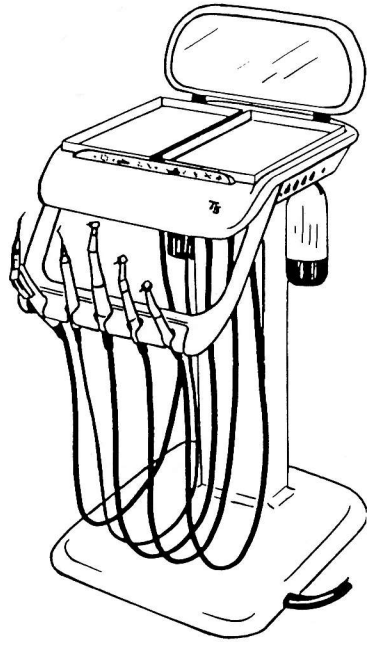
TRIONIC 5

CE 0120

OPERATING GUIDE

86 1017 ISSUE 2



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FIGURES

THE TRIONIC 5 DENTAL DELIVERY UNIT

1) FUNCTIONAL DESCRIPTION

The Trionic 5 is a pilot air controlled dental unit, designed to provide, as appropriate, drive air, spray air and spray water to industry standard, air powered dental instruments, such as high speed turbine handpieces, low speed air motors, air powered 'sonic' scalers and a 3in1 air/water syringe. Automatic selection control is provided, to ensure that the required services are switched through to the instrument in use.
Controls are also provided to allow the adjustment of air and water flows to suit the instrument fitted and to adjust the degree of spray to that desired.

By linking the air control system to air/electric converters, the capability of the Trionic 5 is extended to the control of electrically powered instruments, allowing the customer to choose from a range of electric micromotors, piezo-electric ultrasonic scaler and composite curing light, if preferred. There is also an option of a low voltage power source and appropriate instrument hoses, to allow the use of suitable instruments incorporating fibre optic illumination.

The air operated foot control supplied with the unit incorporates a variable pressure regulator, the output of which increases with increasing lateral movement of the control's lever. It is thus possible to control the speed of rotary instruments.
A pilot valve in the foot control may be engaged/disengaged by actuation of the spray select buttons. When engaged, this valve is operated early in the movement of the foot control lever and the signal used to open the spray air and water valves in the unit and thus provide coolant to the handpiece in use.
A second pilot valve in the foot contol operates when lever movement is to the right of centre and this signal is used to reverse the direction of electric micromotors, if fitted.

A pressurised water bottle system is used to provide spray coolant for the unit, so that it can be installed without dependence on a mains water supply. Such independence is often a mandatory requirement according to the interpretation of bye laws by the local water company.
The coolant system incorporates twin bottles and the facility to switch between one bottle and the other at the press of a switch.

Power to the electrical circuits of the Trionic 5 is derived from a safety extra low voltage supply (24 volt a.c transformer). The 'basic' circuitry incorporated into the 'motherboard' of each unit acts to 'interface' the mebrane switch panel and indicator lamps to other circuit elements. A unit specifiedwith air instrumentation only still utilises the basic circuitry, to power the 3in1 syringe water heater and on/off switch and to control the selection of coolant from botlle A or bottle B, via a solenoid valve.

Since the basis of the unit control is by pneumatic means, the removal of electrical power to the unit will not be catastrophic : operation will 'drop back' to provide normal control of **air** powered instruments, with coolant available from one of the bottles.

2) ELECTROMAGNETIC ENVIRONMENT

The Trionic 5 unit has been designed to satisfy the electromagnetic compatibility (EMC) requirements of international standard EN 60601-1-2. This means that it should operate within its intended environment of use without causing unacceptable deterioration in the performance of other electrical apparatus or appliances and also that it should operate without unacceptable deterioration in its' own performance as a result of the operation of such apparatus or appliances.

The intended environments of use envisaged for the Trionic 5 are dental surgeries as typically found in domestic, commercial and light industrial premises, as well as general medical premises, such as hospital dental departments and clinics.

Should adverse effects be noted in the operation of the Trionic unit or should it be suspected that operation of the unit is causing adverse effects in other electrical equipment as a result of EMC performance, users should contact Tridac for guidance and advice.

Examples of adverse effects in the operation of the unit are uninvoked changes of the electrical control settings, such as scaler power, micromotor speed, water source selection, syringe heater and X-Ray viewer on/off.

3) SERVICING AND REPAIRS

Repairs and servicing should be entrusted to the supplier of the equipment who will have the appropriately qualified personnel to carry out such tasks. Should any difficulty be experienced in obtaining satisfactory service, users should contact Tridac for advice.

Circuit diagrams and component part identification will be made available by Tridac to suitably qualified personnel, as well as guidance and advice on the repair of those parts deemed repairable. Repairers requiring assistance may contact Tridac by telephone on +44 (0)1923 242398, or write to the adress given in the specifications section of this booklet.

4) SPECIFICATIONS AND RATINGS

Manufacturer	Tridac Ltd. Elton House Bushey Hall Road Watford Herts. WD2 2HJ England
Model Reference	Trionic 5
Part Numbers	23 1125 Cart Unit 23 1126 Module Unit 23 1127 Chair Mounting Unit
Transport and Storage	The unit and its' packaging are suitable for transport and storage in an environment with a temperature range of 0 to 50 deg. C and relative humidity of 30% to 95%
Installation Type	Permanently installed
Equipment Classification	Class 1 Warning: This equipment must be earthed
Equipment type	Type B
Anaesthetic Category	NOT AP/APG Do not use near flammable gases
Electricity Supply :	230 Volts
Phase	Single Phase
Frequency	50Hz.
Rating (Trionic Unit)	< 100 milliamps, minimum configuration 500 milliamps, maximum configuration, under maximum intermittent loading.

Note : the mains input fuse fitted to the floor type service box is rated at 13 Amps, to allow for connection of auxiliary equipment. The mains transformer for the unit is internally thermally protected and is fused separately at T1.0 Amp, in the control box.

Rating (floor connection box)	Max. permissible loading 13 Amps Total including auxillary outlet.
Mode of operation :	Continuous, with intermittent loading.

Note : intermittent loading applies, for example, if an electric micromotor is used and when it is loaded by application of a bur or brush. The maximum rating of the unit will occur if the micromotor is close to stalling.

Mains input fuse

Floor type services box	13 Amp. 1" x 1/4" ceramic to BS 1362
Wall type control box	T 1.0 Amp 20 mm x 5 mm, glass, IEC 127

Auxiliary Mains Socket	The floor type services box incorporates a switched socket outlet intended for connection of a dental chair. DO NOT use this socket for heavy loads, like room heaters..
Maximum Output	6.3 Amps
Water Supply (if applicable)	Minimum 1.7 bar (25 PSI) Maximum 8.2 bar (120PSI)

Note : Water Bye Laws may be breached by direct connection of the unit to a mains water supply. Check with your local water company, before installation.

Air Supply	Minimum 5.5 bar (80 PSI) Maximum 8.2 bar (120 PSI) Flow : Approximately 30 to 45 litres/minute at the stated pressures.

Note: the maximum flow in practice will depend on the consumption of particular air powered instruments used. Flow rates vary significantly between instruments from different manufacturers.

Working pressure	High pressure air (regulator AR1)	5.5 bar (80 PSI)
(Factory settings)	Low pressure air (regulator AR2)	2.7 bar (40 PSI)
	Water (regulator WR1,if applicable)	2.4 bar (35 PSI)

Note that the water regulator is redundant, when no external water supply is in use. DO NOT adjust air instrument running pressures by adjusting AR1. This must be left at approximately 5.5 bar. Use the adjusting screws set in the top of the instrument control blocks to adjust running pressures, with a suitable handpiece gauge attached.

ACCESSORIES

The Trionic 5 is either supplied with, or intended for use with, handpieces and accessories which have been accounted for in the design of the equipment, to provide safe and reliable operation. It is important to observe the following specifications when adding or replacing items. Seek technical advice if not replacing like with like, as compatibility must be ensured.

Micromotor Types

The current type of micromotor, fitted as standard, is a Bien Air MC3 type, either optic or non optic, to order. Earlier units will have been fitted with MC2 or ISOLITE types.

SR = 'E' fitting, i.e. external spray from front of motor to attached handpiece

IR = 'E' INTRAmatic, i.e. fully internal spray to and through attached 'E' INTRAmatic hanpieces.

Micromotor Types (contd.)

20,000 RPM :	Bien Air MC2 20 IR	or	MC2 20SR
40,000 RPM :	Bien Air MC2 40 IR	or	MC2 40 SR
40,000 RPM :	Bien Air MC3 IR	or	MC3 SR
40,000 RPM, Fibre Optic :	Bien Air Isolite 300		
40,000 RPM, Fibre Optic :	Bien Air Isolite 100		
40,000 RPM , Fibre Optic	Bien Air MC3 LK IR		

Maximum drive voltage	24 Volts d.c. nominal, at hose terminals. (motor running full speed, but unloaded.)
Fibre optic supply voltage	3.5 Volts d.c. nominal.

Ultrasonic Scaler	Amdent model 930, piezo electric
Oscillation frequency	25 kHz. nominal
Max. electrical input power	24 Watts @ 24 Volts A.C. supply

WARNING:- NOT TO BE USED ON PATIENTS WITH CARDIAC PACEMAKERS

Air Powered Instruments	The unit is designed to accept industry standard Airmotors, High Speed Turbines and Sonic Scalers, with Borden 2 & 3 hole or Midwest 4 hole couplings.
Air Powered Instruments with Fibre Optics	The unit provides 6 hole 'Midwest' style hoses, suitable for connection to mating instruments and / or hose couplings, where the bulb is located either in the coupling or in the instrument itself.
Standard Bulb Rating	3.5 volts @ approx. 700 mAmps..
Maximum Allowable Current	900 mAmps.
Curing Light	Satelec: model SL4055
Radiograph Viewer	Only the Tridac Trionic 5 radiograph viewer is suitable. This operates from low voltage D.C. derived inside the unit. Connection of other viewers is liable to damage the unit and may render it unsafe.
Heated Water 3in1 Syringe	Only the Tridac heated water syringe, supplied with the unit, is suitable for connection to the low voltage heater supply.

3in1 Syringe (contd.)

