Original Instructions
DCM00060 - REV. 13

EMERSON


# VersaGraphix
## Ultraweld L20

# Operating Manual

**Branson Ultrasonics Corp.**
120 Park Ridge Road
Brookfield, CT 06804
(203) 796-0400
http://www.bransonultrasonics.com

BRANSON

## Manual Change Information

At Branson, we strive to maintain our position as the leader in ultrasonics metal welding, plastics joining, cleaning, and related technologies by continually improving our circuits and components in our equipment. These improvements are incorporated as soon as they are developed and thoroughly tested.

Information concerning any improvements will be added to the appropriate technical documentation at its next revision and printing. Therefore, when requesting service assistance for specific units, note the Revision information found on this document, and refer to the printing date which appears on this page.

## Copyright and Trademark Notice

# Foreword

Congratulations on your choice of a Branson Metal Welding system!

The Branson VersaGraphix Series system is process equipment for the joining of metal parts using ultrasonic energy. It is the newest generation of product using this sophisticated technology for a variety of customer applications. This Operating Manual is part of the documentation set for this system, and should be kept with the equipment.

Thank you for choosing Branson!

# Introduction

This manual is arranged into several structured chapters which will help you find the information you may need to know to safely handle, install, set up, program, operate, and/or maintain this product. Please refer to the Table Of Contents of this manual to find the information you may be looking for. In the event you require additional assistance or information, please contact our Product Support department (see 1.4 How to Contact Branson for information on how to contact them) or your local Branson representative.

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## 1.1 Safety Requirements and Warnings

This chapter contains an explanation of the different Safety Notice symbols and icons found both in this manual and on the product itself and provides additional safety information for ultrasonic welding. This chapter also describes how to contact Branson for assistance.

### 1.1.1 Symbols found in this Manual

These symbols used throughout the manual warrant special attention:

| WARNING | Indicates a possible danger |
|---|---|
|  | If these risks are not avoided, death or severe injury might result. |

| CAUTION | Indicates a possible danger |
|---|---|
|  | If these risks are not avoided, slight or minor injury might result. |

| NOTICE | Indicates a possible damaging situation |
|---|---|
|  | If this situation is not avoided, the system or something in its vicinity might get damaged.<br>Application types and other important or useful information are emphasized. |

### 1.1.2 Symbols found on the Product

The VersaGraphix Ultraweld L20 has several warning labels on it to indicate the presence of hazardous voltages inside the unit.

## 1.2 General Precautions

Take the following precautions before servicing the VersaGraphix:

- Be sure the power switch is in the Off position before making any electrical connections
- To prevent the possibility of an electrical shock, always plug the VersaGraphix into a grounded power source
- Power supplies produce high voltage. Before working on the VersaGraphix module, do the following:
    - Turn off the VersaGraphix;
    - Unplug main power; and
    - Allow at least 2 minutes for capacitors to discharge.
- High voltage is present in the VersaGraphix Ultraweld L20. Do not operate with the cover removed
- High line voltages exist in the ultrasonic VersaGraphix module. Common points are tied to circuit reference, not chassis ground. Therefore, use only non-grounded, battery-powered multimeters when testing these modules. Using other types of test equipment can present a shock hazard
- Be sure power is disconnected from the VersaGraphix before setting a DIP switch
- Keep hands from under the horn. Down force (pressure) and ultrasonic vibrations can cause injury
- Do not cycle the welding system if either the RF cable or converter is disconnected

| **WARNING** | |
|---|---|
|  | Sound level emissions of up to 84.9 dB have been measured using a standard test load. To prevent the possibility of hearing loss, use appropriate hearing protection. |

| **NOTICE** | |
|---|---|
|  | Sound level and frequency of the noise emitted during the ultrasonic assembly process may depend upon **a.** type of application, **b.** size, shape and composition of the material being assembled, **c.** shape and material of the holding fixture, **d.** welder setup parameters and **e.** tool design. Some parts vibrate at an audible frequency during the process. Some or all of these factors may result in sound levels of up to 84.9 dB. In such cases operators may need to be provided with personal protective equipment. See 29 CFR (Code of Federal Regulations) 1910.95 Occupational Noise Exposure. For all other countries, follow your local regulations. |

| NOTICE | |
|---|---|
|  | Because the Branson SBC Ultraweld L20 runs on a Windows 10 IoT Enterprise LTSC[a] based PC Platform, it is susceptible to computer viruses. Reasonable steps have been taken to protect our software but all customers are advised to take all necessary steps to ensure that no virus contamination occurs. Do not attempt to run any applications other than the Branson SBC Ultraweld L20 application. If you chose to connect the SBC controller to a computer network, added precautions must be taken in the form of firewalls, etc. No liability will be accepted for any loss or damage sustained as a consequence of any virus transmission. |

a. Windows 10 IoT Enterprise LTSC is a registered trademark of Microsoft Corporation.

### 1.2.1 Intended Use of the System

The Branson VersaGraphix Ultraweld L20 and Actuator are components of an ultrasonic welding system. These are designed for a wide variety of welding or processing applications.

### 1.2.2 Regulatory Compliance

The Branson products (VersaGraphix Ultraweld L20 Welders) are designed to be in compliance with the following U.S. regulatory and agency guidelines and standards:

- ANSI Z535.1 Safety Color Code
- ANSI Z535.3 Criteria for Safety Symbols
- ANSI Z535.4 Product Safety Signs and Labels
- ANSI Z535.6 Product Safety Information in Product Manuals, instructions, and other collateral materials
- NFPA 70 National Electric Code Article 670 Industrial Machinery
- NFPA 79 Electrical Standard for Industrial Machinery
- UL 61010-1
- CSA 22.2 No. 61010-1
- 29 CFR 1910.212 OSHA General Requirements for all machines
- 47 CFR Part 18 Federal Communications Commission

Branson products (VersaGraphix Ultraweld L20 Welders) are designed to be in compliance with the following listed European standards as specified by the Directives issued by the European Parliament and The Council of the European Union:

- Machinery Directive 2006/42/EC
- Low Voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU
- BS EN ISO 13850 Safety of Machinery - Emergency stop equipment, Functional aspects - Principles for design
- EN 13849-1 Safety of Machinery - Safety of related parts of control systems
- EN ISO 12100 Safety of Machinery - Risk assessment - Part 1: Principles
- EN 55011 Limits and methods of measurement of radio disturbance of industrial, scientific and medical radio-frequency equipment
- EN 60204-1 Safety of Machinery - Electrical Equipment of machines
- EN 61000-6-2 Electromagnetic Compatibility - Generic standards - Immunity for industrial environments

- EN 61310-2 Safety of Machinery - Indication, marking, actuation

All products with CE Mark require: Same as above plus

Branson products (VersaGraphix Ultraweld L20 Welders) are designed to be in compliance with relevant UK Statutory Instruments and their amendments:

*Supply of Machinery (Safety) Regulations 2008

*Electromagnetic Compatibility Regulations 2016

All products with UKCA Mark require: Same as above plus

## 1.3 Warranty

For warranty information please reference the warranty section of Terms and Conditions found at: www.emerson.com/branson-terms-conditions.

## 1.4 How to Contact Branson

Branson is here to help you. We appreciate your business and are interested in helping you successfully use our products. To contact Branson for help, use the following telephone numbers, or contact the field office nearest you.

- **Brookfield Main Number (all Departments):** (203) 796-0400 (Eastern Time Zone)
- **Parts Store:** Direct Number for Parts Store in Brookfield (203) 796-9807

Tell the operator which product you have and which person or department you need. If after hours, please leave a voice message with your name and return telephone number.

### 1.4.1 Before Calling Branson for Assistance

This manual provides information for troubleshooting and resolving problems that could occur with the equipment (see Chapter 6: Maintenance). If you still require assistance, Branson Product Support is here to help you. To help identify the problem, use the following questionnaire which lists the common questions you will be asked when you contact the Product Support department.

Before calling, determine the following information:

1. Your company name and location.
2. Your return telephone number.
3. Have your manual with you.
4. Know your equipment model and serial numbers (found on a gray data label on the units). Information about the Horn (part number, gain, etc.) or other tooling may be etched into the tooling. Software- or firmware-based systems may provide a BIOS or software version number, which may be required.
5. What tooling (horn) and booster are being used?
6. What are the setup parameters and mode?
7. Is your equipment in an automated system? If so, what is supplying the "start" signal?
8. Describe the problem; provide as much detail as possible. For example, is the problem intermittent? How often does it occur? How long before it occurs if you are just powering up? If an error is occurring, which error (give error number or name)?
9. List the steps you have already taken.
10. What is your application, including the materials being processed?
11. Have a list of service or spare parts you have on hand (tips, horns, etc.)
12. Notes: _____

_____

_____

## 1.5 Returning Equipment for Repair

| NOTICE | |
|---|---|
|  | To return equipment to Branson, you must first obtain an **RGA number** from a Branson Metal Welding representative, or the shipment may be delayed or refused. |

If you are returning equipment to Branson for repair, you must first call the Repair department to obtain a Returned Goods Authorization (**RGA**) number. (If you request it, the repair department will fax a Returned Goods Authorization form to fill out and return with your equipment).

**Branson Metal Welding Repair Department**

**120 Park Ridge Road**

**Brookfield, Connecticut 06804 U.S.A.**

**direct telephone number: (203) 796-0807**

**fax number: (203) 796-0574**

- Provide as much information as possible that will help identify the need for repair
- Carefully pack the equipment in original packing cartons
- Clearly label all shipping cartons with the RGA number on the outside of cartons as well as on your packing slip, along with the reason for return
- Return general repairs by any convenient method. Send priority repairs by air freight
- You must prepay the transportation charges FOB Brookfield, Connecticut, U.S.A.

### 1.5.1 Get an RGA Number

RGA# _____

If you are returning equipment to Branson, please call the Repair Department to obtain a Returned Goods Authorization (RGA) number. (At your request, the Repair Department will fax an RGA form to fill out and return with the equipment).

### 1.5.2 Record information about the Problem

Before sending equipment for repair, record the following information and send a copy of it with the equipment. This will greatly increase Branson's ability to address the problem.

1. Describe the problem; provide as much detail as possible.
   For example, is the problem intermittent? How often does it occur? How long before it occurs after powering up?

_____

_____

_____

_____

2. Is your equipment in an automated system? NO / YES

3. If the problem is with an external signal, which signal? _____
   If known, include plug/pin # (e.g., P29, pin #3) for that signal:_____
4. What are the Weld Parameters?

_____

_____

5. What is your application? (Type of weld, metal material, etc.)

_____

6. Name and phone number of the person most familiar with the problem:

_____

_____

7. Contact the Branson Metal Welding office prior to shipping the equipment.
8. For equipment not covered by warranty, to avoid delay, include a Purchase Order.

Send a copy of this page with the equipment being returned for repair.

### 1.5.3 Contact Information

Call your local Branson Metal Welding Representative, or contact Branson by calling (203) 796-0400.

My Local Branson Representative's name is:

_____

I can reach this representative at:

_____

### 1.5.4 Pack and Ship the Equipment

1. Carefully pack the system in original packing material to avoid shipping damage. Plainly show the RGA number on the outside of cartons as well as inside the carton along with the reason for return. Make a list of all components packed in the box. KEEP YOUR MANUAL.
2. Return general repairs by any convenient method. Send priority repairs by air freight. Prepay the transportation charges FOB the repair site (either the Branson field office or Brookfield, Connecticut USA location).

| NOTICE | |
|---|---|
|  | Items that are sent Freight Collect will be refused. |

## 1.6 Obtaining Replacement Parts

You can reach the Branson Parts Store at the following telephone numbers:

- Direct Telephone Number: (203) 796-9807
- Fax number: (203) 926-2678

Many parts can be shipped the same day if ordered before 2:30 p.m., Eastern time.

A parts list is found in Chapter 6: Maintenance of this manual, listing descriptions and EDP part numbers. If you need replacement parts, coordinate the following with your purchasing agent:

- Purchase order number
- 'Ship to' information
- 'Bill to' information
- Shipping instructions (air freight, truck, etc.)
- Any special instructions (for example, "Hold at the airport and call"). Be sure to give a name and phone number
- Contact name information

# Chapter 2: The Branson VersaGraphix Ultraweld L20

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## 2.1 About this Operating Manual

This manual provides detailed instructions for the setup, operation, and maintenance of the Branson VersaGraphix Ultraweld L20. For detailed information on operation and maintenance of other components connected to the Ultraweld L20, refer to appropriate Actuator instruction manual.

The VersaGraphix Ultraweld L20 contains a microprocessor-based controller that provides for control and monitoring of welding operations.

## 2.2 Model Covered

This document is intended for use with a 2032S actuator. This document is intended for use in conjunction with others to form a complete manual for your Branson Metal Welding system. Please refer to the Table Of Contents of this Instruction Set to find specific information.

## 2.3 Overview of this Model

The Branson welder generates ultrasonic electrical energy through an ultrasonic converter for welding metals. Several models are available, depending on the desired frequency (for example, 20 kHz) or the desired power range (for example, 2.2 kW). The VersaGraphix also contains a microprocessor-based controller module that provides for control and monitoring of welding operations.

## 2.4 Compatibility with Branson Products

The Branson VersaGraphix Ultraweld L20 is designed to be used with:

- Branson Metal Welding Actuators: 2032S, Ultrasplice 40, Ultrasplice XL, Auto Terminator, Ultraweld L20, WSX ERGO, and Ultraseal 20
- Branson Metal Welding converters: see Table 2.1 VersaGraphix Ultraweld L20 compatibility with Branson Metal Welding Converters below

**Table 2.1** VersaGraphix Ultraweld L20 compatibility with Branson Metal Welding Converters

| Branson Model | Converter |
|---|---|
| 20 kHz/1250 W<br>20 kHz/2500 W<br>20 kHz/3300 W<br>20 kHz/4000 W | 503, 105 |
| 20 kHz/5000 W | High Power |
| 40 kHz/400 W<br>40 kHz/800 W | 4TJ, 4TR, 4TH |

# 2.5 Ultrasonic Theory

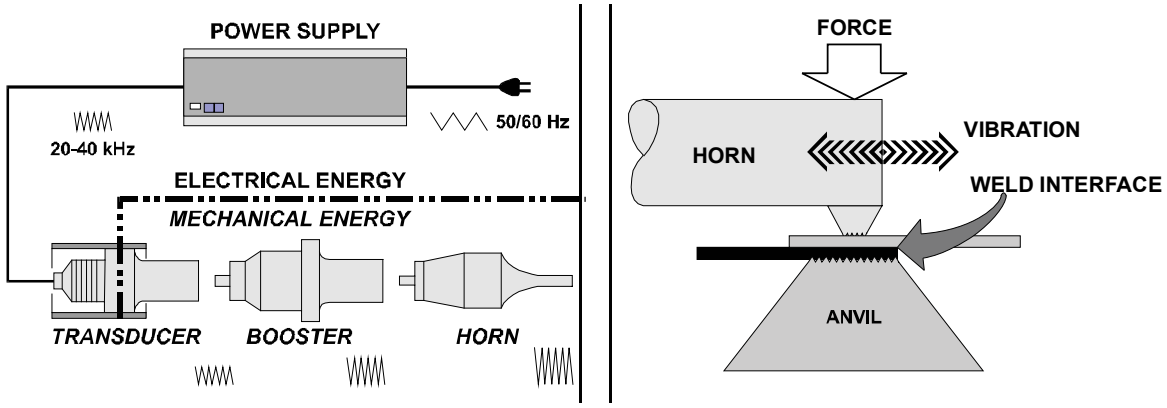
## 2.5.1 What Is An Ultrasonic Weld?

Ultrasonic welding joins metal parts by applying the energy of high frequency vibrations onto the interface area between the parts to be welded.

## 2.5.2 How Does It Work?

Electrical Energy is transformed into high frequency mechanical vibration. This mechanical vibration is transferred to a welding tip through an acoustically tuned horn. The parts are "scrubbed" together under pressure at 20,000 or 40,000 cycles per second. This high frequency vibration, applied under force, disperses surface films and oxides, creating a clean, controlled, diffusion weld. As the atoms are combined between the parts to be welded, a true, metallurgical bond is produced.

**Figure 2.1** How does Ultrasonic Welding Work?




## 2.5.3 Benefits of Ultrasonic Welding

Ultrasonic metal welding exhibits unique welding properties that include:

- Excellent electrical, mechanical, and thermal connections between similar and dissimilar metals
- Low heat build up during the ultrasonic process (no annealing of materials)
- Compensation for normal surface variations of the material
- Ability to clean surface oxides and contaminants prior to welding
- Ability to weld large areas using minimal energy
- Ability to weld thin materials to thick materials
- Low cost per weld

## 2.5.4 How Is An Ultrasonic Weld Made?

Although the theoretical process of producing an ultrasonic weld is uncomplicated, the interactions of the various weld parameters are important and should be understood. When producing an ultrasonic weld, there are three primary variables that interact; they are:

- **Time:** The duration of applied ultrasonic vibration
- **Amplitude:** The longitudinal displacement of the vibration
- **Force:** The compressive force applied perpendicular (normal) to the direction of vibration

The power required to initiate and maintain vibration (motion) during the weld cycle can be defined as

**Table 2.2** Calculating Power

| | |
|---|---|
| **P = F x A x f** | Where:<br>• P = Power (watts)<br>• F = Force * (N)<br>• A = Amplitude (microns)<br>• f = Frequency (Hertz) |

**NOTICE**

Force = (Surface Area of the Cylinder) X (Air Pressure) X (Mechanical Advantage)

**Table 2.3** Calculating Energy

| | |
|---|---|
| **E = P x T** | Where:<br>• E = Energy (joules)<br>• P = Power (watts)<br>• T = Time (seconds) |

Thus the complete 'Weld To Energy' process would be defined as:

$$E = (F \times A \times f) \times T$$

A well designed ultrasonic metal welding system will compensate for normal variations in the surface conditions of the metals by delivering the specified energy value. This is achieved by allowing Time (T) to adjust to suit the condition of the materials and deliver the desired energy.

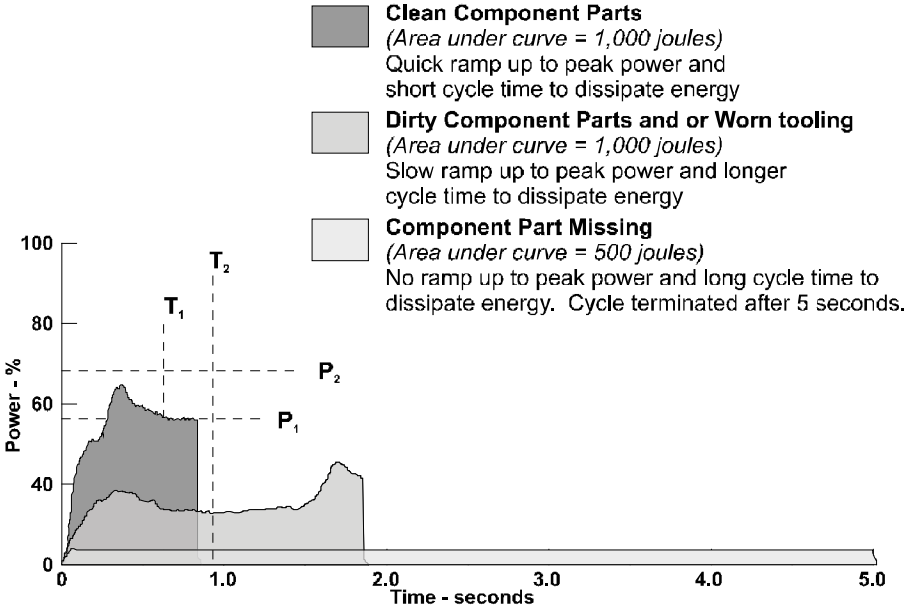
### 2.5.5 Welding To Energy - Why?

Most metal welding applications are produced by 'Welding To Energy' in order to compensate for the various surface oxides and contaminants associated with the metals being joined. In a few applications 'Welding To Time' or 'Welding To Height' will yield better results. Since the majority of all metal welds are produced using energy as the controlling factor we will confine our discussion to that condition.

Welding to energy is necessary because of the non-metallic oxides that form on the metal's surface as well as other contaminates such as grease and dirt. To produce quality welds reliably it is necessary that the surfaces to be joined are clean. The high frequency scrubbing action, combined with pressure, cleans the weld interface at the beginning of the weld process.

The following graph (Figure 2.2 Weld Power Graph for Clean Components, Dirty Components, and when Part is Missing) illustrates a weld produced. The weld 'power graph' is sometimes referred to as weld 'footprint'. It can be used to visualize the weld cycle and assists in parameter optimization. Graphs from consecutive welds will vary slightly as the system dynamically adjusts time to accommodate varying surface conditions. The weld power data is gathered by sampling the power used in 5 millisecond intervals.

**Figure 2.2** Weld Power Graph for Clean Components, Dirty Components, and when Part is Missing

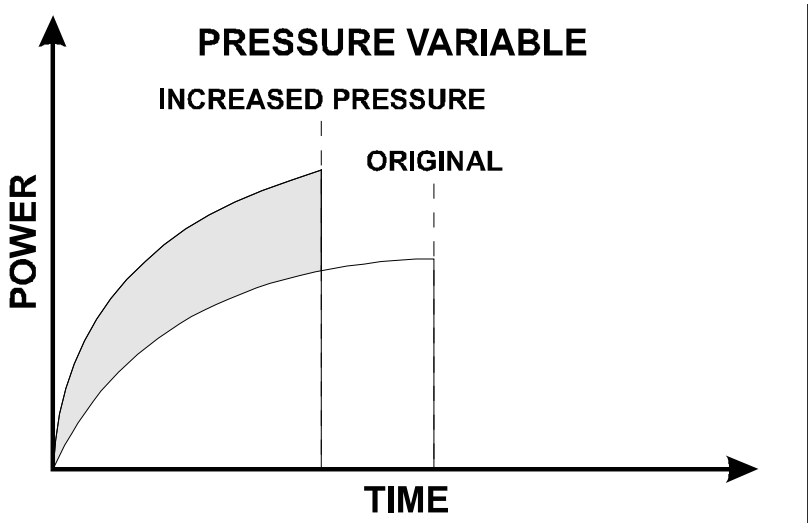



## 2.5.6 Power

The converter/booster/horn, (stack assembly), requires minimal electrical power to initiate and maintain motion (vibration) at a 'no-load' condition. As the mechanical load increases, the power required to maintain the mechanical vibration also increases. The maximum power required during a weld cycle is 'Peak Power'.

