



Model GXC / GC
Power Supply

I N S T R U C T I O N M A N U A L



Sonics & Materials, Inc.

WARNING



SAFETY PRECAUTIONS READ BEFORE INSTALLING OR USING THE EQUIPMENT

This system has been designed to assure maximum operator safety. However, no design can completely protect against improper usage. For maximum safety and equipment protection, observe the following warnings at all times and read the instruction manual carefully before you attempt to operate the equipment.

- High voltage is present in the equipment. Disconnect plug before removing cover or servicing.
- Make sure equipment is properly grounded with a 3-prong plug. Before plugging in equipment, test outlet for proper earth grounding.
- Ultrasonic welders operate above normal audibility for most people. Ear protection is recommended.

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SONICS

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IMPORTANT SERVICE LITERATURE



NOTE: Please read carefully before operating the equipment, then forward to your service department.

The system supplied with this instruction manual is constructed of the finest material and the workmanship meets the highest manufacturing standards. It has been thoroughly tested and inspected before leaving the factory and when used in accordance with the procedures outlined in this manual, will provide you with many years of safe and dependable service.

MANUAL CHANGE INFORMATION

We continually strive to be at the forefront of the latest electronic developments by adding circuit and component improvements to our equipment as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we cannot incorporate these changes immediately into printed manuals. Hence, your manual may contain new change information. Change information, if any, is located in the Appendix.

We reserve the right to make any changes in the design or construction of our equipment at any time, without incurring any obligation to make any change whatsoever in units previously delivered.

The technical data and schematics in the manual are for informational purposes only and may not reflect the current configuration being shipped from our factory. Upon formal request, complete and up-to-date information can be provided from the factory free of charge.



UNPACKING AND INSPECTION



NOTE: We recommend keeping all carton(s) and packing material in case it might be necessary to move the equipment, or to ship it for repair.

Before unpacking the equipment, check the shipping carton for any visible damage. If you see any, be sure to follow the procedures described below under “Visible Loss or Damage.” Otherwise, proceed to remove the equipment from the carton. Before storing any packing material, check it carefully for small parts. Then perform a visual inspection of the equipment to detect any evidence of damage which might have occurred during shipment. Check the following:

1. all components against the enclosed packing list,
2. all module plug-in units,
3. all wire plug-in connections.

The equipment was carefully packed and thoroughly inspected before leaving our factory. All units are tested and checked for problems prior to shipping. It is asked that when a problem does occur that all parts and components be inspected for damage (especially when the unit is not in working order when received). Responsibility for safe delivery was assumed by the carrier upon acceptance of the shipment. Claims for loss of damage sustained in transit must therefore be made upon the carrier, as follows:

VISIBLE LOSS OR DAMAGE

Any external evidence of loss or damage must be noted on the freight bill or express receipt, and signed by the carrier’s agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier’s refusal to honor a damage claim. The form required to file such a claim will be supplied by the carrier.

CONCEALED LOSS OR DAMAGE

Concealed loss or damage means loss or damage which does not become apparent until the merchandise has been unpacked. The contents might have been damaged in transit due to rough handling even though the container may not show external damage. When the damage is discovered upon unpacking, make a written request for inspection by the carrier’s agent within 48 hours of the delivery date. Then file a claim with the carrier since such damage is the carrier’s responsibility. The form required to file such a claim will be supplied by the carrier. Do not destroy packing materials, or move material from one location to another before the carrier makes their inspection.

If the system or any unit is damaged, notify Sonics. Sonics will arrange for repair or replacement of damaged equipment without waiting for the claim against the carrier to be settled, provided a new purchase order is issued to cover the repair or replacement costs. Should any damage, shortage or discrepancy exist, please notify us immediately.

INTRODUCTION

The GXC / GC power supply is an ultrasonic generator with automatic frequency tuning and a built-in Microprocessor that can be operated on a continuous duty basis, or pulsed via an outside control. The Microprocessor is programmed with a multi-function keypad and information is displayed on the back-lit liquid crystal display (LCD). This power supply can be used with a pneumatic press or actuator, or with a stand-alone converter.

OVERVIEW OF ULTRASONIC PLASTICS ASSEMBLY

WHAT IS ULTRASONICS?

Ultrasonics refers to vibrational waves with a frequency above the human audible range which is usually above 18,000 cycles per second (Hz).

PRINCIPLE OF ULTRASONIC ASSEMBLY

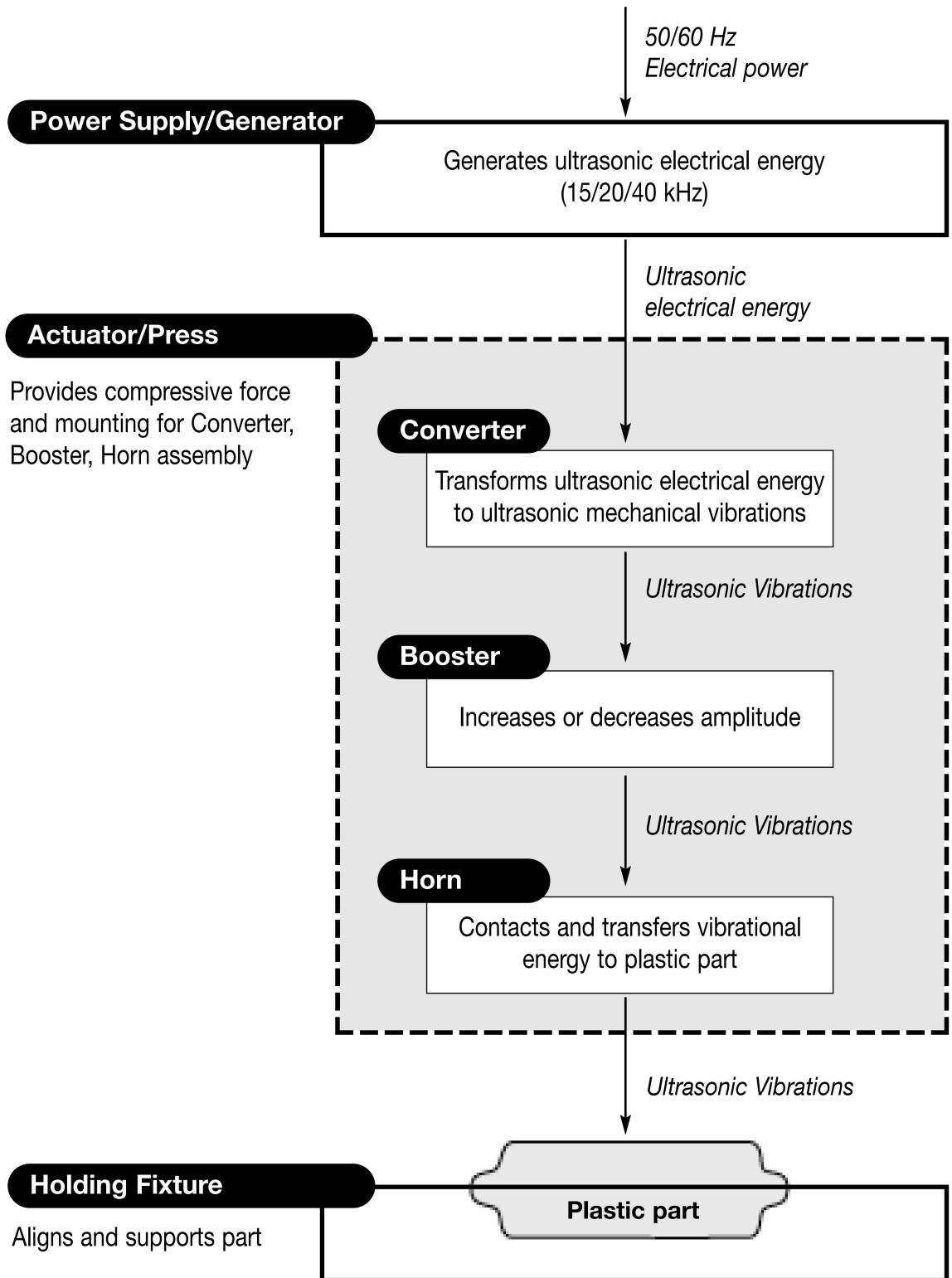
The basic principle of ultrasonic assembly involves conversion of high frequency electrical energy to high frequency mechanical energy in the form of reciprocating vertical motion which, when applied to a thermoplastic, generates frictional heat at the plastic/plastic or plastic/metal interface. In ultrasonic welding, this frictional heat melts the plastic, allowing the two surfaces to fuse together; in ultrasonic staking or insertion, the controlled flow of molten plastic is used to capture or lock another material in place (staking) or encapsulate a metal insert (insertion).