Rated Supp,y Voltage	24 Volts a.c. nominal
Working Suply Voltage	Adjustable, nominally 16 Volts to 25 Volts
Maximum Heater Power	4.2 Watts @ 25 Volts

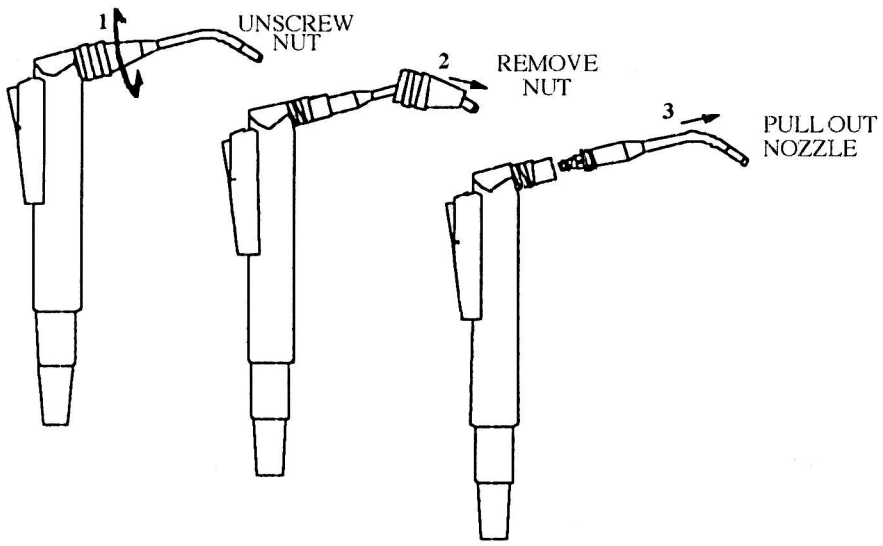
Spittoon Units	The Trionic control panel includes two membrane switches designed to allow the remote operation of the Bowl Flush and Tumbler Filler of suitably specified Tridac CS90 and CS'M' spittoons.
Maximum switch rating	24 Volts A.C. (Safety Extra Low Voltage) 1.0 Watt, resistive load.

Note : If adapting to third party units, the integrity of the low voltage supply must be confirmed as complying with BS EN 60601-1 and the switch ratings must be adhered to. NOT TO BE USED ON HIGH ER OR MAINS VOLTAGES.

5) CONNECTION AND DISCONNECTION OF ACCESSORIES

Syringe Nozzle

The Trionic 5 is supplied with a 3in1 syringe which features a detachable nozzle, allowing the latter to be cleaned and autoclaved. To detach the nozzle, remove the conically shaped nozzle nut and pull the nozzle from the nozzle connector. Follow the reverse procedure to attach the nozzle : ensure that the nut is screwed fully on, but note that it need only be finger tight, DO NOT USE TOOLS.

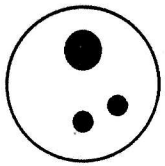


Handpieces

The unit is supplied with handpiece tubings which accept industry standard handpiece connectors, of various styles. All are tightened to the hose by their respective hose nuts, which use right hand threads. The threads are fine and great care should be taken to ensure that they are not crossed : hold the nut and handpiece square with each other and use as little force as possible when 'starting' the thread. Continue to tighten when there is an easy feel to the mating of threads. Tighten firmly to ensure that the handpiece gasket is compressed sufficiently to prevent air and water leaks.

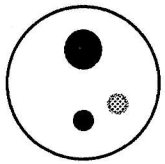
Depending on the ordering specification, one or more of the following fitting styles will be fitted. The illustrations show the hose ends. Align the holes and tubes as indicated :

Ensure that the foot control is NOT OPERATED, when attaching/detaching instruments.



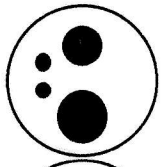
Borden 3 Hole

Align the three corresponding handpiece tubes.



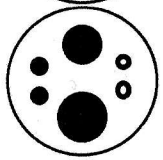
Borden 2 Hole

Align the two tubes with the holes shown vertically in line.
Note:The third hole in the hose coupling will be blanked off by the handpiece gasket (shown dotted) when a 2 hole handpiece is used. Thus the same hose is used for both 2 & 3 hole handpiece fitting styles.

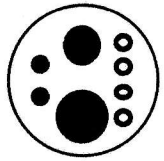


Midwest 4 Hole

Align the four corresponding handpiece tubes .

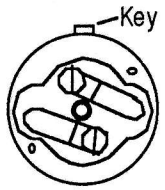


Midwest 6 Hole (electrified, for fibre optics)
Align the four corresponding handpiece tubes and two electrical contacts, shown on the right.
Note: The smaller of the two large holes , shown at the top, is the drive air input. Identifying this may assist in correct alignment.



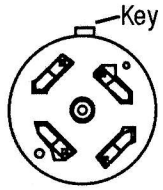
Bien Air 4VLM
Supplied for connection of MC3 micromotors.
Align the four corresponding handpiece tubes and four electrical contacts, shown on the right.

Earlier Micromotors



MC 2 types

Align the key of the hose coupling with the cut -out in the motor threads.



ISOLITE types

Align the key of the hose coupling with the cut -out in the motor threads.

Ultrasonic Scaler Tips and Curing Light
Refer to the individual manufacturer's booklets, supplied with the unit.

6) OPERATING INSTRUCTIONS

Before operating the unit, ensure that your installer has set the unit with the correct air and water pressures and particularly that an in-line handpiece gauge has been used to adjust the running pressure of air powered instruments, like air motors and turbines, to the manufacturer's recommended values.

6.1) Height Adjustment See figure 1 for further guidance.
Standing to the rear of the unit when making adjustments will allow a proper lifting posture and lifting where indicated will result in the least strain being placed on the unit. When lowering the unit, keep clear of projections or sharps which could cause injury.

Increasing the height of the work surface on cart and chair mounted units is accomplished by simply grasping the rear underside of the unit and lifting upwards. The unit will stay in position when released.
With the cart unit, it may be necessary to rest the ball of the foot on the rear of the cart base in order to prevent the base from lifting. Protect the surface of the cart base, if applying pressure by foot, to avoid scuffing.

Decreasing the height of the unit is accomplished by moving and holding the catch knob upwards, identified in the diagram, then exerting downward pressure on the back of the unit. If after a long period in one position, the catch knob is difficult to move, lift the unit a little upward and try again.
Releasing the catch knob will again lock the unit in position. Check that the catch knob is properly down when adjustment is finished.

Vertical motion of the unit is controlled by a damping device, to prevent the unit crashing downwards. Thus there is resistance to movement which can make it feel stiff. Continued downward pressure, rather than an increase in force, will result in the desired downward movement. DO NOT be tempted to lubricate the damping device inside the unit. This would result in virtual complete loss of damping.

6.2) Turning On See figures 2 & 3 for identification of shut off valves and switches.
First, turn on the air supply, by turning the lever through 90 degrees, in the direction of the arrow.

IF an external water supply is connected, turn it on in the same manner.

Observe that there are no air or water leaks and then switch on the electricity supply, by moving the green rocker switch/indicator to the I position. The indicator will light.

...TURNING ON contd.
With the power now on, observe the states of the control panel indicators. (figure 6)

IMPORTANT
It is **essential** to reset the water source selector **to position A** before proceeding. Switching to A is used to reset an internal circuit. (A false B indication may be given if it occurs when switching on from the mains.) Thereafter, A and B may be selected at will.

Change the settings to those desired at the beginning of the work session by operating the appropriate buttons. (see figure 6 for details)
When scaler and/or micromotor are fitted, the power and speed limit settings may come on at any position on the scale. It is good practice to reset the scaler and micromotor settings to position 1, before starting work.

When the scaler and/or micromotor are not fitted options, the relevant indicator lamps will remain illuminated in the No.8 and No. 4 positions , respectively, to act as power on indicators

6.3) Liquid Coolant At the ordering or installation stage, the unit will have been configured to either :

a) Switch between an external water supply and the bottles, or
b) Switch between bottle A and bottle B, with no external supply.

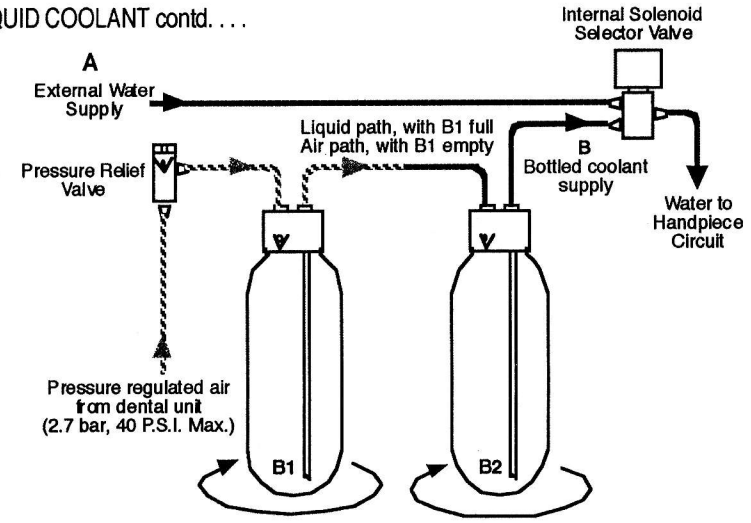
The different schemes are described below, with simplified schematics for clarification.

With either scheme, the reservoir bottles are screwed into special 'caps' housed in the unit head. These caps are fitted with a restrictor valve, so that the bottles may be removed, even when pressurised by the air supply. Escape of air is limited to a small hiss.

To remove a bottle for filling, grasp it around the 'shoulder', which is a stronger part, and unscrew in the direction shown by the arrows in the diagrams. Fill to a level below the neck and replace, by screwing up in the opposite direction. DO NOT over tighten. When the bottle is seated, the hiss will be heard to die away, giving assurance of a seal. Note that air pressure building up in the bottle makes it easier to handle, so slowly refitting is an advantage.

Scheme a)
Pressing button B on the touch panel will select the bottled water supply and light the indicator adjacent to the button. In this mode, the contents of bottle B2 (right hand one, viewed from the front of the unit) will be diverted to the handpiece circuit. Simultaneously, the contents of bottle B1 will be expressed into bottle B2 to replace the liquid used. Thus the contents of B2 will appear to remain constant, while the level in B1 will drop.

Once B1 is empty, only then will the contents of B2 begin to drop.



