

# Operating & Maintenance Instructions

## 1820 Vacuum Forming Machine

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## 1.1 'On delivery' inspection

Upon receipt of the machine inspect generally for any signs of damage. If the machine has been shipped in a wooden case, remove the top boards first or dismantle a bolted packing case. The machine may be lifted using slings under the front control console and the rear heater support casing, taking care to ensure that the slings are as close to the main machine casing as possible and that, when lifting, the slings are balanced for a clean and level lift (Fig 1).

Loose items will comprise a 1 litre tin of lubricating oil and spare fuses which are attached with tape to one of the rear panels and can be left there until required. A lubrication reservoir is located at the rear of the machine and protected by a plastic cover for transit, this cover should be removed prior to use. Remove packing pieces from the rear of the clamp frame by releasing toggle clamps and lifting the frame. Adjust the toggle clamps such that they compress the seal when clamping the proposed sheet to be used by approximately 30% (see Fig 2).

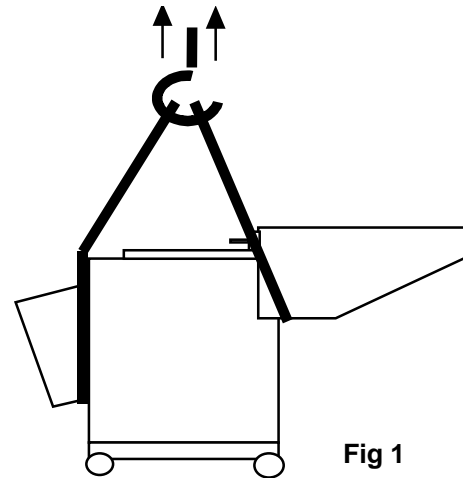


Fig 1

### Toggle Clamp Adjustment

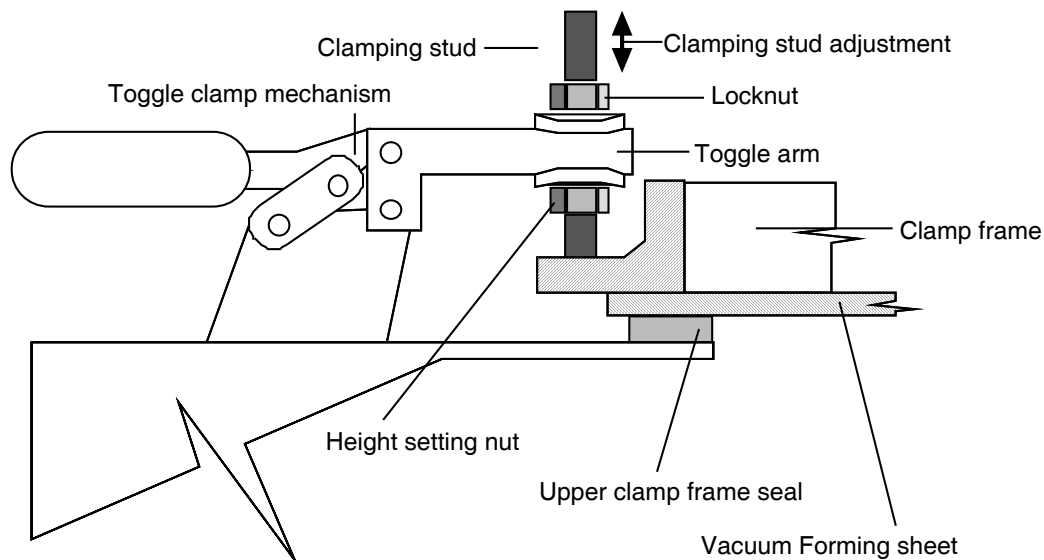


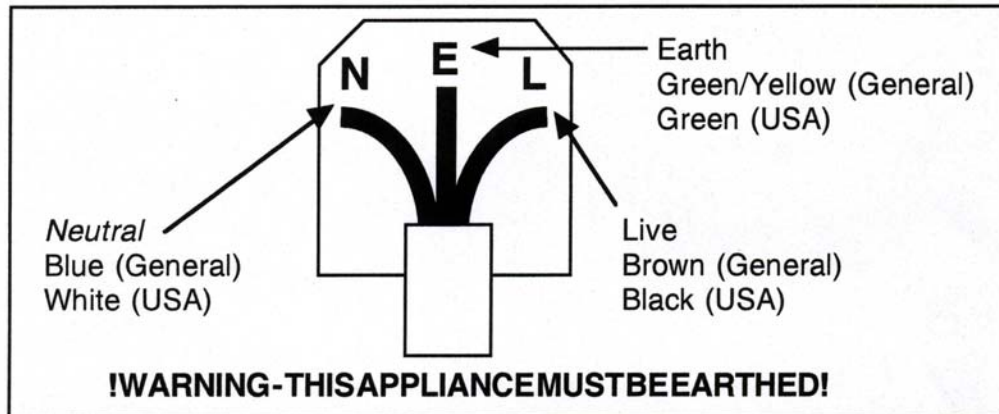
Fig 2

This is not a critical adjustment and when familiar with the feel of the machine the guide for adjustment will often become the feel of the pressure required to operate the toggle clamps as differing sheet thicknesses are used. Check for free operation of the platen and gain a feel for the platen mechanism and the "over centre" lock at the top of the movement.

