Applicable System Models:

| HP 20.61-P | HP 35.61-P |
| HP 20.61-H | HP 35.61-H |
| HP 20.62-P | HP 35.62-P |
| HP 20.62-H | HP 35.62-H |
| HP 30.61-P | HP 40.61-P |
| HP 30.61-H | HP 40.61-H |
| HP 30.62-P | HP 40.62-P |
| HP 30.62-H | HP 40.62-H |

Products are manufactured in ISO registered facilities.
#### Revision History

<table>
<thead>
<tr>
<th>Revision Number</th>
<th>Revision Summary</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 00</td>
<td>Initial Release</td>
<td>19, July 2017</td>
</tr>
</tbody>
</table>
This page intentionally left blank
This page intentionally left blank
SECTION 1

Introduction

General User Information ........................................ 3
Read This Manual First ........................................ 3
Notes, Cautions and Warnings ................................ 3
Drawings and Tables ............................................. 3
System Overview .................................................. 4
Key Features ....................................................... 4
General User Information

Read This Manual First
Before operating the Ultrasonic Hand Held System, read this User’s Manual to become familiar with the system. This will ensure correct and safe operation. The manual is organized to allow you to learn how to safely operate this system. The examples given are chosen for their simplicity to illustrate basic setup procedures.

Notes and Tips
Throughout this manual we use NOTES to provide information that is important for the successful application and understanding of the system. A NOTE block is shown to the right.

Cautions and Warnings
In addition, we use special notices to make you aware of safety considerations. These are the CAUTION and WARNING blocks as shown here. They represent increasing levels of important information. These statements help you to identify and avoid hazards and recognize the consequences. Different symbols also accompany the CAUTION and WARNING blocks to indicate whether the notice pertains to a general condition or practice, an electrical safety issue, a hand protection issue or other condition.

Drawings and Tables
The figures and tables are identified by the section number followed by a sequence number. The sequence number begins with one in each section. The figures and tables are numbered separately. The figures use Arabic sequence numbers (e.g. –1, –2, –3) while the tables use roman sequence numerals (e.g. –I, –II, –III). As an example, Figure 3–2 would be the second illustration in section three while Table 3—II would be the second table in section three.
System Overview

The iQ Series Ultrasonic Hand Held System has two major components: an ultrasonic generator, and a hand probe.

Generator

The generator is specifically designed for ultrasonic applications using hand held probes. Using the available system control inputs and outputs, the generator provides a versatile stand-alone workstation.

This product’s rugged internal circuitry ensures a continuous resonant frequency lock at the start of each weld.

Standard to this line of generators is time and energy control. The brightly lit display is easy to read. The menu structure makes programming simple, and the one-touch hot keys give the operator even more flexibility.

It also includes an RFI line filter that passes strict CE test specifications for global applications.

Hand Probes

The probes are perfect for manual spot welding, staking, cutting and inserting applications. Both the HP and PG (pistol grip) models include hangers so, when not needed, a probe can be hung on a counterbalanced hook. Fittings for air-cooling are also standard on all probes.

Key Features

- **Compact Generator** - The generator is easily transported and setup. Its compact size allows for additional space at any table top or work bench.

- **Pulse Width Modulation** incorporates patented circuitry giving the power supply the ability to efficiently change the output amplitude. This makes it possible to start large horns with reduced power. It also provides more efficient switch-mode generator operation and increased reliability.

- **Linear Ramp Soft Start** circuitry allows the acoustic stack to ramp up to operating amplitude smoothly, minimizing start-up surges and abnormal stress to the stack and generator.

- **Digi-Trac Tuning** tracks the resonant frequency of the acoustic stack and adjusts the generator output frequency to match. This is done for every weld cycle and eliminates the need to manually tune the generator.

- **Line Voltage Regulation** automatically maintains constant amplitude regardless of line voltage deviation. The available output power is maintained with any voltage input within the specified range. This provides consistent system performance regardless of line voltage fluctuations. It also eliminates the need for bulky, external constant-voltage transformers.

- **Load Regulation** provides constant amplitude regardless of power draw. The ultrasonic output amplitude level is held to within ±1% to provide weld process consistency and reduced weld cycle times.

- **Industrial Line–Power Source** - standard systems will operate worldwide at all industrial high line voltage levels. There are no internal transformer taps to change for worldwide operation. North American systems are optionally available to operate on the 120VAC line voltage level.

- **Multiple Electronic Overload** protection circuits prevent instantaneous component failure in the event of extreme output overload conditions, and the rated overload power limit is based on the actual true RMS power output level.

- **Trigger by Power** produces greater weld consistency by requiring that a sufficient amount of pressure/force is applied to the part before the actual weld begins.
SECTION 2

Health and Safety

General Considerations ........................................... 7
Plastics Health Notice. ................................................ 7
Electrical Safety ........................................................ 8
This page intentionally left blank
General Considerations

Please observe these health and safety recommendations for safe, efficient, and injury-free operation of your equipment. In this manual, the term system refers to a complete group of components associated with the welding of plastic or metal parts, also known as an ultrasonic assembly system. A typical system consists of a generator and/or ultrasonic process controller, start and stop switches, power controls, connecting cables, and the probe assembly which includes the transducer, booster, horn and replaceable horn tip.

Proper Installation - Operate system components only after they are properly installed and checked.

No Unauthorized Modifications - Do not modify your system in any way unless authorized to do so by the manufacturer. Unauthorized modifications may cause injury to the operator and/or equipment damage. In addition, unauthorized modifications will void the equipment warranty.

Keep the Cover On - Do not remove any equipment cover unless specifically directed to do so by the manufacturer. The generator produces hazardous electrical voltages which could cause injury.

Grounded Electrical Power - Operate this equipment only with a properly grounded electrical connection. (See Page 11 for grounding information.)

Comply with Regulations - You may be required to add accessories to bring the system into compliance with applicable OSHA regulations for noise exposure.

Plastics Health Notice

Before using any ultrasonic welding system, be sure you are familiar with OSHA regulations from the U.S. Department of Labor about the particular type of plastic(s) you are using.

When plastic materials are being processed, they may emit fumes and/or gases that could be hazardous. Make sure you have adequate ventilation whenever these plastics are processed.
Electrical Safety

Domestic Power Grounding

For safety, the power cords used on this product are a three-wire, grounding-type power cord. Figures 2-1 and 2-2 illustrate the appropriate electrical outlet and plug style for the 100-120 volt and 200-240 volt systems. This information applies to systems shipped to North America or Japan.

![Diagram](image)

**Figure 2–1 Example of 120 Volt, Grounded, 3-Prong Plug and Receptacle**

Approved 2 pole, 3 wire grounding receptacle
HUBBELL No. HBL 5262 or equivalent
NEMA Configuration 5–15R or 5–20R

**Figure 2–2 Example of 240 Volt, Grounded, 3-Prong Receptacle**

Approved 2 pole, 3 wire grounding receptacle
HUBBELL No. HBL 5662 or equivalent
NEMA Configuration 6–15R or 6–20R

International Power Grounding

The power cable normally provided for international use is compatible with the power outlet used in many Continental European countries. Refer to Figure 2–3. However, if your application requires another type of power cord, check with your equipment supplier, and follow local regulations concerning proper wiring and grounding.

**Figure 2–3 International 220/240V Grounding**

**CAUTION**

If you have a two-prong electrical receptacle, we strongly recommend that you replace it with a properly grounded three-prong type. Have a qualified electrician replace it following the National Electric Code and any local codes and ordinances that apply. See Figures 2–1 and 2–2 for suggested parts.

**CAUTION**

If there is any question about the grounding of your receptacle, have it checked by a qualified electrician. Do not cut off the power cord grounding prong, or alter the plug in any way. If an extension cord is needed, use a three-wire cord that is in good condition. The cord should have an adequate power rating to do the job safely. It must be plugged into a grounded receptacle. Do not use a two-wire extension cord with this product.
SECTION 3

Installation

Unpacking ............................................. 11
Placing .................................................. 11
RFI Grounding ......................................... 11
Connecting Cables ...................................... 12
System Outputs Connector ......................... 14
This page intentionally left blank
Unpacking
Carefully open your shipping container, and make sure it contains the items shown on the shipping documents. Inspect all items, and report any missing items or damage immediately.

Placing
Make certain generator placement and cable routing do not interfere with normal operation. Maintain easy access to your equipment. The operator should have unobstructed access to cables and wiring.

RFI Grounding
Proper grounding for the generator chassis is essential for the effective suppression of electrical noise or RFI (Radio Frequency Interference). Every ultrasonic generator contains a RFI filter that blocks noise on the AC power line from entering the system control circuitry. This filter also prevents ultrasonic frequency noise from being fed back into the AC power line. For the RFI filter to operate effectively, it is necessary to correctly ground the system.