Scheme a) : Switch between External Water and Bottle

Removing bottle B1 cuts off the pressurising supply to B2 and so, to continue working with the bottle removed, it is necessary to select water source A. (external supply)

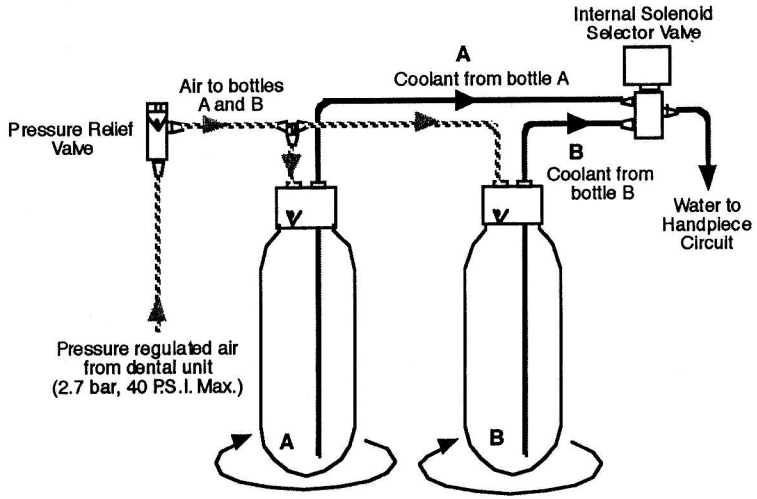
From the above, it is apparent that there should be no need to remove bottle B2, when contents remain in B1. Note however that if this is done, B1 contents will be expressed onto the floor !

Pressing button A on the touch panel will select the external water supply and light the indicator adjacent to the button.
Nevertheless the water bottles will remain under air pressure and if both bottles are to be removed, then B1 should be removed first, followed by B2, for the reason previously stated.

Scheme b)
With scheme b), there is no external water connection. This can be helpful where local bye-laws prohibit connection to the mains water supply and where no independent, pressurised supply is available.

Pressing button A on the touch panel will divert the contents of bottle A (left hand bottle, when viewed from the front of the unit) to the handpiece circuit and light the indicator adjacent to the button. The contents of A will then be expressed independently of the contents of bottle B.

Pressing button B will likewise divert the contents of bottle B to the handpiece circuit, independently of A and light the indicator adjacent to the button.



Scheme b): Switch Between Bottle A and Bottle B

Reminder : Button A must be pressed after switching electricity on from the mains. B may subsequently be selected, if desired.

Since the bottles work independently, it is possible to refill the idle one while work continues with the other.

General :

DO check the bottles regularly for damage and discard suspect ones - they are inexpensive tc replace. Use of bottles with nicks and cuts should particularly be avoided.

DO replace bottles routinely, even when apparently not damaged, as plastics can deteriorate through atmospheric and daylight exposure. Replacement at least twice per annum is recommended.

DO NOT allow the bottle in use to run out of coolant. Air can then enter the spray circuits and is a cause of spluttering at shut off (see section 9.3).

DO NOT remove a bottle which is in use, as this may also allow air to enter the spray circuits.

DO NOT use agressive irrigants which may damage the unit or hanpieces.

6.4) Operation of Instruments

The unit is specified for the operation of one instrument at a time.

When lifting an instrument from its holder, a small air leak is allowed from the instrument holder valve (bleed valve). This signal is sensed by the unit which then automatically primes air, water and electrical supplies, as appropriate, for the selected instrument. Operation of the foot control then completes the function of feeding the requisite supplies through the instrument in use.

Foot Control Functions.

Figure 4 explains the foot control functions. The handle will lock the lever for safety when changing burs or tips. Raising the handle unlocks the lever. Tucking the toe of the shoe under the raised handle allows the control to be lifted and moved, without hands. After placement, push the handle back, to rest on the umbilical where it exits the rear. DO NOT leave the foot control lever in its raised position. It may be vulnerable to items being lowered onto it. Operate the lever with the side of the foot. Choose wet or dry operation by use of the spray select buttons.

Note that for electric micromotors, the direction of lever movement automatically determines forward/reverse of the motor, but that for air instruments the control has no influence on direction.

Output from the foot control, and hence the speed of rotary instruments, varies with the degree of movement of the lever. However, If a piezo ultrasonic scaler is fitted, the control acts as purely on/off and does not affect power. Note that water spray MUST be selected for the ultrasonic to work.

Electric Micromotors

A top speed limit may be set (refer to figure 6). This prevents the operator from exceeding a desired speed. The foot control then gives variation from the start up speed to the set limit.

Note that on limit 1, there is only a small foot control movement between the start up speed (dictated by the Bien Air controller) and the limit speed.

The speed ranges are intended to allow the dental surgeon to subjectively determine a desirable maximum according to the nature of work.

Ultrasonic Scaler

The power setting of the scaler may be chosen as one of 8 steps. (See figure 6)

Refer to the Amdent booklet for information on the use of the scaler. Also see the notes under section 9) 'Precautions'

Spray Controls

The amount of water in the spray to individual instruments is adjustable by the spray water control valves (See figure 5). The controls may be operated by hand or alternatively, by the autoclavable key supplied. This is inserted through the small hole in the centre of the control knobs.

A master spray air control is also provided. This varies the amount of spray air and is common to all instruments. Note that some high speed turbines require spray air, but others do not, they bleed off some of the drive air. If your turbine requires spray air, then only water jets would be evident when the spray air control is turned right down.

Low speed motors do generally require spray air. Adjust the amount to suit your preference, but see the notes in section 12.7.vi regarding the balance of pressures.

Flush Control

Pressing the flush button will bypass the restriction of the water spray control valve and direct a full flow of water through the selected instrument.

It is a good idea to use the flush facility after each use of an instrument, to reduce the risk that contaminants have been drawn back into it. Using the flush button makes a simple contribution to the reduction of cross infection risks.

6.5) Tumbler and Bowl Flush Buttons.

These are simple membrane switches designed to be used with the Tridac CS90 and CS'M' spittoon units, when requested with remote tumbler and bowl flush operation. They may be used with other products provided that the switch ratings are rigidly adhered to and that the circuit they are used in complies with the Safety Extra Low Voltage requirements of International Standard BS EN 60601-1. This will often mean introducing an isolating relay or similar between the host product and the Trionic switch circuit. Contact your supplier for advice.

Note : Timing of the bowl flush and tumbler fill circuits of the Tridac spittoons commences when the operating button is released.

6.6) Syringe Heater, Radiograph Viewer and Water Source Buttons.

Refer to the details given in Figure 6.

Figure 1 SIDE VIEW, SHOWING HEIGHT ADJUSTMENT DETAILS

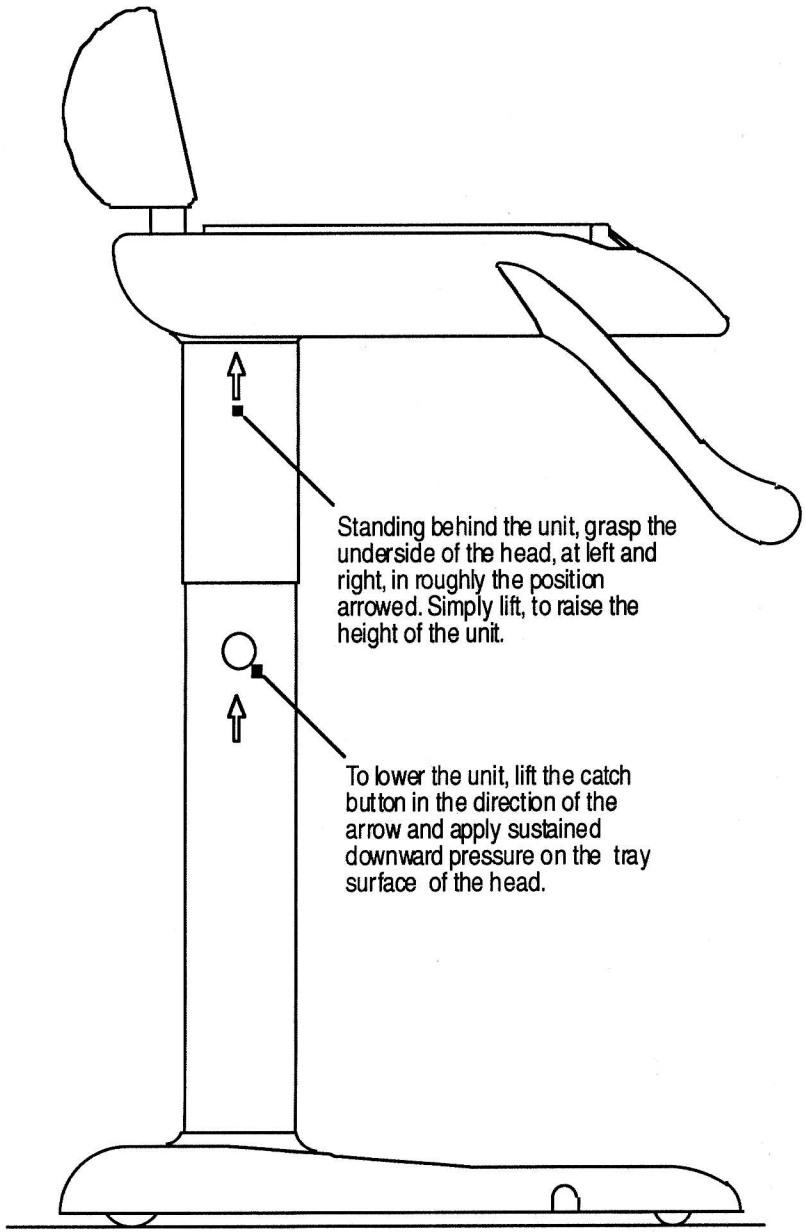


Figure 2 FLOOR SERVICES BOX (CART & CHAIR MOUNT UNITS

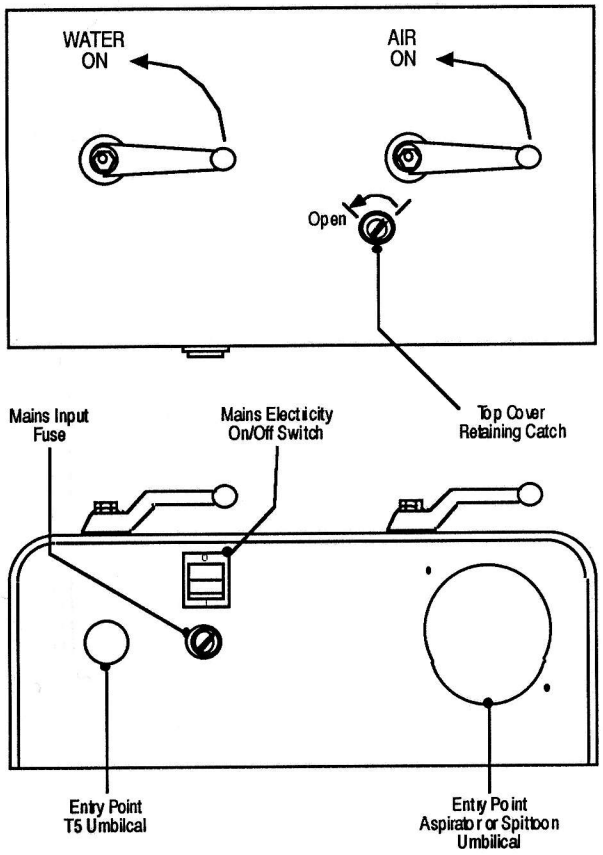


Figure 3 WALL MOUNT SERVICES BOX (MODULE UNITS)

