K~SINE®

MODEL K~1400

Ultrasonic Generator

SERIAL #_____

P.O. #

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Revision: December 5, 2001

MODEL DESCRIPTION

Introduction

Congratulations on your choice of a ***K~Sine*** Model K~1400 Ultrasonic Generator. This instrument is made from the finest materials available and should prove to be an extremely reliable unit for many years to come.

The K~1400 is an external 4 watt ultrasonic generator ready for use in the 62kHz to 66kHz range. The advanced 2 channel design is specifically intended for wire bonding and semiconductor die attachment. This ultrasonic generator has two different built-in interfacing options; the first is the conventional user interface using multi-dials to control the power and time of each channel. The second option works via 8-bit interface with computer control giving way to a multitude of independent power and time controls. For consistent and reliable performance, ***K~Sine*** Model K~1400 searches and locks onto the resonant frequency of a piezoelectric transducer. It automatically compensates for external conditions such as load fluctuations, temperature variations, and tool changes.

ESD Protection

Protection against Electrostatic Discharge is implemented by finishing all exposed painted parts with a powder-coated paint that is dissipative.

Definitions of Models in this Series

- **Model No. K~1400** - Standard external Ultrasonic Generator.
- **Model No. K~1400C** - Includes an 8-bit computer interface.

Specifications

Output Power: *Low Side* – 0 to 2 watts

High Side – 0 to 5 watts

These settings are stable within 0.1% at 20 ohms

Output Frequency: 62 to 66 KHz, automatically tracked

Time Ranges: *Short Setting* - 1 ms to 100 ms

Long Setting - 20 ms to 1 sec. (approx.)

These settings are stable within 0.1% in either range.

Required Transducer Impedance: 20 ohms nominal

Required Services

Electrical service required is 50-60 Hz, single phase, either 115 VAC or 230 VAC, selected by a manual switch located on the back of the K~1400. A fuse and three-prong power cord connector are provided for 115 VAC: For 230 VAC, these must be changed to conform to local requirements.

Dimensions

K~1400 Series Ultrasonic Generator size is 10.0" (25.4 cm) wide x 7.5" (19.05 cm) deep x 3.0" (7.62 cm) high. Weight is 5.4 lbs. (2.5 kg), or approximately 6.6 lbs. (3.0 kg) when packaged individually for shipment.

CAUTIONS

Contained in this section are cautions to be observed during K~1400 Installation and Operation.

Wiring

All of the Ultrasonic Generator wiring has common ground connected to machine chassis and is continuous through the power supply, cord and cord plug. Make sure the receptacle for this plug has a good ground connection.

Safety and Comfort

Some ergonomic studies suggest that long periods of repetitive motion may be traced to certain types of physical discomfort leading to possible injury. We have compiled specific instructions herewith to minimize your chances of experiencing carpal tunnel syndrome (CTS), tendonitis, and tenosynovitis.

It is recommended that your work environment be comfortable for your work situation. A carefully planned work environment can actually increase productivity. ***K~Sine*** recommends that you adopt the following steps for a healthy physical and mental approach to your work.

Exercises

Many motor oil-manufacturing companies often claim that your car engine is most subject to wear and tear when you first start it up in the morning. This is due to the lack of oil on the metal bearing surfaces offering protection when the car is first started. To a great extent, the same can be said for the tendons, bones, and joints that form your body. In the early morning hours, your body tends to retain fluid from its over night rest, and the first time these tendons and joints are put to use, there is often a feeling of stiffness and tightness, and when utilized in an abrupt fashion, can often lead to inflammation and at times injury.

Therefore, it is considered appropriate if not mandatory for most people engaged in physical activities such as sports or heavy labor, such as construction, to perform a variety of warm-up exercises before beginning their job. We have found the same philosophies and many of these same exercises just as beneficial for those individuals who are placed in a seated position for long periods of time where they utilize primarily their upper extremities, and most importantly, their hands and wrists.

We are therefore, suggesting the following gentle warm-up program to be done by you before leaving for work. Begin by gently tilting your head both to the right and left side, to the point of comfortable tension. Next, tilt your head forward and backward, and lastly, turn your head both to the left and to the right. Each of these positions is taken to the end of their natural range of motion and held for a brief period of time. Do not take any of these movements beyond the point of comfort.

Next, for the shoulders, perform a series of simple, slow, shoulder circles in both a forward and backward direction. Five to ten repetitions in each direction should be enough to warm up the shoulder musculature.

Next, while standing, lift your arms laterally out to the side, away from your body and over your head. Repeat this motion five times. For added benefit, make large, wrist circles with your hands while your arms are overhead.