Connect a grounding wire from the grounding stud connection (see Figure 3-1) to the nearest grounded metal pipe or equivalent earth ground.

See Connecting Cables on the next page.
Connecting Cables - Quick Start Guide

Complete the basic connections as shown below:

- AC Line Input
- HAND PROBE Connector
- Grounding Stud
- AC Power Cord Connection

Step 1. Attach the female end of the power cord (200/240V only) to the generator’s power inlet connector - A in Figure 3-1. (The 100/120V model’s power cord is permanently attached to the unit.)

Step 2. Attach the hand probe’s cable connector to the generator’s HAND PROBE connection. - B in Figure 3-1. Secure the connector to the system using the two jack screws attached to the connector hood.

Step 3. Ground the generator chassis with a user–supplied 14-Gauge wire. Attach one end to the grounding stud - C in Figure 3-1. Attach the other end to the nearest grounded metal pipe or equal earth ground.

Step 4. Attach the male end of the power cord to a suitable line receptacle.

Optional Connections - See Page 14 for information about the rear panel OUTPUTS connector.

NOTE

AC Power Inlet
Depending on your generator model, line voltage required for the generator is either 100-120 VAC at 50/60 Hertz or 200-240 VAC at 50/60 Hertz. The unit has a power switch, and is powered ON whenever the AC line power is live and the switch is in the ON position as shown in Figure 3-2 below.

Figure 3-1 Generator Detail - Rear Views

Figure 3-2 Rocker-style Power Switch/Circuit Breaker
**Power Cords**

**200/240 Volt Systems**
The IEC AC power inlet connector mounted on the rear panel requires a properly configured IEC compliant power cord.

The 200/240 AC power cords supplied with the generators are matched to the ultrasonic output power rating and the continent of specified use. See Table 3-I.

<table>
<thead>
<tr>
<th>Continent of Use</th>
<th>Power Cord Part Number</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>200 - 1541</td>
<td>240V, 10A</td>
</tr>
<tr>
<td>Europe</td>
<td>200 - 1542</td>
<td>240V, 10A</td>
</tr>
<tr>
<td>India</td>
<td>200 - 1624</td>
<td>240V, 10A</td>
</tr>
</tbody>
</table>

Table 3-I Standard IEC AC Power Cord Part Numbers

**100/120 Volt Systems (North America or Japan)**
The power cord (including strain relief) supplied with the 100/120 AC systems is permanently attached to the rear of the generator. Units with this power cord are for use in North America or Japan.

**HAND PROBE Connector**

**Ultrasound Output**
The ultrasound output connector used with this generator is integrated into a D-Sub style connector. This connector provides superior shielding of electrical noise. The output connector mates with a fully shielded ultrasound cable that is secured to the generator with two simple, reliable thumbscrews.

The ultrasonic output from this connector (that drives the attached ultrasonic load) is a very high AC voltage. At high power levels there is high current, and the cable must be securely attached to the hand probe for safe operation. Only use original equipment ultrasound cables for safe and reliable system operation.
System Outputs
(Optional Connections)

The OUTPUTS connector is a four-position wire receptacle-type terminal block. If needed, it can provide the operator with basic system welding status. *Everything connected to the OUTPUTS connector is customer-supplied.* Typically indicator lights or sound modules are powered by these output signals. (The lights or sound modules can be mounted on widely available Stack Light assemblies.) Each output signal is rated to operate on a 24VDC power source and can activate an attached load up to a maximum of 500 mA.

Table 3-II lists the signal names.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0V</td>
<td>Output Common</td>
</tr>
<tr>
<td>1</td>
<td>End of Weld Alarm</td>
</tr>
<tr>
<td>2</td>
<td>Any Fault Alarm</td>
</tr>
<tr>
<td>3</td>
<td>Bad Part</td>
</tr>
</tbody>
</table>

Table 3-II System OUTPUTS Connector Signals

---

**Pin 0V (Output Common)**

Pin 0V is connected to chassis ground.

**Pin 1 (End of Weld Alarm)**

Non-isolated NPN output that sinks current at the End of Weld cycle. It activates when ultrasound switches off, or at the end of a preset Hold period. The signal lasts for one second, then deactivates.

**Pin 2 (Any Fault Alarm)**

Pin 2 is a non-isolated digital NPN status output that sinks current to chassis ground if any fault condition is sensed. This output is active until the start of the next cycle or until ENTER is pressed if in non-latching fault mode. In latching fault mode the user must press ENTER to clear this output.

If a hardware fault like Over Temperature or a power fault occurs, Any Fault is active until the fault is cleared in non-latching fault mode. In latching fault mode, the user must press ENTER to clear this output. However if the fault persists, pressing ENTER has no effect.

**Pin 3 (Bad Part)**

Pin 3 is a non-isolated digital NPN status output that sinks current to chassis ground if a Bad Part is detected. This output is active until the start of the next cycle or until ENTER is pressed if in a non-latching fault mode. It is active until ENTER is pressed if in a latching fault mode.

---

**NOTE**

All output signals are non-isolated and sink current to chassis ground when activated.

---

Refer to Figure 9-1, OUTPUTS Interface Example, Page 65.
SECTION 4

Controls

Front Panel & Power Switch Overview .......................................................... 17
Start-Up Sequence ......................................................................................... 19
LCD Display Overview .................................................................................. 20
This page intentionally left blank
Front Panel and Power Switch Overview

This section gives an overview of the front panel and power switch functions: powering the generator on/off, monitoring the process with the display, and programming with the control keys.

![Generator Control](image)

**Figure 4-1 Front and rear views of the generator**

**Power Switch/Circuit Breaker**

The power switch/circuit breaker has a rocker-style actuator switch that will activate or deactivate the AC power to the system. The power ON position is marked with the internationally recognized I symbol, the power OFF position is marked with the 0 symbol. This power switch also integrates an appropriately sized over-current protection circuit breaker function in the generator.

If an over-current condition trips the circuit breaker, it will automatically switch to the OFF position. If the overload current that caused the circuit breaker to trip is due to a transient condition, the circuit breaker can be reset by switching the actuator back to the ON position.

**CAUTION**

If, when resetting the circuit breaker after it has tripped, it immediately trips again, there is likely an internal system malfunction, and the generator will need service. Do NOT repeatedly try to reset the circuit breaker. If it trips, this will only cause more damage to the generator.

**Control Keys**

The control keys shown in Figure 4-1 and described below, are used to display information, and to program the generator.

**INFO**

Press this key to get system information or to modify the hardware settings.

- **System Information** - Identifies the current version of system software.
- **Advanced Process Settings** - Weld Mode, Buzzer, and Fault latching features.
- **Advanced Generator Settings** - Freerun, Ramp up, and Lock and Hold features. Global Settings: Language, and Keyboard features.

**SETUP**

Use the SETUP key to Load, Store, or Delete as many as eight setups.

Continued
Control Keys

AMP
Set the ultrasound amplitude output level in the range of 20 to 100%.
Default amplitude is set to 100%.

TRIGGER
This key is used to enable trigger by power.

TIME
Use this key to select time as the primary method of welding. Set the weld time (seconds).

ENERGY
Use this key to select energy as the primary method of welding. Set the weld energy (joules).

HOLD
Hold is a time period beginning after the weld portion of the cycle is complete. The operator holds the probe in place applying pressure to the weld, and an audible alarm indicates that the Hold time is finished. Hold can be set to a maximum of 30 seconds.

CANCEL
Press CANCEL to return to the previous screen. Think of it as a “back” key. Press this key when you do not want to store the selection in memory.

ENTER
Press the ENTER key to select a menu item, and move to the next level of the menu. Think of it as a “forward” key. When pressed, it also confirms and stores a selection in memory. It is also used to reset a latched condition.

Arrow Keys
Press the right and left arrow keys to move the cursor to the right or left.

+ and - Keys
Press these keys to increase or decrease the value of a selected digit.

System LCD Display
This high resolution, multi-line display provides a clear graphic interface to the operate and in-cycle screens needed to monitor and program the system.

Power Bar Graph
The Power Bar Graph appears at the bottom of the LCD display. It is a high resolution graph that represents readings from 0% to 100%. Above 80% power, the indication is yellow. Above 90%, the indication is red.

In the example below, 40% of the available power is used during the weld cycle. The display shows an In Cycle screen (while U/S is active).

In the example below, 40% of the generator power was the maximum (peak) power delivered in the previous weld. The display shows an Operate screen (while U/S is inactive).

CAUTION
Make sure the stack is properly assembled before it is connected to the system. The horn should never come in direct contact with a metal fixture or anvil when ultrasound is activated.
Start-up Sequence

After all connections have been completed.