ULTRASONIC ASSEMBLY SYSTEMS

Sonics ultrasonic assembly systems are generally composed of the following major elements: a power supply, converter, booster, horn, pneumatic press and holding fixture, as detailed in the diagram on the next page. A review of this diagram will help you understand the basic elements involved in the assembly process and their relation to each other.



SONICS ULTRASONIC ASSEMBLY SYSTEMS



GLOSSARY OF ULTRASONIC TERMS

POWER SUPPLY/GENERATOR – The solid state power supply converts standard 50/60 Hz electrical energy to 15,000 Hz, 20,000 Hz or 40,000 Hz (15/20/40 kHz) electrical energy.

ACTUATOR/WELDING PRESS – The pneumatic actuator provides compressive force and mounting for the converter, booster and horn assembly. The tabletop press consists of a base assembly, column and actuator (head).

CONVERTER – The converter changes the high frequency electrical energy supplied by the power supply to high frequency mechanical vibrations.

BOOSTER – Successful ultrasonic welding often depends on having the right amplitude at the horn face. Often it is not possible to design a horn which has both the necessary shape and required gain (ratios of input amplitude to output amplitude). In such cases, a booster is placed between the converter and the horn to either increase or decrease the amplitude of the horn. In addition to changing/maintaining the amplitude, the booster provides support and alignment in the welding system.

HORN – The horn is a tuned component of the system which comes in contact with the parts to be assembled. The horn 1) transfers the ultrasonic vibrations produced from the converter to the parts being welded, and 2) applies necessary force to the assembly while the material resolidifies.

HOLDING FIXTURE – The holding fixture or nest assures proper alignment and support of the parts being assembled.

INSTALLATION



WARNING

The line cord of the controller/power supply is equipped with a 3-prong, grounding plug. Do not, under any circumstances, remove the ground prong. The plug must be plugged into a mating 3-prong, grounding type outlet.

ELECTRICAL POWER REQUIREMENTS

The power supply requires a fused, single-phase, standard 3-terminal grounding type receptacle capable of supplying the requisite voltage and current. Refer to the table below for power specification.

POWER SPECIFICATIONS

Model	Power Rating/ Frequency	Fuse Rating	
		115 vac	230 vac
GXC400-40	400w - 40 kHz	15 amps	10 amps
GXC800-40	800w - 40 kHz	15 amps	10 amps
GXC1200-20	1200w - 20 kHz	15 amps	10 amps
GXC1700-20	1700w - 20 kHz	N/A	20 amps
GXC2200-20	2200w - 20 kHz	N/A	20 amps
GXC3500-20	3500w - 20 kHz	N/A	30 amps
GXC2200-15	2200w - 15 kHz	N/A	20 amps
GXC3500-15	3500w - 15 kHz	N/A	30 amps
GXC4500-15	4500w - 15 kHz	N/A	30 amps



NOTE: If power supply is to be run continuously, air cooling of the converter and horn is required. Use clean, dry compressed air filtered down to 5 microns (supplied to converter fitting – see page 11).

SETTING UP

The power supply is a free-standing assembly. It should be installed in a clear, uncluttered location that is free from excessive dirt, dust, corrosive fumes, and temperature and humidity extremes. The selected installation site should be near the electrical power source and away from equipment that generates abnormally high electrical transients. Observe the following additional instructions when installing the equipment:

- Allow at least 6 inches (152.4mm) at the rear of the power supply for cable connections.
- Position the power supply so that the front panel controls are visible and readily accessible.
- The power supply is air cooled; allow sufficient space around the assembly to ensure adequate ventilation. If the power supply must be housed in a confined space, forced air cooling may be necessary to keep surrounding air within acceptable ambient temperature limits. Periodically check the ventilation grille and clean as necessary.





NOTE: Do not plug the power supply into an electrical outlet until all other connections have been made.

ELECTRICAL CONNECTIONS

The standard cable supplied with a Sonics press is 10 feet. Optional extension cables are available up to 15 feet without modification.

When making the initial electrical connections, make sure the power is disconnected and follow these precautions.

1. Do not strain or kink the cables. When going around corners, allow as wide a bend as possible. Do not run the cables parallel to any power line within a distance of less than 1 foot (305 mm).
2. To prevent the possibility of an electrical shock, ensure that the power supply line cord is properly grounded. Also make sure that the voltage rating of the electrical power source matches the power supply requirement (refer to the "Power Specifications" table on preceding page).
3. Check with your electrician if you have any wiring questions.





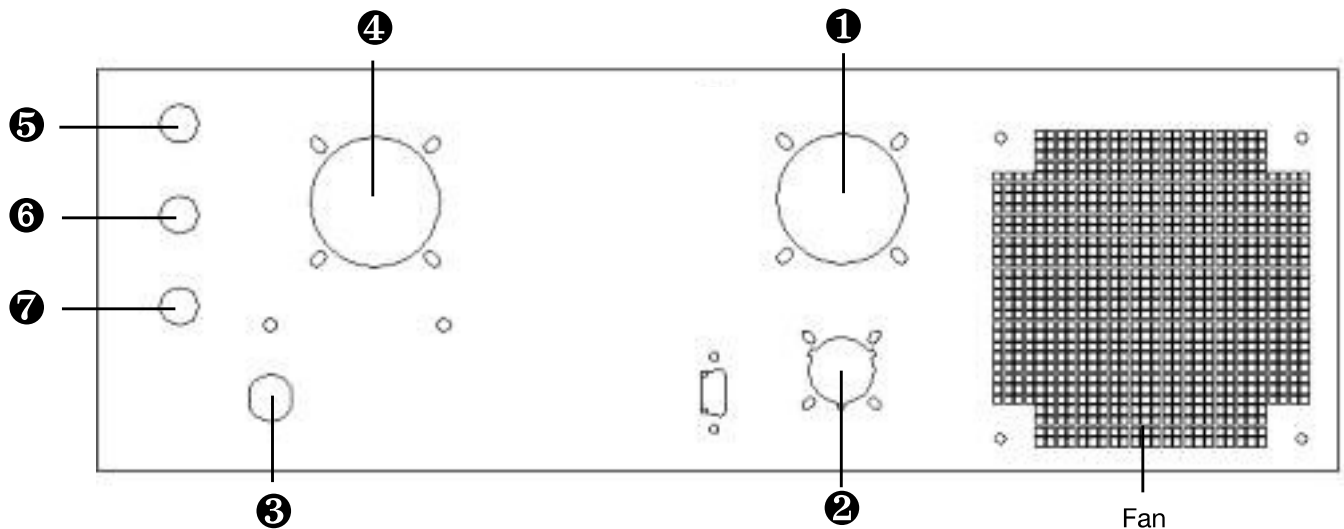
NOTE: Detailed wiring diagrams are supplied in the Appendix at the back of this manual.

CABLE CONNECTIONS – For GXC Models with 400 to 2200 Watts Power:

Located at the rear of the power supply are the cable connections as illustrated below. (The interconnecting cables will be supplied with your system.)