By increasing Pressure and maintaining all other parameters, the mechanical load or force on the weld joint increases, therefore, the amount of Power required to maintain the vibration of the stack increases. Subsequently, because of the increased Power Level, less time is required deliver the same amount of Energy. This relationship is illustrated on Figure 2.3 Pressure Variable with Increased Power.

**Figure 2.3** Pressure Variable with Increased Power

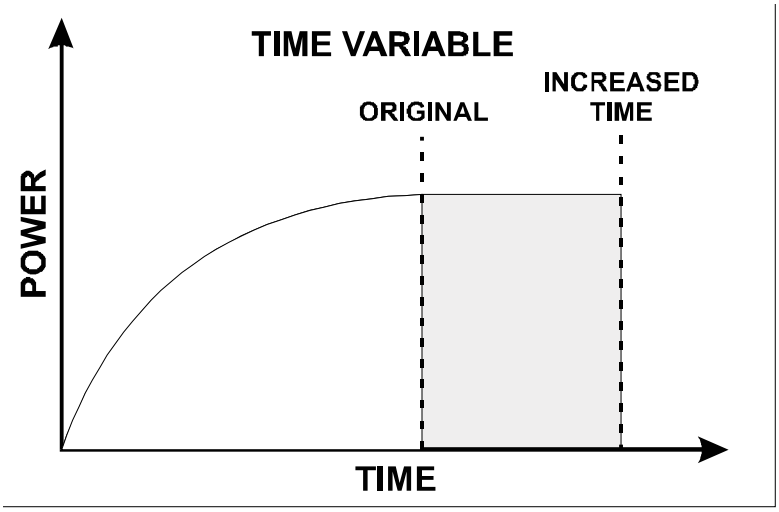



The difference in the appearance of each of the above weld graphs is the result of increased Power loading. Based upon an increase in Pressure, additional Power is required to maintain the motion of vibration. Thus, the same amount of energy is delivered in less time. This approach is typically used to raise the loading of the power supply during a weld cycle to the desired level as determined by the application.

### 2.5.7 Time

The time required to deliver the necessary energy is defined as the Weld Time. For most welds, the time required will be less than one second. If more energy is required and all other weld parameters are maintained, the weld time will increase (Figure 2.4 Pressure Variable with Increased Time).

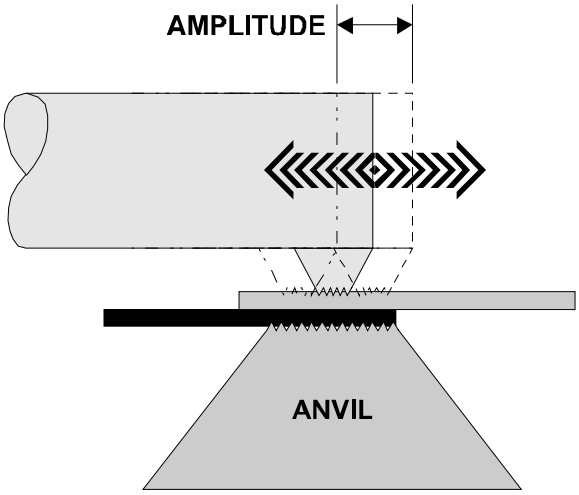
**Figure 2.4** Pressure Variable with Increased Time




### 2.5.8 Amplitude

An ultrasonic tool is a resonant acoustical device. The term Amplitude is used to describe the amount of longitudinal expansion and contraction that the tooling endures as it vibrates (Figure 2.5 Scrubbing Action on Weld Interface). The amplitude correlates to the scrubbing action at the weld interface. This scrubbing action combined with pressure is what advances the weld by a diffusing or mixing of the base materials.

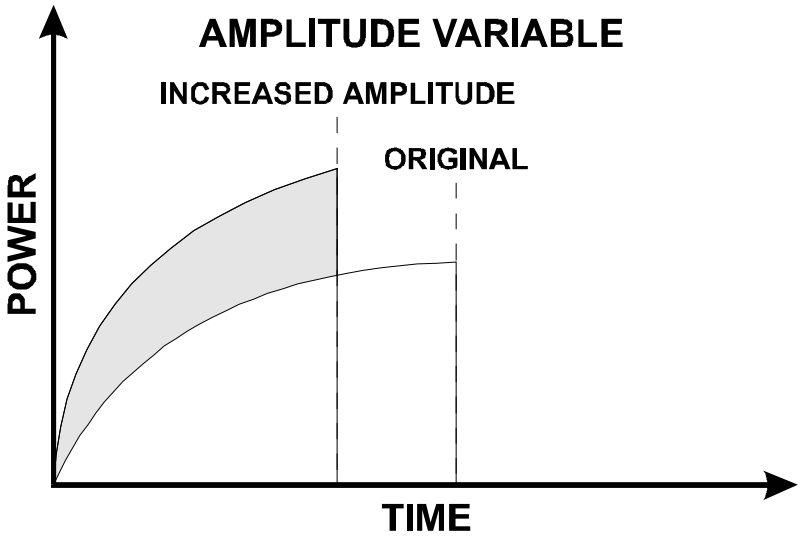
**Figure 2.5** Scrubbing Action on Weld Interface




As previously mentioned, the converter/booster/horn, (stack assembly), requires minimal electrical power to initiate and maintain vibration in a 'no-load' condition. As the amplitude increases, the power required to maintain the increased velocity of vibration also increases. Subsequently, because of the increased Power less time is required deliver the

same amount of Energy. This relationship is illustrated in the following power diagram (Figure 2.6 Amplitude's Influence on Weld Power and Time):

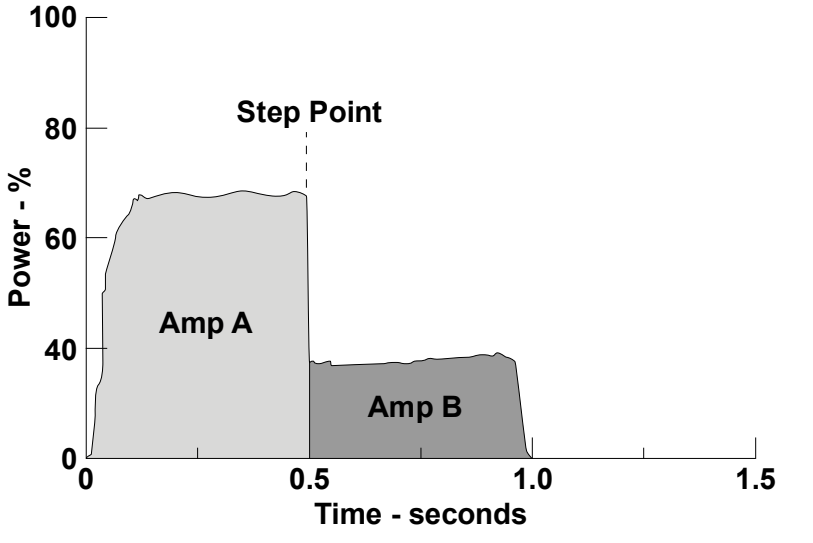
**Figure 2.6** Amplitude's Influence on Weld Power and Time




## 2.5.9 Amplitude Stepping

In standard practice, the scrubbing amplitude at the weld interface is maintained constant during a weld cycle. Recent advances in technology have made it possible to change the amplitude of the horn face during the weld cycle. This is known as Amplitude Profiling. Figure 2.7 Amplitude Stepping Profile illustrates a typical profile where the amplitude is reduced during the cycle. This type of profile is used mostly with welding aluminum to increase weld strength and to help prevent sticking to the tooling.

**Figure 2.7** Amplitude Stepping Profile

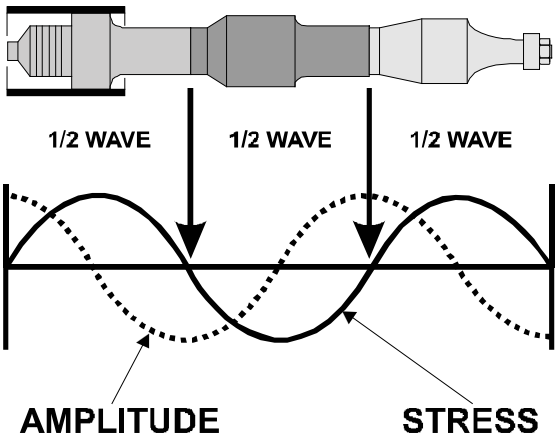


### 2.5.10 Resonant Frequency

The ultrasonic tooling acts as a spring having node points and anti-node points. The mechanical energy used to vibrate the tool is created by the converter. As the vibrations are propagated through the acoustical tool, a harmonic resonance is established consisting of nodes and antinodes. This action results in a resonant wave being transferred through the tooling (Figure 2.8 Harmonic Resonance on Ultrasonic Tooling). The efficiency of the resonant wave transfer depends on the natural resonant frequency of the horn and is determined by two factors:

- The speed of sound through the material
- The geometric shape of the object

**Figure 2.8** Harmonic Resonance on Ultrasonic Tooling




### 2.5.11 Avoiding An Overload Condition

It is possible to increase the Amplitude and or the Pressure to a point where the power available is not adequate to initiate or maintain vibration under the given mechanical load. At this point, the power supply will stall resulting in an Overload condition. Electronic circuits in the system will protect the power supply if this condition exists.

### 2.5.12 Welding To Time

In specific applications, 'Welding To Time' may be desired. As previously mentioned, there are three primary variables that interact; they are:

- **TIME:** The duration of applied ultrasonic vibration
- **AMPLITUDE:** The longitudinal displacement of the vibration
- **FORCE:** The compressive force applied perpendicular (normal) to the direction of vibration

Generally, welding for a specific time will produce acceptable results when:

- The equipment is installed on an automated production line and each station must complete its process within a certain time limit
- Very small low energy welds on clean components are being made

### 2.5.13 Welding Temperature

Ultrasonic welding produces a localized temperature rise from the combined effects of elastic hysteresis, interfacial slip and plastic deformation. The weld interfaces reach approximately 1/3 the temperatures needed to melt the metals. Since the temperature does not reach the melting point of the material, the physical properties of the welded material are preserved. As the ultrasonic welding process is an exothermic reaction, as welding time increases so does weld temperature.

## 2.6 Terminology

**Actuator:** A mechanical device which houses the converter/booster/horn (stack) assembly in a rigid mounting and is utilized to move the stack up or down. This allows for precise control of welding pressure while delivering mechanical vibrations from the ultrasonic stack to the work piece(s).

**After Burst:** A short duration (burst) of ultrasonic energy that begins after the weld is complete and at 1mm from the final height reading. Used when the splice nugget is sticking to the tooling.

**After Burst Delay:** The amount of time, in seconds, between the completion of the ultrasonic welding cycle and the start of the AFTER BURST. (Also see AFTER BURST).

**Amplitude:** Amplitude is the peak-to-peak displacement of mechanical motion as measured at the face of the horn tip. Amplitude is measured either in thousandths of an inch or in microns (e.g. a standard 40 kHz *Converter* produces approximately .0004" or 10 microns of amplitude), Inches x 25.4 = microns. -- This is adjustable depending on system frequency and application tooling.

**Anti-Node:** The anti-node is the area of the horn and booster that exhibits maximum longitudinal displacement and where the internal dynamic forces are equal to zero. This area is at the face and back surface on half-wave technology.

**Anvil:** A device specially designed to grip the lower component and hold it stationary against the energy of vibration(s) which allows a weld to be created.

**BBR:** Nonvolatile random access memory (battery back-up random access memory). Equipped with long life built in batteries, this memory area preserves weld parameters and menu settings when the system is powered off. (Also known as BRAM).

**Booster:** The central component of an ultrasonic stack assembly. A device which transfers mechanical energy from the *Converter* to the ultrasonic horn. The booster will, depending on design, increase, decrease, or maintain the specific amplitude as received from the converter.

**Calibration:** The process of adjusting a device to a known position for purposes of inspection and/or monitoring position, direction, speed, and/or velocity.

**Consumable Spare Tooling:** The tooling portion of the ultrasonic system that wears and requires replacement due to production use. This includes but is not limited to ultrasonic horns, replaceable tips, anvil, and positioning mask. A Spare Tooling Specification Sheet is included within the Actuator Operation Manual to document the spare tooling for a specific metal welding application.

**Ultraweld L20:** The portion of the welding system that provides specific settings & instruction(s) to the overall welding system.

**Converter:** A device which utilizes a PZT (lead-zirconate-titanate) electrostrictive element to change high frequency electrical energy into high frequency mechanical energy.

**Counter:** A programmable device used to monitor system cycles and alert personnel when specific conditions are met.

**Data:** Any representation(s) of instructions, characters, information, or analog quantities to which meaning may be assigned.

**Default:** A chosen system setting or parameter in which the system does not require external data input. In some cases the default value will be changed based upon equipment use.

**Dynamic Spring:** An, adjustable, energy storage mechanism (shock absorber) which allows for stack follow through upon engagement of application tooling with the work pieces to be welded.

**Energy:** Energy is the area beneath the ultrasonic power curve and is calculated in joules, (Watts X Seconds = Joules). When the ultrasonic welding system is setup in the "Weld In Energy" mode the system will deliver the amount of energy as programmed. **NOTE:** The maximum (default) time allowed for delivering ultrasonic energy is five (5) seconds.

**Energy Mode:** A welding method in which the ultrasonic power supply is active until the required amount of energy is delivered (see ENERGY).

**Fixture:** A device for positioning and or holding a component for assembly.

**Force:** The amount of mechanical pressure that is used to deliver (bring down) the mechanical actuator. This programmed force is also called TRIGGER FORCE and is used to engage the knurl pattern into the component part(s) prior to the initiation of ultrasonic energy.

**Frequency:** The number of complete oscillations per second expressed in Hertz (Hz) or kilohertz (1 kilohertz = 1000 Hz). Typically 20 kHz or 40 kHz.

**Gain:** The ratio of the amplitude of motion produced by the *Converter* and delivered by the horn is called the gain. It is determined by the difference in mass on either side of the nodal point.

**Height:** A value, in millimeters (mm), as registered by a linear encoder upon completion of an ultrasonic welding cycle. -- Programmable, in millimeters, with Upper Control Limit & Lower Control Limit.

**Height Encoder:** A device utilized to monitor position, direction, speed, and/or velocity.

**Horn:** An acoustically designed metal tool that delivers mechanical energy from the converter/booster into the work piece. Most applications utilize half wave technology.

**Hold Time:** The amount of time after delivery of ultrasonic energy until the stack tooling begins to retract from the component material(s).

**Joint:** The area where the surfaces are welded together.

**Linear Height Encoder:** See Height Encoder.

**Loading Meter:** A meter which indicates the power drawn from the ultrasonic power supply.

**Maintenance Counter:** Used to alert production personnel of the need to review/ inspect application tooling and/or the ultrasonic system for preventive maintenance purposes. (See Counters).

**Mode:** The method of operating the system (also see WELDING MODE).

**Node:** The node is the area of the horn, (and booster), that exhibits no longitudinal displacement and where the internal dynamic forces are at the maximum. This area is in the center location on half-wave technology.

**Parameter(s):** Programmable units used to control and or monitor the ultrasonic process. --Include but not limited to ENERGY, FORCE, PRESSURE, AMPLITUDE.

**Parts Counter:** Used to monitor system cycles and alert personnel when specific conditions are met. (See Counters).

**Peak Power:** Peak power is the maximum amount of power in watts that was required to keep the ultrasonic stack in motion during the weld cycle.

**Power:** Power, measured in watts, is a function of pressure and amplitude. The amount of power, (watts) required to keep the ultrasonic stack in motion is monitored and used to develop a power curve. This power curve is used to calculate the amount of energy delivered/ dissipated, (Watts = Joules/Time). The power as displayed on the control box is peak power.

**Power Supply (Ultrasonic):** An electronic device that converts 50/60 cycle electrical current into 40 kHz, (40,000) or 20 kHz, (20,000) cycles per second high frequency electrical energy.

**Power Supply Overload (Ultrasonic):** The point or limit at which the amount of power in watts, required to keep the ultrasonic stack in motion, exceeds the available power from the power supply. The system will go into an overload condition in order to prevent system damage.

**Pre-Burst:** A short duration (burst) of ultrasonic energy that begins after the Squeeze Time and before capturing the Pre-Height. Used when welding magnet wire. It helps to break up the insulation around the copper, and provide a small cooling period before the weld takes place.

**Pre-height:** A pre-sonic inspection display, in millimeters (mm), as registered by a linear encoder prior to initiation of the ultrasonic welding cycle. -- Programmable, in millimeters, with Upper Control Limit & Lower Control Limit.

**Presets:** Welding parameters stored in the controller memory.

**Pressure:** The amount of mechanical pressure supplied to the ultrasonic stack assembly while delivering ultrasonic energy to the components.

**Quality Widows & Limits:** Programmable values used by the system to compare actual process data. Actual process data must be within limits or an alarm be issued.

**Quick After Burst:** Once this option is enabled, the after burst needs to be implemented immediately after each weld cycle finished without any time delay or condition judgment.

**Squeeze Time:** The amount of time after the ultrasonic tooling engages the component(s) and before delivery of ultrasonic energy. -- Adjustable from 0 - 2 seconds.

**Stress:** Stress is the amount of dynamic force per cross sectional area.

**Time:** Time is the duration of the ultrasonic, mechanical, activity. Time is a component used to calculate the amount of ultrasonic energy delivered during a weld cycle, (Time = Joules/Watts).

**Tip:** Device specially designed to grip the upper component, to be welded, and to direct the ultrasonic energy into the work piece, (Also Horn Tip & Replaceable Horn Tip).

**Tip Nut:** Device specially designed to securely clamp a replaceable tip onto the horn.

**Trigger Force:** See Force.

**Tuning:** Adjusting to optimize power supply performance according to resonance frequency, especially with regard to the horn and converter.

**Velocity:** The rate of motion at a specific time [velocity = distance time] Also referred to as speed.

# Chapter 3: Shipping and Handling

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3.3 Unpacking . . . . . 28
3.4 Returning Equipment . . . . . 29

## 3.1 Shipping and Handling

| CAUTION | |
|---|---|
|  | The VersaGraphix Ultraweld L20's internal components are sensitive to static discharge. Many components can be harmed if the unit is dropped, shipped under improper conditions or otherwise mishandled. |

### 3.1.1 Environmental Specifications

The VersaGraphix Ultraweld L20 is an electronic unit that converts line voltage to ultrasonic energy and controls user input for regulating the weld process. Its internal components are sensitive to static discharge, and many of its components can be harmed if the unit is dropped, shipped under improper conditions, or otherwise mishandled.

The following environmental guidelines should be respected when shipping the VersaGraphix Ultraweld L20 and Touchscreen Monitor:

**Table 3.1** Environmental Requirements

| Environment | Range |
|---|---|
| Storage / Shipping Temperature | -13º F to +131º F (-25º C to +55º C) |
| Shock / Vibration (Transit) | 40 g shock / 0.5 g and (3-100 Hz) vibration per ASTM 3332-88 and 3580-90 |
| Humidity | 30% to 95%* non condensing |

*Above 40° C the humidity drops to 90%

## 3.2 Receiving

The VersaGraphix Ultraweld L20 is a sensitive electronic device. Many of its components can be harmed if the unit is dropped or otherwise mishandled.

| CAUTION | |
|---|---|
|  | The Actuator and the VersaGraphix Ultraweld L20 are heavy. Handling, unpacking, and installation might require assistance or the use of a lifting device. |

**Scope of Delivery**

Branson units are carefully checked and packed before dispatch. It is recommended, however, that you follow the inspection procedure below after delivery.

**To inspect the VersaGraphix Ultraweld L20 when it is delivered, take the following steps:**

**Table 3.2** Inspect the VersaGraphix upon delivery

| Step | Action |
|---|---|
| 1 | Verify that all parts are complete according to the packing slip. |
| 2 | Check the packing and the unit for damage (visual inspection). |
| 3 | Report any damage claims to your carrier immediately. |
| 4 | Determine if any component has become loose during shipping and, if necessary, tighten screws. |

| NOTICE | |
|---|---|
|  | If the goods delivered have been damaged during shipping, please contact the forwarding agent immediately. Retain packing material (for possible inspection or for sending back the unit). |

| CAUTION | |
|---|---|
|  | The Actuator and the VersaGraphix Ultraweld L20 are heavy. Handling, unpacking, and installation might require assistance or the use of a lifting device. |

## 3.3 Unpacking

The VersaGraphix is fully assembled. It is shipped in a sturdy cardboard box. Some additional items are shipped in the box with the Ultraweld L20.

**When unpacking the Ultraweld L20, take the following steps:**

**Table 3.3** When unpacking the Ultraweld L20

| Step | Action |
|---|---|
| 1 | Unpack the VersaGraphix Ultraweld L20 as soon as it arrives. Save the packing material. |
| 2 | Inspect the unit for signs of damage. |
| 3 | Remove the cover of the VersaGraphix Ultraweld L20 (see Section 6.3 Parts Replacement) to check if any components became loose during shipping. |
| 4 | Store or ship the VersaGraphix Ultraweld L20 only within a temperature range of -13º F to +131º F (-25º C to +55º C). |

| NOTICE | |
|---|---|
|  | If damage has occurred, notify the shipping company immediately. Retain packing materials for inspection. |

## 3.4 Returning Equipment

If you are returning equipment to Branson, please call your Branson Metal Welding Representative or Customer Service to receive approval to return goods to Branson.

If you are returning equipment for repair refer to Section 1.5 Returning Equipment for Repair of this manual, for appropriate procedure.

# Chapter 4: Technical Specifications

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4.2 Electrical Requirements . . . . . 33
4.3 Pneumatic Requirements . . . . . 34
4.4 Operating System . . . . . 35

## 4.1 Environmental Requirements

The VersaGraphix Ultraweld L20 and Touchscreen Monitor have the following Environmental Requirements:

**Table 4.1** Environmental Requirements

| Environmental Concern | Ultraweld L20/Power Supply | Touchscreen |
|---|---|---|
| Ambient Operating Temperature | +41º F to +122º F (+5º C to +50º C) | +32º F to +104º F (0º C to +40º C) |
| Storage / Shipping Temperature | -13º F to +131º F (-25º C to +55º C*) | -4º F to +131º F (-20º C to +55º C) |
| Humidity | 30% to 95%**non condensing | 30% to 80% |
| Operating Altitude | 1000 m (3280 ft) | 3658 m (12000 ft) |
| IP Rating | 2X | |

*70° C for 24 hours

**Above 40° C the humidity drops to 90%

## 4.2 Electrical Requirements

The following tables list input voltages, current requirements, and fuse requirements for the VersaGraphix Welding System, and includes power required when it is used with Branson Metal Welding Actuators.