1. Press the Power Switch to the ON position (Figure 4-2). The generator will then perform a self-diagnostics sequence.

2. The Power-up screen will appear briefly - Figure 4-3.

3. The next screen is the Operate screen indicating that the welder is ready for a new weld to begin. The display shows the weld method and part data for the previous weld (See Figure 4-3a).

Note: On power up, the display will read zeros, because the previous weld data is not stored when the power is off.

Starting a Weld Cycle

1. If the generator is not powered, press its Power Switch/ Circuit Breaker to the ON position.

2. Select the setup you want to use, if appropriate.

3. Apply the probe tip to the components to be ultrasonically joined, and press the hand probe’s trigger switch to activate ultrasound.

4. After meeting the weld parameters (and with the Hold time set to zero) - in either Manual, Time or Energy modes - an internal alarm beeps once after the weld setting is met, or after the trigger switch is released.

   Depending on optional customer OUTPUTS connections - System Outputs, Page 14 - external audible or visual alerts can be activated as well.

5. Release the probe’s activation switch (trigger), and if appropriate, apply pressure while an optional Hold time elapses. The generator signals when that period is over by sounding an audible alert.

   The user can release the activation switch during the Hold time, but there will not be an audible beep until the preset Hold time ends.

Stopping a Weld Cycle

1. Release the hand probe’s activation switch (trigger) to abort a weld cycle and stop ultrasound.

2. In addition, press the generator’s Power Switch/ Circuit Breaker to the OFF position to power down the generator.

   NOTE

   The system will not beep as described here if the Audible Alarm is OFF.

   See Hardware Settings, Page 27 to learn how to turn the Alarm ON or OFF.
LCD Display Overview
There are two basic kinds of screen displays:

**Operate** screens, and **In Cycle** screens.

An **Operate** screen tells the operator what happened in the last weld cycle.

![Figure 4-4 Example of an Operate Screen](image)

An **In Cycle** screen activates when the probe activation switch (trigger) is pressed.

![Figure 4-5 Example of an In Cycle Screen](image)
SECTION 5

Process Control Settings

Select the Welding Mode .............................................. 23
Navigating Through the Modes ................................. 24
Hold ................................................................. 26
Amplitude Adjustment ........................................... 26
Trigger by Power .................................................. 27
System Info, Hardware Settings, Generator Settings ...... 28
Setup Maintenance ................................................. 30
This page intentionally left blank
Process Controller Settings

This section of the manual helps the user become familiar with the operating modes, and illustrates some typical programming steps.

There are three welding modes available. These correspond to the three ways in which the welder can be used: Manual, Time, and Energy.

Select the Welding Mode

**Manual** - In MANUAL mode the operator controls the weld cycle. The cycle starts when the operator presses the hand probe’s trigger switch, and the ultrasonic signal (U/S) activates. When the trigger switch is released, the ultrasonic signal stops, and the cycle is complete. (Manual mode is the default selection.)

**Time** - In TIME mode the operator sets a maximum time (seconds) the ultrasonic signal will be active for each weld cycle. The cycle starts when the hand probe’s trigger switch is activated, and the U/S activates. The U/S stops when the programmed time is reached. The trigger switch must be held activated for the entire welding cycle. Then it is released so that a new weld cycle can begin.

**Energy** - In ENERGY mode the operator sets a maximum energy (Joules) the generator will reach during the weld cycle. [A maximum weld time must be set when welding by energy. If the energy level is not reached, the preset for time will determine when the U/S is deactivated.] When the preset energy level is reached, the U/S will be deactivated. The cycle starts when the hand probe’s trigger switch is pressed, and U/S is activated. When the programmed energy is reached, U/S stops. The trigger switch must be held activated for the entire welding cycle. Then it is released so that a new weld cycle can begin.

NOTE

With one exception, U/S is activated anytime the probe’s trigger switch is pressed regardless of operating mode, or what is displayed on the LCD screen.

The EXCEPTION - When a fault has occurred in Latching Fault Mode. In that case ENTER must be pressed to clear the fault before U/S can be activated.
Navigating Through the Modes

When the generator is first powered up, the default operating mode is Manual, and Manual Weld is shown at the top of the display as shown in Figure 5-1.

Navigate to Time Mode

1. Follow the sequence shown in the figures to the right to navigate from Manual mode to Time mode.
   In Manual mode, press the TIME key (Figure 5-2).

2. Set the time.
   Use the ← → and the + − keys to move the cursor and to set the digits for the weld time you want (See Figure 5-3).

3. Press the ENTER key to accept the time that has been set
   Press the CANCEL key if you decide not to set the time.

NOTE

Navigating to Manual Mode

Set Time or Energy (depending on mode) to OFF, and press ENTER. This will put the welder back in Manual mode.

Alternately:
Press the info key, select Weld Mode, and then push ENTER. A pop up screen appears. Use the up arrow to select Manual and press enter.
Navigate to Energy Mode

1. Follow the sequence shown in the figures to the right to navigate from Time mode to Energy mode.

In Time mode (See Figure 5-5), press the ENERGY key, and the screen as shown in Figure 5-6 appears.

2. Use the ←→ and the + - keys to move the cursor and to set the digits for the energy you want (See Figure 5-7).

3. Press the ENTER key to accept the energy that has been set. Press the CANCEL key if you decide not to set the energy.

4. If you set the energy level, a maximum weld time needs to be set as well. Set a time that is reasonable for your application. The maximum weld time is 30 seconds.

   The time can not be set below 0.001 second.

   Use the ←→ and the + - keys to move the cursor and to set the digits to the time you want (See Figure 5-8).
Hold

HOLD is used most often with Time or Energy modes, but it can be used with the Manual mode. It is a period of time that can be set to follow release of the probe’s trigger switch.

During HOLD the operator typically applies pressure to the part being welded. The operator will hear an audible alarm that serves as an indicator that HOLD has finished, and the probe can be lifted.

HOLD does not allow the operator to begin a new cycle until the HOLD cycle has finished.

To set a HOLD period:
2. Set the time and energy parameters as needed.
3. Press the HOLD key. The screen will appear as it does in Figure 5-9a.
4. Set the time with the + - keys.
   (A maximum of 30 seconds.)
   Figure 5-9b shows a setting for 2.0 seconds.
5. Press the ENTER key to confirm your selection.

Amplitude Adjustment

Amplitude refers to the movement of the horn at its workface. The higher the amplitude setting, the higher the power output level will be at a particular pressure level.

Amplitude settings are given as a percent of the horn’s nominal amplitude in the range of 20% to 100%. It is typical to leave the amplitude setting at 100% for maximum power output.

To adjust amplitude:
1. Press the AMP key. The screen will appear as in Figure 5-10.
2. Set the amplitude level using the left right arrow keys and the + - keys.
3. Press ENTER to confirm your amplitude setting.

NOTE
The generator’s end of HOLD signal will only be heard if the audible alarm is ON.
The Audible Alarm can be set ON or OFF. See Hardware Settings on the next page.
Trigger by Power

Push ENTER to toggle from OFF to ON. When Trigger by Power is selected, three additional settings are presented:

- **Trigger Amplitude** - This is the percentage of amplitude that the generator applies to the horn prior to reaching the Trigger Power setting (See Figure 5-11b).

- **Trigger Power** - This is the power level that must be reached at the Trigger Amplitude setting for the weld cycle to start (See Figure 5-12).

- **Trigger Timeout** - This is the maximum time the welder remains at the Trigger Amplitude setting before aborting the weld cycle (See Figure 5-13).

For a more detailed explanation of Trigger by Power, please refer to Application Note 506 found on our website at:


### Trigger By Power

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigger By Power</td>
<td><strong>ON</strong></td>
</tr>
<tr>
<td>Start Amplitude</td>
<td>60%</td>
</tr>
<tr>
<td>Trigger Power</td>
<td>40W</td>
</tr>
<tr>
<td>Trigger Timeout</td>
<td>4.000s</td>
</tr>
</tbody>
</table>

*↑↓ to highlight  Press ENTER to toggle*

#### Figure 5-11a Trigger By Power

#### Start Amplitude

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

*←→ to highlight  ↑↓ to change*

#### Figure 5-11b Start Amplitude

#### Trigger Power

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>

*←→ to highlight  ↑↓ to change*

#### Figure 5-12 Trigger Power

#### Trigger Timeout

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>3.000</strong></td>
</tr>
</tbody>
</table>

*←→ to highlight  ↑↓ to change*

#### Figure 5-13 Trigger Timeout

**NOTE**

Trigger by Power is only available when the weld mode is either Time or Energy.
System Information, Hardware Settings, Generator Settings

When the INFO key is pressed the display appears as seen in Figure 5-14a. From here System Information can be viewed, Hardware Settings can be updated, and Generator Settings can be updated.

