

BRANSON

Product Manual:

Sales Order			
Customer			
Create Date	11-23-2009	By	MGD
Last Rev Date	12-27-2013	By	LAW
Manual	Include Instruction Sets	Description	
DCM01241-XX		Special Information	
----->	DCM00003	General Information	
----->	DCM00056	MWX100	
----->	DCM00002	TouchScreen Controller	

Special	Actuator	Controller
		

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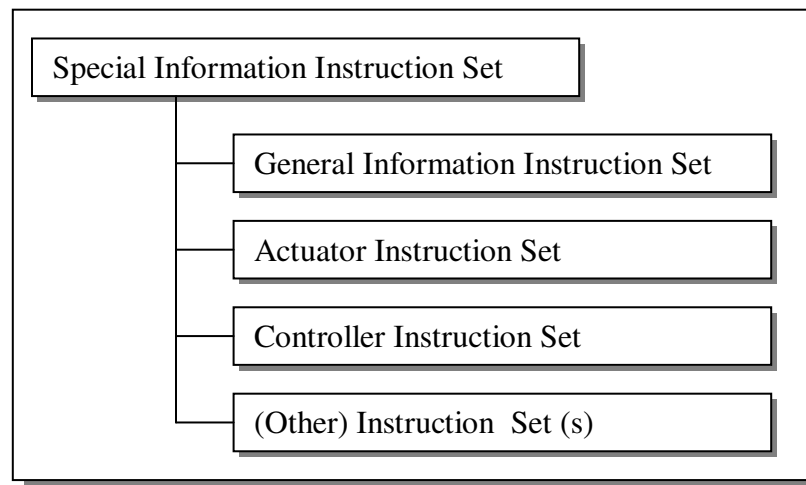
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Introduction:

This is the product manual for your BRANSON Metal Welding ultrasonic welding system. Several combined Instruction Sets form the contents of this manual. This section contains information which relates most uniquely to you as the customer, your particular system and application. It also documents other Instruction Sets used in the manual. The figure below illustrates how the manual is organized.

BRANSON Metal Welding Product Manual



Using this manual:

It is highly recommended that you read and understand the contents of this manual prior to operating your BRANSON Metal Welding system. Each Instruction Set has a table of contents and is intended to logically group information in a manner which the user will find convenient.

Classification of Hazards:

The safety indications in this manual are divided into different classes. The figure below shows the assignment of symbols (pictograms) and signal words to the specific hazards and its potential consequence.

PICTOGRAM	SIGNAL WORD	DEFINITION
	DANGER !	A potentially dangerous situation that could cause injury to persons and serious damage to equipment.
	ATTENTION !	A situation that may cause damage to the equipment
	NOTE	Useful information, an application hint or other important or useful information.

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[illegible]

All tools have a 5 to 6 week lead time.
Prices are subject to change without notice.
An additional fee may be charged for expedited service.

Parameter Preset Information

Sales Order	«SalesOrder»	Customer	«Customer»
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	Name or preset Number								
Welding Parameters	Energy (joules)								
	Force (psi/bar)								
	Pressure (psi/bar)								
	Amplitude (microns)								
	Squeeze Time (ms)								
	Pre-Burst (ms)								
	Hold Time (ms)								
	After Burst Delay (ms)								
Quality Monitoring	After Burst Duration (ms)								
	Weld Time Min. (ms)								
	Weld Time Max. (ms)								
	Weld Power Min. (watts)								
	Weld Power Max. (watts)								
	Pre-Height Min. (mm)								
	Pre-Height Max.(mm)								
	Post Height Min.(mm)								
	Post Height Max. (mm)								

	Name or preset Number								
Welding Parameters	Energy (joules)								
	Force (psi/bar)								
	Pressure (psi/bar)								
	Amplitude (microns)								
	Squeeze Time (ms)								
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	Hold Time (ms)								
	After Burst Delay (ms)								
Quality Monitoring	After Burst Duration (ms)								
	Weld Time Min. (ms)								
	Weld Time Max. (ms)								
	Weld Power Min. (watts)								
	Weld Power Max. (watts)								
	Pre-Height Min. (mm)								
	Pre-Height Max.(mm)								
	Post Height Min.(mm)								
	Post Height Max. (mm)								

File Attachments:

Sales Order		Customer	
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Description	File
Assembly Drawing	159-132-341

File Attachments are included at the end of this instruction set.

Tooling Table:

The (computer) file name of this manual contains a two digit suffix number.

Example: DCM01241- ##. PDF

Use the suffix number from Table 1 to determine the Booster used on your welder.

DCM01241-	Booster Type, Color	Part Number	Gain (ref only)
-01	Super High Gain, Silver	17100-00-416	2:1
-02	High Gain, Gold	17100-00-216	1.67:1
-03	Medium High Gain, Blue	17100-00-316	1.17:1
-04	One-to-One, Red	17100-00-016	1:1
-05	Medium Low Gain, Blue	17100-00-516	0.75:1
-06	Low Gain, Black	17100-00-116	0.5:1

Table 1

Special Instructions:

BRANSON Metal Welding Product Manual- General Information

BRANSON

General Information and Instructions

Document Number DCM00003

Last revised 03/27/2012 LAW

Use of this document is intended for use with all Branson Metal Welding products.

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This document is intended for use in conjunction with others to form a complete manual for your Branson system.

Introduction:

This Instruction Set includes common information which relates to Branson products. It will help you in setting up your system and to understand the fundamentals of the ultrasonic metal welding process.



Portions of this section may be superseded by more specific and detailed information provided in other Instruction Sets.

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Thank You:

Thank you, and congratulations on selecting Branson MWX100/ ULTRASPLICE Systems for your welding production. This system has been developed to produce the highest quality welds at the lowest cost per weld.

If you should experience difficulty or have any recommendations for improvement, please do not hesitate to contact us.

Please be advised that the MWX100/ ULTRASPLICE machine is protected under the United States and International patents listed below. This operator's manual is also protected by copyright and may not be copied without prior written permission by Branson.

Trademarks

MWX100[®] and are registered trademarks of
ULTRASPLICE[®] Branson Ultrasonics Corporation

Copyright

MWX100[®] Computer Software are copyrighted 1994,1995,1996,1997 by
and the MWX100[®] Manual Branson Ultrasonics Corporation

Warranty:

Branson Ultrasonics warrants this equipment to be free from defects in material and workmanship for one (1) year from date of original delivery by Branson or by an authorized representative when used in accordance with written instructions. Any unit which proves defective during this period will be repaired or replaced free of charge at the sole discretion of Branson Ultrasonics, F.O.B. Danbury, Connecticut or an authorized repair station as advised by Branson. This is the buyer's sole and exclusive remedy. The defective unit must be returned properly packed with all transportation charges prepaid.

Expendable tooling produced by Branson such as the horn, tip and anvil will wear at varying rates depending upon the application and duty cycle. For this reason, Branson warrants that all tooling complies with specifications on design and materials but cannot guarantee its useful life for a fixed period of time.

The warranty provisions contained herein are expressly in lieu of all other warranties, express or implied. **THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE MADE IN CONNECTION WITH THE EQUIPMENT TO BE DELIVERED THEREUNDER.**

This warranty is limited to the original purchaser and is not transferable.

BRANSON Ultrasonics will not be liable for any consequential damages claimed in relation to the purchase or warranty of the equipment to be delivered thereunder. Branson will not be liable for any injury to persons or property caused directly or indirectly by the use of the equipment delivered thereunder.

Horns fabricated by Branson for use in Branson equipment are manufactured to exacting parameters and tuned to vibrate at the equipment's ultrasonic operating frequency. An improperly tuned horn can cause undue stress or damage to the converter and power supply. Contact your Branson representative or Branson's world headquarters in Danbury, Connecticut, should you have any questions concerning horn qualifications.

Authorization to return equipment for repair is required. A Return Authorization Number must be obtained from Branson's Service Department. Equipment being returned for repair must be packaged in the original carton(s) to protect it from damage and returned freight prepaid. Any damage that is sustained as a result of improper packaging **may void the warranty** and is the sole responsibility of the customer.

For questions relating to warranty or repair please contact our Repair Department.

Intended Use:

This equipment is for the joining of metal parts using ultrasonic energy. A complete system includes an actuator, controller and tooling (which delivers mechanical energy to the work pieces). Some systems also include special fixturing and machine automation. Branson systems may only be utilized to weld soft, ductile, metal parts together with Branson-supplied weld tooling (such as horns, tips, anvils, and converters) unless an explicit, written, contrary agreement between the ordering party and Branson has been consummated.



Safety, Personal:

Safety Devices

The removal, bridging or disabling of safety devices is not condoned for production operation. Individual safety devices mentioned below may only be disabled if super-ordinate safety devices are employed in their place.

Emergency Stops:

In case of danger, hit the red, emergency stop which is found on the red, top portion of the foot pedal. The actuator, power supply and related fixturing are returned to the "Home" position. If dual anti-tie start buttons are used, there must be a red emergency stop associated in line. Free access to the emergency stop button must be maintained.

Controller Cover

The power supply is equipped with a top cover which should only be removed for maintenance and installation purposes.

Safety Guidelines:

For operating safety, please observe the following precautions:

- Plug the power supply into a grounded electrical supply to avoid electrical shock.
- Ensure that no one is in contact with system moving parts when operating.
- Keep hands away from the horn tip as high force and ultrasonic vibration can cause injury to hands and fingers.
- Do not test ultrasonics when the converter is removed from the actuator. Without the converter there is the danger of damage or shock.
- Before adjusting or repairing the ultrasonic stack or power supply, disconnect the line power.
- Any unauthorized modification of the units control circuitry or wiring may cause a malfunction, which could result in injury to operating personnel.
- Do not operate the equipment until repairs and adjustments have been made and the equipment is in good working order.

Maintenance Safety:

Safety devices, especially covers, guards and ground cables should only be removed when it is absolutely essential for the completion of maintenance work. If safety devices were removed prior to starting maintenance work, be sure to re-install those devices after finishing the maintenance work. The following installation and maintenance operations must be performed prior to any disassembly of equipment:

- All system components must be disconnected from the main electrical supply
- Remove the plug from the main electrical supply and secure it from being re-inserted accidentally.
- All system components must be disconnected from the main air supply
- Disconnect the air hose from the main air supply and release system air pressure via the pressure regulator.

Safety, System:

System Protection Monitoring (SPM)

The SPM (System Protection Monitoring) stops ultrasonics when the power supply has been overloaded or when inappropriate or defective horns are used.

Thermal Switch

A thermal switch is contained within the power supply to automatically disconnect power to the machine if the unit gets too hot. This will occur if the exhaust fans from the generator are inadvertently blocked or clogged.

Daily Functional Safety Checks:

- Check the machine tip and anvil for any signs of grinding, cracking, or galling that could be the result of misalignment or tooling contact. Replace tooling that has excessive wear.
- Check for any loose material or debris in the welding cavity, cleaning it out.
- Check all parameter settings on the controller to ensure they are properly set for the weld to be made.
- Drain water and contaminants from the airline filters as necessary

Unpacking, Handling & Installation:

Unpack the Actuator and Touchscreen Controller. Remove the top cover of the power supply and check if any components became loose during shipment.



If damage has occurred:

Notify the shipping company immediately. **Retain packaging materials** for inspection and possible re-use.

System Location:

Locate the Touchscreen Controller in an area away from radiators or heating vents. Allow sufficient clearance in back of the controller to access the connectors. Observe the following:

- Do not block the exhaust or air intake areas. Proper air circulation is necessary to maintain a safe operating temperature.
- Only operate the controller within an ambient temperature range of 41°F to 122°F (5°C to 50°C).
- Verify that neither dust nor dirt are allowed to restrict the flow of air exhaust or air intake. Clean the air ports as necessary.



If the temperature of the power supply exceeds the recommended operating range, a thermal switch will stop ultrasonics and the power supply will display an Overload alarm. Ultrasonics will remain off until the power supply cools to a safe operating temperature and the RESET button is pressed.

If the environment is excessively dirty or oily, contact Branson for assistance. Special Touchscreen Controller enclosures, filters (i.e. filter/separator/regulator), and other equipment are available.

System Assembly:

Connect the actuator system per the Hookup diagram contained in the Special Information Instruction Set. Verify that connections are complete and correct before proceeding. Plug the Controller into a proper power source. See the Touchscreen Controller Instruction Set for power specifications, plugs and receptacles used.



To prevent the possibility of an electrical shock, always plug the power supply into a grounded power source. Be sure the power switch is in the Off position before making any electrical connections.

Connect the system to a clean (5 micron air filter with 0.5 micron mist separator), dry, 80 psig (5.5 bar) minimum air supply. See the Actuator Instruction Set for information on the set up of application tooling and the use of this equipment for ultrasonic welding.



Crash Gap Adjustment:

In most applications, adjustment of the gap between the ultrasonic Horn Tip and the Anvil is factory set to prevent these surfaces from contacting each other when no parts to be welded are present and the foot pedal is depressed. A poorly adjusted crash gap can cause serious damage to the tooling. See the Actuator Instruction Set for proper setup instructions.

Operating the System:

With all proper connections made and with tooling properly set up, welding may be performed. In most instances it is likely that Branson has developed weld settings for your application and stored them as presets in the controller prior to shipping. See the Touchscreen Controller Instruction Set for information on retrieving presets. For other weld parameter information pertaining to your system, see the parameter preset page included in the Special Information Instruction Set.

Troubleshooting:

This section shows how to fix some of the possible errors and problems which may occur in normal use of the MWX100/ Ultrasplce system.



Weld Overload

Weld overloads are premature shut downs of the power supply. Overloads signify excessive loads and must be corrected if continued reliability of the equipment is to be maintained. Hardware internal to the supply are controlling this function and it can not be defeated.

The control system analyzes the end of weld characteristics to check for overloads. If the system determines an overload an alarm occurs. The control halts action until the system is reset.

Some of the possible causes for overloads are:

- The tool clearances are too small, horn and anvil touch during welding
- Excessive air pressure with low amplitude
- Defective Stack assembly
- Defective Power Transistors in power supply

Low Air Pressure

The control system and its components were designed to run with a clean air supply of from 90 to 120 psi. The control system monitors the air pressure from the low air pressure switch (optional). The low pressure threshold is set from the controller. An alarm occurs when incoming line pressure the drops below the set pressure.

Ready Check

The system undergoes a Ready Check operation at every startup, the end of every weld, and at the exit of Setup mode. This procedure checks the height encoder position. If an incorrect height value is returned, an alarm occurs.

Some of the possible causes of a Ready Check alarm are:

- The horn is stuck in the closed position
- Maintenance has moved the height encoder to an out of limit condition
- Defective encoder or electronics
- Encoder not plugged in to its connector

Troubleshooting Guide

PROBLEM	SOLUTION
System will not turn on.	Power cable plugged in. Power turned on at the outlet. Check internal fuses on the Controller Line Board.
Plant fuse fails or circuit breaker trips when plugging the unit into an electrical outlet.	Inspect power cord, replace if shorted. Check line filter, replace if failed.
Plant fuse fails or circuit breaker trips during weld cycle	Check current rating of the plant fuse or the circuit breaker, replace if failed.
Line fuse fails.	Check fuse current rating, replace if incompatible. Check fan motor, replace if failed.
Horn will not move down or up.	System not connected to air supply. Air not turned on.
Get Emergency Stop when system is turned on.	Check Emergency Stop Switch. All cables properly connected. Press red switch on foot pedal. (if system is equipped with one)
No Sonics when test button is pressed.	RF Cable connected. Check RF cable for broken wire. Ribbon cable in power supply between SPM and programmer unplugged.
No sonics during weld cycle	Check all cable connections. Check start cable for broken wires. Check inside power supply for loose start cable from rear of unit to programmer board. Check thermo switch in power supply.
Overloads when welding	Stack not tuned properly. Tooling not set up properly. Crash gap not set properly. Tip nut cracked, replace if needed. Check weld parameters. Check stack interfaces for fretting. Check for loose or failed horn or booster, tighten or replace as necessary.
When touching the system you get a slight electrical shock.	Inspect power cord, replace if needed. Inspect system ground, repair if needed.

Tooling heats up after machine runs a while.	Cooling air is not turned on or is not on long enough. Cooling air is not directed at tooling.
Low weld strength.	Check weld parameters. Check tooling gaps. Check knurl on tooling. If worn replace tooling. Increase Energy. Check the Down stop adjustment. Check for part contamination. Ensure all hardware is tight.
Excessive welding.	Reset parameters. Reset amplitude. Reset pressure. Measure and re-calibrate amplitude display.
Time limit error or peak power error displayed after weld cycle.	Reset limits. Check tip, rotate or replace if worn. Check anvil for wear, rotate or replace if worn. Check air pressure setting. Check up stop for proper adjustment. Process settings have to be opened up due to part variance or limits should be adjusted according to the part/wire being run. Check anvil clamp for proper torque.
Squealing sound during welding or when test key is depressed	Check plate screws and tighten or replace. Check cover plate screws and tighten. Reset gaps. Re-square horn/tip and reset gaps. Reset horn tip and gap.
Weld heights are inconsistent	Re-calibrate encoders with 1mm gauge. Ensure the connector for the encoder is tightly plugged into the actuator card.
Horn is stuck in down position	Check air pressure. Ensure air lines are installed properly. Check for kinks in air lines.
Air leaking from machine.	Ensure all air line connections are tight. Check for cracked or broken air lines.
Unusual sound during weld cycle.	Check tooling gap. Check converter. Check stack assembly.

Squealing sound from power supply when unit is turned on.	Check cooling fans in rear of unit
Maintenance counter alarm.	Reset maintenance counter.
Actuator arm moves sluggish	Check air lines for contamination. NOTE: Air must be filtered to 5 microns and be oil and water free. Check solenoid valve, replace if needed. Check air regulator.
System has READY CHECK message	The horn is stuck in the closed position. Maintenance has moved the height encoder to an out of limit condition. Defective encoder or electronics. Encoder not plugged into the actuator card.
Time, height and energy inconsistent.	Switch to energy mode & open height window. Make some sample welds. Check the time and the height of the welds for consistency. If the time or weld thickness varies greatly, check the air regulator.

Periodic Maintenance

In order to maintain optimum operating conditions, it is important to perform various maintenance and equipment inspections at periodic intervals. Please observe the following recommendations.

Daily:

- Drain water and contaminants from the airline filters, if required.

Every Tool Rotation:

- Inspect the clamping surfaces of the Tip, the Tip Nut and the Horn for fretting.
- Vacuum and clean out any copper residue or dirt in the actuator.

After one million cycles:

- Vacuum and clean inside of power supply
- Calibrate pressure regulator.
- Clean and torque the stack interface.
- Calibrate amplitude.

FSR Assembly

Air Filter/Separator/Regulator (Optional Branson Part #207-020) should be serviced after 1 year or when a pressure drop of 15 psi is reached.

- Disconnect the air supply.
- Remove and clean out filter bowl with a clean rag.
- Replace the white filter element and re-assemble.
- Remove and clean out separator bowl with a clean rag.
- Replace brass-colored filter element and reassemble.
- Reconnect air supply.



Do not use solvent to clean filter bowls

Clean the air filter bowl with a mild household soap only. The bowl is made from a polycarbonate material, which can rupture if exposed to synthetic lubricating oils solvents or harsh chemicals. The bowl is rated for a maximum line pressure of 140 psig (1043 kPa) and a maximum temperature of 120°F (49°C).

Contacting Branson:

Spare Parts & Replacement Tooling:

Spare parts or replacement tooling for the ultrasonic welding system may be ordered directly from Branson. A spare tooling specification sheet is included in the Special Information Instruction Set. Additional part listings are contained in the Actuator and Touchscreen Controller Instruction Set sections of this manual.

Branson will work with you and recommend components you need and should carry in inventory based upon your manufacturing philosophy and or production needs. We will quote price, delivery and can coordinate special arrangements such as expedited service or blanket orders.

When Ordering Spare or Replacement Parts have the purchasing agent Fax the order to us with the following information provided:

- Purchase Order Number,
- Branson Part Number, Quantity, and Date Required,
- Ship To Information, (including “Ship to the Attention of”)
- Bill To Information
- Shipping Instructions, (such as air freight, truck, etc.)
- Special Instructions, (such as “Hold at Pick-Up Counter and Call” -- Be sure to provide a name and a phone number)

Questions or Problems:

If you have any questions or are experiencing a problem, call the local Branson field sales and/or service representative. He or she will be familiar with your equipment and application and, in most cases, will be able to help you. He or she may have the replacement part you need, in stock, that will return your system to operation in the shortest possible time.

If necessary, the representative will contact Branson for additional service and, in some cases, will put you into contact with the appropriate personnel. If the local representative is unavailable, please call us directly.

Before you call, take the following steps:

- Have this manual with you.
- Know how your system has been set up and equipped, including your MBOS version.
- Be able to describe the situation or problem.
- Have a list of steps that you have already taken.
- Have a list of spare parts in your inventory
- Have the name and phone number of the Local Branson Representative

Returning Equipment:

In order to properly and efficiently handle an equipment return to Branson, the following procedure must be followed. Contact your Local Sales Manager or Branson Customer Service for assistance. Proper handling and identification of your equipment will expedite servicing and/or return.

Using the Return Authorization Form, (next page), complete the following:

- Customer Information Section
- Description of Problem
- Equipment Information

Call Branson and Receive a Return Authorization Number (RA#) from Branson Customer Service.

- Properly package the equipment to prevent damage
- Clearly mark the RA# on the outside of the package
- Include a copy of the completed Return Authorization Form inside the package
- Return general repairs by any convenient method. Send priority repairs via Air Freight
- Prepay the transportation charges, (FOB Danbury, CT)

Return Authorization Form			
Customer Information		Authorization Information	
Customer name:		Return Authorization No:	
Address:		Assigned By:	
		Special Instructions:	
Contact:			
Phone:			
Fax:			
Description of Problem:			
Equipment Information:			
Machine Type:			
Machine Serial Number:			
Date of Original Purchase:			
Part Number of Component:			
PO Number for Repair:			
Do not ship to Branson without an RA number. Mark the RA number on the shipping label. Please fax a copy of this completed form to Branson Customer Service prior to Shipping.		For Branson Use Only	
		☐ Under Warranty	
		☐ Billable Repair	
		☐ Charge Repair to Sales	
		☐ Sold Replacement Part	

New Applications:

Branson is always eager to work with you on a new ultrasonic application. Whether it be a manual workstation, a semi or fully automated system, Branson has the personnel and technical competence to support your requirements. Branson's application laboratory, product and automation engineering, customer service and manufacturing capabilities are second to none. Branson is the world leader in ultrasonic metal welding and our business philosophy is practiced to assure customer success.

Application assistance is always available. For initial application review, contact your Local Sales Manager who can indicate initial feasibility and assist you in completing the Ultrasonic Weld Evaluation Request Form, (next page). Please complete one (1) request form for each application.

Please copy the attached Ultrasonic Evaluation Request Form (next page), complete the customer and application information section and forward it to Branson along with enough component material to produce 24 assemblies, (if this is not practical please advise). A feasibility evaluation will be performed and samples returned, for review, along with a system quotation/ proposal. Be sure to include drawings of the completed assembly and include the electrical, mechanical, and production requirements. Complete the form as completely as possible. The Branson Sales Representative can assist you.

Evaluation Request Form			
Lab Application No:		Date:	
Please fill out this form with at least 24 samples parts for an ultrasonic weld analysis			
Name:			
Company:			
Address:			
City:			
Telephone:			
Component Description:			
	Part 1	Part 2	
Material:			
Hardness:			
Plating:			
Insulation:			
Application Requirements:			
Production Rate: (parts/hr)			
Location tolerance: (in)			
Is weld appearance important:			
Pull Strength (lbs)			
Drawing Notes:			
This information to be completed by Branson			
Representative:			
Telephone:			
Return samples to:		Representative	Customer
Sales Engineer:			
Applications Engineer:			

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 for efficient 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 completion of the AFTER BURST DELAY. (Also See: AFTER BURST DELAY & AFTER BURST DURATION)

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 & AFTER BURST DURATION)

After Burst Duration: The amount of time, in seconds, that AFTER BURST energy is delivered. (Also See: AFTER BURST & AFTER BURST DELAY)

Amplitude: Amplitude is the peak-to-peak displacement of mechanical motion as measured at the face of the horn tip. Amplitude is measured in thousandths of an inch or in microns. (i.e. A standard 40 kHz converter produces approximately .0004" or 10 microns of amplitude), Inches x 25,400 = microns. -- With 'Advanced Power Supply' 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.

Baud Rate: A communications measure describing the speed at which signals are transmitted serially (the number of signal events per second).

BBRAM: 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 BBR)

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 energy (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.

Clock: An electronic circuit that generates timing pulses to synchronize the operations of various other circuits in a device(s).

Communications: Transmission of information between points of origin and reception without alteration of the sequence and or structure of that information content.

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 Operation Manual to document the spare tooling for a specific metal welding application.

Continuous Sonics Mode: A system setting in which the power supply will deliver ultrasonic electrical energy until the start signal is terminated.

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

Converter: A device which utilizes a lead-zirconate-titanate electrorestrictive 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.

Hand Shaking: The procedure (signal exchange) when a connection is established between two electronic devices. A common example is the signal exchange between a terminal and a MODEM. These signals (hardware and software) are used to control the flow of data (start/stop) between devices.

Height: A display 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, (40 kHz = 2.2" $\pm$, 20 kHz = 5.5" $\pm$).

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 welded surfaces

Linear Height Encoder: (See: Height Encoder)

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

Maintenance Counter: A programmable device used to alert production personnel of the need to review/ inspect application tooling and/or the ultrasonic system for preventive maintenance purposes. The device increments one (1) count for each system cycle. (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: A programmable device 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.

Preheight: 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: System memory available for storage and retrieval of welding parameters.

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 condition will exist.

Setup Mode: The condition the control box must be in prior to adjusting parameters, quality windows, and/or any others settings except those contained within the Command Mode.

Squeeze Time : The amount of time after the ultrasonic tooling engages the component(s) and before delivery of ultrasonic energy. -- Adjustable from 0 - 0.5 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)

Weld Mode:

- **Weld In Energy:** System delivers ultrasonic energy until a predetermined amount of energy, in joules is dissipated. The system determines energy by calculating the area beneath the power curve -- Watts x Time = Joules (1 watt per second = 1 joule).
- **Weld In Height:** System delivers ultrasonic energy until the ultrasonic tooling reaches a predetermined position.
- **Weld In Time:** System delivers ultrasonic energy for a predetermined amount of time.
- **Welding Parameters:** (See: **Parameters**)

Ultrasonic Theory:

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.

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 (Figure 1). 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 (Figure 2). As the atoms are combined between the parts to be welded, a true, metallurgical bond is produced.

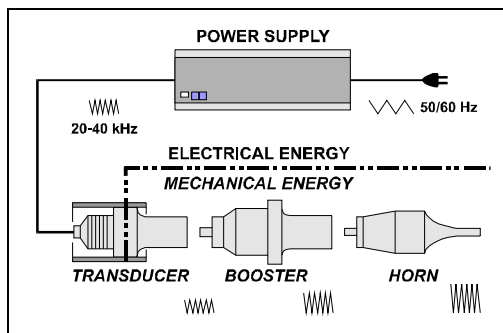


Figure 1

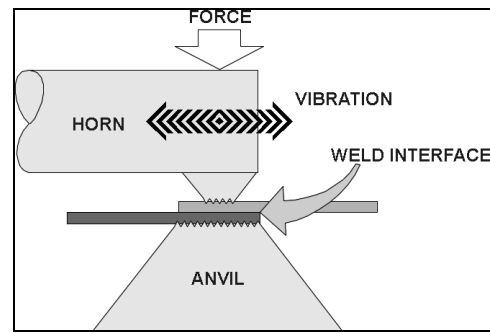


Figure 2

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.

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

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

$$P = F \times A$$

Where:

- P = Power (watts)
- F = Force * (psi)
- A = Amplitude (microns)

*Note:

Force is determined by multiplying:

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

Energy is calculated as:

$$E = P \times T$$

Where:

- E = Energy (joules)
- P = Power (watts)
- T = Time (seconds)

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

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

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.

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 contaminants such as grease and dirt. To producing 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 3) illustrates a weld produced. The weld 'power graph' is sometimes referred to a 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.

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'.

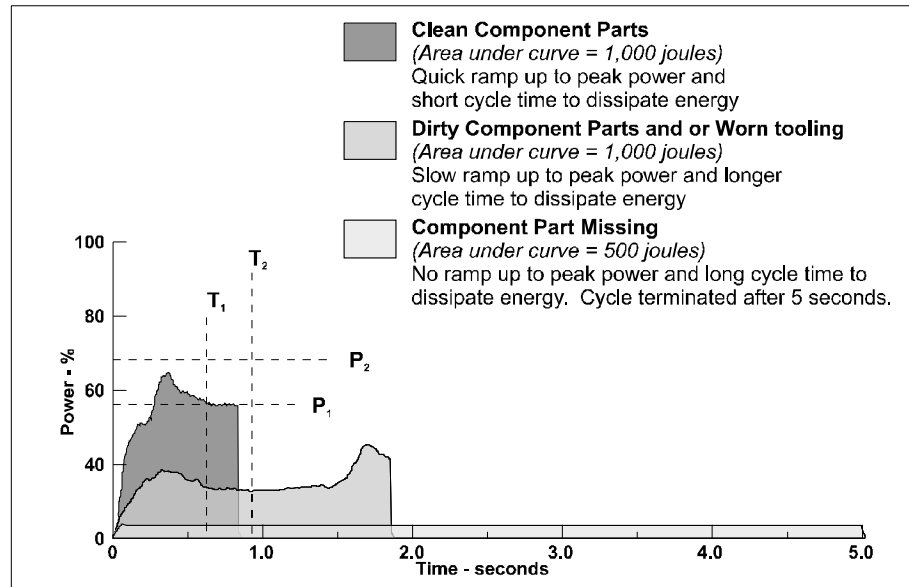


Figure 3

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 in the following diagram (Figure 4):

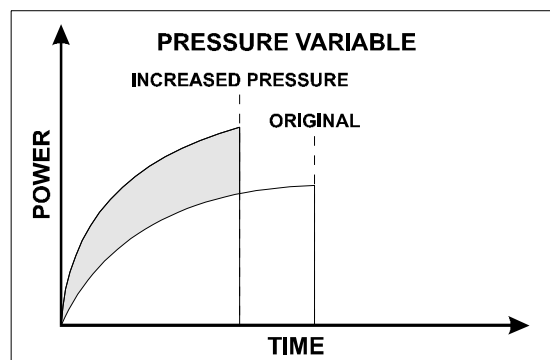


Figure 4

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.

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 5).

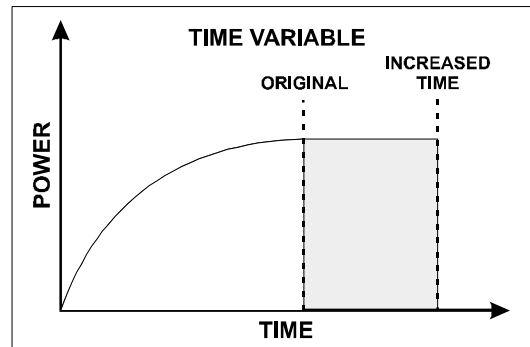


Figure 5

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 6). 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.