Lastly, and possibly most importantly, it is important that you carefully flex and extend your wrist prior to beginning your workday. Using the opposite hand to bend the wrist downward does this. This is best done with the arm in a forward position with the elbow straight. To assist in wrist extension, lift your wrist up, using the palm of the opposite hand, pressing against the fingers to assist in lifting the wrist. These stretches are done only to the point of comfortable tension and are repeated with both hands.

CAUTIONS

These basic exercises will get you off to a good start in the morning and allow your drive to work to be more comfortable and less likely to increase the tension and tightness in your upper back, shoulders and hands.

Work Station Exercises

Sometimes it is only when we take breaks at work that we realize how stiff or uncomfortable we have become from working in a seated position. When we concentrate intensely on our work, these types of discomfort often go unnoticed and therefore, we recommend the following exercise program.

After Work Cool-Down Exercises

When you return home from work, it is helpful to relax the hard working muscle groups by repeating your morning exercise program. Many people also find that taking a gentle walk or similar forms of activity provide a nice change of pace from the immobile routine encountered at work. Please check with your physician, however, before beginning any type of exercise program.

Take periodic breaks several times during the work schedule. Gently press your hands against a table, stretch, and hold for several seconds. Stretch and massage your fingers, hands, wrists and forearms throughout the day. Shake your hands and fingers to relieve any tension and to promote blood flow. Rotate your shoulders forward and backward in a full circle several times daily. Try to use different muscle groups throughout the day, i.e. if sitting for prolonged periods, get up and walk around several times a day.

If you experience pain any time during the operation of your ***K~Sine*** Ultrasonic Generator consult a qualified health professional.

Chair And Table Top

When evaluating your workstation, pay particular attention to those surfaces that come in contact with your wrist and forearms. Sharp edges or hard surfaces should be modified to form a work surface that is comfortable at the point of contact. Reshaping corners and applying a more comfortable softer surface in the work area can be extremely helpful.

The chair should be comfortable and provide firm support to the lumbar region (lower back). The chair should be adjustable in height so that your forearms form approximate right angles with the upper arms while hands rest upon the tabletop. Next, ensure feet rest flat on the floor and, if not, use a footrest that is high enough so that your thighs are reasonably parallel to the floor while seated. During the course of operating your ***K~Sine*** Ultrasonic Generator, maintain this recommended posture—any slouching puts unnecessary strain on your back and may weaken muscles over time.

Microscope / Monitor

When using a microscope or a monitor it is important to look away from the microscope eyepieces and/or monitor frequently. Try to focus on an object about 20 feet away from several seconds. Eyepieces of the microscope should be clean and microscope should be frequently calibrated for parfocal viewing.

INSTALLATION

Ensure that both the bonder and the ***K~Sine*** Model K~1400 are disconnected from electrical power.

The voltage select switch is located on the rear panel of Model K~1400. Set it to indicate the voltage that is available at your facility. Refer to page 1 for acceptable voltages.

When Model K~1400 is shipped, the lower time and power ranges are selected and ramping is disabled. Internal switches exist to select the timer range, ultrasonic power range, and ramping option. To change any of these selections, the unit must be opened; refer to page 5 for a description of each switch.

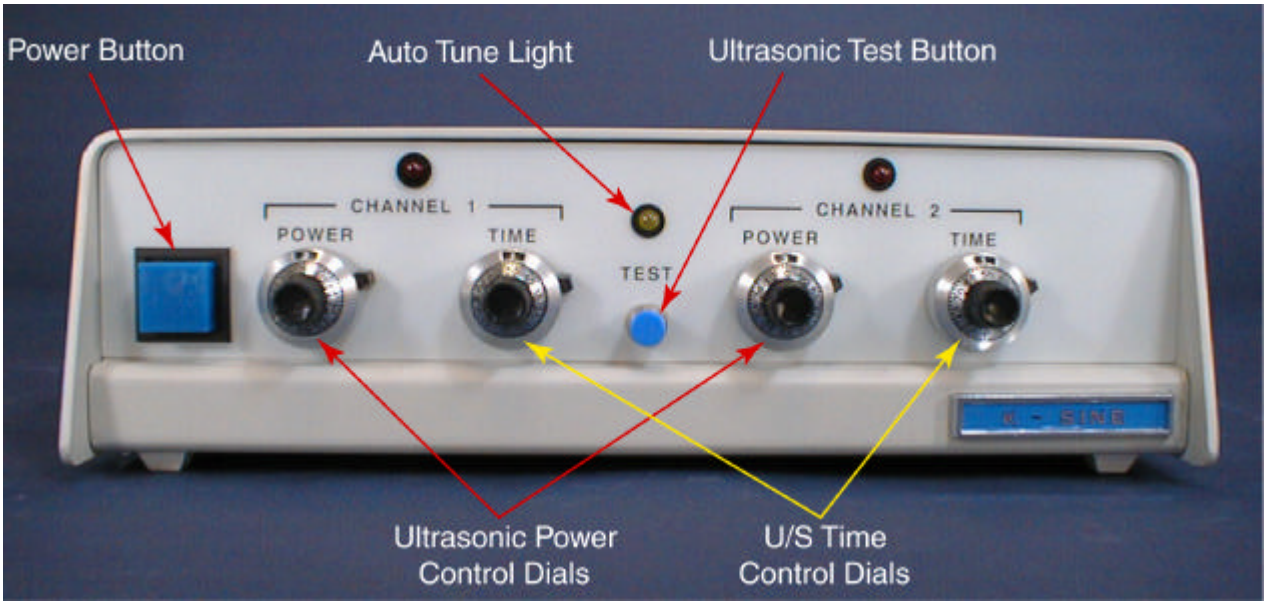
The cabling depends upon the particular bonder. Refer to page 6 for descriptions of the pins of each connector. If this has been done and cables have been designed and made, then connect the bonder to Model K~1400 now.