1. System Information

   Push enter to display model type and firmware information.

   Figure 5-14b shows an example of this information.

2. Hardware Settings

   Weld Mode
   Displays the mode (See Figure 5-15). Push ENTER to change the mode.

   Buzzer
   Push ENTER to change the status of buzzer from OFF to ON. When ON, buzzer will activate at the end of the cycle.

   Latch On Fault
   Push enter to toggle mode from OFF to ON.
   If Latch on Fault is on, and a fault occurs, the alarm sounds twice (beep, beep) indicating the generator is latched and it will not weld again until the fault is cleared.
   Pressing ENTER clears the fault, and the next cycle can begin.
   If Latch on Fault is off, and a fault occurs, the audible alarm (beep, beep) will be heard, but welding can continue.

   NOTE
   Changes in Hardware Settings take place after ENTER is pressed.
3. **Generator Settings**

**Free Run Frequency**

Free run is the frequency at which the generator drives the ultrasound output pulses until a valid feedback signal is detected. Typically this value should be below the operating frequency of the probe (See Figure 5-16a).

Push ENTER to change the current value.

**Ramp Up Time**

This parameter increases the amplitude linearly in the programmed time period at the start of the weld from zero to the programmed amplitude level. This brings the probe up to operating amplitude smoothly preventing shock stress.

Push ENTER to change the current value.

**Lock and Hold**

For an explanation of Frequency Lock and Hold, please refer to Application Note 505 found on our website at:


Push ENTER to change the current value.

**Language**

This enables one to select which language is displayed. Press ENTER to select language (Figure 5-17).

**Keyboard**

Pushing the enter button enables the keyboard function. This facilitates entering weld time and energy values directly by number. Pushing the ENTER button will toggle the feature on and off. As shown in Figure 5-16.

When the TIME or ENERGY button is pushed, a numerical keypad will be displayed (Figure 5-18). Use the left and right arrows along with the up and down arrows to highlight the desired value and push ENTER. The value will be entered from left to right. (Figure 5-18) Highlight the displayed value and push ENTER to accept. (Figure 5-19).

Select “Weld Time” or “Energy” as shown in Figure 5-20. A pop-up screen will appear that will enable one to use the up and down arrows to select the weld method. Figure 5-21.
Setup Maintenance

Introduction

The screens available in Setup Maintenance allow the operator to Load, Store, or Delete generator weld setups. As many as eight (8) setups can be loaded and stored for your convenience.

Navigating

When the SETUP key is pressed, the screen will display the weld method and the value for each parameter. Use the up and down arrow to select a setup.

- **Load** - (Load means to put data into the generator’s memory, or to program a setup.)

  With the desired setup selected (Figure 5-22a) press ENTER. A pop-up screen asks to confirm loading the selected setup (See Figure 5-22b).

- **Store** - (Store means to save the setup data.)

  Tap the right arrow key once to highlight Store. See Figure 5-23a.

  Press ENTER, and a pop-up screen as shown in Figure 5-23b appears.

  Select YES if you want to overwrite (replace) what was in the setup with what has been updated in the setup, and select NO if you do not want to change anything in that setup.

  Press the ENTER key to save your selection.

- **Delete** - To delete the setup, select Delete as shown in Figure 5-24, and press the ENTER key. A pop-up screen appears to ask you to confirm your choice (See Figure 5-24b).

  Select YES or NO, and press ENTER again.

  Continued
Setup Maintenance  Continued

Storing the Current Setup

The following example will demonstrate how to load and store a setup:

1. Follow instructions on Page 24 to set the mode to *Weld by Time*. Set the time to 1.520 seconds (See Figure 5-25).

2. Press SETUP and then press the + key to select an unused setup (See Figure 5-26a).

3. Use the right arrow key to select Store, and then press ENTER. A pop-up screen will be displayed to confirm overwriting the selected setup (See Figure 5-26b). Select YES, and then push ENTER. You will be returned to the Operate screen.

4. Confirm that your setup has been stored in memory by going back to SETUP and selecting the setup you just saved. Your new setup should appear as it does in Figure 5-27 with the new *Weld by Time* value.

Loading a Setup

To load a setup previously stored:

1. Press SETUP and with Load highlighted, use the + - keys to select the number of the setup you want to load.

3. Press ENTER, and a pop-up screen will ask you to confirm your selection. Make your choice, and press ENTER.

4. The Operate screen will display this setup selection as a number in the lower right hand corner.

Deleting a Setup

To delete a setup previously stored:

1. Press SETUP and with Delete highlighted, use the + - keys to select the the setup you want to delete.

3. Press ENTER, and a pop-up screen will ask you to confirm your selection. Make your choice, and press ENTER.

4. Check that the setup is deleted. Press SETUP, and the Setup Maintenance screen will show EMPTY for the setup you just deleted.
SECTION 6

Probes and Probe Stacks

Ultrasonic Probe Overview ........................................ 35
   Theory of Operation .............................................. 36
   Probe Configuration ............................................ 36
   Ultrasonic Horn ................................................... 37
   Booster ............................................................... 37

Stack Assembly ......................................................... 38
   Installing Replaceable Tips ..................................... 38
   Mounting Stud to Horn/Booster ............................... 39
   Horn to Booster .................................................... 40
   Booster to Probe .................................................. 40
   Horn to Probe ....................................................... 40

Stack Disassembly ....................................................... 42

Booster Notes .......................................................... 44
This page intentionally left blank
Ultrasonic Probe Overview
The three types of probes used with the iQ Hand Held Systems are shown in Figure 6-1 below.

Operating Notes
Compressed Air Fitting - In continuous duty operation, it is important to keep the probe cool with compressed air. Use the air fitting to connect the air source to the probe. See Section 7, Specifications for more detail.

CAUTION
The ultrasonic cable carries high electrical current when in operation. Do not nick or cut this cable. If cut, there would be a high potential for electric shock!

NOTE
Compressed air supply: Make sure the air is clean, oil-free, and dry.

Figure 6-1
Typical Hand Held Probes
Theory of Operation

Plastic welding is the most common application of ultrasonic assembly. To perform ultrasonic plastic welding, the vibrating tip is brought into contact with one of the work pieces. Pressure is applied and ultrasonic energy travels through the material generating frictional heat at the contact point of the two parts. The frictional heat melts a molded ridge of plastic on one of the pieces and the molten material flows between the two surfaces. When the vibration stops, the material solidifies forming a permanent bond.

Probe Configuration

A basic ultrasonic probe package consists of:

1. A probe which houses the transducer to convert the electrical energy supplied by the generator into mechanical vibrations.

2. A horn to transfer the mechanical vibrations from the probe to the parts to be welded.

Optional components include special replaceable tips which can be threaded on to the tip of the horn, and a booster to amplify the mechanical vibrations of the horn. A basic hand–held probe system is shown in Figure 6-2. The hand probe is easily identified by its trigger actuator and permanently attached cable. Normally a booster is not used with a hand probe as this increases the length and weight and reduces its versatility. The optional threaded titanium tip can be used when the application calls for a staking profile or a pointed spot weld. Replaceable tips are not commonly used in high–volume production environments.

CAUTION

Never use the hand probe if the cable insulating jacket is cut or damaged in any way.

Figure 6–2 Hand Probe, Horn and Tip
Ultrasonic Horn
The horn transfers the ultrasonic mechanical vibrations (originating at the transducer in the probe housing) to the plastic parts through direct physical contact. The horn is precision machined and designed to vibrate at either 20kHz, 30kHz, 35kHz, 40kHz, 50kHz or 70kHz. The tuning is accomplished using electronic frequency measurement. Inherent variations in material composition prevent tuning by dimensional machining alone.

There are many different horn profile styles depending upon the process requirements. Factors which affect the horn design are the materials to be welded and the method of assembly. Horns are usually constructed from aluminum, hardened steel or titanium. As the frequency increases, vibration amplitude typically decreases, but internal stress in the horn increases. Higher frequencies are used for delicate parts that cannot handle a lot of amplitude. Some factors to keep in mind for high-frequency (e.g. 40kHz) ultrasonic welding versus low-frequency (e.g. 20kHz) ultrasonic welding are listed here.
1. Stress in the horn is higher at high frequencies.
2. Wear on the horn is greater at high frequencies.
3. Clean and flat mating surfaces between the horn, booster and transducer are more critical at high frequencies.

Booster
The function of a booster is to alter the gain (i.e. output amplitude) of the probe. A booster is amplifying if its gain is greater than one and reducing if its gain is less than one. A neutral or coupling booster is used to provide an additional clamping location for added probe stack stability. A probe designed to be mounted in a fixture along with a booster and horn is shown in Figure 6–3. This is commonly referred to as a stack. As indicated, the components are secured with threaded studs.

