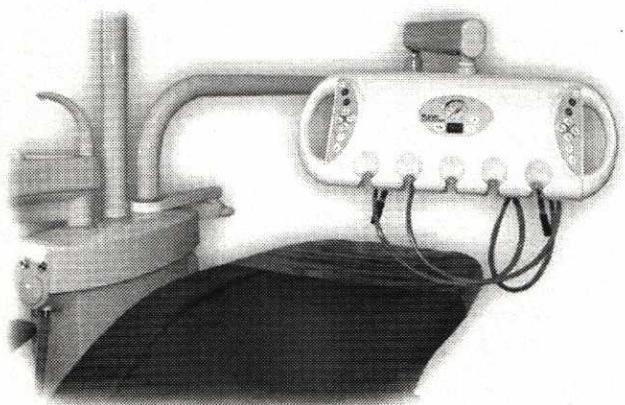
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Section 2: Installation on KLR style units

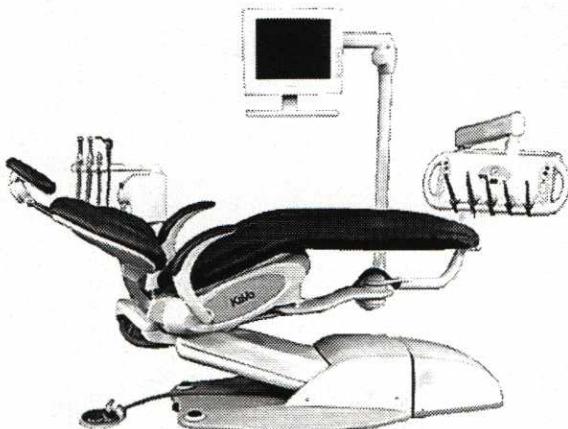
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(KOTP) KaVo over-the-patient style support arm
for the control head



(KLR) KaVo left or right handed unit. Control head
support arm pivots from underneath seat.

Section 1: Introduction

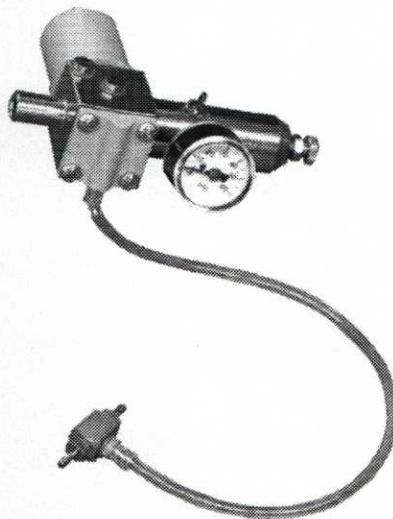
Kit contents

The city water selector kit for units without cupidors consists of two small subassemblies and a small bag of loose parts.

The first subassembly consists of the water regulator with a piece of clear tubing and tee fitting connected to it as in the photo.

The second subassembly consists of the selector switch connected to a tee fitting by a short length of blue tubing and an additional length of blue tubing extending from the tee fitting.

The small bag of loose parts may be more than actually needed but includes all the necessary parts to cover a variety of installations.



Regulator and tee fitting



Selector switch and tubing

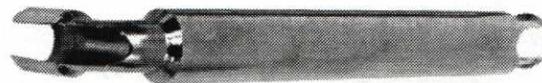


Additional small parts

Tools required

The following tools and supplies will be required for installation of the city water conversion kit:

- Assorted standard open-ended wrenches
- Small wire cutters
- 5/64, 3/32 & 5/32 Allen wrenches
- Masking tape (for identifying tubing)
- 1/8" & 1/4" sleeve installation tools
- 1/4" nut driver
- #2 Phillips screwdriver



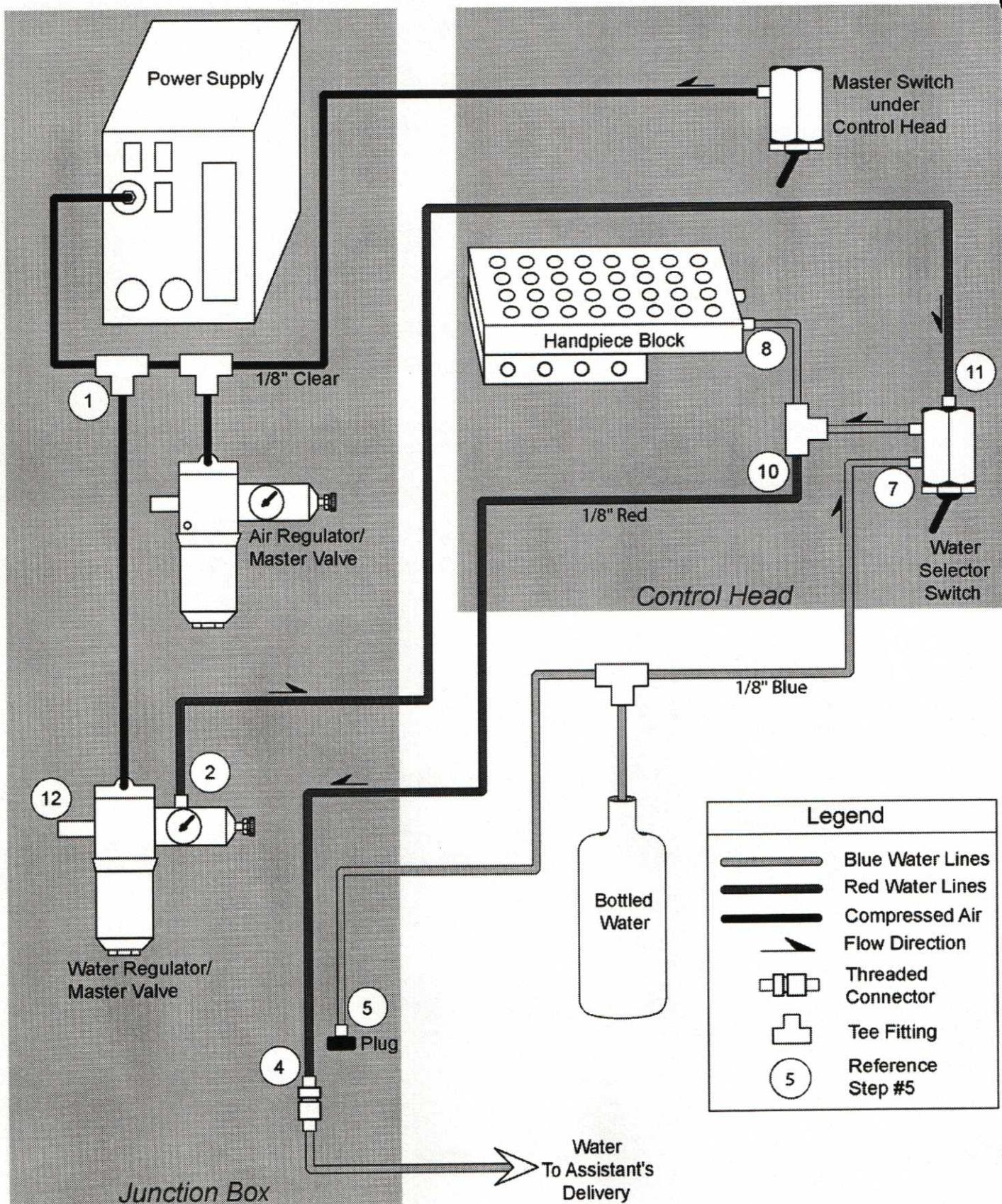
Sleeve installation tools

Installation Summary

Installation of the water selector switch kit involves plumbing city water to the new regulator inside the junction box and splicing into master-switch signal-air to control the master-valve assembled to the water regulator. City water must be run up to the selector switch mounted in the control head.

Bottled water must be diverted from the handpiece block to the selector switch and switched water plumbed to the handpiece block and over to the