Connect the bonder and Model K~1400 to electrical power outlets and power them up.

Your *K~Sine* K~1400 Ultrasonic Generator is now ready for operation.

FEATURES

Front Panel



POWER BUTTON

The power button is an unlabeled latching rectangular push-button located at the far left of the front panel. The button controls electrical power to the entire ***K~Sine*** Model K~1400.

POWER CONTROL DIALS

A ten-turn potentiometer is provided to control the power level for each of the two channels. Mother board switch S1 determines the range of these controls as described in (see page 9)

TIME CONTROL DIALS

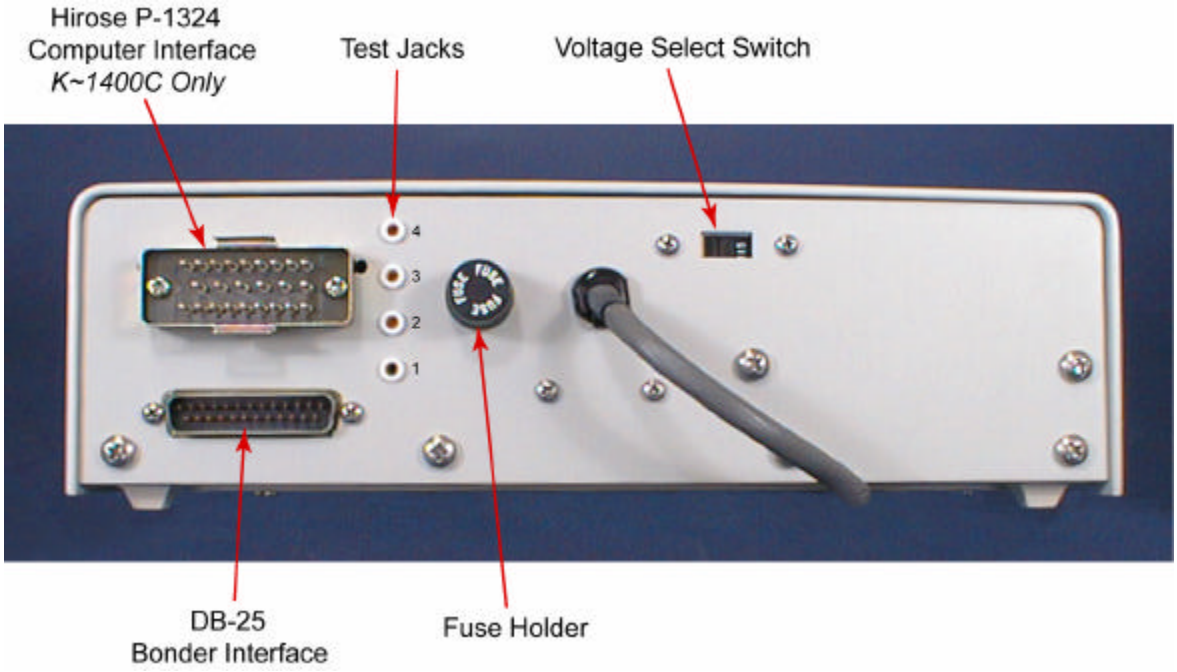
A ten-turn potentiometer is provided to control the bond time for each of the two channels. Timer board switch S1 determines the ranges of these controls as described on page 9.

TEST BUTTON

A blue momentary-contact push-button (labeled TEST) near the middle of the front panel applies power to the transducer when pressed. The power level is always 60% of full power, determined only by the setting of mother board switch S1 (see page 9)

The amber “Auto Tune” light is unlabeled, and is located just above the TEST button on the front panel. It lights whenever transducer resonance is attained.