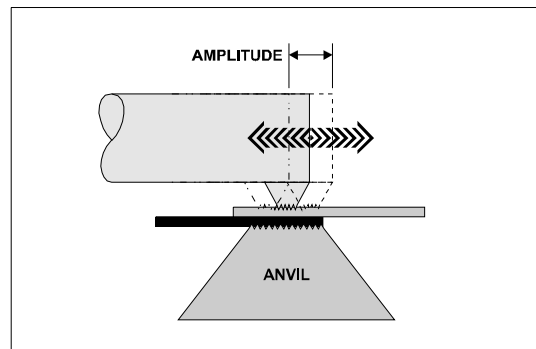


Figure 6

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 power diagram (Figure 7):

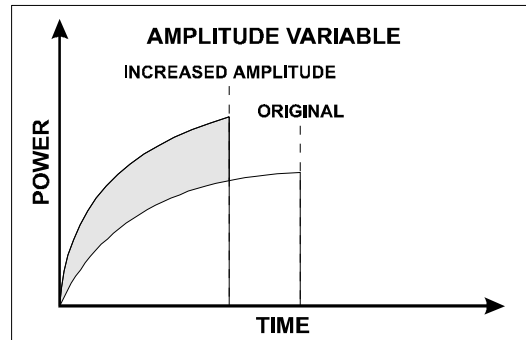


Figure 7

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 anti-nodes. This action results in a resonant wave being transferred through the tooling (Figure 8). 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

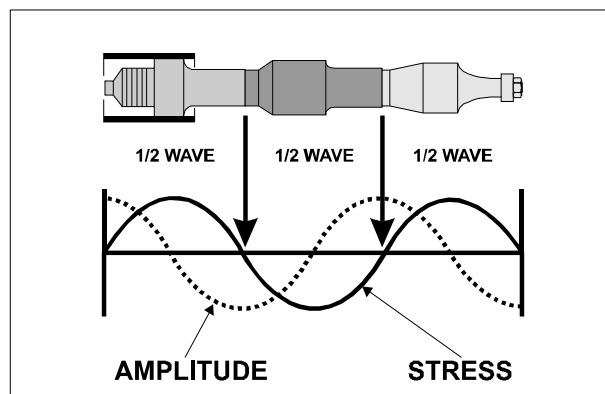


Figure 8

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.

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.

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.

Actuator Information and Instructions

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This document is intended for use in conjunction with others to form a complete manual for your BRANSON Metal Welding system.

Introduction:

This Instruction Set includes information for the BRANSON MWX100 actuator. This actuator is intended for use with a BRANSON controller.



Portions of this section may be superseded by more specific and detailed information provided in other Instruction Sets.

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Mechanical Actuator System

The MWX100 system is comprised of a power supply and control box, ultrasonic stack assembly, application tooling, and mechanical actuator. The mechanical actuator is the system that rigidly holds and moves the converter, booster, and horn assembly known as the ultrasonic stack. A pneumatic cylinder drives the actuator to apply a precise pressure to the parts to be welded during the weld cycle.



Specifications	
Length	18.4in (467mm)
Height	14.7in (373mm)
Width	8.5in (216mm)
Stroke	0.98in (25mm)
Weight	49 lbs (22kg)

Figure 1: Equipment Specifications

Ultrasonic Stack Assembly

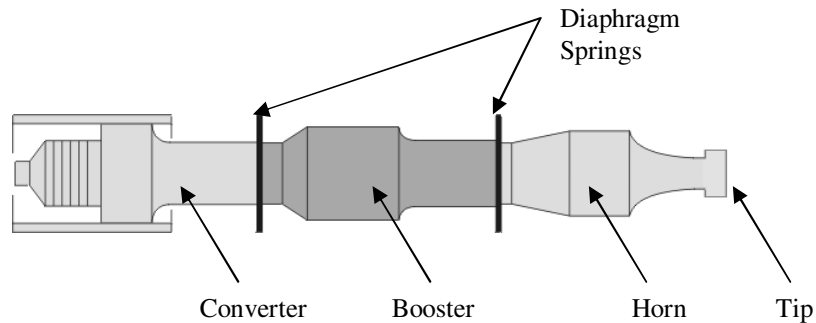


Figure 2: Ultrasonic Stack Assembly

Converter

The 40 kHz electrical energy from the power supply is applied to the transducer element or converter, which transforms the high frequency electric current into high frequency mechanical vibrations at the same frequency. The heart of the converter is a lead-zirconate-titanate electrostrictive element that, when subjected to an alternating voltage expands and contracts. The converter's efficiency of changing electrical energy to mechanical vibrations exceeds ninety-five percent.

Booster

A booster couples the converter to the horn and helps determine the amplitude of vibration produced at the face of the horn. The booster is a resonant half-wave metal device made of titanium or aluminum and is designed to resonate at the same frequency as the converter with which it is to be used.

A booster has two functions:

1. A rigid mounting for the converter/booster/horn stack
2. An amplitude-of-vibration increaser or decreaser as ultrasonic energy is transmitted from the converter through the booster to the horn. The ratio of input to output amplitude is called the gain.

Horn

The horn is a half-wave length resonant metal device that transfers the ultrasonic vibrations from the booster to the weld tip. The horn is made of steel (titanium for replaceable tip tooling) and is designed to resonate at 40 kHz. The acoustical efficiency of the steel and titanium helps to maintain constant amplitude throughout the operating temperature of the welder. Since the horn is a vital part of the ultrasonic assembly system, it should not be altered without proper training and advice from BRANSON Metal Welding. Depending upon the particular application at hand, the horn may be either a solid horn as shown in Figure 2a, or a Horn with a replaceable tip that can be rotated or replaced as shown in Figure 2b.

Figure 2a

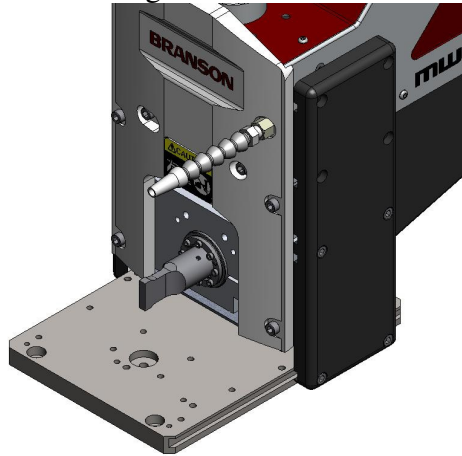
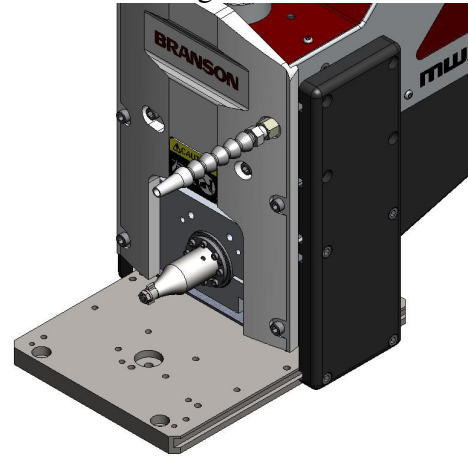


Figure 2b



Welding Tip (Replaceable Tip Tooling)

The welding tip is designed to grip the upper component of the part to be welded, and to couple the ultrasonic vibrations through that element into the bonding area. Welding tips are fabricated from high-speed tool steel and heat-treated to precise specifications to provide maximum life. The tip is coated to further enhance tool life and to provide corrosion resistance. The patented tip design offers multiple weld surfaces by indexing the tip on the horn to a new weld area.

Tip Nut (Replaceable Tip Tooling)

The tip nut is made of titanium and is designed to securely clamp the tip onto the horn. The *horn-welding tip-tip nut* assembly is an efficient system for transmitting ultrasonic vibration to the parts to be welded and offers an interchangeable tool at a low cost.

Polar Shell & Ultrasonic Stack.

The *converter-booster-horn* assembly, or ultrasonic stack, is supported in a steel Polar Shell by means of two diaphragm springs. The diaphragm springs are mounted at either end of the booster and are securely bolted to the Polar Shell. The diaphragm shaped springs are made from titanium and are acoustically tuned at the 40 kHz operating frequency. This system permits efficient transmission of ultrasonic vibration along the axis of the ultrasonic stack while providing rigid mounting.

Anvil

The anvil is made of high-grade tool steel and coated for maximum wear and corrosion resistance. The patented tool design allows it to be rotated to present multiple weld surfaces.

Actuator

The ultrasonic stack is mounted into a steel polar block and securely clamped in place. The polar block is mounted to a crossed roller recirculating bearing which provides precise vertical travel of the stack assembly, while providing excellent rigidity to resist any loss of ultrasonic energy in the horizontal direction of sonic vibrations. See Figure 3.

Application Tooling

Application tooling is designed and manufactured to position and weld component materials to meet customer specifications. Application tooling typically consists of a horn / tip / tip nut, anvil, anvil clamp, anvil holder, and tool support. See Figure 3.

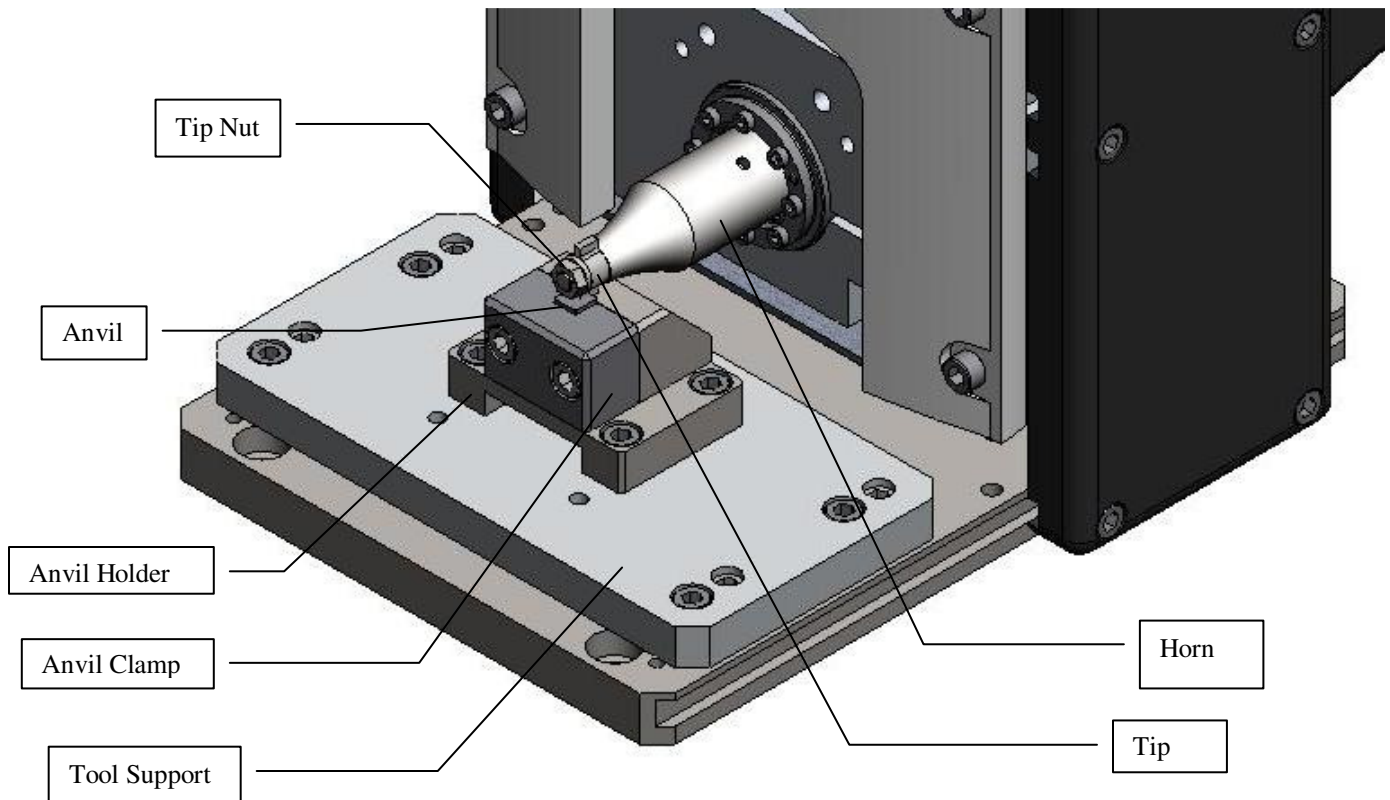


Figure 3: Actuator Slide Mechanism

Controls and Adjustments

Speed Up

The Speed Up knob, located on the rear of the actuator, controls the upward speed of the ultrasonic stack. This is useful for raising the stack quickly for other mechanism actions and for quick part removal.

To DECREASE the upward speed, turn the indicated knob clockwise.

To INCREASE the upward speed, turn the indicated knob counter-clockwise.

Speed Down

The Speed Down knob, located on the side of the actuator, controls the downward speed of the ultrasonic stack. This is useful to prevent damaging the parts to be welded, increasing/decreasing cycle times to get better weld results.

To DECREASE the downward speed, turn the indicated knob clockwise.

To INCREASE the downward speed, turn the indicated knob counter-clockwise.

Cooling Air



Do not turn cooling air off completely using the cooling air adjustment knob. Doing so may damage the converter.

Cooling air is designed to keep the weld area and the converter cooled to a reasonable temperature during welding.

To INCREASE cooling airflow rate, turn the cooling air control knob counter-clockwise.

To DECREASE cooling airflow rate, turn the cooling air control knob clockwise.

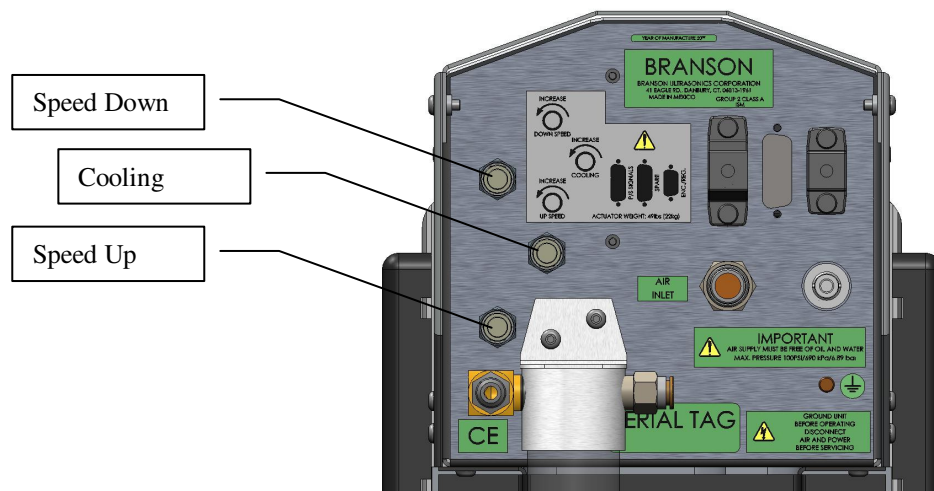


Figure 4: Speed Controls and Cooling Knob Location

Adjustment of the Down Stop



See Figure 5 for location.

The down stop is used as a safety to prevent contact between the Horn and Anvil if the welder is cycled without the part(s) to be welded. Unless otherwise specified, a 0.004" (0.10 mm) gap between the Horn and Anvil is recommended.

To adjust the down stop:

1. Loosen the M10 Hex Nut on top of the weld cylinder.
2. Turn the Down Stop Knob counter-clockwise to increase the maximum downward travel end position.
3. Turn the Down Stop Knob clockwise to decrease the maximum downward travel end position.
4. Tighten the M10 Hex Nut when the desired down travel location is achieved.

Adjustment of the Up Stop



See Figure 5 for location.

The up stop is used to limit the upward travel of the Horn. Two examples for the use of the up stop are limiting the upward travel to quicken cycle times and for easier loading and unloading of components

To adjust the down stop:

1. Loosen the M6 set screw (accessed through the front plate) so that the up stop screw moves smoothly.
2. Using a long wrench or T-handle, turn the M10 Set Screw counter-clockwise to increase the maximum upward travel end position.
3. Using a long wrench or T-handle, turn the M10 Set Screw clockwise to decrease the maximum upward travel end position.
4. Tighten the M6 set screw when the desired upward travel location is achieved.

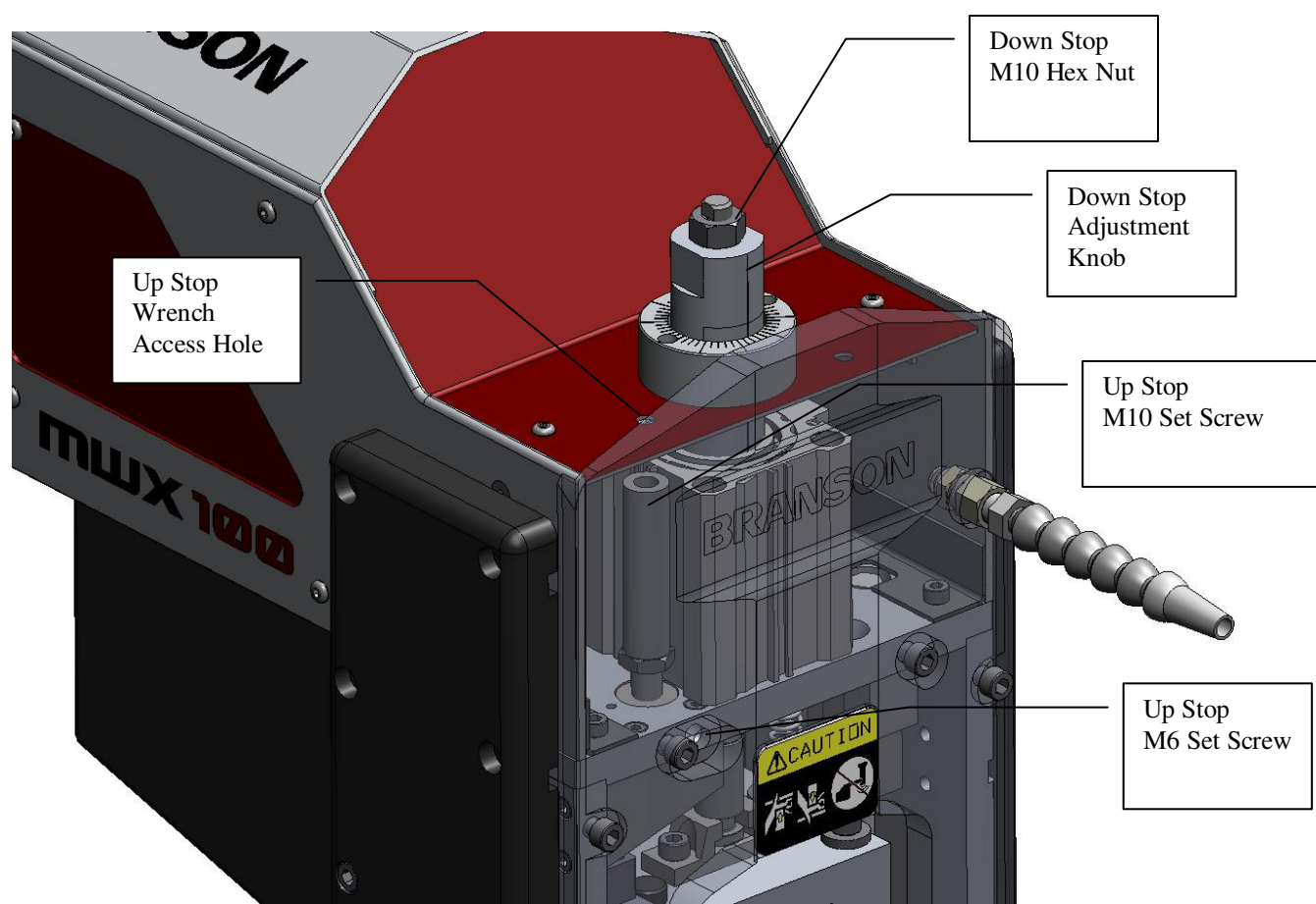


Figure 5: Up/Down Stop Locations

Tool Gap Requirements

Tooling includes the Horn (or Horn Tip), Anvil and all surfaces that contact the weld nugget during processing. The tooling should be inspected to confirm a gap as per the application tooling set up sheet. If the tooling is in contact during the application of ultrasonic energy, severe damage may result to the tooling and power supply



This test should be checked whenever the tooling is changed. Also perform this test whenever you suspect tool contact.

Most tooling that contacts the weld nugget is designed with several weld surfaces. When one surface is worn and no longer useful, an alternate surface may be used resulting in extended tool life.

To set the Tool Gap set the air regulator at the same pressure as the weld pressure. Ensure that there are no work pieces between the Horn and Anvil. Press the SETUP button on the power supply, then press the HORN button, which will cause the Horn to descend to its stop. Measure this crash gap as per the application tooling setup sheet. Press the HORN button again to raise the Horn and adjust the down stop screw located on the top of the actuator.

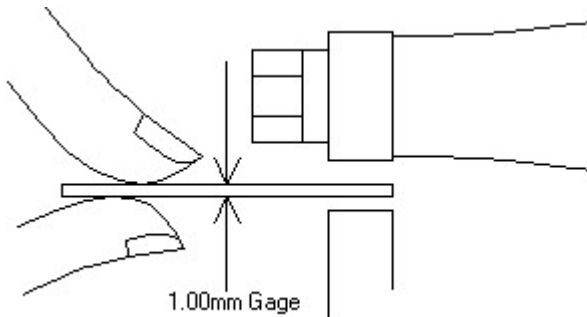


Figure 6: Tool Gap

The BRANSON Metal Welding MWX100 is capable of accurate height measurements and can adjust for weld pressure and crash gap settings. All tool setups especially crash gap must be complete before this procedure.

Knurl Pattern Imprint Evaluation

The imprint that the tooling creates on the interface is a result in the aligning the welding tip to the anvil. If the weld appears heavy to a certain side, readjustment of the tooling will be required to get even weld results across the weld surface. Typically, using carbon paper will give the best results. Figure 7 shows what typical imprints will look like and the corrective action to be taken.

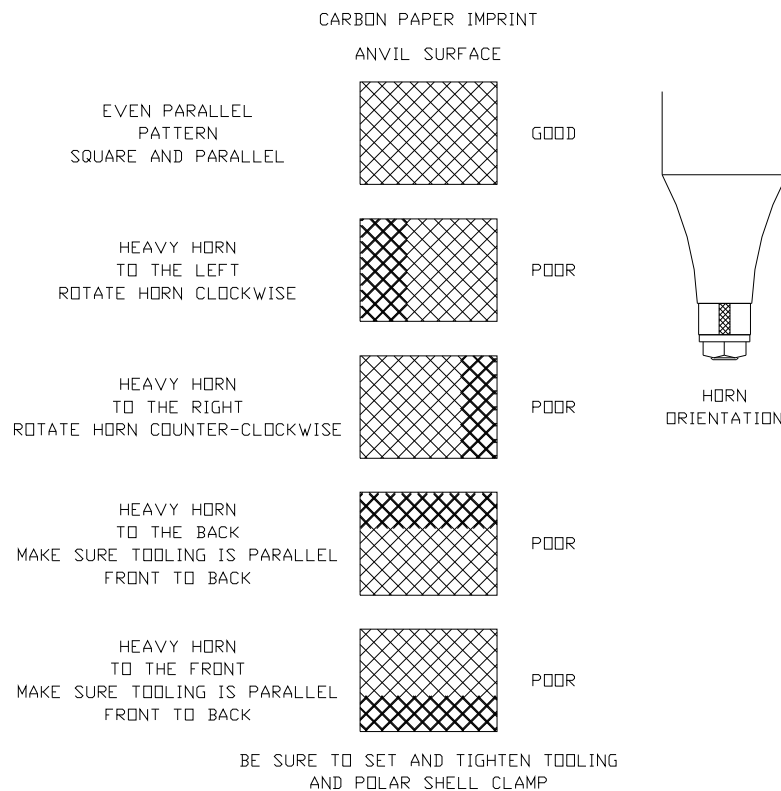


Figure 7: Knurl Pattern Imprint Evaluations

Torque Check

Proper tightness of tooling is critical to assure efficient transmission of ultrasonic energy into the weld nugget. Please check the tightness of the following areas during a tool change or whenever looseness is suspected.

Horn to Booster	150 IN-LBS (16.9 N-M)
Converter to Booster	150 IN-LBS (16.9 N-M)
Tip Nut (if used)	100 IN-LBS (11.3 N-M)(Unless otherwise specified)

Check Welder Performance

Ensure that nothing is touching the tip on all four sides. With the tooling disengaged and unloaded, press the “TEST” button on the power supply for no longer than one second. If there is a loud squealing noise, the problem may be in the following areas:

1. The Tip may not be secured properly.
2. The Horn may not be secured properly.
3. Tooling may be in contact with each other.

Establishing Weld Parameters

With the tooling properly set up and with the ultrasonic stack tuned, welding may be performed. Optimize the weld settings in the following manner:



Weld parameters may already be established. Refer to Parameter Preset Information located in the Special Information Section.

1. Set weld energy and pressure for initial weld trials to minimum values:
50 joules and 15 PSIG for air pressure as a starting point.
2. Place the parts to be welded securely into the fixture.
3. Cycle the welder by actuating the foot switch or the start switches.
4. Inspect the welded joint.
5. Increase/decrease the values for energy and air pressure as necessary to reach an acceptable level of welding.

Ultrasonic Stack Disassembly



See Figure 9 for item listings.

The transmission of ultrasonic energy along the stack requires a tight and clean interface between the Converter, Booster, Diaphragm Springs and Horn.

Please remove the stack and check the interfaces after one million cycles or whenever a problem is suspected. The procedure is as follows:

1. Be sure that the power supply is off to prevent any possible electrical shock from the high voltage contact on the converter.
2. Disconnect the cable at the rear of the Converter (Item 8).
3. Remove the Tip Nut and Tip (applicable to replaceable tip horns only).
Check the Tip and Nut to be sure that the clamp surfaces are clean and smooth.
Follow the instructions in Figure 10.



Clean only the clamp surface, not the knurl area.

4. Using the torque wrench and the Torque Wrench Adapter, remove the Horn (Item 6) from the Stack Assembly.
5. Remove the eight M3 SHCS's (Item 9), the Clamp Ring (Item 1) and the Front Diaphragm Spring (Item 2).
6. Remove the eight M3 SHCS's (Item 9) from the back end of the Polar Shell (Item 4).
7. The Converter (Item 8), Clamp Ring (Item 1), Rear Diaphragm Spring (Item 3) and Booster (Item 7) can now be slipped out of the Polar Shell (Item 4) towards the rear of the actuator.

8. With two spanner wrenches carefully separate the Booster from the Converter. Check and clean the mating surfaces of these components with an oilstone or 600-grit paper as shown below.
 - a. Place 600 grit emery on a hard, flat surface. Place component on emery with the mating side you wish to clean face down.
 - b. Do not press down. Using only the weight of the converter, booster, or horn as downward pressure, drag the component across the emery in a single, straight, long stroke (see Figure 8).

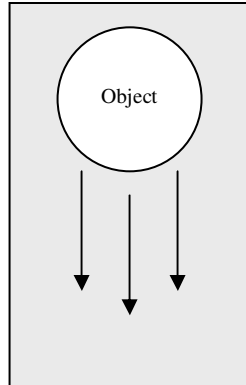


Figure 8: Cleaning object mating surface direction

- c. Turn the component 90 degrees and repeat step 2. Repeat this procedure until all mating surfaces are clean.
9. Clean and then polish away any roughness on the Diaphragm Spring.
10. Assemble the stack per the steps in the next section.

Ultrasonic Stack Assembly



See Figure 9 for item listings.

1. Clean Horn, Converter, Booster and diaphragm surfaces with solvent to remove all contaminants and previously used paste.
2. Apply an even, light coat of Molykote G-n paste (about equal in size to half a paper match head) to the mating surfaces of the Converter, Booster and Horn. Do NOT apply paste to threaded opening or to stud threads or to diaphragm. Do NOT use silicone grease.
3. Place the Rear Diaphragm Spring (Item 3 – 0.316"φ center hole) and Clamp Ring (Item 1) onto the studded end of the Booster (Item 7). Then thread the Booster into the Converter. Be careful to center the Diaphragm Spring on the Booster and then torque Booster and Converter to 150 IN.-LBS (16.9 N-m) using two spanner wrenches. Do not clamp on the Converter.

4. Slide the Booster/Converter subassembly in through the rear of the Polar Shell. Assemble the eight M3 SHCS's to fasten in an alternating pattern the Clamp Ring to the rear of the Polar Shell.
5. Place a Clamp Ring and the Front Diaphragm Spring (Item 2 – 0.500"φ center hole) onto the studded end of the Horn (Item 6). Then thread the Horn into the Booster. Assemble the eight M3 SHCS's to fasten in an alternating pattern the Clamp Ring to the front of the Polar Shell. Be careful to center the Diaphragm Spring on the Horn and then torque Booster and Horn to 150 IN.-LBS (16.9 N-m).
6. Replace the Tip and loosely thread on the Tip Nut. (applicable to replaceable Tip Horns only) The Tip (or Horn blade) will have to be made square and parallel to the Anvil prior to welding.



Do not operate ultrasonics while the tip is loose.

Do not operate ultrasonics without connecting the converter lead wire and ground.

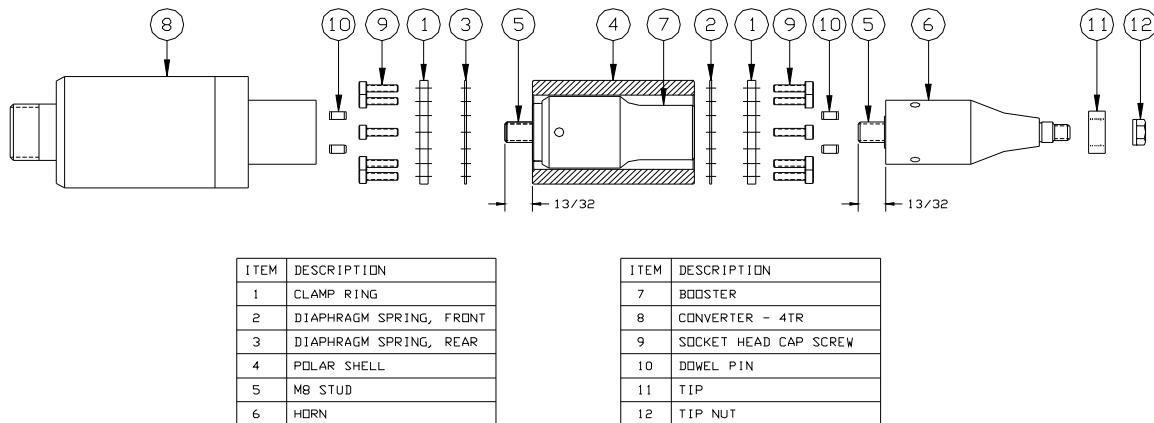


Figure 9: Exploded Ultrasonic Stack Assembly

AFTER PROLONGED USE, BURRS MAY FORM ON THE CLAMPING SURFACES OF THE TOOLING. THESE BURRS MAY BE REMOVED FROM THE TIP AND TIP NUT BY POLISHING WITH 600 GRIT EMERY PAPER PLACED ON A FLAT SURFACE. WITH LIGHT PRESSURE, POLISH THE CLAMP FACES IN A FIGURE 8 PATTERN. THE BURRS ON THE HORN CLAMPING SURFACE MUST BE REMOVED BY MACHINING BACK THE HORN CLAMP SURFACE. THE LEAST AMOUNT OF MATERIAL SHOULD BE REMOVED, BUT IN NO CASE SHOULD MORE THAN .020" BE REMOVED. THE UNDERCUT AT THIS CLAMPING SURFACE MUST ALSO BE RECUT.