**Table 4.2** Electrical Input Operating Voltages

| Power Supply Rating | Nominal Input Operating Voltage, +/- 10% |
|---|---|
| 20 kHz / 2200 W | 200-230 V, 50/60 Hz, Single Phase |
| 20 kHz / 3300 W | 200-230 V, 50/60 Hz, Single Phase |
| 20 kHz / 4000 W | 200-230 V, 50/60 Hz, Single Phase |

**Table 4.3** Input Current and Fuse Requirements

| Model | Input Current | Fuse Requirements |
|---|---|---|
| For 20 kHz Models | 2200 W 200V - 230V | 14 Amp Max. @ 200V / 20 Amp fuse |
| | 3300 W 200V - 230V | 21 Amp Max. @ 200V / 20 Amp fuse |
| | 4000 W 200V - 230V | 25 Amp Max. @ 200V / 25 Amp fuse |

## 4.3 Pneumatic Requirements

The factory compressed air supply must be "clean (to a 5 micron level), dry and unlubricated" air with a regulated maximum pressure of 80 psig (5.5 bar).

## 4.4 Operating System

The VersaGraphix Ultraweld L20 uses an embedded Single Board Computer (SBC) to offer advanced user interface functions. It uses Windows 10 IoT Enterprise LTSC as its operating system.

### 4.4.1 About Microsoft Windows 10 IoT Enterprise LTSC

While Windows 10 IoT Enterprise LTSC is similar to the standard desktop version of Windows 10 there are some differences that the advanced user should be aware of.

To protect the application and the operating system, Windows employs a Unified Write Filter Utility (UWF). This filter uses a RAM overlay to record changes to the Solid State Drive. Any changes made to the C: drive are lost during a power cycle. Only the C:\AmtData folder remains unprotected allowing the VersaGraphix application to write directly to the C: drive in order to save presets, sequences, setup parameters and log files.

The UWF must be disabled before modifying the Windows configuration. Changes made to Windows configuration such as printer driver installation or Local Area Network configuration will be lost if the UWF has not been previously disabled. Once all changes have been saved, the UWF must be re-enabled before resuming controller operations. Enabling and disabling the UWF goes beyond the scope of this application user manual. Contact customer support if this becomes necessary (see section 1.5.3 Contact Information).

| NOTICE | |
|---|---|
|  | Operating the system while the UWF is disabled will not allow the application to save presets, sequences, setup parameters and log file information. |

# Chapter 5: Operation


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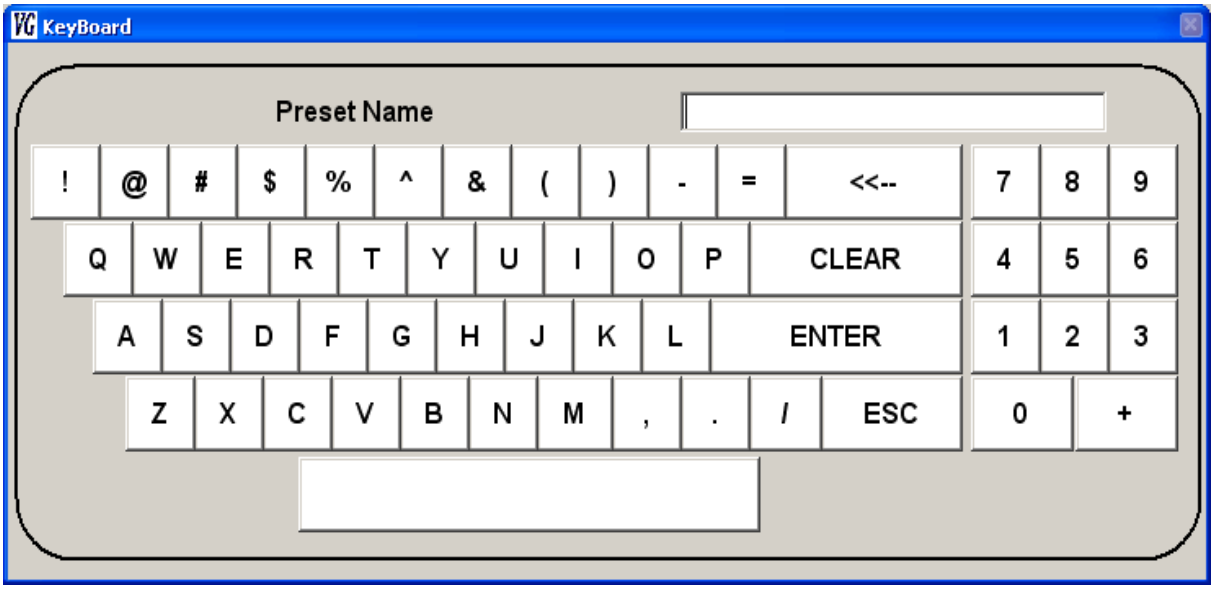
## 5.1 Before You Begin

| WARNING | |
|---|---|
|  | High voltage might be present in the Branson VersaGraphix Ultraweld L20 (VersaGraphix). When setting up and operating the welding system, observe the potential hazards listed below. |

- Do not operate the VersaGraphix with the cover removed
- To prevent the possibility of electric shock, always plug the VersaGraphix Ultraweld L20 into a grounded power source
- Do not cycle the welding system if either the RF cable or the converter is disconnected. High voltage could be present at open power connections
- Ensure power switch is in the OFF position before making or breaking any electrical or pneumatic connections to the VersaGraphix and/or Welder
- Do not touch Ultrasonic Horn during or immediately following the welding cycle. Vibrations and heat can burn skin

## 5.2 Pop Up Alphanumeric Keypad

**Figure 5.1** Pop up Alphanumeric Keypad

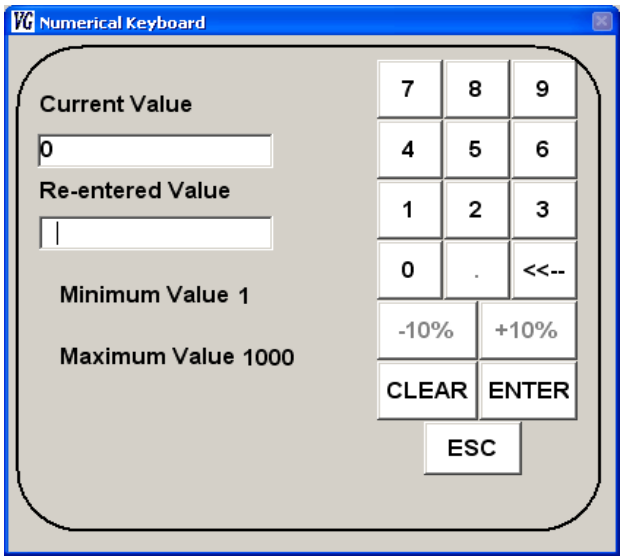



A pop up keypad will be displayed on the touchscreen when it is necessary to enter alphanumeric data using the touchscreen. This keyboard includes upper case letters A through Z, numbers 0 through 9, space, backspace, enter, clear and cancel. It also includes the following symbols: ! @ # $% ^ & () - = / + and ,.

Using non permitted characters when naming a preset or a sequence may happen if you use an external keyboard. To avoid system errors due to invalid name, please refer to the alphanumeric characters in the image above when naming a preset or a sequence with an external keyboard.

## 5.3 Pop Up Numeric Keypad

**Figure 5.2** Pop up Numeric Keypad




A numeric keypad will pop up on the touchscreen when it is necessary to input numeric data. This Keypad includes buttons for the numbers 0 through 9, decimal point, Backspace (<<--), ENTER, CLEAR, and ESC. It also has a +10% button and a -10% button, which are used to enter values +/- 10% of the currently set value, allowing quicker setups.

## 5.4 Editing Buttons


### Edit

When the "Edit" is highlighted, it allows you to edit sequences.

### Delete

When the "Delete" button is highlighted, you may remove unwanted sequence steps. On the file manager screen the "Delete" buttons allows you to eliminate unwanted files in the Browse and Application folders.

### Enter

Touching the "Enter" button saves changes.


### Copy

When highlighted, the "Copy" button allows you to create a copy of a sequence step.


### Escape

Touching the "Escape" button undoes the previous change.


### Copy To

"Copy To" buttons are available on the File Manager screen. You may use them to copy files between the Browse and Application folders.


### Move To

"Move To" buttons are available on the File Manager screen. You may use them to move files between the Browse and Application folders.


### Select All

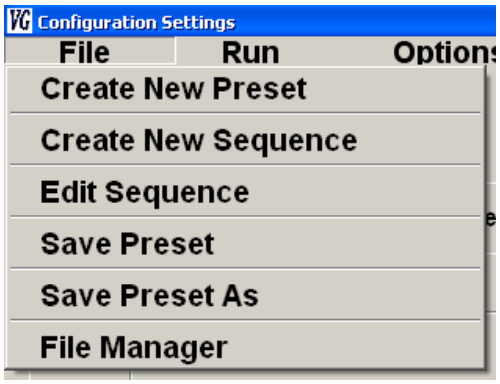
"Select All" buttons are available on the File Manager screen. You may use them to **Move**, **Copy,** or **Delete** at once all files in the user's or Branson's Application folders.

## 5.5 Pull Down Menus

Use the pull down menus at the top of each screen to navigate between different screens. The title of each screen appears in the screen's title bar.

### 5.5.1 File Menu

**Figure 5.3** File Menu




#### 5.5.1.1 Create New Preset

Select Create New Preset to input new weld Preset names into the controller. The Presets will be saved into the controller's library with default preset values. You may then proceed to the Setup screen to enter the preset's weld parameters. See Section 5.10.3 Setup Screen (When Running a Preset) for more information on entering weld parameters.

#### 5.5.1.2 Create New Sequence

Select Create New Sequence to input weld sequences. A sequence is a series of grouped weld presets which are to be executed in a particular quantity and order. Sequences are constructed using existing weld presets stored in the Ultraweld L20's library.

#### 5.5.1.3 Edit Sequence

Touching this option will take you to the Edit Sequence screen where you can modify Sequences.

#### 5.5.1.4 Save Preset

When a preset is modified on the Setup Screen, the preset is modified in running memory. An ' * ' symbol is appended to the preset name to indicate that the preset has not been saved. By selecting Save Preset, changes to the preset that is currently running on the Ultraweld L20 are made permanent. This also causes the ' * ' to disappear from the preset name.

| NOTICE | |
|---|---|
|  | Unless the preset is saved by selecting Save Preset, all unsaved setup changes will be lost when loading a different preset, closing the VersaGraphix application, or powering off the VersaGraphix Ultraweld L20. |

#### 5.5.1.5 Save Preset As

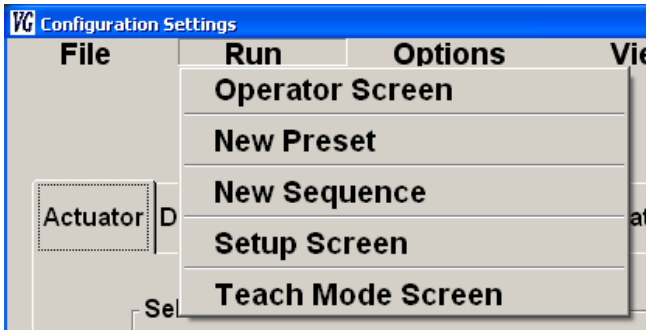
By selecting Save Preset as you can create a copy of the preset currently running on the Ultraweld L20. You will be prompted to supply a new preset name. This new preset will be automatically loaded to memory.

#### 5.5.1.6 File Manager

Selecting File Manager will take you to the Branson File Manager screen. From this screen files can be moved and copied between your directories and Branson's Application Directory. You can also delete files from either your own folders or from Branson's application folders.

### 5.5.2 Run Menu

**Figure 5.4** Run Menu




#### 5.5.2.1 Operator Screen

Touching this button will take you to the operator screen. You can choose the Operator Screen to be the start screen when you turn on your controller. For information see Section 5.11.1.5 System Configuration.

#### 5.5.2.2 New Preset

Select New Preset to load a preset from the Ultraweld L20's library. After selecting a preset the Operator Screen will be displayed.

#### 5.5.2.3 New Sequence

Select New Sequence is used to load a Sequence from the Ultraweld L20's library. After selecting a sequence the Operator Screen will be displayed.

#### 5.5.2.4 Setup Screen

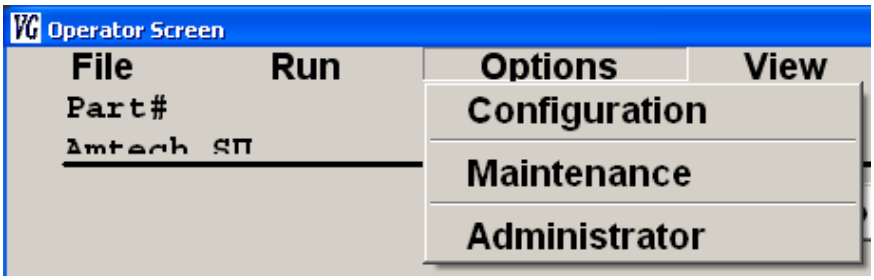
When running a preset, select Setup Screen to change individual weld parameters which are the basic elements required to make a weld. See Section 5.10.3 Setup Screen (When Running a Preset) for more details on entering weld parameters.

When running a Sequence, the Setup Screen can be used to monitor results for each weld. Weld parameters cannot be edited when running a sequence.

You can choose the Setup Screen to be the start screen when you turn on your controller. For information see Section 5.11.1.5 System Configuration.

## 5.5.3 Options Menu

**Figure 5.5** Options Menu




### 5.5.3.1 Configuration

Select this option to access the Configuration screen where Ultraweld L20 features can be setup. These features include: Actuator model; default weld settings; Teach Mode settings; System Configuration; and COM settings.

### 5.5.3.2 Maintenance

Select this option to access the Maintenance screen. This screen allows adjustment and on-demand control of motion devices used in the actuator. This screen also allows access to the maintenance log, maintenance counters, and limit settings.

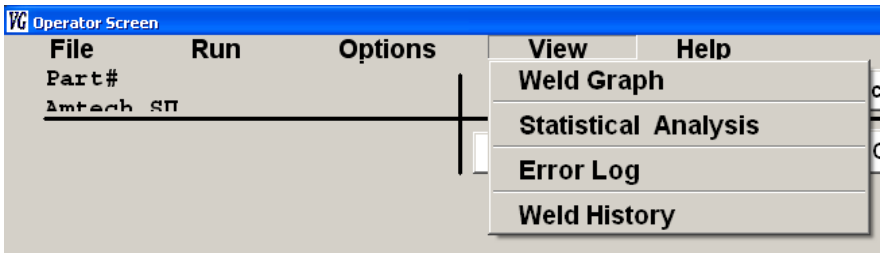
### 5.5.3.3 Administrator

Select this option to access the Administrator screen. From this screen you can exit the Ultraweld L20 program; determine if Windows should shut down at exit; rename auxiliary buttons; enable password requirement; edit the Administrator and Technician passwords; and set screen permissions.

| NOTICE | |
|---|---|
|  | The default password is **ADMIN**. |

## 5.5.4 View Menu

**Figure 5.6** View Menu




### 5.5.4.1 Weld Graph

Selecting this option will display a popup window with a graph showing how the last weld developed over time.

#### 5.5.4.2 Statistical Analysis

Select this option to view weld result data for Time, Power, Pre-Height and Height in relation to their quality windows.

#### 5.5.4.3 Error Log

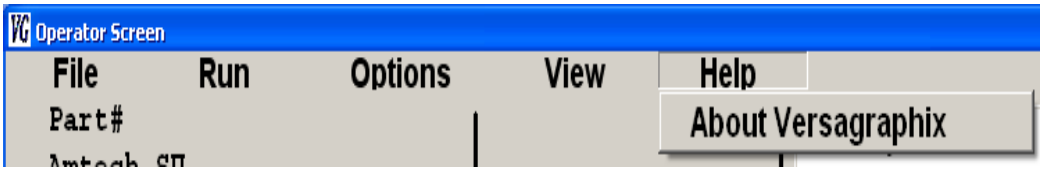
Selecting this option will take you to the Error Log window. In this window the date/time, part name, error type and value for unsuccessful welds can be viewed and printed.

#### 5.5.4.4 Part History

Select this option to view and/or print weld results.

### 5.5.5 Help Menu

**Figure 5.7** Help Menu




#### 5.5.5.1 About VersaGraphix

Select About VersaGraphix to display the VersaGraphix's software version, and Ultraweld L20 version.

### 5.5.6 Branson Logo

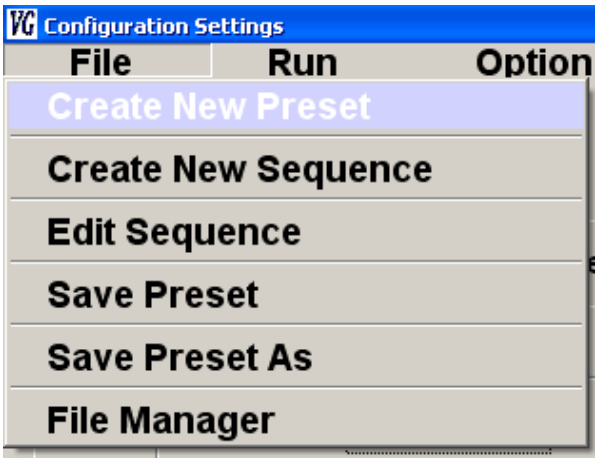
Touching the Branson logo in any of the screens will cause the Language Settings window to pop up.

**Figure 5.8** Branson Logo

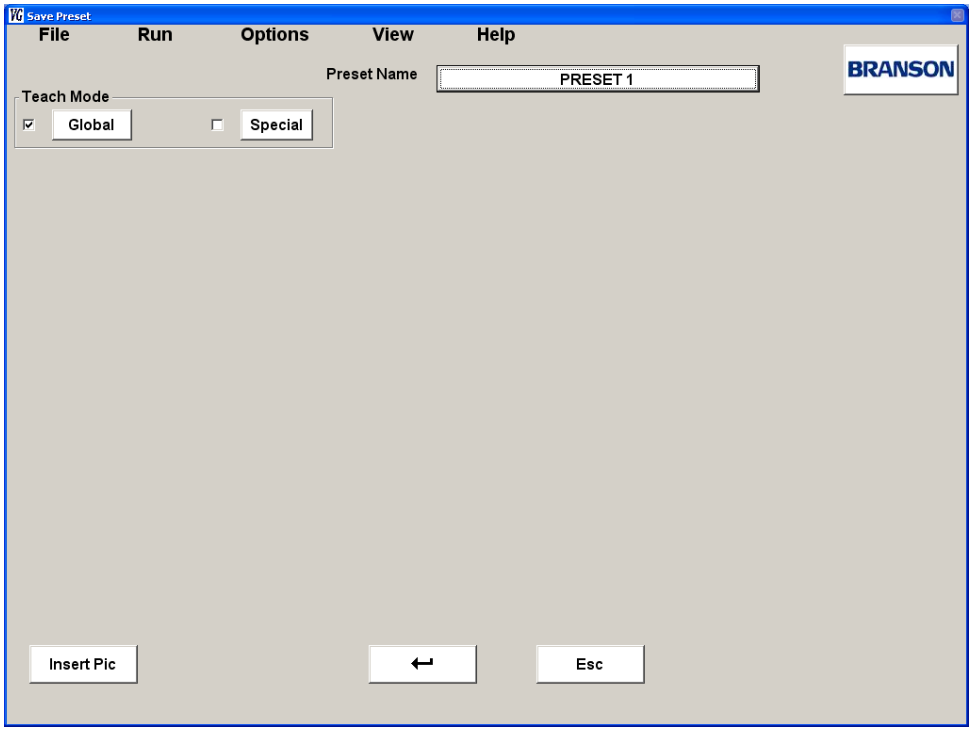
## 5.6 Create New Preset

**Table 5.1** Create New Preset

| Step | Action |
|---|---|
| 1 | Select Create New Preset from the File Menu. |




| Step | Action |
|---|---|
| 2 | Touch the field next to Preset Name. (An alphanumeric keyboard will pop up). Input the preset name (20 characters max). |



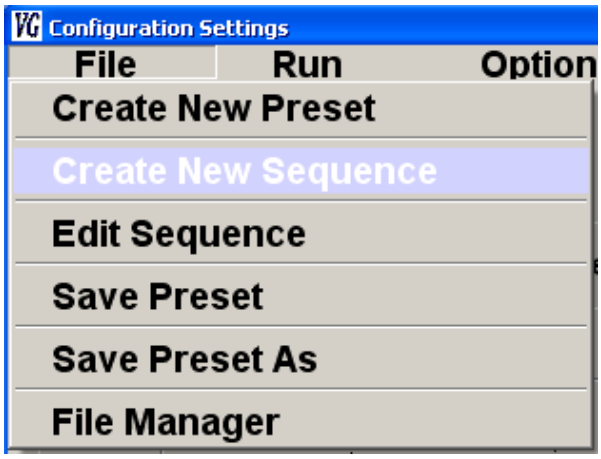
| Step | Action |
|---|---|
| 3 | Select either Global or Special Teach Mode settings for your preset. Global Settings are set on the Teach tab in the Configuration Screen. For more information, see Section 5.11.1.3 Teach Mode Settings. |
| 4 | Touch the Insert Pic button to include an image to be displayed on the Operator screen as a visual aid for manufacturing. |
| 5 | Press the Enter button to save the preset. |

Presets will be saved into the controller's library with default preset values. You may then proceed to the Setup screen to enter the preset's weld parameters. See Section 5.10.3 Setup Screen (When Running a Preset) for more information on entering weld parameters.