Plumbing Schematic for KLR style units *without* cuspidors

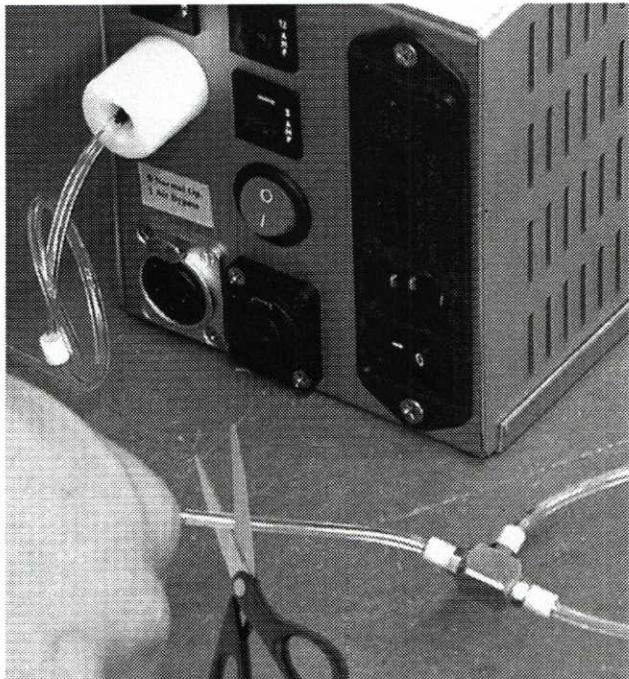


Section 2: Installation on KLR style units

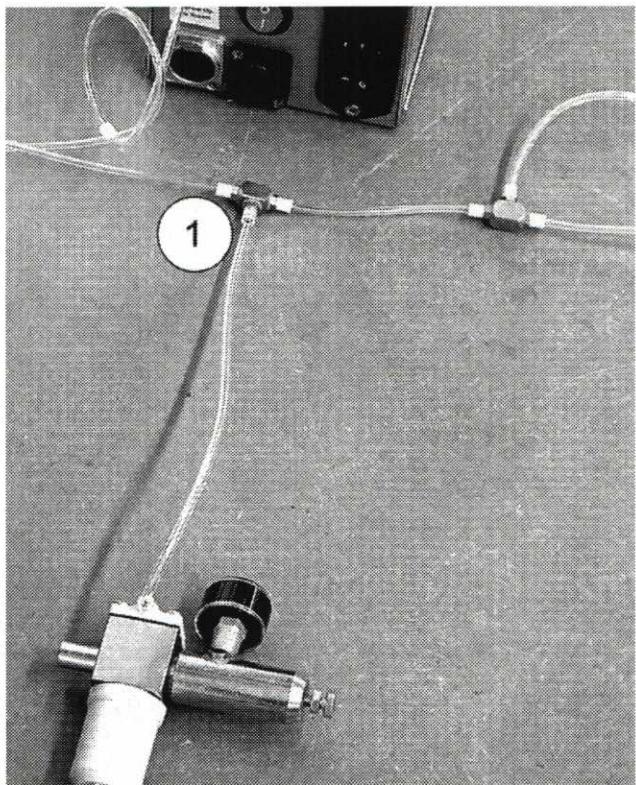
1) Begin by removing the cover from the junction box at the foot of the unit. Splice the tee fitting attached to the new regulator into the clear tubing leading to the air/electric switch on the power supply.



Regulator with pre-assembled tubing and tee fitting

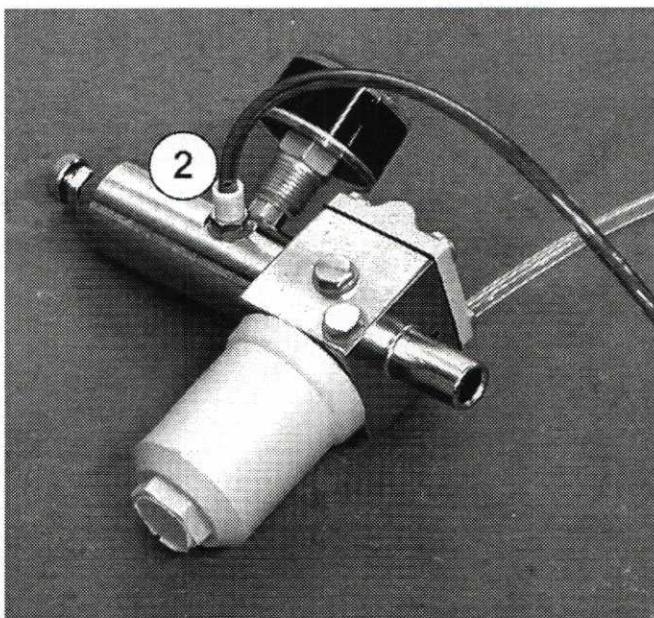


Cut the clear tubing next to the power supply



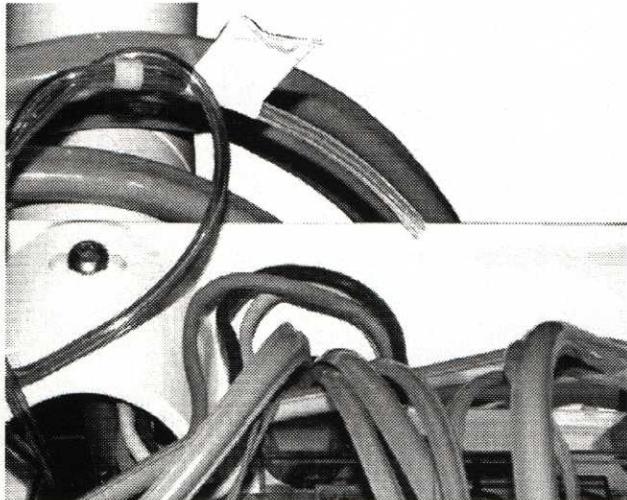
Signal air from master switch connected to water regulator

2) In the junction box, identify the two unused red lines from the umbilical. Connect one tube to the regulator as pictured. Secure the tube onto the fitting with one of the plastic sleeves provided. This tubing will carry city water to the selector switch.



Spare red tube connected to regulator

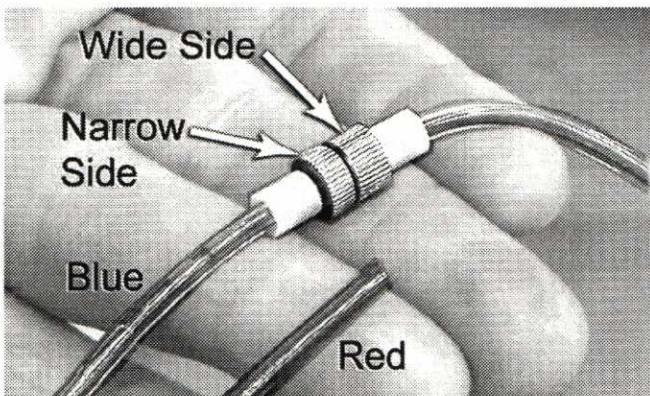
3) The two unused tubes terminate inside the control head. Remove the cover on the control head and locate them. Use a syringe to draw air through the tubes to identify the tube connected to the regulator and mark the upper end of the tube with tape.



Trace tubing up to control head

4) *Skip this step if there is no assistants delivery.*

Disconnect the blue tube from the narrow side of the threaded coupler in the junction box. Connect the other spare red tube in its place and secure it with a plastic sleeve. This tubing will carry switched water to the assistant's delivery.



Red tube replaces blue tube at the coupler



Spare red tube connected to blue tube

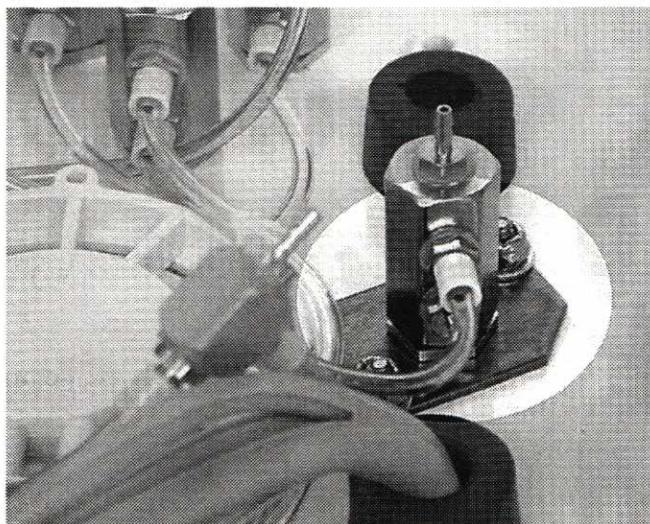
5) *Skip this step if there is no assistants delivery.*

Plug the end of the blue tube which was just disconnected from the coupler. Use the plug and sleeve supplied in the kit.



Blue tube from water bottle plugged in junction box

6) Mount the selector valve in the control head. The valve can be mounted in any unused handpiece tubing hole at the rear of the control head. Use the two bolts, washers and Nyloc nuts provided.

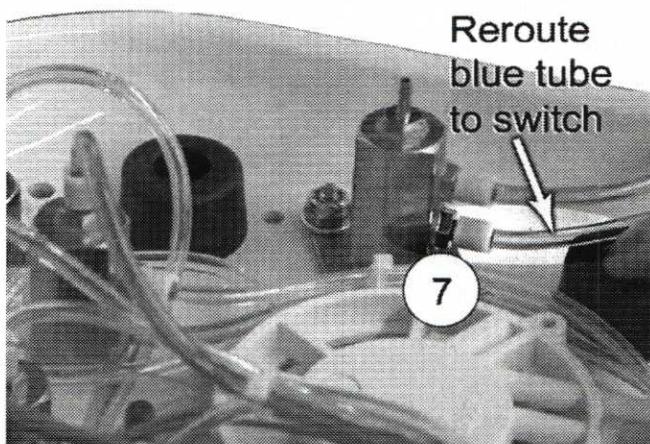


Mount selector switch inside control head

7) Disconnect the blue tube from the end of the handpiece block and reconnect it to the lowest barbed fitting on the selector valve. The blue tube will need to be pulled back through several zip ties so that it can be rerouted to the selector switch without kinking. Trim 1/2" off the end of the tube and use a plastic sleeve to secure it. This tubing brings bottled water to the selector switch.