- ❶ J1, a round, 12-pin RF cable that connects the welding press or converter to the power supply.
- ❷ J2, a control cable that connects the power supply to a trigger source (press cable or external trigger source.) Refer to wiring diagrams in Appendix.
- ❸ The power line cord that plugs into the appropriate electrical outlet.

Once these connections have been made, the power supply is ready for operation. If applicable, be sure to consult your welding press instruction manual to insure that all connections on the press side are correct, and



NOTE: To see a list of converters that can be connected to the power supply, see the table on page 15.

that the press is ready for operation.

Also located at the rear of the power supply are the following:

- ❹ Optional J5 External I/O
- ❺ Fuse (0.5 amp - internal low voltage)
- ❻ Line fuse (based on requirements listed in “Power Specifications” table, page 9),
- ❼ Line fuse (based on requirements listed in “Power Specifications” table, page 9),



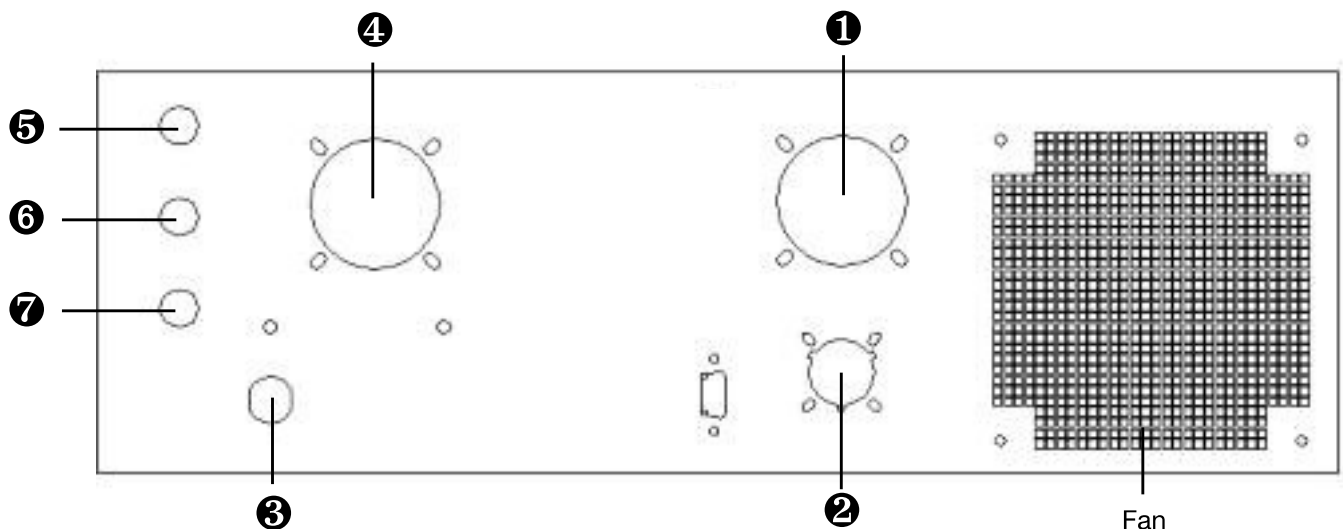
NOTE: Detailed wiring diagrams are supplied in the Appendix at the back of this manual.

CABLE CONNECTIONS – For GC Models with 400 to 2200 Watts Power:

Located at the rear of the power supply are the cable connections as illustrated below. (The interconnecting cables will be supplied with your system.)

- ❶ J1, a round Lemo cable that connects the welding press or converter to the power supply.
- ❷ J2, a control cable that connects the power supply to a trigger source (press cable or external trigger source.) Refer to wiring diagrams in Appendix.
- ❸ The power line cord that plugs into the appropriate electrical outlet.

Once these connections have been made, the power supply is ready for operation. If applicable, be sure to consult your welding press instruction manual to insure that all connections on the press side are correct, and



NOTE: To see a list of converters that can be connected to the power supply, see the table on page 15.

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- ❼ Line fuse (based on requirements listed in “Power Specifications” table, page 9),





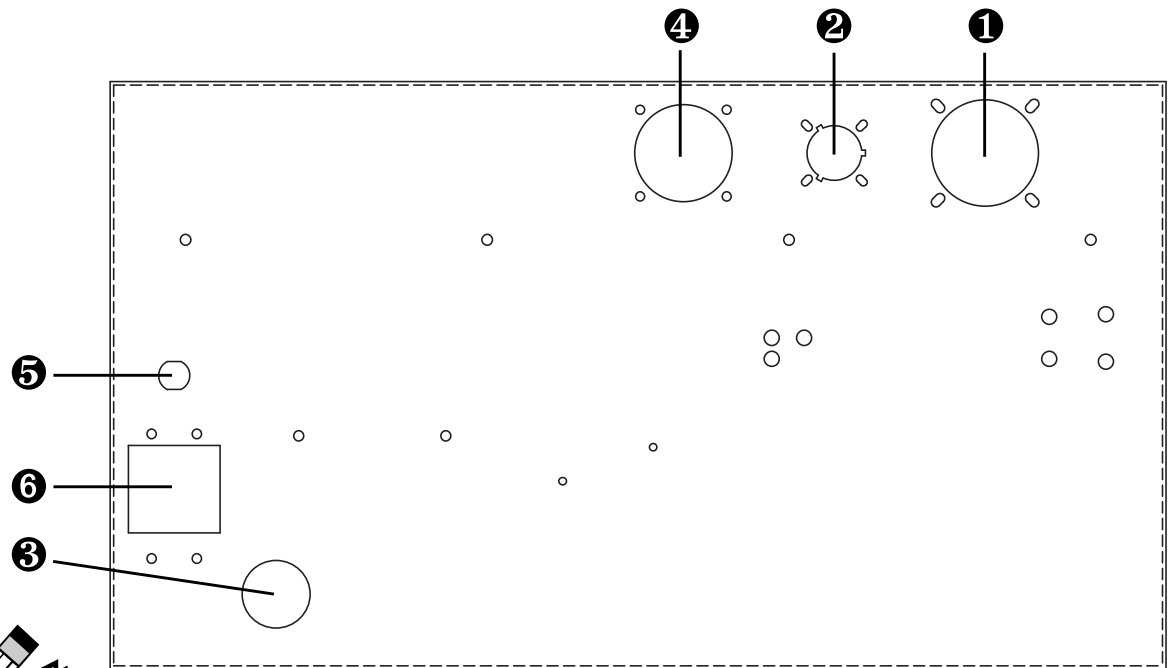
NOTE: Detailed wiring diagrams are supplied in the Appendix at the back of this manual.

CABLE CONNECTIONS – For GC Models with 3500 or 4500 Watts Power:

Located at the rear of the power supply are the cable connections as illustrated below. (The interconnecting cables will be supplied with your system.)

- ❶ J1, a round, Lemo cable that connects the welding press or converter to the power supply.
- ❷ J2, an actuation cable that connects the power supply to a trigger source (press cable or external trigger source.) Refer to wiring diagrams in Appendix.
- ❸ The power line cord that plugs into the appropriate electrical outlet.

Once these connections have been made, the power supply is ready for operation. If applicable, be sure to consult your welding press instruction manual to insure that all connections on the press side are correct, and that the press is ready for operation.



NOTE: To see a list of converters that can be connected to the power supply, see the table on page 15.