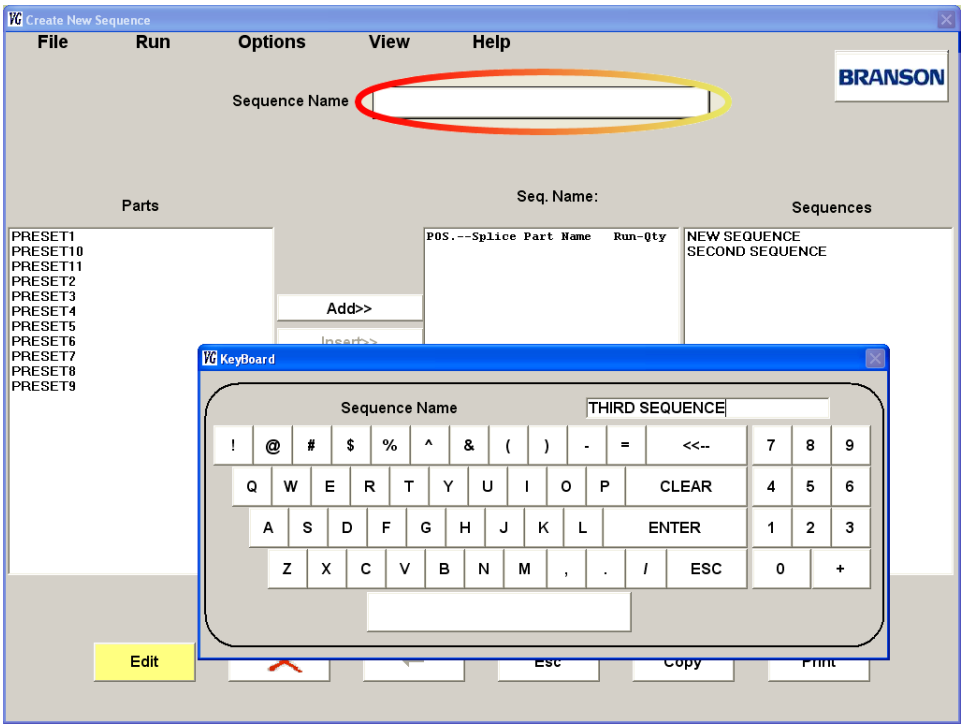
## 5.7 Create New Sequence

**Table 5.2** Create New Sequence

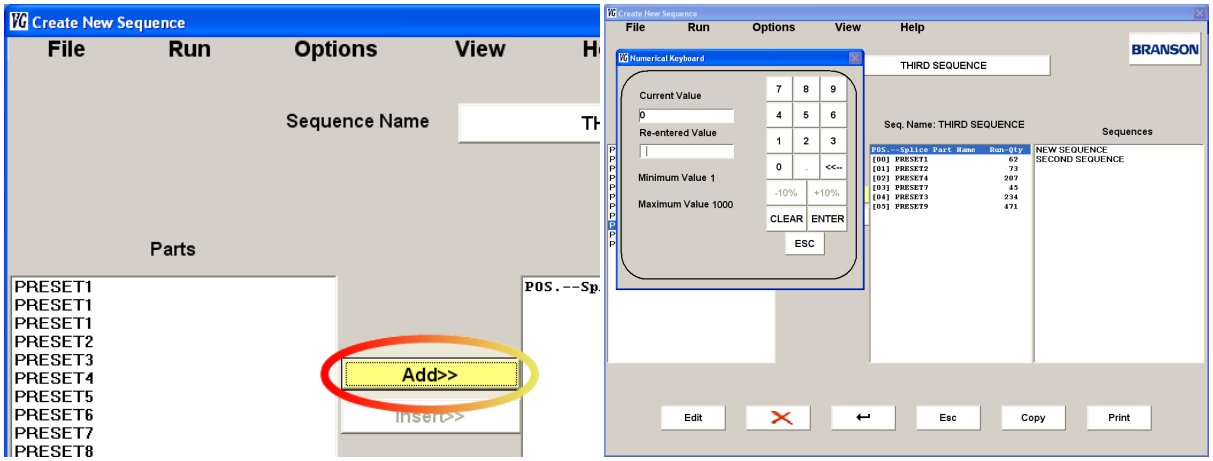
| Step | Action |
|---|---|
| 1 | From the File menu select **Create New Sequence.** |




| Step | Action |
|---|---|
| 2 | Touch the field next to **Sequence Name**. (An alphanumeric keyboard will pop up). Input the sequence name (20 characters max). |



| Step | Action |
|---|---|
| 3 | Touch the **ADD>>** button then choose a Preset from the Parts list to add a step. A numerical keyboard will pop up. Enter the number of welds for the step. Each step in a sequence can support multiple welds of a single weld preset. |




| NOTICE | |
|---|---|
|  | Touching the **Insert** button allows user to insert steps. After touching the Insert button select a part from the Parts list. Then touch the position above which you wish to insert it. A numeric key pad will pop up. Enter the amount of welds you wish to make and press enter to insert the step. |

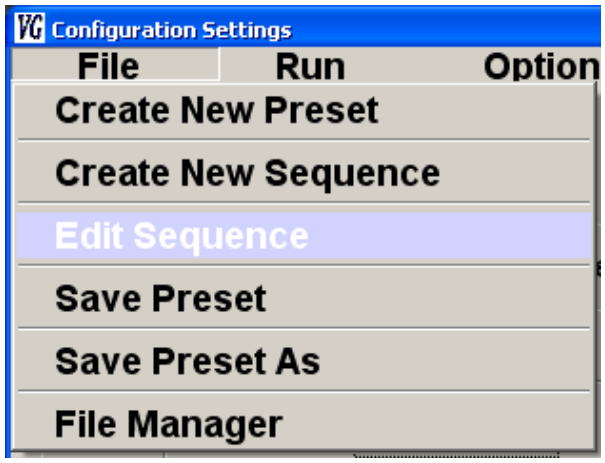

| Step | Action |
|---|---|
| 4 | Once sequence has been completed touch the **Enter** button to save it. The VersaGraphix supports up to 250 presets per sequence. |

## 5.8 Edit Sequence

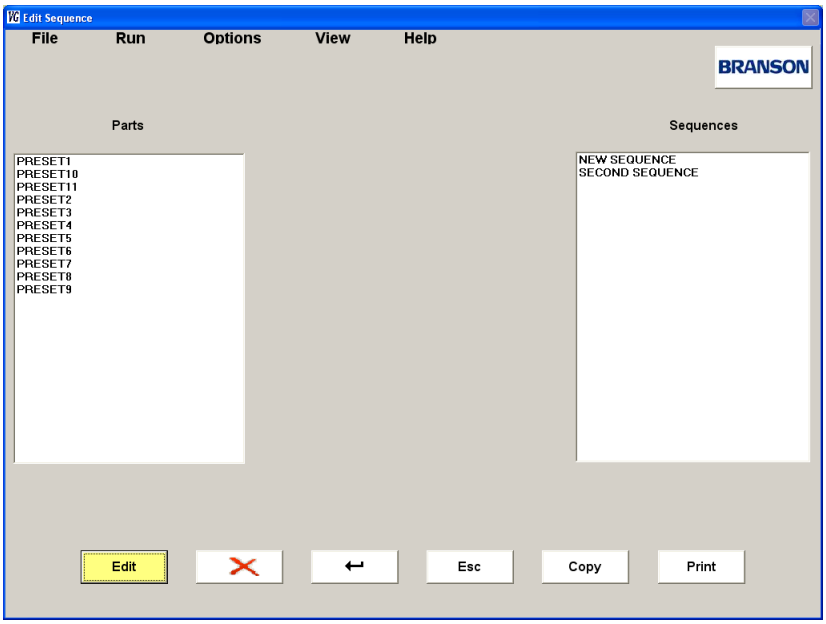
Existing Sequence presets may be edited from the Edit Sequence Screen.

**Table 5.3** Edit Sequence

| Step | Action |
|---|---|
| 1 | From the File menu touch the Edit Sequence. |



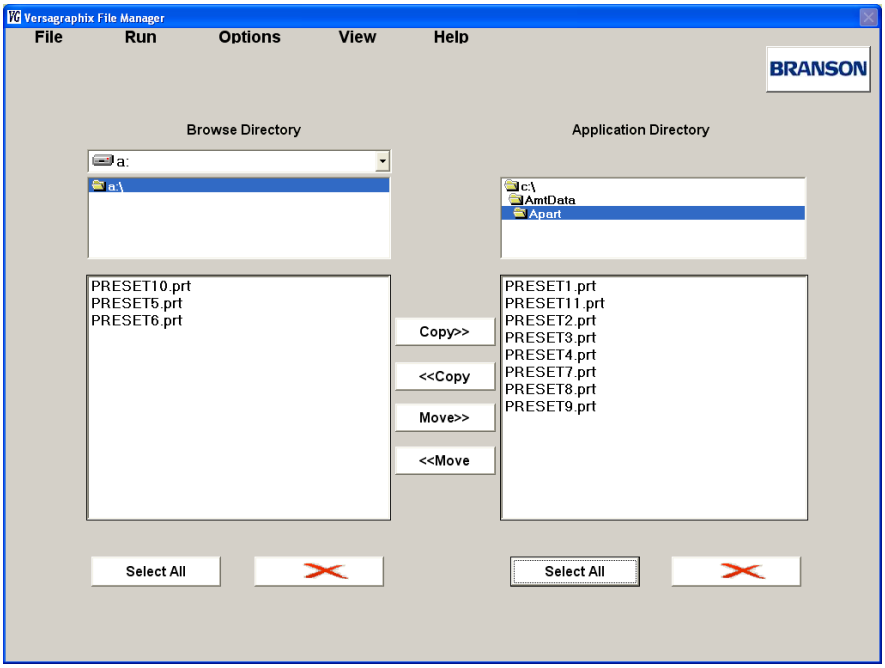

| Step | Action |
|---|---|
| 2 | Touch the **Edit** button so that it is highlighted. Select **the Sequence** preset to be edited from the preset library. |



| Step | Action |
|---|---|
| 3 | A list box with the sequence's steps will appear in the middle of the window. The steps may now be edited (go to Section 5.7 Create New Sequence for more information on sequences). |
| 4 | Press the enter button to save the changes. |

## 5.9 File Manager

**Figure 5.9** File Manager screen




The File Manager screen is used to maintain data files used by the application. You may copy Presets, Sequences and History files to and from the VersaGraphix to other storage devices such as USB memory sticks, and external network drives. The Application Directory box shows the files that are available to the application. They are stored in a fixed directory structure as shown. The user's browsing on the controller files is limited to these three directories:

Presets: **`C:\AmtData\Apart\Prstname.prt`**

Sequences: **`C:\AmtData\Aseq\Seqname.seq`**

Log Files: **`C:\AmtData\history\Wename.tsv`**

### 5.9.1 Copying Files To The Application

**Table 5.4** To copy files from the **Application Directory** to the **Browse Directory**

| Step | Action |
|---|---|
| 1 | Touch the **<<Copy** button, so that it is highlighted. |
| 2 | Touch the file(s) on the **Application Directory** that you wish to copy into the **Browse Directory**. |

**Table 5.5** To copy files from the **Browse Directory** to the **Application Directory**

| Step | Action |
|---|---|
| 1 | Touch the **Copy>>** button, so that it is highlighted. |

**Table 5.5** To copy files from the **Browse Directory** to the **Application Directory**

| Step | Action |
|---|---|
| 2 | Touch the file(s) on the **Browse Directory** that you wish to copy into the **Application Directory**. |

| NOTICE | |
|---|---|
|  | Only files of types .prt, .seq, and .tsv can be copied using the file manager. They will automatically be put into the appropriate application library directory. |

### 5.9.2 Moving Files

**Table 5.6** To move files from the **Application Directory** to the **Browse Directory**

| Step | Action |
|---|---|
| 1 | Touch the **<<Move** button, so that it is highlighted. |
| 2 | Touch the file(s) on the **Application Directory** that you wish to move into the **Browse Directory**. |

**Table 5.7** To move files from the **Browse Directory** to the **Application Directory**

| Step | Action |
|---|---|
| 1 | Touch the **Move>>** button, so that it is highlighted. |
| 2 | Touch the file(s) on the **Browse Directory** that you wish to move into the **Application Directory.** |

| NOTICE | |
|---|---|
|  | Moving files works the same as Copying with the exception that the source file is deleted after the transfer. |

### 5.9.3 Deleting Files

**Table 5.8** To delete files from the either the Application Directory or the Browse Directory

| Step | Action |
|---|---|
| 1 | Touch the Delete button under the appropriate directory, so that it is highlighted. |
| 2 | Touch the files you wish to delete (You will be prompted to confirm). |
| 3 | Select Yes to delete the file. |
| 4 | Repeat steps 2 and 3 for all the files you wish to delete. |

| NOTICE | |
|---|---|
|  | If you Touch the Select All button when the Delete button is highlighted you will be prompted to confirm the deletion of all the files in the directory. |

# 5.10 Run Menu

The Run pull down menu contains the following choices:

## 5.10.1 Operator Screen (When Running a Preset)

**Figure 5.10** Operator screen (When running a Preset)


This is the Operator Screen when running a preset. You can choose this screen to be the start screen when you turn on your controller. For information see Section 5.11.1.5 System Configuration.

Displayed on the upper section of the screen are the Preset's name, the part counter (Part Count), cycle counter (Cycles), and the batch size (End Count). The cycle counter keeps track of the amount of welds performed. When the Part Counter equals the End Count the controller will ask if you want to reset the part counter to zero. Touch the **Part Count** or the **Cycles** button to reset the cycle or part counter. Touch the End Count button to enter a new batch size.

Touch the red arrow to switch between the Operator and Setup screens.

When running a preset on the Operator Screen, changes made to the End Count are kept in memory only. The preset name will display a ' * ' symbol to note that the preset has not been saved. If a different preset is loaded, the VersaGraphix application is closed, or the VersaGraphix Ultraweld L20 is powered off, unsaved changes will be lost. To save the End Count change to the preset file, select Save Preset from the File menu, or select Save Preset As to save the changes into a new preset file.

| NOTICE | |
|---|---|
|  | Unless the preset is saved by selecting Save Preset, all unsaved setup changes will be lost when loading a different preset, closing the VersaGraphix application, or powering off the VersaGraphix Ultraweld L20. |

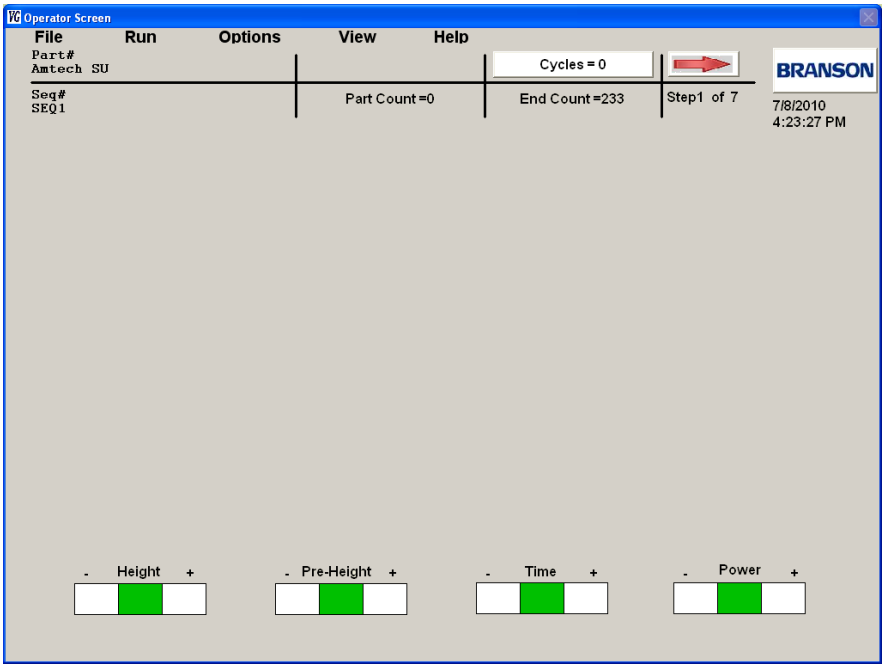
| NOTICE | |
|---|---|
|  | If an image was selected for the preset, it will be displayed on the middle of the screen. |

On the bottom of the screen you can see the quality indicators. These indicate visually if the **Height**, **Pre-Height**, **Time**, and **Power** readings fell within the acceptable range for the last weld. They each have three sections. The section in center is the pass section and it will light green when the parameter reading fell within the acceptable range. The left and right sections are, respectively, the fail low, and fail high sections. These sections will light red when the parameter reading fell outside the acceptable range. The controller will also display a pop up window with an alarm message for unsuccessful welds.

**Figure 5.11** Result is taller than maximum height message


## 5.10.2 Operator Screen (When Running Sequence)

**Figure 5.12** Operator screen (When running a Sequence)



This is the Operator Screen when running a sequence. You can choose this screen to be the start screen when you turn on your controller. For information see Section 5.11.1.5 System Configuration.

Displayed on the upper section of the screen are the sequence's name, the current step's Preset name, the part counter (Part Count), cycle counter (Cycles), the step's batch size (End Count) and the current step number. The cycle counter keeps track of the total amount of welds performed while the part counter keeps track of the welds performed for the current step. Touch the **Cycles** button to reset the cycle counter. Touch the red arrow on the upper right side of the screen to go the next step on the sequence.

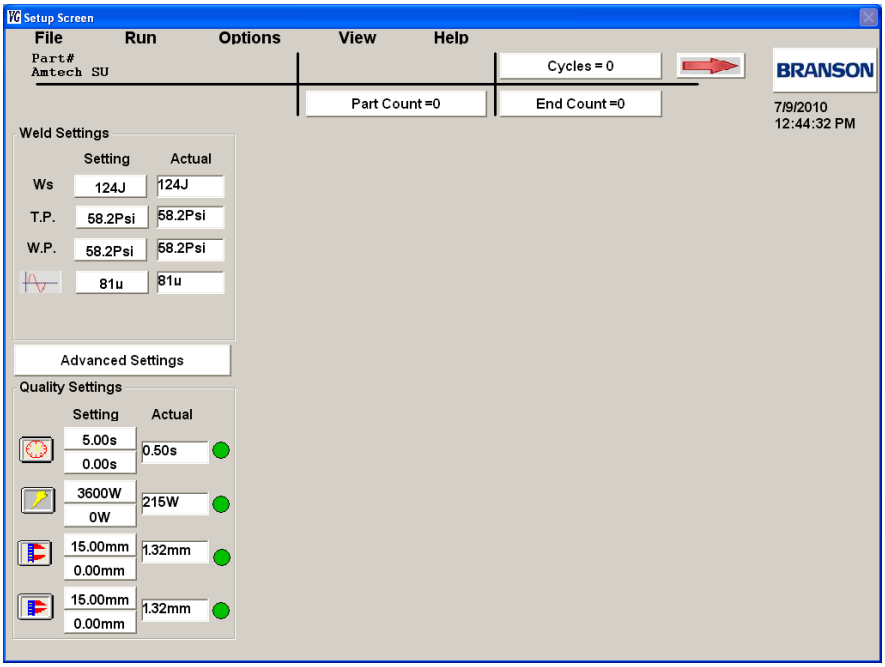
| NOTICE | |
|---|---|
|  | If an image was selected for the preset, it will be displayed on the middle of the screen. |

On the bottom of the screen you can see the quality indicators. These indicate visually if the **Height**, **Pre-Height**, **Time**, and **Power** readings fell within the acceptable range for the last weld. They each have three sections. The section in center is the pass section and it will light green when the parameter reading fell within the acceptable range. The left and right sections are, respectively, the fail low, and fail high sections. These sections will light red when the parameter reading fell outside the acceptable range. The controller will also display a pop up window with an alarm message for unsuccessful welds.

**Figure 5.13** Result is smaller than minimum height message

## 5.10.3 Setup Screen (When Running a Preset)

**Figure 5.14** Setup screen (When running a Preset)




This screen can be used to setup and fine-tune your weld presets. On this screen you can run and edit Weld, Advanced, and Quality settings for your currently loaded preset. You can choose this screen to be the start screen when you turn on your controller. For information see Section 5.11.1.5 System Configuration.

Displayed on the upper section of the screen are the Preset's name, the part counter (Part Count), cycle counter (Cycles), and the batch size (End Count). The cycle counter keeps track of the amount of welds performed. When the Part Counter equals the End Count the controller will ask if you want to reset the part counter to zero. Touch the **Part Count** or the **Cycles** button to reset the cycle or part counter. Touch the End Count button to enter a new batch size.

Touch the red arrow to switch between the Operator and Setup screens.

In the middle of the screen on the left side are the Weld Settings Box, the Advanced Settings button, and the Quality Settings box. On the right side of each quality parameter a circle is displayed. The circle will light green for successful welds and red for unsuccessful welds. If an image was selected for the preset, it will be displayed on the screen. The controller will also display a pop up window with an alarm message for unsuccessful welds:

**Figure 5.15** Result is taller than maximum height

While on the Setup Screen, when running a preset, all changes made to a preset setup are kept in memory only. The preset name will display a ' * ' symbol to note that the preset has not been saved and a Save Preset Button will appear in the lower-left section of the screen. If a different preset is loaded, the VersaGraphix application is closed, or the VersaGraphix Ultraweld L20 is powered off, unsaved changes will be lost. To save the setup changes to the preset file, touch the Save Preset button, select Save Preset from the File menu, or select Save Preset As to save the changes into a new preset file.

| NOTICE | |
|---|---|
|  | Unless the preset is saved by selecting Save Preset, all unsaved setup changes will be lost when loading a different preset, closing the VersaGraphix application, or powering off the VersaGraphix Ultraweld L20. |

#### 5.10.3.1 Weld Settings

In the Weld Settings box you can see the actual readings for the last weld on the rightmost column. You may alter the parameter settings by touching the buttons on the center column. The parameters:

**Watt/seconds (Ws):** The amount of energy (in joules) delivered on each weld.

**Trigger Pressure (T.P):** The clamping pressure that needs to be exerted to the parts before applying ultrasonic energy.

**Weld Pressure (W.P):** The clamping pressure applied to the parts during a weld.

**Amplitude (**  **):** The amplitude (in microns) of the applied ultrasonic vibration. If an amplitude stepping mode has been selected on the Advanced Settings window, you will be able to enter Amplitude A, Amplitude B, and a Step Point.

#### 5.10.3.2 Quality Settings

In the Quality Settings box you can see the actual readings for the Time, Energy, Pre-Height, and Height of the last weld. You may also adjust the acceptable range for the following quality parameters.