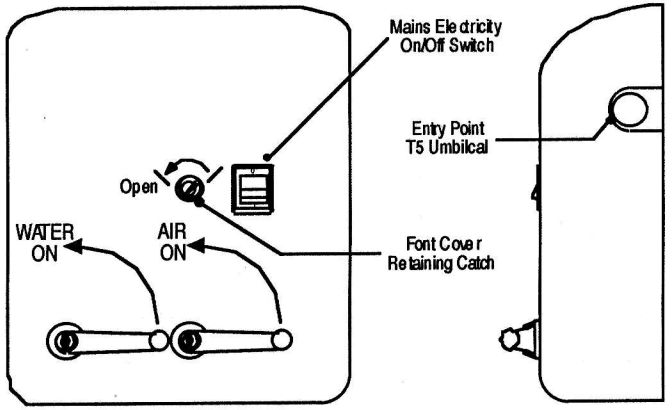
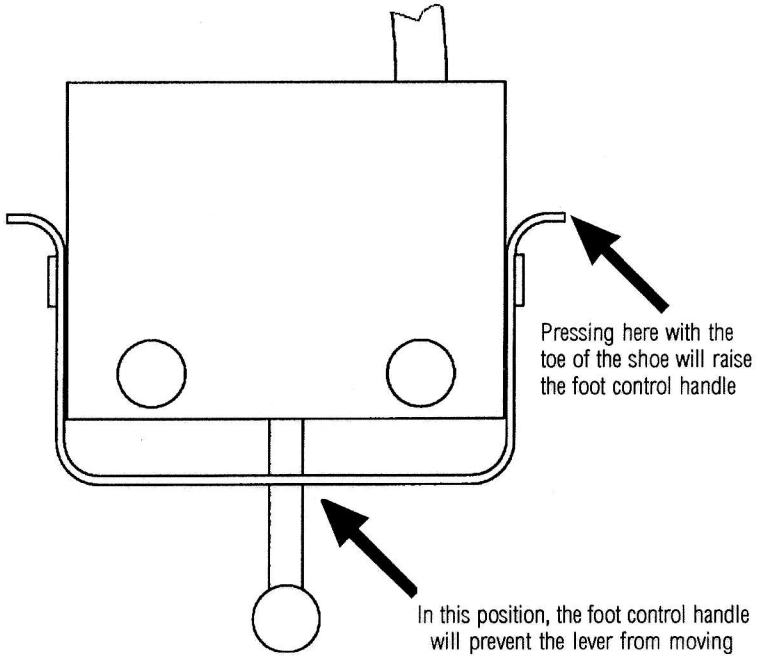


Figure 4 FOOT CONTROL FUNCTIONS



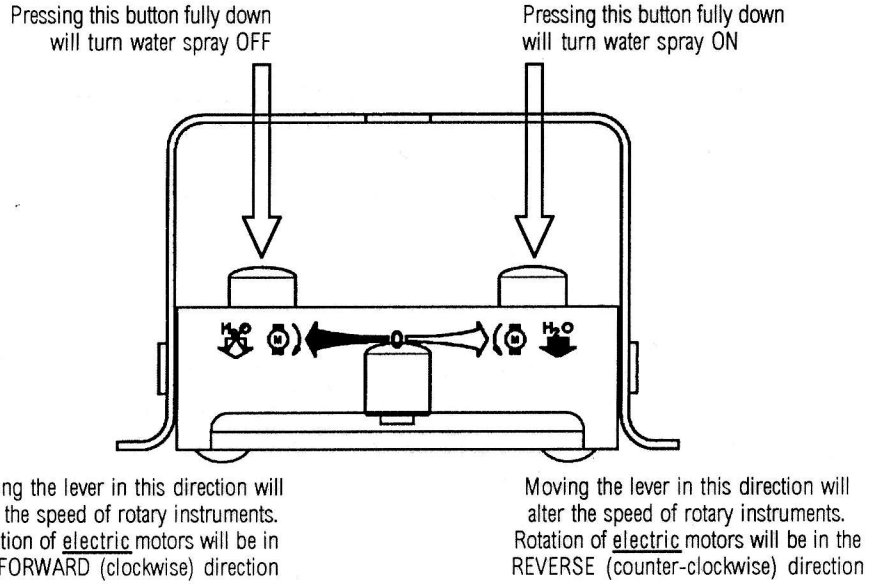
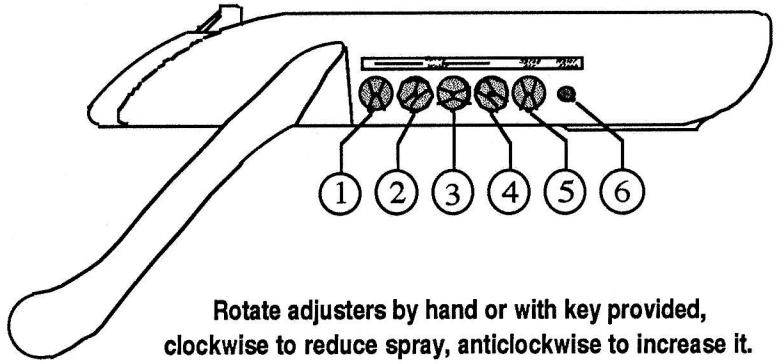
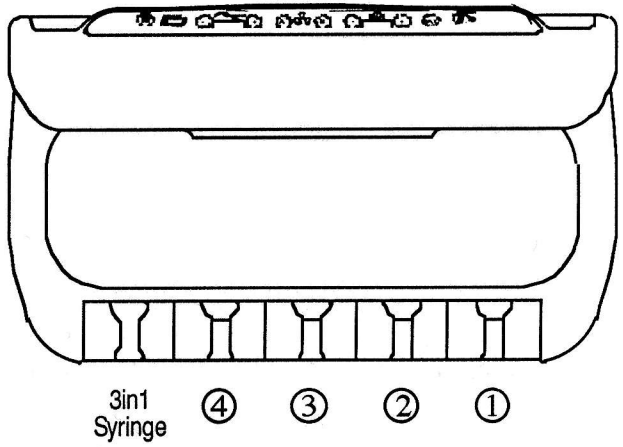


Figure 5 SPRAY CONTROLS AND POSITIONS



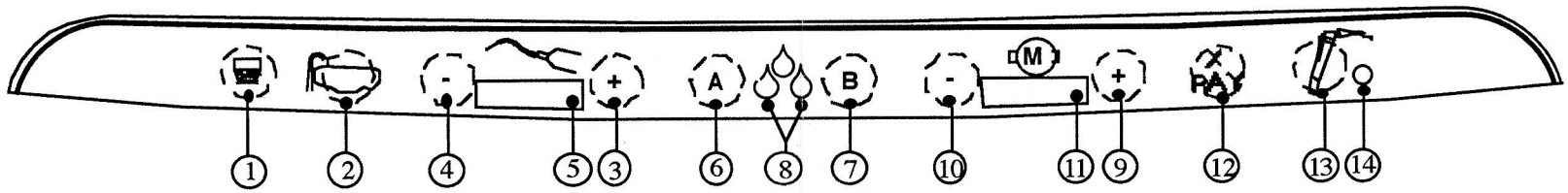
Rotate adjusters by hand or with key provided, clockwise to reduce spray, anticlockwise to increase it.

1) Spray water adjuster for instrument in position 1.
2) Spray water adjuster for instrument in position 2.
3) Spray water adjuster for instrument in position 3.
4) Spray water adjuster for instrument in position 4.
5) Spray AIR adjuster, common to instruments in all 4 positions.
6) Flush control. Press to purge coolant liquid through instruments which are selected (instruments 1 to 4).



Instrument positions

Fig. 6 : Control Panel Functions and Indicators



① **Tumbler Fill Button -** This button is only operative when the Trionic unit is used in conjunction with a suitable spittoon unit, e.g. Tridac CS'M' with remote tumbler fill option. A momentary press will trigger the spittoon timer to fill the mouthwash tumbler. No audible signal is emitted when this button is pressed. MAX LOAD : 24 Volts, 1.0 Watt, Resistive

② **Bowl Flush Button -** This button is only operative when the Trionic unit is used in conjunction with a suitable spittoon unit, e.g. Tridac CS'M' with remote bowl flush option. A momentary press will trigger the spittoon timer to flush the spittoon bowl. No audible signal is emitted when this button is pressed. MAX LOAD : 24 Volts, 1.0 Watt, Resistive

③ **Scaler Power Up -** This button is only operative if the piezo ultrasonic scaler option has been installed. A momentary press of this button will increment the scaler tip power by one step. Holding this button down will cause the scaler output to increment successively. Once at maximum power, the next step will return the power setting to minimum and the sequence will start again. Steps are confirmed by an audible 'bleep'.

④ **Scaler Power Down -** This button is only operative if the piezo ultrasonic scaler option has been installed. A momentary press of this button will decrement the scaler tip power by one step. Holding this button down will cause the scaler output to decrement successively. Steps are confirmed by an audible 'bleep'. Once at minimum power, no further change of setting will occur even if the button is kept depressed, although bleeps will sound.

⑤ **Scaler Power Indicator -** The indicator light will assume one of eight positions to signify the current output power setting. When the ultrasonic scaler option has not been installed, the indicator light will remain lit in the number 8 position.

⑥ **Irrigant Source A -** Pressing this button will select the source of coolant spray designated 'A'. This will be either the left hand bottle (viewed from the front of the unit), or an external water supply, depending on the mode chosen at installation. Bleeps will sound while the button is kept depressed, but only one transition will occur(i.e. B to A)

⑦ **Irrigant Source B -** Pressing this button will select the source of coolant spray designated 'B'. This will be either the right hand bottle (viewed from the front of the unit) or simply both bottles in tandem, if source A has been installed as an external supply. Bleeps will sound while the button is kept depressed, but only one transition will occur (i.e. A to B)

⑧ **Irrigant Source Indicators -** The appropriate indicator will light, adjacent to the source button of the irrigant currently on line.

⑨ **Micromotor Speed Limit Up -** This button is only operative if the electric micromotor option has been installed. A momentary press of this button will increment the speed limit by one step. Holding this button down will cause the limit to increment successively. Once at maximum the next step will return the limit to minimum and the sequence will start again. Steps are confirmed by an audible 'bleep'.