Figure 6–3  Probe, Booster and Horn
Stack Assembly

Attaching a Replaceable Tip to a Horn

1. Inspect all horn and tip surfaces for stress cracks, chips, or gouges. Any of these irregularities will affect operation and could lead to further equipment damage. Contact the Dukane Ultrasonics Tooling Department concerning damaged horn components.

2. Apply an extremely thin layer of a high temperature, high pressure silicon grease to the back surface that mates with the horn. The grease will allow both surfaces to intimately mate and become acoustically transparent which improves the energy transfer. Do not apply any grease to the threads. We recommend Dow–Corning #4 (or #111 as an alternate). A small packet of Dow–Corning #4 is supplied with the system. If you cannot use a silicon–based grease in your facility, a petroleum–based grease may be used. However, it is likely to leave carbonaceous deposits on the surface, and require more frequent joint maintenance. Failure to follow these instructions, may result in the mating surfaces bonding and difficulty removing the tip from the horn.

3. Thread the tip into the horn and tighten to the torque specifications below using an open end wrench of the correct size to fit the wrench flats of the tip. This is illustrated in Figure 6–4. If necessary, use a spanner wrench (on horns with spanner wrench holes) or an open end wrench (on horns with wrench flats) to keep the horn from turning in your hand. A canvas strap wrench is permissible if it does not gouge or scratch the horn.

NOTE
Do not apply any grease to the threads of the replaceable tip. This may cause the tip to loosen from the horn resulting in inconsistent operation.

CAUTION
NEVER clamp the horn in a vise. The resulting scratches or gouges in the surface are stress risers which may result in cracks.

Replaceable Tips to Horn

<table>
<thead>
<tr>
<th>inch-lb</th>
<th>ft-lb</th>
<th>N-m</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>360</td>
<td>30</td>
<td>40.7</td>
<td>1/2&quot; x 20 tpi tip threads</td>
</tr>
<tr>
<td>336</td>
<td>28</td>
<td>38</td>
<td>3/8&quot; x 24 tpi tip threads</td>
</tr>
<tr>
<td>300</td>
<td>25</td>
<td>33.9</td>
<td>5/16&quot; x 24 tpi tip threads</td>
</tr>
<tr>
<td>240</td>
<td>20</td>
<td>27.1</td>
<td>1/4&quot; x 28 tpi tip threads</td>
</tr>
</tbody>
</table>

Table 6-I Tip Torque Unit Conversions

NOTE
Dukane Part No. for the 20kHz spanner wrenches is 721–68.

Dukane Part No. for 30kHz, 35kHz, and 40kHz spanner wrenches is 721–44.
Attaching the Mounting Stud to a Horn or a Booster

1. Inspect the stud for cracks or damaged threads. Replace the stud if it is cracked or otherwise damaged.

2. Remove any foreign matter from the threaded stud and the mating hole.

3. Thread the mounting stud into the input* end of the horn or the input* end of the booster and tighten to the following torque specifications using an Allen wrench in the socket head of the mounting stud. Table 6-II lists the torque specifications in units for both English and Metric systems of measurements.

**DO NOT** hold the booster by the mounting rings when tightening stud. The mounting rings have a shear pin which could snap under excessive torque. Use a spanner wrench (on horns with spanner wrench holes) or an open end wrench (on horns with wrench flats) to keep the horn or booster from turning in your hand.

<table>
<thead>
<tr>
<th>in-lb</th>
<th>ft-Lb</th>
<th>N-m</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-18</td>
<td>1 - 1.5</td>
<td>1.4 - 2</td>
<td>1/2” X 20 tpi studs</td>
</tr>
<tr>
<td>12-18</td>
<td>1 - 1.5</td>
<td>1.4 - 2</td>
<td>3/8” X 20 tpi studs</td>
</tr>
<tr>
<td>12-18</td>
<td>1 - 1.5</td>
<td>1.4 - 2</td>
<td>8 mm studs</td>
</tr>
</tbody>
</table>

* Always assemble the mounting studs that mate boosters, transducers and horns to the input end of the horn or the input end of the booster first. This is shown in Figure 6-6.

**NEVER** thread a stud into the transducer or the output end of the booster first. See **Booster Notes** in this section for correctly identifying the output end of a booster.
Attaching The Horn to a Booster, Booster to a Probe, or Horn to a Probe

1. Inspect all surfaces to be joined for stress cracks, chips, or gouges. Any of these irregularities will affect operation and could lead to further equipment damage. Contact the Dukane Ultrasonic Tooling Department concerning a damaged booster.

2. Ensure that the mating surfaces of the two components are clean and smooth. These surfaces must make intimate contact for the mechanical energy to pass from one component to the next. Pitting or a buildup of old grease and dirt on a mating surface will interfere with the energy transfer and reduce the power delivered.

3. Make sure that the stud in the horn or booster is tight. See the preceding mounting stud assembly instructions for torque specifications.

4. Remove any foreign matter from the threaded stud and mating hole.

5. Apply an extremely thin layer of a high temperature, high pressure silicon grease to the surface that mates with the horn. The grease will allow both surfaces to intimately mate and become acoustically transparent which improves the energy transfer. We recommend Dow–Corning #4 (or #111 as an alternate). A small packet of Dow–Corning #4 is supplied with the system. If you cannot use a silicon–based grease in your facility, a petroleum–based grease may be used. However, it is likely to leave carbonaceous deposits on the surface, and require more frequent joint maintenance. Grease may be omitted if mylar washers are preferred on systems that require frequent changes. Mylar is plastic and will creep under compression, so mylar is not recommended for system that are not changed frequently. Failure to follow these instructions may result in the mating surfaces bonding and difficulty removing the horn from the booster or the booster from the probe.

NOTE
Always remove a probe stack from the machine in which it is mounted before attaching or removing a horn.

CAUTION
Never leave a horn or booster assembly hand tight. Torque it to the proper specifications before proceeding. If the assembly is installed without being properly torqued down, the assembly may vibrate severely, damaging the mating surfaces and causing the generator to overload.

Figure 6–5 Stack Assembly Procedure
6. Thread the components together and tighten to the following torque specifications using only the correct size wrenches. Use spanner wrenches on components with spanner wrench holes or an open end wrench on components with wrench flats. See Figure 6–5 for the correct procedure. Refer to Table 6–III for torque unit conversions. Be careful not to overtighten.

<table>
<thead>
<tr>
<th>In-lb</th>
<th>Ft-lb</th>
<th>N-m</th>
<th>kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>540</td>
<td>45</td>
<td>61</td>
<td>15 kHz stack</td>
</tr>
<tr>
<td>420</td>
<td>35</td>
<td>47.5</td>
<td>20 kHz stack</td>
</tr>
<tr>
<td>216</td>
<td>18</td>
<td>24.4</td>
<td>30 kHz stack</td>
</tr>
<tr>
<td>216</td>
<td>18</td>
<td>24.4</td>
<td>35 kHz stack</td>
</tr>
<tr>
<td>216</td>
<td>18</td>
<td>24.4</td>
<td>40 kHz stack</td>
</tr>
</tbody>
</table>

**NOTE**
Horn and booster torque specifications are higher than stud torque specs. Be sure to tighten the horn or booster joints to the higher torque limits. Do not tighten the studs to these higher ratings as it may induce unnecessary stress in the assembly.
Stack Disassembly

Stack disassembly is required when changing the booster or horn, or for a thorough inspection of all stack components. In mounted systems, always remove the stack from its mounting to disassemble the stack components.

To establish a maintenance schedule, inspect the mating surfaces after the first 200–400 hours of operation. If they require cleaning, halve the time between inspections. If the surfaces do not require reconditioning, then double the time between inspections. Each system is different due to the large number of operational parameters and stress factors.

The assembly and disassembly procedures for a hand probe are shown in Figure 6–6. It makes no difference whether the horn is attached to the booster first, or the booster is attached to the probe first.

CAUTION

Never hold a probe by the housing when tightening or loosening an adjoining component. The probe housing has anti–rotation devices to keep the transducer aligned. These could shear under excessive torque.
Separating the Horn from a Booster, Booster from a Probe or Horn from a Probe

On all transducers and horns with spanner wrench holes, use only the correct size spanner wrench that came with your system to provide sufficient torque to loosen a joint. See Figure 6–7.

![Figure 6–7 Separating the Horn from the Booster](image)

On boosters and horns with wrench flats, use only the correct size wrench to provide sufficient torque to loosen a joint when necessary.

Removing the Mounting Stud from a Horn or Booster

Only use an allen wrench of the correct size in the socket head’s stud to remove the stud from the horn or booster.