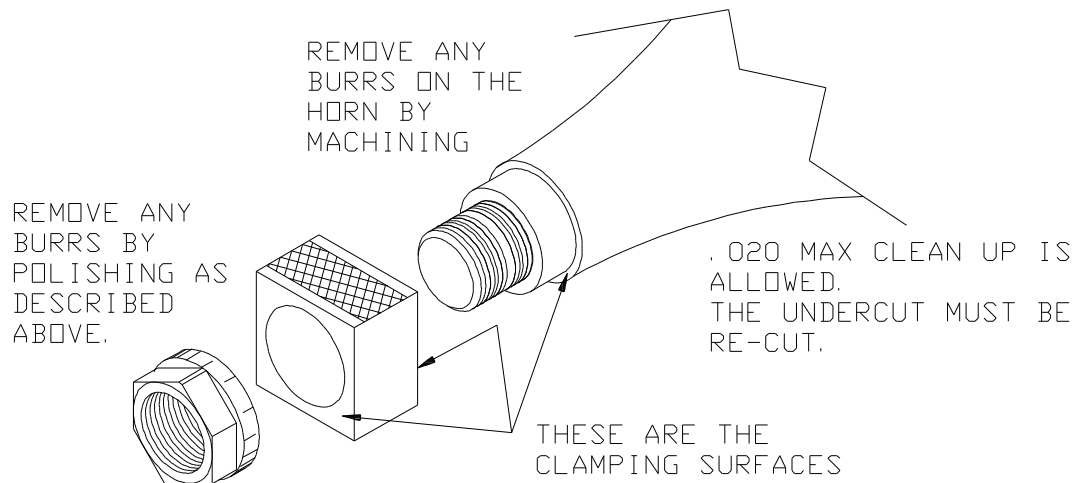
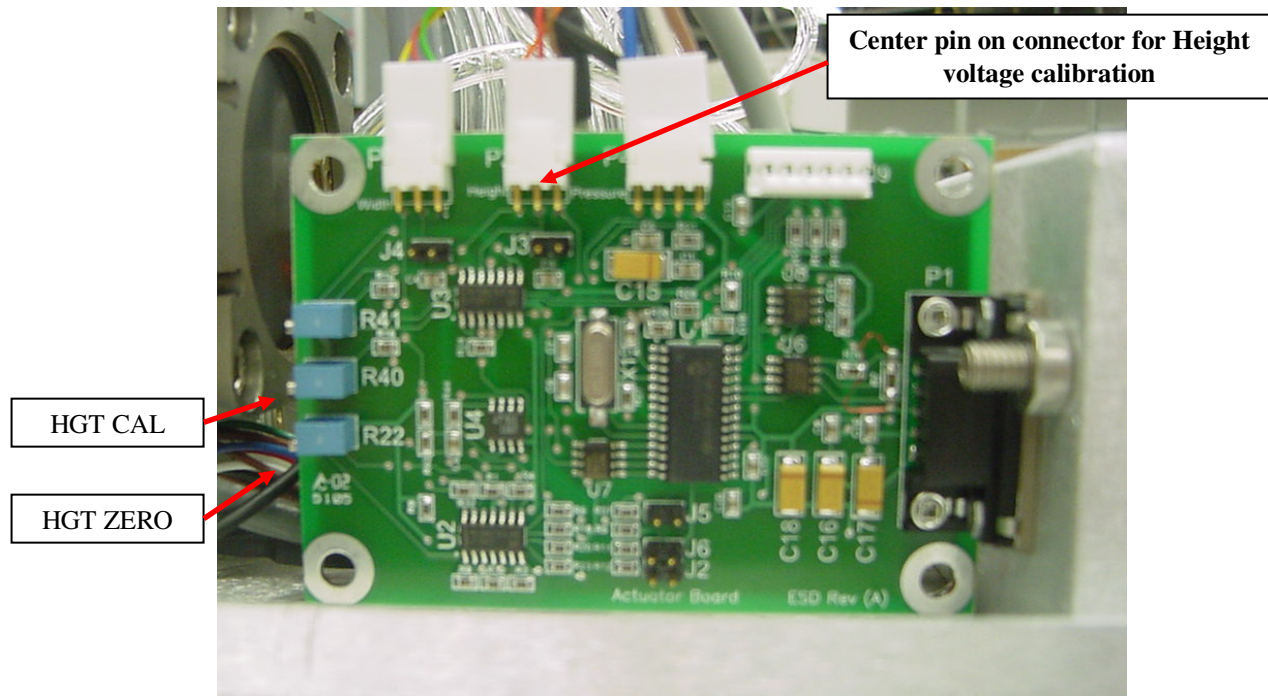


Figure 10: Tool Cleaning



Encoder Board Calibration

Encoder board calibration is factory set and generally does not need to be changed. Any calibration required due to tool wear or adjustment is built into the controller software and may be accomplished using touchscreen commands (refer to the Touchscreen Controller Instruction Set). If a new encoder board is installed it will be necessary to calibrate Height and Width as follows. If a new width encoder belt is installed, follow the procedures for Width only.

Calibrate Height

- From the controller, lower the horn (step reference- Menu >Maintain >Height > Horn)
- Remove the top cover from the actuator and locate the actuator board.
- With digital voltmeter measure dc voltage at center wire of height connector to ground. The 9 pin connector should be used as the ground point.
- Voltage should read + 0.150 vdc. If not turn voltage the HGT ZERO potentiometer until the voltmeter reads + 0.150 vdc. (The voltage must be positive)
- From the controller raise the horn (step reference- Horn).

Height Span Adjustment

- Position a 1mm shim on the tip.
 - From the controller lower the horn (step reference- Menu >Maintain >Height > Horn)
 - From the controller calibrate the height (step reference- Calibrate). The controller will reset the zero point and the anvil arm will move up.
 - Position a 6mm shim on the tip.
 - From the controller lower the horn (step reference- Horn)
 - Verify that the height reads 6mm. Adjust the HGT CAL potentiometer until a reading of 6mm is obtained.
 - Repeat above steps until the height reads 6mm without adjustment at the previous step.
- From the controller exit the calibration screen (step reference- Exit)

Slide Maintenance

Lubrication:

The purpose of lubrication for the linear motion rolling guides is to prevent direct metal-to-metal contact of the raceways and rolling elements, thereby reducing friction, wear, and heat generation. When an adequate grease film is formed between the raceways and rolling elements at the rolling contact area, the contact stresses due to weld loading can be moderated.

A quality lithium-soap base grease containing extreme pressure additives (Alvania EP Grease 2 (SHELL)) is pre-packed in the recirculation crossed roller slide. However, the quality of any grease will gradually deteriorate over time. Periodic re-lubrication is essential. The re-lubrication interval varies depending on the operating conditions of the rolling guides. A six-month interval is generally recommended. If the machine operates at a high cycle rate (i.e. 42 cycles/min = 100,000 cycles a week, 40 hrs/wk) and/or short strokes, re-lubrication every three months is recommended. A grease nipple is provided at the slide unit for re-lubrication.

Access to the grease fitting is achieved in two ways depending on revision of actuator:

1. Remove the black cover plate on the side of the actuator. Once removed, there is an access point in the steel housing to insert the grease nozzle onto the fitting.
2. Remove the front plate of the actuator. Once removed the grease fitting is located in the upper left corner of the actuator. Insert the grease nozzle to apply the grease

New grease must be supplied through the grease fitting until the old grease is discharged. After the grease is replenished, cycling the actuator will cause the excess grease to be discharged from the inside of the rolling guide. Discharged grease must then be removed before starting regular operation. Generally, immediately after grease is replenished, frictional resistance tends to increase. If cycling the actuator is performed for 10 to 20 cycles after excess grease is discharged, frictional resistance becomes small and stable.

Lubrication Schedule:

Actual lubrication interval is under the influence of each application and environment.



When re-mounting the slide block to the rail for any reason, care must be taken to avoid dislodging rollers from the tracks within the slide block.

BRANSON Metal Welding recommends the following schedule as an initial plan to follow:

1. After 1 month of normal operation:
 - a. Inspect interior of actuator for possible grease discharge.
 - b. Re-lubricate slide with specified grease until slide reservoir is full (minimum of 0.6 CC).
 - c. Allow full travel of the slide unit inside the actuator.
 - d. Cycle the slide 10-20 to re-circulate the grease.
2. After 3 months of normal operation:
 - a. Inspect interior of actuator for possible grease discharge.
 - b. Re-lubricate slide with specified grease until slide reservoir is full (minimum of 0.6 CC).
 - c. Allow full travel of the slide unit inside the actuator.
 - d. Cycle the slide 10-20 to re-circulate the grease.
3. After 6 months of normal operation:
 - a. Remove slide assembly from actuator.
 - b. Inspect the slide block and rail for damage or unusual wear.
 - c. Re-lubricate slide with specified grease until slide reservoir is full (minimum of 0.6 CC).
 - d. If slide is damaged or wear is apparent, contact BRANSON Metal Welding Customer Service.
 - e. Using a setup rail (BRANSON Metal Welding #105-355); slide the block the full length of the rail 5-10 times manually to re-circulate the rollers through the grease reservoir.
 - f. Re-assemble the slide assembly within the actuator.

If, after the 1st and 2nd inspections, the slide grease is abnormally low, has discoloration, or there is dust/dirt in the slide block, more frequent inspections will be required.

Lubrication used:	Alvania EP Grease 2 (Shell) – Extreme Pressure Grease
Grease fitting on slide:	IKO #B-M4 (BRANSON Metal Welding #209-336)
Supply Nozzle:	IKO #A-8120V (BRANSON Metal Welding #209-337)

File Attachments

<i>Description</i>	<i>Files</i>
Tool Kit	R3A00A68
Assembly Drawing (Manufacturing & Commercial)	159-134-341

These file attachments are included at the end of this instruction set.

Recommended Spare Components List

Primary Spare Items: Items that are highly recommended to have readily available to prevent extended equipment down time and/or setup time.		
<i>Part Number</i>	<i>Part Description</i>	<i>Additional Information</i>
102-242-632R	PC Board	
100-143-172	Linear Encoder	25mm Stroke
100-095-168	Spring, Front Diaphragm	
100-095-169	Spring, Rear Diaphragm	

Secondary Spare Items (optional items): Items that are recommended to have readily available to prevent extended equipment down time and/or setup time when maintenance is required.		
<i>Part Number</i>	<i>Part Description</i>	<i>Additional Information</i>
100-143-171	Valve Assembly	
100-246-1445P	Electronic Pressure Regulator	
200-095-167	Spring, Extension	
100-034-088	Cylinder	
100-003-087	Slide Rail and Block	

Welder Touchscreen Controller Instruction Manual

DCM00002

Rev. 5

BRANSON Ultrasonics Corporation

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Manual Change Information

At Branson, we strive to maintain our position as the leader in ultrasonics metal welding, plastics joining, ultrasonic 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 the cover of this document, and refer to the printing date which appears at the bottom of this page.

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Welder Touchscreen Controller Instruction Manual

Foreword

Congratulations on your choice of a Branson Metal Welding system!

The Branson Touchscreen system is a 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 Instruction 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](#) and/or the Index 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 [Section 1.4, "How to Contact Branson" on page 1-6](#) for information on how to contact them) or your local Branson Metal Welding representative.

NOTICE

This document is intended for use with the following Branson products: Touchscreen Controller with a Welder.

This Instruction Set includes information for the Touchscreen Controller and actuator. Please refer to the Table of Contents of this Instruction Set to find specific information.

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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 Safety Requirements and Warnings

1.1.1 Symbols found in this Manual

Three symbols used throughout the manual warrant special attention:

NOTICE

A Note contains important information. It does not alert the user to potential injury, but only to a situation that might eventually require additional work or modification if you ignore it initially.

CAUTION

A Caution indicates a potentially hazardous situation, which, if not avoided, can result in minor or moderate injury. It can also alert the user to unsafe practices or conditions that can damage equipment if not corrected.

WARNING

A Warning indicates a hazardous situation or practice that, if not avoided, can result in serious injury or death.

1.1.2 Symbols found on the Product

The Touchscreen Controller has several warning labels on it to indicate the presence of hazardous voltages inside the unit.

Figure 1.1 Safety Labels found on the power supply



Warning.
Ground unit before operating.



High voltage. Risk of electric shock or burn.
Do not remove cover. Refer service to qualified personnel only.

1.2 General Precautions

Take the following precautions before servicing the Touchscreen:

- 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 Touchscreen into a grounded power source.
- Power supplies produce high voltage. Before working on the Touchscreen module, do the following:
 - Turn off the Touchscreen;
 - Unplug main power; and
 - Allow at least 2 minutes for capacitors to discharge.
- High voltage is present in the Touchscreen Controller. Do not operate with the cover removed.
- High line voltages exist in the ultrasonic Touchscreen 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 Touchscreen before setting a DIP switch.
- Keep hands away from horn. 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.

1.2.1 Intended Use of the System

The Branson Touchscreen Controller and Actuator are components of an ultrasonic welding system. These are designed for a wide variety of welding or processing applications. Branson is not liable for damages that arise due to non-intended use.

1.2.2 Regulatory Compliance

The Branson products (Touchscreen Controllers, Welders and Splicers) 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 (Touchscreen Controllers, Welders and Splicers) 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 2006/95/EC as amended
- EMC Directive 2004/108/EC as amended
- BS EN ISO 12100-1, -2 Safety of Machinery - Basic concepts, general guidelines for design
- BS EN ISO 13850 Safety of Machinery - Emergency stop equipment, Functional aspects - Principles for design
- EN 574 (ISO 13851) Safety of Machinery - Two-hand control devices - Functional aspects - Principles for design
- EN 13849-1 Safety of Machinery - Safety of related parts of control systems
- EN ISO 14121-1 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 60529 Degrees of protection provided by enclosure
- EN 60664-1 Insulation coordination for equipment within low-voltage systems
- EN 61000-3-2 Electromagnetic Compatibility - Limits for harmonic emissions (For European products that draw less than 1000 watts from the line at full rated power)
- EN 61000-3-3 Electromagnetic Compatibility - Limitations of voltage fluctuations and flicker in low voltage supply systems (For European products that draw less than 1000 watts from the line at full rated power)
- EN 61000-6-1 Electromagnetic Compatibility - Generic standards - Immunity for residential, commercial and light-industrial environments (For European products that draw less than 1000 watts from the line at full rated power)
- EN 61000-6-2 Electromagnetic Compatibility - Generic standards - Immunity for industrial environments
- EN 61310-2 Safety of Machinery - Indication, marking, actuation

Figure 1.2 CE Mark



1.3 Warranty Statement, Disclaimer

The following excerpts from the “Terms and Conditions of Sale” (found on the back of your Invoice) are essential guidelines for the product Warranty issued with your Branson ultrasonic welding components. The items listed in this section specifically address issues involving the delivery, shipment, and warranty period provided. If you have any questions, please refer to the back of the Invoice included with your system, which lists all of the Terms and Conditions of Sale, or contact your Branson Metal Welding representative.

1.3.1 TERMS AND CONDITIONS OF SALE

BRANSON Ultrasonics Corporation (Branson) is herein referred to as the “Seller” and the customer or person or entity purchasing products (“Products”) from Seller is referred to as the “Buyer”. Buyer’s acceptance of the Products will manifest Buyer’s assent to these Terms and Conditions.

1.3.2 NORTH AMERICAN WARRANTY POLICY ULTRASONIC JOINING EQUIPMENT

Each product manufactured by Branson is guaranteed to be free from *defects in material and workmanship* for a period of time specified in [Table 1.1](#) from the date of invoice.

Table 1.1 Warranty Period

Branson Touchscreen Controller	12 months
Actuators	12 months
Accessories	12 months
Converters	12 months (limited to <i>one-time</i> replacement)
Non-Branson equipment (i.e. printers, terminals)	warranted by the manufacturer
Boosters	12 months
Rental Equipment	6 months

Expendable tooling produced by Branson such as the horn, tip and anvil will wear at varying rates depending upon the application and duty cycle. For this reason, Branson warrants that all tooling complies with specifications on design and materials but cannot guarantee its useful life for a fixed period of time.

The warranty does *not* apply to:

- any product which has been subject to misuse, misapplication, neglect (including without limitation inadequate maintenance), accident or improper installation, modification or adjustment.
- non-Branson equipment (i.e., horns, boosters, converters) or improperly tuned horns.
- Set up/installation of equipment and software updates.

Warranty Service covers the following:

Repair service at Branson Danbury or a regional office

- Includes parts and labor performed at Branson authorized repair facilities. The customer must return the equipment properly packed with all shipping charges prepaid.

Repair service at the customer site

- Includes parts and labor at the customer site performed by a Branson Metal Welding technician. The customer is responsible for all travel-related charges.

Additional Warranty Notes

- Components replaced during in-warranty repair carry the remainder of the original warranty.
- Serialized assemblies replaced during the repair of out-of-warranty equipment are warranted for a period of 12 months.

If you have any questions concerning the warranty coverage (including coverage outside of North America), please contact your Branson Metal Welding representative or Branson Customer Support.

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.

- **Danbury Main Number (all Departments):** (203) 796-0400 (Eastern Time Zone) Refer to Table 1.2 for specific Branson contact information.
- **Parts Store:** Direct Number for Parts Store in Danbury (203) 796-9807.

Tell the operator which product you have and which person or department you need (See [Table 1.2, "Branson Key Contacts" on page 1-10](#)). 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

41 Eagle Road

Danbury, Connecticut 06810 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 Danbury, 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, and asking for the appropriate department as indicated in [Table 1.2](#) below.

Table 1.2 *Branson Key Contacts*

For information about...	Department	Extension
New welding systems or components	Branson Local Representative or Customer Service	807
Welding system application and setup	Welding Applications Lab	828
Horn and Tooling application assistance	Welding Applications Lab	828
Welding system technical support	Welding Product Support	405
Horn and Tooling technical support	Branson Engineering	467
Ordering new parts	Parts Store	807
RGA's, Request for Repair, Status of a Repair	Welding Repair Department	807
System Automation/Hookup Information	Product Support	473

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 Danbury, 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 Touchscreen Controller

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

The Touchscreen Controller contains a microprocessor-based controller that provides for control and monitoring of welding operations.

2.1 Model Covered

This document is intended for use with an 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 and Index of this Instruction Set to find specific information.

2.2 Overview of this Model

Figure 2.1 Metal Welding Power Supply



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 Touchscreen also contains a microprocessor-based controller module that provides for control and monitoring of welding operations.

Ultrasonic Power Supply Module

Generates ultrasonic energy at the resonant frequency of the Converter-Booster-Horn Stack. The Ultrasonic Power Supply Module contains five main circuits as follows:

- 320VDC Power Supply: converts AC line voltage to +320VDC for the output power devices.
- FET bridge- switches the 320 vdc into ultrasonic pulses at the resonant frequency.

- Output circuit – matches the impedance of the output power device to the Converter-Booster-Horn Stack; and provides feedback to the Control circuit.

- Control circuits: perform the following functions:
 - Provide drive signal to output power device.
 - Determine true percentage of ultrasonic power used over a range of amplitudes.
 - Allows control of the resonant frequency.
 - Control starting amplitude.
- System Protection: Protects the Power Supply by providing five levels of protection:
 - Voltage
 - Current
 - Phase
 - Temperature
 - Power

Line Board Module

Performs the dual function of providing RFI filtering for the line voltage input to the power supply, and controlling the electrical current surge to the ultrasonic Power Supply Module at power up until the inrush current limiter relay engages. The filtering also blocks ultrasonic signals from entering the AC main line. Additionally, the Line Board contains a soft start circuit module which limits the effects of current inrush.

DC Power Module- rectifies, filters, and regulates the AC voltages from the Line into DC voltages for the CPU Board. These two circuits are described below:

- 5VDC output: provides +5VDC for the analog and digital circuitry on the CPU Board.
- 24VDC output: provides +24VDC for the CPU Board control signal and user I/O voltage.

The DC Power Supply is mounted to the rear of the Power Supply case. It is mounted so it will swivel up to service the DC Power Supply, Line Board, and fuses.

Machine Controller Board

Provides a standard interface for automation and is accessed on the rear of the power supply. It gives the customer the ability to make their own interface for automation or special control and/or special reporting needs. It is mounted to the CPU Board on standoffs, and is connected to the rear of the controller case by its end panel.

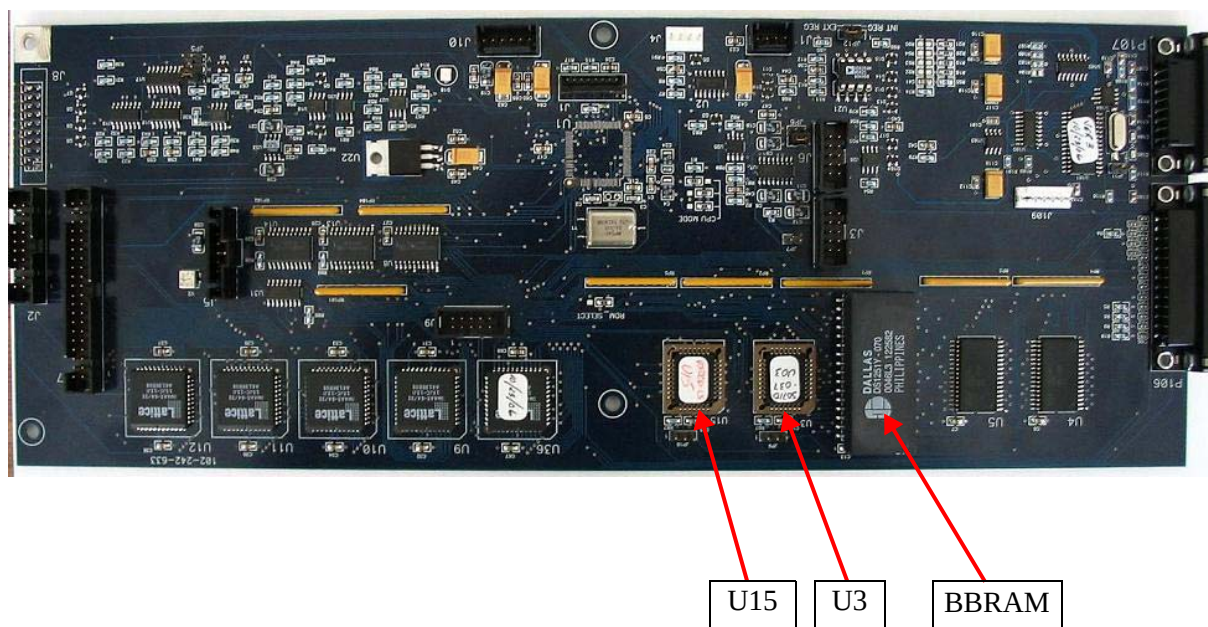
CPU Board

Controls the following functions of the Power Supply:

- Responding to start and stop signals
- Responding to alarm and reset signals
- Responding to user input from the front panel
- Activating and monitoring ultrasonics
- Provides information for Front Panel Displays
- Generate alarms
- Activate printing
- Control communications

This board mounted to the bottom of the power supply box on standoffs and is connected to the rear of the controller case by its end panel. To access this board removal of the Machine Controller Board is required. The system software EPROMs reside in sockets U15 and U3 as shown in [Figure 2.2](#). The battery backup ram (BBRAM) is located next to the eproms and saves stored information when power is removed from the system.

Figure 2.2 The CPU Board



Front Touchscreen Panel and Bezel Assembly

It is held by four upper screws which are accessible from inside the enclosure and four lower screws which are accessible from outside the enclosure through the ventilation slots in the bezel. Removal of the front bezel allows access to the following components which are housed inside it:

- **Touchpanel-** The sensing element which provides the user interface with the controller.
- **LCD screen-** The visual display through which instructions are communicated to the user. It is mounted directly behind the touchpanel.
- **Display Board-** Contains the video control circuits for the LCD Screen. This board is mounted directly behind the LCD controller.
- **Front Panel Board-** Houses the alarm beeper and the four diagnostic lights which are located to the right of the touchscreen on the front bezel.
- **Power Switch-** Used to turn the Controller on and off.

Motor Control Board

Contains the control circuit for controlling actuators which are equipped with a stepper motor driven gather mechanism.

Pneumatic Kit

Refer to the Special Information Instruction Set.

2.3 Compatibility with Branson Products

The Branson Touchscreen Controller is designed to be used with:

- Branson Metal Welding Actuators: Ultraweld 20, Ultraweld 40, MTS 20, Ultrasplice 40, ST 40.
- Branson Metal Welding converters: see [Table 2.1](#) below.

Table 2.1 Touchscreen Controller compatibility with Branson Metal Welding Converters

Branson Model	Converter
20 kHz/3300 W 20 kHz/4000 W	502, 105
40 kHz/800 W	4TJ, 4TR, 4TH

2.4 Ultrasonic Theory

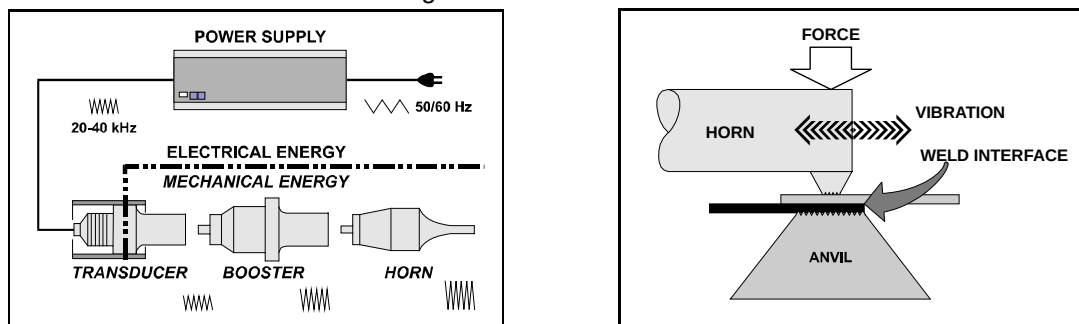
2.4.1 What Is An Ultrasonic Weld?

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

2.4.1.1 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 2.3 How does Ultrasonic Welding Work?



2.4.2 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.

2.4.3 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

$P = F \times A \times f$	Where: • P = Power (watts) • F = Force * (N) • A = Amplitude (microns) • f = Frequency (Hertz)
*Note: Force = (Surface Area of the Cylinder) X (Air Pressure) X (Mechanical Advantage)	

Energy is calculated as;

Table 2.3 Calculating Energy

$E = P \times T$	Where: • E = Energy (joules) • P = Power (watts) • 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.

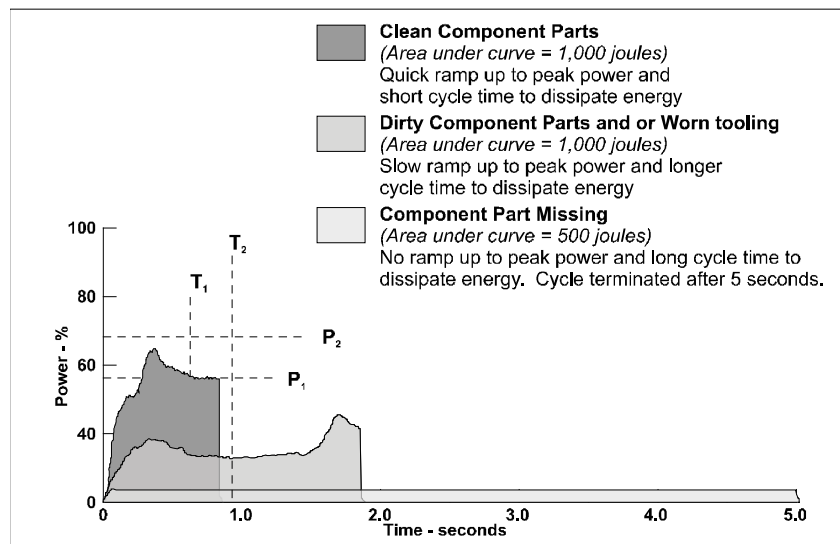
2.4.4 Welding To Energy - Why?

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 contaminants such as grease and dirt. To producing 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 2.4](#)) illustrates a weld produced. The weld 'power graph' is sometimes referred to a 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 2.4 Weld Power Graph for Clean Components, Dirty Components, and when Part is Missing.

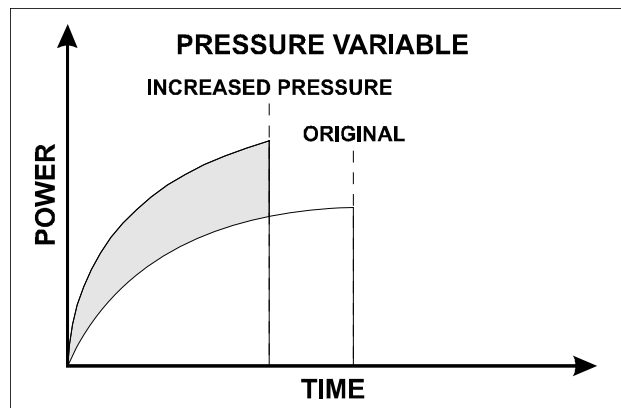


2.4.5 Power

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 2.5](#).

Figure 2.5 Pressure Variable with Increased Power

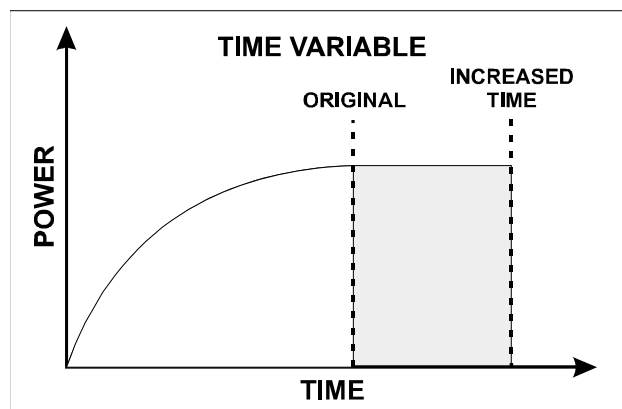


The difference in the appearance of each of the above weld graphs is the result of increased Power loading. Based upon an increase in Pressure, additional Power is required to maintain the motion of vibration. Thus, the same amount of energy is delivered in less time. This approach is typically used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

2.4.6 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 2.6](#)).

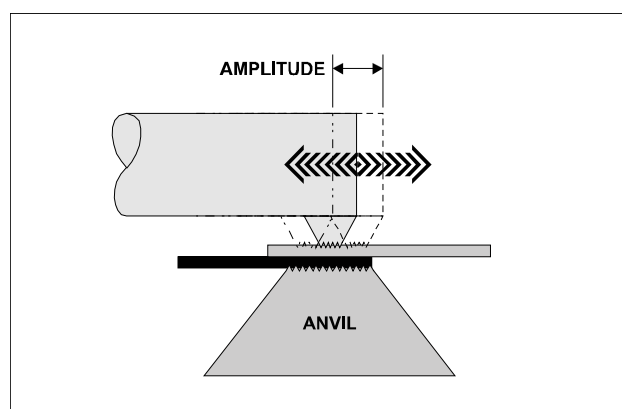
Figure 2.6 Pressure Variable with Increased Time



2.4.7 Amplitude

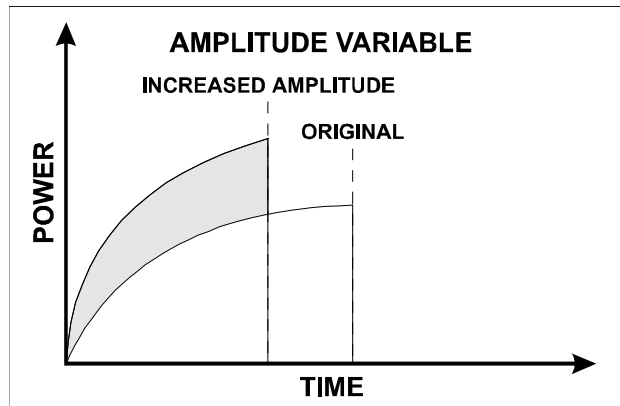
An ultrasonic tool is a resonant acoustical device. The term Amplitude is used to describe the amount of longitudinal expansion and contraction that the tooling endures as it vibrates ([Figure 2.7](#)). The amplitude correlates to the scrubbing action at the weld interface. This scrubbing action combined with pressure is what advances the weld by a diffusing or mixing of the base materials.