**Time(**  **) max/min:** The max/min time that the ultrasonic energy may be applied to a weld.

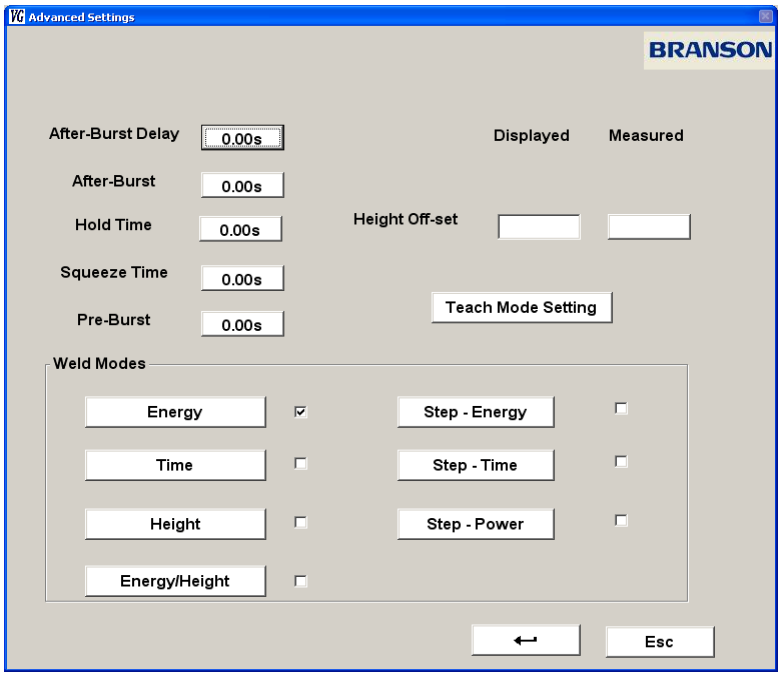
**Energy(**  **) max/min:** The max/min power which may be applied to a weld.

**Pre-Height(**  **) max/min:** The max/min height of the parts before welding. This is a pre-welding inspection reading from the height encoder.

**Height (**  **) max/min:** The max/min height of the resulting weld.

### 5.10.3.3 Advanced Settings Screen

**Figure 5.16** Advanced Settings screen




This window allows access to the advanced weld settings described below. These values will normally reflect the default settings made in the Configuration Settings screen on the Settings tab. Values set on this window will only affect the current preset's settings.

**Parameters:**

- **After Burst (s):** Used to fire sonics for a predetermined amount of time after the weld is complete and after After burst delay times out
- **After Burst Delay (s):** Used to delay after burst. Delay should be set so that no force is on the part
- **Hold time (s):** Delays the release of the weld. Used to remove discoloration from the weld
- **Squeeze Time (s):** Delay the weld for a predetermined amount of time. Allows the force of the cylinder to build up on the part before welding
- **Pre Burst (s):** Used to fire sonics for a predetermined amount of time after the Squeeze Time and before capturing the Pre-Height. Used when welding magnet wire. It helps to break up the insulation around the copper, and provide a small cooling period before the weld takes place

**Weld Modes:**

- **Energy:** Ultrasonics are activated until the specified amount of Energy (Watts integrate over time) has been applied
- **Time:** Ultrasonics fire for a predetermined amount of time
- **Height:** Ultrasonic energy is applied until a predetermined height is reached
- **Energy/Height Compensation:** Used for contaminated parts. The controller will first put in the predetermined amount of Energy, it will then look at the final height window. If the final height is not within the window, the controller will then put in up to 3 times more energy to get to the center of the window. Note quality window for time may need to be adjusted when using this mode. Ultraweld L20 will shut down when the upper time limit is exceeded
- **Amplitude stepping:** There are three stepping modes available: Step - Energy, Step - Time, and Step - Power. If a stepping mode is selected, you must also set the start amplitude, end amplitude, and a step point. After choosing a stepping mode, set the start amplitude, end amplitude and step point by editing the Amplitude setting located in the Weld Settings area of the Setup screen. See Section 2.5.9 Amplitude Stepping for more information

**Off-set:**

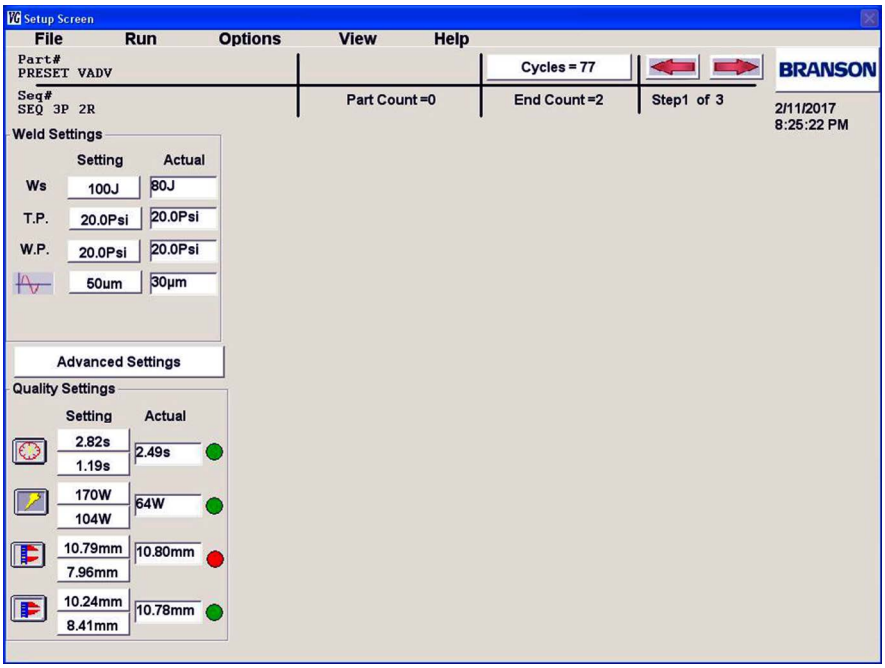
- **Height Off-set:** Displays the height measurement for the last weld. Touching the button under the Measured column allows the user to enter the height he measured on the last welded piece. The controller automatically adds a corrective offset to its measurements, so displayed values to match the user's measurements

**Teach Mode Setting:**

- **Global:** Select Global to use the Teach Mode settings set on the Teach tab on the configuration screen. For more information, see Section 5.11.1.3 Teach Mode Settings
- **Special:** Select Special to enter different Teach Mode settings for the current preset

## 5.10.4 Setup Screen (When Running a Sequence)

**Figure 5.17** Setup screen (When running a Sequence)




This screen can be used to monitor actual weld and quality results for each weld.

You can choose this screen to be the start screen when you turn on your controller. For information see Section 5.11.1.5 System Configuration.

| NOTICE | |
|---|---|
|  | While on the Setup Screen, no changes can be made to the preset settings. |

Displayed on the upper section of the screen are the sequence's name, the current step's Preset name, the part counter (Part Count), cycle counter (Cycles), the step's batch size (End Count) and the current step number. The cycle counter keeps track of the total amount of welds performed while the part counter keeps track of the welds performed for the current step. Touch the **Cycles** button to reset the cycle counter. There are two red arrows on the upper right side of the screen. Touching the arrow pointing to the left will

take you to the previous step on the sequence. Touching the arrow pointing to the right will take you to the next step on the sequence.

In the middle of the screen on the left side are the Weld Settings Box, the Advanced Settings button, and the Quality Settings box. On the right side of each quality parameter a circle is displayed. The parameters shown are the same as the ones described in sections 5.10.3.1 Weld Settings, 5.10.3.2 Quality Settings, and 5.10.3.3 Advanced Settings Screen, but they cannot be modified within the sequence. The circle will light green for successful welds and red for unsuccessful welds. The controller will also display a pop up window with an alarm message for unsuccessful welds.

**Figure 5.18** Result is smaller than minimum height


## 5.10.5 Teach Mode Screen

In the Teach Mode screen, the controller automatically derives the quality window's limits based on calculations performed on results from a weld sample set. It is operational in three run screens: Setup Screen, Operator Screen and Statistical Analysis Screen. There are three available teach modes: Standard Teach Mode, Auto Teach Mode, and Sigma Teach Mode. To run Teach Mode click on: Run > Teach Mode Screen. The controller will run in the teach mode currently selected in the TEACH tab in the Configuration Settings window. See Section 5.11.1.3 Teach Mode Settings.

| NOTICE | |
|---|---|
| | While in any of the Teach Modes, the screen background is orange and the Quality settings are not editable. |

| NOTICE | |
|---|---|
| | Exit the Teach Mode by closing the application, loading a Preset/ Sequence, Saving/Editing a Preset/Sequence, or by switching to following screens: Run New Preset/Sequence, File Manager, Maintenance, Configuration Settings, and Administrator. |

| NOTICE | |
|---|---|
|  | You can switch between the Operator Screen, Statistical Analysis screen, Weld Graph screen, Weld History screen and Error Log screen without affecting the Teach process. While in teach mode, the Operator Screen and Statistical Analysis screen will also be shown in orange background. |

| NOTICE | |
|---|---|
|  | To start a new Teach process click [Run -> Teach Mode Screen] and select the required preset to be loaded from the list. |

| NOTICE | |
|---|---|
|  | If you change any Weld/Advanced settings at any time, the Teach mode restarts with wide open quality windows. The preset will be saved at this point. |

#### 5.10.5.1 Standard Teach Mode

In the Standard Teach Mode the default quality windows (wide open) are used, and you may accept or reject each weld as part of the sample set. Upon successful completion of the sample set, the average values for Time, Power, Pre-Height, and Height are computed; the allowable min/max deviation percentages are factored in; and the resultant is used to calculate the weld settings and the quality window settings. The quantity of samples to be run and the allowable deviation percentages for each weld parameter are set in the TEACH tab in the Options > Configuration window. See Sections 5.11.1.3 Teach Mode Settings. After completing the Teach process, the Preset and the quality windows settings are saved; the gray Operator Screen is displayed; and you will no longer be in Teach Mode.

#### 5.10.5.2 Auto Teach Mode

In the Auto Teach Mode you may not reject samples. If no changes are made to the Weld/Advanced settings, the previously saved quality windows are used for the first five welds, which form a basis. Their averaged values for Time, Power, Pre-Height and Height, plus or minus ten percent tolerance, are used to evaluate the acceptability of the remaining samples. If one of the remaining samples falls outside of this range, it is rejected and an alarm occurs. Up to three welds may be rejected in a teach session. If a fourth bad weld is encountered the Auto Teach process starts over with wide open quality windows. The run quantity for Auto Teach Mode can be set in the Teach tab in the Configuration settings window. When the Teach process is complete, the Preset and the quality window settings are saved; the gray Operator Screen is displayed; and the system will be in monitoring mode. While in monitoring mode you can weld normally. The system will restart a complete Auto Teach session automatically if you change any of the weld parameters,

quality windows settings, recall a new preset, or go to the File Manager, Maintenance, Configuration or Administration screens.

| NOTICE | |
|---|---|
|  | In Auto Teach mode File > Create New Sequence, File > Edit Sequence, Run > New Preset, and Run > New Sequence menu options are always grayed out. |

| NOTICE | |
|---|---|
|  | If you go to the Statistical Analysis or the Operator Screen just after selecting Auto Teach option in Configuration screen, the application will go directly into monitoring mode and you will be allowed to weld normally with the currently loaded preset. |

| NOTICE | |
|---|---|
|  | If Auto Teach mode is left selected in the configuration screen before powering down, the system will display the operator screen; load the previously loaded preset or default preset; and go directly in to monitoring mode in Auto Teach mode on the next power up. |

| NOTICE | |
|---|---|
|  | After Creating a New preset while in Auto Teach mode both Run > Operator Screen and Run > New Sequence menu options are grayed out. The only way to weld is to first go through the Auto Teach process for the newly created preset by clicking Run > Teach Mode Screen. |

### 5.10.5.3 Sigma Teach Mode

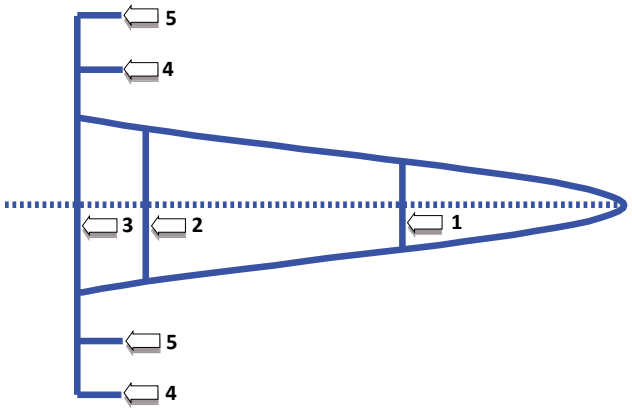
The Sigma Teach mode collects data for the last 128 samples taken for each weld. It limits itself to the last 128 samples to keep data and statistics that will be meaningful to the current sample. The Sigma Teach mode calculates the average and standard deviation for each or the monitored parameters (Time, Power, Preheight, and Height). The early samples are displayed starting on the left of the screen and, as they are added, continue from the left to right.

At 128 and later samples, the oldest data point on the left is removed and the latest data point is added at the right position. Average and standard deviation are always based on the latest data. Removed data has no influence on the calculations.

Standard deviation is calculated with an (n-1) weighting. This tends to make the smaller values of the n have wider standard deviations.

The collected data is displayed between the Upper Specification Limit (USL) and the Lower Specification Limit (LSL). These are the limits as shown on the Run screen. If there are more the 3 samples in the data a Gaussian curve is displayed. The Gaussian curve is positioned between the limits and as much of its data as possible is displayed. There are markers on the curve to show 1, 2, 3, 4, 5, standard deviations. The 1, 2, and 3 markers are vertical while the 4 and 5 are horizontal (see Figure 5.19 Sigma markers below). The most desirable situation is narrow limits with a tight curve.

**Figure 5.19** Sigma markers




After completing the Teach process, the Preset and the quality windows settings are saved; the gray Operator Screen is displayed; and you will no longer be in Teach Mode.

# 5.11 Options Menu

The Options pull down menu contains the following choices:

## 5.11.1 Configuration

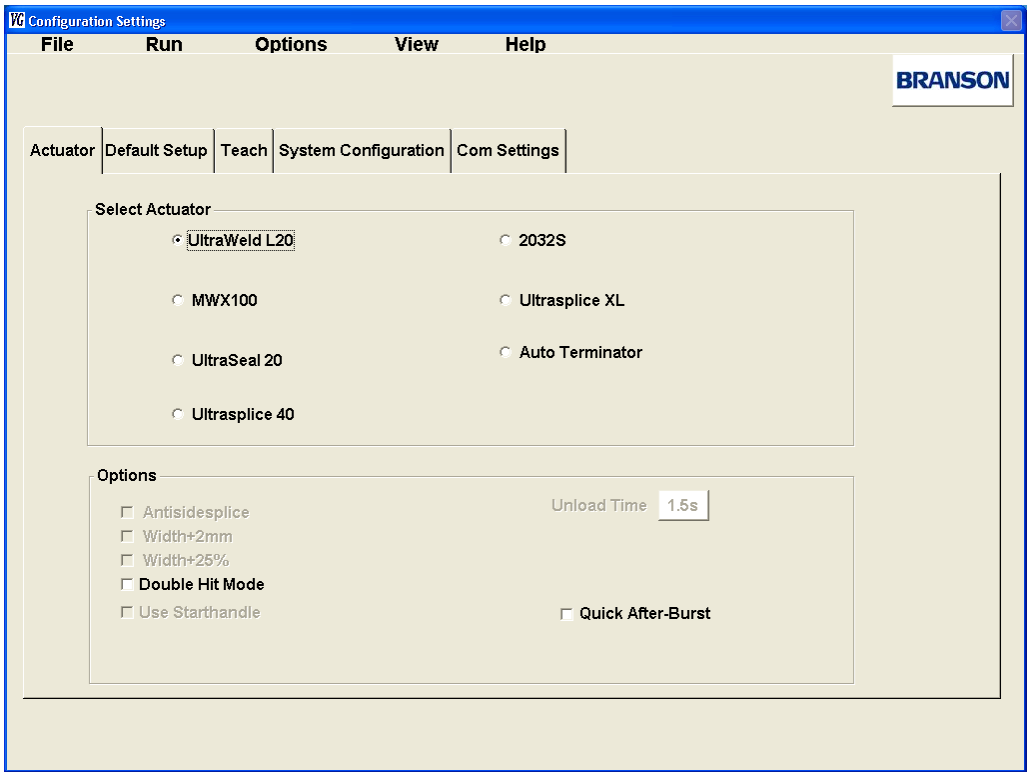
User is allowed to configure the following features of the application.

- Actuator
- Default Setup
- Teach
- System Configuration
- Com Settings

### 5.11.1.1 Actuator

The Actuator tab found in the Configuration screen allows you to setup the VersaGraphix to work with your Actuator model.

**Figure 5.20** Actuator Tab




The VersaGraphix can be setup to work with any of the following actuators:

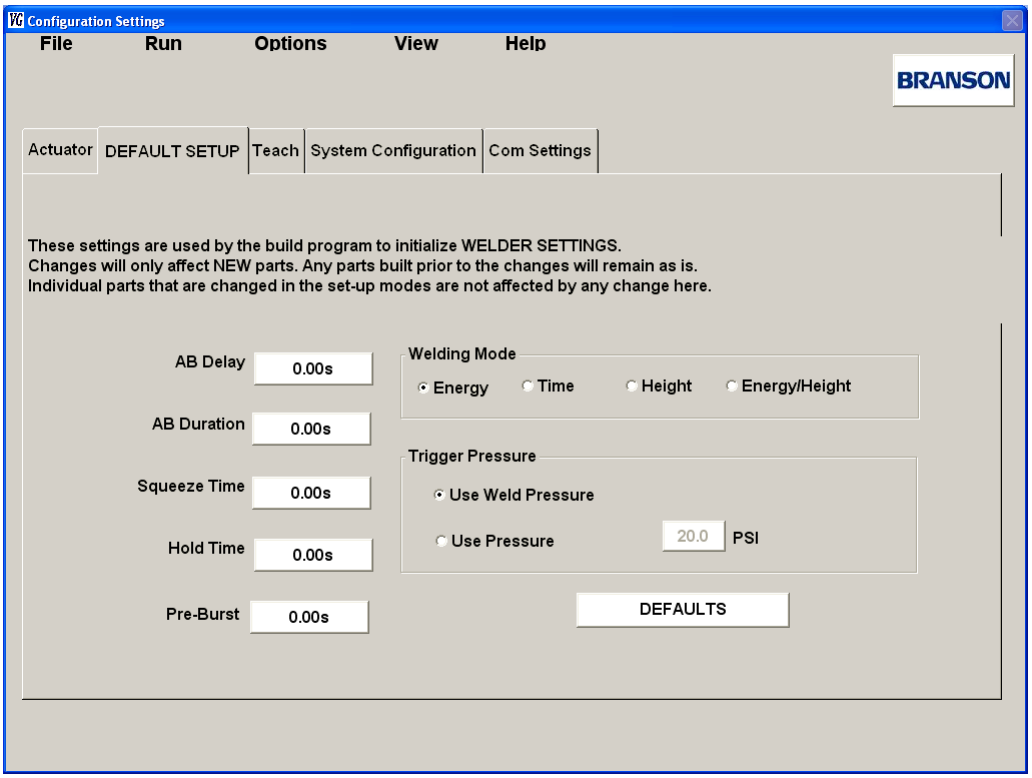
- UltraWeld L20
- MWX100
- Ultraseal 20
- Ultrasplice 40
- Ultrasplice XL
- Auto Terminator

On this tab you may also set the following:

- Double Hit Mode: Used for Automation. Do not activate unless instructed by Branson
- Quick After Burst: The after burst function is implemented immediately after each weld cycle finished without any time delay or condition judgment

### 5.11.1.2 Default Preset Settings

**Figure 5.21** Default Setup Tab



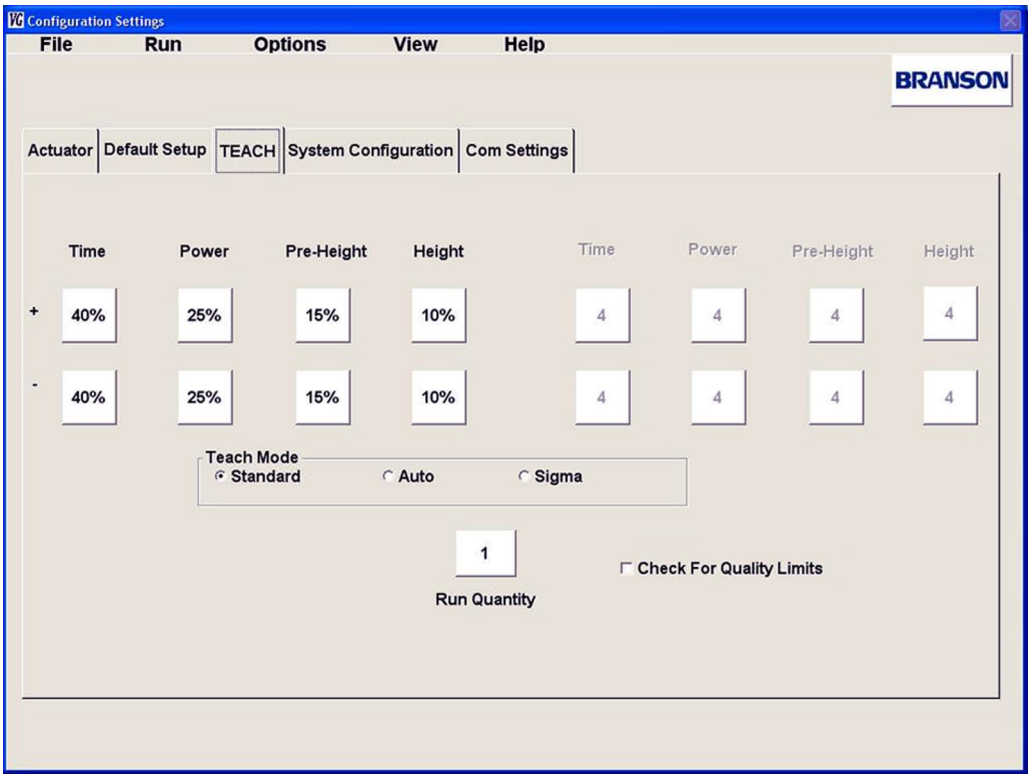

Set the default weld settings for all new presets on the Default Setup tab. These settings will only affect new presets. You may set the following parameters:

- AB Delay
- AB Duration
- Squeeze Time
- Hold Time
- Pre-Burst
- Welding Mode
- Trigger Pressure

See Sections 5.10.3.1 Weld Settings and 5.10.3.3 Advanced Settings Screen for more information on these parameters.