Removing Replaceable Tips from a Horn

Use an open end wrench of the correct size to fit the wrench flats of the detachable tip. Use a spanner wrench (on horns with spanner wrench holes) or an open wrench (on horns with wrench flats) to provide an opposite force to keep the horn from turning in your hand. Refer to Figure 6–8 for the correct tip removal procedure.

![Figure 6–8 Removing a Replaceable Tip from the Horn](image)

**NOTE**

Do not hold a booster by the mounting rings when removing the stud from the booster. Use a spanner or open–end wrench to provide opposite force and keep the horn or booster from turning in your hand when loosening the stud. Use a spanner wrench on horns and boosters with spanner wrench holes. Use an open end wrench on horns and boosters with wrench flats.
Booster Notes

How to Tell the Booster Input End from the Output
1. The depth of the threaded hole on the output end is always deeper than the threaded hole on the input end.
2. On an amplifying booster (gain > 1.0), the larger diameter end is the input end. On a reducing booster (gain < 1.0) the larger diameter end is the output end. On a neutral acting booster the diameters are equal.
3. The cap screws on the booster mounting rings are always inserted from the output end toward the input end.

How to Tell if the Booster Is Amplifying or Reducing
Boosters have a die-stamped number on their surface that indicates their gain or reduction. If the number is greater than 1.0 (e.g. 1.5), it is an amplifying booster. If the number is less than 1.0 (e.g. 0.6), it is a reducing or reverse booster. A neutral booster has no gain and has 1.0 stamped on it. A neutral or coupling booster is used to provide another probe stack clamping location for added stability.

CAUTION
NEVER install a booster upside down to change an amplifying system to a reducing system. The boosters are dimensionally asymmetric. They are tuned from input to output to act like an acoustic lens. Reversing them will not give the expected results and may cause damage to the system.
SECTION 7

Troubleshooting

No Ultrasonic Output ........................................... 47
System Power Output Level .................................... 47
Welding Problems .................................................. 48
Pop-up Fault Status Screens .................................... 49
No Ultrasonic Output
Probe
Make sure that the hand probe cable is connected to the generator connector (HAND PROBE) and that the thumb screws are tightened to the rear panel. Also, make sure the hand probe stack is properly assembled.

System Power Output Level

Overload
When an overload occurs, it will automatically reset when the next ultrasound activation signal begins. If the condition persists:
Turn the generator OFF and:
1. Check the system. Change the hand probe to one that is known to be good.
2. Turn the generator ON, and see if the fault condition has been corrected.

Overtemperature
When the system overheats, and the generator’s internal temperature exceeds 85° C (185° F) an overtemperature fault condition will trip.
When the system cools, the system automatically resets the overtemperature fault.

Generator Fault Does Not Reset
When a system fault condition does not automatically reset, the generator needs servicing.

System Power Diagnostic Procedures
Information regarding power diagnostic faults can be found by visiting: www.dukane.com/EasyAlarm

NOTE
The LCD screen displays a variety of pop-up status changes as they occur. Check Tables 7-I and 7-II - Pop-up Fault Status Screens - Pages 49- 50.

NOTE
When Latching Faults is enabled, ENTER must be pressed to clear a fault.
Welding Problems

Weak Welds
Weak welds, or underwelding, is caused by insufficient energy being transmitted to the part. You can increase the weld pressure, increase the weld duration (Time or Energy) or change to a higher gain booster to increase the amplitude to increase the energy delivered to the weld.

Inconsistent Welds
Variations in plastic due to filler materials and moisture absorption may lead to inconsistent welds. Fillers can be especially troublesome if they are not uniformly distributed, the content is too high or it contains too much or poor quality regrind or degraded plastic.

Try welding by energy. This eliminates many inconsistencies. There should be no unusual or loud noise from the acoustic stack. If there is, disassemble the stack and inspect the mating surfaces to insure they are clean and flat. Also, inspect the horn for damage or cracks. When this is complete reassemble the stack.

Exchange the probe with another unit to see if the problem disappears. If not, exchange the generator with another unit to try and isolate the problem.

The horn amplitude may not be uniform if it has been machined, altered or damaged. All of these will change the resonant frequency of the horn. You can have the horn analyzed.

NOTE
Primary factors in achieving consistent, quality welds - especially when using hand held probes - are the skill and training of the operator.
# Pop-up Alarm Status Screens

<table>
<thead>
<tr>
<th>Process Alarms</th>
<th>Alarm Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Latch On Fault ENABLED</strong></td>
<td><strong>Latch On Fault DISABLED</strong></td>
</tr>
<tr>
<td>Process Alarm</td>
<td>Set Weld Time Not Reached - appears if the weld ends before the set time is reached due to operator error, or because the weld was intentionally aborted.</td>
</tr>
<tr>
<td>Alarm ID # U418</td>
<td>Alarm ID # U418</td>
</tr>
<tr>
<td>Set Weld Time Not Reached</td>
<td>Set Weld Time Not Reached</td>
</tr>
<tr>
<td>Press ENTER to clear</td>
<td>Press ENTER to clear</td>
</tr>
<tr>
<td>Process Alarm</td>
<td>Set Weld Energy Not Reached - appears if the weld ends before the set energy is reached due to operator error, or because the weld was intentionally aborted.</td>
</tr>
<tr>
<td>Alarm ID # U419</td>
<td>Alarm ID # U419</td>
</tr>
<tr>
<td>Set Weld Energy Not Reached</td>
<td>Set Weld Energy Not Reached</td>
</tr>
<tr>
<td>Press ENTER to clear</td>
<td>Press ENTER to clear</td>
</tr>
<tr>
<td>Process Alarm</td>
<td>Trigger By Power Not Reached is displayed When Trigger by Power is enabled and the programmed power threshold is not reached within the trigger timeout period.</td>
</tr>
<tr>
<td>Alarm ID # U421</td>
<td>Alarm ID # U421</td>
</tr>
<tr>
<td>Trigger By Power Not Reached</td>
<td>Trigger By Power Not Reached</td>
</tr>
<tr>
<td>Press ENTER to clear</td>
<td>Press ENTER to clear</td>
</tr>
<tr>
<td>Initiate Alarm</td>
<td>When triggering by power a maximum time limit must be entered. This is the time between when the operator presses the initiate switch and begins to put pressure on the part.</td>
</tr>
<tr>
<td>Alarm ID # U406</td>
<td>Alarm ID # U406</td>
</tr>
<tr>
<td>Trigger Timeout set to Zero</td>
<td>Trigger Timeout set to Zero</td>
</tr>
<tr>
<td>Press ENTER to clear</td>
<td>Press ENTER to clear</td>
</tr>
<tr>
<td>Process Alarm</td>
<td>The maximum weld time when Frequency Lock and Hold is enabled is 5 seconds. Reduce the weld time to 5 seconds or less.</td>
</tr>
<tr>
<td>Alarm ID # U422</td>
<td>Alarm ID # U422</td>
</tr>
<tr>
<td>Lock &amp; Hold Maximum Weld Time Exceeded</td>
<td>Lock &amp; Hold Max Weld Time Exceeded</td>
</tr>
<tr>
<td>Press ENTER to clear</td>
<td>Press ENTER to clear</td>
</tr>
</tbody>
</table>

Table 7-I Pop-Up Fault Status Screens - Process Alarms
Overload alarms

Many overload alarms can be the result of damage to the Ultrasonic stack assembly (probe and horn). More information regarding maintenance to the stack assembly can be found at:


<table>
<thead>
<tr>
<th>Overload Alarms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pop-Up Alarm Displayed</strong></td>
</tr>
<tr>
<td>Latch On Fault ENABLED</td>
</tr>
<tr>
<td><strong>Alarm Status</strong></td>
</tr>
<tr>
<td>Alarm ID # U104 Frequency Overload Alarm 1</td>
</tr>
<tr>
<td>Press ENTER to clear</td>
</tr>
<tr>
<td><strong>Alarm Status</strong></td>
</tr>
<tr>
<td>Alarm ID # U106 Peak Overload Alarm</td>
</tr>
<tr>
<td>Press ENTER to clear</td>
</tr>
<tr>
<td><strong>Alarm Status</strong></td>
</tr>
<tr>
<td>Alarm ID # U116 Ultrasound Voltage Exceeded</td>
</tr>
<tr>
<td>Press ENTER to clear</td>
</tr>
<tr>
<td><strong>Alarm Status</strong></td>
</tr>
<tr>
<td>Alarm ID # U106 Average Overload Alarm</td>
</tr>
<tr>
<td>Press ENTER to clear</td>
</tr>
</tbody>
</table>