Figure 2.7 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 2.8](#)):

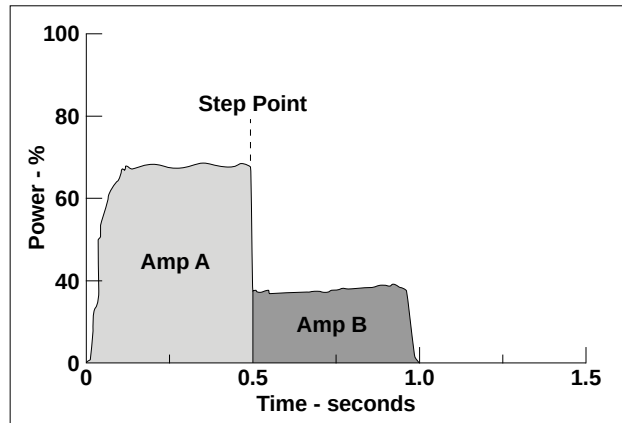
Figure 2.8 Amplitude's Influence on Weld Power and Time



2.4.8 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 2.9](#) 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 2.9 Amplitude Stepping Profile

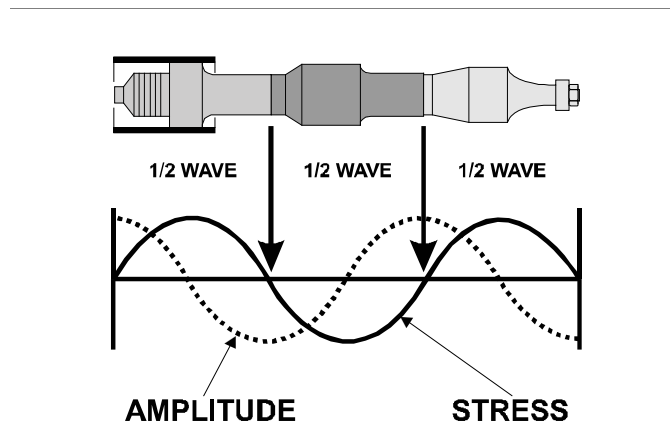


2.4.9 Resonant Frequency

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 2.10](#)). 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 2.10 Harmonic Resonance on Ultrasonic Tooling.



2.4.10 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.

2.4.11 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.

2.4.12 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.

2.5 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.

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.

Controller: 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.

Gathering Block: A specially designed mechanical device used to sweep across the face of the Tip to collect the wire strands, and to form the width of the compression chamber.

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.

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

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.

Width Encoder: A device utilized to monitor the position of the Gathering Block.

Chapter 3: Shipping and Handling

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3.2 Receiving - - - - - 3-3

3.3 Unpacking- - - - - 3-4

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3.1 Shipping and Handling



The Touchscreen Controller'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 Touchscreen Controller 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 Touchscreen Controller:

Table 3.1 *Environmental Requirements*

Environment	Range
Storage / Shipping Temperature	-13°F to +131°F (-25°C to +55°C)
Humidity	30% to 95%* non condensing

*Above 40°C the humidity drops to 90%

3.2 Receiving

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



The Actuator and the Touchscreen Controller 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 Touchscreen Controller when it is delivered, take the following steps:

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).



The Actuator and the Touchscreen Controller are heavy. Handling, unpacking, and installation might require assistance or the use of a lifting device.

3.3 Unpacking

The Touchscreen is fully assembled. It is shipped in a sturdy cardboard box. Some additional items are shipped in the box with the Controller.

When unpacking the Controller, take the following steps:

Step	Action
1	Unpack the Touchscreen Controller as soon as it arrives. Save the packing material.
2	Inspect the unit for signs of damage.
3	Remove the cover of the Touchscreen Controller (see Section 6.1.3, "Parts Replacement") to check if any components became loose during shipping.
4	Store or ship the Touchscreen Controller only within a temperature range of -13°F to +131°F (-25°C to +55°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 [Chapter 1, "Safety and Support"](#), [Section 1.5, "Returning Equipment for Repair."](#), of this manual, for appropriate procedure.

Chapter 4: Technical Specifications

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4.1 Environmental Requirements

The Touchscreen Controller has the following Environmental Requirements:

Table 4.1 *Environmental Requirements*

Environmental Concern	Controller/Power Supply
Ambient Operating Temperature	+41°F to +122°F (+5°C to +50°C)
Storage / Shipping Temperature	-13°F to +131°F (-25°C to +55°C*)
Humidity	30% to 95%**non condensing
Operating Altitude	1000 m (3280 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 Touchscreen 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%
40 kHz / 800W	200-230 V, 50/60 Hz, Single Phase
20 kHz / 3300W	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*

For 20 kHz Models	3300 W 200V - 230V	21 Amp Max. @ 200V / 20 Amp fuse
	4000 W 200V - 230V	25 Amp Max. @ 200V / 25Amp fuse
For 40 kHz Models	800 W 200V - 230V	5 Amp Max. @ 200V / 8 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).

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Before attempting to operate the controller, make sure you have reviewed the entire manual and have an understanding of safety procedures. Check that connections between the controller and actuator are as shown in the Hookup Diagram provided in Special Information Instruction Set. The power button on the front of the system may then be used to turn the system on.



High voltage might be present in the Branson Touchscreen Controller (Touchscreen). When setting up and operating the welding system, observe the potential hazards listed below.

- Do not operate the Touchscreen with the cover removed.
- To prevent the possibility of electric shock, always plug the Touchscreen Controller 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 Touchscreen and/or Welder.
- Do not touch Ultrasonic Horn during or immediately following the welding cycle. Vibrations and heat can burn skin.
- When operating the controller keep clear of the actuator moving parts.
- If power is removed from the system while the controller is on, it will be necessary to press the power button to its off position and then once again to its on position in order to restore power to the system.

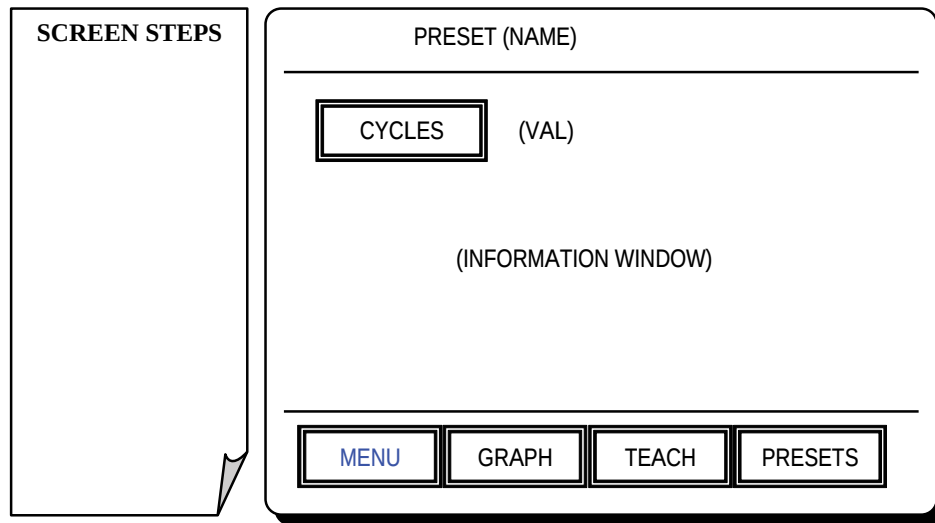
Interactive user screens supply a means of function selection and data entry for setting up the controller. The following pages provide illustrations, function descriptions and screen navigation instructions.

In the event of a system fault or an improper keyed entry, the controller will provide an instructional prompt screen in order to remedy the condition.

Controller User Screen Hierarchy:

A drawing included in the Special information Instruction Set provides an overview of the controller user screens and functions shown in tree structure. It serves as a useful tool for navigating the command structure of the controller.

5.1 Run Screen



NOTICE

A image similar to the above will accompany the controller instructions in this section. The image on the right side resembles the controller touchscreen display. The left sidebar shows the screen steps required to arrive at the current display. If you are viewing the manual on a computer you may click on the blue links which will emulate many of the touchscreen operations.

Run Screen:

This is the Run Screen. When you turn on your Controller it will start at this screen. Navigating from this menu will allow setup and configuration of the unit for your application.

Press one of the following options for this screen:

MENU

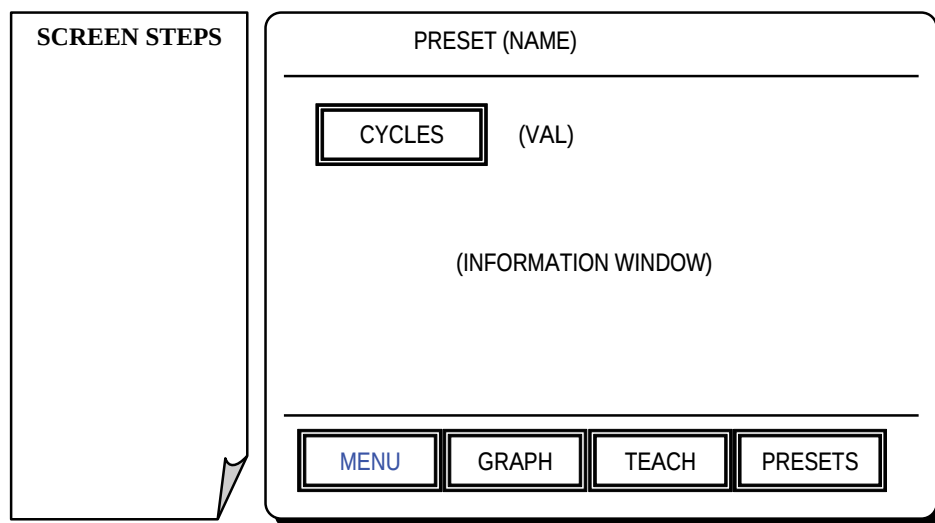
To go to the Menu Options which allows access to the settings and features of the controller. See [Section 5.2, "Menu Options Screen."](#)

GRAPH/ DATA TOGGLE

To alternately display:

Power/ time graph of previous weld.

Current weld settings and feedback from previous weld.



TEACH TOGGLE

To accept teach samples when **TEACH** is shown highlighted. Used in standard mode the **PRESET** button will be replaced by an **ACCEPT** button which is pressed to add the previous weld data to the sample set. For more on Teach Mode see [Section 5.22, "Teach Mode Setup Screen."](#)

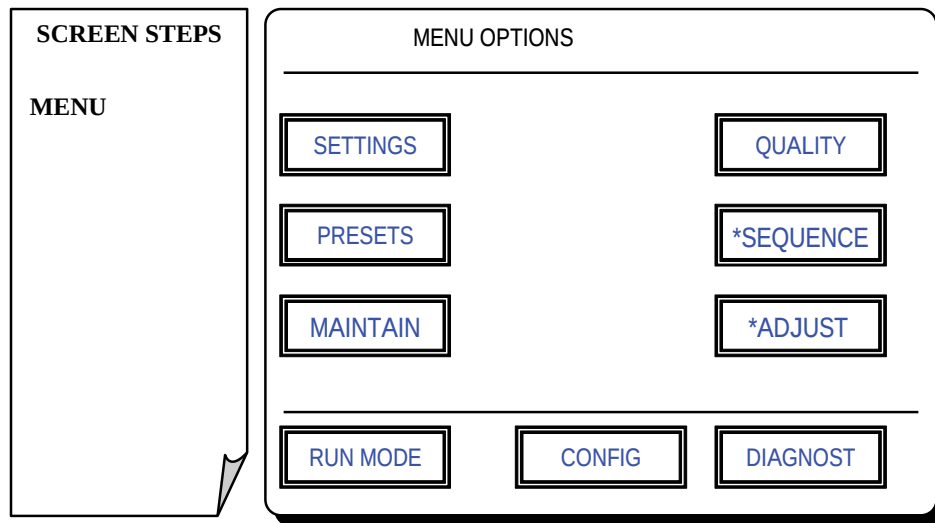
PRESETS

To retrieve a preset or save over an existing one stored in the controller preset library. For more on Presets see [Section 5.6, "Preset Menu Screen."](#)

CYCLES

To reset the continuous cycle counter provided for user reference.

5.2 Menu Options Screen



Menu Options Screen:

This screen allows access to the features of the controller. Features are divided in to related groups. Access to Configuration and Diagnostics are protected by a user changeable password. The password is initially set to 2677, the last four digits of Branson Metal Welding's phone number.

Press one of the following options for this screen:

SETTINGS

To change individual weld parameters which are the basic elements required to make a weld. See [Section 5.3, "Weld Settings Screen."](#)

PRESETS

To name, save and recall specific weld parameter settings which may be stored in the controller's non volatile memory. See [Section 5.6, "Preset Menu Screen."](#)

MAINTAIN

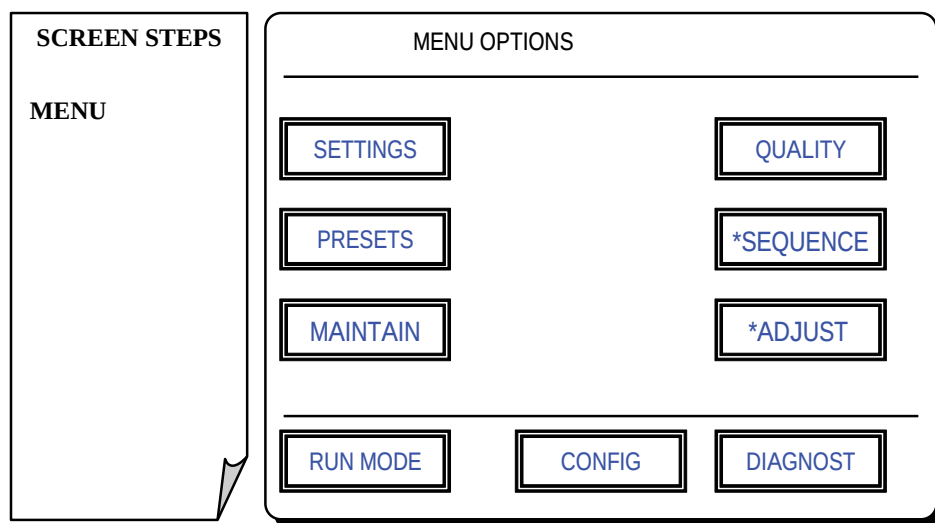
To allow adjustment and on demand control of the various motion devices in the weld actuator. Also allows access to maintenance counters which monitor tool life and printer functions. See [Section 5.9, "Maintenance Menu Screen."](#)

QUALITY

To allow setting min and max parameters for weld time, power, preheight and height. See [Section 5.14, "Weld Limits Screen."](#)

SEQUENCE ¹

To name, save and recall sequences which may be stored in the controller's non volatile memory. A sequence is a series of grouped presets which are to be executed in a particular quantity and order. See [Section 5.15, "Sequence Menu Screen."](#)



ADJUST ²

To set weld height adjustment based on the measurements taken from the previous weld. See [Section 5.19, "Height Adjustment Screen."](#)

CONFIGURATION

To access configuration features of the controller. These include units and language selection as well as various other operational settings. See [Section 5.20, "System Configuration Screen."](#)

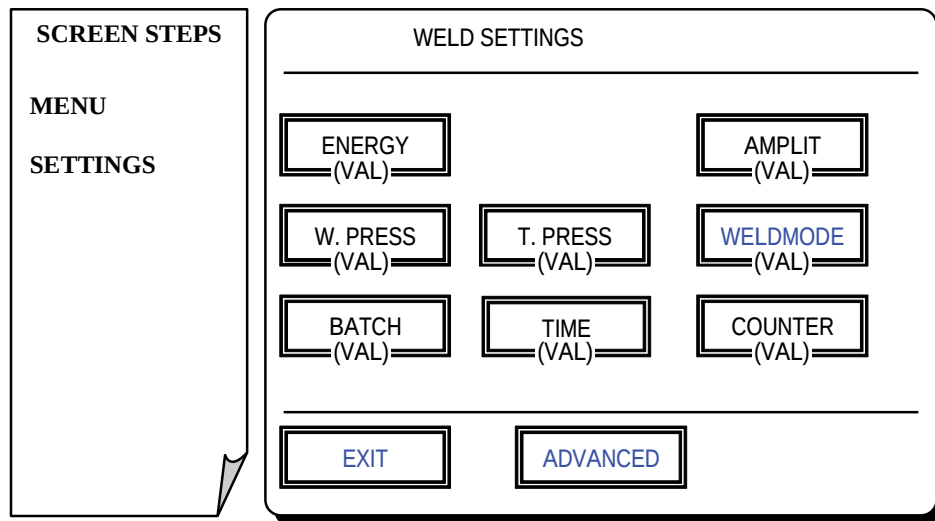
DIAGNOSTIC

To make changes at the operating system level. These include initialization, serial port configuration and touch panel calibration. See [Section 5.30, "Diagnostic Screen."](#)

RUN MODE

To return to Run Mode. See [Section 5.1, "Run Screen."](#)

5.3 Weld Settings Screen



Weld Settings Screen:

From this screen you may change individual weld parameters which are the basic elements required to make a weld.

Press one of the following options for this screen:

ENERGY

To change the amount of energy (joules) delivered for each weld. See [Section 5.33, "Typical Keypad Entry Screen."](#)

WELD PRESSURE

To change the clamping pressure delivered by the actuator while the weld is taking place. See [Section 5.33, "Typical Keypad Entry Screen."](#)

BATCH

To set a batch count quantity which will display from the Run Screen in data mode. See [Section 5.33, "Typical Keypad Entry Screen."](#)

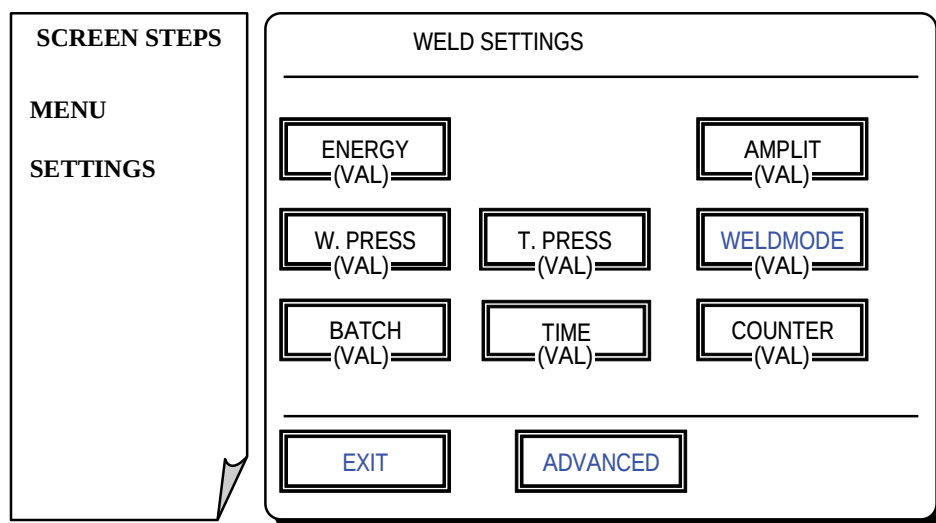
TRIGGER PRESSURE

To change the pressure used to engage the knurl pattern into the component parts prior to initiation of ultrasonic energy. See [Section 5.33, "Typical Keypad Entry Screen."](#)

TIME

To change the time duration of ultrasonic energy applied for each weld cycle. See [Section 5.33, "Typical Keypad Entry Screen."](#)

Available only when Weld Mode is set to Time. See [Section 5.4, "Weld Mode Screen."](#)



AMPLITUDE

To change amplitude which is measured in microns. If an amplitude stepping mode has been selected on the Weld Mode screen, you will be able to enter Amp-A, Amp-B, and a Step Point. Amplitude is the displacement of mechanical motion of the horn. See [Section 5.33, "Typical Keypad Entry Screen."](#)

WELDMODE

To select the determining criteria for cut off of the ultrasonic energy. See [Section 5.4, "Weld Mode Screen."](#)

COUNTER

To reset the batch counter.

ADVANCED

To enter selections pertaining to afterburst, squeeze and hold time. See [Section 5.5, "Advanced Weld Settings Screen."](#)

EXIT

To return to Menu Options. See [Section 5.2, "Menu Options Screen."](#)

5.4 Weld Mode Screen

SCREEN STEPS

MENU

SETTINGS

WELDMODE

WELD MODE : (VAL)

Weld mode: (VAL)

ENERGY TIME *HEIGHT *ENER/HG

EXIT STEP

Weld Mode Screen:

From this screen the weld mode may be selected. The weld mode dictates which weld setting variable will serve as the cutoff limit for the delivery of ultrasonic energy during each weld cycle.

Press one of the following options for this screen:

ENERGY

To weld in energy mode. The system delivers ultrasonic energy until a predetermined amount of energy (joules) is dissipated.

TIME

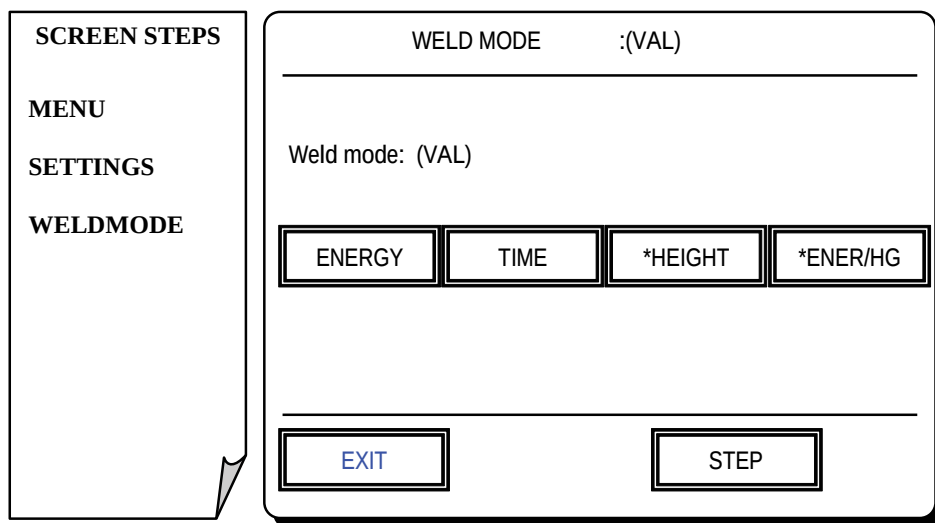
To weld in time mode. The system delivers ultrasonic energy for a predetermined amount of time (sec).

HEIGHT ²

To weld in height mode. The system delivers ultrasonic energy until the tooling reaches a predetermined height (mm).

ENERGY W/ HEIGHT COMPENSATION ²

To weld in energy with height compensation mode. The system first delivers the predetermined amount of energy. If after the energy is delivered the welded part size does not fall within the height (mm) window, the system will deliver as required up to 300% more energy in order to achieve a mid window weld height.



STEP

To select the amplitude stepping mode. For information on entering the start amplitude, the step amplitude, and a stepping point see "Amplitude " under [Section 5.3, "Weld Settings Screen."](#)
For information on Amplitude Stepping, see [Section 2.4.8, "Amplitude Stepping."](#)

EXIT

To return to Weld Settings. See [Section 5.3, "Weld Settings Screen."](#)

5.5 Advanced Weld Settings Screen

SCREEN STEPS

MENU

SETTINGS

ADVANCED

ADVANCED WELD SETTINGS

AB TIME (VAL)

PREBURST (VAL)

AB DELAY (VAL)

HOLD (VAL)

SQZ TIME (VAL)

EXIT

Advanced Weld Settings:

This screen allows access to the advanced options features defined below. These values will normally reflect the default settings made in Configuration mode. Values set from this screen will only effect the pre-set currently in use.

Press one of the following options for this screen:

AFTERBURST TIME

To change the amount of time (sec) of a short burst of ultrasonic energy that begins after the ultrasonic welding cycle. See [Section 5.33, "Typical Keypad Entry Screen."](#)

AFTERBURST DELAY

To change the amount of time (sec) between the completion of the ultrasonic weld cycle and the start of the afterburst. See [Section 5.33, "Typical Keypad Entry Screen."](#)

SQUEEZE TIME

To change the amount of time (sec) between when the horn engages the components(s) and when the delivery of ultrasonic energy occurs. See [Section 5.33, "Typical Keypad Entry Screen."](#)

PREBURST

To change the amount of time (sec) of a short 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. See [Section 5.33, "Typical Keypad Entry Screen."](#)

The diagram illustrates the 'Advanced Weld Settings' screen. On the left is a vertical menu titled 'SCREEN STEPS' containing 'MENU', 'SETTINGS', and 'ADVANCED'. The 'ADVANCED' option is highlighted. On the right is the 'ADVANCED WELD SETTINGS' screen, which contains several input fields labeled 'AB TIME', 'AB DELAY', 'SQZ TIME', 'PREBURST', and 'HOLD', each followed by '(VAL)'. An 'EXIT' button is located at the bottom of the settings screen.

SCREEN STEPS	
MENU	
SETTINGS	
ADVANCED	

ADVANCED WELD SETTINGS	
AB TIME	(VAL)
PREBURST	(VAL)
AB DELAY	(VAL)
HOLD	(VAL)
SQZ TIME	(VAL)
EXIT	

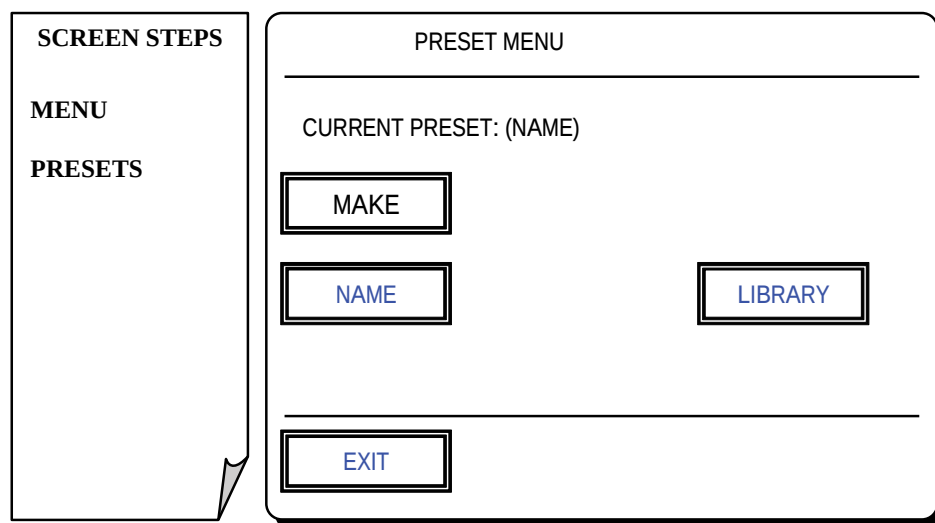
HOLD

To change the amount of time (sec) the components remain held under weld pressure after the delivery of ultrasonic energy. See [Section 5.33, "Typical Keypad Entry Screen."](#)

EXIT

To return to Weld Settings. See [Section 5.3, "Weld Settings Screen."](#)

5.6 Preset Menu Screen



Presets Menu Screen:

The controller allows for the storage of weld settings. The stored information is known as a preset. When a name is created and saved in the library, presets may then be saved under that name.

Press one of the following options for this screen:

MAKE NEW

To clear the current preset name in use. Advanced settings will default to those set under Configuration.

NAME

To create or edit a Preset Name. See [Section 5.7, "Preset Name Screen."](#)

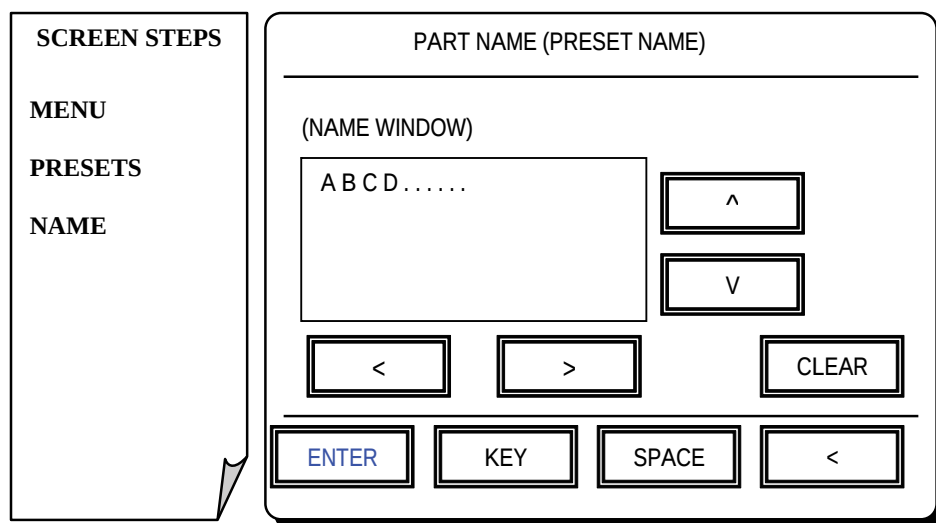
LIBRARY

To save a preset by name for later recall. See [Section 5.8, "Preset Library Screen."](#)

EXIT

To return to Menu Options. See [Section 5.2, "Menu Options Screen."](#)

5.7 Preset Name Screen



Preset Name Screen:

Names are created from this screen. The reason for creating a name is to associate it with particular group of weld settings and then store it in the controller library. A preset name may contain up to 20 characters.

Press one of the following options for this screen:

UP, DOWN, LEFT or RIGHT ARROWS

To navigate cursor over the desired character in the selection box.

KEY

To add the character in the name window.

SPACE

To add spaces in name window.

ARROW (lower right hand of screen)

To backspace one character.

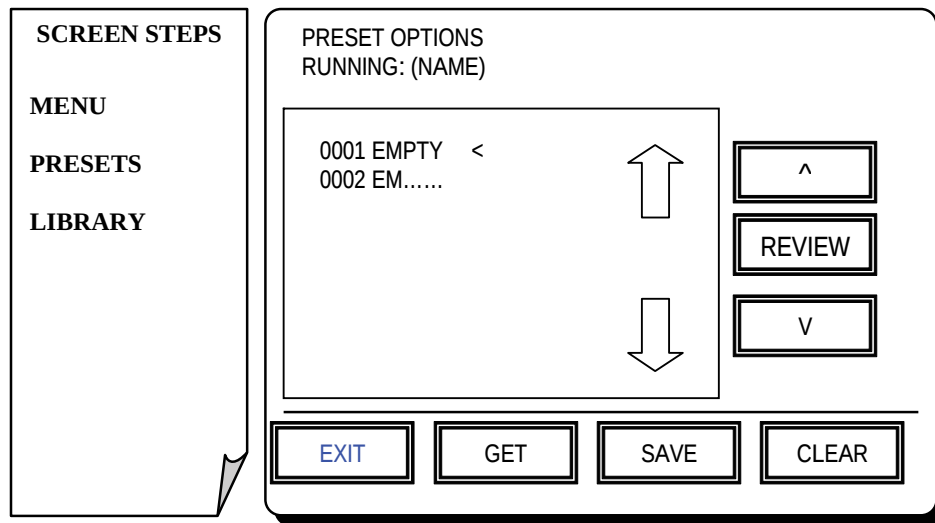
CLEAR

To erase all characters in the name window.