### 5.11.1.3 Teach Mode Settings

**Figure 5.22** Teach Tab



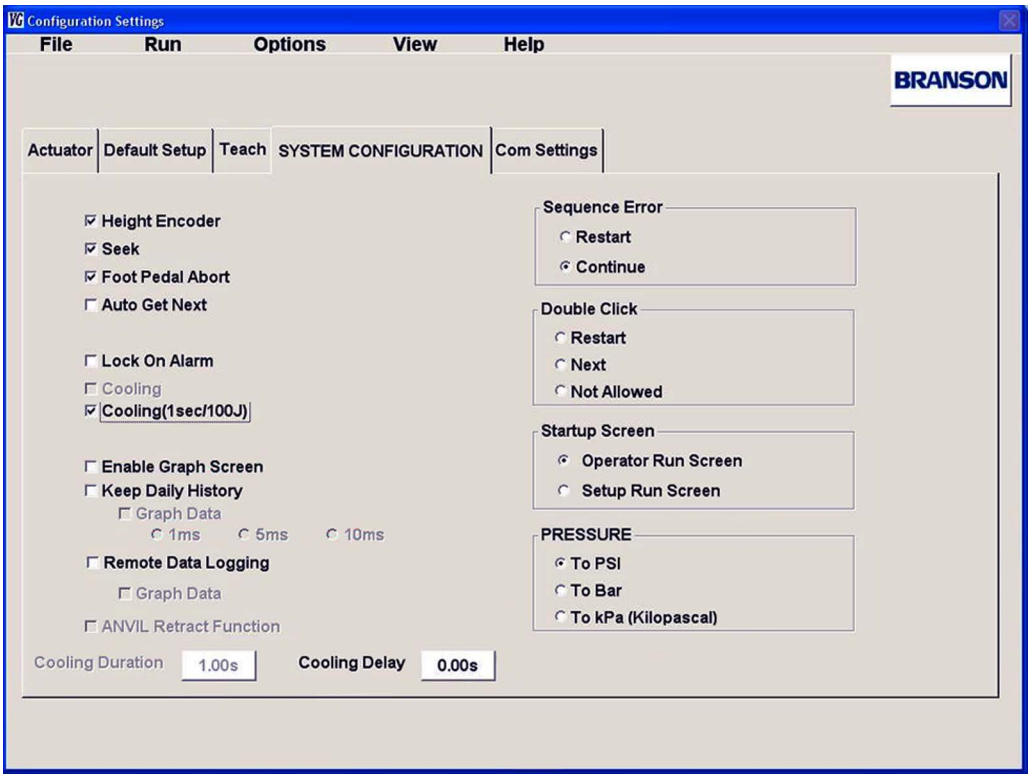

On the Teach tab you may select the teach mode the VersaGraphix will use. There are three different teach modes available: Standard, Auto, and Sigma. On this tab you can set the run quantity and allowable deviation percentages for the Standard or Auto teach modes. See Section 5.10.5 Teach Mode Screen for more information on Teach modes.

### 5.11.1.4 Check for quality limits

Add the "check for quality limits" check box in the teach tab of the configuration menu to enable/disable (turn ON/OFF) the "Check for Quality Limits" mode. When in the "Check for Quality Limits" mode, if the recalled preset has never been through the teach mode yet, then the preset will be automatically recalled into the teach mode menu; else the system will work as usual and go to Run mode with the recalled preset. If the check box is disabled, the system will also work as usual. In this scenario, all the splices/presets of sequence need to be checked in the sequence mode when a new sequence is recalled. An error message will be shown up on the screen as long as there is anyone unqualified splice/preset in the recalled sequence. Error Message says the following: "Teach Mode Required" then shows the unqualified splice/preset.

### 5.11.1.5 System Configuration

**Figure 5.23** System Configuration Tab




**Height Encoder:** Toggles the height encoder on/off.

**Seek:** Toggles Seek function on/off. This pulses ultrasonic energy to the stack prior to each weld in order to allow the system to tune to stack frequency.

**Foot Pedal Abort:** When this box is checked, foot pedal must be maintained until sonic starts or the weld cycle will be aborted.

**Auto Get Next:** When this box is checked the Ultraweld L20 automatically sequence to the next part. Used in sequencing.

**Lock On Alarm:** Toggles between locking or allowing a weld to continue when an alarm condition exists. When set to lock the actuator will not release the part until a password is entered.

**Cooling:** Enables the setting of a predetermined amount of time the cooling air will stay on after a weld.

**Cooling (1sec/100J):** Automatically sets cooling duration after a weld to 1 second per 100J of energy applied.

**Enable Graph Screen:** Enable Disable Power Graph data.

**Keep Daily History:** When this box is checked the Ultraweld L20 will create a daily folder on the hard drive to store all weld results. If the **Graph Data** box is checked the Ultraweld L20 will also store the weld power readings, sampled every 1ms, 5ms or 10ms (depending on the option that is selected) into a text file.

**Remote Data Logging:** When this box is checked the Ultraweld L20 will send weld results out the Ethernet port at the end of each weld cycle. If the **Graph Data** box is checked the Ultraweld L20 will also send the weld power readings, sampled every 1ms, 5ms or 10ms (depending on the option that is selected).

**Sequence Error:** Sets what the Ultraweld L20 should do when a weld error occurs when running a sequence. It has two Options:

- Restart - to restart the sequence from step 1
- Continue - To reweld the same step in the sequence

**Double Click:** Sets double click action when running a sequence. The options are:

- Restart the sequence - to restart the sequence from step 1
- Next - to move to the next step of the weld sequence
- Not allowed - to disable double click inputs

**Startup Screen:** Sets the screen that will be displayed on powerup. The options are:

- Operator Run Screen
- Setup Run Screen

**Cooling Duration:** To change the amount of time the cooling air is on after each weld cycle.

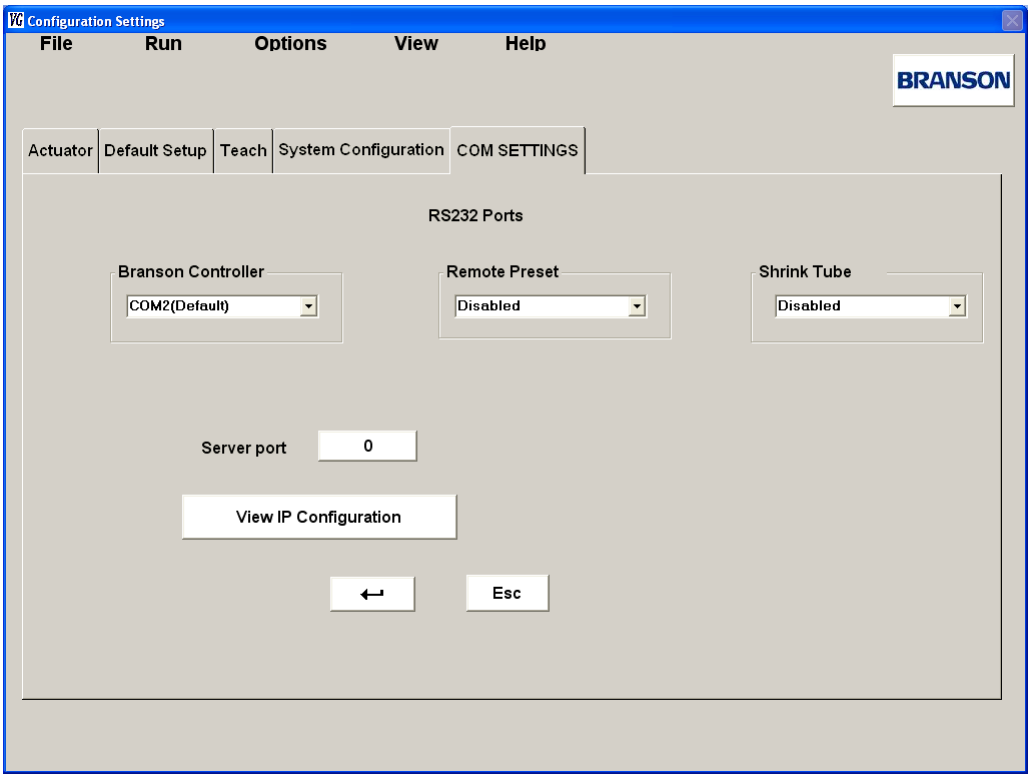
**Cooling Delay:** To change the delay period after a weld and before cooling is turned on.

**Pressure:** Toggles pressure units between the 3 options available:

- To PSI
- To Bar
- T kPa (Kilopascal)

#### 5.11.1.6 COM Settings

**Figure 5.24** COM Settings Tab




On the COM SETTINGS tab you can configure serial port and Ethernet settings to communicate to its internal controller and an external devices.

**Branson Ultraweld L20**

The Branson Ultraweld L20 is connected to port COM2 by default.

**Remote Preset**

Presets and sequences can be recalled by an external user application connected to one of the available RS-232 serial ports. Use this drop-down selection list to set the serial port to which the application will be connected. The ports available for Remote Preset recall are COM1, through COM4. Baud rate is fixed at 115000 baud.

To recall a Sequence or Preset, a string containing the 'Preset Name' or a 'Sequence Name' followed by a carriage return must be sent by the user application:

NAME<CR>

| NOTICE | |
|---|---|
|  | The application will search sequences first, then search presets. |

Sequence or Preset to the VersaGraphix application.

The VersaGraphix application returns one of three responses:

**sNAME<CR><LF>** Application found sequence.

**pNAME<CR><LF>** Application found preset.

**nNAME<CR><LF>** Application found neither a sequence or a preset or it found a sequence with a missing preset.

The VersaGraphix application will timeout after 5 seconds if characters are sent without a carriage return **<CR>**. A response "Timeout" will be sent and the receive buffer will be reset.

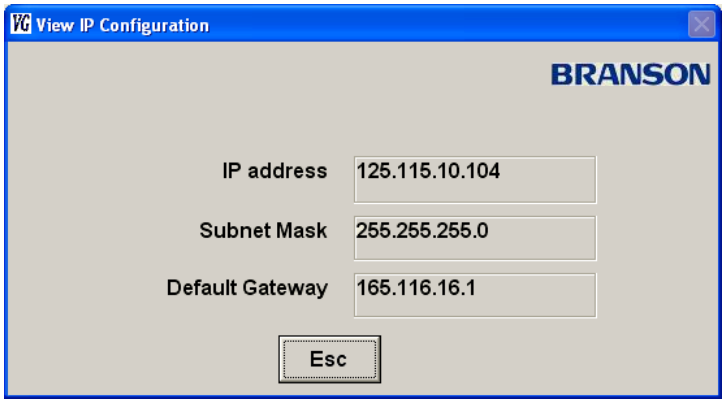
**Shrink tube**

The VersaGraphix Ultraweld L20 can be connected to an external Raychem® RBK-ILSProcessor shrink tube machine. Use this drop-down selection list to set the serial port to which the shrink tube machine will be connected.

### View IP Configuration

Displays the current IP configuration.

**Figure 5.25** View IP Configuration




| NOTICE | |
|---|---|
|  | The Host IP Address must be set from the Microsoft XP Control panel. |

### Server Port

Sets the server port that will be used to communicate between the VersaGraphix and user data logging application.

## 5.12 Remote Data Collection

At the end of each weld cycle the VersaGraphix writes a line to the daily history log file if "Keep Daily History" is enabled.

This special will echo this line to a remote user application through an Ethernet socket connection. For this special the data format will be hard coded.

A header will be sent every time the user connects to the socket.

### 5.12.1 Connection to VersaGraphix SBC will be through a TCP/IP socket

| NOTICE | |
|---|---|
|  | The Unified Write Filter (UWF) must be disabled when configuring the SBC's Network Connections. |

The 'Host IP Address' will be set outside the application at the system level.

- Exit the VGX application
- Disable the UWF

**UWF Configuration Utility**

The UWF Configuration Utility is a command-line tool designed to manage the Unified Write Filter (UWF) on Windows systems. It allows users to enable or disable disk protection, add or remove files/folders from the exemption list, and manage UWF settings.

**Prerequisites**

- Administrative privileges are required to run this utility.

**Running the Utility**

1. Navigate to the directory containing the "UWF Configuration Utility.cmd" file:

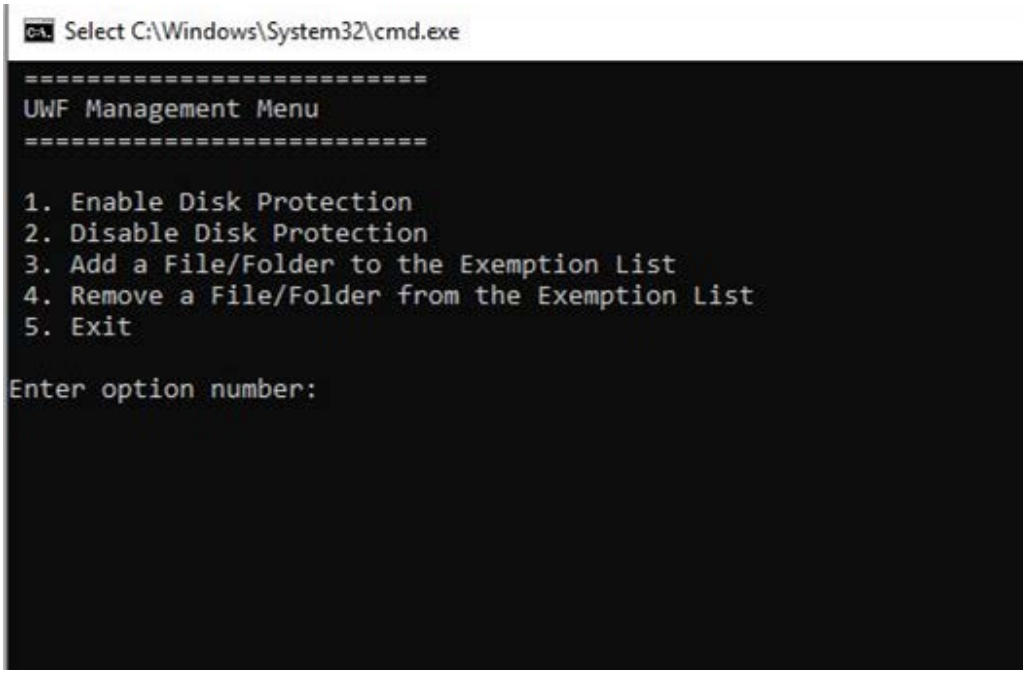
C:\UWF Configuration Utility\

2. Right-click on the "UWF Configuration Utility.cmd" file.

Select "Run as administrator" from the context menu.

### Main Menu

**Figure 5.26** Main Menu




Upon running the script, the main menu will be displayed with the following options:

1. Enable Disk Protection
2. Disable Disk Protection
3. Add a File/Folder to the Exemption List
4. Remove a File/Folder from the Exemption List
5. Exit

### Menu Options

1. Enable Disk Protection

- Protects the C: drive with UWF.
- Changes will take effect after a system restart.
- The system will automatically restart after enabling protection.

2. Disable Disk Protection

- Removes protection from the C: drive.
- Changes will take effect after a system restart.
- The system will automatically restart after disabling protection.

3. Add a File/Folder to the Exemption List

- Prompts for the path of the file/folder to be added to the exemption list.
- Ensures the specified path exists before adding it to the exemption list.
- Changes will take effect after a system restart.

4. Remove a File/Folder from the Exemption List

- Prompts for the path of the file/folder to be removed from the exemption list.
- Ensures the specified path exists before removing it from the exemption list.
- Changes will take effect after a system restart.

5. Exit

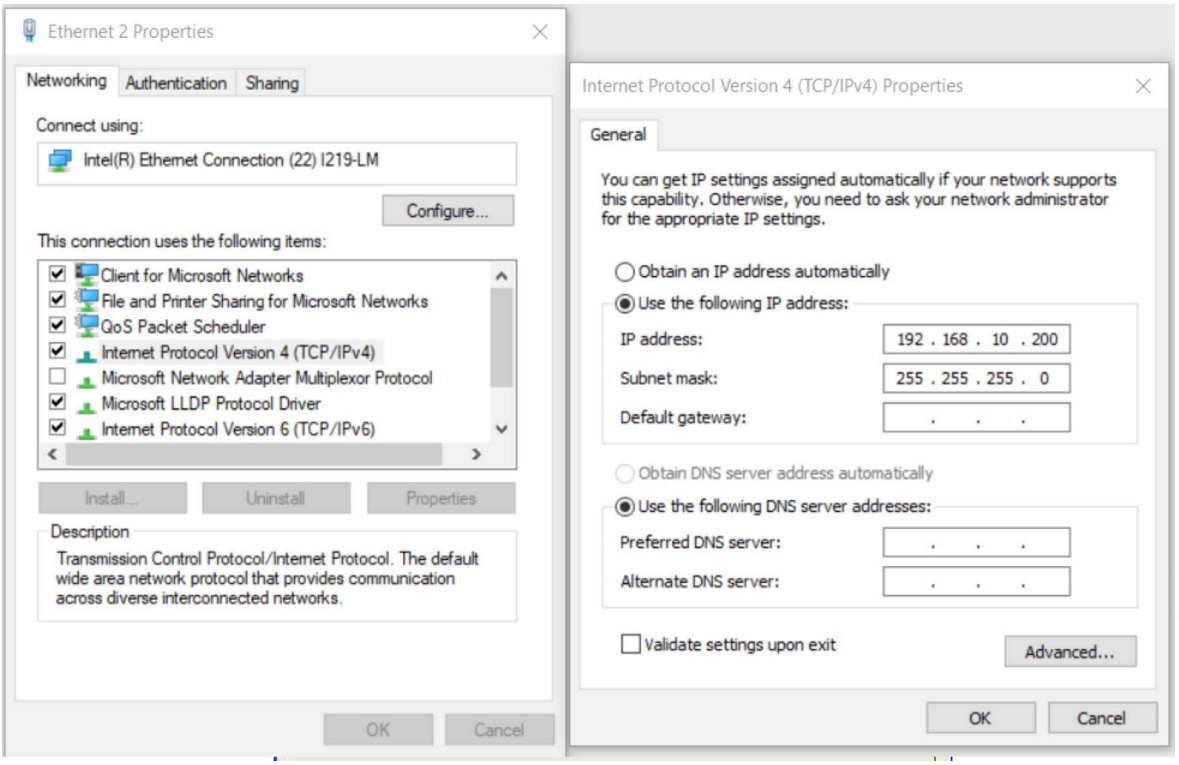
- Exits the utility.

### Error Handling

- If UWF is already enabled, the utility will notify the user and proceed to the main menu.
- If an error occurs while enabling UWF, the utility will notify the user and exit.
- If an invalid option is selected from the menu, the utility will prompt the user to enter a valid option.

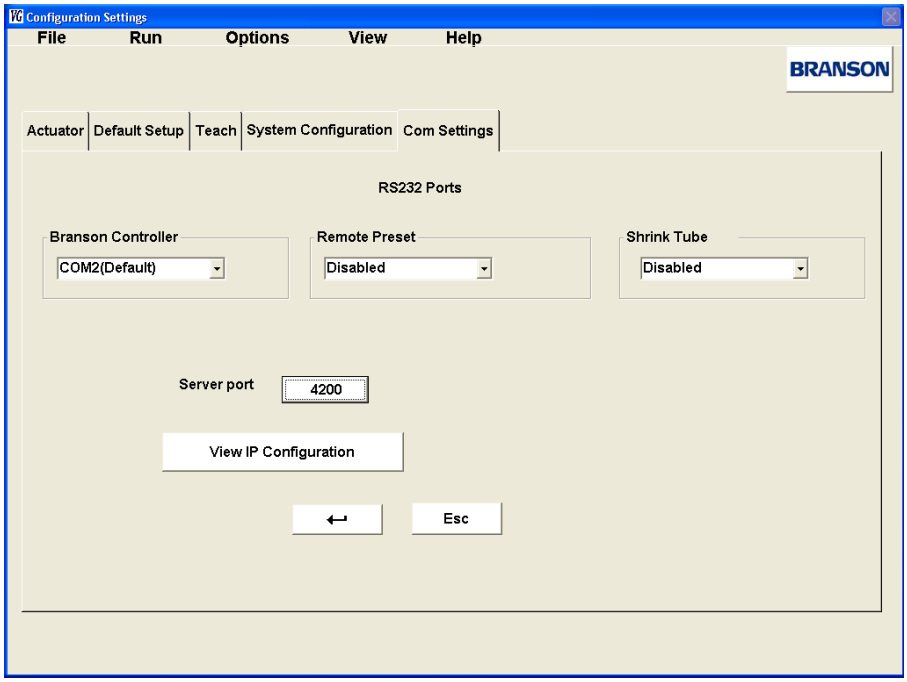
### Notes

- Ensure all paths entered for adding or removing exemptions are correct and exist on the system.
- The system will restart automatically to apply changes when enabling or disabling disk protection.
- Allow the unit to reboot
- Exit the VGX application
- Set the 'Host IP Address' in Windows



- Open the VGX application

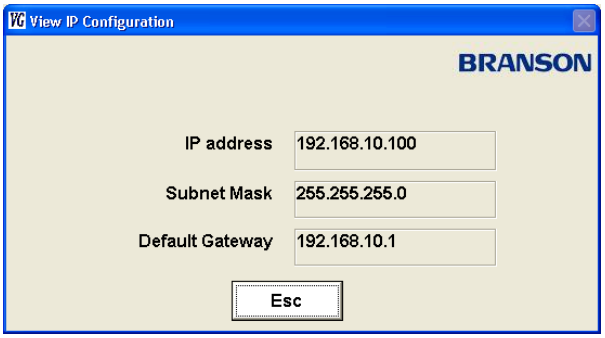
Set the 'Server Port Number' to 4200.