Also located at the rear of the power supply are the following:

- ❹ Optional J5 External I/O
- ❺ Fuse (0.5 amp - internal low voltage)
- ❻ Circuit breaker



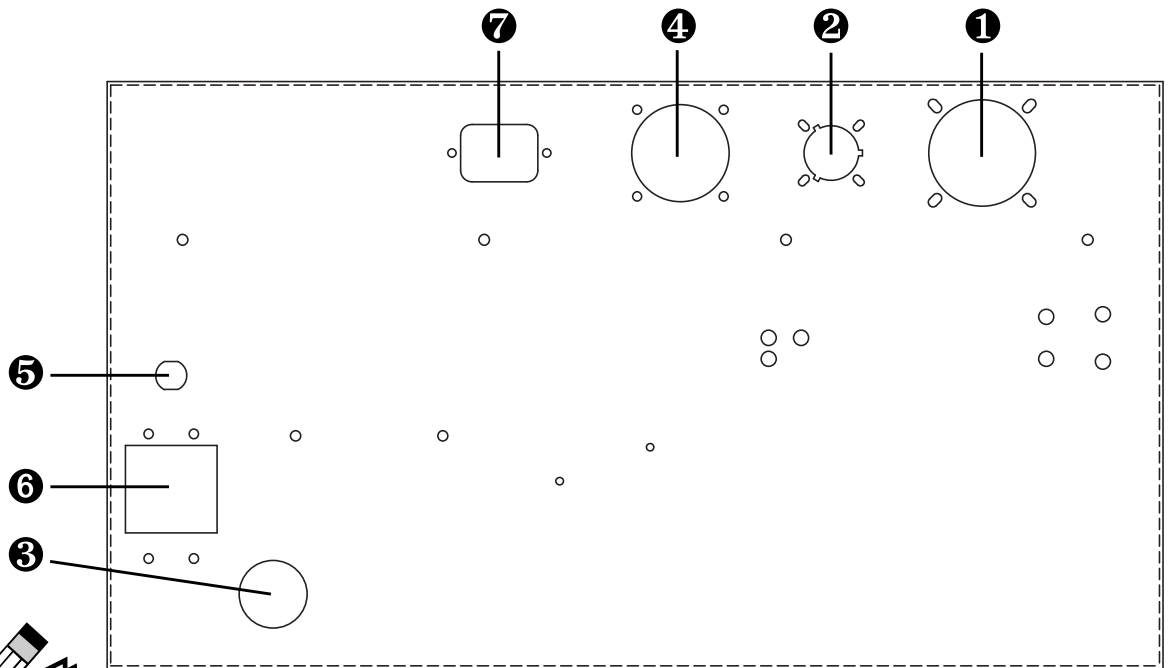
NOTE: Detailed wiring diagrams are supplied in the Appendix at the back of this manual.

CABLE CONNECTIONS – For GXC Models with 3500 or 4500 Watts Power:

Located at the rear of the power supply are the cable connections as illustrated below. (The interconnecting cables will be supplied with your system.)

- ❶ J1, a round 12 pin RF cable that connects the welding press or converter to the power supply.
- ❷ J2, an actuation cable that connects the power supply to a trigger source (press cable or external trigger source.) Refer to wiring diagrams in Appendix.
- ❸ The power line cord that plugs into the appropriate electrical outlet.

Once these connections have been made, the power supply is ready for operation. If applicable, be sure to consult your welding press instruction manual to insure that all connections on the press side are correct, and that the press is ready for operation.



NOTE: To see a list of converters that can be connected to the power supply, see the table on the following page.

Also located at the rear of the power supply are the following:

- ❹ Optional J5 External I/O
- ❺ Fuse (0.5 amp - internal low voltage)
- ❻ Circuit breaker
- ❼ J6 on 1595 only. Press motor connector.



AVAILABLE CONVERTERS FOR POWER SUPPLIES

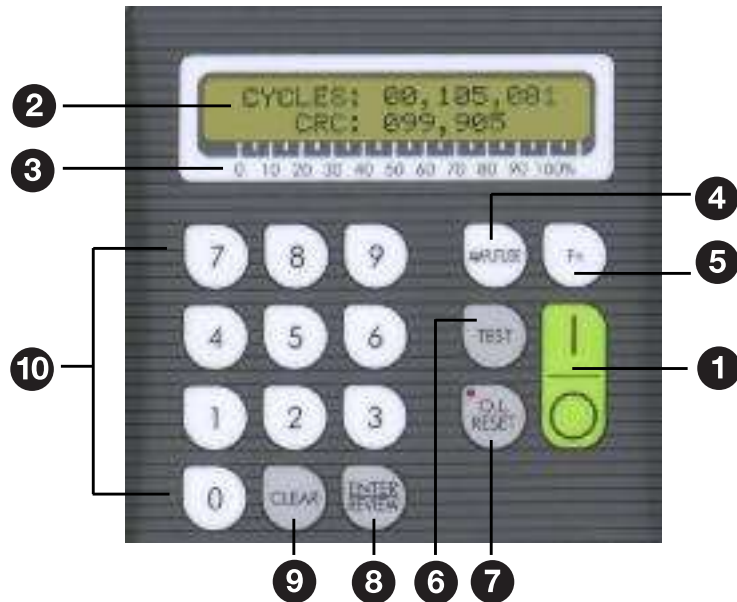
Item No.	Description
CV00016	15 kHz with Button connector (O-ring mount)
CV00161	15 kHz with Lemo connector (O-ring mount)
CV00034	15 kHz with Button connector (O-ring mount)
CV00341	15 kHz with Lemo connector (O-ring mount)
CV00344	15 kHz with Lemo connector and fitting for air cooling (O-ring mount)
CV00015	20 kHz with Button connector (O-ring mount)
CVR0015	20 kHz with Button connector (rigid mount)
CV00151	20 kHz with Lemo connector (O-ring mount)
CVR0151	20 kHz with Lemo connector (rigid mount)
CV00154	20 kHz with Lemo connector and fitting for air cooling (O-ring mount)
CVR0154	20 kHz with Lemo connector and fitting for air cooling (rigid mount)
CV00157	20 kHz with Button connector and fitting for air cooling (O-ring mount)
CVR0157	20 kHz with Button connector and fitting for air cooling (rigid mount)
CV00159	20 kHz Hand Gun with handles and cables (O-ring mount)
CVR0159	20 kHz Hand Gun with handles and cables (rigid mount)
CV00029	20 kHz with Button connector (O-ring mount)
CV00291	20 kHz with Lemo connector (O-ring mount)
CV00294	20 kHz with Lemo connector and fitting for air cooling (O-ring mount)
CV00331	20 kHz with Fischer connector
CV00334	20 kHz with Fischer connector and fitting for air cooling
CVR0023	40 kHz with Button connector (rigid mount)
CVR0231	40 kHz with Lemo connector (rigid mount)
CVR0233	40 kHz with SHV connector side mounted (rigid mount)
CVR0234	40 kHz with Lemo connector and fitting for air cooling (rigid mount)



OPERATING PROCEDURES

FRONT PANEL CONTROLS AND INDICATORS

Located on the front panel of the power supply are the following controls and indicators:



1. **ON/OFF** keys which turn the unit on and off.
2. **LCD SCREEN** which displays various settings, parameters and prompts as detailed in the following pages. In addition, during the weld process it displays a load meter indicator showing the power level of ultrasonics that is being delivered to the welding press (see #3 below).
3. **LOAD METER SCALE** from 0 to 100% which (in conjunction with vertical line indicators on LCD display) shows the running power (bar graph at bottom of display) and peak power (single vertical line at top of display) during the weld. Peak power is reported as %Pmax after the cycle (see page 18).
4. **AMPLITUDE** key which controls adjustment of the following amplitude settings of the system's high-frequency vibrations over the full operating range. (Major adjustments of amplitude can be made through the use of different boosters – consult your press manual for further information.)
 - a. Amplitude Setting
 - b. Amplitude Ramp (only on systems configured for more than 2200 watts)
5. **FN** key. Option not available on this model.

6. **TEST** key which can be used to test ultrasonic operation and displays idle losses of converter/booster/horn as a percentage of maximum power when key is depressed. Also functions as a frequency display.
7. **O.L. RESET** key which resets the power supply following an overload condition. Red LED in upper left corner indicates an overload condition exists.
8. **ENTER/REVIEW** key which Enters data into the system as keyed in with the numerical keys and displayed on the LCD screen. In Review function, displays the alarm, mode and cycle information.
9. **CLEAR** key which cancels a prior parameter value when a new value is to be entered.
10. **0-9 NUMERIC KEY PAD** which allows input of numeric data or numeric selection options by pressing the keys.