FEATURES



Rear Panel

FUSE

A fuse holder is on the rear panel. It should contain a 0.5-ampere fuse. To reduce the risk of electrical shock please unplug the power cord when changing this fuse.

VOLTAGE SELECT SWITCH

The voltage select switch is located on the rear panel. It allows compatibility with the voltage that is available at your facility. Refer to page 1 for acceptable voltages. When changing the VOLTAGE SELECT SWITCH please ensure that your K~1400 Ultrasonic Generator is disconnected from its power source. This prevents the possibility of a current surge that will blow the fuse.

TEST JACKS

Convenient test points that allow quick checks of the calibration. See page 8 for further information upon each jack.

BONDER INTERFACE CONNECTOR

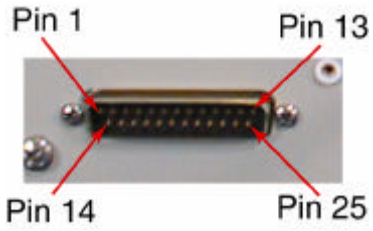
The Conventional Bonder Interface Connector is a 25-pin male connector (Cannon DB-25S) mounted on the rear panel of the Ultrasonic Generator. For details on its use refer to page 7.

COMPUTER INTERFACE CONNECTOR - *K~1400C ONLY*

The 8-Bit Bonder Interface Connector is the upper and larger of the two multi-pin bonder interface connectors on the rear panel of a K~1400C. A standard K~1400 does not have this option. It is a 24-pin male connector (Hirose P-1324). For details on its use refer to page 7.

ADVANCED FEATURES

Bonder Interface Connector



The Conventional Bonder Interface Connector is a 25-pin male connector (Cannon DB-25S) mounted on the rear panel of the Ultrasonic Generator. This connector is identified as J1 in the Mother Board schematic in Section 4 Drawings and Diagrams. The pins are described below.

Pin 5: Internally connected to +12 volts DC. Total current load should not exceed 75 mA.

Pin 7: Channel 2 Select input; channel two becomes active when this input signal is above a threshold of +2.5 volts.

Pin 8: Internally connected to +25 volts DC through a series 1KΩ resistor.

Pin 9: Internally grounded.

Pin 11: Input to an inverter whose open collector output is connected only to Pin 24. Input threshold is +2.5 volts.

Pin 12: Same as Pin 5; the two pins are connected internally.

Pin 14: "Bond Busy" output to bonder. This output is the collector of a transistor (2N3417); the collector is low during the pre-bond delay and during the bond. Note that this is different from the activity of Pin 10 of the 8-Bit bonder interface connector.

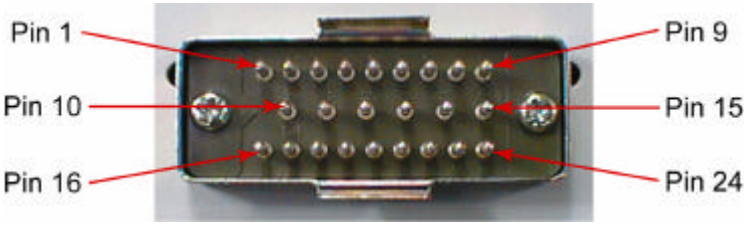
Pin 15 & 16: "High" and "Low" outputs to transducer, respectively. The two wires of the transducer can be wired to these two pins in either order. The peak-to-peak voltage of the "High" output (Pin 15) is greater than that of the "Low" output (Pin 16). Neither of the transducer output pins is directly grounded, but the Low output is indirectly grounded internally through a 1 ohm resistor. Do not ground either of these signals. These outputs are also connected internally to test jacks on the rear panel (see page 8)

Pin 20: Full ultrasonic power is triggered when this input signal exceeds a threshold of +2.5 volts.

> **IMPORTANT!** In some cases, powering off the bonder could turn on the full power output. To avoid this, connect this signal as follows:
>
> 1. Connect Pin 5 (+12v) to Pin 20 through a 10KΩ pull-up resistor.
> 2. Connect Pin 20 to Pin 24 (output of inverter).
> 3. Connect bonder High Ultrasonic output to Pin 11 (input to inverter). Full ultrasonic power is triggered when Pin 11 is pulled low by the bonder.

Pin 24: Open collector output from inverter whose input is connected only to Pin 11.

Computer Interface Connector



The 8-Bit Bonder Interface Connector is the upper and larger of the two multi-pin bonder interface connectors on the rear panel of a K~1400C. A standard K~1400 does not have this option. It is a 24-pin male connector (Hirose P-1324).

This connector is the more versatile of the two bonder interface connectors on the rear panel. It allows the bonder to directly control the power and time, without reference to channels. The bonder can also control the rate of onset of the ultrasonic power by varying the power setting during a bond.