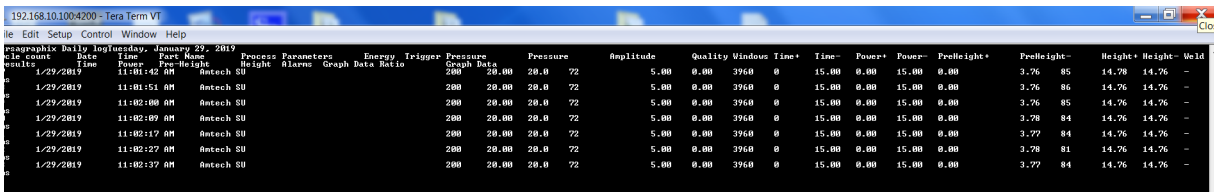

- Options/Configuration/COM SETTINGS/Server Port'. Default= 4200

## 5.12.2 Testing Remote Data Collection

- Testing and verification will be done using TeraTerm.
- Connect to the VersaGraphix SBC using an Ethernet Cable.
- Start TeraTerm Terminal on the remote PC.
- Connect Using: TCP/IP
- Host Address: (Use IP address of VersaGraphix SBC)




- Port Number: 4200 (default)
- Make a Weld Cycle
- Weld results should be displayed as follows:

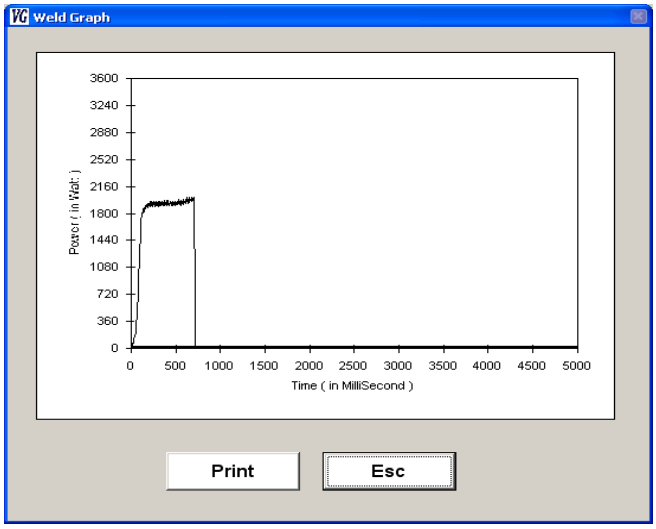


# 5.13 View Menu

The pull down View menu contains the following choices:

## 5.13.1 Weld Graph

**Figure 5.27** Weld Graph



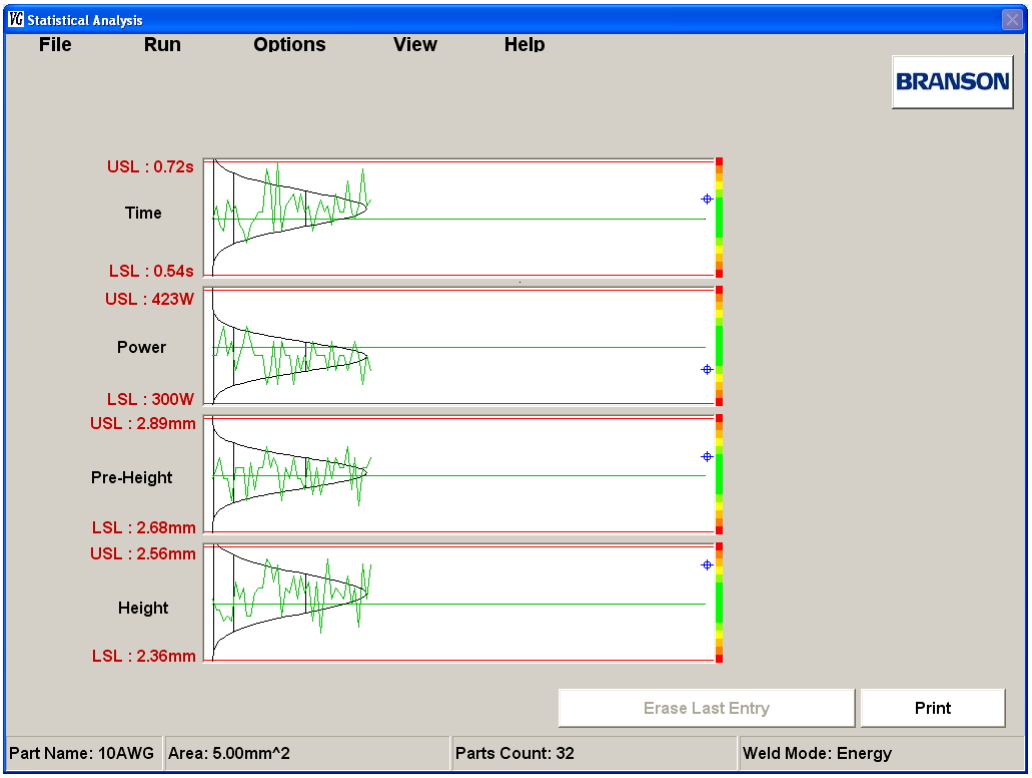

Touch View > Weld Graph to display a pop up window containing a graph of Power (Watts vs. Time) for the last weld performed.

Weld graphs are sometimes referred to as weld "foot print". It can be used to visualize the weld cycle and assists in parameter optimization. Graphs from consecutive welds will vary slightly as the system dynamically adjusts time to accommodate varying surface conditions. (See Figure 2.2 Weld Power Graph for Clean Components, Dirty Components, and when Part is Missing).

| NOTICE | |
|---|---|
|  | Weld Graph data can be saved into a text file or sent out the Ethernet port. See 5.11.1.5 System Configuration for more information. |

## 5.13.2 Statistical Analysis Screen

**Figure 5.28** Statistical Analysis Screen



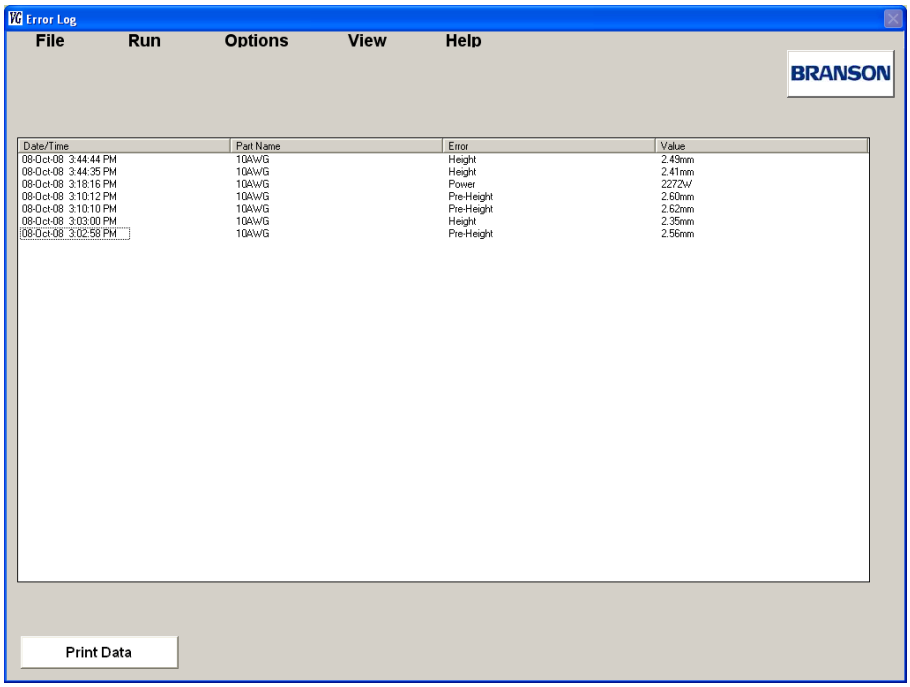

The Statistical Analysis screen displays a histogram and Gauss curves for an accumulation of up to 128 samples of the current part.

The program keeps a file on each part and records each sample as it is run. The file is updated at the end of each weld cycle that does not contain any faults. Weld cycles that contain faults are not included in the data nor is the parts counter increments. The file contains data for the last 128 weld cycles for the current part. If less than 128 cycles are available, only those available are displayed. If more than 128 parts are on the counter, the file is updated by discarding the oldest sample data and adding the latest sample data. The average, standard deviation, and Gauss curves are based on the latest data.

The labels USL and LSL are the upper and lower Specification Limits set on the Setup Screen. The Gauss curves are displayed proportional to the upper and lower specification limits and have markers for the 1, 2, 3, 4, 5 and 6 sigma deviations if they fall inside the limits. No Gauss curves are displayed if the parts counter is less than 3.

## 5.13.3 Error Log

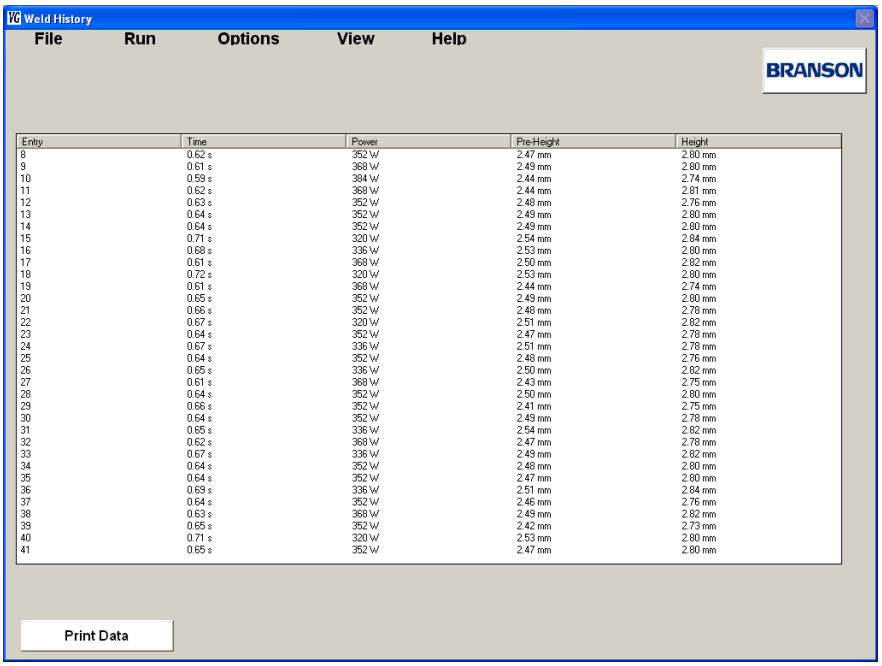
**Figure 5.29** Error Log




The Error log keeps track of all unsuccessful welds and their fault cause. You can generate a printout of all errors by touching the Print Data button.

## 5.13.4 Weld History

**Figure 5.30** Weld History




On the Weld History screen you can view all saved weld results. You can generate a printout of all weld results by touching the Print Data button.

| NOTICE | |
|---|---|
|  | The Keep Daily History checkbox on the Settings tab on the Configuration screen must be checked for the controller to store weld results. |

| NOTICE | |
|---|---|
|  | Weld results can also be sent out the Ethernet port at the end of each weld cycle. See Section 5.11.1.5 System Configuration for more information. |

## 5.14 Help Menu

In the Help pull down menu you can select About VersaGraphix to view the VersaGraphix software version and Ultraweld L20 version.

**Figure 5.31** About VersaGraphix

## 5.15 Language Support

**Figure 5.32** Language Settings


The VersaGraphix software supports 18 user selectable languages. The supported languages are: English, French, German, Japanese, Russian, Romanian, Portuguese, Spanish, Hungarian, Korean, Polish, Czech, Turkish, Italian, Simplified Chinese, Traditional Chinese, Thai and Slovenian.,

| NOTICE | |
|---|---|
|  | Touch the Branson logo on any of the screens to pop up the Language Settings window. |

# Chapter 6: Maintenance

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6.3 Parts Replacement . . . . . 86
6.4 Troubleshooting . . . . . 87
6.5 Service Events . . . . . 89

## 6.1 Preventive Maintenance

| WARNING | |
|---|---|
|  | • Use LOTO (Lock Out Tag Out) lockable plug cover over line cord plug during any maintenance<br>• All system components must be disconnected from the main electrical supply<br>• All system components must be disconnected from the main air supply and system air pressure must be released via the pressure regulator<br>• When performing maintenance on the welder, make sure that no other automated systems are active |

The following preventive measures help assure long term operation of your Branson equipment.

### 6.1.1 Periodically Clean the Equipment

Air is continuously drawn into the Branson VersaGraphix Ultraweld L20. Periodically disconnect the unit from power, remove the cover and vacuum out any accumulated dust and debris. Remove material adhering to the fan blades and motor, transistors, heat sinks, transformers, circuit boards, cooling intake vents, and exhaust ports. Filters can be added to the VersaGraphix cooling fans for dusty environments. External covers may be cleaned with a damp sponge or cloth using a solution of mild soap and water. Do not allow cleaning solution to enter the unit. To prevent rust in areas of high humidity, exposed steel surfaces, such as handles, hardware, and the main column may require a very light film of oil, such as WD-40®[1].

| NOTICE | |
|---|---|
|  | When it is necessary to clean the touch screen, wipe gently with a soft cloth dampened with a mild window glass commercial cleaner or 50/50 mixture of water and isopropyl alcohol. Use a soft cloth moistened with mild detergent to clean the display housing. Do not use abrasive cleaners, waxes or solvents to clean the touch screen monitor. |

### 6.1.2 Routine Component Replacement

The lifetime of certain parts is based on the number of cycles the unit has completed, or on hours of operation, e.g., at 20,000 hours, cooling fans should be replaced.

1. WD-40 is a registered trademark of WD-40 Manufacturing Company Corporation.

## 6.2 Parts List

This section provides the list of replacement parts.

**Figure 6.1** VersaGraphix Ultraweld L20

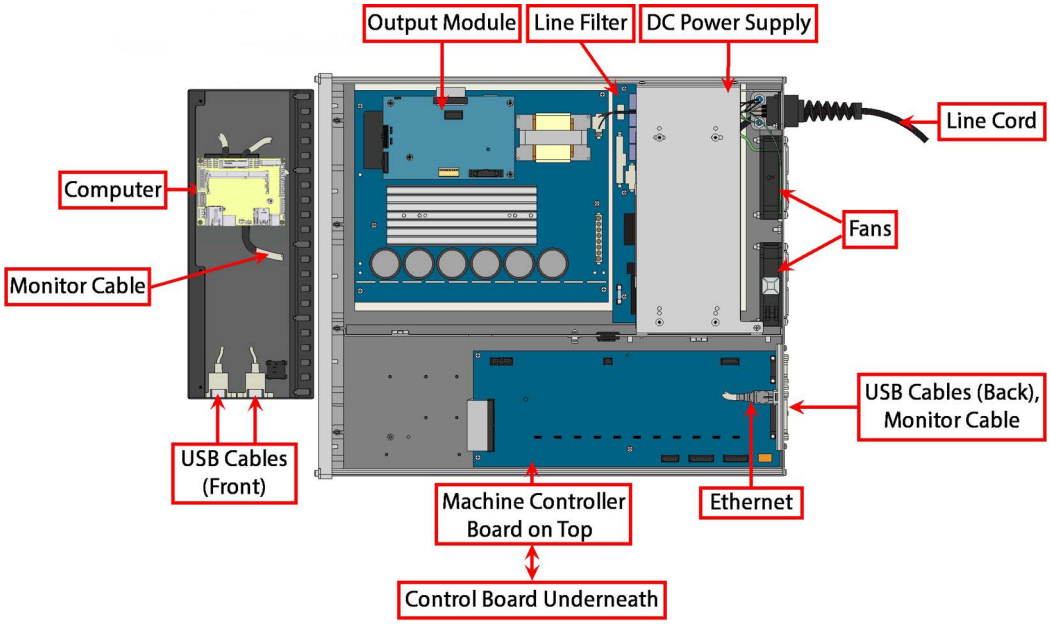



**Table 6.1** Suggested Spares

| Description | Part Number |
|---|---|
| Control Board[1] | 102-242-1272R |
| Machine Controller Board | 102-242-968 |
| DC Power Supply | 200-132-294R |
| Line Filter | 100-242-1199R (100-242-1230R for 4KW units only) |
| Output Module[2] | Call Branson |
| Fan | 100-126-015R |
| Line Cord | 100-246-947 |
| Touchscreen monitor | BU-1039160 |
| Monitor Cable | BU-1039334 |
| Computer | Call Branson |
| Ethernet | Call Branson |
| USB Cables (Front) | BU-1039342 |
| USB Cables (Back) | BU-1039343 |

[1]Please go to “About Branson” on the Help dropdown menu for software version and controller version.
[2]Have power supply wattage and frequency available for costumer service.

## 6.3 Parts Replacement

| CAUTION | |
|---|---|
|  | The Branson VersaGraphix Ultraweld L20 contains components that can be degraded or damaged by electrostatic discharge. Always use a Grounded Wriststrap and use a grounded work area when handling or servicing the VersaGraphix. |

The VersaGraphix is designed for a long service life. In the event the system malfunctions, many of the internal components (Modules) are replaceable as a unit. If a particular module has failed, it should be replaced or repaired at an Branson Depot Facility.

## 6.4 Troubleshooting

When the Branson VersaGraphix Ultraweld L20 encounters a situation that is outside normal conditions, an alarm is generated. If there is any alarm condition, the Touchscreen displays an alarm message and generates an audible alarm (see Table 6.2 System Alarms with Probable Cause and Corrective Action). If you use the Emergency Stop button to terminate a weld, the welder will not operate until reset.

### 6.4.1 System Alarms

The following table details alarms that you can encounter on the VersaGraphix, listed alphabetically by the Display Message that is presented on the touchscreen. The message on the touchscreen of VersaGraphix is shown in the first column. The second and third columns indicate the condition that led to the alarm and the corrective action you should take.

**Table 6.2** System Alarms with Probable Cause and Corrective Action

| Alarm Message | Cause | Corrective Action |
|---|---|---|
| COM port Error | | |
| EMERGENCY STOP ON! | Emergency stop is active | Unlock emergency stop button |
| FILE ERROR | | |
| Height System failure | Ultraweld L20 did not see the encoder move 1mm in 1 second | Check air pressure. Check flow controls. |
| Highest power is above power maximum | Power result above the maximum quality window | |
| Highest power is below power minimum | Power result below the minimum quality window | |
| Invalid PASSWORD Re-enter data | Wrong password entered | Enter correct password |
| Lock On Alarm | Quality windows exceeded. Part is locked down | Enter password to release part. |
| Password Exists! | Enter different password | |
| Power OVERLOAD | Power results above the maximum available power | |
| Result is smaller than minimum height | Final height is below quality window | |
| Result is taller than maximum height | Final height is above quality window | |
| Safety System Abort! | Safety system | |
| Weld longer than maximum time | Weld cycle too long | Check for parts contamination. Make sure correct preset is used. Check tooling for wear. |

**Table 6.2** System Alarms with Probable Cause and Corrective Action

| Alarm Message | Cause | Corrective Action |
|---|---|---|
| Weld shorter than minimum time | Weld cycle too quick | Check proper preset is used. Check air pressure. Check correct parts are being welded. |
| Insufficient Storage | Memory has reaches 90% of Capacity | Transfer the History files to an external drive. |

### 6.4.2 Safety Circuit Alarms

The Safety Control System within the Controller constantly monitors the system's safety related components for correct operation. When this system detects a fault condition, operation is interrupted and the system immediately goes to a safe state. A beeper is used to signal a safety system alarm.

Use the following procedure to troubleshoot safety circuit alarms:

1. Verify that the 9-pin footswitch cable is properly connected to the back of the Controller.
2. Power down and then power up the Controller to reset the system.
3. If the alarm persists, call Branson Support. See 1.5.3 Contact Information

## 6.5 Service Events

| WARNING | |
|---|---|
|  | Service events should be performed only by qualified individuals. The potential for injury or death exists, as well as that for damage to the equipment (which can include loss of product warranty) or loss of valuable setup information for your application.<br>When servicing the system, the service person(s) can have a need for certain conventional hand tools, and you might need to have the following information for testing or returning the system to service. |

### 6.5.1 Required Tools

Special tools for the ultrasonic Converter, such as spanner wrenches, are provided with your system. You might also need the following hand tools or service tools:

- Six-inch or longer Phillips-head screwdriver with a magnetic tip or screw starter
- Good-quality multi-meter for continuity, AC and DC voltages, and resistance, with insulated test probes

### 6.5.2 Cold Start Procedure

The VersaGraphix's internal memory stores the system default settings and the parameters that you set. It also provides temporary storage to support the Ultraweld L20's internal functions. A Cold Start clears Battery Backed RAM (BBR) values and restores them to their original factory defaults. It is not necessary to perform a cold start during normal operation and servicing, but you might find a cold start helpful when:

- You suspect the system is not operating properly
- You want to reset the system to its factory default setup

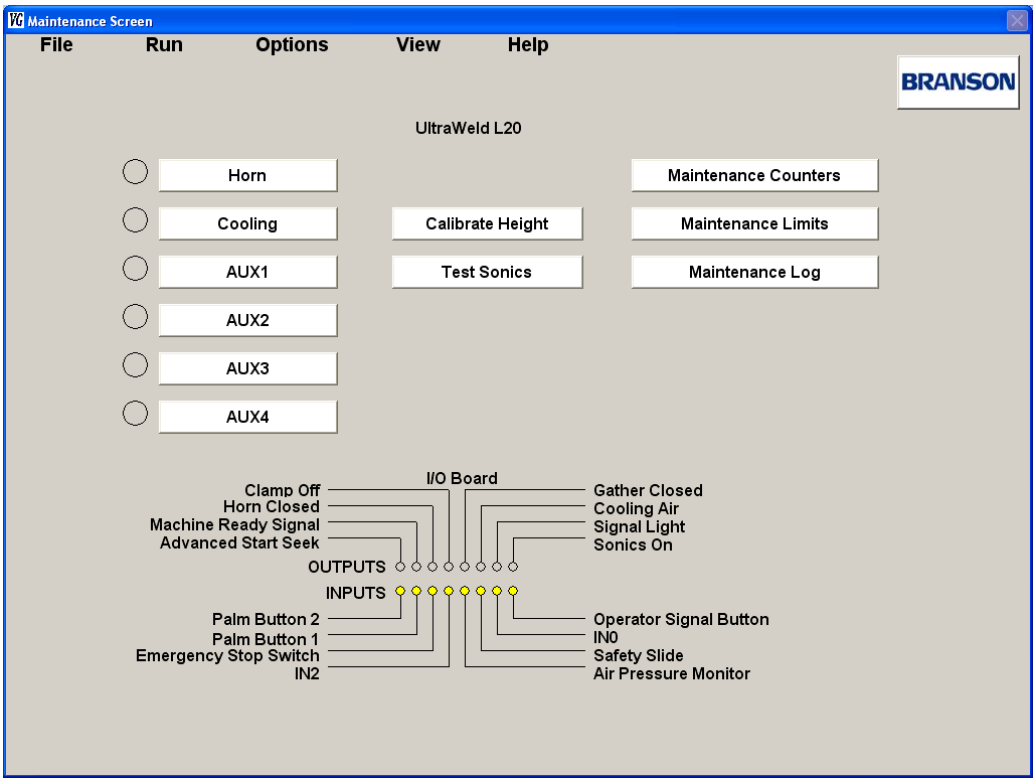
#### 6.5.2.1 Performing a Cold Start

| NOTICE | |
|---|---|
|  | Before performing a cold start, the power supply power rating and maximum amplitude should be written down. This information will be needed for input after clearing the BBR. It can be found in the Maintenance Screen under Test Sonics. |

To perform a Cold Start touch the Init BBR button on the Options tab in the Administrator screen (see 6.5.4.1 Administrator Options Tab). Once a cold start is performed the Height needs to be recalibrated, along with reinstating the calibrated amplitude and power rating.

