



NOTE: If no time is set, an error message (“Set Weld Timer”) will display prompting a parameter entry.



NOTE: A review of the Basic Weld Cycle Time Line on page 47 gives additional information on how the weld cycle and settings operate.

TIME SETTINGS

There are five time parameters, or timers, that can be set. They are accessed by pressing the Time key which allows specification of the following time parameters. The first menu display will show the following:

Weld Time – sets the duration of time for which ultrasonic vibrations are applied to the parts. A time value must be entered in order to weld.

Press the Time key again (and successively after each menu display) to advance to these next screen displays:

Hold Time – sets the duration of time for which pressure is maintained to ensure proper bonding of the parts, after the actual weld time and with ultrasonics off. (This allows the weld to cool.)

Delay Time – sets the duration of time allotted for pressure to build up after the parts have been contacted and before the application of ultrasonic vibrations to the horn. (“Delay Timer” must be selected as the trigger mode – see page 20 – and a value equal to or greater than 0 must be set.)

Afterburst Time – sets the duration of time for another application of ultrasonic vibrations to the horn (for “shake-off”) to ensure that the parts being assembled do not adhere to the horn.

Time Limit Low – sets the low time alarm examination point (as a tolerance limit). A time alarm will be triggered if the actual weld time is less than this value. The time low alarm will show on the Alarm Screen display and will be indicated by a flashing LED on the Time key. By specifying values for this limit and the Time Limit High, a weld time “window” is created that defines a “good weld.” (If no alarms are triggered – the weld cycle occurred within the designated time limits.)

Time Limit High – sets the high time alarm examination point. A time alarm will be triggered if the actual weld time is greater than this value. The time high alarm will show on the Alarm Screen display and will be indicated by a flashing LED on the Time key.



NOTE: Major adjustments of amplitude and pressure are made on the press through the use of boosters and pressure controls.

AMPLITUDE/PRESSURE

Fine adjustments of the following amplitude and pressure settings can be made by using the Amplitude/Pressure key. All settings range from 20% (minimum) to 100% (maximum).

Amplitude Ramp – (only on systems configured for more than 2200 watts) Used primarily for 15 kHz systems to ensure a slow start-up when welding with big horns.

Trigger Force (Press) – this setting can be used to specify the pressure that needs to be reached to trigger the ultrasonics when “Force/Pressure” has been selected as the Trigger mode.

Amplitude Setting – this setting is used to specify the vibrational amplitude.

TRIGGER

Selection of the trigger mode is achieved by pressing the Trigger Key and then using the Up/Down arrow keys as a toggle to select one of the following modes to act as the trigger to start ultrasonics.

Delay Timer – selecting this mode means that the ultrasonics will be triggered when the Delay Time specified in the Time menu is reached.

Force/Pressure – selecting this mode means that the ultrasonics will be triggered when the Trigger Force (Pressure) specified in the Amplitude/Pressure menu is achieved.

Pretrigger - Top – selecting this mode means that the ultrasonics will be triggered as soon as the head assembly leaves its home (head up) position and starts descent. This means that ultrasonics will be on before contact is made with the parts to be welded.

ADDITIONAL FEATURES AND FUNCTIONS

JOB STORAGE

Up to 15 different jobs may be stored and recalled or changed upon demand. Typical job parameters stored include Time and Power, Force Trigger, Limits, and Amplitude.

Save

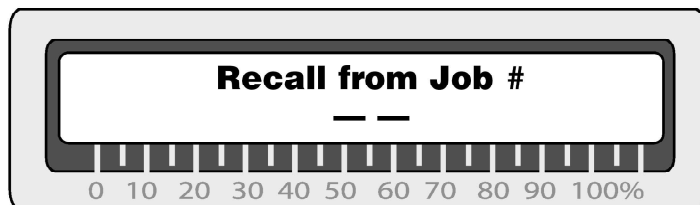
To use the job storage feature, press the Recall/Save key. If the “recall” option is displayed on the screen press the button again. The Save display appears as follow:



Saved jobs will be numbered 01 through 15. To save a job, use the numerical keys to enter in the desired job number (01 – 15). Once the job number is keyed in, press the ENTER key. All the parameters for that job will be saved under the job number keyed in. The system will return to the ready screen.

Recall

To recall a job that has been saved, press the Recall/Save key. If the “save” option is displayed on the screen press the button again. The Recall display appears as follow:



Recalled jobs are numbered 01 through 15. To recall a job, use the numerical keys to enter in the desired job number (01 – 15). Once the job number is keyed in, the settings for that job will be displayed on the various parameter menus.

The System will not respond if there is no job saved under a number corresponding to the numerical key pressed.

FREQUENCY DISPLAY

The TEST key can also be used to display the running frequency. When the press head is in the UP position, press and hold the TEST key for 3 seconds. The information on the display will change from the power display (watts) to a frequency counter display (Hz). After this switch, the power is captured (no longer updated) and the frequency display will update every second. This information can help diagnose problems with the horn and/or stack assembly.