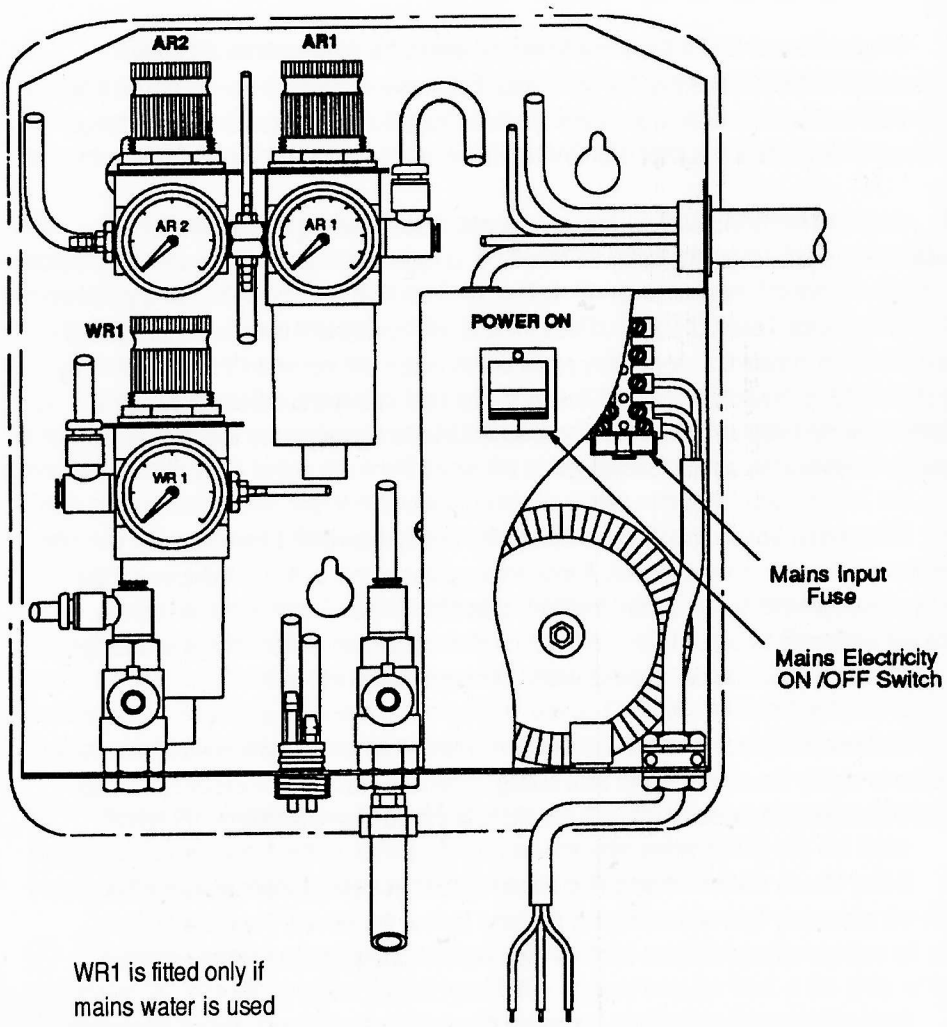
⑩ **Micromotor Speed Limit Down -** This button is only operative if the electric micromotor option has been installed. A momentary press of this button will decrement the limit by one step. Holding this button down will cause the limit to decrement successively. Steps are confirmed by an audible 'bleep'. Once at minimum, no further change of setting will occur even if the button is kept depressed, although bleeps will sound.

⑪ **Micromotor Speed Limit Indicator -** The indicator light will assume one of four positions to signify the current speed limit setting. When the electric micromotor option has not been installed, the indicator light will remain lit in the number 4 position.

⑫ **X-Ray Viewer Switch -** If an X-Ray viewer option has been chosen, pressing this switch will alternately light and extinguish the lamp behind the screen. Press the button briefly for a single change from on to off or vice versa. Audible bleeps confirm operation.

⑬ **Syringe Water Heater Switch -** Pressing this switch will alternately switch on and off the syringe heater element. Press the button briefly for a single change from on to off or vice versa. Audible bleeps confirm operation.
When the heater is ON, the indicator ⑭ will be lit.

Figure 7 WALL MOUNT CONTROL BOX & REGULATORS



WR1 is fitted only if mains water is used

Figure 8 STAND UPRIGHT & REGULATORS

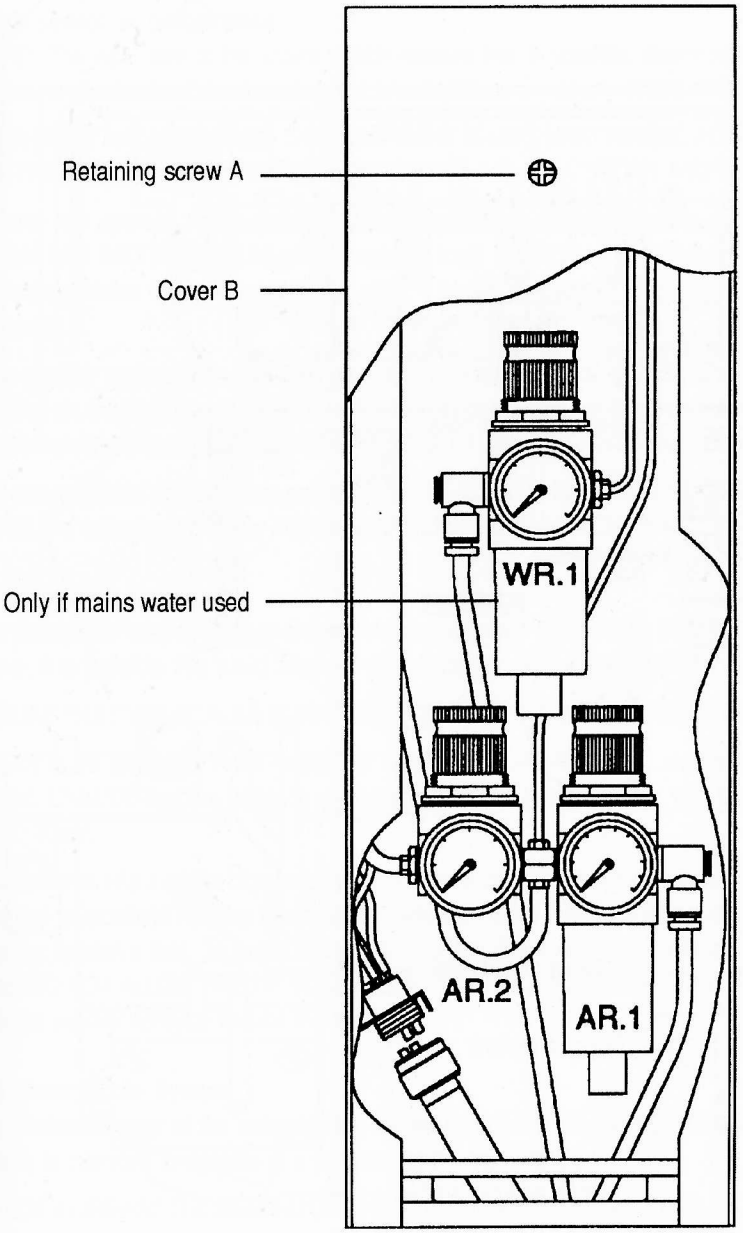
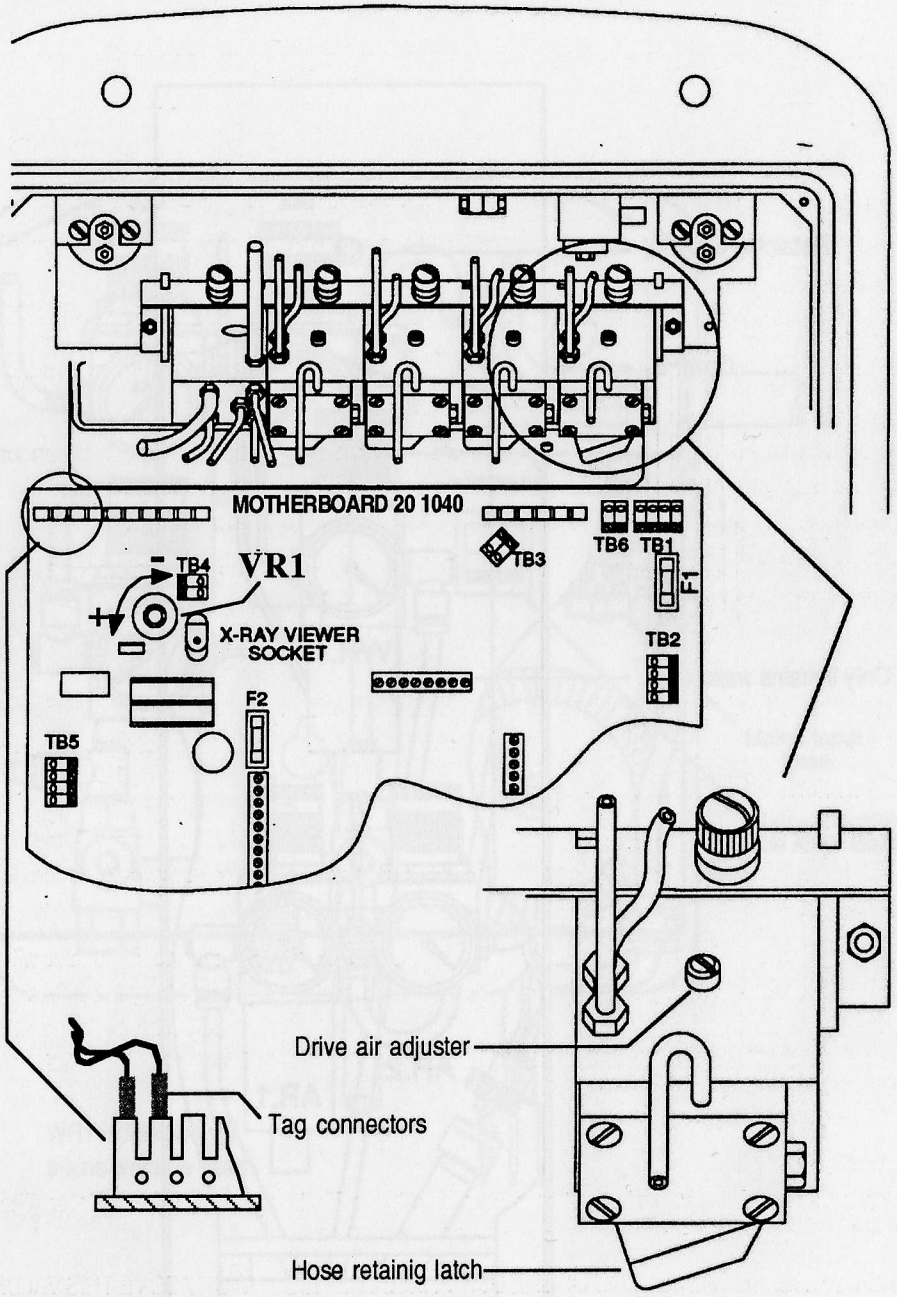


Figure 9 DRIVE AIR & SYRINGE HEATER ADJUSTERS



7) PRECAUTIONS

7.1) General Safety

Mains voltages are present in control boxes :- DISCONNECT THE ELECTRICAL SUPPLY before service or maintenance.