**Table 7-II** Pop-Up Fault Status Screens - Overload Alarms
## General Alarms

<table>
<thead>
<tr>
<th>Pop-Up Alarm Displayed</th>
<th>System Status or Alarm Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alarm Status</strong></td>
<td>Generator model number does not match internal components. Cycle power. If fault persists, contact Dukane Technical Support.</td>
</tr>
<tr>
<td>Alarm ID # U100</td>
<td></td>
</tr>
<tr>
<td>Configuration Alarm</td>
<td></td>
</tr>
<tr>
<td><strong>Alarm Status</strong></td>
<td>AC line voltage is not within the specified limits. Review incoming AC line voltage to insure it is correct. If AC line voltage measurement is correct, and alarm persists, contact Dukane Technical Support.</td>
</tr>
<tr>
<td>Alarm ID # U110</td>
<td></td>
</tr>
<tr>
<td>Power not OK Alarm</td>
<td></td>
</tr>
<tr>
<td><strong>Alarm Status</strong></td>
<td>System Over temperature fault detected. Fault will reset when system cools down.</td>
</tr>
<tr>
<td>Alarm ID # U111</td>
<td></td>
</tr>
<tr>
<td>Over Temperature Alarm</td>
<td></td>
</tr>
<tr>
<td><strong>Initiate Alarm</strong></td>
<td>If the cycle initiate signal was held on during power up, the generator will be prevented from turning on ultrasound. Remove the cycle initiate signal and begin a new cycle. Make sure the cycle initiate signal is not active during power up.</td>
</tr>
<tr>
<td>Alarm ID # U308</td>
<td></td>
</tr>
<tr>
<td>Not Ready</td>
<td></td>
</tr>
</tbody>
</table>

*Table 7-1 Pop-Up Alarm Status Screens - General Alarms*
SECTION 8

Options

iQ Hand Probe Foot Switch Kit. .......................... 55
**iQ Hand Probe Options**

**Foot Switch Kit (Part No. 438-976)**

This kit allows the customer to add their own external foot switch to replace the trigger on the hand probe.

An external breakout box with cabling is supplied. The box connects to the generator and to the hand probe.
SECTION 9

Specifications

Generator Outline Drawing ........................................... 59
Probes Outline Drawings ............................................. 60
Weights ........................................................................ 61
Operating Environment .................................................. 61
AC Power Requirements .................................................. 62
Regulatory Agency Compliance ....................................... 63
This page intentionally left blank
Figure 9-1 Generator Outline Drawing
Figure 9-2 Probes Outline Drawings and Dimensions
### Weights

- **Generator:** 11 pounds (4.99 kg)
- **Probes:** Please see the table on the previous page.
- **Shipping:** Add 5 pounds (2.27 kg) to unit weight for packing materials.

### Operating Environment

Operate the equipment within these guidelines:

- **Temperature:** 40°F to 100°F (+5°C to +38°C)
- **Air Particulates:** Keep the equipment dry.
  Minimize exposure to moisture, dust, dirt, smoke and mold.
- **Humidity:** 5% to 95% non–condensing @ +5°C to +30°C

**Nonoperating storage guidelines:**

- **Temperature:** - 4°F to 158°F (-20°C to +70°C)
- **Air Particulates:** Keep the equipment dry.
  Minimize exposure to moisture, dust, dirt, smoke and mold.
- **Humidity:** 5% to 95% non–condensing @ 0°C to +30°C
# AC Power Requirements

<table>
<thead>
<tr>
<th>Operating Frequency</th>
<th>System Model Number</th>
<th>Generator Model Number</th>
<th>Overload Power Rating (Watts)</th>
<th>Input AC Power Requirements Nominal AC Volt</th>
<th>North America/Japan AC Outlet Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>20kHz</td>
<td>HP 20.61-P</td>
<td>20HP060-1H</td>
<td></td>
<td>100-120 VAC, 50/60 Hz @ 9.0 Amps</td>
<td></td>
</tr>
<tr>
<td>20kHz</td>
<td>HP 20.61-H</td>
<td>20HP060-1H</td>
<td></td>
<td>100-120 VAC, 50/60 Hz @ 9.0 Amps</td>
<td></td>
</tr>
<tr>
<td>20kHz</td>
<td>HP 20.62-P</td>
<td>20HP060-2H</td>
<td></td>
<td>200-240 VAC, 50/60 Hz @ 4.5 Amps</td>
<td></td>
</tr>
<tr>
<td>20kHz</td>
<td>HP 20.62-H</td>
<td>20HP060-2H</td>
<td></td>
<td>200-240 VAC, 50/60 Hz @ 4.5 Amps</td>
<td></td>
</tr>
<tr>
<td>30kHz</td>
<td>HP 30.61-P</td>
<td>30HP060-1H</td>
<td></td>
<td>100-120 VAC, 50/60 Hz @ 9.0 Amps</td>
<td></td>
</tr>
<tr>
<td>30kHz</td>
<td>HP 30.61-H</td>
<td>30HP060-1H</td>
<td></td>
<td>100-120 VAC, 50/60 Hz @ 9.0 Amps</td>
<td></td>
</tr>
<tr>
<td>30kHz</td>
<td>HP 30.62-P</td>
<td>30HP060-2H</td>
<td>600 Watts</td>
<td>200-240 VAC, 50/60 Hz @ 4.5 Amps</td>
<td>15.0 Amps</td>
</tr>
<tr>
<td>30kHz</td>
<td>HP 30.62-H</td>
<td>30HP060-2H</td>
<td></td>
<td>200-240 VAC, 50/60 Hz @ 4.5 Amps</td>
<td></td>
</tr>
<tr>
<td>35kHz</td>
<td>HP 35.61-P</td>
<td>35HP060-1H</td>
<td></td>
<td>100-120 VAC, 50/60 Hz @ 9.0 Amps</td>
<td></td>
</tr>
<tr>
<td>35kHz</td>
<td>HP 35.61-H</td>
<td>35HP060-1H</td>
<td></td>
<td>100-120 VAC, 50/60 Hz @ 9.0 Amps</td>
<td></td>
</tr>
<tr>
<td>35kHz</td>
<td>HP 35.62-P</td>
<td>35HP060-2H</td>
<td></td>
<td>200-240 VAC, 50/60 Hz @ 4.5 Amps</td>
<td></td>
</tr>
<tr>
<td>35kHz</td>
<td>HP 35.62-H</td>
<td>35HP060-2H</td>
<td></td>
<td>200-240 VAC, 50/60 Hz @ 4.5 Amps</td>
<td></td>
</tr>
<tr>
<td>40kHz</td>
<td>HP 40.61-P</td>
<td>40HP060-1H</td>
<td></td>
<td>100-120 VAC, 50/60 Hz @ 9.0 Amps</td>
<td></td>
</tr>
<tr>
<td>40kHz</td>
<td>HP 40.61-H</td>
<td>40HP060-1H</td>
<td></td>
<td>100-120 VAC, 50/60 Hz @ 9.0 Amps</td>
<td></td>
</tr>
<tr>
<td>40kHz</td>
<td>HP 40.62-P</td>
<td>40HP060-2H</td>
<td></td>
<td>200-240 VAC, 50/60 Hz @ 4.5 Amps</td>
<td></td>
</tr>
<tr>
<td>40kHz</td>
<td>HP 40.62-H</td>
<td>40HP060-2H</td>
<td></td>
<td>200-240 VAC, 50/60 Hz @ 4.5 Amps</td>
<td></td>
</tr>
</tbody>
</table>

Table 9-II AC Power Requirements
Regulatory Agency Compliance

**FCC**
The Hand Probe Plus Welder complies with the following Federal Communications Commission regulations.

**CE Marking**
This mark on your equipment certifies that it meets the requirements of the EU (European Union) concerning interference causing equipment regulations. CE stands for Conformité Européenne (European Conformity). The Hand Probe Plus Welder complies with the following CE requirements.
- The EMC Directive 2014/30/EU for Heavy Industrial
  - EN 61000-6-4
  - EN 55011
  - EN 61000-6-2
    - EN61000–4–2
    - EN61000–4–3
    - EN61000–4–4
    - EN61000–4–5
    - EN61000–4–6
    - EN61000–4–8
    - EN61000–4–11
- The Low Voltage Directive 2014/35/EU
- The Machinery Directive 2006/42/EC
- EN ISO 12100: Safety of Machinery - General principles of design, risk assessment, and risk reduction.

**UL & CSA**
The Hand Probe Plus Welder complies with these standards:
- **Underwriters Laboratories (UL):**
  - UL61010-1
- **National Standards of Canada (CSA):**
  - CAN/CSA C22.2 No. 61010-1

as verified by TÜV Rheinland.