ENTER To return to Preset Menu when you are satisfied with the name you have created. See [Section 5.6, "Preset Menu Screen."](#)

NOTE: the name will not be saved until it is stored in the library. See [Section 5.8, "Preset Library Screen."](#)

5.8 Preset Library Screen



Preset Library Screen:

When presets have been named and configured they must be stored in the library memory in order to retrieve them at a later date. Previously stored presets are also retrieved from this screen. The storage registers are shown mid screen starting with the number 0001 EMPTY. The preset that has been created or is in use is shown at the top of the screen. The library may store up to 1000 presets.

Press one of the following options for this screen:

UP or DOWN ARROWS

(Inside the storage register display window) To scan the library a page at a time.

UP or DOWN ARROWS

(Outside the storage register display window) To position the selection cursor next to the storage register you wish to fill, edit or retrieve from.

REVIEW

To view the weld settings associated with the register you have selected.

GET

To retrieve the preset into current memory.

SAVE

To retain the preset information in a selected register.

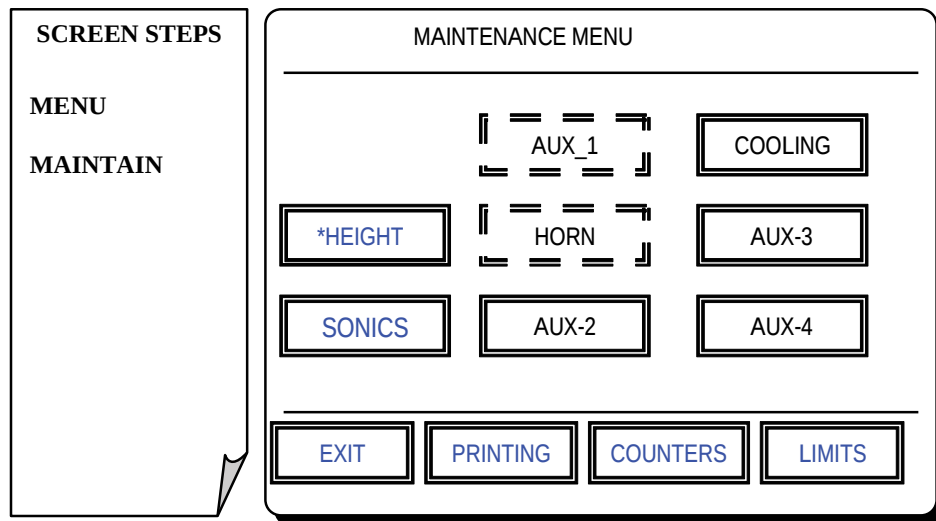
CLEAR

To erase information stored in a register.

EXIT

To return to the Preset Menu. See [Section 5.6, "Preset Menu Screen."](#)

5.9 Maintenance Menu Screen



Maintenance Menu Screen:

The maintenance screen allows adjustment and on demand control of motion devices that are used in the weld actuator. This screen also allows access to printer functions, maintenance counters and limit settings.

The level 2 password must be entered to access this menu. Default password is 2677.

Press one of the following options for this screen:

HEIGHT ²

To calibrate the horn to anvil clearance. See [Section 5.10, "Height Calibration Screen."](#)

SONICS

To allow on demand control of ultrasonic weld energy and calibrate amplitude. See [Section 5.11, "Sonic Generator Screen."](#)

AUX_1 / GATHER

To toggle auxiliary actuator used on special systems (Ultraweld 20, Ultraweld 40, MTS 20, and ST 40).
To toggle the gather between open and closed positions (Gun 40 and MTS 20).

HORN / ANVIL

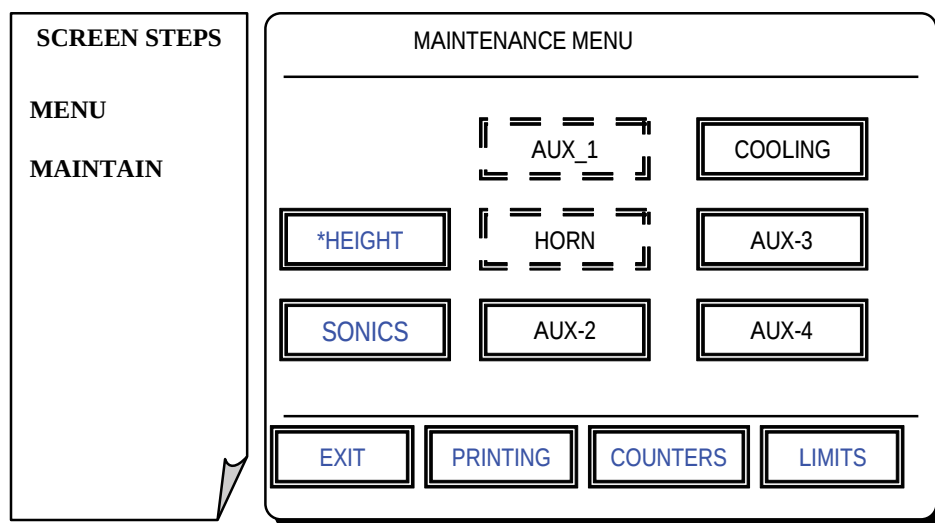
To toggle the horn between up and down positions. (Ultraweld 20, Ultraweld 40, and ST 40).
To toggle the anvil between up and down positions (Gun 40 and MTS 20).

AUX_2, AUX_3, AUX_4

To toggle auxiliary actuator used on special systems.

COOLING

To toggle the cooling air control solenoid on and off.



PRINTING

To initialize and set printer variables. See [Section 5.12, "Printing Screen."](#)

COUNTERS

To set individual maintenance counters for critical parts on the actuator. See [Section 5.13, "Maintenance Counters and Limits Screen."](#)

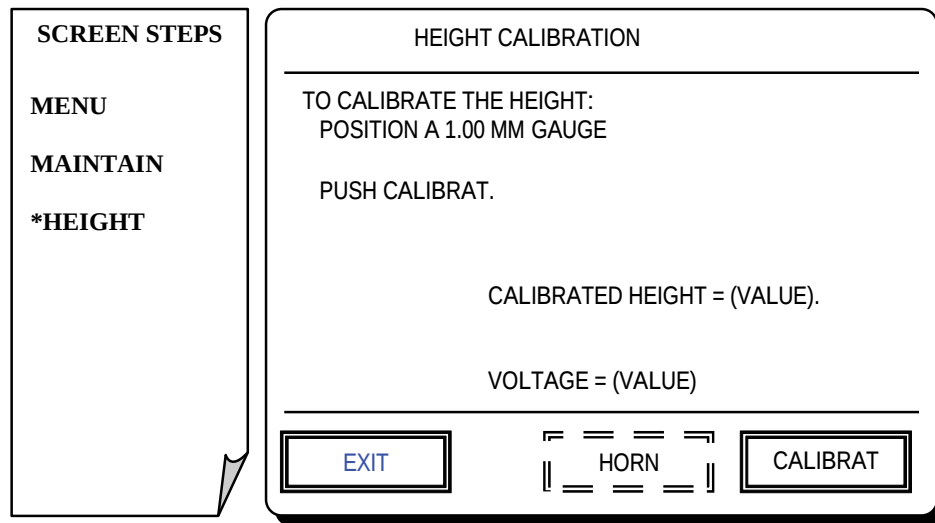
LIMITS

To set individual maintenance limits for critical parts on the actuator. See [Section 5.13, "Maintenance Counters and Limits Screen."](#)

EXIT

To return to Menu Options. See [Section 5.2, "Menu Options Screen."](#)

5.10 Height Calibration Screen



Height Calibration Screen: [2](#)

This screen is for height (horn to anvil) calibration.

The instructions on the screen explain the procedure for calibrating.

Press one of the following options for this screen:

HORN / ANVIL

To open and close horn against anvil.

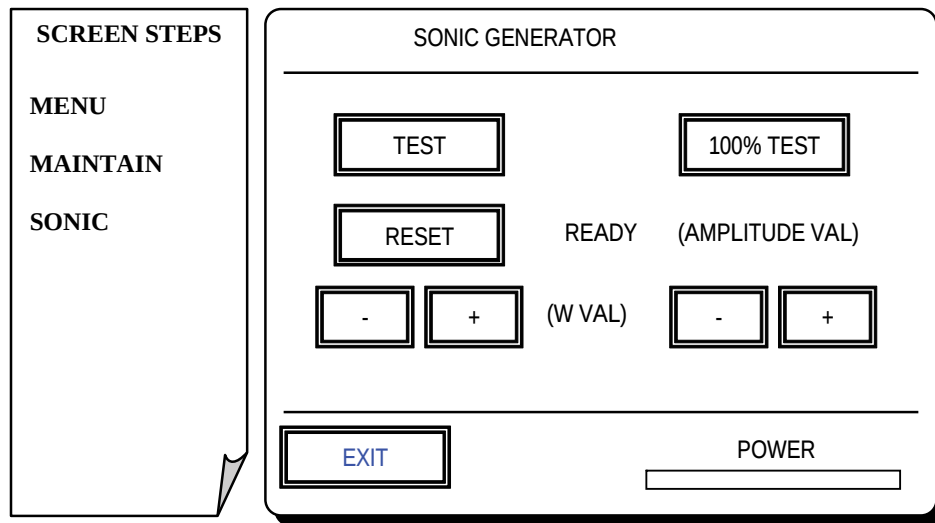
CALIBRATE

To calibrate height

EXIT

To return to Maintenance Menu. See [Section 5.9, "Maintenance Menu Screen."](#)

5.11 Sonic Generator Screen



Sonic Generator Screen:

This screen allows on demand control of ultrasonic weld energy and 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 100% test button is held and gage reading is viewed.

The gage reading $\times 2$ = total amplitude, this is the value to be entered for the amplitude value when calibrating.

Press one of the following options for this screen:

TEST

To fire ultrasonic energy at the current amplitude setting.

RESET

To reset the controller if a weld overload should occur.

PLUS or MINUS (W)

Is set by Branson for a given actuator and is not changed. Generally the setting for 20 kHz actuators is 3300 W and the setting for 40 kHz actuators is 800W.

100% TEST

To fire ultrasonic energy at 100% amplitude. This is used when calibrating amplitude.

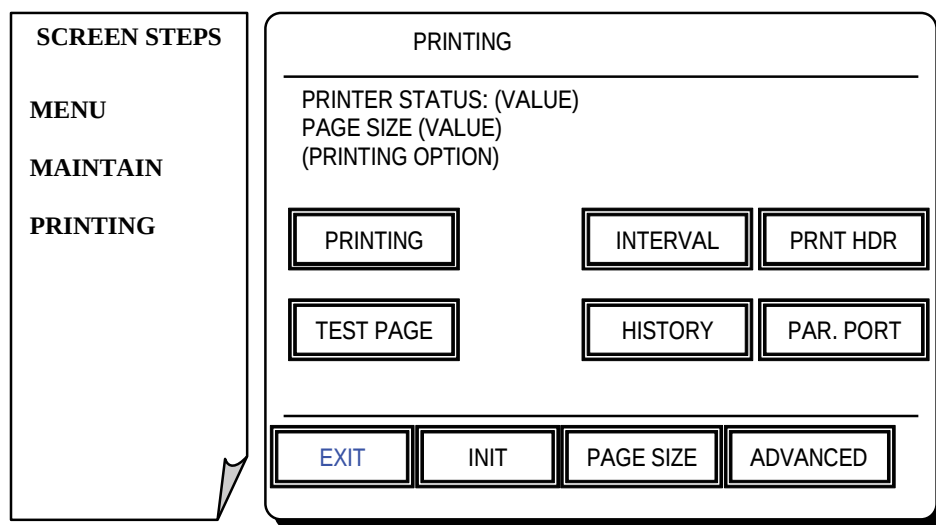
PLUS OR MINUS (MICRONS)

To set the amplitude value based on the indicator reading. See above.

EXIT

To return to Maintenance Menu. See [Section 5.9, "Maintenance Menu Screen."](#)

5.12 Printing Screen



Printing Screen:

This screen is for setup and test of an optional printer used for recording weld information. Most inkjet and laser printers are currently supported. Turn on the Touchscreen Controller before the printer or the printer may not function properly.

Press one of the following options for this screen:

PRINTING

To select the printing options which include:

Printing off

Print each weld (used also with interval feature below)

Graph each weld

Print on alarm

TEST PAGE

To print a test page

INTERVAL

To set an interval value (1 to 99) for printing weld data. See [Section 5.33, "Typical Keypad Entry Screen."](#)

HISTORY

To print weld history information for previous welds. Prints up to 128 welds.

SCREEN STEPS			
MENU			
MAINTAIN			
PRINTING			

PRINTING			
PRINTER STATUS: (VALUE) PAGE SIZE (VALUE) (PRINTING OPTION)			
PRINTING	INTERVAL	PRNT HDR	
TEST PAGE	HISTORY	PAR. PORT	
EXIT	INIT	PAGE SIZE	ADVANCED

PRNT HDR / NO HDR

To toggle header printing on and off.

PAR. PORT / SER. PORT

To toggle between parallel and serial printer communication.

INITIALIZE

To initialize a newly installed printer.

PAGE SIZE

To select page size option of 8.5 x11 or A4

ADVANCED

To set printer compatibility with Branson Metal Welding CPU boards. A toggle button will appear. Select version 3 or version 5 (current).

EXIT

To return to Maintenance Menu. See [Section 5.9, "Maintenance Menu Screen."](#)

5.13 Maintenance Counters and Limits Screen

SCREEN STEPS	MAINTENANCE (COUNTERS / LIMITS)			
MENU	(VALUE kJ)	(VALUE kJ)	(VALUE kJ)	(VALUE kJ)
MAINTAIN	TIP	ANVIL	TOOL-1	TOOL-2
COUNTERS OR LIMITS	(VALUE)	(VALUE)	(VALUE)	(VALUE)
	HORN	CONVERTR	GENERA	ACTUAT
	EXIT			

Maintenance Counters and Limits Screen:

Maintenance counters and limits are related. Both are set using the above screen. A maintenance counter will increment after each weld cycle up to the limit values set by the user. When a limit is exceeded the controller will issue a warning the next time it is turned on. Maintenance counters and limits may be reset at will. Any maintenance counter value which is less than its corresponding set limit value does not produce a warning on startup.

The top four values on the screen for tip, anvil, tool-1 and tool-2 are set in kilo joule units.

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

If a limit is set to 0 it will not yield a warning regardless of the maintenance count.

Press one of the following options for this screen:

ANY BUTTON

That you wish to set counter or limit values for. See [Section 5.33, "Typical Keypad Entry Screen."](#)

EXIT

To return to Maintenance Menu. See [Section 5.9, "Maintenance Menu Screen."](#)

5.14 Weld Limits Screen

WELD LIMITS		
	MIN	MAX
TIME	(VALUE)	(VALUE)
POWER	(VALUE)	(VALUE)
PREHEIGHT	*(VALUE)	*(VALUE)
HEIGHT	*(VALUE)	*(VALUE)

EXIT

Weld Limits Screen:

Weld limits assure that certain weld settings fall within a min/max range. This operating window assures the user of consistency between welds. If values fall outside these limits an alarm is given.

Press one of the following options for this screen:

TIME MIN or MAX

To set the min/max time (sec) that ultrasonic energy may be applied to a weld. See [Section 5.33, "Typical Keypad Entry Screen."](#)

POWER MIN or MAX

To set the min/max power (watts) which may be applied to a weld. See [Section 5.33, "Typical Keypad Entry Screen."](#)

PREHEIGHT MIN or MAX ²

To set the min/max preheight (mm). This is a pre sonic inspection reading from the height encoder prior to weld. See [Section 5.33, "Typical Keypad Entry Screen."](#)

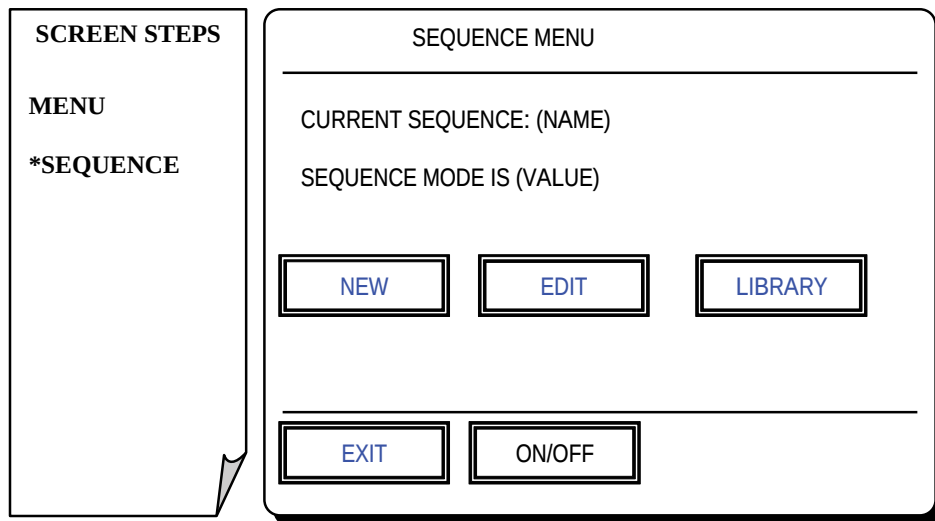
HEIGHT MIN or MAX ²

To set the min/max height (mm). This is a post sonic inspection reading from the height encoder after welding. See [Section 5.33, "Typical Keypad Entry Screen."](#)

EXIT

To return to Menu Options. See [Section 5.2, "Menu Options Screen."](#)

5.15 Sequence Menu Screen



Sequence Menu Screen: [1](#)

A sequence is a series of grouped presets which are to be executed in a particular quantity and order. Sequences are constructed using existing presets which have been previously stored in the preset library. When the combination of presets and their desired cycle quantities have been constructed they may be saved into the sequence library for future recall.

Press one of the following options for this screen:

NEW

To create a new sequence name. See [Section 5.16, "Sequence Name and Edit Screen."](#)

EDIT

To edit an existing sequence name. See [Section 5.16, "Sequence Name and Edit Screen."](#)

LIBRARY

To access the sequence library. See [Section 5.18, "Sequence Library Screen."](#)

ON/OFF

To toggle sequence mode on and off.

EXIT

To return to Menu Options. See [Section 5.2, "Menu Options Screen."](#)

5.16 Sequence Name and Edit Screen

The diagram illustrates the 'SEQUENCE (VALUE)' screen. On the left, a vertical box labeled 'SCREEN STEPS' contains the following text: 'MENU', '*SEQUENCE', and '*NEW OR EDIT'. The main screen area is titled 'SEQUENCE (VALUE)' and contains a sub-header '(SEQUENCE NAME BEING ENTERED)'. Below this is a text input field showing 'A B C D'. To the right of the input field are two buttons: '^' (up arrow) and 'V' (down arrow). Below the input field are three buttons: '<' (left arrow), '>' (right arrow), and 'CLEAR'. At the bottom of the screen are four buttons: 'ENTER' (highlighted in blue), 'KEY', 'SPACE', and '<' (left arrow).

Sequence Name & Edit Screen: [1](#)

Sequence names are created and edited from this screen. Once the name is created the user may choose the presets which make up the sequence. Up to 50 sequences may be stored.

Press one of the following options for this screen:

UP, DOWN, LEFT or RIGHT ARROWS

To navigate cursor over the desired character in the selection box.

KEY

To add the character in the name window.

SPACE

To add spaces in name window.

ARROW (lower right hand of screen)

To backspace one character.

CLEAR

To erase all characters in the name window.

ENTER

When satisfied with the sequence name. The Sequence Steps screen will appear and presets used in the sequence may be selected. See [Section 5.17, "Sequence Steps Screen."](#)

5.17 Sequence Steps Screen

Sequence Steps Screen: [1](#)

A sequence consists of a series of presets, each of which is executed a designated number of times. This screen allows selection of presets and assignment of quantities.

Press one of the following options for this screen:

UP or DOWN ARROWS

(Inside the storage register display window) To scan sequence steps a page at a time.

UP or DOWN ARROWS

(Outside the storage register display window) To position the selection cursor next to the storage register you wish to fill, edit or retrieve from.

ADD

To add a preset to the sequence. A screen will appear which allows you to select a preset from the preset library.

DELETE

To delete the selected preset from the sequence.

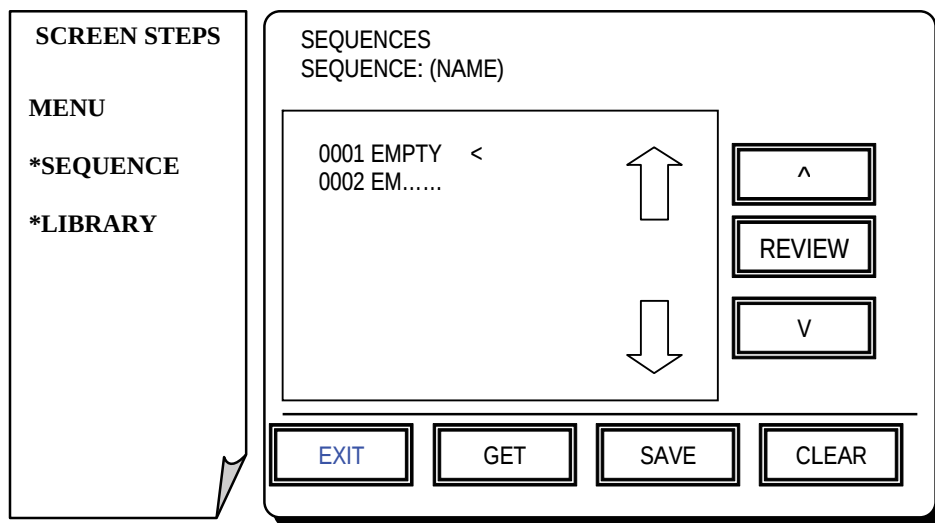
QUANTITY

To specify the number of times to execute the selected preset in the sequence (250 times maximum).

EXIT

When satisfied with the sequence steps. If the sequence is new or has been changed, an option to try the sequence (return to the Run Screen, see [Section 5.1, "Run Screen"](#)) or exit (return to Sequence Menu, see [Section 5.15, "Sequence Menu Screen"](#)) is given.

5.18 Sequence Library Screen



Sequence Library Screen: [1](#)

When a sequence has been named and configured it must be stored in the library memory in order to retrieve it at a later date. The sequence that has been created or is in use is shown at the top of the screen.

Press one of the following options for this screen:

UP or DOWN ARROWS

(Inside the storage register display window) To scan the sequence library a page at a time.

UP or DOWN ARROWS

(Outside the storage register display window) To position the selection cursor next to the sequence storage register you wish to fill, edit or retrieve from.

REVIEW

To view the presets associated with the selected sequence.

GET

To retrieve the sequence into current memory.

SAVE

To retain the sequence information in a selected register.

CLEAR

To clear a stored sequence from its storage register.

EXIT

To return to the Sequence Menu. See [Section 5.15, "Sequence Menu Screen."](#)

5.19 Height Adjustment Screen

SCREEN STEPS	HEIGHT ADJUSTMENT
MENU	ADJUST HEIGHT TO THE ACTUAL MEASUREMENTS OF THE LAST WELD.
*ADJUST	PART NAME: (VAL)
	RESULT MEASURED
	HEIGHT (VAL) (VAL) ADJUST
	EXIT

Height Adjustment Screen: [2](#)

The actual measured value of a weld may vary from the height setting in the controller. The height setting does not include added height of component material which extrudes into the knurl patterns of the tooling. This screen allows an offset compensation to be entered so that the resultant weld matches the set value for height. The result value is set in the controller and represents the desired actual dimension of the weld. The measured value is taken from an actual sample and input using the adjust button. The controller will then create a compensation factor to produce the desired weld size.

Press one of the following options for this screen:

ADJUST

To enter a measured height (mm) value. See [Section 5.33, "Typical Keypad Entry Screen."](#)

EXIT

To return to Menu Options. See [Section 5.2, "Menu Options Screen."](#)

5.20 System Configuration Screen

The screenshot shows the 'SYSTEM CONFIGURATION' screen. On the left, a sidebar titled 'SCREEN STEPS' contains the options 'MENU', 'CONFIGURE', and '(PASSWORD)'. The main screen area contains several buttons and labels: 'COOLING' (with a value field '----- (VAL)'), 'TEACH' (with 'SET UP' next to it), 'PHt-SRCH' (with 'OFF' next to it), 'PRESSURE' (with '(VAL)' next to it), 'LANGUAGE', 'EXIT', 'ADVANCED', and 'NEXT'.

System Configuration Screen:

Features in this screen are global and remain unchanged regardless of other weld setting or presets that are currently in use. The exception is Advanced settings which serve as defaults and may be overridden on an individual preset basis. See [Section 5.5, "Advanced Weld Settings Screen."](#) for reference.

Press one of the following options for this screen:

COOLING

To set timers that control post weld cooling air. See [Section 5.21, "Cooling Screen."](#)

TEACH

To set mode and criteria for the teach function. The teach feature is a method for establishing weld limits. See [Section 5.22, "Teach Mode Setup Screen."](#)

PHt-SRCH

To toggle Pre-Height Search function on and off.

ADVANCED (Default)

To set default values for advanced features. The screen and features are identical to those in Advanced Weld Settings. See [Section 5.5, "Advanced Weld Settings Screen."](#) for reference.

PRESSURE

To toggle pressure units between PSI and bar

LANGUAGE

To select a controller display language in English, Spanish, Portuguese, French or German.

NEXT

To view more configuration features. See [Section 5.23, "System Configuration Screen \(Next\)."](#)

EXIT

To return to Menu Options. See [Section 5.2, "Menu Options Screen."](#)

5.21 Cooling Screen

The diagram illustrates the Cooling Screen interface. On the left is a vertical sidebar titled "SCREEN STEPS" containing the following menu items: MENU, CONFIGURE, (PASSWORD), and COOLING. The COOLING item is highlighted with a pointer. The main area on the right is titled "WIDTH AND HEIGHT ADJUSTMENT" and contains two input fields: "DURATION (VAL)" and "DELAY (VAL)". At the bottom of this main area is an "EXIT" button.

Cooling Screen:

This screen allows access to timer settings which control post weld cooling air for tooling.

Press one of the following options for this screen:

DURATION

To change the length of time the cooling air is on after each weld cycle. See [Section 5.33, "Typical Keypad Entry Screen."](#)

DELAY

To change the delay period after weld and before cooling air is turned on. See [Section 5.33, "Typical Keypad Entry Screen."](#)

EXIT

To return to System Configuration. See [Section 5.20, "System Configuration Screen."](#)

5.22 Teach Mode Setup Screen

SCREEN STEPS	TEACH MODE SETUP			
MENU	TIME	POWER	PREHEIGHT	HEIGHT
CONFIGURE	(VAL)% MAX	(VAL)% MAX	*(VAL)% MAX	*(VAL)% MAX
(PASSWORD)	(VAL)% MIN	(VAL)% MIN	*(VAL)% MIN	*(VAL)% MIN
TEACH	SAMPLES:		(QTY)	(MODE)
	EXIT	TEACH	^	v

Teach Mode Setup Screen:

The teach feature may be used to establish weld limits (see [Section 5.14, "Weld Limits Screen"](#) for reference) from a series of sample welds made by the user. Upon successful completion of the sample set the controller does the following:

- Calculates average values for Time, Power, Preheight and Height variables.
- Factors the allowable min/max deviation percentages as entered in this screen.
- Uses the resultant values to create the weld limits.

There are two teach modes available as means to do sampling. The mode in use will be displayed at the top of this screen. These modes are as follows:

In the Standard Teach Mode the user may accept or reject each weld as part of the sample set. The button to accept the samples will appear to the right of the **TEACH** button on the Run Screen. Sample sets of 1 to 50 may be used.

In the Auto Teach Mode the user may not reject samples. Instead, the first five welds form a basis using the averaged values for Time, Power, Preheight and Height. A plus or minus ten percent tolerance is added to these averages which are used to evaluate the acceptability of the remaining samples. If a remaining sample falls outside of this range it is rejected and an alarm occurs. A teach session may encounter up to three errors in the first 15 welds made after which the sampling must be started over. Once completed the preset must be saved. When the preset is recalled again the controller will use the saved quality windows for the first five welds, after the first five welds are made, the controller will recalculate the windows to plus or minus ten percent and follow the same routine as stated above for the auto teach mode. Auto Teach mode will automatically reactivate when you change any of the weld parameters, quality windows or recall a new preset.

Once the teach mode sample size and variation criteria has been established, a sample run may be initiated by pressing the **TEACH** button on this screen or on the Run Screen.

SCREEN STEPS	TEACH MODE SETUP			
MENU	TIME	POWER	PREHEIGHT	HEIGHT
CONFIGURE	(VAL)% MAX	(VAL)% MAX	*(VAL)% MAX	*(VAL)% MAX
(PASSWORD)	(VAL)% MIN	(VAL)% MIN	*(VAL)% MIN	*(VAL)% MIN
TEACH	SAMPLES:		(QTY)	(MODE)
	EXIT	TEACH	^	v

Press one of the following options for this screen:

ANY MIN/MAX % VALUE

To select an allowable deviation to be applied to the sample average. Availability of Preheight and Height settings is actuator dependant. See endnote 2 ².

(MODE)

To toggle between Standard and Auto teach modes.

(QTY)

To enter a quantity for the sample set. The sample set may include up to fifty welds. In Auto mode the sample set has a fifteen weld minimum.

TEACH

To put the controller in teach mode.

EXIT

To return to System Configuration. See [Section 5.20, "System Configuration Screen."](#)

5.23 System Configuration Screen (Next)

The screenshot displays the 'SYSTEM CONFIGURATION' screen. On the left is a sidebar titled 'SCREEN STEPS' with a list: 'MENU', 'CONFIGURE', '(PASSWORD)', and 'NEXT'. The 'CONFIGURE' step is highlighted. The main area is titled 'SYSTEM CONFIGURATION' and contains several buttons: 'ACTUATOR (VAL)', 'ON ALARM (VAL)', 'PASSWOR', a dashed line input field, 'REWELD (VAL)', 'LOW AIR (VAL)', 'EXIT', and 'NEXT'.

System Configuration Screen (Next):

This screen allows access to other configuration settings.

Press one of the following options for this screen:

ACTUATOR

To configure the controller for the correct actuator. See [Section 5.24, "Actuator Selection Screen."](#)

PASSWORD

To create passwords that control operator access to the touchscreen commands. See [Section 5.25, "Password Changing Screen."](#)

REWELD

To toggle the reweld mode on/off. This provides an option when a weld limit alarm (see [Section 5.14, "Weld Limits Screen"](#) for reference) occurs. If the reweld setting is on the user may choose to reweld the same part again. Weld limits are turned off for one cycle while the reweld takes place.

ON ALARM

To toggle between lock or allow a weld to continue when an alarm condition exists. When set to lock the actuator will not release the part until a level 1 password is entered.