## 6.5.3 Maintenance Screen

**Figure 6.2** Maintenance Screen




The maintenance screen allows the adjustment and on-demand control of electromechanical devices in your actuator. This screen also allows you to clear maintenance counters, set maintenance limits and make entries to the maintenance log.

The left hand set of buttons have indicators associated with them. Touching each of these buttons allows you to:

**Horn:** Toggle the horn between the up and down positions.

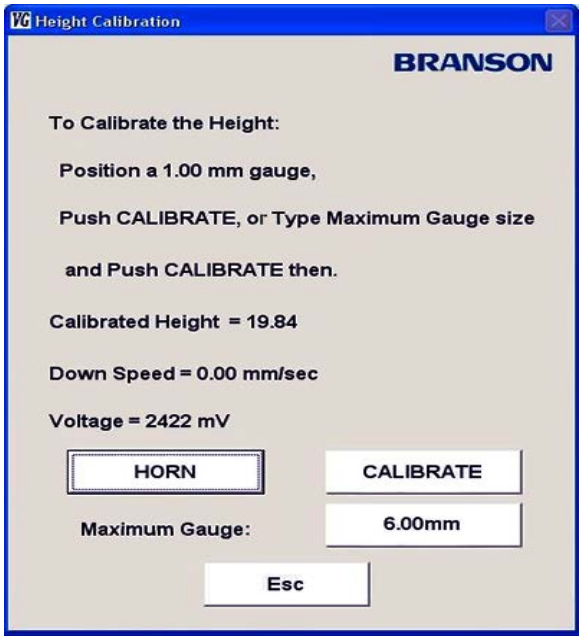
**Cooling:** Toggle the cooling air control solenoid on and off.

**Aux 1-Aux 4:** Toggle auxiliary actuators (used on special equipment). You may rename the auxiliary buttons in order to describe their given function (see 6.5.4 Administrator for more information on renaming auxiliary buttons).

The indicators under the ***I/O BOARD*** label show the current state of digital inputs and outputs.

### 6.5.3.1 Calibrate Height

**Figure 6.3** Height Calibration




This window is used to perform a height (from horn to anvil) calibration. The instructions on screen explain the calibration procedure.

The following buttons are used to perform a height calibration:

**Horn:** To move the horn up and down against the anvil.

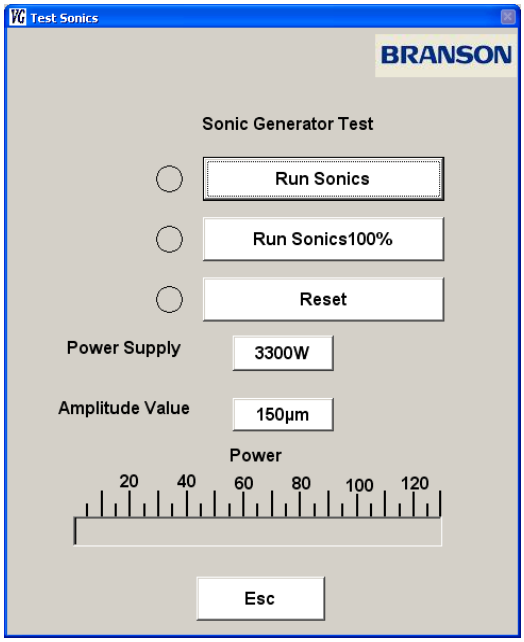
**Calibrate:** To calibrate the height.

Press the **ESC** button to return to the Maintenance Screen.

**Maximum Gauge:** To set up the second gauge. Default setting is 6mm. If entered a value which is out of range, a alarm message will show up.

### 6.5.3.2 Test Sonics

**Figure 6.4** Test Sonics




This screen allows the on-demand control of ultrasonic weld energy and the calibration of amplitude.

Amplitude calibration requires a dial indicator to be temporarily mounted in line with, and in front of, the horn, usually on a magnetic base. The Run Sonics 100% is held and the gage reading is viewed.

The gage reading x2 = total amplitude, this is the value to be entered as the amplitude value when calibrating.

The following buttons are used to test the Power supply and to calibrate the amplitude:

**Run Sonics:** Used to fire ultrasonic energy at the current amplitude setting.

**Run Sonics 100%:** Used to fire ultrasonic energy at 100% amplitude. Used when calibrating amplitude.

**Power:** Power rate is displayed in real-time.

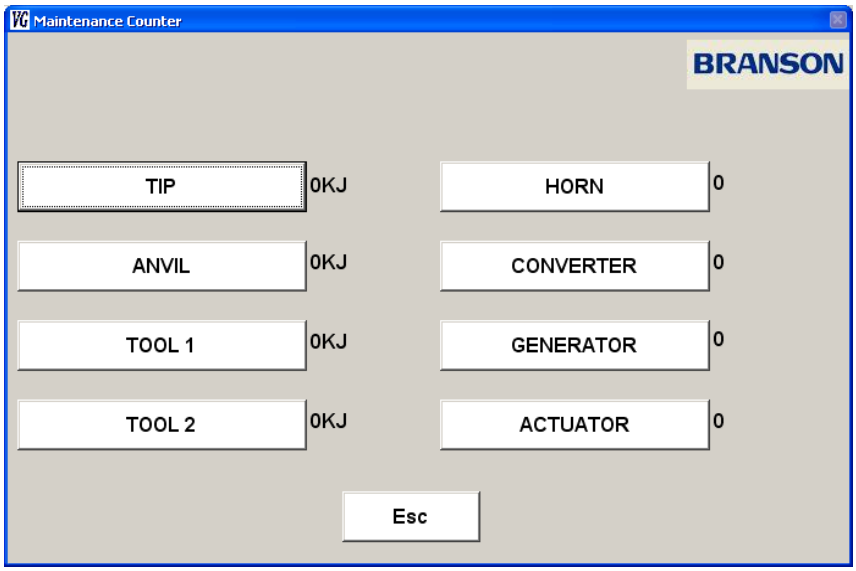
**Power supply button:** This value is set by Branson for a given actuator and should not be changed. Generally the setting for 20 kHz actuators is 3300W and the setting for 40 kHz actuators is 800W.

**Amplitude Value Button:** Used to set the amplitude value based on the gage reading. See above.

Press the **ESC** button to return to the Maintenance Screen.

### 6.5.3.3 Maintenance Counters

**Figure 6.5** Maintenance Counters




The lifetime of certain parts of your Branson system is based on the number of weld cycles performed, or the energy delivered for welding. Other parts require periodic maintenance depending on the number of cycles performed, or the energy delivered for welding. Maintenance Counters allow you to easily keep track of your system's maintenance requirements.

Maintenance counters and Maintenance limits are related. They are used in conjunction to schedule component maintenance or replacement. Maintenance counters increment after each weld cycle up to the limits set by the user on the Maintenance Limits screen. When a limit is exceeded the VersaGraphix will display warning on screen the next time it is turned on. Any maintenance counter which value is less than its corresponding limit does not produce an alarm. See 6.5.3.4 Maintenance Limits for more information on maintenance limits.

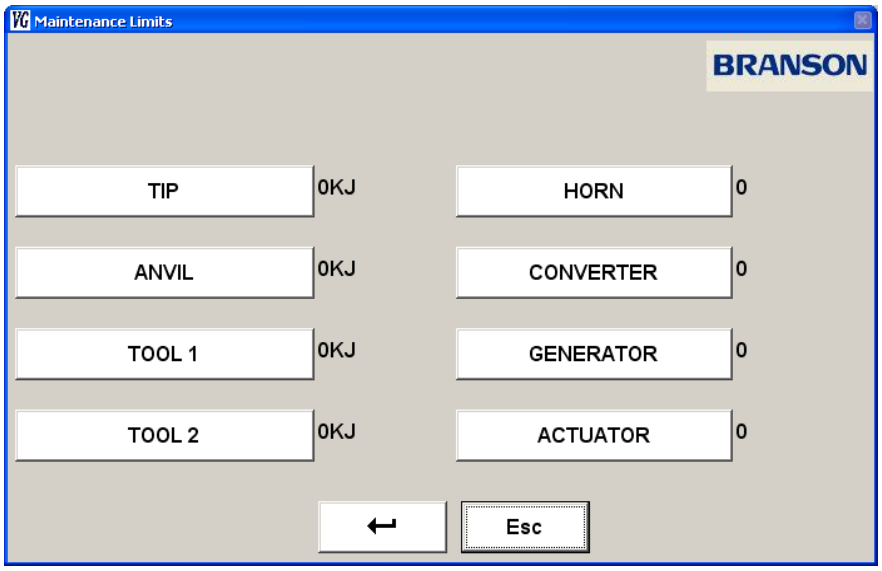
The maintenance counter window allows you to reset the counters to zero. Touch the name of the counter you want to reset (you will be prompted to confirm).

A maintenance counter should be reset after a maintenance is performed on the part it relates to.

Press **ESC** to return to the maintenance screen.

### 6.5.3.4 Maintenance Limits

**Figure 6.6** Maintenance Limits




The lifetime of certain parts of your Branson system is based on the number of weld cycles performed, or the energy delivered for welding. Other parts require periodic maintenance depending on the number of cycles performed, or the energy delivered for welding. Maintenance Counters allow you to easily keep track of your system's maintenance requirements.

Maintenance counters and Maintenance limits are related. They are used in conjunction to schedule component maintenance or replacement. Maintenance counters increment after each weld cycle up to the limits set by the user on the Maintenance Limits screen. When a limit is exceeded the VersaGraphix will display warning on screen the next time it is turned on. Any maintenance counter which value is less than its corresponding limit does not produce an alarm. See Section 6.5.3.3 Maintenance Counters for more information on maintenance counters.

The **Maintenance Limits** window allows you to set the maintenance limits for the listed items. Touch the name of the counter limit you want to set and a numeric keypad will pop up so you can set the counter limit. If a limit is set to 0 the controller will not yield an alarm for the counter regardless of its maintenance count.

The left side counter limits for the Tip, Anvil, Tool 1 and Tool 2 are set in kilo-joule units. For example, if the energy weld setting in use is 1500 joules, a limit setting of 7500 kilo joules will produce about 5000 cycles before reaching its limit. The Tool 1 and Tool 2 counters may be used to represent any special fixture tooling.

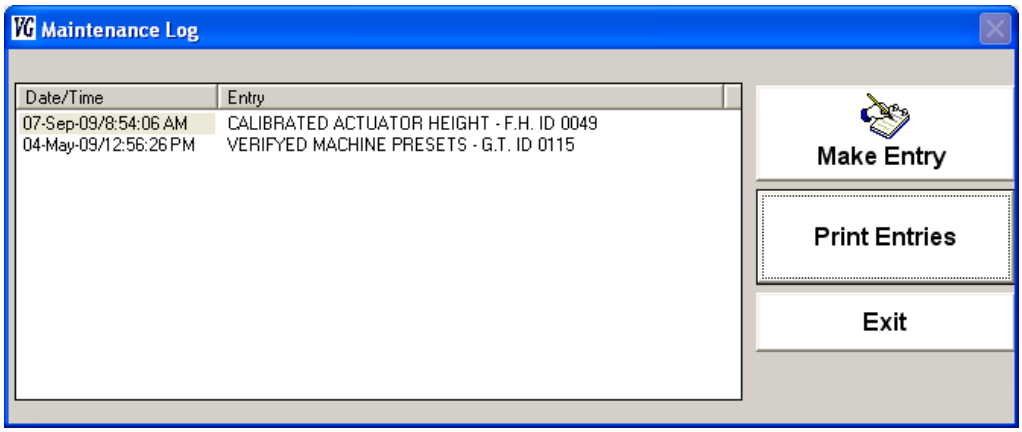
The right side four values on the screen for horn, converter, generator (ultrasonic power supply), and actuator are set in number of weld cycles.

Press the enter button to save the changes.

Press **ESC** to return to the maintenance screen without saving the changes.

#### 6.5.3.5 Maintenance Log

**Figure 6.7** Maintenance Log




The VersaGraphix has a built in Maintenance log that allows you to keep track of maintenance or testing done to your system.

On the Maintenance Log pop up window you can make entries to the controller maintenance log. Entries are limited to 100 characters per entry. You may also generate a printout of all currently stored entries.

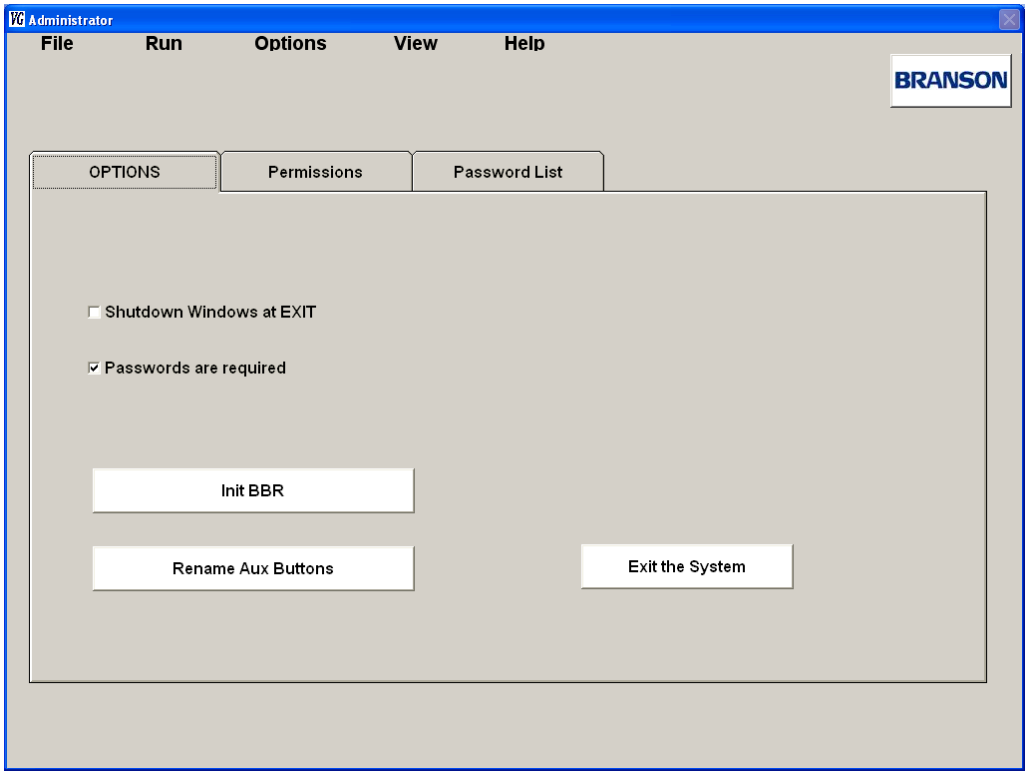
### 6.5.4 Administrator

On the Administrator screen you can perform a system Cold Start; exit the VersaGraphix software; shut down the system; and manage password requirements and screen access permissions.

| NOTICE | |
|---|---|
|  | The Administrator screen can only be accessed by entering the Administrator Password. The default Administrator password is **ADMIN**. |

### 6.5.4.1 Administrator Options Tab

**Figure 6.8** Administrator Options Tab




On this Tab you have the following check boxes and buttons:

**Shutdown Windows at EXIT:** Set this checkbox if you want the system to shut down when the Exit System button is pressed. If left unchecked the Software will give control to windows when the Exit System button is pressed.

**Passwords are required:** Set this checkbox to make passwords required when accessing the Maintenance, Setup, Configuration, Create Preset/Sequence, Edit Preset/ Sequence, and Teach Mode screens, as set on the Permissions tab. See 6.5.4.2 Administrator Permissions Tab.

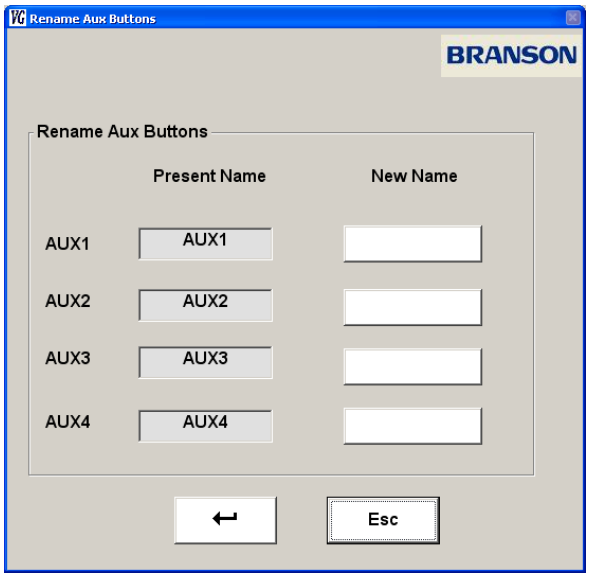
**Init BBR:** Touch the init BBR button to perform a Cold start. Touching this button resets the VersaGraphix's BBR (Battery Backed Ram) to its initial factory defaults. See Section 6.5.2 Cold Start Procedure for more information on performing a Cold Start.

| NOTICE | |
|---|---|
|  | Before performing a cold start, the power supply power rating and maximum amplitude should be written down. This information will be needed for input after clearing the BBR. It can be found in the Maintenance Screen under Test Sonics. |

**Rename Aux Buttons:** Touching this button will cause the Rename Aux Buttons window to pop up. On this Window you may rename the four Auxiliary buttons shown on the maintenance screen. These buttons are used to control additional actuators on special

systems in order to perform maintenance activities. See Section 6.5.3 Maintenance Screen.

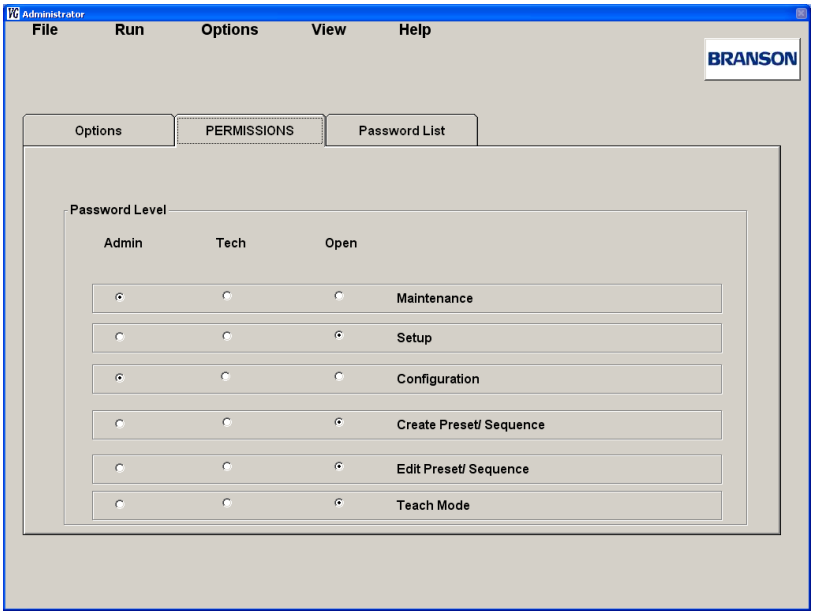
**Figure 6.9** Rename Aux Buttons




**Exit the system:** Touch this button to exit the VersaGraphix's software. If the Shutdown Windows at EXIT checkbox is checked, the system will shut down completely. If left unchecked, the software will exit and give control to the Windows OS.

### 6.5.4.2 Administrator Permissions Tab

**Figure 6.10** Administrator Permissions Tab




On this tab you can assign password requirements for the Maintenance, Setup, Configuration, Create Preset/Sequence, Edit Preset/Sequence, and Teach Mode screens. There are three possible security levels you can assign to these screens:

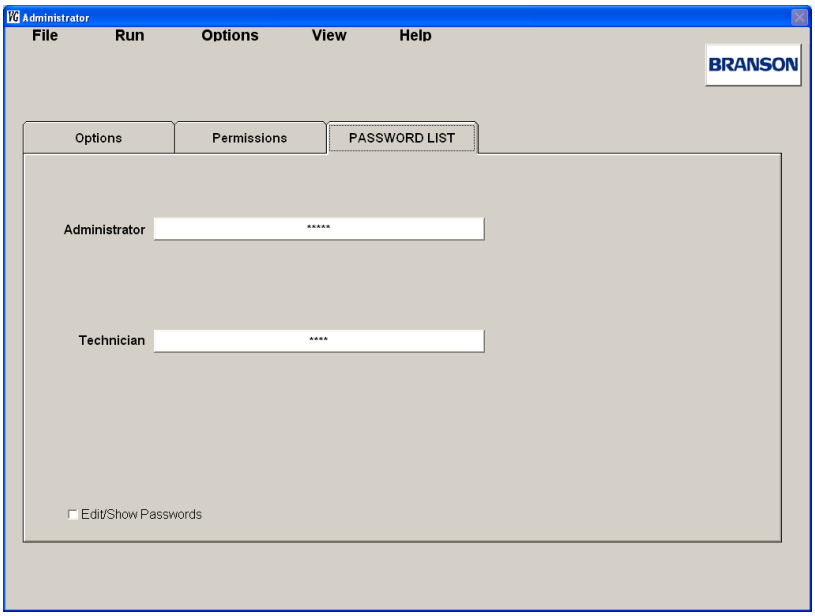
**Open:** Set the radio button to Open to make this screen accessible without a password.

**Tech:** Set the radio button to Tech to make this screen accessible using either the Technician or Administrator passwords.

**Admin:** Set the radio button to Admin to make this screen accessible only by using the Administrator password.

### 6.5.4.3 Administrator Password List Tab

**Figure 6.11** Administrator Password List Tab




On this tab you may edit Both the Administrator and Technician passwords. First you must check the Edit/Show Passwords check box, to make the passwords visible and editable. Having this checkbox unchecked protects the passwords from being modified.

| NOTICE | |
|---|---|
|  | The default Administrator password is **ADMIN**. |