ADVANCED FEATURES

The pins are described below. However, this connector can be configured differently, usually at no additional cost.

Pins 1-8*:* Binary 8-Bit TTL input from the bonder controls the output power level. Front panel settings are ignored and no channel selection signal is needed when these inputs are used. The ultrasonic generator is active whenever any bit is nonzero. Therefore, the bonder controls bond time directly, by the timing of the numeric changes at these pins. The output power increases as the (unsigned) binary number increases, where Pin 1 is the least significant bit and Pin 8 is the most significant bit. Pins 1-8 are pulled down (to ground) through a 2.2KΩ resistor.

Pin 10: Output to bonder to indicate when circuit is "turned", i.e., when transducer resonance is attained. This output is the collector of a transistor (2N3417); the collector is open when the circuit is tuned. The unlabeled AUTO TUNE LIGHT above the TEST button on the front panel illuminates whenever this output is open. Note that this is different from the activity of the "Bond Busy" output at Pin 14 of the conventional bonder interface connector, J1.

Pin 12: Ramping control TTL input from bonder. If motherboard switch S2-3 is open, and if this pin is brought high at about the same time that the ultrasonic generator is activated, then the output power increases gradually, attaining 90% of the set value in 3 milliseconds. This signal should be brought low after the bond is complete. (If motherboard switch S2-3 is closed, then ramping always occurs and this pin is ignored).

Pins 17 & 18: "Low" and "High" outputs to transducer, respectively. The two wires of the transducer can be wired to these two pins in either order. The peak-to-peak voltage of the "High" output is greater than that of the "Low" output. Neither of the transducer output pins is directly grounded, but the "Low" output is indirectly grounded internally through a 1 ohm resistor. Do not ground either of these signals. The "High" output is also connected internally to the third test jack (from bottom) on the rear panel. The "Low" output is connected to the second test jack from bottom.

Pins 22 & 24: Internally grounded.

Test Jacks

Test Jack 4: Internally connected to +12 volts DC (via Pin 4 of J4 on the mother board). Total current load should not exceed 75 mA.

Test Jack 3: Internally connected to the "High" transducer output (via Pin 1 of J4 on the mother board). The instantaneous voltage at this jack, referenced to Test Jack 2, is the instantaneous voltage across the transducer.

Test Jack 2: Internally connected to the "Low" transducer output (via Pin 2 of J4 on the mother board). That output is connected to ground through a 1 ohm resistor, so the instantaneous voltage at this jack, referenced to ground, is equal to the instantaneous transducer current in amperes.

Test Jack 1: Internally grounded (via Pin 3 of J4 on the mother board).

ADVANCED FEATURES

Internal Option Switches

MOTHER BOARD SWITCHES

The following switches are on the mother board, inside the ***K~Sine*** Model K-1400. For a visual reference see page 11.

S1: Has settings labeled LO and HI on the mother board. LO selects the lower output power range 0 to 2 watts. HI selects the higher range 0 to 5 watts. The factory setting is LO.

S2-1: When this switch is OPEN it disables ramping for Channel 1. Otherwise, whenever Channel 1 is selected, the output power increases gradually, attaining 90% of the set value in 3 milliseconds. The factory setting is OPEN.

S2-2: When this switch is OPEN it disables ramping for Channel 2. Otherwise, whenever Channel 2 is selected, the output power increases gradually, attaining 90% of the set value in 3 milliseconds. The factory setting is OPEN.

S2-3: When this switch is OPEN it allows ramping to be controlled by the 8-Bit Computer Interface Connector (see page 7). If this switch is closed, then ramping is always used. The factory setting is OPEN.

TIMER BOARD SWITCHES

The following switches are on the timer board, inside the ***K~Sine*** Model K~1400.

S1-1: When this switch is OPEN it selects the longer timer range (20 ms to 1 Sec) for Channel 1. Otherwise the timer range is 1 to 100 ms. The factory setting for this switch is CLOSED.

S1-2: When this switch is OPEN it selects the longer timer range (20 ms to 1 Sec) for Channel 2. Otherwise the timer range is 1 to 100 ms. The factory setting for this switch is CLOSED.

INTERNAL TEST POINTS

These four test points are used to verify the voltage of each voltage regulator. See page 10 for calibration details.

CALIBRATION

This section details the calibration procedure for ***K~Sine*** Model K~1400. All measurements are made with respect to common ground, unless otherwise noted.

Required Equipment

Procure the following items before beginning the calibration sequence:

- An oscilloscope with at least 10MΩ impedance at the probe.
- A multimeter.
- A 20Ω, 5 watt resistor, to be used as a resistive load.
- A transducer that is known to be in good working condition.
- Use a working bonder as a triggering source.