## 2.1 Installation Requirements

Electrical specifications are detailed under the technical specification section but a minimum 15 Amp 1Ph supply will be required terminated at a suitable isolating switch or switch fuse into which the mains cable should be connected using an approved strain relief gland. If required the flexible mains cable may be replaced with 20mm conduit, a connection block is situated inside the machine casing to enable replacement of the mains feed without disruption of the internal wiring.

## 2.2 Installation



**!!IMPORTANT!**

The wires in this mains lead are coloured in accordance with the following code:

<b>General</b>	<b>Earth</b>	<b>USA</b>
Green & Yellow	<b>Neutral</b>	Green
Blue	<b>Live(Hot)</b>	White
Brown		Black

### General

The green and yellow wire must be connected to the terminal marked with the letter E, or the earth symbol, or coloured green and yellow or green.

The blue wire must be connected to the terminal marked with the letter N, or coloured blue or white.

The brown wire must be connected to the terminal marked with the letter L, or coloured brown or red.

### USA (115V)

The green wire must be connected to the green pin (the largest).

The white wire must be connected to the silver pin.

The black wire must be connected to the brass pin.



**Warning - read instructions before installation and use.**

**If in doubt about electrical supply or connection refer to your supplier or consult a qualified electrician.**

### 3.1 Controls

Heater Hood - contains the ceramic element system, is pulled towards the front of the machine for the heating cycle.

Clamp Frame - swings down to clamp a sheet in place and up to release it.

Toggle clamps - secure the clamp frame in place over a sheet ensuring an air tight seal.

Heat Output Indicators - illuminated when the heaters are energised; pulses on and off in a 60 second cycle when Energy (Heat) Regulator is below full.

Digital Timer - for setting cycle times.

Vacuum Pump On/Off switch - turns the vacuum pump on and off.

Vacuum/Blow diverter valve - converts the air flow at the platen from vacuum to blow for releasing formings at the end of the vacuum forming process. At rest - vacuum.

Pushed - blow.

Energy (Heat) Regulators - regulates the power supplied to the elements.

Fuses (not shown - located at base of panel)- protecting the vacuum and heater circuits, they 'pop up' if there is a system overload. Push in to reset.

Mains Switch - makes power available to the machine (O = OFF I = ON).

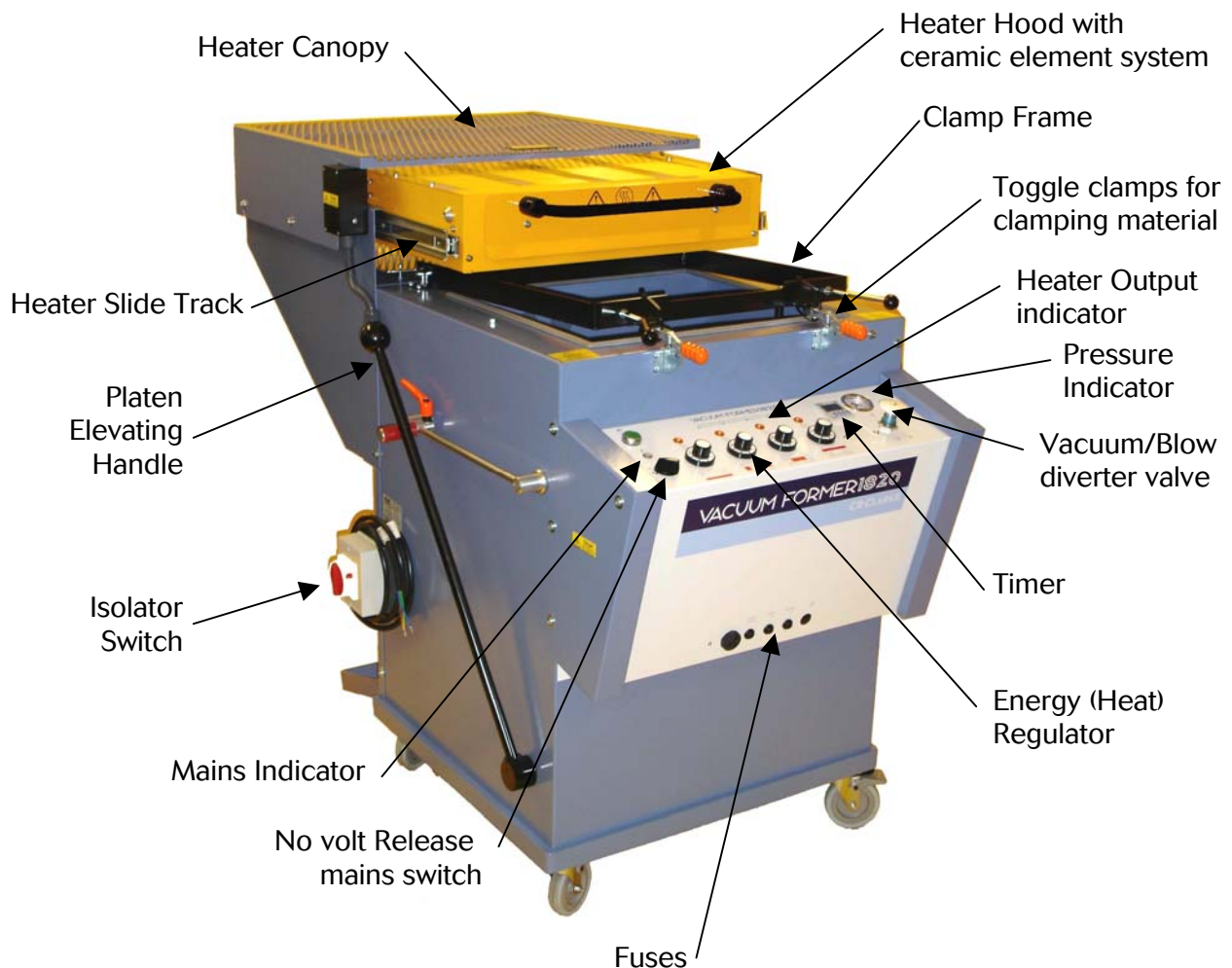
Mains Indicator - illuminated green when there is power available to the machine.