NOTE: The input side of the mains switch remains live. If possible, disconnect the supply at the mains distribution board serving the installation.

EACH NIGHT AND WHENEVER THE EQUIPMENT IS LEFT UNATTENDED FOR LONG PERIODS USE THE CONTROLS PROVIDED TO SWITCH OFF AIR, ELECTRICITY AND WATER SUPPLIES.

Tumbler and spittoon switches on the Trionic membrane switch panel are rated for 24 VOLTS MAXIMUM, 1 WATT MAXIMUM, with a resistive load. DO NOTconnect higher rated loads without a suitable isolating interface or relay. If in doubt, ask your engineer or consult Tridac for advice.

If the tumbler and spittoon switches are used, or if any other connection is made between the unit and an ancillary power supply, it MUST be ensured that the latter conforms to the requirements of international standard EN 60601-1, for safety extra low voltage.

The connection of any ancillary power supply MUST NOT introduce an earth reference to the Trionic low voltage circuit. The Trionic circuit MUST REMAIN FLOATING.

7.2) Ultrasonic Scaler

The handpiece lead of a piezo-electric ultrasonic scaler carries high frequency, high voltage power. It is possible this could interfere with electronic devices brought into close proximity : -

ENSURE THAT THE SCALER IS NOT USED ON PATIENTS WITH CARDIAC PACEMAKERS

Polarity of the two wires in the handpiece lead IS IMPORTANT. If the lead is removed and refitted, ENSURE that the wiring is correctly terminated, in accordance with the note on the circuit board.

The frictional effect of the high energy, high frequency oscillations of an ultrasonic scaler will give rise to localised heating if contact is made with other materials (like rubbing two sticks together to start a fire). To avoid injury to the patient, the scaler tip should be kept moving at al times. DO NOT ALLOW THE TIP TO DWELL WHILE IN COTACT WITH ORAL TISSUE. Use copious coolant spray to reduce the risk.

7.3) Water Bottle System

The pressurising air to the water bottles comes from the unit's low pressure air regulator. The system is intended to operate at a pressure of 2.7 bar (40PSI) :-

DO NOT INCREASE THE SETTING OF THE LOW PRESSURE REGULATOR ABOVE THIS VALUE

Check the condition of the bottles regularly (see page 12). They must be undamaged and must particularly be free of nicks and cuts. Note that they are easy and cheap to replace. Water from the bottles is not filtered. KEEP FOREIGN PARTICLES OUT OF THE BOTTLES.

7.4) Electric Micromotors

Cooling

The motors are cooled by forced air from the drive air circuit of the dental unit, which is adjustable by a restrictor screw in the control block (see section 11.7.i). Air pressure must be sufficient to displace an oil seal fitted to the front shaft of the motor, thus allowing air to pass. There must be sufficient flow to maintain a safe case temperature when the motor is in use. Refer to the instructions supplied with the motor for the manufacturer's recommendations on cooling.

Prevention of oil Ingress

Oil in the motor can mix with carbon dust from the brushes, creating a conductive sludge. Such contamination may result in permanent damage to the motor and/or its' electronic control circuit and should clearly be avoided.

NEVER ALLOW OIL TO ENTER ELECTRIC MICROMOTORS BY ANY MEANS : DO NOT LUBRICATE THEM !.

The passage of cooling air resists the ingress of oil, which may drain from handpieces into the front of the motor.
When the motor is not in use, no cooling air flows and the seal at the front of the motor retracts onto the shaft. This also prevents the ingress of oil through the front of the motor.

Further protection can be effected by the following measures :

Ensure that the air supply to the unit is clean and oil free, otherwise the cooling air can contaminate the motor.

Keep the motor clean and wipe off excess oil.

Do not over lubricate handpieces. Allow excess oil to drain from them before attaching to the motor.

Remove handpieces from the motor when not in use.

7.5) Fibre Optics

Check that the voltage rating of the fibre optic bulbs in your handpiece is compatible with the unit (3.5 Volts nominal).
A small amount of adjustment is possible about the nominal value. Have your technician check the voltage and, if necessary, adjust to suit your handpiece.

8) HYGIENE, DISINFECTION & CLEANING

When cleaning dental equipment, it is recommended to wear suitable protective clothing. This would include a face mask, eye protection and strong rubber gloves, household rather than surgical, as there is a danger that the latter could be easily split or punctured.

8.1) Barrier Protection : The surfaces of the Trionic 5 lend themselves to the application of thin film, barrier protection. Transparent films, like cling film, can be readily applied across the front panel, touch panel and tray holder surfaces , without adversely affecting function or visibility of controls. It is highly recommended that this approach be used to prevent soiling and possible contamination. Additionally, the need to utilise disinfectant cleaners , which may be corrosive and possibly expensive, is very much reduced.

8.2) Surface Cleaning: Cleaning of the unit's surfaces may safely be accomplished by wiping with a soft cloth, dampened with a detergent solution, as recommended in BDA guidelines[1]. Ensure that the cloth is squeezed out. DO NOT soak the unit.

Aggressive detergent based products, such as proprietary / domestic floor cleaners, should be avoided. Also avoid abrasive cleaners, which willl dull, and eventually thin, the surface coating.

With so many proprietary surface disinfectants on the market, it is impractical for us to test them all. Some will contain aggressive or corrosive chemicals, with a danger that surfaces will deteriorate or discolour through repeated exposure. Again, we would recommend the approach suggested in BDA guidelines. That is, to reserve the use of virucidal and bactericida disinfectants for the surfaces visibly contaminated with blood. This will reduce the frequency of exposure.

TEST any chosen proprietary disinfectant / cleaner on inconspicuous areas of the unit, preferably the underside, before use.

Dilute hypochlorite solution, at a concentration of 10,000 parts per million, may be used to wipe visibly contaminated areas which do not have a metallic finish. Excess liquid should not be allowed to lie where it is unlikely to dry naturally within several minutes, and thus expose those areas to prolonged or permanent contact. Use absorbent paper towels to 'wick' up the excess.

Alcohol based cleaners[2] have been applied to the unit in tests without sign of surface degradation. Disinfectant claims of such products should be verified with the appropriate manufacturer or distributor.

Buffing of dry surfaces, to restore a lustrous finish, should be done with a soft cloth, duster, or soft paper towels. Avoid hard paper products, as they may scuff the painted finish. Occasional use of aerosol furniture polishes on previously cleaned surfaces, applied sparingly, will effectively and gently remove any marks left by drying detergents.

Footnotes :

[1] "Guide to Blood Borne Viruses and the Control of Cross Infection in Dentistry"
Published by the British Dental Association, 64 Wimpole Street, London, W1M 8AL

[2] 'Mikrozid AF' suface disinfectant, by Schulke & Mayr.

'Formal Spray' suface disinfectant, by Courtin Ltd.

8.3) Instrument Line Flush After each patient, detach the instruments for cleaning and sterilisation, then flush the used instrument hoses into a suitable bowl, by pressing the flush button. This will purge selected hoses with a full flow of coolant, minimising any potential for contaminated hose internals.

8.4) Instrument Trays The aluminium instrument trays provided with the unit are suitable for autoclaving and may be cycled at 134 - 138 deg. C for 3 minutes. Prior cleaning may be accomplished by washing in detergent and rinsing clear.
DO NOT use hypochlorite solutions or other disinfectants which react on contact with metals.

8.5) Instrument Hoses The silicone tubing material may be cleaned with a cloth dampened with detergent. If necessary, it may also be wiped with dilute (10%) hypochlorite and dried off after 3-5 minutes. HOWEVER, this is not recommended because the metal parts of the instrument tubings must not be wetted by hypochlorite .
'Formal' spray, an alcohol based product distributed by Courtin Ltd., has been found to be a non corrosive disinfectant/cleaner suitable for use on both the metal and silcone parts.
Any 'stckiness' of the surface of the silicone, after cleaning, is in fact due to the high surface friction of the material. If desired, this effect can be overcome by wiping the hoses with a cloth lightly dusted with talc.
Avoid aerosol cans as the solvents/propellants can swell and degrade silicone materials.

8.6) 3in1 Syringe The syringe body and trigger assembly is best protected in use by the application of commercially available barrier sleevings. Cleaning, when necessary, may be carried out by wiping with detergent solutions, 'Formal' spray, or similar.

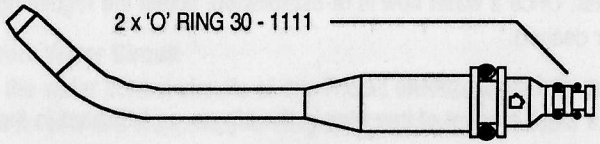
The NOZZLE is designed for easy detachment and may be cleaned by washing in detergent, either manually or in an ultrasonic bath. Avoid cleaning with solvents as they may deteriorate the "O" rings. After cleaning, the nozzle may be autoclaved through a 134 - 138 deg. C cycle. The 'O" rings may be left in place during autoclaving, since they are of a high temperature material. They will deteriorate in the long term, but are inexpensive to replace.

8.7) Micromotor, Ultrasonic Scaler and Curing Light.
All of these should be cleaned and disinfected in accordance with their separate msnufacturer's instructions.

9) MAINTENANCE & ADJUSTMENTS
Handpieces and attachments should be maintained in accordance with the respective manufacturer's directions.

Few parts of the Trionic 5 unit require any routine maintenance, outside of that described under Hygiene & Cleaning. However, the items below may require adjustment or periodic attention.