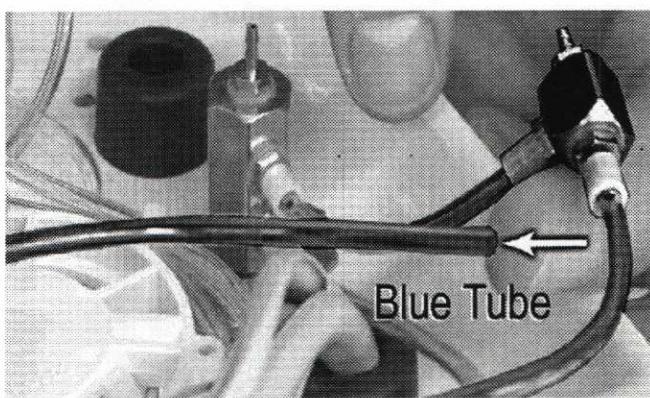


Disconnect blue tube from handpiece block

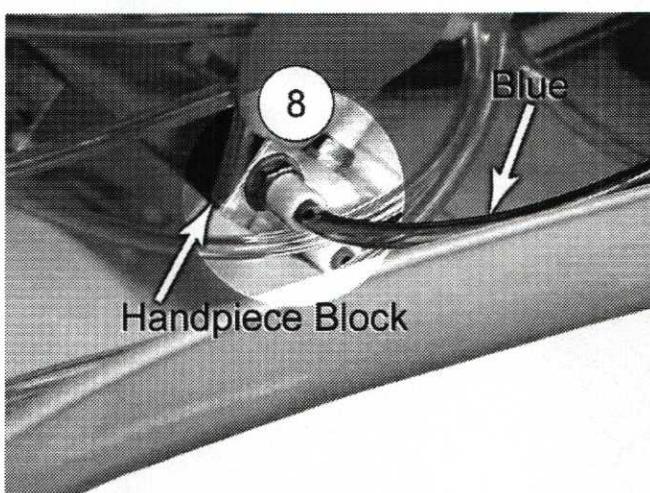


Reconnect bottled water to bottom barb on switch

8) Connect the free end of the blue tubing from the tee fitting back to the open barb on the handpiece block and secure it with a sleeve. This tubing carries switched water to the handpieces.



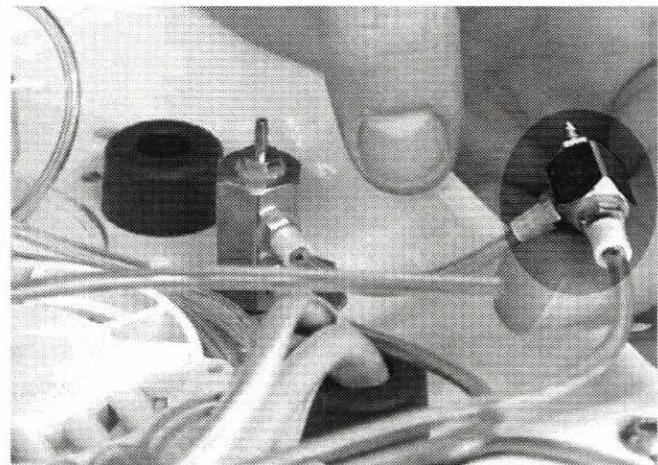
Output from selector switch



Reconnected to handpiece block

9) Skip this step if the unit has an assistants delivery.

If the unit has no assistant's delivery, the tee fitting next to the selector valve is not needed. Disassemble the blue tubes from the tee fitting and splice the two tubes together with the barbed connector supplied in the kit. Trim 1/2" off the ends of the tubing before installing onto the connector. Secure the tubes with sleeves.

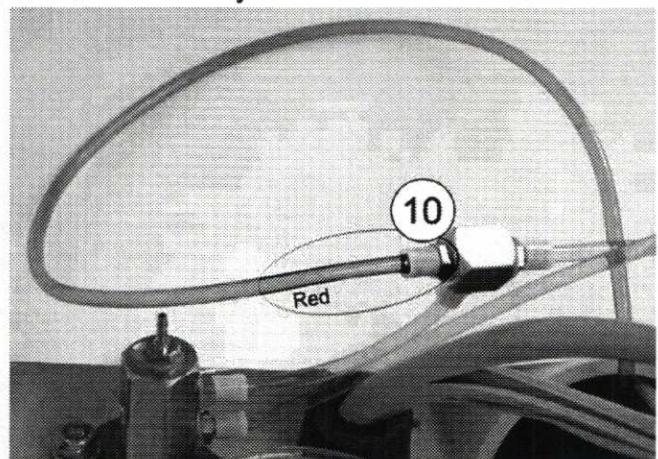


Remove tee fitting



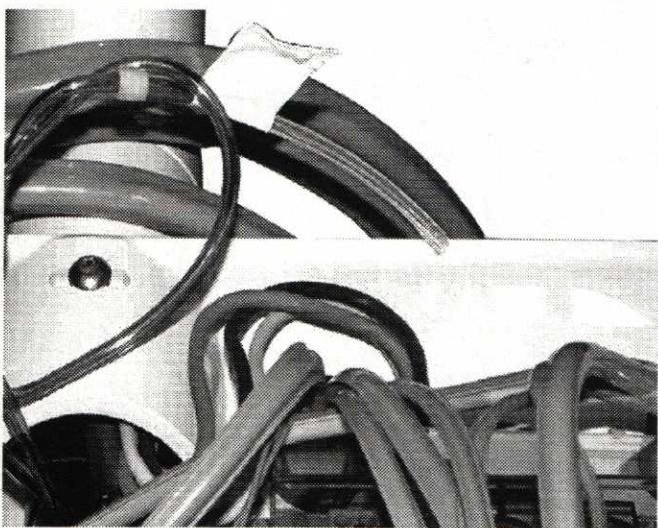
Splice the blue tubes together

10) Skip this step if there is no assistants delivery. Connect the unmarked spare red tube in the control head to the open barb on the tee fitting next to the selector valve. Secure the tubing in place with a sleeve. This tube carries switched water back down to the junction box then out to the assistant's delivery.

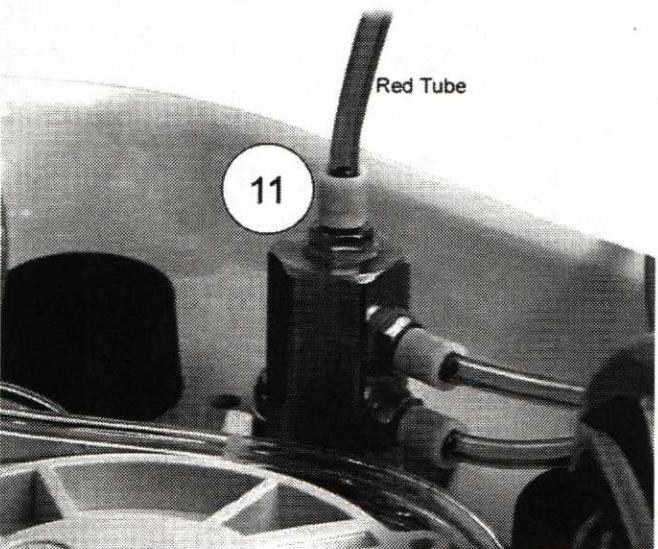


Connect unmarked red tube to tee fitting

- 11) Connect the "marked" red tubing in the control head to the top barb on the selector valve and secure with a sleeve. This tubing brings city water to the selector switch.



Marked red tube in control head carries city water

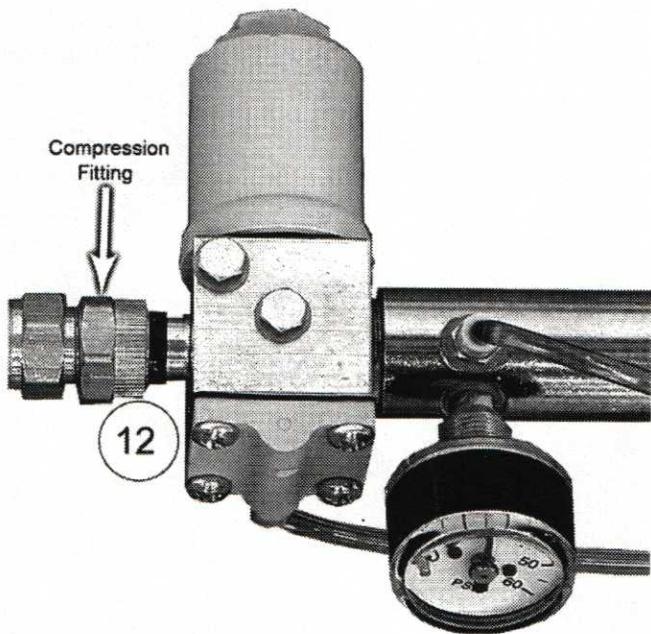


City water connected to selector switch

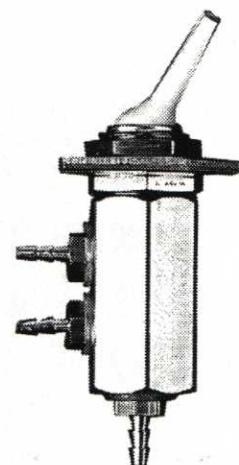
- 12) Connect the city water supply to the regulator with a 3/8" compression fitting and turn on the main water supply.

- 13) Flip the switch on the selector valve so that the toggle is "away" from the side mounted hoses on the valve body. This position selects city water.