The following items are helpful, but not essential to the calibration sequence:

- An AC voltmeter capable of measuring rms voltages at 100 KHz.
- A frequency counter.

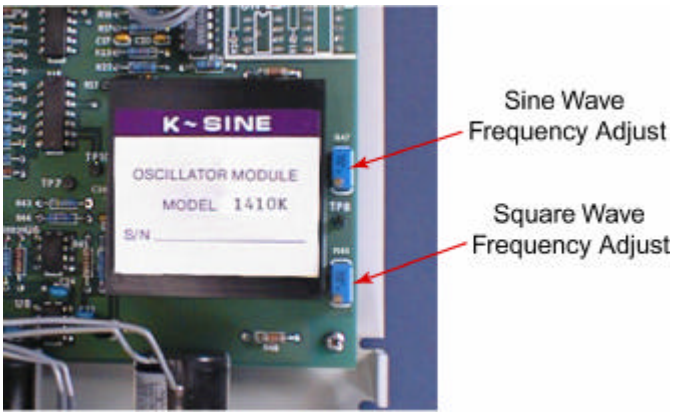
DC Voltage Verification

1. Disconnect all connectors from the K~1400, except the power cord, and remove the top cover. Refer to page 11 for an identification of pots, switches, and test points.
2. Note the settings of mother board switch S1 and timer board switches S1-1 and S1-2, so you can restore their settings when calibration is complete.
3. Turn on the main power. Using the multimeter, verify the DC voltages at internal test points as follows:

TP1	+18v ± 0.7v
TP2	-18v ± 0.7v
TP3	+12v ± 0.3v
TP4	-12v ± 0.3v

Lock Detector Calibration

1. Connect the oscilloscope probe to TP8.
2. Verify that the signal is approximately a square wave.
3. Verify that the amplitude of the signal is about 2.8 V_{P-P}.
4. Adjust R46 until the frequency is 64 KHz ± .5 KHz, i.e., until the period is between 15.5 µS and 15.7 µS.

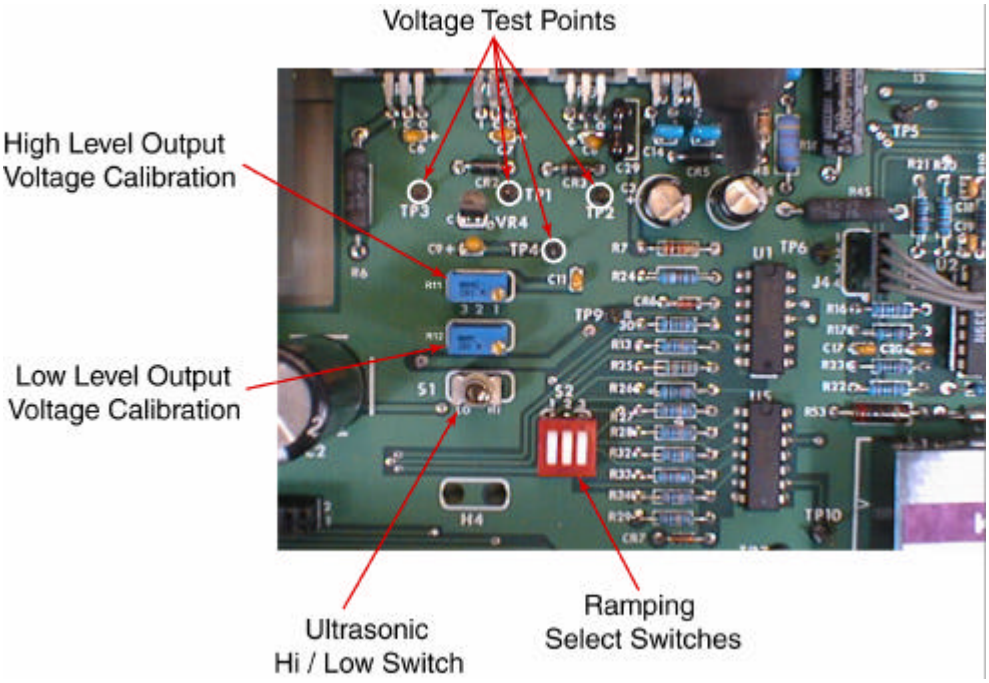


CALIBRATION

Oscillator Calibration

1. Move the oscilloscope probe to TP7.
2. Verify that the signal is approximately a sine wave.
3. Verify that the amplitude of the signal is about 2.7 V_{P-P}.
4. Adjust R47 until the frequency is 63.5 KHz ± .5 KHz, i.e., until the period is between 15.8 µS and 15.6 µS.
5. With no transducer or other load connected, press the TEST button on the front panel. While holding the button, verify that the frequency has dropped, as an indication that the phase-track circuit is working.