KEYING IN PARAMETERS

To make numeric entries into a cursor location that is displayed on a screen menu, use the numeric keypad. When the desired entry is displayed on the LCD screen, use the ENTER key to register the new value. Entries are made left to right.

The CLEAR key will clear an existing value to 0, displayed as a series of dashes, and relocate the cursor to the extreme left-hand entry position ready to accept entries again. As soon as a desired value is keyed in and displayed, pressing the ENTER key makes the system accept that entry. If a number value is not "Entered," then it will not be accepted by the system and the parameter value will return to its former setting (before any numerical values were changed).

OPERATIONAL FEATURES

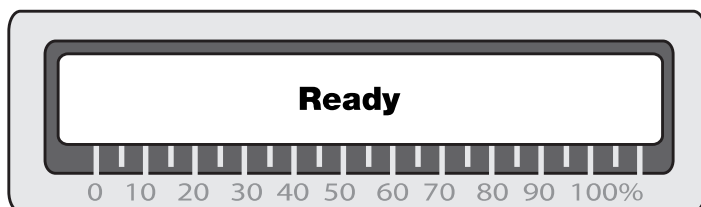
- Information displays showing customer resettable counter (CRC) and number of cycles
- Keypad security.
- Self-diagnostic input test.



NOTE: The **TEST** and Load Meter check should always be done for all cold start-ups, and for any start-up after the system has been idle for 20 minutes or more.

STARTING UP THE POWER SUPPLY

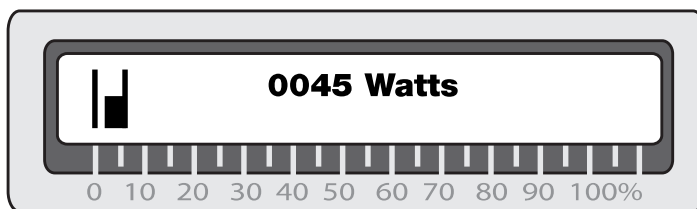
Press the ON/OFF key to turn the power supply on. The LCD screen will briefly display “Start Sequence” and show wattage and frequency information. Then the LCD screen will show the following “ready” display:



INITIAL OPERATION

After the power supply is turned on (as described on previous page), follow these steps:

1. Make sure that all necessary preparations have been made with regard to the ultrasonic system and tooling, and that the items to be welded are in position.
2. Press and hold the **TEST** button. While depressing the **TEST** button, check the LCD display. Make sure the bar graph indicator on the LCD display (a series of vertical lines that register to the 0 to 100% load meter scale – see example below) does not exceed 20%.



During the testing process, keep in mind that the ultrasonics are only activated as long as the TEST button is depressed – once you release the TEST button, ultrasonics is terminated.

A bar graph indicator reading of above 20%, signals that there may be a problem with the stack. Check your assembly and re-test.

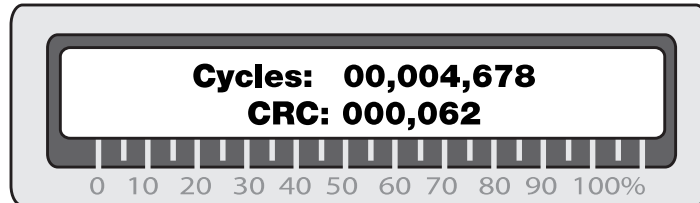
3. The power supply is now ready for operation.

Frequency Display

The TEST key can also be used to display the running ultrasonic frequency being used by the system. Refer to page 20 for more information.

READY SCREEN

In addition to the start-up ready screen (shown on page 16) there is another “ready” screen as shown below. The system must be displaying one of these two ready screens in order for welding to commence. Welding cannot be initiated from any other display.



Counter Screen

The Counter screen displays the number of cycles run to date and the customer resettable counter (CRC). The resettable counter can be reset whenever desired by pressing the Clear key when the counter screen is displayed (the keypad must be unlocked).



NOTE: Major adjustments of amplitude is made on the press through the use of boosters.

AMPLITUDE

Fine adjustments of the following amplitude and pressure settings can be made by using the Amplitude 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.

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

ADDITIONAL FEATURES AND FUNCTIONS

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:

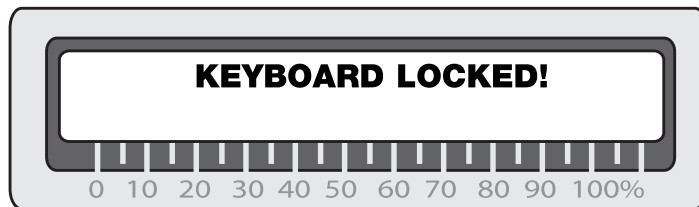
- decrease horn force
- decrease amplitude (change booster or decrease output control)
- decrease downspeed
- check for loose or broken studs
- check the coupling surfaces between horn/booster and booster/converter
- check for cracked horn or booster
- check to see if the load meter exceeds 100% during 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.

MAINTENANCE

GENERAL

1. Always make sure the power supply has adequate ventilation by keeping sufficient space around the assembly.
2. Periodically check the ventilation grilles and clean as necessary.

REPAIRS / SERVICE

If problems are encountered, contact our Service Department at 1-800-745-1105.

It is suggested that a system in need of repair be sent back to the factory with a written description pertaining to the nature of the problem.

Always contact the factory for return authorization before shipping any instrument. Include date of purchase, model number, and serial number. For units not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay. Care should be exercised to provide adequate packing to insure against possible damage in shipment. The system should be sent with all transportation charges prepaid and return method of shipment indicated.



NOTE: *If packing unit for return shipment, DO NOT use styrofoam "peanuts."*



WARRANTY

Sonics & Materials, Inc., hereinafter referred to as "Sonics", warrants its products for a period of one year from the date of original shipment against defects in materials and workmanship under normal installation, use and maintenance as described in the operating instructions which accompany such equipment. During the warranty period, Sonics will, at its option, as the exclusive remedy, either repair or replace without charge for material and labor, the part(s) which prove upon our examination to be defective, provided the defective unit is returned to us properly packed with all transportation charges F.O.B. Sonics dock, Newtown, CT. Warranty period on equipment rentals that are converted to purchase are deemed to have commenced on the date of original rental equipment shipment.

Ultrasonic plastics welding horns constructed of titanium or aluminum are guaranteed against defects for a period of one year from date of shipment. Sonics will repair or replace a cracked or defective horn once without charge, if failure occurs within the warranty period.

Ultrasonic plastics welding horns constructed of steel are guaranteed against defects for a period of ninety days from date of shipment. Sonics will repair or replace a cracked or defective steel horn once at a charge of 50% of the original purchase price, if failure occurs within the warranty period.

Ultrasonic metal welding horns constructed of titanium or steel are guaranteed against defects for a period of one year from date of shipment. Sonics will repair or replace a cracked or defective horn once without charge, if failure occurs within the warranty period.

Sonics warrants its ultrasonic converters for a period of one year from date of shipment with a one-time replacement if a converter proves to be non-repairable.

When customer site service is required, all travel, living and related expenses will be billed at cost. In-warranty service labor time (including travel time) at the customers facility is provided Monday through Friday (excluding holidays) from 8:00 am to 5:00 pm. Any in-warranty service time requested outside of these days and hours will be billed at 150% of Sonics current rate per hour for such site service work.

LIMITATION OF WARRANTY

This warranty does not apply to items subject to normal wear and tear or, to equipment or tooling which has been subject to unauthorized repair, misuse, abuse, negligence or accident. Misuse includes operation of equipment with tooling that is not qualified for the equipment or tooling not properly installed on the equipment.

Equipment which, in our judgment, shows evidence of having been used in violation of operating instructions, or which has had the serial number altered or removed, will be ineligible for service under this warranty.