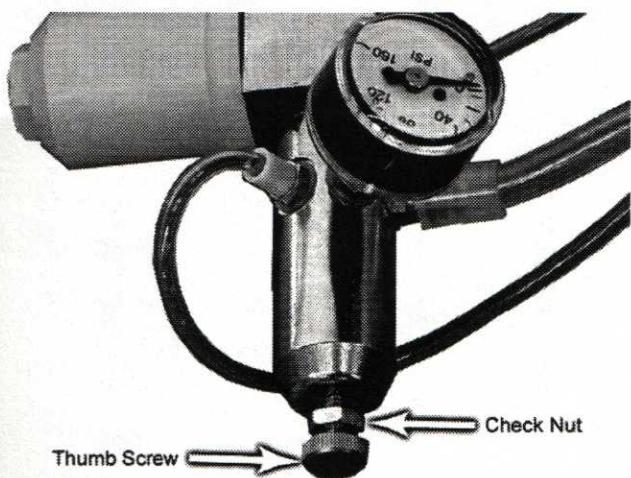
- 14) Water pressure can only be adjusted while water is flowing. Activate flow through a syringe or handpiece and adjust the water pressure to 40 PSI. When set, snug the check nut against the regulator housing.



Connect city water to regulator

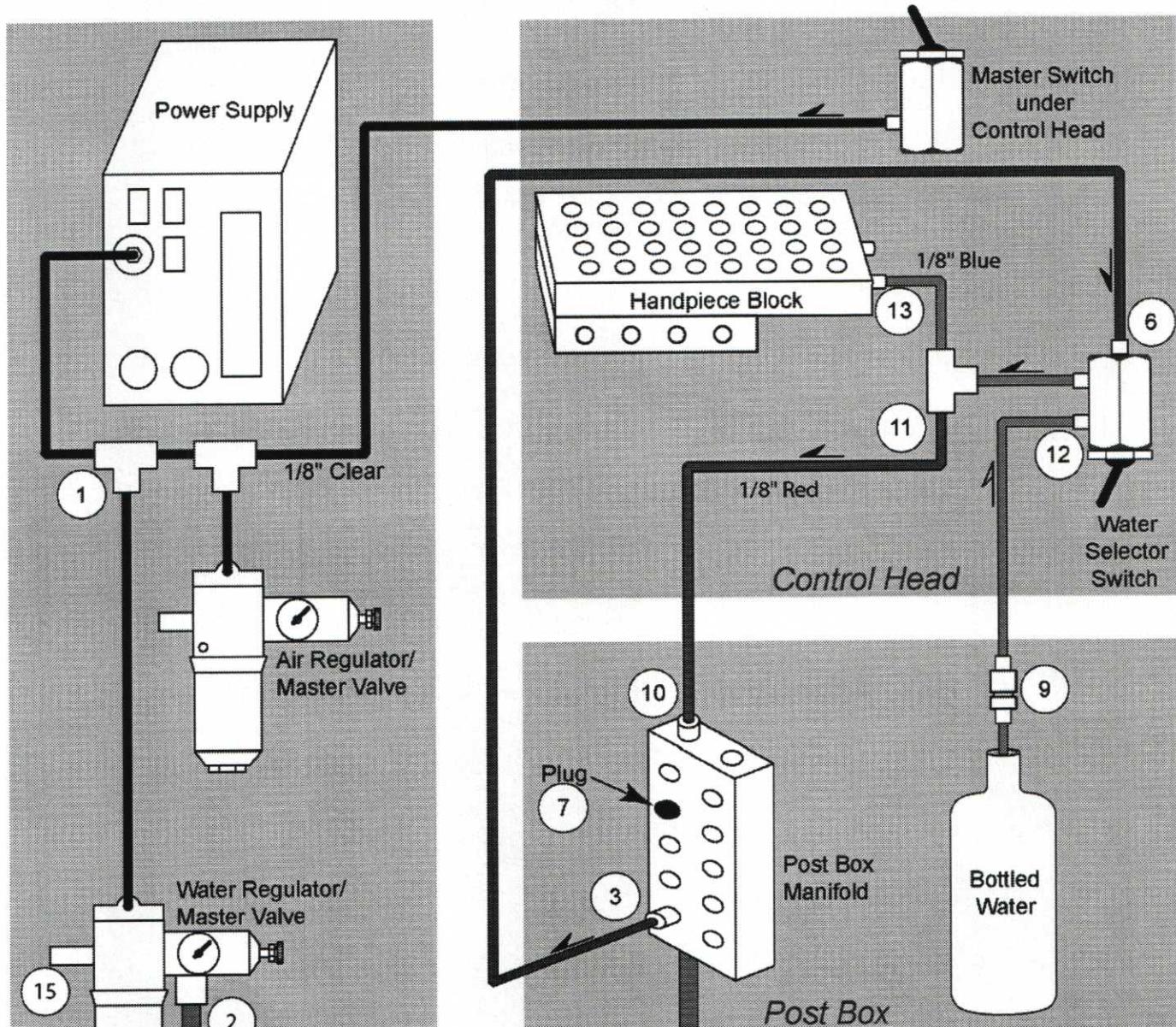


Switch in the city water position



Water pressure adjustment

Plumbing Schematic for KOTP style units *without* cuspidors



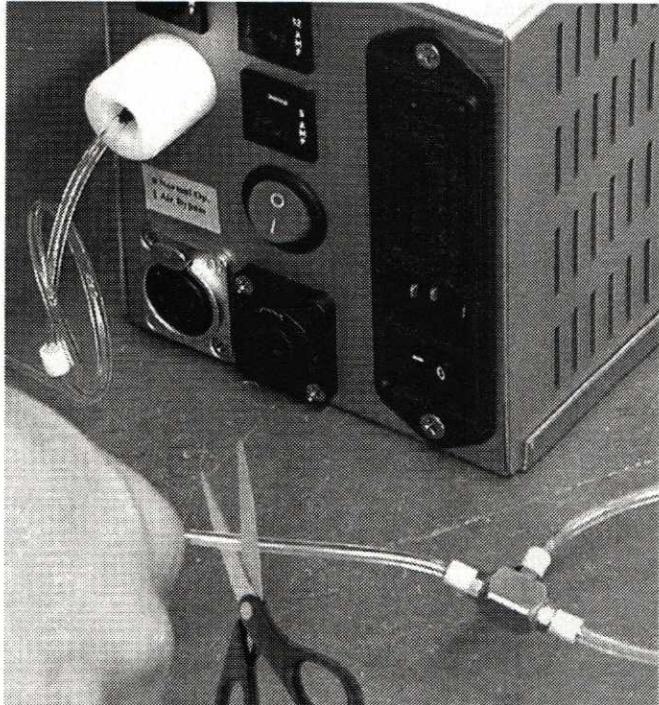
Legend	
—	1/8" Blue Water Lines
—	1/4" Blue Water Lines
—	1/8" Red Water Lines
—	Compressed Air
→	Flow Direction
□	Threaded Connector
□	Tee Fitting
(5)	Reference Step #5

Section 3: Installation on KOTP style units

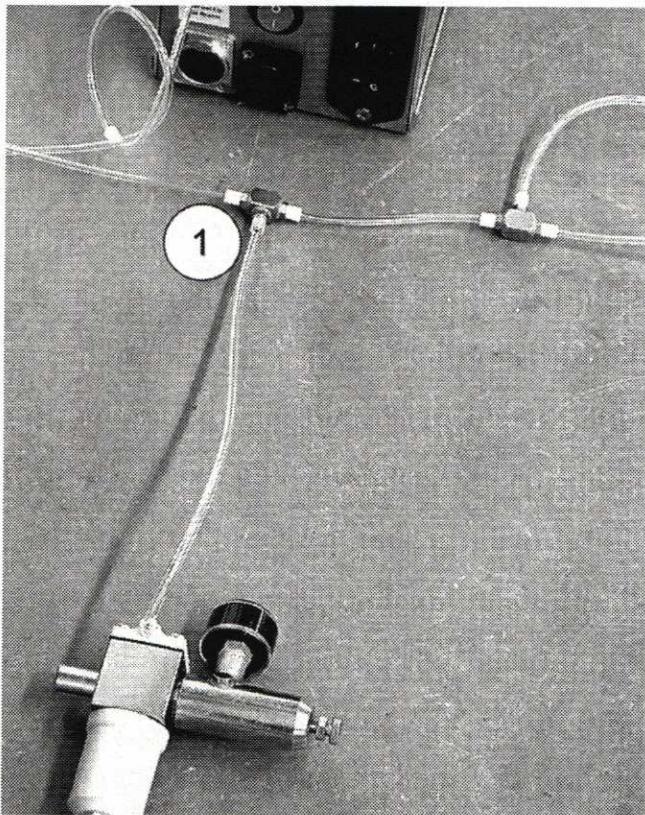
1) Begin by removing the cover from the junction box and splice the tee fitting attached to the new regulator into the clear tubing leading to the air/electric switch on the power supply.