Isolator Switch - Disconnects machine from mains supply.

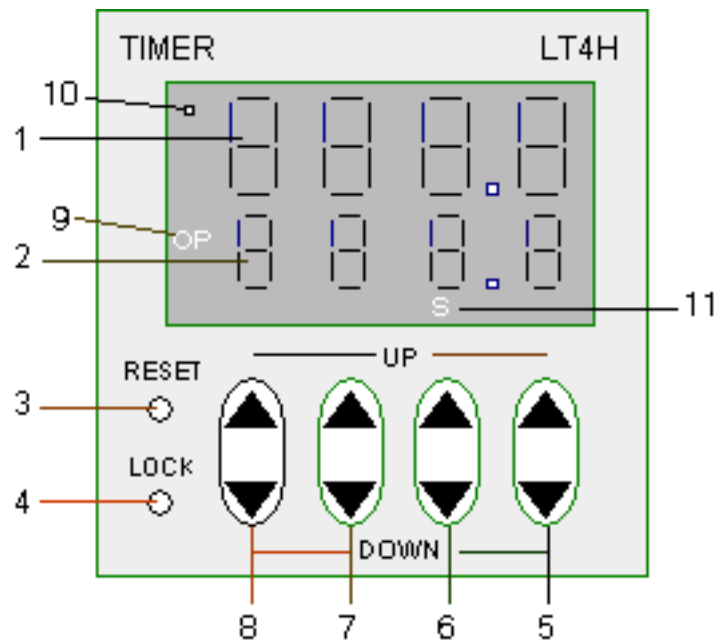
Platen Elevating Handle - lifts and lowers the platen.

Pressure Indicator - indicates pressure developed from vacuum pump.

Platen - moving platform onto which the mould is placed. Connected to the vacuum pump. Operated by the Platen Elevating Handle.



## 3.2 Timer



- 1 Live display. Displays time elapsed since cycle start (in seconds). Red Illuminated display.
- 2 Set time display. Displays time set (in seconds) and can be adjusted when the timer is at rest or during a cycle. Orange illuminated display.
- 3 Reset button. Cancels timing cycle.
- 4 Lock button. Locks the Set Time, so that it cannot be adjusted by pressing toggle buttons 5,6,7 or 8. Press to lock and to unlock.
- 5 Tenths of seconds toggle button. Press on the down arrow to decrease tenths of seconds and the upward arrow to increase tenths of seconds (between 0 & 9).
- 6 Seconds toggle button. Press on the down arrow to decrease seconds and the upward arrow to increase seconds (between 0 & 9).
- 7 Tens of seconds toggle button. Press on the down arrow to decrease tens of seconds and the upward arrow to increase tens of seconds (between 0 & 9).
- 8 Hundreds of seconds toggle button. Press on the down arrow to decrease hundreds of seconds and the upward arrow to increase hundreds of seconds (between 0 & 9).
- 9 Operational indicator. Illuminated orange, flashes during cycle.
- 10 Secondary operational indicator. Illuminated red, flashes during cycle.
- 11 Format indicator. Illuminated orange, displays the time format (normally seconds).

Note: The timing cycle is automatically started when the Heater Hood is pulled over the TP sheet. Make sure the timer is set to the correct time before starting the heating cycle. Correct times must be ascertained by experiment - see page 10. The timer resets automatically when the Heater Hood is pushed back into the idling position

## 4.1 Health & Safety Information

The Heater Hood can become hot during use, as indicated by:



Always wear protective gloves when operating the machine.

This equipment is designed for the vacuum forming of thermoplastic sheet material of 6-8 mm or less thickness. It should not be used for heating any other materials or for any other process.

Do not cover or place items on the Heater Hood and canopy while the machine is in operation or cooling down as this might impair ventilation and could lead to items becoming burnt or melting.

Do not leave the machine unattended while it is in use.

## 5.1 Introduction to the machine - Machine checks

Switch on the power at both the isolation switch and the main switch located on the left of the machine console, O = OFF I = ON, the clear mains indicator should glow. Ensure that the heater hood is fully back in its idling position and operate the green "HEATER START" momentary actuator. Upon rotating each of the four energy regulator knobs to the "FULL" setting the amber indicator positioned above each regulator will indicate that power is being directed to the relevant zone of the heater bank. The indicators will be constantly illuminated when a zone is set to "FULL" but on any other setting will flash on and off in sympathy with the regulation in power selected. Note that the lowest setting No 1 is equivalent to a power reduction of approximately 45%.