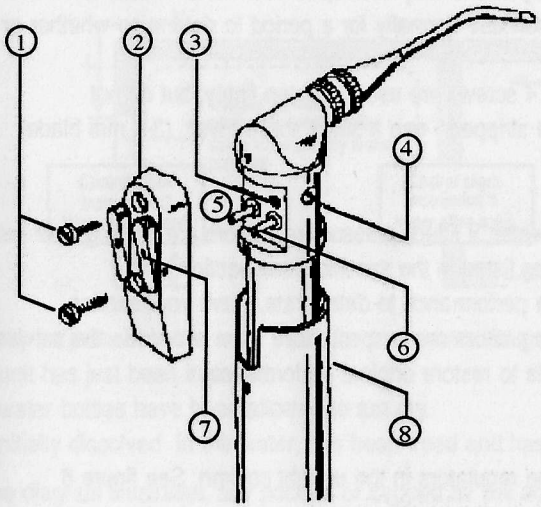
9.1) 3in1 Syringe
Nozzle : Change the 'O' rings if operation with 'air only' results in moist air (air pressure feeding back past the small 'O' rings will blow unwanted water out of the water tube)

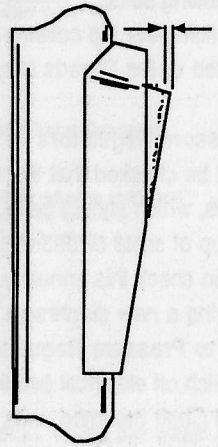


NOZZLE P/No. 60 1097 'O' RING 30 - 1112

If water flows from the syringe without the nozzle fitted, but ceases with the nozzle in place, then the nozzle water tube is probably blocked. Detach a suspected blocked nozzle from the syringe and try blowing high pressure air into the tip end, using a hanpiece hose. If this fails tc clear the blockage, try probing the water tube with a fine wire, such as a handpiece water jet probe, followed by reverse air flow as above.

Syringe adjustment





The syringe incorporates flow regulating screws for air (3) and water (4). To access the regulating screws , detach the trigger block (2) by removing the two screws (1), then slide back the body sleeve (8)
Air to the syringe is fed from a low pressure regulated supply and the air regulator (3) is adjusted fully open, in the factory. There is generally no need to alter this setting.

The water regulator (4) is adjusted on assembly to reduce water flow such that when air and water are operated together, a good atomised spray is produced.

The regulating screw (4) is a tapered needle and if dirt or debris lodge between the needle and its seating, water flow can become restricted. Should this happen, increase water flow by turning regulating screw (4) counter-clockwise. Operate water valve (5) by pressing down with a small coin or similar. Once a water flow is re-established, adjust the regulating screw to give the degree of water desired.

Refit the body sleeve and trigger block.
Check that there is a small amount of free play in the trigger, as indicated in the diagram, before it is felt contacting the valve stem .

Syringe Heating
To adjust the amount of heating, first switch off the electrical supply. Remove the instrument trays and mat. Remove the 4 screws retaining the top cover and carefully lift off the cover. With the cover removed, be very careful not to allow foreign objects or water to enter the unit - they could seriously damage the circuit when power is re-applied.
Adjust heating effect by turning control VR1: See figure 9

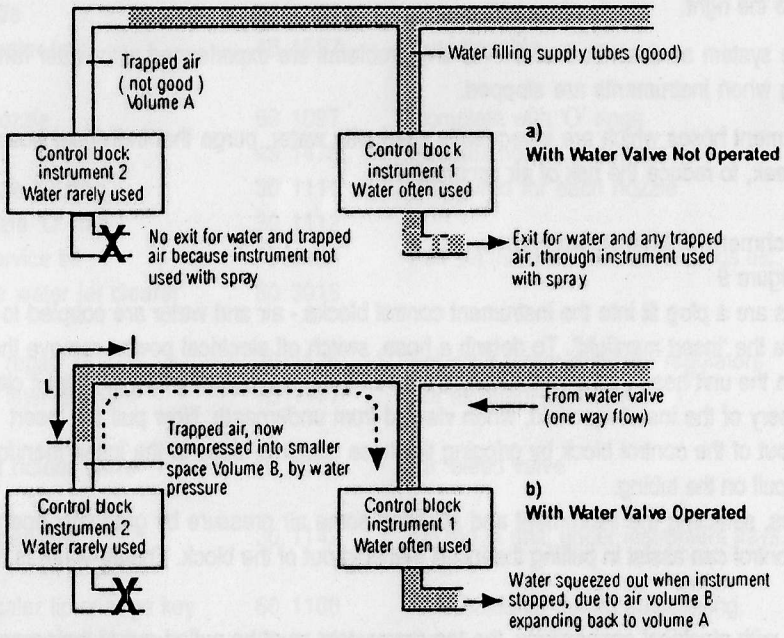
Clockwise = Less Heat Anticlockwise = More Heat

Note that the syringe heater takes a long time to fully heat up or cool down - make an adjustment, reassemble the unit and then use normally for a period to determine whether or not the setting suits.
When refitting the top cover, ensure all 4 screws are used - tighten firmly, but do not overtighten or the threads may become stripped - use a small screwdriver (3-4 mm blade)

9.2) Pressure Regulators
It should be checked that the air (and water, if fitted) pressure regulators are holding their set pressures, which should be at the values listed in the specifications section.
A build up of scale or debris can cause performance to deteriorate. Have your service technician check this annually. If the regualtors are suspect, have them serviced - the service kit contains a new diaphragm and seals to restore original performance.
Access to Pressure Regulators
First, switch off electrical power.
Cart and Chair mounted units house the regulators in the upright column. See figure 8

Pressure Regulators (contd.)
To gain access, lift the unit head to its' full height, remove screw A and pull off cover B.
Cabinet mounted units house the regulators in the wall mount services box. see figures 3 & 7
Remove the nuts securing the air and (if fitted) water tap handles. Pull off the handles then turn the cover retaining latch as indicated. Remove the cover.
Air Filter Element
A clogged filter in the high pressure air filter/regulator (AR.1) can restrict the air supply and reduce the performance of air powered instruments.
The condition of the element will depend on the quality of the air supply and it may remain serviceable. However, it is a good idea to replace the filter element when the regulators are checked, as it is an inexpensive part.

9.3) Purging Air from Water Circuit
Any air present in the water control circuits of the Trionic unit can cause spluttering or run-on of water when instruments are stopped. The diagram illustrates the reason.



Air may be present in the water pipes for several reasons :
The unit has just been installed.
The water bottles have been allowed to run dry.
Air, initially dissolved in the water, has been freed and has accumulated.

As the diagram illustrates, any pockets of trapped air will act as a piston. When the water valve opens water pressure compresses trapped air from Volume A to volume B.

Purging Air from Water Circuit (contd.)

When the instrument in use is stopped, the water valve in the unit closes again and water pressure drops. Air that has been compressed into volume B starts to expand to its original volume A, displacing a volume of water contained in pipe length L . Water cannot return to the supply as it is not compressible and thus the expanding volume of trapped air pushes water along the path shown dotted and out through the only available exit : the instrument currently in use !

To purge air from the system, first ensure that the water bottles are filled. Then select all instrument hoses for which a spray conrol valve exists, remove detachable instruments/motors and hold or hang the hose ends over a basin. Open the spray control valves several turns to allow a copious flow of water. Select water at the foot control then operate the press button flush valve. Now operate the foot control lever several times, about 3 seconds per time, to actuate the spray valve. Release the foot control, then the flush button and return the hoses to their holders.

Repeat the exercise one hose at a time, starting with the hose nearest the syringe and working to the right.

Purge the system as described whenever any problems are experienced with water run-on or sputtering when instruments are stopped.

For instrument hoses which are infrequently used with water, purge that individual hose about once a week, to reduce the risk of air accumulation.

9.4) Detachment of Instrument Hoses.

Refer to figure 9

The hoses are a plug fit into the instrument control blocks - air and water are coupled to the tubings via the 'insert manifold'. To detach a hose, switch off electrical power, remove the top cover from the unit head (as in section 9.1), then lift the hose retaining latch so that it clears the periphery of the insert manifold, when viewed from underneath. Now pull the insert manifold out of the control block by gripping the hose coupling close to the insert manifold - DO NOT pull on the tubing.

Sometimes, selecting the instrument and applying some air pressure by gradually operating the foot control can assist in pulling the insert manifold out of the block. Ensure water is not selected.

On hoses with electrical connections, the tag connectors must be pulled out of their respective circuit board connectors. MAKE A NOTE of the wire colours and positions before detaching wires. When re-installing, polarity and position ARE IMPORTANT. Grip the tags through the insulating boot - DO NOT pull on the wires.

When reinstalling, ensure the 'O' rings of the manfold connectors are perfectly clean and undamaged and wipe them with a smear of silicone grease.

10) SPARE PARTS REFERENCES

Item	Part Number	Description/Comment
Mains input fuse (floor type services box).	10 1025	13 Amp 1" x 1/4" Ceramic, BS 1362
Mains input fuse (wall type control box)	10 1309	T 1.0 Amp 20 mm x 5 mm, IEC 127
Transformer primary fuse	Ditto	Ditto
Motherboard fuse F1	10 1028	F 5.0 Amp 20 mm x 5 mm, IEC 127
Motherboard fuse F2	10 1135	F 1.0 Amp 20 mm x 5 mm, IEC 127
Micromotor board fuse F1	10 1028	F 5.0 Amp 20 mm x 5 mm, IEC 127
Scaler board fuse F1	10 1220	T 1.6 Amp 20 mm x 5 mm, IEC 127
Fibre optic board fuse F1	10 1186	T 500 mA 20 mm x 5 mm, IEC 127
Water Bottle	70 1156	
Spray adjuster key	45 1587	Autoclavable
Syringe Nozzle	60 1097	Complete with 'O' rings
Nozzle nut	45 1478	Secures nozzle to syringe
Small nozzle 'O' ring	30 1111	2 required for each nozzle
Large nozzle 'O' ring	30 1112	
Syringe service kit	70 1104	Full set internal/external 'O' rings etc.
Handpiece water jet clearer	60 3016	
Regulator repair kit	70 1176	For air & water pressure regulators
Regulator filter element	70 1177	For air filter/Regulator AR 1
Instrument holder valve	22 1199	Air 'bleed valve'
White rubber mat	30 1142	On top of unit, under instrument trays.
Amdent scaler tip change key	60 1108	Also holds tip during autoclaving.
Amdent handpiece sleeve	60 1122	Grey
Borden fitting instrument hose	60 1131	3 hole, straight, grey, silicone.
Midwest fitting instrument hose	60 1113	4 hole, straight, grey, silicone.
Fibre optic Midwest hose	60 1114	4 hole2 contacts, Straight, grey, silicone.
MC3 Micromotor hose	60 1152	Straight, grey, silicone

11) OPERATIONAL CHECK AND

Any faulty operation of the unit is likely to be noticed in normal operation. However, we recommend carrying out a quarterly check to confirm all is working correctly.
Leave the air, water and electrical supplies on during the check. Ensure water bottles are full.

11.1) Inspect the unit and services connection box for water leaks.