Regulator with pre-assembled tubing and tee fitting

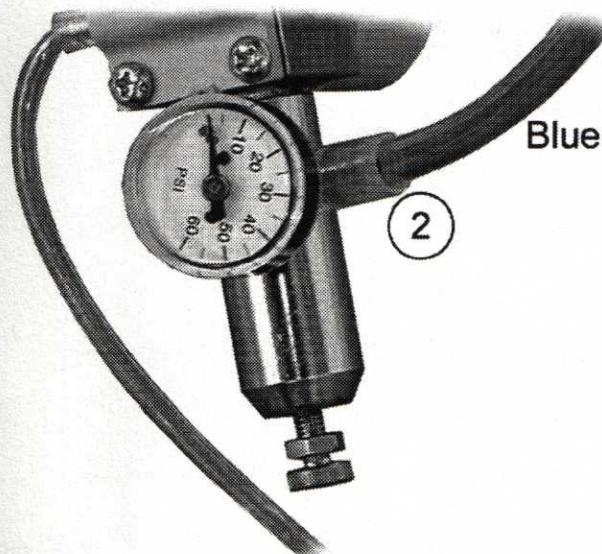


Cut the clear tubing next to the power supply



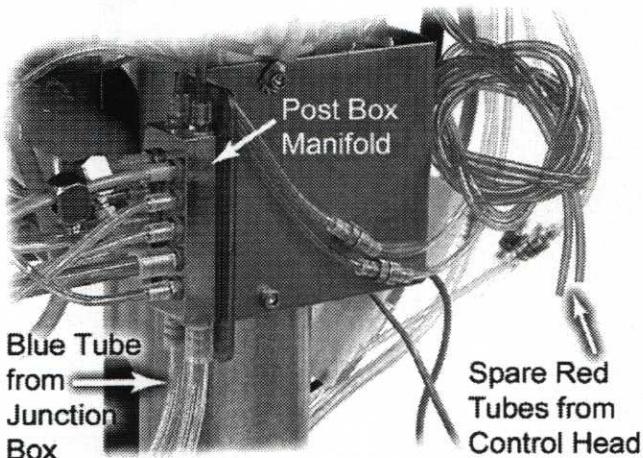
Signal air from master switch connected to water regulator

2) Locate the unused 1/4" blue line in the junction box umbilical. Connect the tube to the regulator as pictured. Secure the tube onto the fitting with one of the plastic sleeves provided. This tubing will carry city water to the manifold inside the post box.

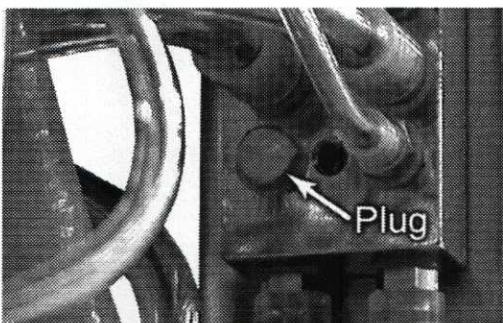


Spare blue tube connected to regulator

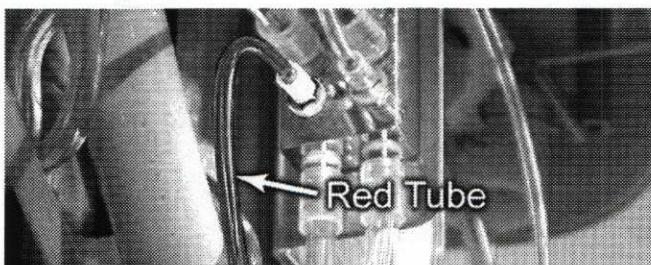
3) Remove the two side covers from the post box and identify the two unused 1/8" red tubes coming from the control head umbilical. Attach one of the red tubes to the bottom left port on the face of the post box manifold. To do this, the plug in the manifold must be replaced by an 1/8" barbed fitting supplied in the kit. Use a new plastic washer under the barbed fitting and secure the tube with a plastic sleeve.



Post box manifold detail with covers removed

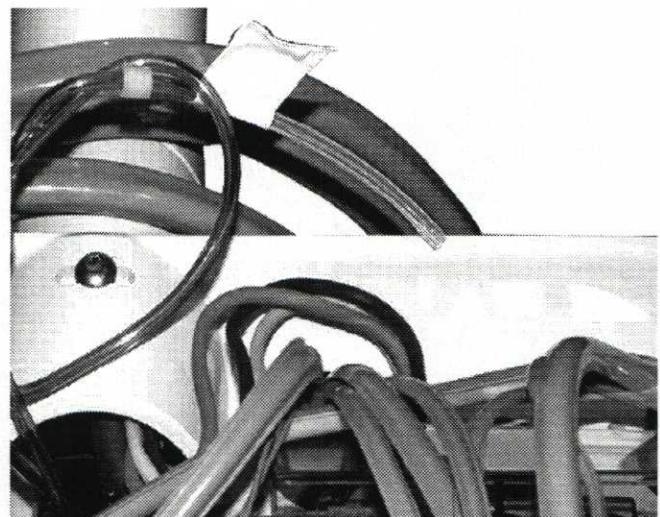


Remove plug from post box manifold



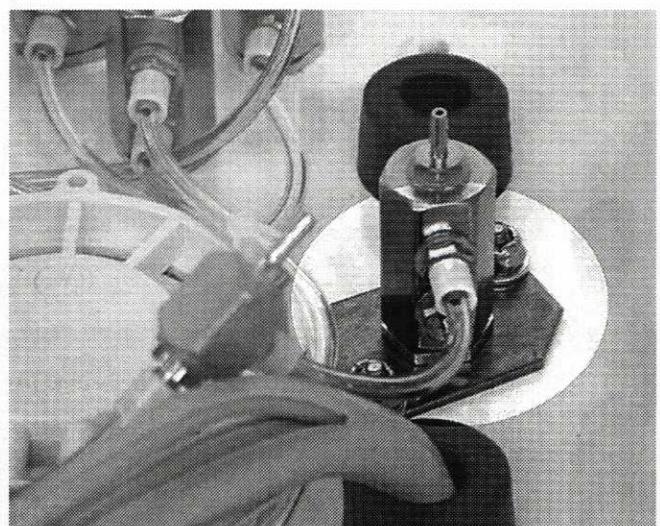
Spare red hose installed on barbed fitting

4) Remove the cover from the control head to locate the two spare red tubes. Use a syringe to draw air through the tubes to identify the tube connected to the post box manifold and mark the upper end of the tube with tape.



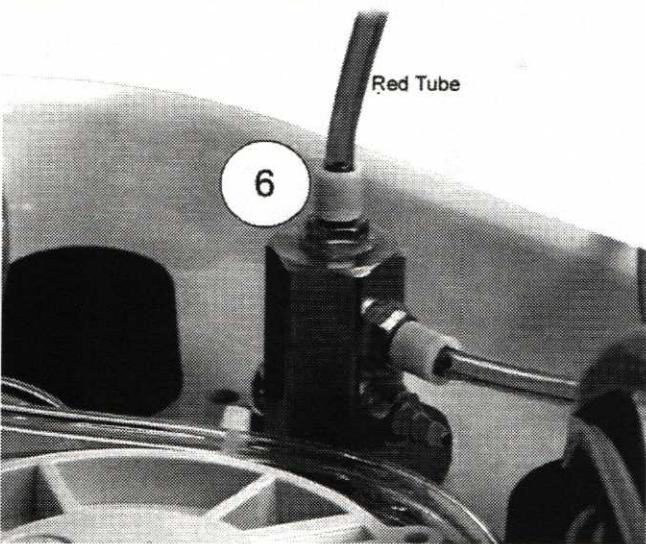
Identify spare red tube connected to post box manifold

5) Mount the selector valve in the control head. The valve can be mounted in any unused handpiece tubing hole at the rear of the control head. Use the two bolts, washers and Nyloc nuts provided.



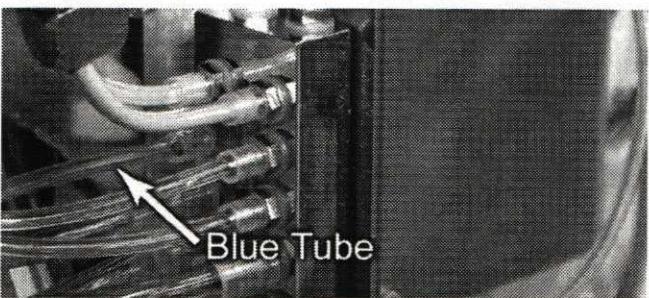
Mount selector switch inside control head

6) Connect the "marked" spare red tube in the control head to the top barb on the selector valve and secure with a sleeve. This tube brings city water to the selector switch.

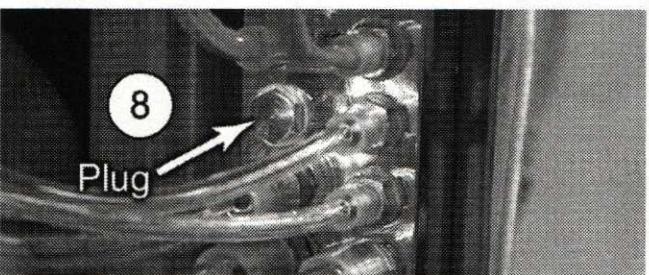


Connect marked red tube to selector switch

7) Disconnect the 1/8" blue tube from the face of the post box manifold. It is located in the left column, second down from the top. Remove the barbed fitting from the manifold and install the plug removed from the manifold in step 3. Use a new plastic washer under the head of the plug to prevent leakage.