Set the timer to read 5 seconds (see page 5), clamp the clamp frame into it's operating position and roll the heater hood fully forward. The timer will commence counting up to the set time and upon reaching the set point a buzzer will sound indicating that the hood should be returned to it's idling position. When actually producing a forming the vacuum pump will be switched on just prior to the timer reaching it's set point and it will be safe to raise the platen once the buzzer has cancelled, indicating that the hood is clear of the area into which the mould will subsequently elevate. Do not leave the heater over the platen area for more than the few seconds indicated above as there is a danger of overheating the silicone seal. During normal use the thermoplastic sheet being formed shields this seal from the harmful effect of direct radiated heat. Switch on the vacuum pump and observe that air is being evacuated from the central hole in the platen and operate the "BLOW" diverter valve knob by pushing it downwards and observe that the air flow is reversed.

Note that no seal exists to allow the vacuum to be applied until the platen is raised into the fully up position, the vacuum pump can therefore be switched on at any point in the forming process, it will not apply any vacuum until the platen is raised and locked into the fully up position. The vacuum pump is lubricated from an oil reservoir located externally at the rear of the machine, consumption is low and once the oil has passed through the pump it is discarded in a fine mist with exhausting air. To prevent this oil dissipating to the atmosphere it is collected in a foam filter located in an oil "dump box" situated on the right hand side of the machine casing. Occasional washing of the filter in paraffin or similar will remove the collected oil, say once to every four refills of the feed reservoir, or as operating experience dictates.

The heater hood incorporates ceramic heaters of carefully selected ratings and arranged in four zones as indicated on the control console. These heaters provide very efficient heating but will require 15-20 minutes to attain full operating temperature, the warm-up period is accelerated by the heat reflector over which the heater is positioned in the idling position. Once forming commences the mould and other surrounding metal work will begin, initially, to absorb some of the heat energy and slightly extend cycle time so be prepared to gradually reduce timer settings during this period.

The platen is designed to accommodate a mould base board measuring 432 x 482mm (17 x 19ins) and is 20mm (3/4ins) deep. It is provided with an expanded metal mesh screen which is there to allow distribution of the air over the entire underside of the mould base board.

It is recommended that a "cold run" is practiced prior to operating the machine, going through all the operations involved to familiarise the operator with the feel of all controls. Do this without heat and material, but with the intended mould. This will be found of benefit when the first formings are produced and major concentration is on observing material condition and machine behaviour.

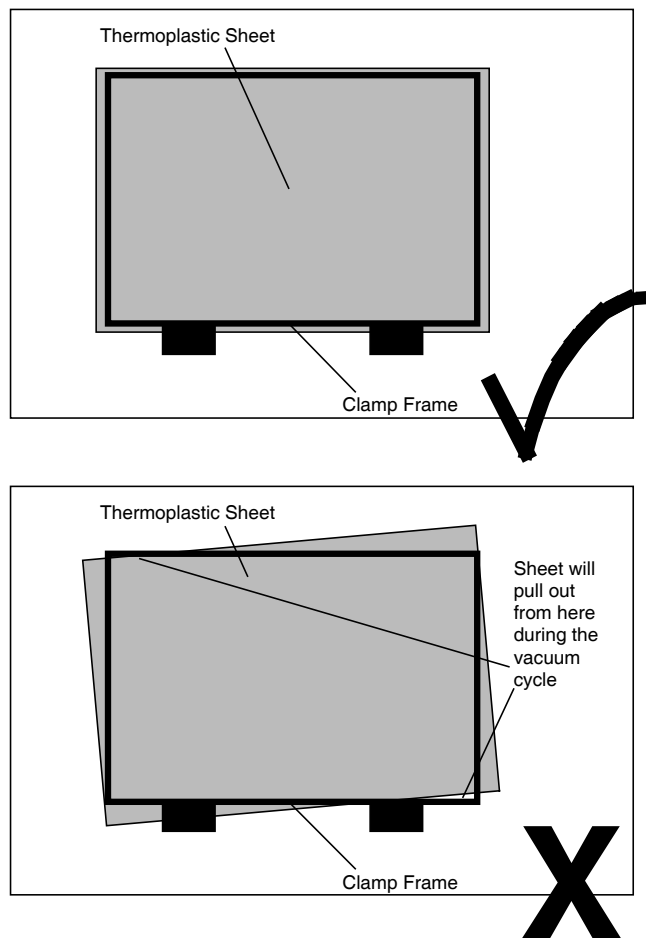


## 6.1 Elements of the forming process

Turn the machine on as described in the previous section and turn the Energy Regulators to the desired setting. Ensure that the heater hood is rolled back into the idling position. The heaters will take 10 - 15 minutes to warm up.

Place a mould mounted on a base board 432 x 482 mm (17 x 19ins) on the platen\* whilst it is in the up position, then lower the platen

Place a thermoplastic sheet, pre-cut to 458 x 508mm (18 x 20ins), over the silicone rubber Clamp Frame seal, lower and clamp the Clamp Frame. Make sure that the clamp frame does not overhang the sheet at any point on it's perimeter ie. that material can be seen on the inside and the OUTSIDE of the clamp frame.