LOW AIR

To set options and threshold for low line air pressure. See [Section 5.27, "System Configuration Screen \(Next, Next\)."](#)

The diagram illustrates the 'SYSTEM CONFIGURATION' screen layout. On the left is a vertical sidebar titled 'SCREEN STEPS' containing the following menu items: 'MENU', 'CONFIGURE', '(PASSWORD)', and 'NEXT'. The main area is titled 'SYSTEM CONFIGURATION' and contains several interactive elements arranged in two columns. The left column includes buttons for 'ACTUATOR', 'PASSWOR', and 'REWELD', each followed by '(VAL)'. The right column includes buttons for 'ON ALARM' (followed by '(VAL)'), a password input field represented by a box with ten dashes '-----', and 'LOW AIR' (followed by '(VAL)'). At the bottom of the main area are two buttons: 'EXIT' on the left and 'NEXT' on the right.

NEXT

To view more configuration features. See [Section 5.27, "System Configuration Screen \(Next, Next\)."](#)

EXIT to return to System Configuration.

See [Section 5.20, "System Configuration Screen."](#)

5.24 Actuator Selection Screen

SCREEN STEPS

MENU

CONFIGURE

(PASSWORD)

NEXT

ACTUATOR

SELECT ACTUATOR

Current Actuator: (VALUE)

Current Option: (VALUE)

ULTRA 20 MWX100 ST 40/30 GUN 40

MTS 20

EXIT MORE OPTIONS

Actuator Selection Screen:

This screen is used to match the controller firmware to its attached actuator type.

Press one of the following options for this screen:

ULTRA 20

To configure the controller for the Ultraweld L20 actuator.

MWX100

To configure the controller for the MWX100 actuator.

ST 40/30

To configure the controller for the ST 30/40 actuator (plastic tube sealing).

GUN 40

To configure the controller for Gun 40 actuator.

MTS 20

To configure the controller for the Ultraseal 20 actuator (metal tube sealing).

OPTIONS (Ultraweld L20, MWX100, and Ultraseal 20 Only)

To select available options:

Normal Mode / Double Hit Mode: To switch between normal mode and Double Hit mode (used for automation). Do not activate Double Hit Mode unless instructed by Branson. (Ultraweld L20 and MWX100 only.)

Use FootSwitch / Use StartHandle: Usset to select between using a foot switch or a start handle to begin the weld cycle. (Ultraseal 20 Only)

SCREEN STEPS

MENU

CONFIGURE
(PASSWORD)

NEXT

ACTUATOR

SELECT ACTUATOR

Current Actuator: (VALUE)
Current Option: (VALUE)

ULTRA 20 MWX100 ST 40/30 GUN 40

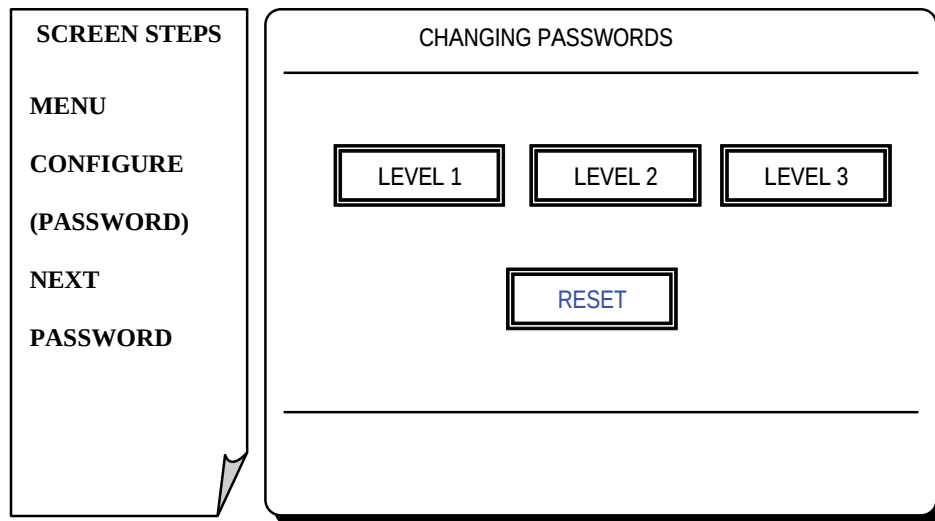
MTS 20

EXIT MORE OPTIONS

EXIT

To return to System Configuration. See [Section 5.23, "System Configuration Screen \(Next\)."](#)

5.25 Password Changing Screen



Password Changing Screen:

This screen is used to create passwords that control operator access to the touchscreen commands. Level 1 passwords restrict access to the following screens:

Settings	Quality
Sequence	Splices
Teach	Adjust

Level 2 passwords restrict access to the Configuration, Maintain and Diagnostic screens. In order to use a Level 1 password a Level 2 password must be set.

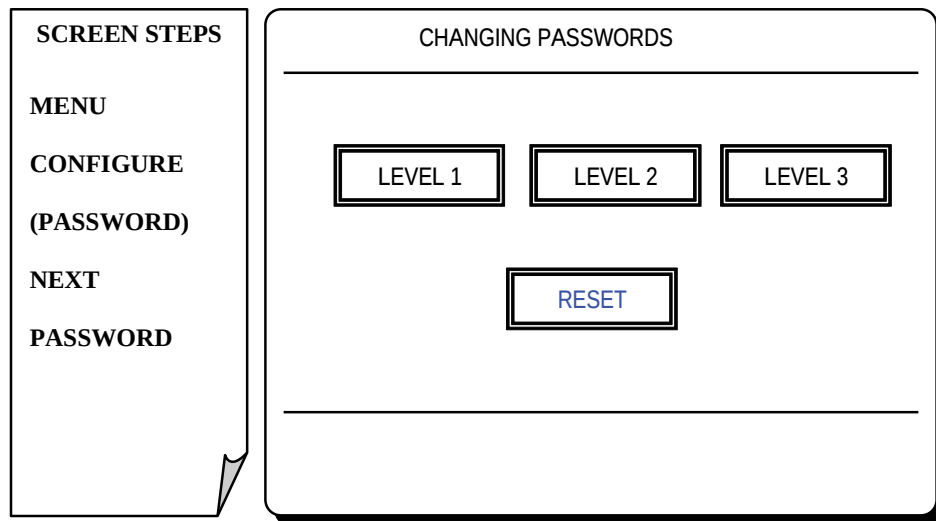
Level 3 passwords restrict access to the following screens:

Quality limits key pads	Make a new splice	Teach Button
Weld setting key pads		

A Level 1 Level 2 or Level 3 password which is set to "0" turns password protection off. The factory settings for the controller are "0" for Level 1,3 and "2677" for Level 2.

To change a password the user must first enter the current password. If password protection is off, enter "0" as the current password. A new password may then be entered.

A password may be up to 4 numbers Max.



Press one of the following options for this screen:

LEVEL 1

To change the Level 1 password setting.

LEVEL 2

To change the Level 2 password setting.

LEVEL 3

To change the Level 3 password setting.

RESET

To return to System Configuration. [Section 5.23, "System Configuration Screen \(Next\)."](#)

5.26 Low Air Alarm Screen

SCREEN STEPS

- MENU
- CONFIGURE (PASSWORD)
- NEXT
- LOW AIR

LOW AIR PRESSURE ALARM

DISABLED CONTINUE LOCK

PRESSURE (VAL)

PRESSURE

EXIT

Low Air Alarm Screen:

This screen is for setting low air line pressure alarm options.

Press one of the following options for this screen:

DISABLED

To disable low pressure alarm. Select this setting if the system is not equipped with a pressure switch.

CONTINUE

To finish weld after sensing low pressure.

LOCK

To not allow weld after sensing low air pressure.

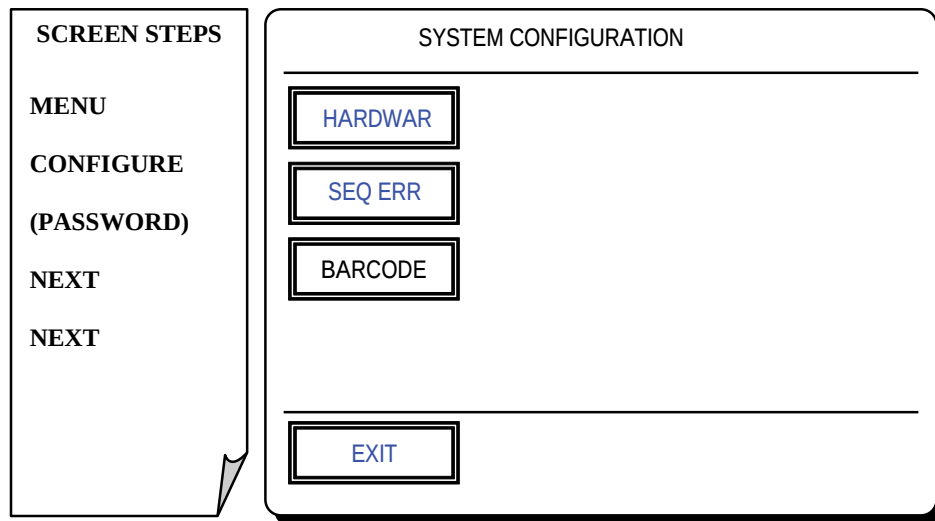
PRESSURE

To set the alarm threshold for low line pressure. See [Section 5.33, "Typical Keypad Entry Screen."](#)

EXIT

To return to System Configuration. See [Section 5.23, "System Configuration Screen \(Next\)."](#)

5.27 System Configuration Screen (Next, Next)



System Configuration Screen (Next, Next):

This screen allows access to other configuration settings.

Press one of the following options for this screen:

HARDWARE

To set information feedback devices. See [Section 5.28, "Transducer Configuration Screen."](#)

SEQUENCE ERROR

To set error handling options when running in Sequence mode. See [Section 5.29, "Sequence Error Screen."](#)

BARCODE

To enable/disable barcode functionality.

EXIT

To return to System Configuration. See [Section 5.23, "System Configuration Screen \(Next\)."](#)

5.28 Transducer Configuration Screen

SCREEN STEPS

- MENU
- CONFIGURE (PASSWORD)
- NEXT
- NEXT
- HARDWARE

TRANSDUCER CONFIGURATION

-----	(VAL)	SEEK	(VAL)
HGT ENC	(VAL)	WLD COOL	(VAL)
PR READ	(VAL)	FP ABORT	(VAL)

EXIT

Transducer Configuration Screen:

This screen allows control of information feedback devices on the actuator.

Press one of the following options for this screen:

HEIGHT ENCODER ¹

To toggle height encoder on/off

PRESSURE READING

To toggle pressure reading transducer on/off

SEEK

To toggle on/off seek function. This pulses ultrasonic energy to the stack prior to each weld in order to allow the system to tune to stack frequency.

WLD COOL

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

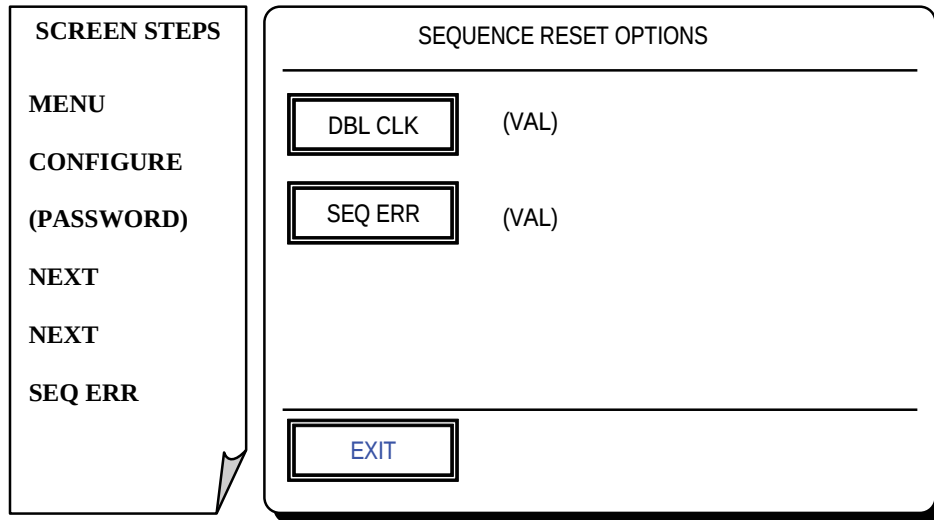
FP ABORT

When enabled, foot pedal must be maintained until sonic starts or the weld cycle will be aborted.

EXIT

To return to System Configuration. See [Section 5.27, "System Configuration Screen \(Next, Next\)."](#)

5.29 Sequence Error Screen



Sequence Error Screen:

When a weld error occurs while running in Sequence mode, options are available for when the system is reset. This screen allows for setting these options.

The double click functions are applicable only when the controller is equipped with a remote reset button.

Press one of the following options for this screen (Display will toggle between options):

DOUBLE CLICK (To Next)

To move to the next step in the sequence.

DOUBLE CLICK (Not Allowed)

Turns Double Click option off.

DOUBLE CLICK (Restart)

Restart – to restart sequence from step 1.

SEQUENCE ERROR

To toggle between sequence options which apply after a weld error is cleared.

Restart- to restart the sequence from step 1.

Reweld- to reweld the same step in the sequence.

EXIT

To return to System Configuration. See [Section 5.27, "System Configuration Screen \(Next, Next\)."](#)

5.30 Diagnostic Screen

SCREEN STEPS

MENU

DIAGNOSTIC

(PASSWORD)

☐ EXIT ☐ INIT ☐ SERIAL

PROGRAM RUNNING
Tick Count: (val)

Height: (val)
Width: (val)

☐ TOUCHPANEL ☐ CYCLES

TOTAL WELDS: (val)
Software Version: (val)

Diagnostic Screen:

This screen allows access to operating system settings and information.

Press one of the following options for this screen:

INITIALIZE

To reinitialize the controller for software upgrades or in the unlikely event of a system failure. An option of partial or full initialization will be presented. A partial initialization will save all presets and sequences stored in the controller library.

NOTICE

A full initialization will not save all presets and sequences stored in the controller library.

SERIAL

To set baud rate and test serial communications. See [Section 5.31, "Serial Port Diagnostic Screen."](#)

TOUCH PANEL

To go through a series of steps which recalibrate the touch panel. This is a factory set calibration that should not need adjustment.

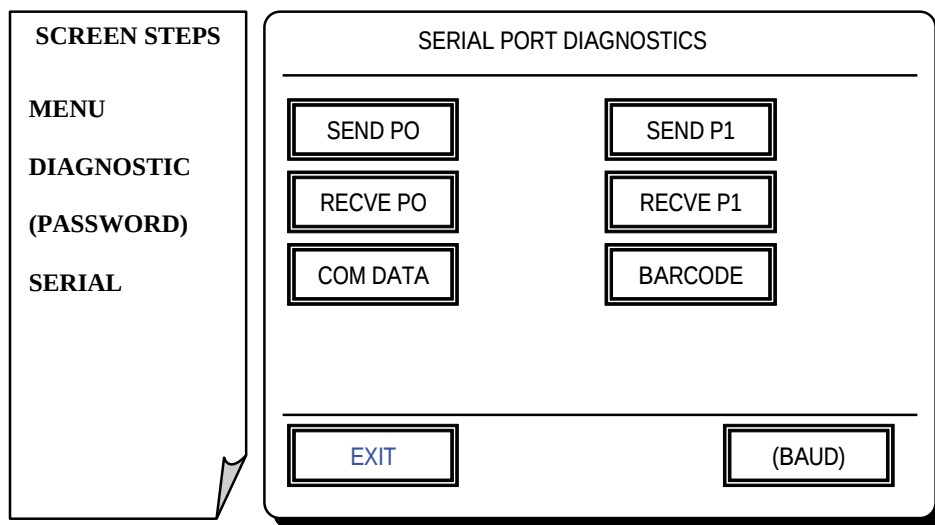
CYCLES

To set options for automatic actuator cycling used for testing. See [Section 5.32, "Cycles Screen."](#)

EXIT

To return to Run Mode. See [Section 5.1, "Run Screen."](#)

5.31 Serial Port Diagnostic Screen



Serial Port Diagnostics Screen:

This screen is to setup test and move data between two controllers or a controller and a PC. The button functions are described below. For precise instructions on how to save/ transfer preset and sequence information see [Section 5.35, "Saving/Transferring Preset and Sequence Information."](#)

Press one of the following options for this screen:

SEND PO

To send 10,000 "U" characters to Port 0 as test transmission

RECEIVE PO

Allows message typed on PC (hyperterminal) to be displayed on touchscreen.

COM DATA

Allows sending of stored Preset or Sequence information to Port 0.

SEND P1

To send 10,000 "U" characters to Port 1 as test transmission.

RECEIVE P1

Allows message typed on PC (hyperterminal) to be displayed on touchscreen.

BARCODE

To initialize Port 1 to receive barcode data.

BAUD

To set baud rate value for Port 0. (Port 1 baud is fixed at 9600)

EXIT

To return to Diagnostics. See [Section 5.30, "Diagnostic Screen."](#)

5.32 Cycles Screen

SCREEN STEPS

- MENU
- DIAGNOSTIC (PASSWORD)
- CYCLES**

CYCLES

CYCLES RUN

CONTINUE STOP

CYCLES LEFT: (VALUE)

EXIT

Cycles Screen:

This screen allows automatic cycling of the weld actuator for a designated number of cycles. This feature is used for test purposes.

Press one of the following options for this screen:

CYCLES

To set the number of cycles to be completed. See [Section 5.33, "Typical Keypad Entry Screen."](#)

CONTINUE

To continue the actuator cycling after initiating a stop command without resetting the counter.

RUN

To start actuator cycling.

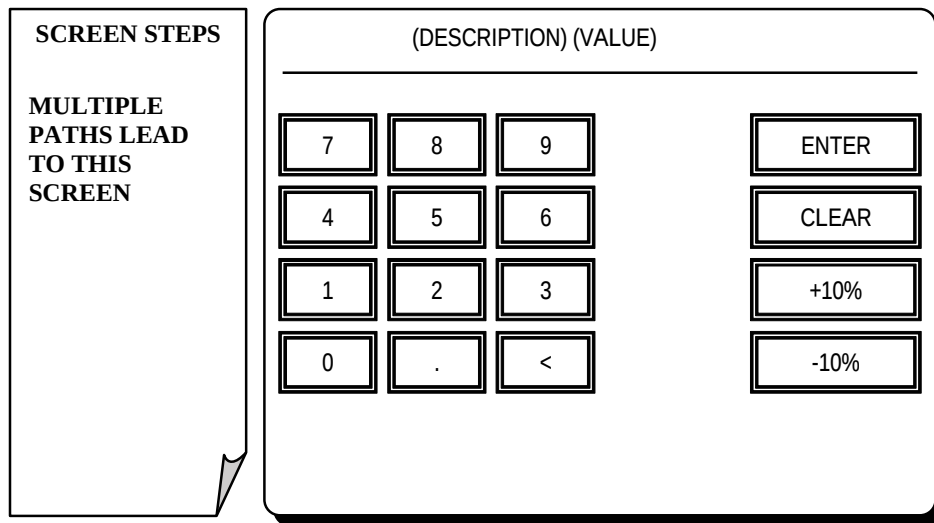
STOP

To stop actuator cycling

EXIT

To return to Diagnostics. See [Section 5.30, "Diagnostic Screen."](#)

5.33 Typical Keypad Entry Screen



Typical Keypad Entry Screen:

A number of touchscreen menu paths lead to a numerical entry keypad screen similar to that shown above. Generally the current variable and its value are displayed at the top of the screen.

Note that some screens do not contain the 10% keys.

Press one of the following options for this screen:

NUMERIC KEYPAD

To enter a new value.

+10% or -10%

To increment the current setting by plus or minus 10 percent.

CLEAR

To undo the value you entered.

CLEAR then ENTER

To return to settings and leave the previous value unchanged.

ENTER

To save the new value and return to previous screen.

5.34 Advanced Function Switch Select

Once you connect external controls to the power supply, you can set the following Advanced Functions using the Switch Select block:

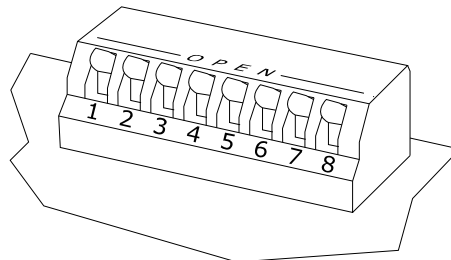
- Seek - Provides options for controlling, monitoring, and storing operating frequency.
- Amplitude control - Allows for varying amplitude (50% - 100%) via external controls or keeping the amplitude fixed.
- Select Start - Provides four starting ranges. Select start allows the power supply to ramp amplitude to accommodate different converter and load requirements.
- Memory - Stores horn frequency at end of each weld.

See [Figure 6.1](#) for switch location. Refer to [Table 5.1](#) for switch settings.

Table 5.1 Advanced Function Switch Select Table

Function	Options	Set Toggles...
Seek	Seek on power up - Checks horn frequency upon power up and stores it in memory.	1 – Closed = OFF (Default) 1 – Open = ON
	Auto Seek - Checks horn frequency once each minute, timed from the last activation of ultrasonics.	2 – Closed = OFF (Default) 2 – Open = ON
	Auto Seek Duration - Indicates the length of time the Auto Seek function is active.	3 – Closed = 100 ms 3 – Open = 500 ms (Default)
	Store at End of Weld - Updates horn frequency memory at the end of each weld.	4 – Closed = OFF 4 – Open = ON (Default)
Amplitude Control	Variable - Front panel adjustment of amplitude (50% to 100%) Note: Pin 6 must be Open or Amplitude Control will not work.	6 – Closed = Fixed at 100 % 6 – Open = Variable (Default)
Start	Short - Sets ramp time to 10 ms.	7 – Closed 8 – Closed
	Medium - Sets ramp time to 35 ms.	7 – Open 8 – Closed
	Standard - Sets ramp time to 80 ms.	7 – Closed (Default) 8 – Open (Default)
	Long - Sets ramp time to 105 ms.	7 – Open 8 – Open

Figure 5.1 Advanced Functions Dip Switch



5.35 Saving/Transferring Preset and Sequence Information

Equipment required:

- Standard IBM PC Null Modem cable.
- A computer running Windows®¹ HyperTerminal and a standard RS232 serial port. Other computers may be configured to work but will require additional instructions.
- A Branson TouchScreen Controller version 5.03.00 or later. It must be configured and ready to run.

Download Procedure:

- Connect the PC to the touchscreen controller (connection P105) with the Null Modem cable. Note the PC COM port because it will be required for setting HyperTerminal. Do not start the controller at this time.
- From the PC, start HyperTerminal (Usually in the Accessories program menu folder).
- Setup a HyperTerminal connection (File, New Connection). Use the default settings with the following changes:

Set Phone Number: Direct to Com 1 (or Com 2 as available)

In Configure set:

Bits per second	19200 (Default for TouchScreen)
Data bits	8
Parity	None
Stop bits	1
Flow control	None

In Settings set Emulation: VT52

- Save and connect with the new connection
- Turn on touchscreen controller. HyperTerminal view window should show:

```
UUIA1
:020000030900F2
:02000000C740f7
:0100000100FE
```

1. Windows is a registered trademark of Microsoft Corporation.

This is the touchscreen's sign on to an attached serial port. It is always sent when the control starts to tell any waiting device that the COM port is active. If you do not see this sign on or the characters are unusual check the settings. The baud rate may have been changed or if there is no display check the Null Modem cable and COM port assignment.

- From the touchscreen controller go to the Serial Port Diagnostics Screen. (Menu> Diagnostic > Password> Serial).
- Check the BAUD rate at the lower right corner of the screen. It must match the Bits per second used in HyperTerminal.
- From the PC HyperTerminal go to Transfer, Capture Text.
- It is recommended that the data be stored on a floppy disk in the A: drive. A file name a:\tsdata.txt or similar can be used. Use a .txt extension.
- From the touchscreen controller press COM DATA. When the next screen appears press PRE-SETS or SEQUENCE to upload the data to the PC HyperTerminal.
- When all data has been sent to the PC go back to Transfer, Capture Text and Stop. This will close the file with data stored.

Upload Procedure:

- The captured text file contains all the information required to return the data back to any waiting touchscreen controller. Assuming the HyperTerminal setup was saved, load that setup to start the system. If you have not saved the setup you can use the above steps to setup a new HyperTerminal session.
- **IMPORTANT:** Leave the controller at the RUN screen. From the PC, use the Send Text File (instead of Capture Text) to upload the file to the controller.

Controller to Controller:

The PC is required only to store the data. If desired, two touchscreen controllers can be attached via the Null Modem cable and the data sent directly from one controller to another. The BAUD rate must be identical, there is no other setup.

5.36 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 [Table 1.2. "Branson Key Contacts" on page 1-10](#) in [Section 1.5.3. "Contact Information."](#)

Endnotes:

- ¹ Not available on Ultrasplice 40 & ST 40 actuators.
- ² Available only on Ultraweld 20, Ultraweld 40, MTS 20, & ST 40 actuators equipped with a height encoder which is set to on.

Chapter 6: Maintenance

6.1 Preventive Maintenance - - - - - 6-2

6.1.1 Periodically Clean the Equipment - - - - - 6-2

6.1.2 Routine Component Replacement - - - - - 6-3

6.1.3 Parts Replacement - - - - - 6-3

6.2 Parts List - - - - - 6-4

Safety devices, especially covers, guards and ground cables should only be removed when it is absolutely essential for the completion of maintenance work. If safety devices were removed prior to starting maintenance work, be sure to re-install those devices after finishing the maintenance work. The following installation and maintenance operations must be performed prior to any disassembly of equipment:

WARNING

- All system components must be disconnected from the main electrical supply.
 - Remove the plug from the main electrical supply and secure it from being re-inserted accidentally.
 - Use LOTO (Lock Out Tag Out) lockable plug cover over line cord plug during any maintenance.
 - Disconnect the air hose from the main air supply.
 - Before you begin to disassemble any parts of the controller, ensure that it is turned off, and the main power is disconnected. Wait at least two minutes to allow capacitors to discharge.
 - High voltage is present in the power supply. Do not operate with the cover removed. High line voltages exist in the ultrasonic power supply 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.
-

6.1 Preventive Maintenance

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 Touchscreen Controller. 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 Touchscreen 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 detergent or a window glass commercial cleaner. Give a final wipe to the entire screen with the soft damp cloth. Under no circumstances should you use solvents or ammonia to clean the screen.

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

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.

6.1.3 Parts Replacement



If a particular module has failed, it should be replaced or repaired at an Branson Depot Facility.



The Branson Touchscreen Controller 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 Touchscreen.

The Touchscreen is designed for a long service life. In the event the system malfunctions, many of the internal components (Modules) are replaceable as a unit.

Power Supply Cover

The cover is held in place with seven screws, three on each side of the case and one on the rear. Lift the rear of the cover up to remove it. The cover must be in place when the system is operating due to fan-forced ventilation design.

Circuit Boards and Modules

Replaceable modules are shown in [Figure 6.1](#). Be sure to note ribbon cable and connector orientation prior to removing components for maintenance or replacement. The cooling fans use identical wiring harnesses, with one tying back the 'extra' lead length. Make note of any wiring paths if you are removing a module, before you disassemble. In some cases, there are several possible paths, but one preferred location. Be especially careful with harnesses and wires that go between the two portions of the case, as they can be pinched by the metal case if miss-routed.

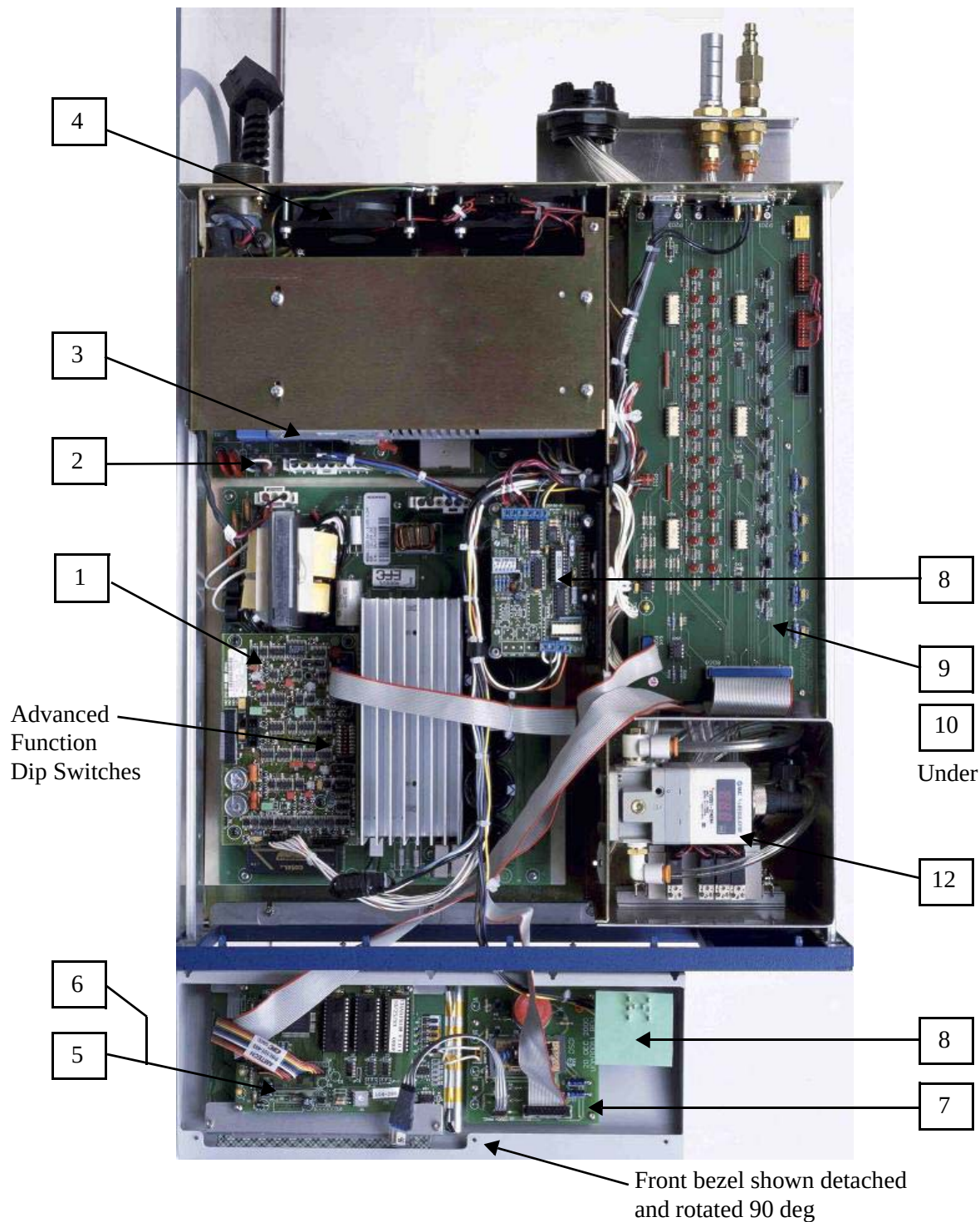
6.2 Parts List

This section provides the list of replacement parts.