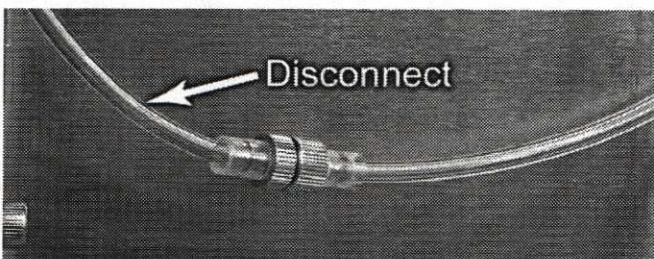


Remove blue tube and barbed connector from post box manifold



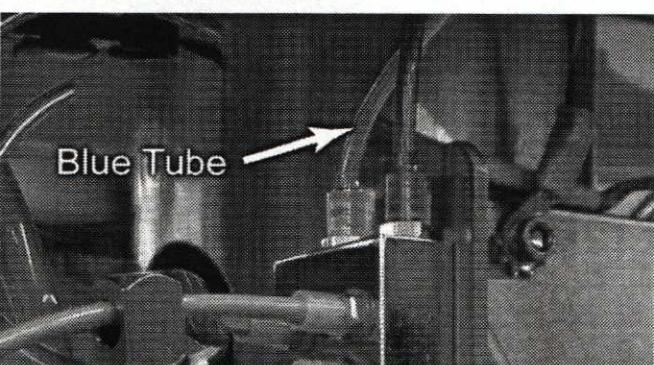
Install plug in place of barbed fitting

8) Trace the disconnected blue tube back to the threaded coupler in the post box. Disconnect the blue tube from the barbed end of the threaded coupler. This short piece of tubing may now be discarded.

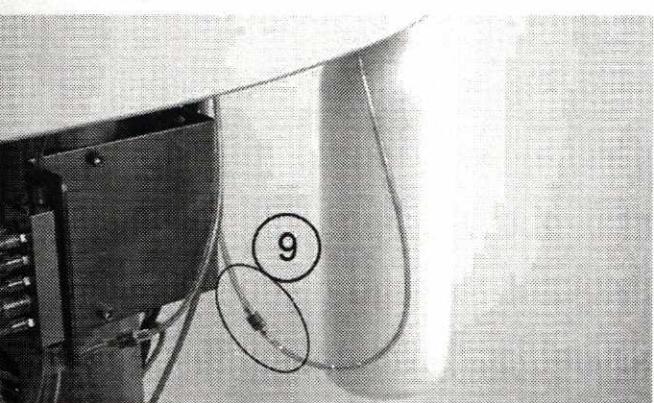


Remove blue tube from barb on coupler

9) Disconnect the 1/8" blue tube from the barbed fitting on top of the post box manifold and reconnect it to the threaded coupler from the previous step. Trim 1/2" off the end of the blue tube before reconnecting it so that a fresh section of tubing slides over the barbs. Secure the tube with a plastic sleeve. The blue tubing carries bottled water directly to the selector switch, bypassing the post box manifold.



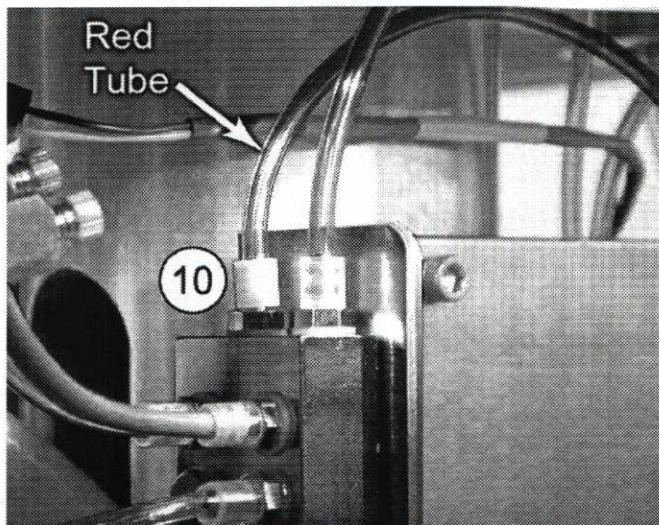
Disconnect bottled water from top of manifold



Reconnect bottled water to coupler in previous step

10) Skip this step if there is no assistant's delivery.

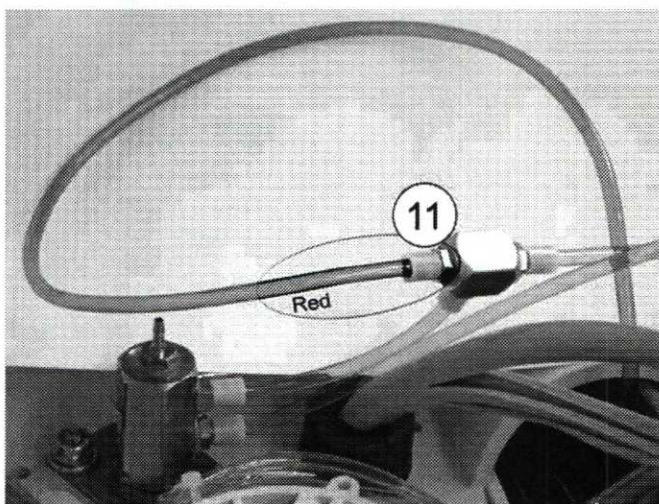
Locate the second spare red tube in the post box and connect it to the open barb on top of the post box manifold. Use a plastic sleeve to secure the tube. This tube brings switched water to the manifold where it is dispersed to the assistant's delivery.



Connect spare red tube to post box manifold

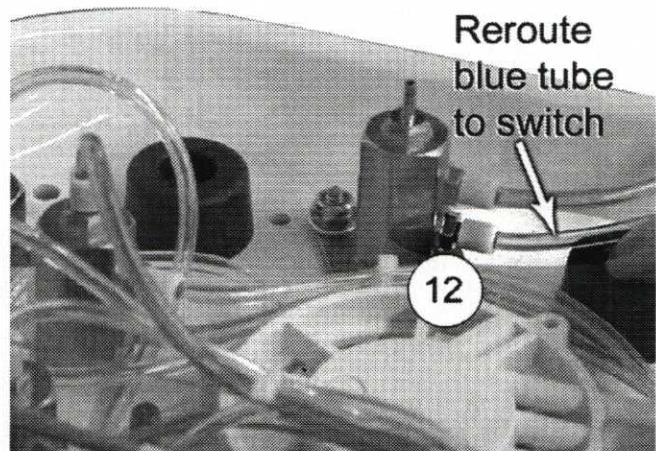
11) Skip this step if there is no assistants delivery.

Connect the "unmarked" spare red tube in the control head to the open barb on the tee fitting next to the selector valve. Secure the tubing in place with a sleeve. This tubing will carry switched water back down to the post box manifold and out to the assistant's delivery.



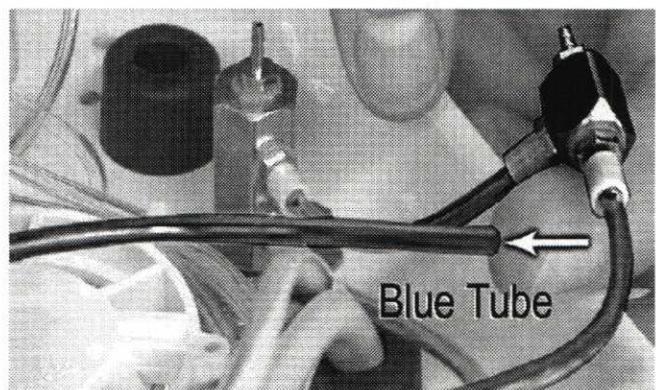
Connect unmarked red tube to tee fitting

12) Disconnect the blue tube from the end of the handpiece block and reroute it to the bottom barb on the selector switch. Secure with a sleeve. This carries bottled water directly to the selector switch.

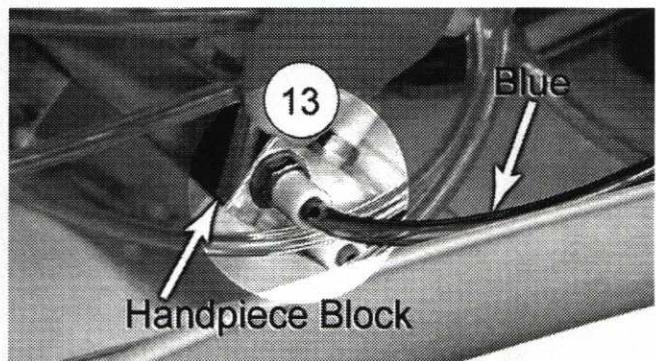


Connect bottled water to switch

13) Connect the free end of the blue tubing from the tee fitting to the open barb on the handpiece block and secure it with a sleeve. This tubing carries switched water to the handpieces.