**Positioning a sheet under the clamp frame**

Select a generous time on the timer (see page 5), well in excess of that anticipated. 2.0mm polystyrene will take approximately 60 seconds. PVC and cast acrylic will take longer as they are higher temperature materials for a similar thickness.

\* see our technical information sheet no. 4 for information on mould making and base boards.

Pull the Heater Hood to the front of the unit - over the thermoplastic sheet - and begin heating. As the material gets hot it will soften. It is ready for vacuum forming when you can easily make an indentation in the sheet with a blunt instrument, such as a screw driver handle (don't use your fingers!) or you can see the sheet sagging under its own weight\*\*.

When the sheet is ready, turn on the vacuum pump. Slide the Heater Hood back to it's idling position. (When the timer is set to an established time, the end of the heating cycle is audibly signaled by a buzzer. On returning the Heater Hood to the idle position, the buzzer will cancel automatically, indicating that the Heater Hood is clear of the forming aperture, and that it is safe to raise the mould).

Raise the platen using the Platen Elevating Handle until it is locked in the up position - the material will drape over the mould before being pulled down onto it once the platen is locked in position.

With a cold mould, the workpiece will "freeze" almost immediately upon contact. As soon as this state is achieved, press the Vacuum/Blow Diverter Valve. The reverse air flow will push the material off the mould and it will go out of shape. This is normal and it will recover the shape of the mould as soon as the Diverter Valve is released and the vacuum pulls the material down again. Using the Blow function like this prevents the forming gripping the mould and makes subsequent Blowing operations easier. The Blow function only needs to be used for a few seconds - as soon as the forming has released from the mould, revert back to vacuum ie. let go of the Vacuum/Blow Diverter Valve. "Over blow" may damage the final product by inducing stress points.

Continue the Vacuum/Blow cycle (ie. when the forming has pulled down fully press the Vacuum/Blow Diverter Valve until the forming releases from the mould, then revert to Vacuum) until the forming has cooled and is rigid†.

Release and lower the platen and switch off the Vacuum Pump. If the mould remains inside the forming, lock the platen in the up position again, turn on the Vacuum Pump and operate the Blow function before lowering the platen again.

Release the Clamp Frame Toggle Clamps, lift the Clamp Frame and remove the completed forming from the machine.

**The unit can be operated on a continuous basis, however, remember to turn the unit off at the Mains Switch when not in use.**

\*\*It is a good idea to record the time it takes for sheets of particular materials and thickness to reach vacuum forming temperature. These times can be used for subsequent formings (making use of the timer - see page 5), removing the need to test the sheet's readiness by hand. When recording times make sure the machine is up to it's full operating temperature ie. it has been in use for more than twenty minutes.

†Note that as the mould warms up, cooling to the freeze point will take longer and if the blow is applied too soon it will be obvious because of the way the material behaves. In this case, revert to vacuum immediately and no harm should have been done. Try again when it is considered that the material has cooled sufficiently. Excessive blow prior to the material reaching the freeze point will result in a fold or web.

## **Manual Machine Fitted with Optional Cooling Fans**

The optional cooling fans on the 1820 manual machine are instigated automatically via the delay timer on the control panel. The set time is adjusted by rotating the left hand dial until the pointer is on the required setting. When the buzzer sounds upon completion of the heating cycle, the delay timer will be energised. When the desired delay time has elapsed, the fans will switch on. The run time of the fans is set by the right hand dial. Once this has elapsed the fans will switch off automatically.

## 7.1 Reducing Frames

Reducing frames are available to handle half size (254 x 458mm) and quarter size (228 x 254mm) sheets. Whilst a reducing frame increases the sheet size options of any machine they should not be considered as suitable for virtually permanent fixture. Even with four heating zones, it is mechanically impracticable to configure the heating system to cover the reducing frame area only. They therefore tend to run at relatively high temperatures because they are insulated from the heat sinking capability of the main casing by the clamp frame seals and subsequently the life of these seals is considerably shortened. As a policy use the reducing frames, if purchased, for short periods and do not leave them mounted with their own or the main toggle clamps closed. Use of the reducing frames is explained by the instructions that accompany each frame.

**It is important to remove the original air distribution mesh from the platen before loading the lower sub-platen. Failure to do so will raise the reducing frame sub-platen above its design height, cause the top edge to make premature contact with the forming aperture, put excessive strain on the mechanism and impair air seal efficiency.**

## 8.1 General Operating Hints and Tips

### **Frequency of vacuum pump starts.**

The vacuum pump should not be energised more than 50 times per hour, which relates to a minimum total cycle time of 1.2 minutes. In the event that cycle times are less than 1.2 minutes it is recommended that the pump is run continuously. This presents the problem of removing the finished forming with the vacuum holding it down. The technique is to release the toggle clamps on completion of forming and apply "blow" which will normally lift the workpiece at some point and break the air seal. The forming can then be removed whilst the pump is still running and the platen can be lowered for the next cycle. Do not adopt the practice of lowering the platen before removing the forming as there is a tendency for the mould to stick in the forming on occasions and when release occurs the mould will fall to the lower platen position with risk of possible damage to mould and machine. Do not attempt to lower the platen using the operating handle when vacuum is applied to a forming as atmospheric pressure is acting on both the forming and platen bottom applying, typically, some 740kg. clamping force holding the two together.