Output Voltage Calibration



1. Set mother board switch S1 to the HI position.
2. Connect the 20Ω resistor across the transducer output terminal (Test Jacks 2 and 3 may be used).
3. Move the oscilloscope probe to TP5. Also connect a 100 KHz AC voltmeter, if available, to TP5 for better measurement.
4. Connect the trigger source to the full power control input at J1 Pin 20.
5. Momentarily trigger the full power control input and observe the output voltage (either peak-to-peak or rms). Do no keep the trigger signal on for more than 2.5 seconds.

CALIBRATION

6. If the output is 10.00 V_{rms}, or about 28.3 V_{P-P}, then proceed to the next step. Otherwise, adjust R11 to change to output level, and go back to step 5.

7. Set mother board switch S1 to the LO position.

8. Momentarily trigger the full power control input and observe the output voltage (either peak-to-peak or rms). Do not keep the trigger signal on for more than 2.5 seconds.

9. If the output is 6.00 V_{rms}, or about 17 V_{P-P}, then proceed to the next step. Otherwise, adjust R12 to change the output level, and go back to step 8. Every time R11 is adjusted, then R12 must be readjusted.

10. Replace the 20Ω resistor with the (known good) transducer.

11. Set mother board switch S1 to the HI position.

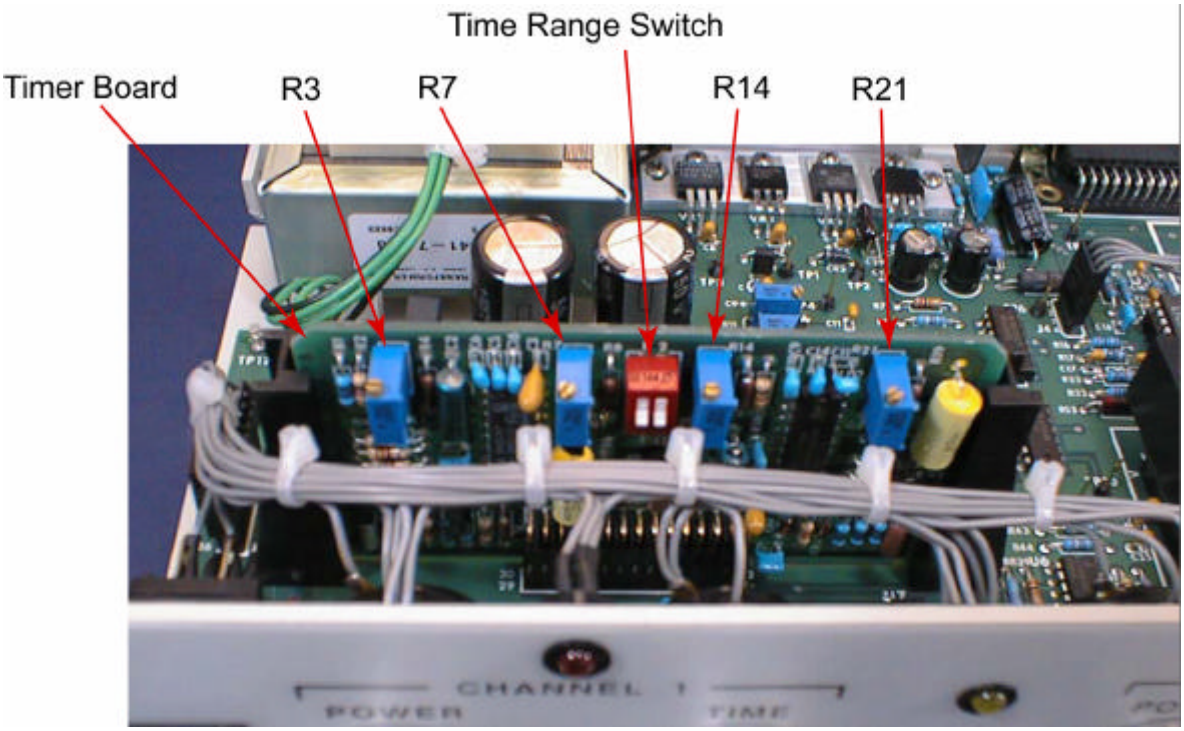
12. Press the TEST button on the front panel. Observe the sinusoidal waveform. It should be clean and undistorted. Also verify that the front panel amber LED is lit.

13. Disconnect the trigger source from the full power control input. Disconnect the oscilloscope and voltmeter from the K-1400.

Phase Calibration

Phase adjustment is not required.