Output from selector switch

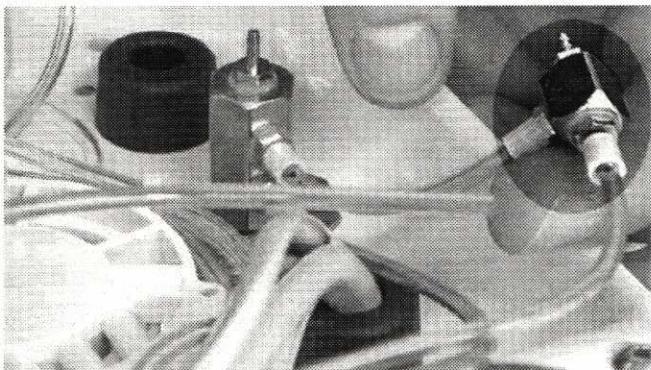


Connected to handpiece block

14) Skip this step if the unit has an assistants delivery.

If the unit has no assistant's delivery, the tee fitting next to the selector valve is not needed.

Disassemble the blue tubes from the tee fitting and splice the two tubes together with the barbed coupler supplied in the kit. Trim back 1/2" off the tubing before installing onto the new barbs. Secure the tubing with sleeves.

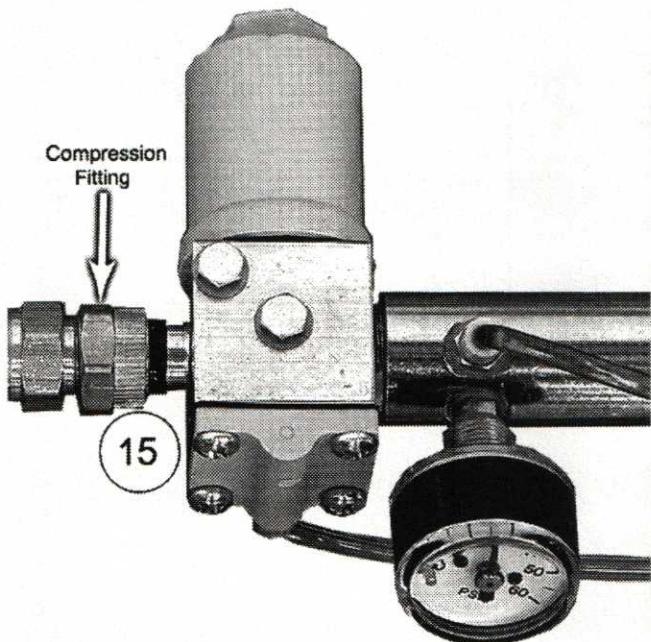


Remove tee fitting



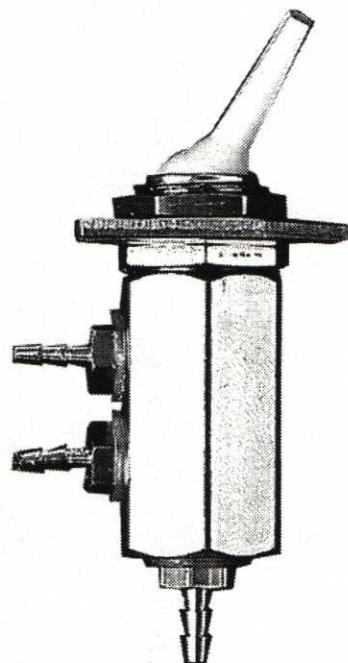
Splice blue tubes together

15) Connect the city water supply to the regulator with a 3/8" compression fitting and turn on the main water supply.



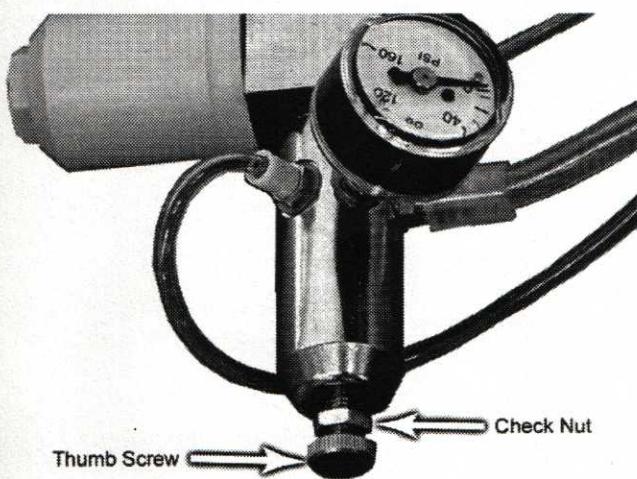
Connect city water to regulator

16) Flip the switch on the selector valve so that the toggle is "away" from the side mounted hoses on the valve body; this position selects city water.



Switch in the city water position

17) Water pressure should be adjusted while water is flowing. Activate flow through a syringe or handpiece and adjust the water pressure to 40 PSI. When set, tighten the check nut snug against the regulator housing.