---

**IP Rating**
The Hand Probe Plus Welder has an IP (International Protection) rating from the IEC (International Electrotechnical Commission).
The rating is IP2X, in compliance with finger-safe industry standards.

---

**CAUTION**
DO NOT make any modifications to the generator or associated cables as the changes may result in violating one or more regulations under which this equipment is manufactured.
This page intentionally left blank
SECTION 10

Outputs Interface

Outputs Connection Example. .......................... 67
This page intentionally left blank
Section 10 – I/O Interface

iQ Hand Probe Generator
Rear Panel Detail

NOTE
0V (Output Common) is connected to Chassis Ground (Earth).

Figure 10-1 OUTPUTS Connection Example
This page intentionally left blank
SECTION 11

Contacting Dukane
This page intentionally left blank
Contacting Dukane

Equipment Identification and Problem Details
When contacting Dukane about a service related problem, be prepared to give the following information:

- Model number, line voltage and serial number
- Fault/error indicators from the LCD display
- Software version (Press INFO. With pointer at System Information, press ENTER to get this data.)
- Problem description and steps taken to resolve it

Some problems can be solved over the telephone, so it is best to call from a telephone located near the equipment.

Ultrasonics Division

Mailing Address: Dukane IAS LLC.
2900 Dukane Drive
St. Charles, IL 60174 USA

Main Phone: (630) 797–4900
Main Fax: (630) 797–4949
Service & Parts Fax: (630) 584–0796

Website

The website has information about our products, processes, solutions, and technical data (including 3D CAD models). Downloads are available for many kinds of literature.

Main page:
www.dukane.com/us

Downloads page:

You can locate your local representative at:
www.dukane.com/us/SA_IntSales.htm
This page intentionally left blank
APPENDICES

List of Figures ........................................... 75
List of Tables. ............................................ 76
## List of Figures

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Example of 125 Volt, Grounded, 3-prong Plug and Receptacle</td>
<td>8</td>
</tr>
<tr>
<td>2-2</td>
<td>Example of 250 Volt, Grounded, 3-prong Plug and Receptacle</td>
<td>8</td>
</tr>
<tr>
<td>2-3</td>
<td>International 220/240V Grounding</td>
<td>8</td>
</tr>
<tr>
<td>3-1</td>
<td>Generator Detail - Rear Views</td>
<td>12</td>
</tr>
<tr>
<td>3-2</td>
<td>Rocker-style Power Switch/Circuit Breaker</td>
<td>12</td>
</tr>
<tr>
<td>4-1</td>
<td>Front Panel</td>
<td>17</td>
</tr>
<tr>
<td>4-1A</td>
<td>Power Bar Graph - In Cycle</td>
<td>18</td>
</tr>
<tr>
<td>4-1B</td>
<td>Power Bar Graph - Operate</td>
<td>18</td>
</tr>
<tr>
<td>4-2</td>
<td>Power Switch</td>
<td>19</td>
</tr>
<tr>
<td>4-3</td>
<td>Power-up Screen</td>
<td>19</td>
</tr>
<tr>
<td>4-3A</td>
<td>Operate Screen Appears After Power-up</td>
<td>19</td>
</tr>
<tr>
<td>4-4</td>
<td>Example of an Operate Screen</td>
<td>20</td>
</tr>
<tr>
<td>4-5</td>
<td>Example of an In Cycle Screen</td>
<td>20</td>
</tr>
<tr>
<td>5-1</td>
<td>Manual Weld Mode</td>
<td>24</td>
</tr>
<tr>
<td>5-2</td>
<td>Navigate To Weld Mode</td>
<td>24</td>
</tr>
<tr>
<td>5-3</td>
<td>Enter Weld Time</td>
<td>24</td>
</tr>
<tr>
<td>5-4</td>
<td>Select Manual Mode</td>
<td>24</td>
</tr>
<tr>
<td>5-5</td>
<td>Time Weld Mode</td>
<td>25</td>
</tr>
<tr>
<td>5-6</td>
<td>Navigate to Energy Mode -1</td>
<td>25</td>
</tr>
<tr>
<td>5-7</td>
<td>Energy Weld Mode - 1</td>
<td>25</td>
</tr>
<tr>
<td>5-8</td>
<td>Energy Weld Mode - 2</td>
<td>25</td>
</tr>
<tr>
<td>5-9a</td>
<td>HOLD Time - 1</td>
<td>26</td>
</tr>
<tr>
<td>5-9b</td>
<td>HOLD Time - 2</td>
<td>26</td>
</tr>
<tr>
<td>5-10</td>
<td>Amplitude</td>
<td>26</td>
</tr>
<tr>
<td>5-11a</td>
<td>Trigger By Power</td>
<td>27</td>
</tr>
<tr>
<td>5-11b</td>
<td>Start Amplitude</td>
<td>27</td>
</tr>
<tr>
<td>5-12</td>
<td>Trigger By Power</td>
<td>27</td>
</tr>
<tr>
<td>5-13</td>
<td>Trigger Timeout</td>
<td>27</td>
</tr>
<tr>
<td>5-14a</td>
<td>INFO screen</td>
<td>28</td>
</tr>
<tr>
<td>5-14b</td>
<td>System Information Screen</td>
<td>28</td>
</tr>
<tr>
<td>5-15</td>
<td>Weld Mode</td>
<td>28</td>
</tr>
<tr>
<td>5-16a</td>
<td>Generator Settings Screen</td>
<td>28</td>
</tr>
<tr>
<td>5-16b</td>
<td>Generator Settings Screen-2</td>
<td>29</td>
</tr>
<tr>
<td>5-17</td>
<td>Language Selection</td>
<td>29</td>
</tr>
</tbody>
</table>
List of Figures continued

5-18 Numerical Input ........................................................................................................................................ 29
5-19 Numerical Input ........................................................................................................................................ 29
5-20 Selection Input ......................................................................................................................................... 29
5-21 Selection Input ......................................................................................................................................... 29
5-22a Setup Maintenance - 1 .......................................................................................................................... 30
5-22b Pop-up Load Setup ................................................................................................................................ 30
5-23a Setup Maintenance - 2 .......................................................................................................................... 30
5-23b Pop-up Overwrite Setup ......................................................................................................................... 30
5-24a Setup Maintenance - 3 .......................................................................................................................... 30
5-24b Pop-up Delete Setup ............................................................................................................................... 30
5-25 Set Weld By Time(Storing) ....................................................................................................................... 31
5-26a Store In Setup Maintenance .................................................................................................................. 31
5-26b Pop-up Overwrite Setup ......................................................................................................................... 31
5-27 New Setup Stored .................................................................................................................................... 31
6-1 Typical Hand Held Probes .......................................................................................................................... 35
6-2 Hand Probe, Horn and Tip .......................................................................................................................... 36
6-3 Probe, Booster and Horn ............................................................................................................................ 37
6-4 Replaceable Tip Installation ......................................................................................................................... 38
6-5 Stack Assembly Procedure ....................................................................................................................... 40
6-6 Hand Probe Assembly and Disassembly .................................................................................................. 42
6-7 Separating the Horn from the Booster ...................................................................................................... 43
6-8 Removing a Replaceable Tip From the Horn ............................................................................................ 43
9-1 Generator Outline Drawing ....................................................................................................................... 59
9-2 Probes Outline Drawings and Dimensions ............................................................................................... 60
10-1 OUTPUTS Interface Example .................................................................................................................. 67

List of Tables

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-I</td>
<td>Standard IEC AC Power Cord Part Numbers</td>
<td>13</td>
</tr>
<tr>
<td>3-II</td>
<td>System OUTPUTS Connector Signals</td>
<td>14</td>
</tr>
<tr>
<td>6-I</td>
<td>Tip Torque Unit Conversions</td>
<td>38</td>
</tr>
<tr>
<td>6-II</td>
<td>Stud Torque Unit Conversions</td>
<td>39</td>
</tr>
<tr>
<td>6-III</td>
<td>Horn/Booster Torque Unit Conversions</td>
<td>41</td>
</tr>
<tr>
<td>7-I</td>
<td>Pop-up Alarm Screens - Process Alarms</td>
<td>49</td>
</tr>
<tr>
<td>7-II</td>
<td>Pop-up Alarm Screens - Overload Alarms</td>
<td>50</td>
</tr>
<tr>
<td>7-III</td>
<td>Pop-up Alarm Screens - General Alarms</td>
<td>51</td>
</tr>
<tr>
<td>9-I</td>
<td>Hand Probe Dimensions</td>
<td>61</td>
</tr>
<tr>
<td>9-II</td>
<td>AC Power Requirements</td>
<td>62</td>
</tr>
</tbody>
</table>
This page intentionally left blank
Please refer to our website at:

www.dukane.com/us/sales/intsales.htm

to locate your local representative.