Table 6.1 *Suggested spares*

Item	Description	Part Number
1	Ultrasonics Power Supply Module	100-244-043 (3300w) 159-244-069 (4000w)
2	Line Filter Module	100-242-613R (100-242-791R for 4KW)
3	DC Power Module	200-132-294R
4	Cooling Fans	100-126-015R
5	Touch Screen	200-220-028
6	LCD Display	200-220-027
7	Front Panel Board	100-242-665R
8	Power Switch	200-099-252R
9	Machine Controller Board	102-242-968R
10	CPU Board	102-242-633R
11	Motor Control Board (Splicer)	105-068B
12	Pneumatic Kit	See Special Info Instruction Set

Figure 6.1 Touchscreen Controller - Top view with cover removed



MACHINE TYPE	ULTRAWELD 40 TOOL KIT
ASSEMBLY No.	R3A00A68

PART NUMBER	PART NAME	QTY	COMMENTS
106-089A	SPANNER WRENCH, MODIFIED	1	
201-118-024	SPANNER WRENCH	1	
211-099	MOLYKOTE (GN PASTE) (TUBE)	1	
211-142	11/32" X 1/4" DRIVE SOCKET (FOR 40kHz TIP NUT)	1	
211-205	600 GRIT EMORY (SHEET)	1	
211-206	4-3/8" x 11" METAL FINISHING PAD	1	
211-250	3/8" TO 1/4" DRIVE SOCKET ADAPTER	1	
211-636	CANVAS BAG	1	
211-658	METRIC ALLEN HEX WRENCH SET (1.5mm-5mm)	1	
M1A50A42	0.0010" SHIM	4	
M1A50A45	1MM SPACER	1	
X3A50325	6MM SPACER	1	
211-079	Dial Indicator (use with Magnetic Base)	N/A	Optional Item Purchase Separately
211-127	3/8" Torque Wrench - 40kHz	N/A	Optional Item Purchase Separately
211-245	Magnetic Base (use with Dial Indicator)	N/A	Optional Item Purchase Separately

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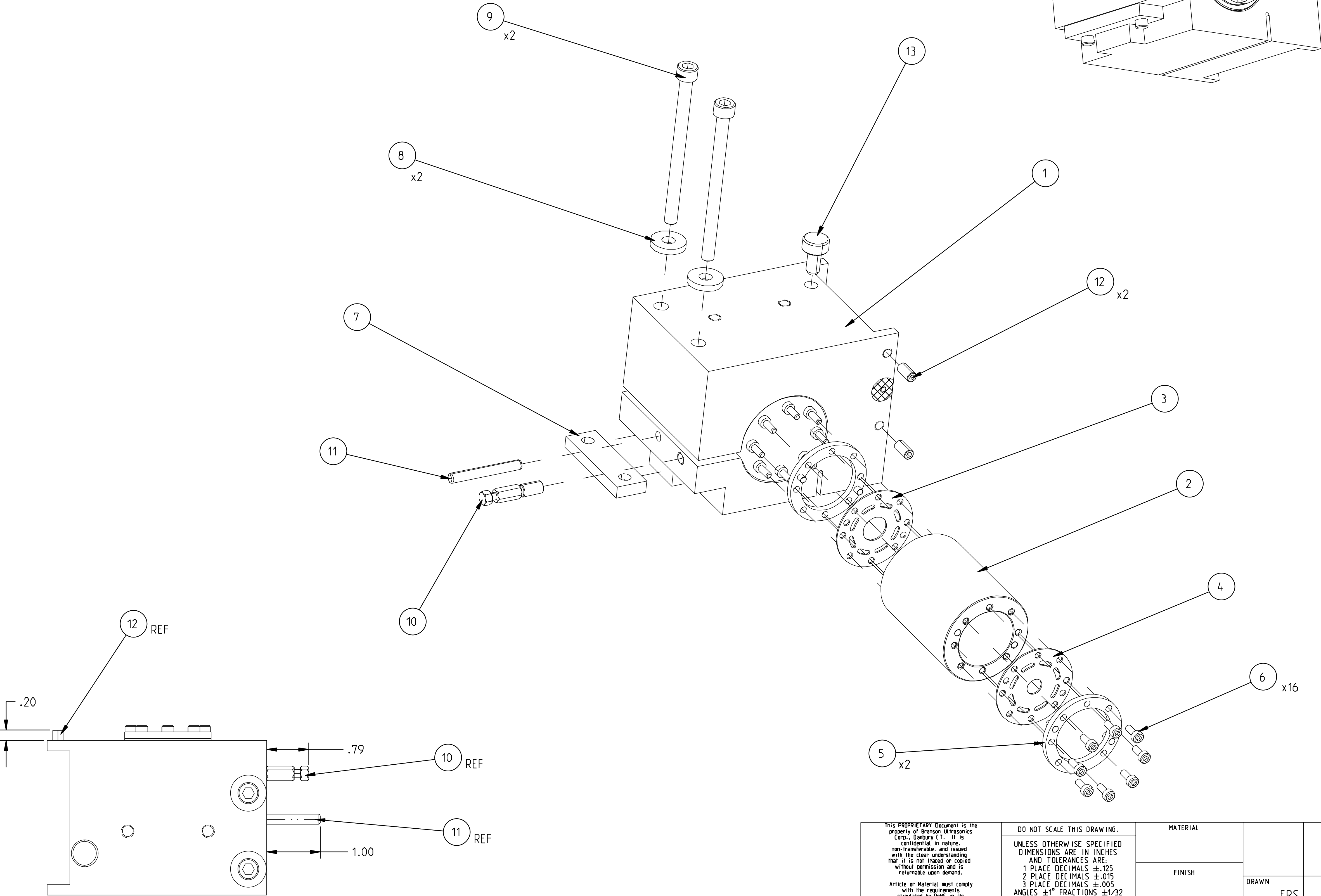
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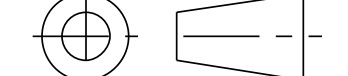
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REVISIONS				
REV.	DESCRIPTION	DATE	ECO/ECN	APPVL



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	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE: 1 PLACE DECIMALS ±.125 2 PLACE DECIMALS ±.015 3 PLACE DECIMALS ±.005 ANGLES ±1° FRACTIONS ±1/32		FINISH		DRAWN		TITLE				
			CNC TAPE NO.		ERS		7-09-09		ACTUATOR MWX 100 SPOT WELD		
					CHECKED		DAS		7-09-09		SCALE 1:1 SIZE D DWG.NO. 159-134-341 REV. 0
		THIRD ANGLE PROJ.		ENGR		DAS		7-09-09		REF. 1 REF. 2 SHEET 1 OF 4	
										SOFTWARE: PRO/ENGINEER File:159-134-341	

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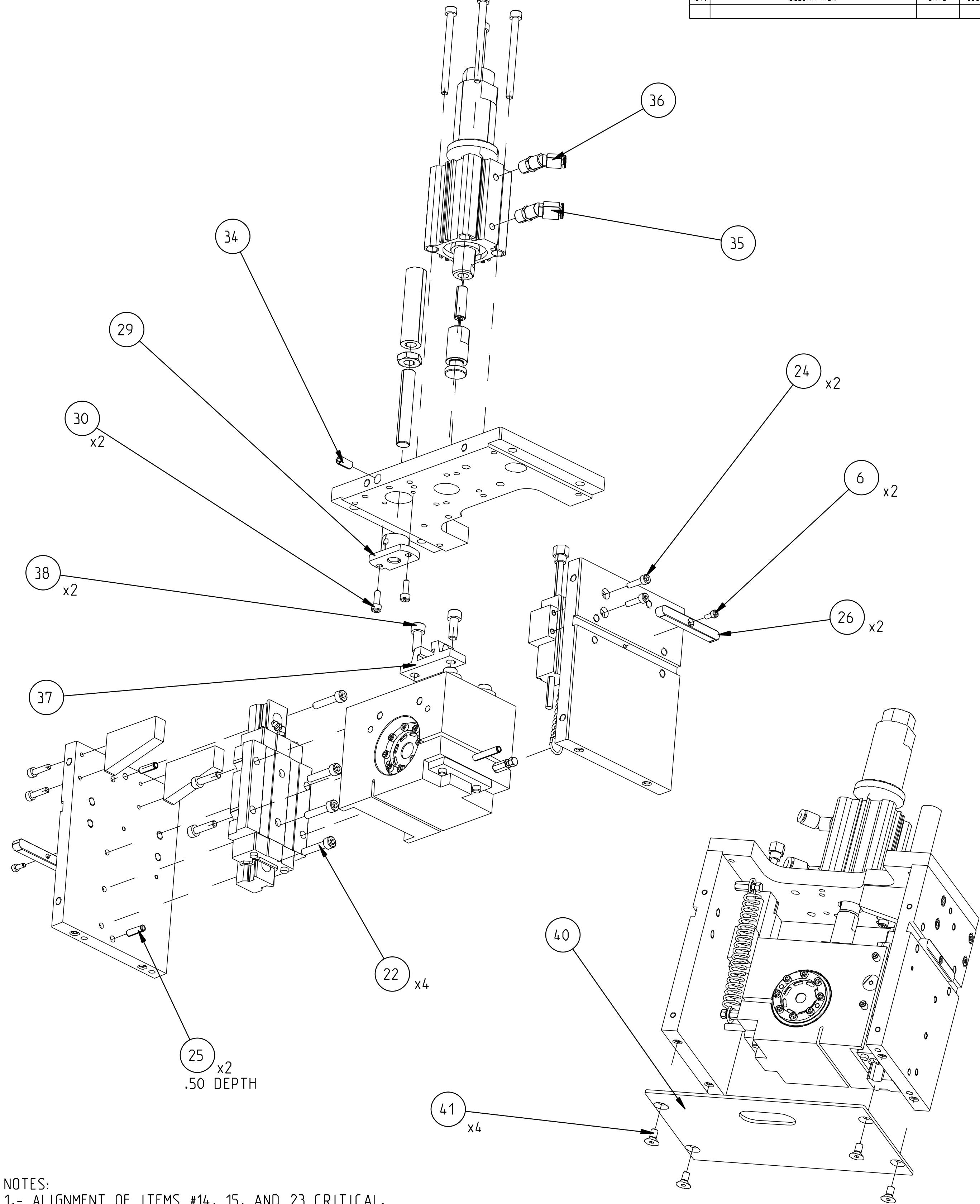
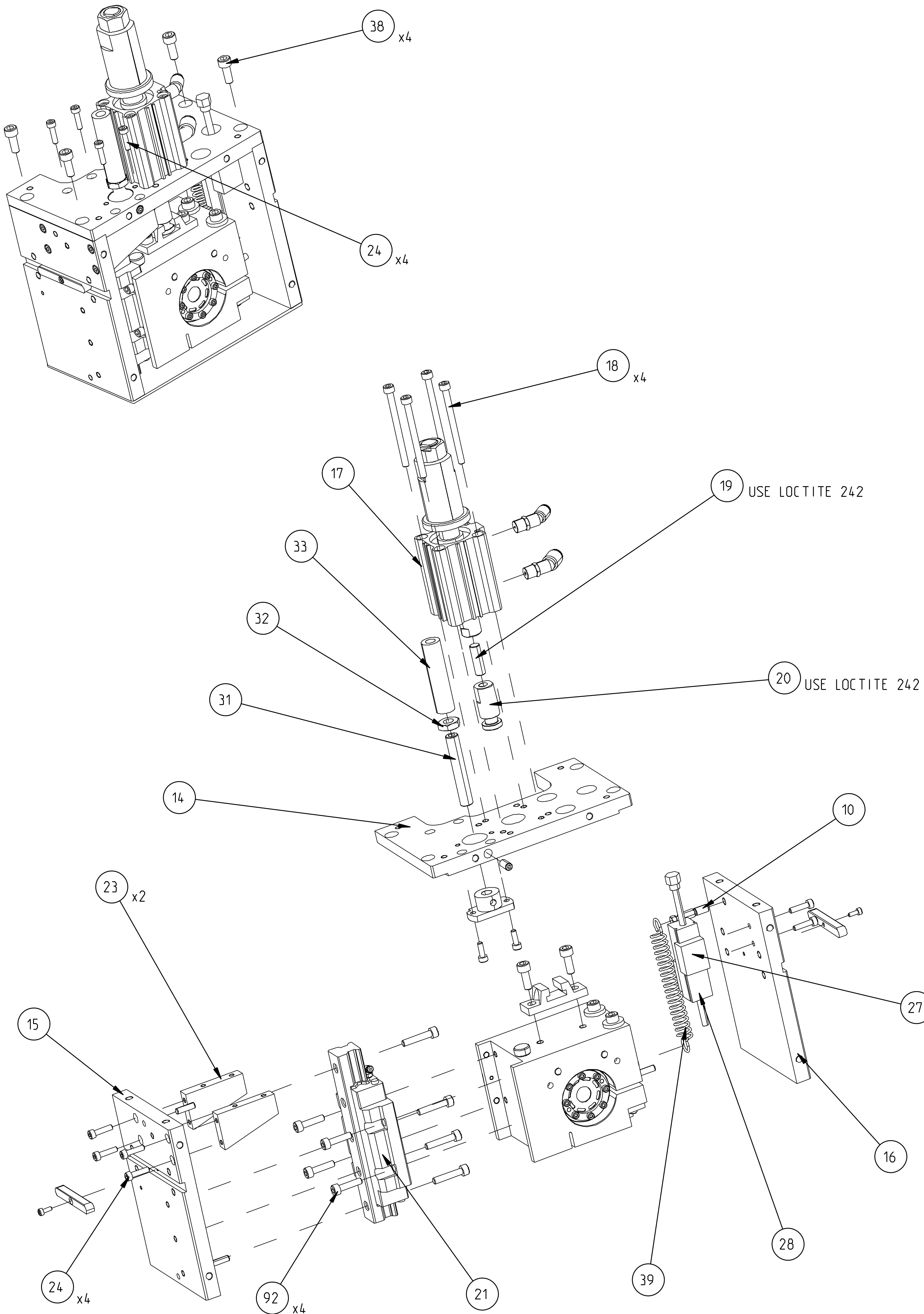
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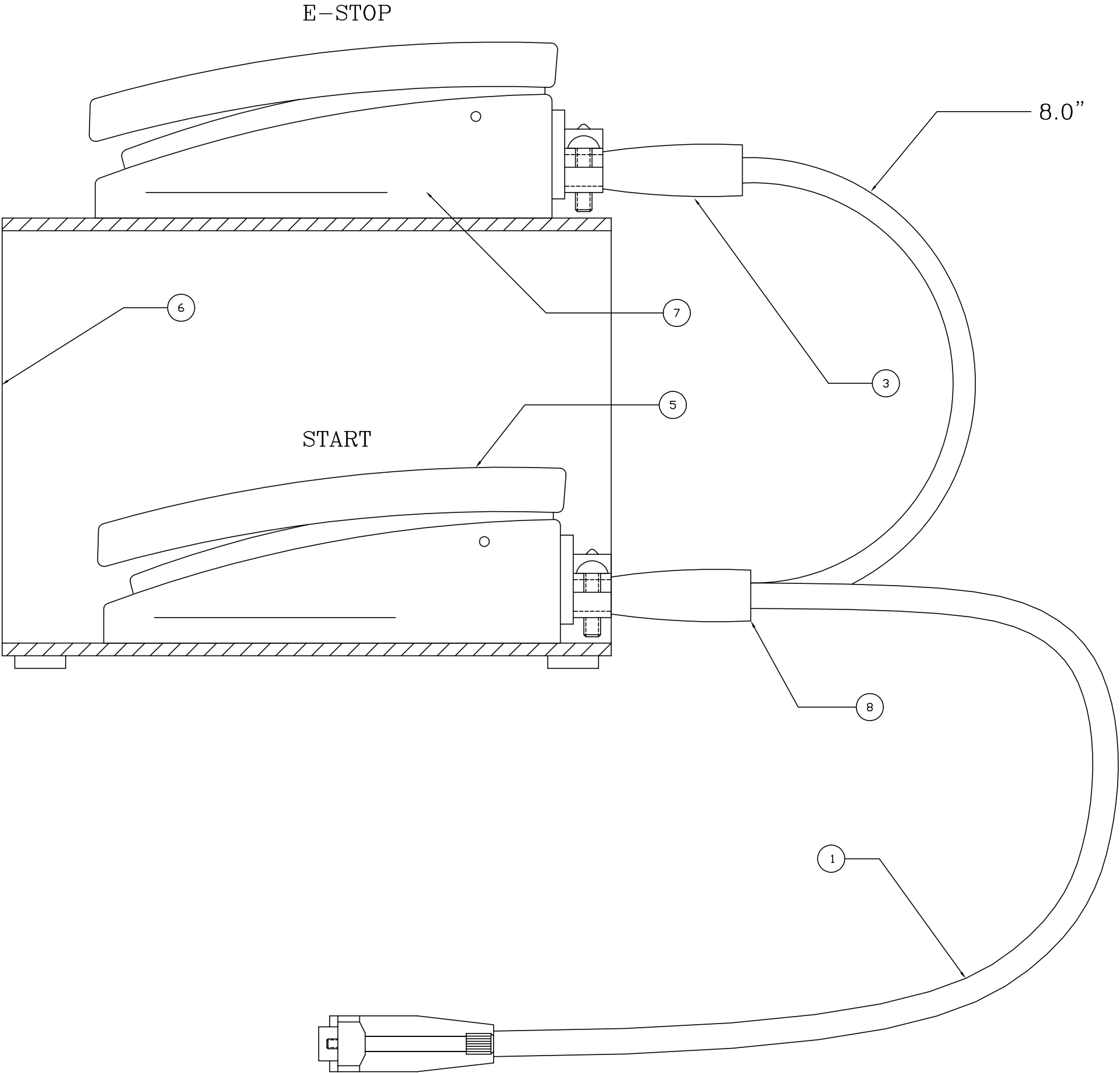


NOTES:
1.- ALIGNMENT OF ITEMS #14, 15, AND 23 CRITICAL.
2.- ALIGN ITEM #21 TO DOWEL PINS #25.

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	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE: 1 PLACE DECIMALS ±.125 2 PLACE DECIMALS ±.015 3 PLACE DECIMALS ±.005 ANGLES ±1° FRACTIONS ±1/32		FINISH		DRAWN		TITLE				
	SURFACE FINISH 125		CNC TAPE NO.		ERS 7-09-09		ACTUATOR MW X 100 SPOT WELD				
	THIRD ANGLE PROJ.		CHECKED		DAS 7-09-09		SCALE	SIZE	DWG.NO.	REV.	
	CAD GENERATED DOCUMENT DO NOT MANUALLY UPDATE		ENGR		DAS 7-09-09		REF. 1	REF. 2		SHEET	
								159-134-341		0	
										2 OF 4	
SOFTWARE: PRO/ENGINEER File:59-134-341											

BALLOON	PRDNO	DESCRP	PSREQ
1	100-006-220	POLAR BLOCK (SPOT WELDER)	1
2	100-058-181	HOUSING BOOSTER MWX 100	1
3	100-095-168	SPRING,FRONT DIAPHRAGM	1
4	100-095-169	SPRING,REAR DIAPHRAGM	1
5	100-087-417	CLAMP RING	2
6	200-298-287	SCR CAP M3-0.5X8 SOC STL-B	24
7	200-079-436	PLATE,NUT,MWX 100	1
8	200-114-254	WASHER THICK M6 STL-Z	2
9	200-098-957	SCR CAP M6x80 SOC	2
10	200-096-186	STNDF EXTENSION SPRING	2
11	203-078-095	DOWEL 3/16x1-1/2	1
12	200-298-294	SCR SET M5-0.8X10 SOC STL-B	2
13	200-013-044	BUMPER,REST,STEEL	1
14	100-079-428	PLATE, TOP	1
15	100-079-429	PLATE, SIDE, LEFT	1
16	100-079-430	PLATE, SIDE, RIGHT	1
17	100-034-088	CYL AIR 32MM BORE X25MM STRK	1
18	200-098-780	SCR CAP M5x65 SOC	4
19	200-298-286	SCR SET 5/16-24X1 SOC STL-B	1
20	100-159-033	COUPLING ROD END MWX 100	1
21	100-003-087	BEARING SLIDE, MWX100	1
22	200-298-290	SCR CAP M5-0.8X25 SOC STL-B	4
23	100-079-437	PLATE, GUSSET	2
24	200-298-288	SCR CAP M4-.7X16 SOC STL-B	10
25	203-078-096	DOWEL 3/16x5/8	2
26	200-128-027	KEY,8MM SQUARE, 60MM LG	4
27	100-006-222	ENCODER MOUNT BLOCK	1
28	100-246-1450P	ASSY ENCODER MWX 100	1
29	100-161-026	STOP RETRACT MWX100	1
30	200-098-988	SCR CAP M4x12 SOC	2
31	200-298-293	SCR SET M10-1.5X60 SOC STL-B	1
32	200-073-173	NUT JAM M10x1.5	1
33	200-096-187	STNDF RND F/F M10 X 60	1
34	200-298-295	SCR SET M6-1.0X12 SOC STL-B	1
35	200-040-124	ELBOW MALE 45 1/8NPTX6MM TUBE	1
36	200-040-125	ELBOW MALE 45 1/8NPTX 4MM TUBE	1
37	200-159-034	COUPLING HOLDER MWX 100	1
38	200-098-998	SCR CAP M6x16 SOC	6
39	200-095-167	SPRING RETURN MWX 100	1
40	100-032-488	COVER BOTTOM MWX 100	1
41	200-298-292	SCR FLH M5-0.8X10 SOC STL-B	4
42	100-115-104	COVER, REAR WELDMENT	1
43	100-143-171	ASSY SOLENOID VALVE PRESS REG	1
44	200-298-285	SCR BTN M4-.7X10 SOC SST	20
45	200-114-167	WASHER FLAT M4 SST	2
46	200-073-183	NUT LOCK M4 STL ZINC	2
47	100-065-612	LABEL CE	1
48	100-065-752	LABEL SERIAL TAG	1
49	100-065-624	LABEL WARNING GROUND/DISCONN	1
50	100-065-628	LABEL IMPORTANT AIR SUPPLY	1
51	100-065-670	LABEL AIR INLET	1

BALLOON	PRDNO	DESCRP	PSREQ
52	100-065-1010	LABEL,CONNECTIONS,MWX100	1
53	100-065-598	LABEL DATA TAG ACT	1
54	100-065-633	LABEL DATE OF MFG.	1
55	200-163-032	FILTER AIR AUTO DRAIN W/HOLES	1
56	200-040-041	ELBOW PH 2202P-4-4	1
57	200-047-138	FTG QUICK DISCONNECT	1
58	200-047-094	FTG MALE 1/4 NPT X5/16TUBE	1
59	200-047-136	FTG PLUGIN Y 4MM X 6MM	1
60	200-040-127	FITTING,PLUG-IN ELBOW,6MM	1
61	200-047-139	NIPPLE,6MM TUBE	1
62	100-246-1445P	ASSY PRESSURE REGULATOR MWX100	1
63	200-047-134	FTG BULKHD 1/8 NPT 8MM TUBE	1
64	200-040-126	ELBOW MALE 1/8NPT X 6MM TUBE	1
65	100-010-516	BRACKET 15 PIN COVER	1
66	200-029-1058	CONN SHV BULKHEAD	1
67	200-114-253	WASHER,1/2"ID,3/4"OD,0.032" TH	2
68	102-242-632R	ASSY AMTECH ACTUATOR INTF BD	1
69	200-298-289	SCR CAP M5-0.8X10 SOC STL-B	5
70	100-065-137	LABEL GROUND DECAL	1
71	200-047-137	FTG REDUCER 4MM X 3.2MM	1
72	200-063-195R	KIT ACCY D SHELL CONN	2
73	200-298-096	SCR SEM M3X6 PHH STL-Z	2
74	100-079-432	PLATE,SIDE SUPPORT,MWX 100	2
75	200-098-954	SCR CAP M6x20 SOC	8
76	100-079-433	PLATE,BASE,MWX 100	1
77	100-032-489	COVER LOWER MWX 100	1
78	100-032-493	COVER, TOP	1
79	100-032-495	COVER, SIDE, LEFT	1
80	100-032-494	COVER, SIDE, RIGHT	1
82	200-298-291	SCR FLH M4-0.7X8 SOC SST	8
83	100-027-027	COLLAR GRADUATED	1
84	100-004-038	BEZEL,FRONT,MWX 100	1
85	200-047-135	FTG BULKHD 1/8 NPT 4MM TU	1
86	200-047-132	FTG,SNAP-LOC, 1/8 NPT	1
87	200-110-176	TUBING,SNAP-LOC	1
88	200-047-133	FTG,SNAP-LOC,NOZZLE	1
89	100-065-1009	LABEL,CRUSH AND SONICS,MWX 100	1
90	200-298-296	SCR CAP M6-1.0X16 SOC SST	6
91	200-113-103	VALVE FLOW CONT 6MM PNL MT	3
92	200-098-897	SCR CAP M5x20 SOC	4
93	200-113-104	VALVE FLOW CONT 1/8 TUBE	1
94	200-113-105	VALVE QUICK EXHAUST 4 MM	1
95	100-240-359P	ASSY CABLE COAX 1'	1
96	200-110-078	TUBING 093ID x 1/8OD NYLON	0.10417
99	200-110-177	TUBING 4MM HIGH FLEX	3
100	200-110-178	TUBING 6MM HIGH FLEX	2.5
101	209-110-162	TUBING AIR 5/16 DIA (BLUE)	0.83333
102	200-098-763	SCR PNH M3x6 PHH STL-Z	1
103	100-032-496	COVER, MESH	2
104	200-073-192	NUT LOCK M3-0.5 STL ZINC	6
105	200-114-229	WASHER FLAT M3 STL ZINC	6



REVISIONS				
ECN#	LTR	DESCRIPTION	DATE	APPROVED
	A	B. O. M. CHANGED ITEM #1 INFORMATION: REMOVED ITEM #2 REMOVED ITEM #4	12-21-94	MGD
	B	ADDED E-STOP TO PICTURE, ADDED ITEM # 7, ADDED ITEM # 8, CHANGED P/N OF ITEM # 3.	04-05-95	CKD
1272	3	ADDED 101-216-12 TO LIST, REMOVED J-00-020 (ALL CHANGES IN ITEM 1 LIST)	5-1-01	J.C.

NOTE:
SEE DWG# J-00-013 FOR WIRING

AMTECH PART #				
COMMERCIAL PARTS LIST				
MACH.# FOOTSWITCH		ASSEMBLY # M1A00A09		SHEET 1 OF 1
ITEM	PART NUMBER	PART NAME	QTY	REMARKS
1	101-216-12	INMAC CABLE	1	
2				
3	101-022	AMP. RUBBER BOOT	1	AMTECH
4				
5	102-029	LINEMASTER FOOT SWITCH	1	AMTECH
6	102-030	LINEMASTER SWITCH GUARD	1	AMTECH
7	102-028	LINEMASTER E-STOP FOOT SWITCH	1	COLOR MUST BE RED
8	101-023	AMP. RUBBER BOOT	1	AMTECH
9				
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04-21-95
1:37 PM

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FRACTIONAL DIM. ±1/64
4 PLACE DECIMAL ±.0005
3 PLACE DECIMAL ±.005
2 PLACE DECIMAL ±.010
ANGLES ±1/2°

DRAWN BY: MGD

CHECKED BY:

APPROVED BY:

REVISED BY: CKD

DATE: 2-1-94

SCALE: 1=1

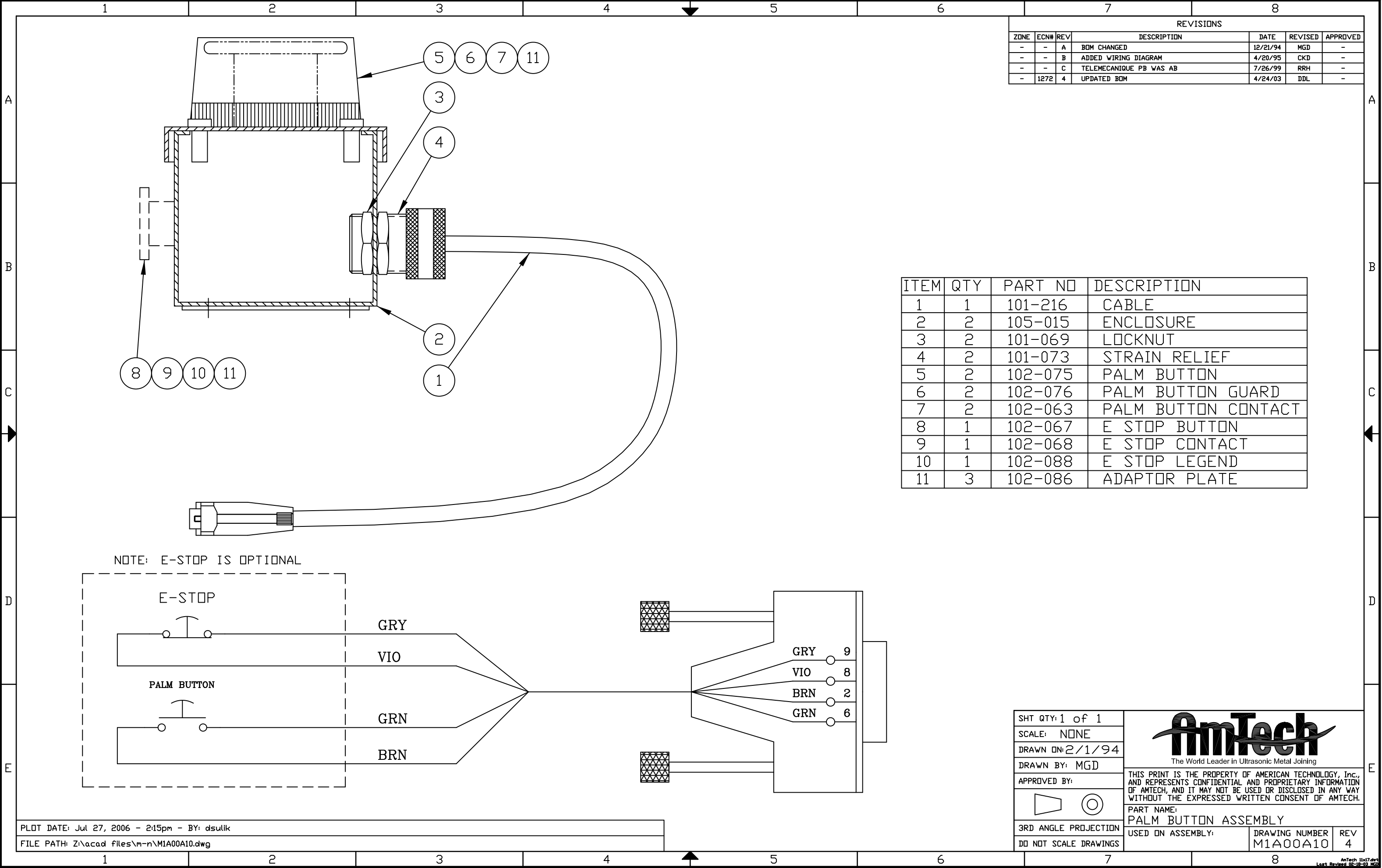
AMTECH

FOOTSWITCH B.O.M.