For components and parts not manufactured by Sonics but included in Sonics manufactured equipment, this warranty shall be limited to the warranty as given to Sonics by said original component or part manufacturer.

Ultrasonic horns supplied by Sonics are manufactured to exacting specifications and are tuned to vibrate at a specific frequency. Using an out-of-tune horn will cause damage to the equipment and may result in warranty nullification. Sonics assumes no responsibility for converters, horns or fixtures not supplied by Sonics or for consequential damages resulting from their usage.

Ultrasonic converters showing signs of excessive heat or contamination, such as but not limited to, oils and moisture, are not covered by this warranty.

Warranty does not apply to ultrasonic horns quoted as prototype, experimental or of unusual design which, in our judgment are more likely to fail in use.

Warranty does not apply to re-sharpening of ultrasonic blade type cutting or slitting horns.

Warranty does not apply to knurl pattern wear on ultrasonic plastics and metal welding horns and tips.

Warranty does not apply to ultrasonic horn or tip face wear when used with plastics that are molded with fillers, such as but not limited to, glass or talc.

This warranty does not apply to ultrasonic plastics welding equipment, horns or fixtures where metal-to-metal tooling contact time is in excess of 250 milliseconds.

This warranty does not apply to used or re-built equipment.

This warranty is non-transferable.

Data supplied in Sonics instruction manuals has been verified and validated and is believed adequate for the intended use of the equipment. If the equipment or procedures are used for purposes other than those specified herein, confirmation of their validity and suitability should be obtained in writing from Sonics. Otherwise Sonics does not guarantee results and assumes no obligation or liability.

This warranty is in lieu of any other warranties, either express, implied, or statutory. Sonics neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the sale of its products. Sonics hereby disclaims any warranty or merchantability or fitness for a particular purpose. No person or company is authorized to change, modify, or amend the terms of this warranty in any manner or fashion whatsoever. Under no circumstances shall Sonics be liable to the purchaser or to any other person for any incidental or consequential damages or loss of profit or product resulting from any malfunction or failure of this Sonics product.

APPENDIX

J5 POWER SUPPLY CONNECTOR

CUSTOMER I/O CONNECTIONS	CUSTOMER I/O CONNECTIONS
1 BLACK	+24VDC ISOLATED SUPPLY #1
2 WHITE	+24VDC ISOLATED SUPPLY RETURN #1
3 RED	+24VDC ISOLATED SUPPLY #2
4 GREEN	+24VDC ISOLATED SUPPLY RETURN #2
5 ORANGE	SPARE DIGITAL INPUT
6 BLUE	GROUND
7 WHITE/BLACK	N.C.
8 RED/BLACK	N.C.
9 GREEN/BLACK	N.C.
10 ORANGE/BLACK	N.C.
11 BLUE/BLACK	N.C.
12 BLACK/WHITE	N.C.
13 RED/WHITE	+VDC (SINK INPUTS)
14 GREEN/WHITE	RETURN (SOURCE INPUTS)
15 BLUE/WHITE	DIGITAL INPUT #1 (0.08 BIT 0)
16 BLACK/RED	DIGITAL INPUT #2 (0.08 BIT 1)
17 WHITE/RED	DIGITAL INPUT #3 (0.08 BIT 2)
18 ORANGE/RED	+VDC (SOURCE OUTPUTS)
19 BLUE/RED	RETURN (SINK OUTPUTS)
20 RED/GREEN	DIGITAL OUTPUT (READY SIGNAL)
21 ORANGE/GREEN	DIGITAL OUTPUT (GOOD PART SIGNAL)
22 BLACK/WHITE/RED	DIGITAL OUTPUT (BAD PART SIGNAL)
23 WHITE/BLACK/RED	DIGITAL OUTPUT (SPARE #4)
24 RED/BLACK/WHITE	N.C.
25 GREEN/BLACK/WHITE	N.C.
26 ORANGE/BLACK/WHITE	EXTERNAL AMPLITUDE CONTROL: (1--10VDC = 20--100% AMPLITUDE) ISOLATED SUPPLY (SEE NOTE 5)
27 BLUE/BLACK/WHITE	OVERLOAD INDICATION (SEE NOTE 3)
28 BLACK/RED/GREEN	COMMON EMITTER
29 WHITE/RED/GREEN	OVERLOAD RESET (SEE NOTE 4)
30 RED/BLACK/GREEN	GROUND
31 GREEN/BLACK/GREEN	TUNE LOCK (SEE NOTE 8)
32 ORANGE/BLACK/GREEN	FREQUENCY/10 (SEE NOTE 7)
33 BLUE/WHITE/ORANGE	SMPS READY SIGNAL (SEE NOTE 9)
34 BLACK/WHITE/ORANGE	WATTS OUTPUT: 0--10VDC = 0--100% (SEE NOTE 6)
35 WHITE/RED/ORANGE	N.C.
36 ORANGE/WHITE/BLUE	N.C.
37 WHITE/RED/BLUE	N.C.
38 BLACK/WHITE/GREEN	N.C.
39 WHITE/BLACK/GREEN	N.C.
40 RED/WHITE/GREEN	N.C.
41 GREEN/WHITE/BLUE	N.C.
42 ORANGE/RED/GREEN	N.C.
43 BLUE/RED/GREEN	N.C.
44 BLACK/WHITE/BLUE	N.C.
45 WHITE/BLACK/BLUE	N.C.
46 RED/WHITE/BLUE	N.C.
47 GREEN/ORANGE/RED	N.C.
48 ORANGE/RED/BLUE	N.C.
49 BLUE/RED/ORANGE	N.C.
50 BLACK/ORANGE/RED	N.C.
51 N.C.	
52 N.C.	
53 N.C.	
54 N.C.	
55 N.C.	
56 N.C.	
57 N.C.	

NOT AVAILABLE ON GC & GXC MODELS

CONNECTION NOTES:

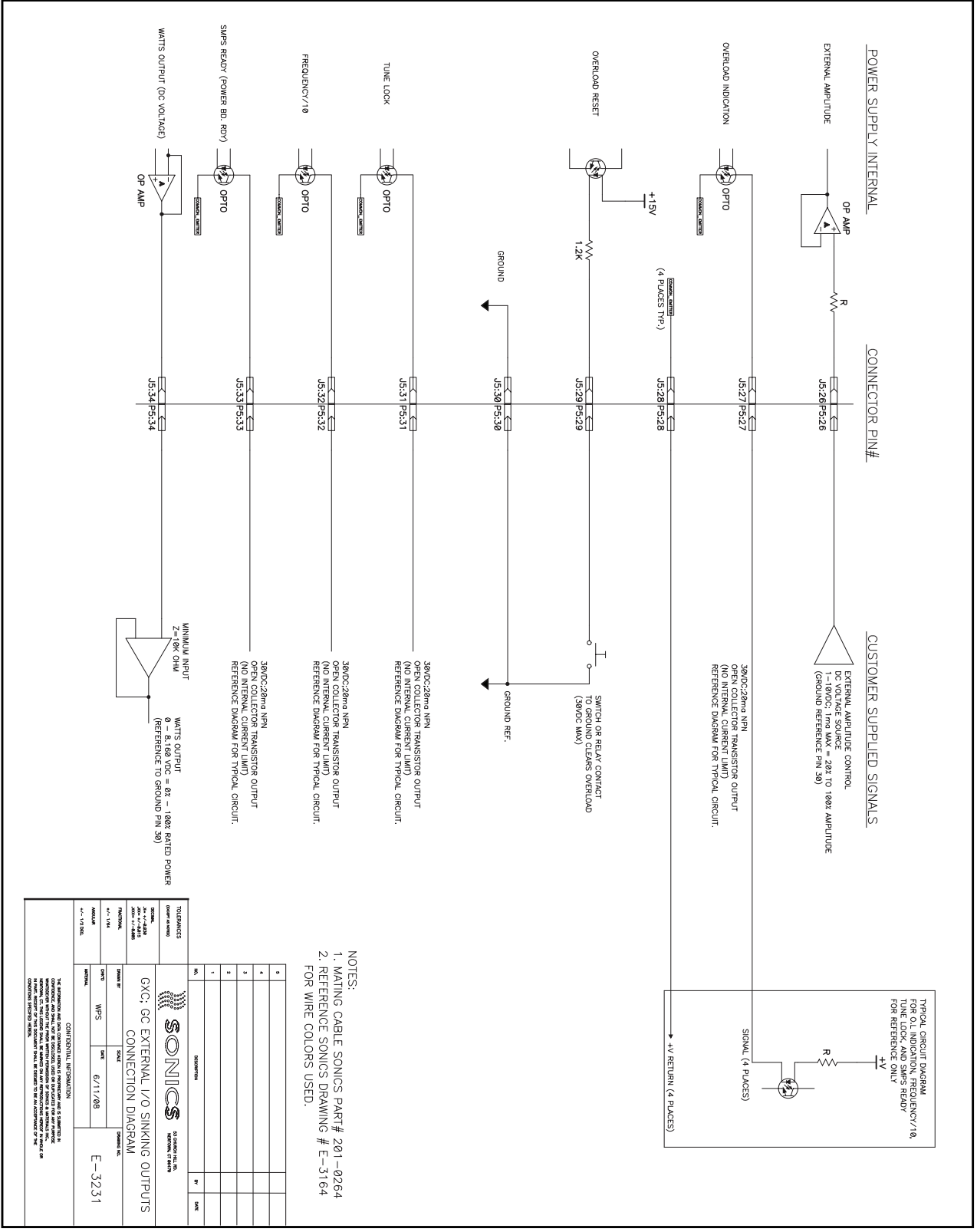
- +24VDC ISOLATED SUPPLIES MAX RATING 24VDC UNREGULATED 500mA MAX
- +24VDC ISOLATED SUPPLY RETURNS ON PINS 2&4 NOT COMMON TO GROUND ON PIN 6, OR PIN 30.
- OVERLOAD INDICATOR - 30VDC; 20mA MAX; NPN OPEN COLLECTOR TRANSISTOR OUTPUT (TO COMMON EMITTER PIN 28)
- NO INTERNAL CURRENT LIMIT PIN 15 IS IN OVERLOAD CONDITION
- TRANSISTOR ON = HORN/STACK IS IN FREQUENCY RANGE WHEN TRANSISTOR IS ACTIVE
- OVERLOAD RESET - 20VDC MAX; NPN OPEN COLLECTOR TRANSISTOR OUTPUT (TO COMMON EMITTER PIN 29)
- NO INTERNAL CURRENT LIMIT
- FOR GC: GXC MODELS DC VOLTAGE OUTPUT (0-8.16 = 0-100% RATED OUTPUT) (0-10VDC = 0-100% RATED OUTPUT)*
- FOR GXC: GXC MODELS DC VOLTAGE OUTPUT (0-8.16 = 0-100% RATED OUTPUT) (0-10VDC = 20-100% AMPLITUDE)
6. WATTS OUTPUT - DC VOLTAGE OUTPUT TO GROUND
- NO INTERNAL CURRENT LIMIT
- NO INTERNAL CURRENT LIMIT
- OSCILLATING AT ULTRASONIC FREQUENCY/10
8. TUNE LOCK - 30VDC; 20mA MAX; NPN OPEN COLLECTOR TRANSISTOR OUTPUT (TO COMMON EMITTER PIN 28).
- NO INTERNAL CURRENT LIMIT
- TRANSISTOR ON = HORN/STACK IS IN FREQUENCY RANGE WHEN TRANSISTOR IS ACTIVE
- OVERLOAD RESET - 20VDC MAX; NPN OPEN COLLECTOR TRANSISTOR OUTPUT (TO COMMON EMITTER PIN 29).
- NO INTERNAL CURRENT LIMIT
- TRANSISTOR ON = FLU/CONTROL BD. READY

DRAWINGS ASSOC. W/ DIAGRAM AND MODELS AVAILABLE ON:

- E-3167 SOURCING OUTPUTS TO PLC (GXC,EXT,GXL)
- E-3168 SINKING OUTPUTS TO PLC (GXC,EXT,GXL)
- E-3170 PLC TO SINKING INPUTS (GXC,EXT,GXL)
- E-3171 PLC TO SINKING INPUTS (GXC,EXT,GXL)
- E-3231 EXTERNAL I/O SIGNALS (GXC,EXT,GXL,GXC,GSC)

FILE # E-3164SCH

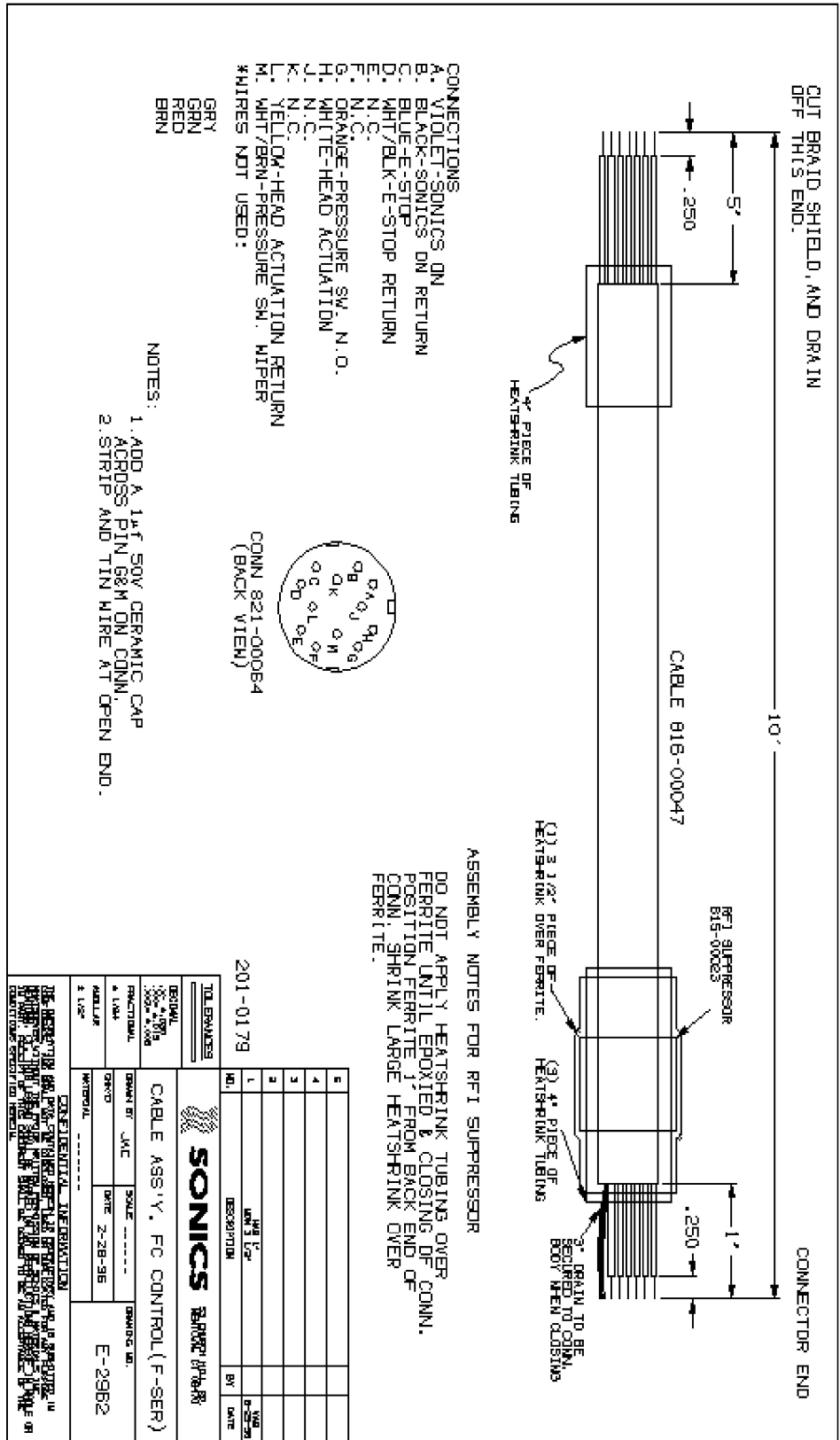
TOLERANCES (UNLESS NOTED)		SONICS 52 CHERRY HILL RD. WATKINS, CT 06095	
DECIMAL	3X +/- 0.030 2X +/- 0.015 1X +/- 0.005	<p>GX-SERIES CONTROLLER EXTERNAL I/O CONNECTIONS</p> <p>DATE: 7-14-05</p> <p>DRAWING NO: E-3164</p>	
FRACTIONAL			
SHOWN BY			
DATE			
AMOUNT	+/- 1/16	<p>CONFIDENTIAL INFORMATION</p> <p>THE INFORMATION CONTAINED HEREIN IS UNCLASSIFIED AND SHALL NOT BE RECLASSIFIED, UNLESS OTHERWISE INDICATED BY SONICS & MATERIALS INC. IN WRITING. THIS DOCUMENT IS THE PROPERTY OF SONICS & MATERIALS INC. AND IS LOANED TO YOU FOR YOUR USE ONLY. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM. WITHOUT THE WRITTEN PERMISSION OF SONICS & MATERIALS INC. IN WRITING, NO PART OF THIS DOCUMENT SHALL BE DUBLISHED OR REPRODUCED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF SONICS & MATERIALS INC.</p>	
	+/- 1/2 DEC.		