OVERLOAD PROTECTION

The overload protection circuit will terminate ultrasonics when the system is operated under adverse conditions, i.e., improper tuning, excessive power supply loading, loose or failed horn or booster, thereby protecting the power supply and other system components. When an overload condition exists, a repetitive beep will sound and the **O. L. RESET** button will illuminate and remain lit until the button is pressed (regardless of whether the condition is corrected or not). If a repeated overload condition exists, resolve the problem before a failure of the power supply occurs.

If an overload condition exists, refer to the actuator instruction manual which may recommend one of the following possible solutions:

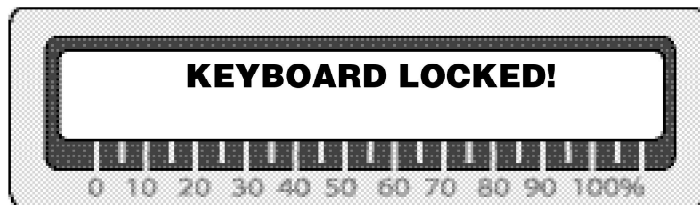
- decrease horn force
- decrease amplitude (change booster or decrease output control)
- decrease downspeed
- check for loose or broken studs
- check the coupling surfaces between horn/booster and booster/converter
- check for cracked horn or booster
- check to see if the load meter exceeds 100% during weld process (if so, a higher powered unit is needed)

If you cannot remedy the situation, contact Sonics' Service Department at 1-800-745-1105.

KEYPAD SECURITY

The keypad can be “locked,” so that no new parameters or commands can be entered via the keyboard, thereby preventing unauthorized cancellation or adjustment.

To activate the security feature, press and hold the numeral 7 key on power up. When the keypad is secured in this manner, any attempt to change or enter parameters will result in the following message being displayed on the LCD screen:



To return to normal operation and unlock the keypad, power down and repeat the lock procedure – press and hold the numerical key 7 on power up.

NOTE: for external job recall, the keyboard must be locked.

PRINT LINE OUTPUT



NOTE: The Print Line option default is "OFF." Switch 5 determines OFF/ON (see page 48).



NOTE: Use of a printer causes the cycle to be extended by approximately 100 ms.

At the end of every weld cycle, the power supply sends an ASCII print line which includes the data for weld time, maximum power and alarm status. This line can be directed to a printer, a PLC ASCII card or a computer running any terminal program that will present the information. (The hyperterminal program is included with any PC under the Accessories/Communications directory. Note that the communication channel is not bi-directional at this time; it is an output print line only.)

The transmission settings are fixed at: 19200 bits per second, 8 data bits, parity = None, 1 stop bit and flow control = None. The cabling and connector arrangement is set to use a standard 9-pin Null Modem cable, the same RS232 cable that would be used to connect two PC computers together.

The order of the data is the same for each line and the length of the line does not change with the values of the data. Line length could be important if a receiving device is attempting to parse the data for other uses. It means that the data items are always in the same place and therefore much easier to remove from the print line.

The end of each print line contains two non-printable characters, a carriage return followed by a line feed character. These characters are standard RS232 control characters to position the cursor location to the beginning of the next line on the screen or print page.

Sample Print line:

1	2	3	4	5	6	7	8
005647	00.48 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005648	00.47 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005649	00.45 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005650	00.48 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005651	00.47 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005652	00.45 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005653	00.48 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005654	00.47 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005655	00.45 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005656	00.49 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005657	00.46 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005658	00.46 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----
005659	00.47 sec	0.025 in	000130 J	045 %Pmax	Alarms T:-- D:-- E:--	J06	----

From left to right, the data items show the following information: (for more detailed information on these items and the print output, refer to the Appendix)

Position 1 = Customer Resettable Counter (CRC)

Position 2 = Actual weld time

Position 3 = Distance data (applicable for Model GXL only)

Position 4 = Energy data (applicable for Models GXL or GXE only)

Position 5 = Maximum percent power number

Position 6 = Any alarm violations for time

Position 7 = The last job number saved or recalled from job storage memory

Position 8 = Used to indicate a weld cycle termination due to an external cause

AUTOMATION INTERFACE & I/O CONTROLS

As listed below, there are several interface signals available for operating the power supply via external digital control lines. These lines are used to initiate a weld cycle and to monitor the operation (see External I/O Connection drawing E-3164 in the Appendix).

1. Impulse Input – the impulse input signal is used to initiate a weld cycle by external contact to ground. The contact must be closed for a minimum of 50 milliseconds for the welder to recognize the command. Once initiated, the weld cycle will proceed and the contact should be released. The contact must be released before the end of the weld cycle; the system will wait for the impulse contact to open before returning to the ready screens for data presentation. The impulse input is expecting a dry contact closure between J2 pin J and K (see Impulse Actuation Cable drawing E-2703 in the Appendix).