### **Base board thickness.**

The platen tray is approximately 20mm deep and allowance must be made for the air distribution mesh under the base board. Base board thickness should be selected to lie flush or slightly below the platen tray edges. Any tendency to stand proud of this edge will introduce the possibility that the base board will become trapped under the forming aperture in the main casing resulting in loss of sealing pressure for the lower platen seals located around the platen edges and therefore loss of vacuum.

### **Air seal life.**

The vacuum seals will, after a considerable number of operating hours, become permanently compressed and less effective. The upper seals must be considered a consumable item and a replacement seal kit which includes a high temperature adhesive is available, Part No. 725/90. The seals are easily replaced but their maximum life can be ensured by leaving them free and uncompressed whenever possible by resting the clamp frame on the closed toggle clamps when not in use as indicated by the information label attached to each machine.

The lower platen seal is retained in a channel and need not be secured by adhesive. Replacement of this seal is not frequent and very straightforward. The platen should be left in the down position when not in use.

### **Safety.**

Never allow the heater or it's mesh guard to be covered during use or within 1 hour of use after switching off at the main switch. If removing machine covers for service ensure that the machine is isolated from the main supply.

## 9.1 Servicing

Under normal operating conditions the machine will require very little maintenance or regular attention. A little oil on clamp frame pivot points, platen elevating shaft pivots and slide rails is recommended together with an occasional check of important fixings such as the heater hood screws, slide mountings etc.

### Vacuum pump Care & Maintenance

**Construction:** The vacuum pump is a precision product, there being only .002 clearance at the top and .0025" - .0035" total at the ends of the rotor. The vanes will self-adjust to compensate for wear, and should last 5,000 - 15,000 hours operation.

**Lubrication:** Use of the correct oil in correct amounts will maximise pump life. A film of oil provides the seal for the vanes to ride on and fills any tolerance clearance. Spare oil is available from the manufacturers or their nominated distributors (Part No VP10). A high detergent 10wt. automotive engine oil (eg Shell ROTELLA X) may be used as an alternative.

To fill the oil reservoir, pull reservoir (reference #13 on diagram on next page) up and out of adjusting sleeve of the oiler (reference #12) and invert. Add oil through the tube hole. When filled, replace reservoir by inserting it through the adjusting sleeve so that the reservoir is firmly seated against the top of adjusting sleeve. For reference, the point of the tube should be approximately 1/4" from the bottom of the oil jar.

**Flushing.** The vacuum pump is fitted with a thermal overload to protect the pump motor. This overload resets automatically once the pump cooled. Most pump trouble can be corrected by flushing rather than disassembly. A noisy or inefficient pump is often caused by a vane stuck in its rotor slot due to excessive or insufficient oiling. Remove the lower rear panel by firstly pulling the oil reservoir up and out of the adjusting sleeve. Unscrew the back panel to reveal the motor. Remove inlet and outlet filter assemblies, add several teaspoons of solvent\* slowly at the intake while unit is running. Flush unit in a well ventilated area. Eye protection is recommended. Keep face away from exhaust port and do not flush unit with flammable solvent. Lay unit on side with outlet downward so solvent\* will work out again. Right the pump, add a few drops of oil at intake and refit inlet and outlet filter assemblies.

**Disassembly :** If the pump vanes are stuck, try flushing. If this does not eliminate the foreign matter, remove the lower rear panel as described in the previous paragraph in order to gain access to the motor.

**IMPORTANT Disconnect from mains electrical supply before servicing.**

\* Recommended solvent is Loctite Safety Cleaner (Ref No 16086).

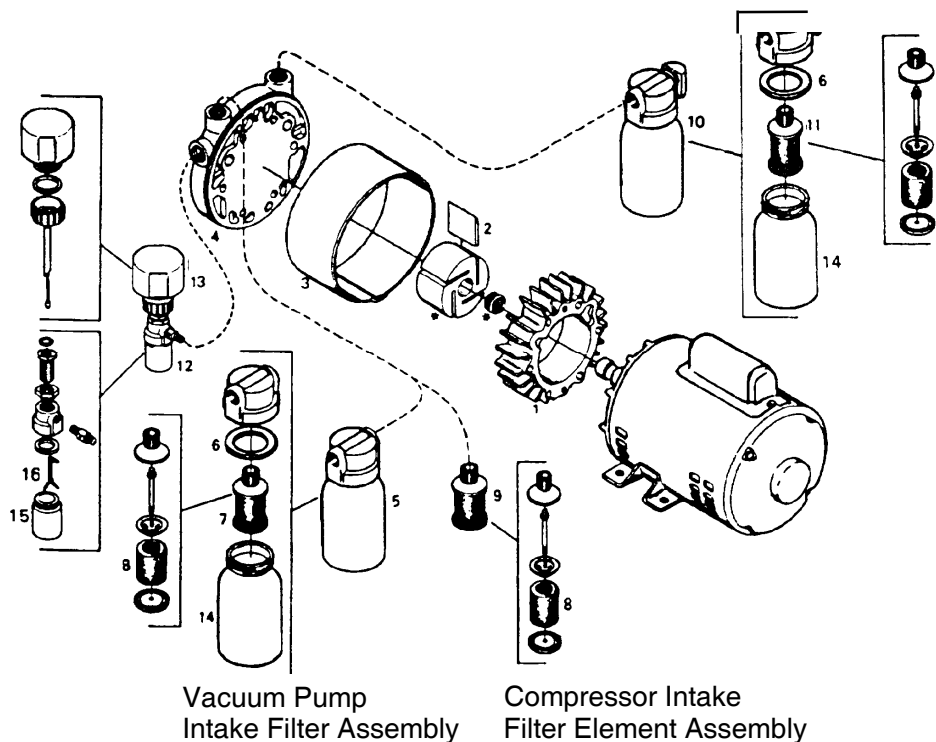
Remove only the end plate and the four vanes (do not at any time remove the rotor or loosen any of the electric motor through-bolts.)