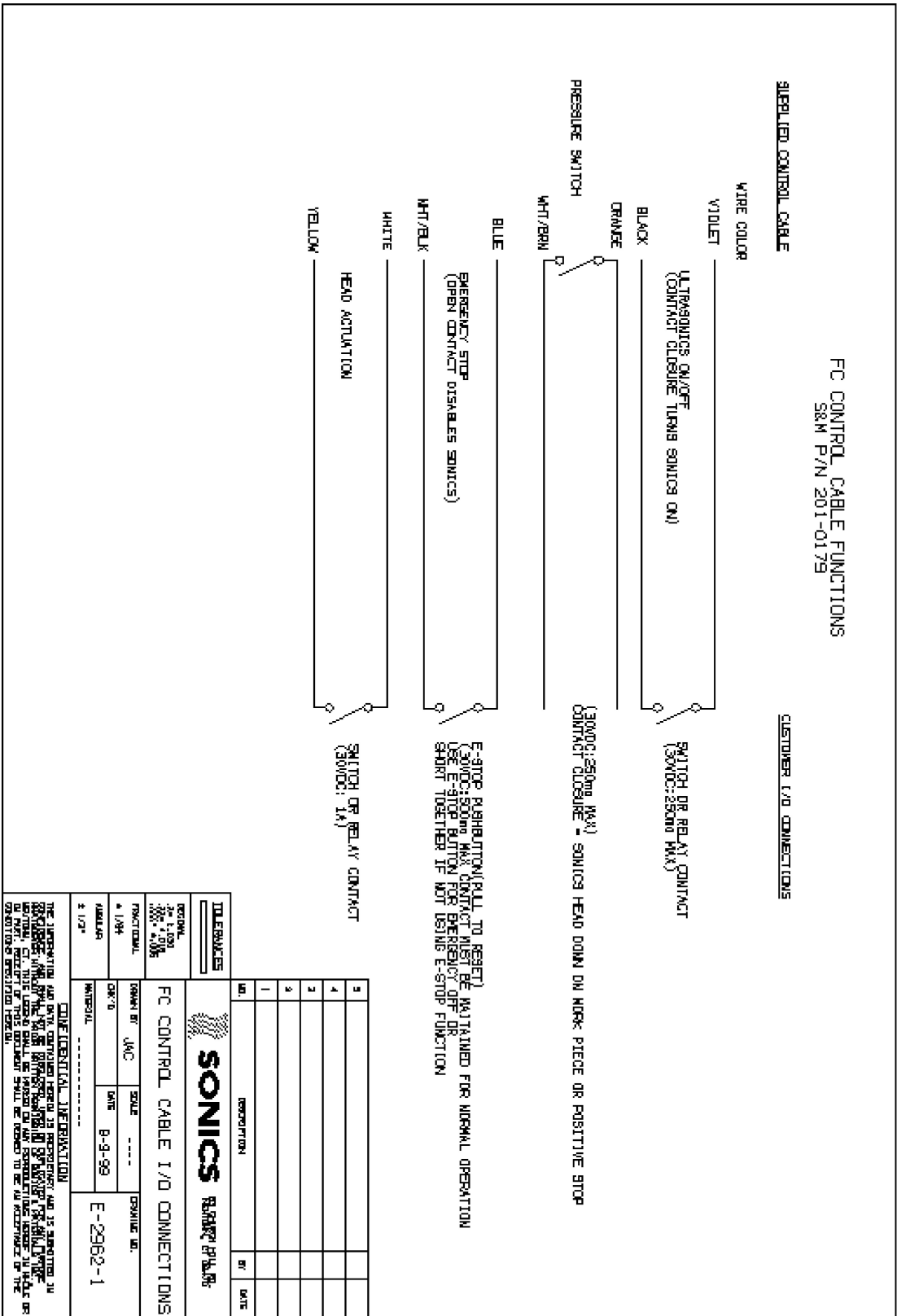
- NOTES:
1. MATING CABLE SONICS PART# 201-0264
 2. REFERENCE SONICS DRAWING # E-3164 FOR WIRE COLORS USED.

TOLERANCES UNLESS OTHERWISE SPECIFIED		SONICS		DATE OF REV.	
0.1 - 1.499	FRACTIONAL	GXC: GC EXTERNAL I/O SINKING OUTPUTS CONNECTION DIAGRAM		E-3231	
1.5 - 2.99	DECIMAL				
3.0 - 9.99	FRACTIONAL	DATE	6/11/08	E-3231	
10.0 - 99.99	DECIMAL	DESIGNED BY			
100.0 - 999.99	FRACTIONAL	CHECKED BY		THE INFORMATION AND DATA CONTAINED HEREIN IS SUBJECT TO THE TERMS AND CONDITIONS OF THE SONICS LIMITED WARRANTY AND IS NOT INTENDED TO BE USED FOR ANY OTHER PURPOSES. SONICS LIMITED SHALL BE RESPONSIBLE FOR ANY DAMAGE TO PROPERTY OR PERSONS ARISING FROM THE USE OF THIS INFORMATION.	
1000.0 - 9999.99	DECIMAL	APPROVED BY			
10000.0 - 99999.99	FRACTIONAL	CONVENTIONAL NOTATION		THE INFORMATION AND DATA CONTAINED HEREIN IS SUBJECT TO THE TERMS AND CONDITIONS OF THE SONICS LIMITED WARRANTY AND IS NOT INTENDED TO BE USED FOR ANY OTHER PURPOSES. SONICS LIMITED SHALL BE RESPONSIBLE FOR ANY DAMAGE TO PROPERTY OR PERSONS ARISING FROM THE USE OF THIS INFORMATION.	
100000.0 - 999999.99	DECIMAL	SONICS			

APPENDIX



APPENDIX



G-SERIES SWITCHES

SWITCH	POS. OFF	POS. ON	DEFAULT
SW2-4	Program Flash (Production only)	Enable-WD (Always on)	ON
SW2-3	Not used		
SW2-2	Not used		
SW2-1	Auto Start	Wait for 'ENTER'	ON