2. Ready Output – when the system is ready to run a cycle, the ready signal will be true. Any automation system should monitor this signal prior to initiating a weld cycle with the impulse input. The ready signal will be set false when a weld cycle begins. It will return true at the end of the weld after the data has been written to the selected ready screen, the print line has been sent (if ON) and the alarm signals have been examined and set.

In practice, automation controls should verify that the ultrasonic press is up and out of the way before loading the next “parts-to-be-welded” into the fixture and initiating another weld cycle. The ultrasonic system does not require the press to return “Home” before the next cycle can begin, so welding could possibly be initiated before the next parts-to-be-welded are in the ready position.

3. Good Part / Bad Part Outputs – There are two outputs that indicate the status of the last weld cycle. Both of these status signals are set false at the beginning of a weld cycle when the ready signal is set false (to indicate that a cycle is underway). One of these signals will be set true based on examination of the alarm settings at the end of the cycle. If any alarm examination points (process limits) have been violated, the Bad Part Output will be set true. If there are no alarm violations or no limits have been set, the Good Part signal will be set true.

The Good Part / Bad Part signals are meant to provide an external controller with the information necessary to handle the previously welded part in the automation environment. If the part is “good” then send it to the Good part location, if it’s “bad” then recycle or remove it for further examination.

The Good Part / Bad Part outputs will be valid prior to the ready signal returning to true at the end of a cycle. The system should use the ready

signal to qualify these outputs, if ready is true, then the Good Part / Bad Part outputs are valid.

4. DO4 – There is one extra digital output that is reserved for future application.

5. DI1, DI2, DI3 and DI4 – Four digital input signals are used for setting an external job selection when the keyboard is “Locked.” 15 sets of weld control parameters may be stored in the controller’s battery RAM area. (see page 21, Job Storage). They may be recalled into the working job area by setting a binary address code with these digital inputs (see table below). Valid jobs must exist and have been previously stored via the keyboard entries. All valid jobs must have a non-zero weld time entry. If a job does not contain a non-zero time entry, a weld cycle cannot be initiated.

The keyboard must be locked (see page 23) and the system must be at a Ready screen for the job address inputs to be active. The inputs are ignored if these conditions are not set. The keyboard must be locked so that job or data changes cannot be requested from two different sources – the keypad and remote address lines – at the same time. Only one source of job change is allowed: the keyboard (if not locked) or the digital inputs (when the keyboard is locked).

The job address lines may be changed anytime but must be held stable for a minimum of 50 ms prior to initiating a weld cycle with the impulse input command contact. When a job change has been recognized, the system will momentarily indicate Not Ready for a maximum of 30 ms while the job settings are recalled from battery backed RAM and the system internals are reset for a new cycle. The impulse command should be delayed until the Ready signal returns from the job recall operation if external job setting is used.

For the quickest possible cycle time, the next job address may be set after the present weld cycle begins as indicated by the ready signal (false). This does not affect the present weld cycle as it is already underway and the settings cannot be changed during the present cycle. They are locked once a cycle has started. If the job address has been changed during the present weld to reflect the desired job for the next weld cycle, the recall operation will happen at the end of the weld cycle before the final Ready indication.

Once Ready is true, the job has already been changed and the system is Ready to initiate the next cycle. This method extends the weld cycle by 30 ms which are needed to recall the job settings for the next cycle. Depending on weld times, up to 80 cycles per minute may be achieved including job changes between each weld (print line must be OFF to achieve this cycle rate).

EXTERNAL JOB ADDRESS LINES

0= OFF or open line
1= ON or contact closed

DI1	DI2	DI3	DI4	JOB#
0	0	0	0	No job change
1	0	0	0	1
0	1	0	0	2
1	1	0	0	3
0	0	1	0	4
1	0	1	0	5
0	1	1	0	6
1	1	1	0	7
0	0	0	1	8
1	0	0	1	9
0	1	0	1	10
1	1	0	1	11
0	0	1	1	12
1	0	1	1	13
0	1	1	1	14
1	1	1	1	15

Note that job Code 0 (0, 0, 0, 0) is not a valid job code and does not cause a job recall operation. Ex: If the last job recalled was Job 10 and the inputs are set to code 0, then Job 10 still dictates the active job settings.

The digital inputs (DI1, DI2, DI3, DI4) and the digital outputs (DO1, DO2, DO3, DO4) are set for "Sourcing" as shipped from the factory. They can be changed to "Sinking" by moving two optical isolator chips (U28/U44 for inputs; U43/U42 for outputs) on the internal microprocessor controller if desired. They are completely isolated and floating from the internal power levels and they are not required to be set the same. The inputs and outputs are set as a group so all 4 signals will be the same configuration. You may set one for "Source" and the other for "Sink" if required by the application interface. This can eliminate relay logic conversions to save parts and panel space for some PLC input/output cards. The chips are both optical isolator chips (PS2501-4 quad optical isolators; digikey part# PS2501-4-ND, as of this printing) available from most electronic distributors. The isolators are rated for 30 VDC, 100 ma max – do not connect AC voltage levels!

For more detailed information and to view applicable drawings, refer to Appendix.