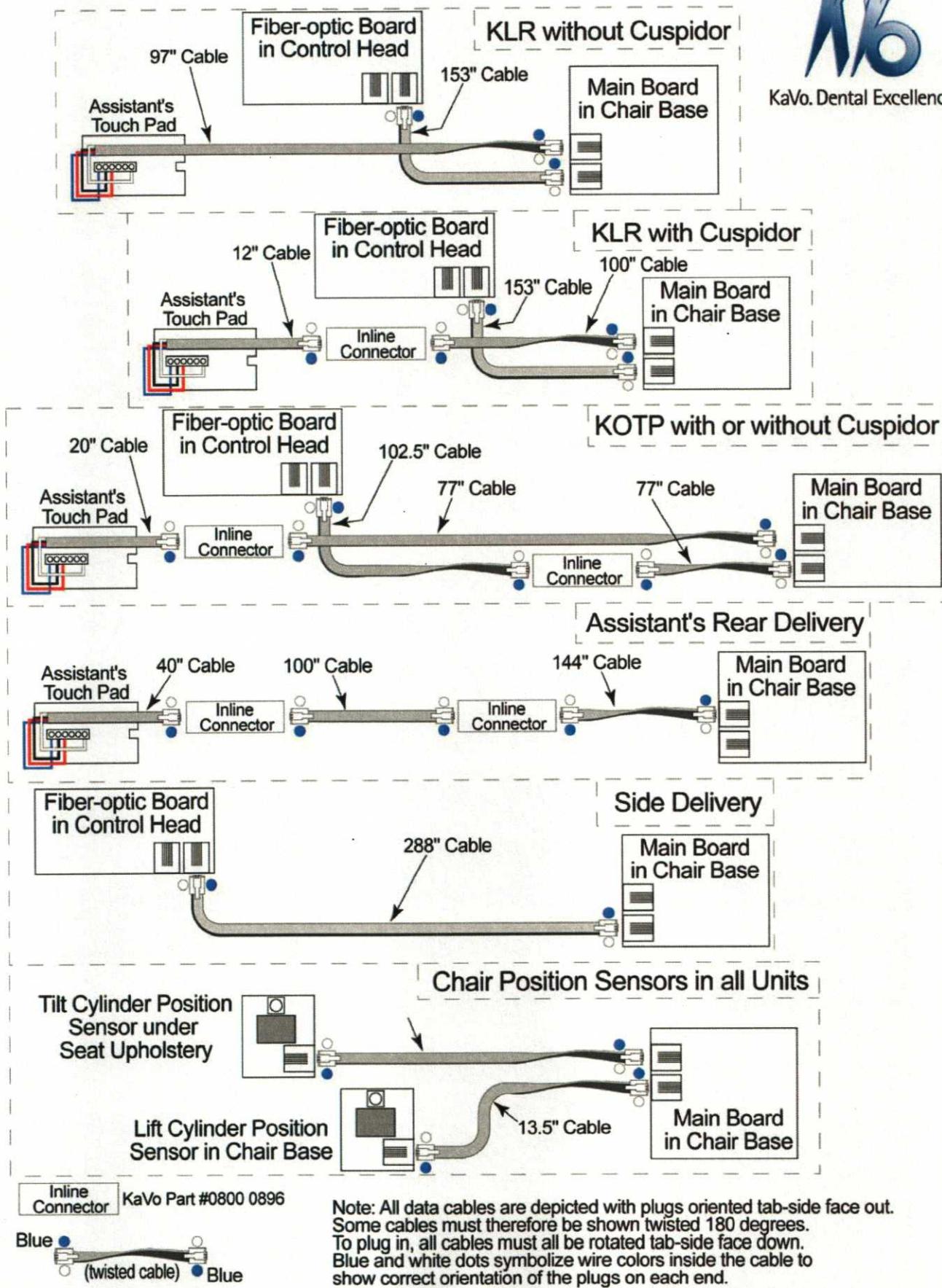


Water pressure adjustment

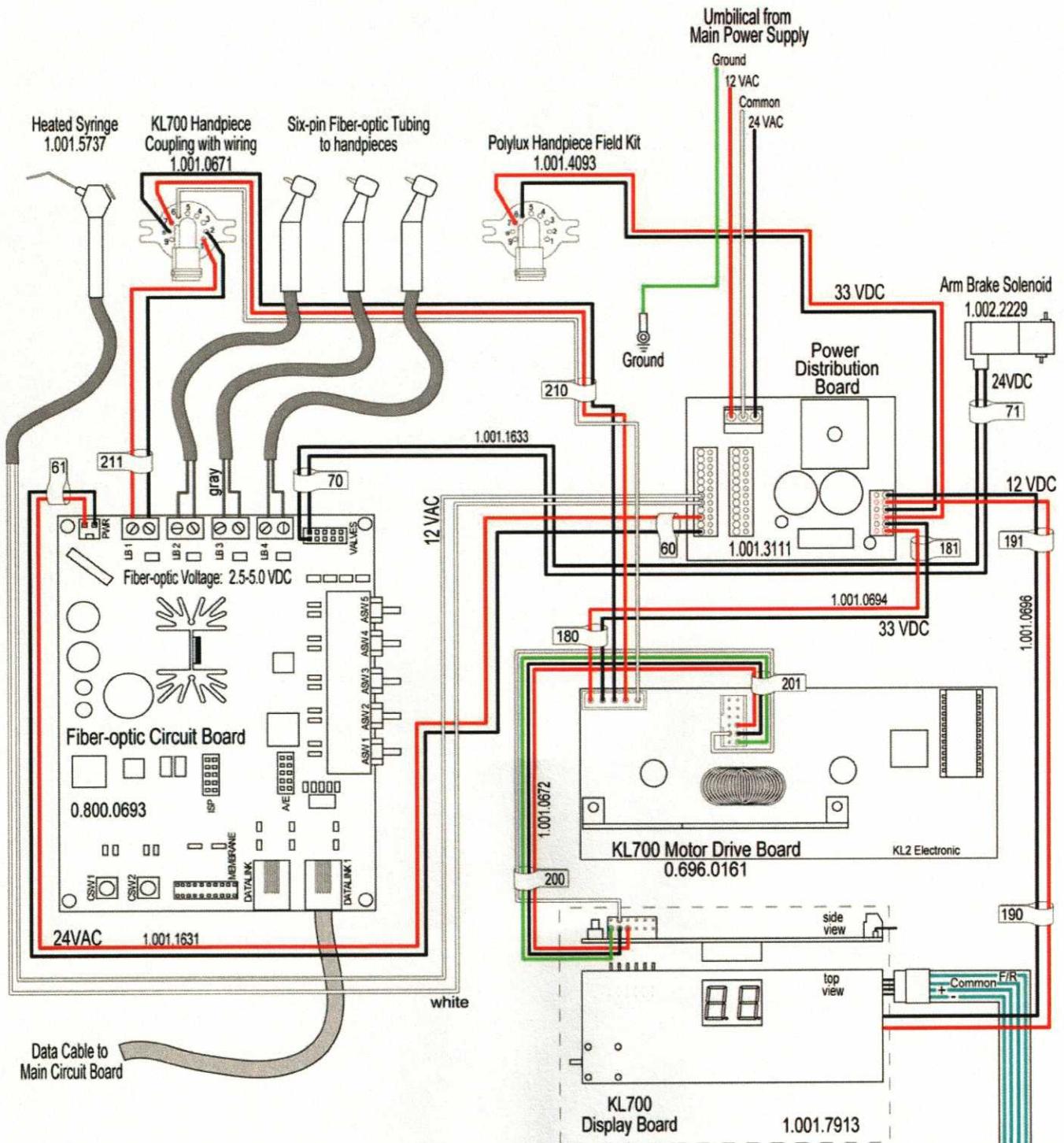
Data Cable Configuration Diagram



KaVo. Dental Excellence.

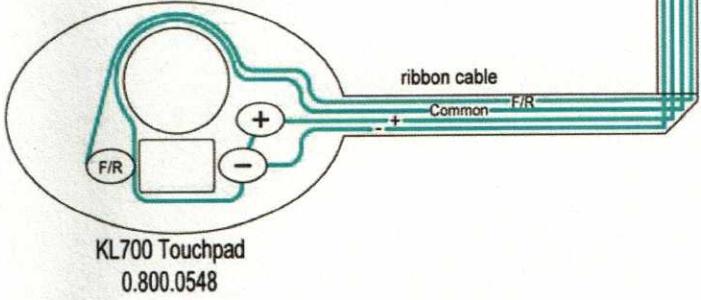


Control Head Wiring Schematic

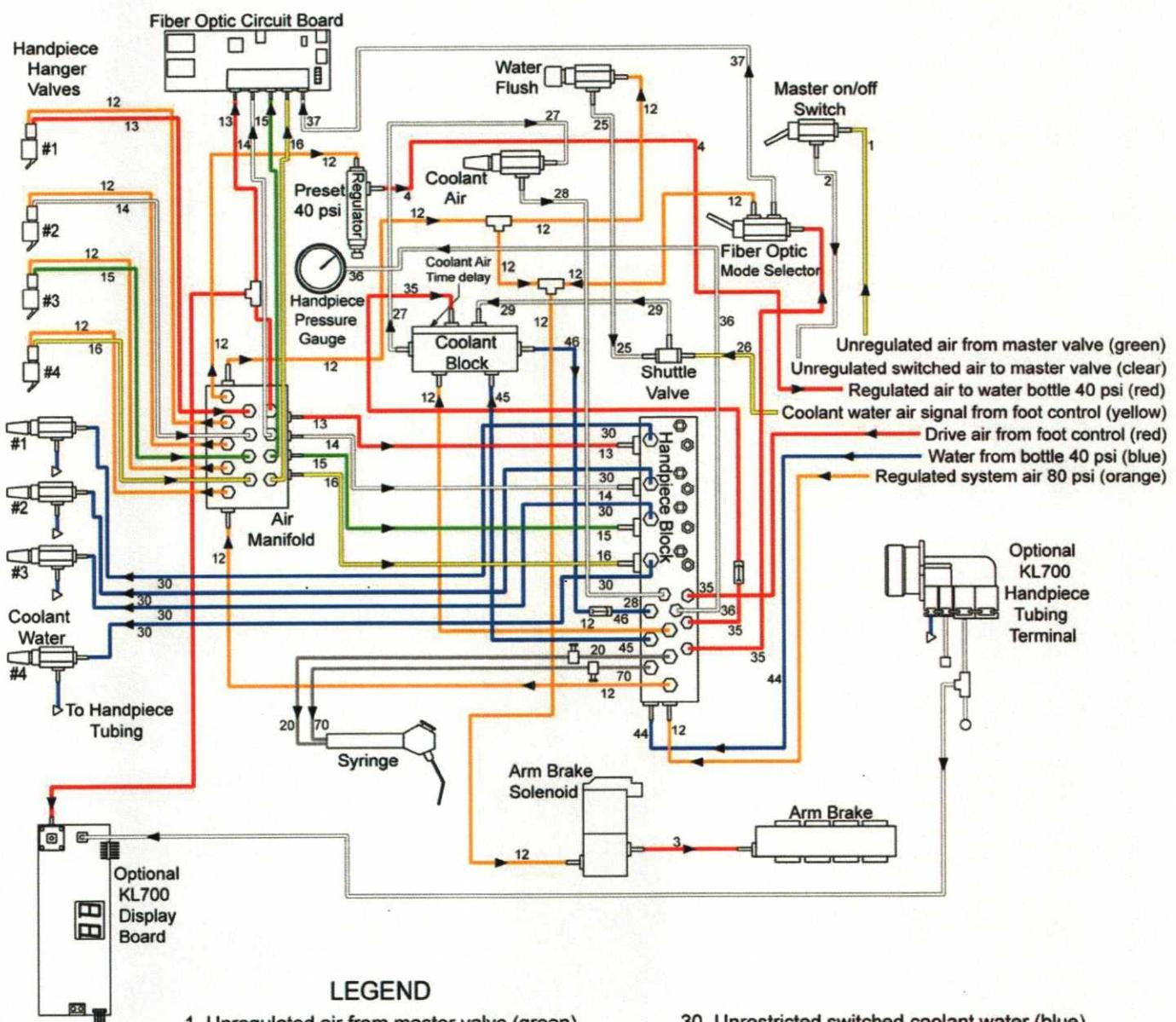


LEGEND

 180	Wiring Identification Tags
1.001.0694	Wiring Harness Part Numbers
0.800.0693	Kit and Component Part Numbers
	Black Wires
	Red Wires
	White Wires
	Blue Wires
	Green Wires
	Gray Wires



Control Head Air/Water Schematic



LEGEND

- | | |
|--------------------------------------------------------|--------------------------------------------------------|
| 1 Unregulated air from master valve (green) | 30 Unrestricted switched coolant water (blue) |
| 2 Unregulated switched air to master valve (clear) | 35 Drive air from foot control (red) |
| 3 Arm brake air (red) | 36 Drive air to gauge (clear) |
| 4 Regulated air to water bottle 40 psi (red) | 37 Fiber optic mode selector (clear) |
| 12 Regulated system air 80 psi (orange) | 44 Water from bottle 40 psi (blue) |
| 13 Handpiece #1 on (red) | 45 Coolant water from manifold to coolant block (blue) |
| 14 Handpiece #2 on (clear) | 46 Switched coolant water (blue) |
| 15 Handpiece #3 on (green) | 70 Syringe water (gray) |
| 16 Handpiece #4 on (yellow) | ▲ Shuttle valve |
| 20 Syringe air (gray) | □ Tee fitting |
| 25 Purge air (clear) | ■ Flow restrictor |
| 26 Coolant water air signal from foot control (yellow) | ■ Check valve |
| 27 Unrestricted switched coolant air (clear) | ○ Drive air |
| 28 Flow controlled switched coolant air (clear) | ▷ Coolant water |
| 29 Coolant water air signal (clear) | □ Coolant air |