11.2) Check electrical power :
i) Mains switch indicator lit

ii) One lamp lit on each of scaler power and micromotor speed limit scales. and A or B indicator lit for water source

iii) If an electric micromotor is fitted, press + and check that speed setting cycles through indicators 1 to 4, with accompanying 'beeps'

iv) If an ultrasonic scaler is fitted, press + and check that power setting cycles through indicators 1 to 8, with accompanying 'beeps'

11.3) With all instruments parked, listen carefully, at a quiet time of the day, for air leaks.

11.4) With all instruments parked, operate the foot control, with spray NOT selected, to the full extent of the lever movement. None of the instruments should run

12) TROUBLESHOOTING

The following text is referenced to the numbers in the Check Operation list.
This symbol ✙ is used where investigation or repair should be entrusted to your service technician.
Disconnect electrical power before accessing the interior of the unit. Allow two minutes for internal circuits to discharge.

12.1)
Any water leaks should be remedied without delay. ✙
DO NOT use the unit if water leaks can potentially wet electrical components or connections or constitute a hazard to personnel or property.

12.2)
i) Mains indicator extinguished, check :
Surgery mains electricity supply is on. Unit mains switch is ON.
Mains input fuse is intact - replace if necessary. If the problem is not resolved or if a new fuse blows, call your service.technician. ✙
DO NOT continue to use the unit with electrical power connected.

ii) If the indicators are not lit, check :
Transformer primary fuse, located : Floor box, Chair Base Services Chassis, or Wall Service Box, as appropriate. ✙
Fuses F1 and F2 on the circuit motherboard. ✙

iii) No cycling 1 to 4, check fuse F1 of micromotor control board ✙

iv) No cycling 1 to 8, check fuse F1 of scaler control board ✙

12.3)
If hissing is heard from the instrument holders :
I) Check that instruments are properly and fully seated in their holders. A partially operated holder valve can cause a significant hiss.

ii) If instruments are properly seated, it may be that the holder valve is worn or badly adjusted. ✙

iii) Note that if the foot control is operated with all instrument parked, it is normal for it to emit a hiss.

12.4)
If any instrument runs while parked, its' holder valve is likely to be faulty or out of adjustment. Have it adjusted or replaced ✙

11.5) Check the operation of the syringe, for air, water, spray and dripping.

11.6) Check the operation of Air Powered instruments in turn and check the following :
i) The selected instrument does not express water, with the foot control NOT operated,.

ii) Operate the foot control progressively, in either direction, with spray NOT selected. and check that there is a corresponding progressive increase in speed :

iii) Attach a suitable handpiece gauge, operate the foot control at full lever movement and check that the unit is supplying pressure within the handpiece manufacturer's range.

iv) Select spray at the foot control, then move the lever slowly until water spray is emitted. This should happen at a low handpiece speed.

v) Release the foot control and check that the spray shuts-off quickly.

vi) Check that the water volume can be altered with the appropriate spray control valve. Refer to Figure 5 to ensure that the correct valve is being adjusted.

11.7) Check the operation of electric micromotors as follows :
i) Select the motor, remove any fitted handpiece, select speed limit 1 on the panel, and operate the foot control, without spray, to its full lever movement in either direction. Hold the motor 'E' coupling close to your top lip and determine that coolant air is flowing through the motor - a slight draught should be felt .

ii) Operate the foot control slowly, moving the lever to the left of centre, until the motor first starts to rotate. Observe the direction of rotation, which should be forward

12.5)
Check the syringe as described in section 9.1. If unsuccessful, the syringe may require new internal seals, for which a service kit is available ✙

12.6)
i) If it does, the flush valve may be seeping. Have it replaced. ✙

ii) If there is no speed variation, check input air pressure (see iii, below). If that is O.K. then have your technician check the foot control valve operation. ✙

iii) If the handpiece pressures are incorrect, check first that your compressor is providing sufficient output : ensure that the Trionic's high pressure air regulator is set to the recommended value (see specifications) and that it does not fall by more than about 0.3 bar (5 PSI) when a turbine is run.
If it does, then the regulator may be faulty, or the air supply to the unit may be restricted e.g the air filter clogged, the supply tap not fully open or the compressed air supply inadequate. Have this checked. ✙ If the supply pressure is O.K. the handpiece pressures may need adjusting, using the restrictor screws provided (see figure 9). DO NOT adjust the unit's pressure regulators.

iv) If the spray does not start up or starts up very late, the spray pilot valve in the foot control may need adjusting or replacing. ✙

v) If spray does not shut off cleanly, the cause may be :
a) Air in the control system (see section 9.3).
b) A faulty or badly adjusted foot control spray pilot valve. ✙

vi) If water volume cannot be controlled the cause may be :
a) The spindle of the control valve is stuck in (often due to infrequent adjustment) Open the valve fully, operate the instrument with water selected for several minutes to give the spindle a chance to work free. If unsuccessful, refer to your service technician. ✙
b) The flush valve is seeping. ✙
c) The non return valve in the control block is faulty ✙

12.7)
i) If there is insufficient or no cooling air, check air supplies to the unit as described in 12.6.iii) above. If air supplies are OK, adjust the cooling air using the restrictor screw in the control block. (see figure 9)

ii)& iii)
a) If the motor runs in the opposite directions to those expected, the micromotor tubing may have been replaced with the electrical connections to the circuit board inverted.

iii) Repeat ii), but moving the lever to the right of centre. The direction should be reverse.

iv) Run the motor with the foot control lever fully operated in either direction. Now press the + button to consecutively select speed limits 2,3 and 4. Motor speed should rise at each step

v) With the speed limit set to 4, observe that variations of foot control lever movement give corresponding variations in motor speed.

vi) Check the operation of the spray circuit, as for air instruments.

11.8) Check the operation of the ultrasonic scaler (if fitted) as follows :
i) Select power setting 1. Select water spray at the foot control and then operate the foot control. Adjust spray water until drips are seen to fall from the end of the scaler tip. Now increase the scaler power settings through steps 2 to 8. As power is increased, more vigorous cavitation should be observed (the point at which cavitation begins may be seen to move back towards the handpiece end of the tip). NOTE that the degree of foot control lever movement has no effect on the power setting - it acts just as on/off.

b) If the motor runs in one direction, but not in the other, the switches on the micromotor control board may be faulty ✙
c) If the motor runs in the same direction whichever direction the foot control is operated, the reverse pilot valve in the foot control may be faulty ✙

iv)
a) If there is no variation in speed, check air pressures as described in 12.6.iii) above.
b) If the motor runs only at a very high speed, STOP USING IT. - It is likely that the electronic drive circuit is faulty. If so the motor will run above its' designed speed range and continued use could cause irreparable damage to the motor and/or handpieces. ✙

v) As iv) above. IF MOTOR DOES NOT RUN AT ALL, in any of the above tests, check fuse F1 of the micromotor control module. Check for broken wires in the instrument hose. ✙

vi) Note the remarks on spray operation given in 6.v) and 6.vi) above. Also note the following : Low speed motors generally mix separate spray air and water supplies together, either in the motor or in the handpiece. The consequences can be that :
a) If the spray air valve is off, water at the mixing point will simply flow down the empty air tube. Serious run-on and dribbling will occur when the motor is stopped as some of the water will run back out of the air tube. Ensure that at least a little spray air is used on the low speed motors.
b) If the spray air valve is opened too far, the spray air pressure will exceed the spray water pressure. Air at the mixing point will try to push the water back down the water tube into the unit. This will attempt to close off the water valve in the unit and will cause either a pulsating spray or an absence of spray water altogether. Ensure that the spray air valve is not opened further than necessary to produce an acceptable spray.

12.8)
i)
a) If cavitation is present but operation of the tip seems discontinuous (hunting), then the tip is probably worn outside of the tuning range of the electronic generator. Check the tip against the Amdent wear template. If in doubt, try changing the tip for a new one
b) If power does not appreciably increase through the range, the tip may be worn. Check as above
c) If power does not appreciably increase through the range and the handpiece is felt to get hot, then the handpiece may be damaged, possibly by the entry of water. STOP using the instrument ✙
NEVER attempt to dismantle the handpiece - if 'O' ring seals are disturbed, water will enter the transducer and cause permanent damage.
d) If power does not appreciably increase through the range and it is not due to the previous reasons, then the electronic generator or scaler circuit module may be faulty ✙

OPERATIONAL CHECK (contd.)

ii) Deselect spray at the foot control, and check that the scaler does NOT operate.
(The scaler is not intended to operate without a supply of water through it)

iii) Check the water shut-off as for air instruments. Note : It is normal to get one or two drips from the scaler after operation is stopped.

iv) Check for tip wear using the template provided in the Amdent instructions.

v) IN NORMAL USE check that the scaler is not causing complaints of undue discomfort from patients. If it is, there may be a fault in technique or a fault in the equipment

11.9) Check the curing light (if fitted) as follows :
i) Lift the handpiece from its holder and ensure that the light guide is directed safely away from any persons present. Press the start button on the handpiece and note that an intense beam of light is emitted.

ii) Also note also that cooling air can be heard flowing (a hiss from the handpiece).

iii) Allow the light to continue running and observe that it automatically stops after 3 cycles.

iv) Trigger the light on once more and note that it can be turned off by pressing the button a second time.

TROUBLESHOOTING (contd.)

ii) If the scaler continues to operate when water spray is deselected then either
a) Your unit has a serial number earlier than T5181
b) The spray detect switch on the scaler circuit module is faulty. ✙

iii) Refer to 12.6.v) above.

iv) Replace worn tips.

v) If use of the scaler is causing complaints of severe discomfort from patients then
a) Check your technique (see section 7.2) and the Amdent booklet).
b) Check that the wires to the scaler handpiece have not been reversed. ✙ (See section 7.2) Reversed wires will cause electrical stimulation of the gums which is likely to be most unpleasant.

12.9)
i) If the lamp does not light, the handpiece may have reached maximum temperature (see iii) below).
If the handpiece is cool, check that the bulb is serviceable and properly seated in its holder. (see Satelec booklet). If this is OK, there may be a fault with the Satelec module or the handpiece and lead ✙

ii)
a) If there is little cooling air, check the supply and regulator pressures as in 12.6.iii).
b) If there is no cooling air, the problem may be with the Satelec circuit board or solenoid valve. ✙

iii) If it stops earlier, the handpiece may have reached its maximum allowable temperature and the internal thermal cut-out operated. This can happen after 3 to 4 consecutive operations of 3 cycles each. Allow the handpiece to cool and try again. Note that air cooling persists through the handpiece after the thermal cut out has operated.

iv) If not, there may be a fault with the Satelec module or the handpiece switch. ✙