AMTECH
WORLD LEADER IN
ULTRASONIC METAL WELDING
MILFORD, CT 06460

DRAWING NUMBER/CAD #
M1A00A09



REVISIONS						
ZONE	ECN#	REV	DESCRIPTION	DATE	REVISED	APPROVED
-	-	A	BOM CHANGED	12/21/94	MGD	-
-	-	B	ADDED WIRING DIAGRAM	4/20/95	CKD	-
-	-	C	TELEMECANIQUE PB WAS AB	7/26/99	RRH	-
-	1272	4	UPDATED BOM	4/24/03	DDL	-

ITEM	QTY	PART NO	DESCRIPTION
1	1	101-216	CABLE
2	2	105-015	ENCLOSURE
3	2	101-069	LOCKNUT
4	2	101-073	STRAIN RELIEF
5	2	102-075	PALM BUTTON
6	2	102-076	PALM BUTTON GUARD
7	2	102-063	PALM BUTTON CONTACT
8	1	102-067	E STOP BUTTON
9	1	102-068	E STOP CONTACT
10	1	102-088	E STOP LEGEND
11	3	102-086	ADAPTOR PLATE

SHT QTY: 1 of 1

SCALE: NONE

DRAWN ON: 2/1/94

DRAWN BY: MGD

APPROVED BY:

3RD ANGLE PROJECTION

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PART NAME:
PALM BUTTON ASSEMBLY

USED ON ASSEMBLY:
DRAWING NUMBER
M1A00A10

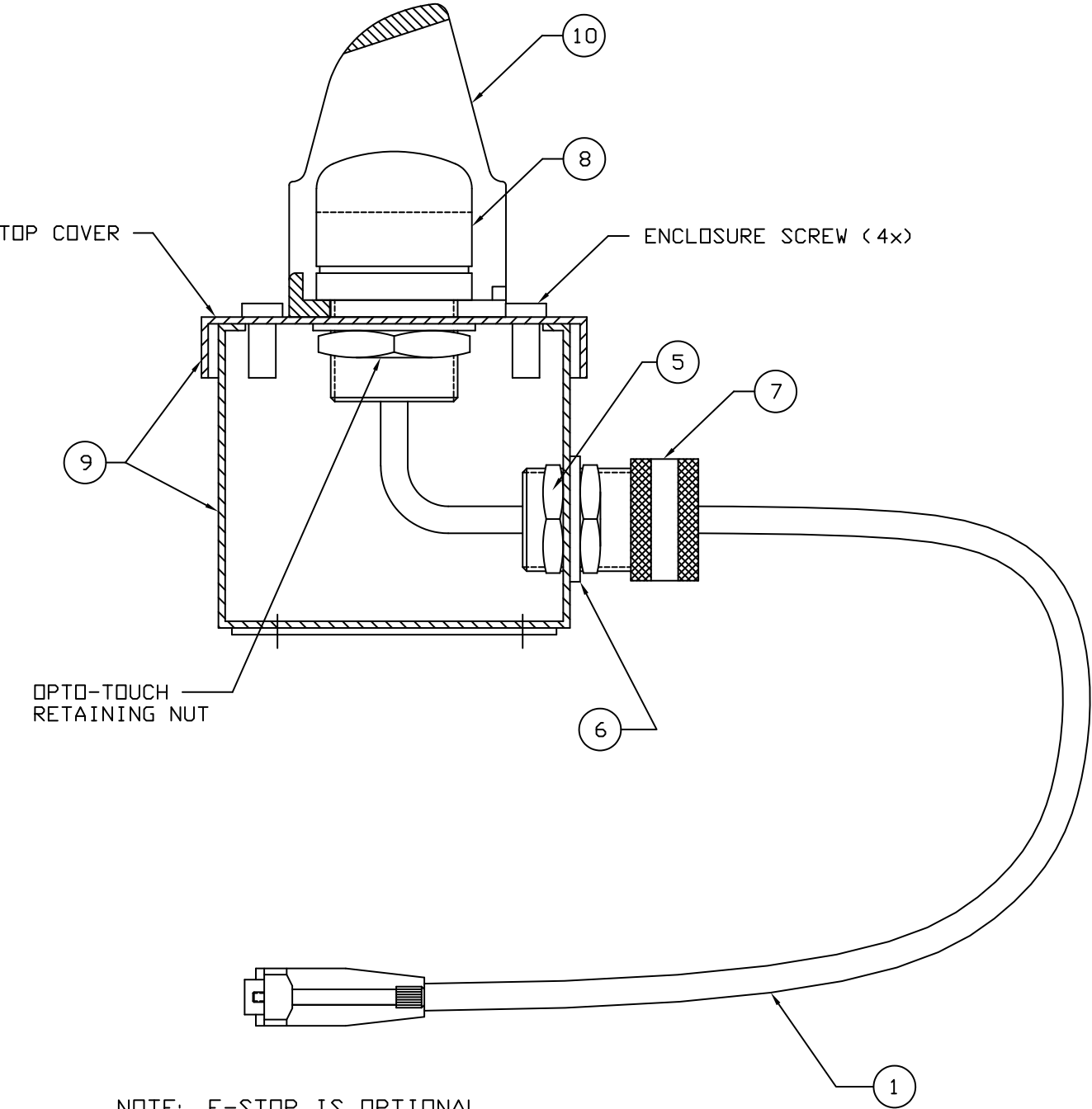
REV
4

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	B. O. M. CHANGED ITEM #1 REMOVED ITEM #2 REMOVED ITEM #3 REMOVED ITEM #4	12-21-94	MGD
	B	ADDED ITEMS 11 & 12 TO B. O. M. ADDED WIRING DIAGRAM	03-08-95	CKD

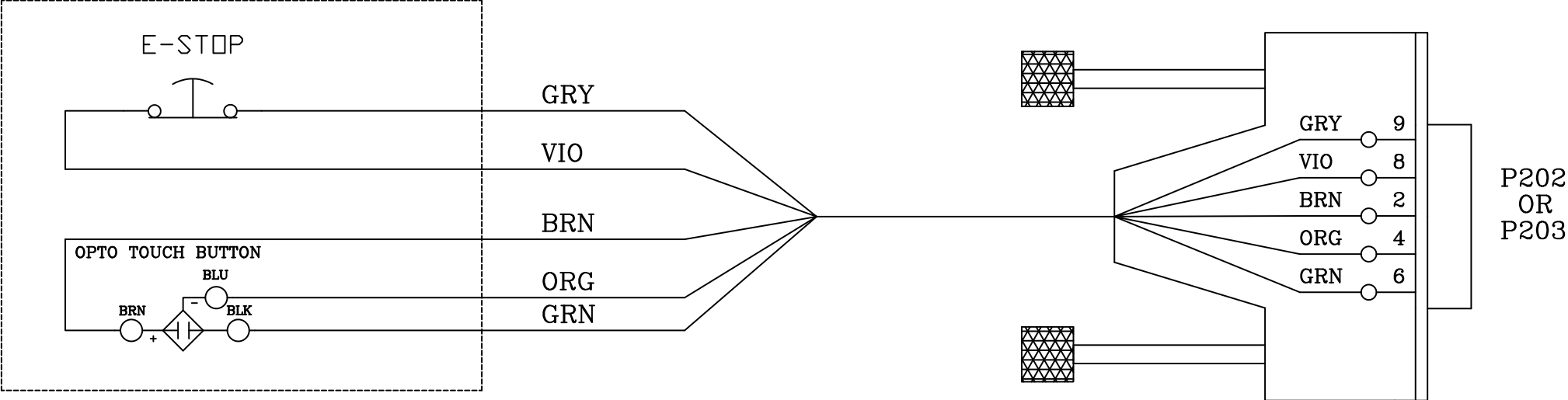
FIELD COVER ATTACHMENT

1. REMOVE FOUR ENCLOSURE SCREWS HOLDING TOP COVER ON ENCLOSURE (9).
2. REMOVE TOP COVER FROM ENCLOSURE.
3. LOOSEN OPTO-TOUCH RETAINING NUT ON INSIDE OF THE TOP COVER.
4. RAISE OPTO-TOUCH BUTTON (8) AND SLIDE FIELD COVER (10) UNDER OPTO-TOUCH BUTTON AS SHOWN.
5. TIGHTEN OPTO-TOUCH RETAINING NUT ON INSIDE OF THE TOP COVER.
6. REPLACE TOP COVER ON ENCLOSURE. THE OPTO-TOUCH BUTTON & FIELD COVER SHOULD BE ORIENTATED AS SHOWN.
7. REPLACE FOUR SCREWS HOLDING TOP COVER ON ENCLOSURE.
8. JUMPER PINS 8 & 9 WHEN E-STOP IS NOT USED.

COMMERCIAL PARTS LIST				
MACH.# OPTO-TOUCH		ASSEMBLY # M1A00A11		SHEET 1 OF 1
ITEM	AMTECH PART NUMBER	PART NAME	QTY	REMARKS
1	101-216	AMTECH START CABLE	1	J-00-020
2				
3				
4				
5	101-069	T&B 1/2in. LOCKNUT	1	AMTECH
6	101-071	T&B 1/2in. O-RING	1	AMTECH
7	101-073	T&B STRAIN RELIEF	1	AMTECH
8	102-044	BANNER OPTO-TOUCH SW	1	DTBVPG
9	105-015	HOFFMAN ENCLOSURE	1	HOFFMAN F-1PB
10	102-066	OPTO-TOUCH FIELD COVER	1	AMTECH
11	102-067	TELEMECANIQUE E-STOP	1	ZB2-BT4
12	102-068	TELEMECANIQUE NC,DBL CONT. BLOCK	1	ZB2-B2104
13				
14				
15				

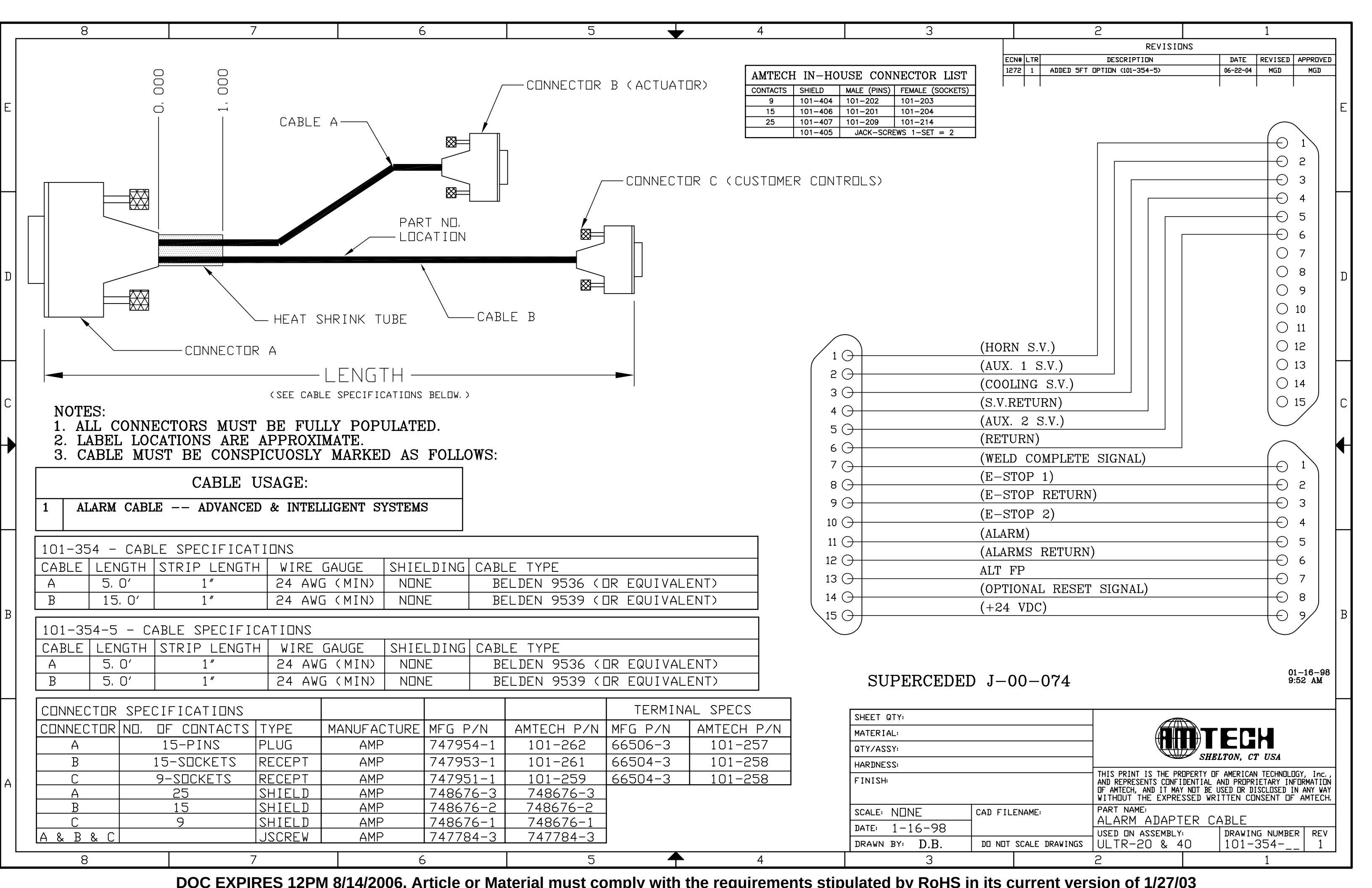


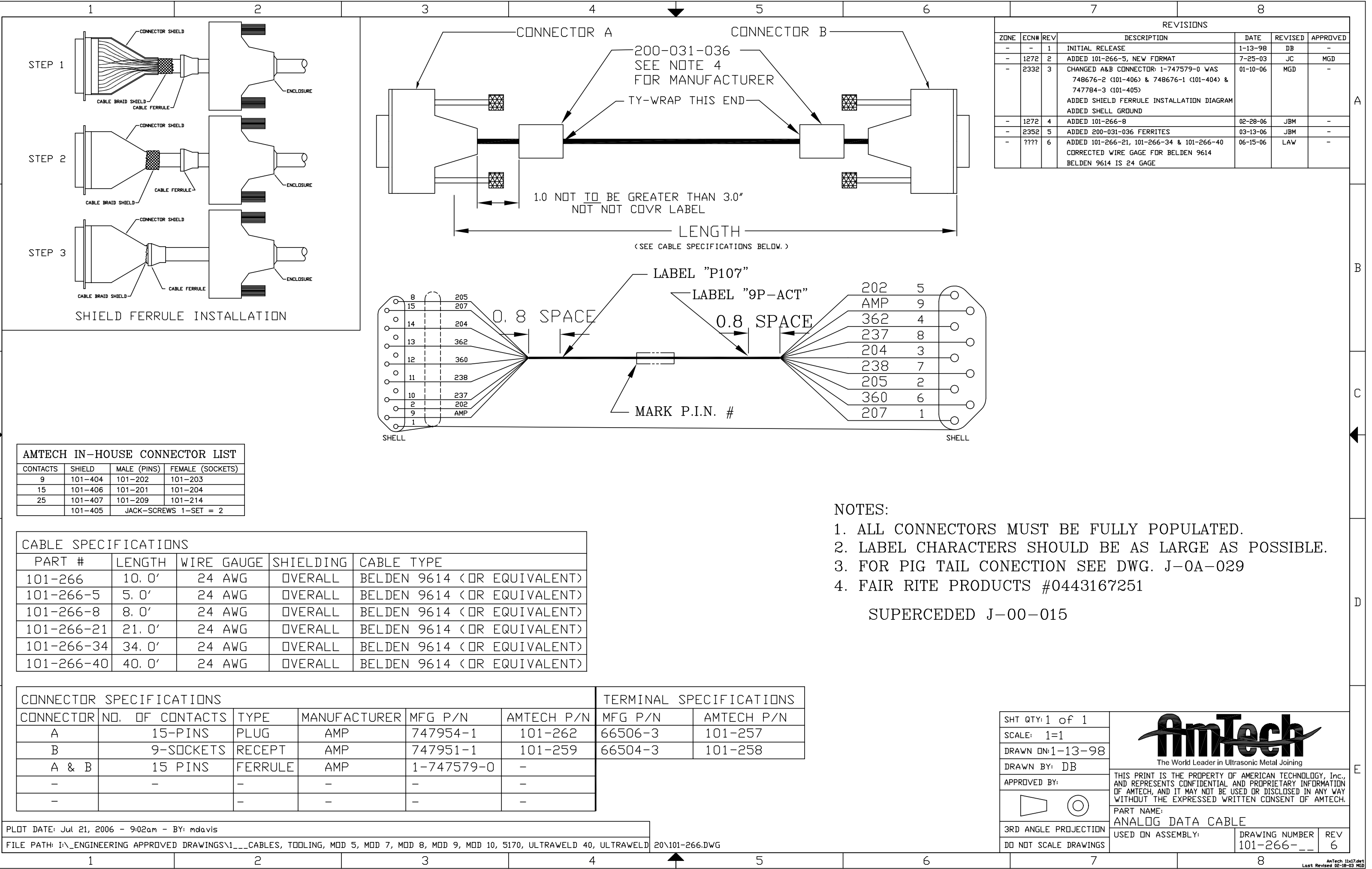
NOTE: E-STOP IS OPTIONAL

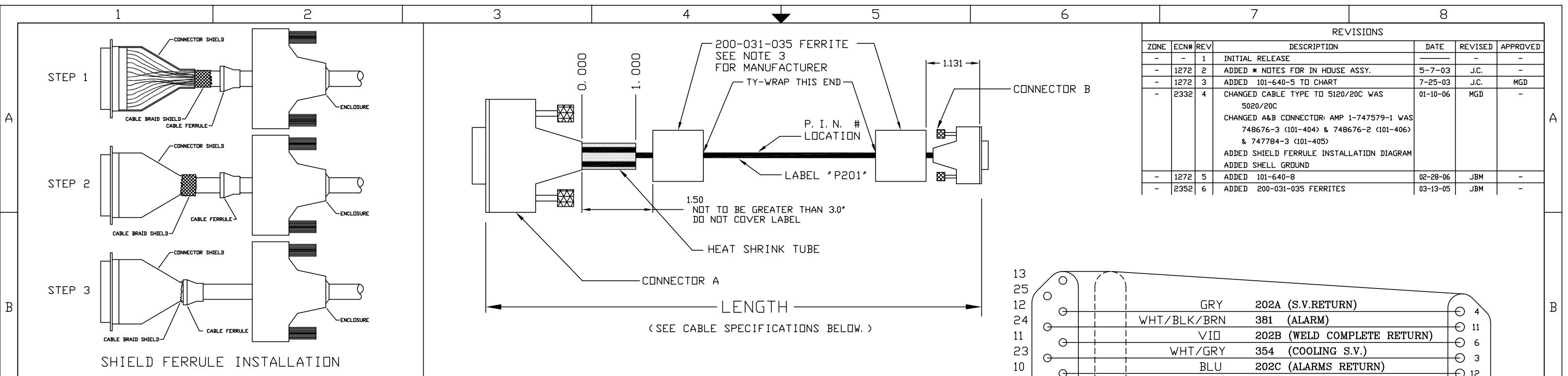


04-05-95
3:06 PM

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DO NOT SCALE DRAWINGS	DRAWN BY:	MGD			
UNLESS OTHERWISE STATED	CHECKED BY:				
	APPROVED BY:				
FRACTIONAL DIM. ±1/64	REVISED BY:	CKD	DATE: 2-1-94	SCALE: 1=1	
4 PLACE DECIMAL ±.0005	AMTECH				
3 PLACE DECIMAL ±.005	OPTO-TOUCH B.O.M.				
2 PLACE DECIMAL ±.010	DRAWING NUMBER/CAD #				
ANGLES ±1/2°	M1A00A11				







NOTES:

1. ALL CONNECTORS MUST BE FULLY POPULATED.
2. LABEL LOCATIONS ARE APPROXIMATE.
3. CABLE MUST BE CONSPICUOUSLY MARKED AS FOLLOWS:
4. FAIR RITE PRODUCTS #0443164151

CABLE USAGE:

1	CONTROL CABLE -- TOUCHSCREEN & INTEG. SYSTEMS (P201 TO ACTUATOR.)
---	--

CABLE SPECIFICATIONS				
P. I. N. #	LENGTH	WIRE GAUGE	SHIELDING	CABLE TYPE
101-640	10'	24 AWG	NONE	ALPHA 5120/20C (OR EQUIVALENT)
101-640-5	5'	24 AWG	NONE	ALPHA 5120/20C (OR EQUIVALENT)
101-640-8	8.0'	24 AWG	NONE	ALPHA 5120/20C (OR EQUIVALENT)

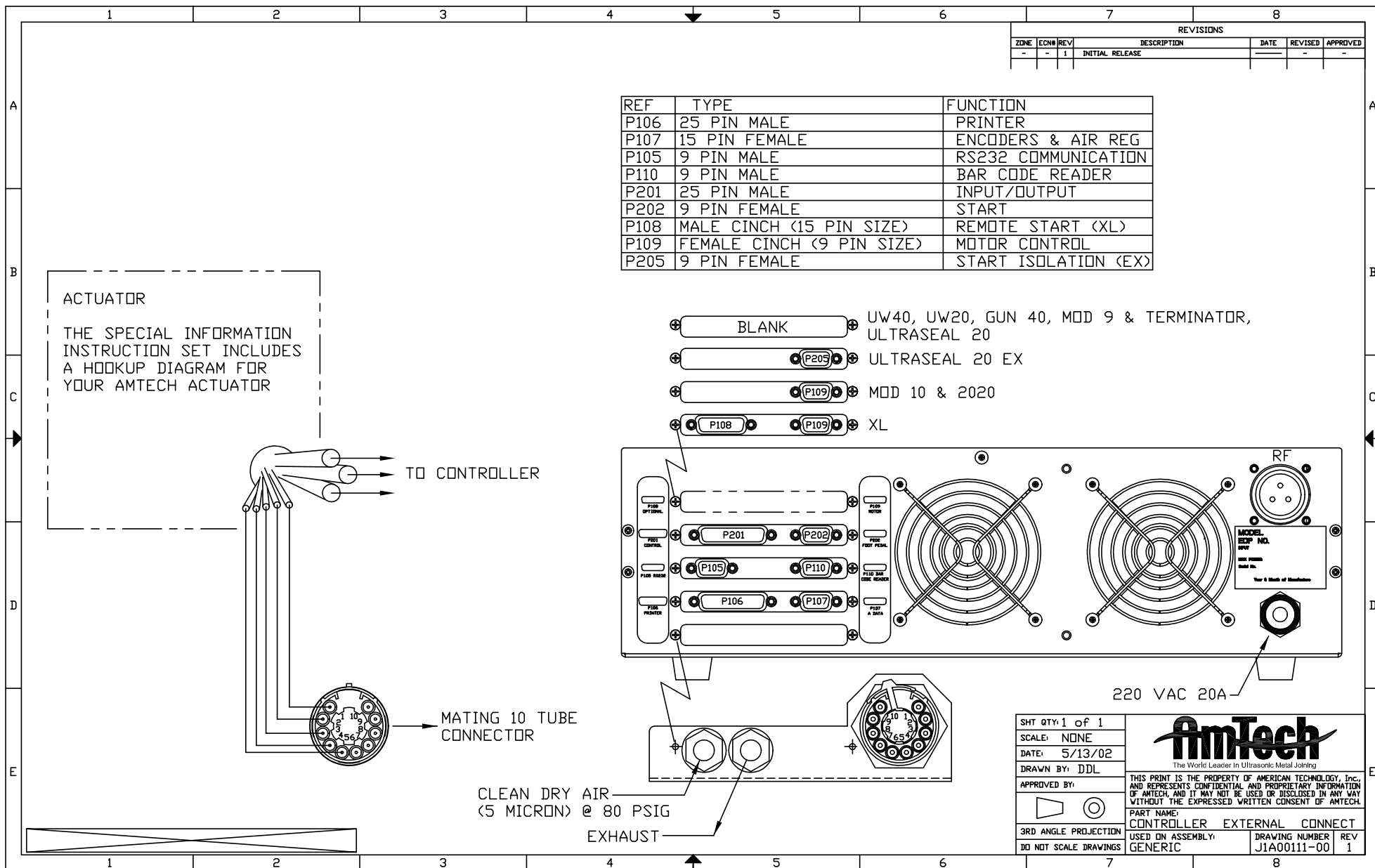
CONNECTOR SPECIFICATIONS						TERMINAL SPECIFICATIONS	
CONNECTOR	NO. OF CONTACTS	TYPE	MANUFACTURER	MFG P/N	AMTECH P/N	MFG P/N	AMTECH P/N
A	25-SOCKETS	SOCKETS	AMP	747955-1	*101-263	66504-3	*101-258
B	15-SOCKETS	SOCKETS	AMP	747953-1	**101-261	66504-3	**101-258
					SEE NOTE		SEE NOTE
A&B	-	FERRULE	AMP	1-747579-1	-		
-	-	-	-	-	-		
-	-	-	-	-	-		

NOTE:

1. *101-263 & 101-258 REPLACED BY (1) 101-214 25 FEMALE CONN. WHEN MADE IN HOUSE AT AMTECH
2. **101-261 & 101-258 REPLACED BY (1) 101-204 15 FEMALE CONN. WHEN MADE IN HOUSE AT AMTECH

PLOT DATE: Jul 20, 2006 - 1:08pm - BY: mdavis FILE PATH: I:_ENGINEERING APPROVED DRAWINGS\1__CABLES, TOOLING, MOD 5, MOD 7, MOD 8, MOD 9, MOD 10, 5170, ULTRAWELD 40, ULTRAWELD 20\101-640.dwg
--

SHT QTY: 1 of 1	 The World Leader in Ultrasonic Metal Joining		
SCALE: 1=1			
DRAWN ON: 3-5-03			
DRAWN BY: J.C.			
APPROVED BY:	THIS PRINT IS THE PROPERTY OF AMERICAN TECHNOLOGY, Inc., AND REPRESENTS CONFIDENTIAL AND PROPRIETARY INFORMATION OF AMTECH, AND IT MAY NOT BE USED OR DISCLOSED IN ANY WAY WITHOUT THE EXPRESSED WRITTEN CONSENT OF AMTECH.		
	PART NAME: TOUCHSCREEN CNTRL CABLE		
3RD ANGLE PROJECTION	USED ON ASSEMBLY:	DRAWING NUMBER	REV
DO NOT SCALE DRAWINGS	STANDARD	101-640-	6



Handshaking and Remote Communications

HANDSHAKING Interface

For custom interface of the ULTRAVELD system, the following external signals are available from and to P201 utilizing Remote Start Cable J1A00134. All outputs go to 24 VDC when true and can drive a 600 ohm relay. All inputs except Emergency Stop are into a 2.2K ohm resistor. Emergency Stop is a 600 ohm relay load with a bypass diode in parallel with a 2.2K ohm resistor.

READY SIGNAL (Controller Output - Gray wire)

Comes on at startup and after the weld cycle, by checking the horn height position. If the horn height is within 1 millimeter of the open height, the ready pin goes to true. If the welder is not equipped with a height encoder this signal is issued after the weld cycle is complete, when the horn is opened, and the sonic signal is turn off. Several hardware error conditions also put this output to false. Conditions that put this output to false generally will not allow the welder to run. SETUP mode also puts this false.

E-STOP Return and E-STOP (Controller Inputs - Red and Brown wire)

These pins must be held at 24VDC to keep the control running. If there is no 24VDC at these pins the hardware will prevent the control from running. The alarm signal will go true and the ready signal will go false. When this input is false the control automatically cancels all operations and all motions return to the rest position. The front panel shows 'EMERGENCY STOP' when this signal is false.

Low Air Pressure (Controller Input - White wire)

Like the E-STOP, this pin must be held at 24VDC to keep the control running. If there is no 24VDC at these pins the hardware will prevent the control from running.

Alarm (Controller Output - Yellow wire)

Turns on if any alarms are found during the weld cycle. Will also come on if various other problems with the hardware are found.

24VDC Return or Common (Purple wire)

When a 24VDC input supply from customer is present this pin is to be tied to the dc power supply common of customer control for reference input.

Remote Start (Controller Input - Green wire)

A 300 millisecond 24VDC pulse at this pin will start the weld cycle. The weld cycle start will be ignored if the control is in any setup mode or the hardware check did not pass.

Reset Signal (Controller Input - Black wire)

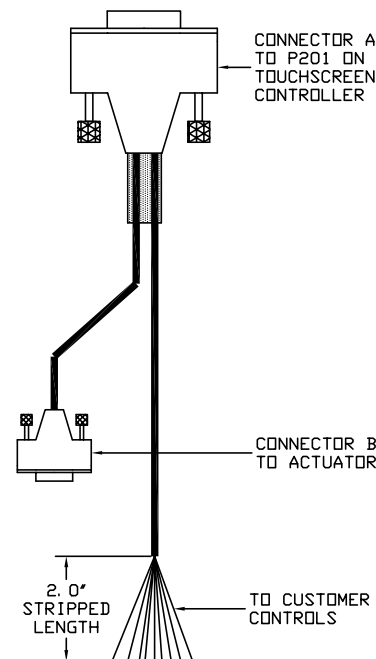
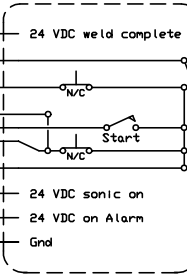
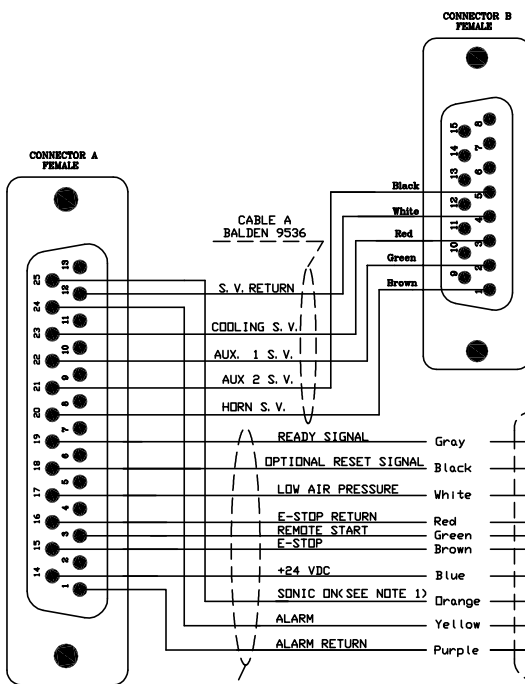
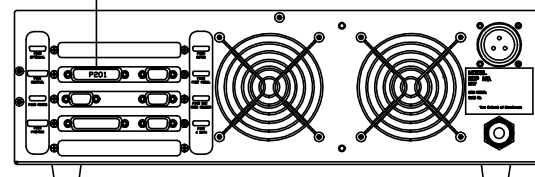
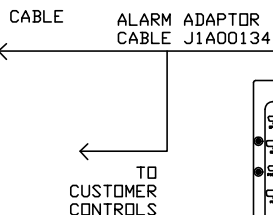
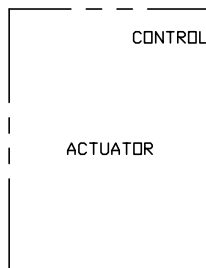
If a weld quality error is found the control will not operate until all errors are cleared. The Alarms output will not clear until all errors are cleared one by one. This input will only clear quality alarms. Weld overload or hardware alarms can only be cleared or bypassed from the front panel.

Sonic ON (Controller Output - Orange wire)

This output comes on during the weld cycle while the sonics are actually ON.

+24VDC (Blue wire)

This source voltage, supplied by the controller, can be used to drive the handshaking inputs. This source can also be used for up to (2) 600 ohm loads to drive peripherals.



REVISIONS						
ZONE	ECN	REV	DESCRIPTION	DATE	REVISED	APPROVED
-	-	1	INITIAL RELEASE	-	-	-
-	-	2	PER RDC 10224: CHANGED CABLE TO J1A00134 WAS 101-354 CHANGED CONNECTOR PINOUT DESCRIPTIONS	01-11-06	MGD	-

SHT QTY: 1 OF 1
SCALE: NONE
DRAWN ON 11/3/03
DRAWN BY: DDL
APPROVED BY:
3RD ANGLE PROJECTION
DO NOT SCALE DRAWINGS

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PART NAME	CUSTOMER INTERFACE FOR AUTOMATION
USED ON ASSEMBLY	DRAWING NUMBER J1A00133
	REV 2