Wash vanes, end plate, and pump chamber with solvent\*. Dry and relubricate lightly. If the pump fails to produce the correct vacuum level, the top clearance between the rotor and body may have increased. A metallic clanging could mean the rotor and the body are touching. Remove end plate, loosen body bolts, and set top clearance to .004". This can be done by tapping lightly with a small hammer on the pump body (either top or bottom, depending upon whether clearance is too large or too small.) The rotor should be turned while setting clearance so that all points on the circumference of rotor will clear. End clearance, total for both sides of rotor, may vary from .0025" to .0035".

**Inspection:** The vacuum filter will collect any debris which may enter from the platen. The pressure filter will slowly fill with oil from the pump outlet. These filters should therefore be cleaned on a regular basis. Access to filters is gained by removing the lower rear cover from the machine. Remove the filter bowls and filters, and either wash in solvent\* or replace. Reassemble ensuring that the lip seal in each filter head is properly located, so that the filter bowl seals correctly.

\* Recommended solvent is Loctite Safety Cleaner (Ref No 16086).

### DO NOT USE ANY FLAMMABLE SOLVENTS TO FLUSH VACUUM PUMP



### Vacuum Pump

## Vacuum Pump Parts List

Quantity	Description	Gast Ref No
1	Body	1 AK518
+ 2	Vane	4 AK741
3	Shroud	1 AK511
4	End Plate	1 AK515B
5	Intake Filter Assembly	1 AB599
+ 6	Cover Gasket	2 AA405
7	Filter Element Assembly	1 AC433
+ 8	Cartridge	2 AC393
10	Exhaust Muffler Assembly	1 AB599C
11	Muffler Element Assembly	1 AC434
12	Constant Level Oiler	1 AD125K
13	Oil Reservoir	1 AD117
14	Jar	2 AA805
15	Jar	1 AA935A
+ 16	Wick	1 AA934
	Service Kit	1 K486

+ Denotes parts included in SERVICE KIT.

\* (See schematic) Under most circumstances, rotor and tolerance ring should not be replaced in the field.

## Heating Element replacement.

If an element becomes broken due to misuse or mechanical failure, proceed as follows:-

- 1) Pull the hood fully forward
- 2) Remove all screws that secure the mesh Heater Hood cover before removing the cover itself. You now have access to the element terminals.
- 3) Disconnect faulty heater at terminal and spring clip, and remove via underside of hood.
- 4) Fit new unit and reassemble in reverse order.

To establish if an element is non-operational, energise the machine from cold and touch heaters in turn to establish if they are warming up. Warmth should be felt within 1-2 minutes. If unable to touch all elements, remove hood as described above and test alongside machine. Note that if an element is found non-operational, it is more likely to be a loose or corroded connection at the terminal block than a faulty element.



## 10.1 Problems with vacuum forming

Following are some of the common problems and their solutions associated with vacuum forming.

### Sheet Doesn't Pull Down over the Mould

Air may be trapped between the mould and the sheet - check that you have enough evacuation holes (resin and aluminium moulds only).

The sheet may not be hot enough - increase the heating time or power output.

The clamp frame or platen seals may need replacing - check and renew if necessary (see Fault Diagnosis later).

The vacuum pump filter may need cleaning/replacing.

The sheet may be cast acrylic, which does not vacuum form very easily or to very high definition.

### Sheet Burns or Blisters

The sheet may have become too hot - reduce the heating time or power output (turn down the Energy (Heat) Regulator).

The sheet may be hygroscopic\* and moisture in the sheet is causing it to blister, - dry the sheet thoroughly before heating.

If the sheet is thick (over 5 mm) it may need more time for the heat to soak all the way through - reduce power and increase the heating time.

### Sheet Pulls out of Clamp Frame when Raising the Platen & Mould

The sheet was not positioned correctly - see page 9.

The sheet was not hot enough - increase the heating time.

The material may not be vacuum formable - check source and type.

The mould may be too large or it's edges too close to the perimeter of the forming aperture - modify the mould design.

### Webbing Occurs on the Finished Forming

The sheet may have got too hot and sagged too far during heating - reduce heating time or power output.

The design of the mould may need to be modified.\*\*

### Forming will not Release from the Mould

There may be undercuts on the mould which are holding the forming in place - check mould for undercuts.\*\*\*

The forming may have 'shrunk' onto the mould - start the blow cycle earlier.

The mould material may have bonded with the forming material - put a thin coating of silicone oil or similar on the mould before forming.

The mould may have become too hot - turn the machine off and wait for the mould to cool before attempting another forming.

The mould surface may be too rough - make sure there is a good, even finish on the mould before vacuum forming.