Channel 1 Timer Calibration



CALIBRATION

1. Set mother board switch S1 to the LO position.

2. Set the front panel CHANNEL 1 POWER control dial to 0.0 (minimum power).

3. Set the front panel CHANNEL 1 TIME control dial to 10.0 (maximum time).

4. Set timer board switch S1-1 to select the shorter timer range by depressing the side of the switch that is not labeled OPEN.

5. Connect the trigger source to the Channel 1 Select input at J1 Pin 3.

6. Use the oscilloscope to monitor U1 Pin 5 of the timer board, and momentarily trigger Channel 1. There should be a single rectangular pulse about 10.5 volts high and about 15 ms wide. Adjust R3 on the timer board to change the duration. This is the Channel 1 pre-bond delay.

7. Move the oscilloscope probe to U1 Pin 9 of the timer board, and momentarily trigger Channel 1. There should be a single rectangular pulse about 10.5 volts high and about 100 ms wide. Adjust R7 on the timer board to change the duration. This is the Channel 1 bond time. The Channel 1 red LED indicator should blink each time Channel 1 is triggered.

8. Restore mother board switch S1 and timer board switches S1-1 and S1-2 to their normal settings.

9. Replace the cover of the K~1400.

Channel 2 Timer Calibration

1. Set mother board switch S1 to the Lo position.

2. Set the front panel CHANNEL 2 POWER control dial to 0.0 (minimum power).

3. Set the front panel CHANNEL 2 TIME control dial to 10.0 (maximum time).

4. Set timer board switch S1-2 to select the shorter timer range by depressing the side of the switch that is not labeled OPEN.

5. Move the trigger source to the Channel 2 Select input at J1 Pin 7.

6. Use the oscilloscope to monitor U2 Pin 5 of the timer board, and momentarily trigger Channel 2. There should be a single rectangular pulse about 10.5 volts high and about 15 ms wide. Adjust R14 on the timer board to change the duration. This is the Channel 2 pre-bond delay.

7. Move the oscilloscope probe to U2 Pin 9 of the timer board, and momentarily trigger Channel 2. There should be a single rectangular pulse about 10.5 volts high and about 100 ms wide. Adjust R21 on the timer board to change the duration. This is the Channel 2 bond time. The Channel 2 red LED indicator should blink each time Channel 2 is triggered.

8. Restore mother board switch S1 and timer board switches S1-1 and S1-2 to their normal settings.

9. Replace the cover of the K~1400.

TROUBLESHOOTING

Typically, problems are related to incorrect parameter selection. Once you have checked your programmable parameters for correctness, ensure that all connections made to the host bonder are clean and well seated. If you continue to experience difficulties, please contact the ***K~Sine*** customer service department for immediate and personal assistance. The customer service technician will then have the opportunity to ask questions which will identify the required solution.

In the event that service is desired, contact the ***K~Sine*** sales or service departments. Do not return the K~1400 Ultrasonic Generator without first contacting ***K~Sine*** for packing and shipping instructions. A shipment will not be accepted unless it has been authorized.

Service Record

Use the section below to maintain a service record for your K~1400 Ultrasonic Generator.

DATE	PROBLEM	SOLUTION	TECHNICIAN

WARRANTY

a. Seller warrants to the original Buyer that each new product manufactured by ***K~Sine*** is free from defects in material and workmanship. Seller's liability hereunder shall be limited to the replacement of any product manufactured by ***K~Sine*** provided that the defective product is returned within one year from date of invoice to the ***K~Sine*** factory in Anaheim, California, with transportation charges prepaid. Upon examination by ***K~Sine***, a product found defective due to manufacture and not the result of abuse, unauthorized alteration or normal wear, will be replaced. Seller makes no warranty concerning products or accessories not manufactured by ***K~Sine***. However, Seller will give all reasonable assistance to Buyer in obtaining from the respective manufacturer whatever adjustment is appropriate under the terms of that manufacturer's own warranty. No product may be returned to the factory without a Return Material Authorization (RMA) number issued by authorized factory personnel.

b. This warranty is in lieu of all other warranties expressed or implied. ***K~Sine*** expressly disclaims any and all warranties of merchantability and fitness for a particular purpose. No employee, agent or representative of Seller has any authority to obligate Seller beyond that specifically included herein unless agreed to in writing by an authorized officer of Seller.

c. Seller assumes no liability or risk for any special, direct, indirect or consequential damage caused by defective products manufactured by ***K~Sine***.

Rev. 4/99

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SCHEMATICS

THE FOLLOWING PAGES CONTAIN DRAWINGS AND SCHEMATIC INFORMATION FOR THE *K~Sine* K~1400 SERIES

Model K~1400 uses the following schematics:

B-6513	Mother Board
B-6514	Timer Board
B-6516	Oscillator Module
B-6517	Option Board (K~1400C Only)
B-6774	Power Supply and Wiring Diagram