\* see our information sheet no. 1 Plastic Materials, page 1.3. Also see information sheet no. 3 Vacuum Forming, page 3.4 for details of which thermoplastics need pre-drying for vacuum forming

\*\* see our information sheet no. 4 Mould Making, pages 4.4 & 4.5

\*\*\*see our information sheet no. 4 Mould Making, pages 4.5

## 11.1 Fault diagnosis

Your 1820 should provide long and reliable service but in the event of any operational problems the following checks can be carried out to identify the source of any problems.

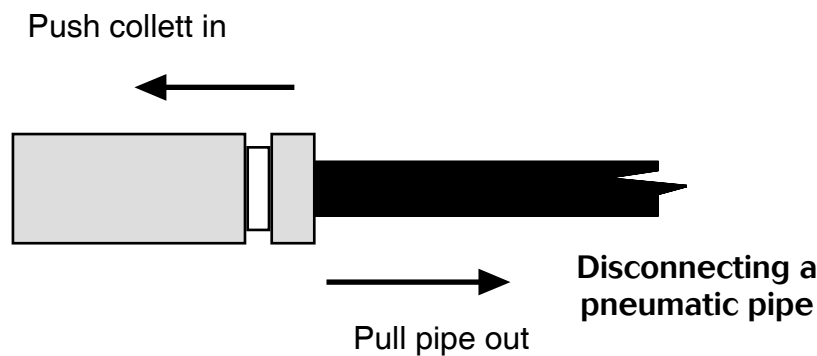
### Loss of vacuum

Are the toggle clamps adjusted so that an airtight seal is formed between the upper seal and the material?

Check that the lower platen seal is in good condition, stands proud of the platen edge by at least 2mm all the way around and forms an air-tight seal when the platen is elevated. To check this, take a currency note and clamp it between the platen and the underside of the casing. The seal is good if it grips the note so that it cannot be pulled out. If the note can be pulled out without tearing it, then you need to replace the lower platen seal.

Remove the back cover and check that there are no loose or displaced pipes.

**IMPORTANT**-Disconnect from mains supply before removing any machine



covers. The pneumatic lines are terminated by the use of push fit connectors. To release a pipe, push the pipe and collet firmly into the fitting and then pull the pipe out. To connect a pipe, push the end of the pipe firmly into the collet.

### Uneven heating

Ensure the machine is not in the path of any draught.

Check all heaters are intact. With the machine switched off and cold check each heater element by touching each one in turn. If one or more heaters is cracked or broken, note their position, size and wattage and replace.

Check all heaters are operational. Switch on the machine from cold and check each heater element is heating up by touching each one in turn within the first few seconds of powering the heater. If one or more heaters fails to heat up there may be a loose or corroded connection above the reflector. Note the element's position, size and wattage and replace.

## **Failure to heat**

If the complete heater bank is non-operational check the fuse on the base of the control panel. Replace if fuse has 'blown'.

Check the Mains Switch and replace if it is not operational.

Check each of the Energy Regulators. Replace if one or more is not operational.

If all of the above are okay, unscrew the control panel, tilt it forward and check all the cable terminations are intact and there are no loose wires. If any are found, refer to the wiring diagram in the back of this manual or refer back to your distributor or the manufacturer.

### **IMPORTANT DISCONNECT FROM MAINS ELECTRICAL SUPPLY BEFORE SERVICING.**

## **Non-operation of vacuum pump**

Check the fuse on the base of the control panel. Replace if the fuse has 'blown'

Check the Mains Switch and replace if it is not operational.

If both the above are okay, unscrew the control panel, tilt it forward and check all the cable terminations are intact and there are no loose wires. If any are found, refer to the wiring diagram in the back of this manual or refer back to the your distributor or the manufacturer.

## **Mains indicator glows but goes out when main isolator/overload switch is operate.**

Check neutral connections within machine, power supply or extension lead (if applicable). Re-connect any loose connections.

## **Low vacuum performance**

After considerable use (12 months continuous or equivalent) the vacuum filter may become contaminated or blocked with residue from the forming process. See section on servicing.

### **FOR SPARES AND ADVICE ON MAINTENANCE AND REPAIR, REFER TO YOUR DEALER OR THE MANUFACTURER.**

## 12.1 Technical specification

### General

Cut sheet size	458mm (18ins) x 508mm (20ins)
Max. forming aperture	432mm (17ins) x 482mm (19ins)
Max. material thickness	6 - 8mm(0.25 - 0.315ins)
Platen stroke	305mm (12ins)
Vacuum pump - type	Rotary vane-lubricated
Vacuum pump - free air	16.2 cu m/hr (10 cu ft/min)
Vacuum pump - typical vacuum	635mm Hg (-0.86 bar)
Heater system	Ceramic

### Shipping - Bare Machine

Width x Depth x Height (metric)	870 x 1448 x 1181mm
Width x Depth x Height (imperial)	34.25 x 57 x 46.5ins
Weight	174kg (383lb)

### Electrical

Voltage	220-240
Current (max)	12.26-14.16A
VA rating	3400
Hz	50/60

**FAILURE TO OPERATE THIS EQUIPMENT IN ACCORDANCE WITH THESE INSTRUCTIONS MAY RESULT IN IMPAIRED PERFORMANCE OR FAILURE OF CERTAIN SYSTEMS**