DUKANE

Ultrasonics

ULTRA

15 kHz

Assembly System

INSTALLATION and OPERATION

Press System Model No.

15C4001P
15D4001P
15E4001P
15T4001P

Column & Base
43A216

Thruster
43A215

4kW Generator
15A4000

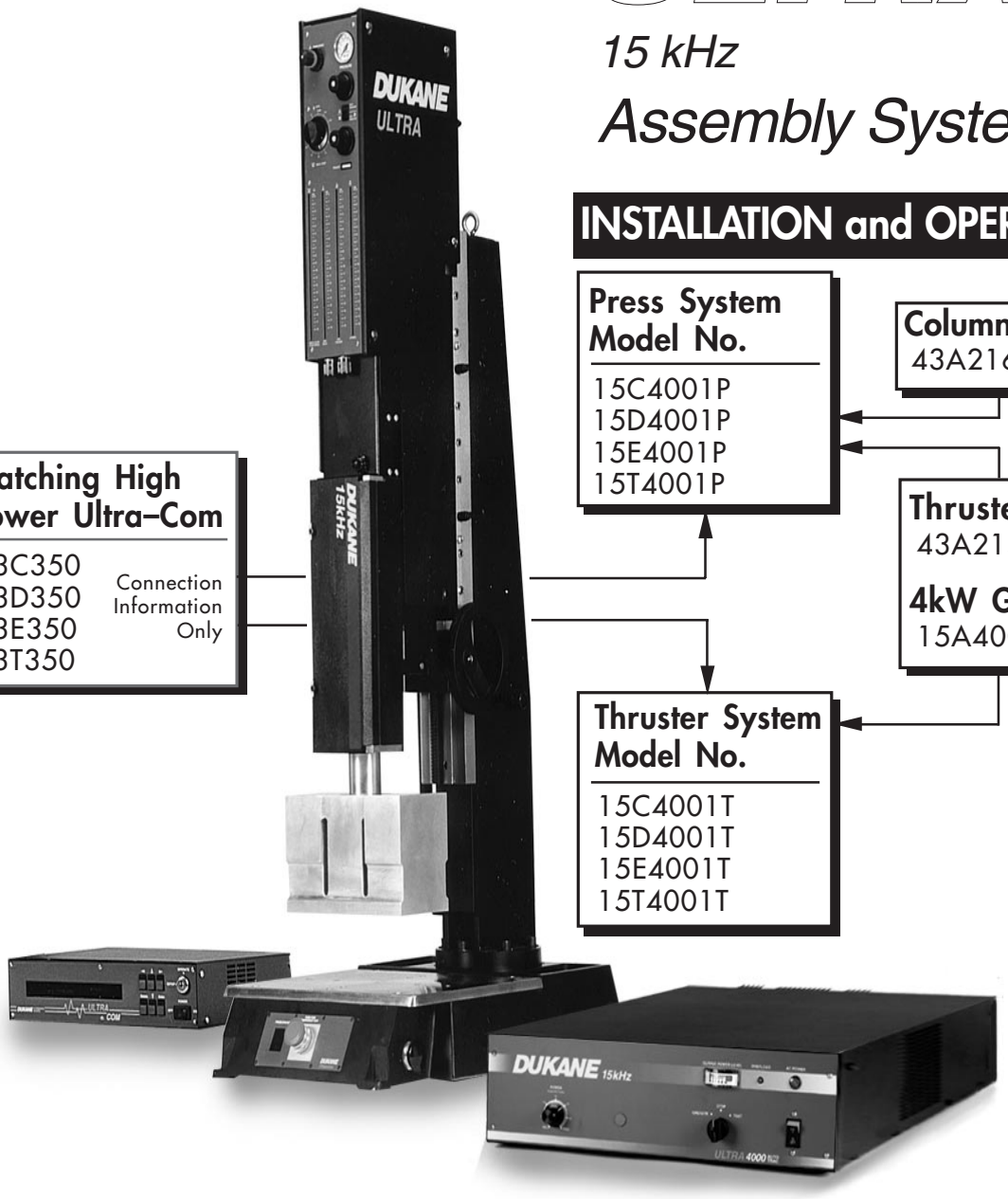
Matching High Power Ultra–Com

43C350
43D350
43E350
43T350

Connection Information Only

Thruster System Model No.

15C4001T
15D4001T
15E4001T
15T4001T



User's Manual

Dukane Part No. 403–542–00.1

www.dukcorp.com

Dukane Corporation • Ultrasonics Division • 2900 Dukane Drive • St. Charles, Illinois 60174 USA • TEL (630) 797-4900 • FAX (630) 797-4949

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3,780,926 3,825,481 4,131,505 4,277,710 5,798,599 and 5,880,580

Revision History

Revision Number	Revision History	Date
–00	Original release.	16–Mar–2001
–00.1	Online Version ONLY Updated telephone numbers and consolidated warranty	23–Mar-2005

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SECTION 1

Introduction and Safety

- This section introduces the User's Manual and the equipment, and also deals with safety considerations.

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Before Operating Equipment

Before you operate the equipment, please follow the recommendations given here.

Read this Manual First

Before operating the equipment, read this *User's Manual* to get familiar with the Ultra Assembly System.

Read the Supplementary Ultra-Com Manual

Because the Ultra-Com High Power process controller is an integral part of your plastics assembly system, please read the *User's Manual* (Dukane Part No. 403-393C) before operating the system. The Ultra-Com manual is a companion to this *User's Manual*, and it supplements information provided here.

By reading both manuals you will have gained basic understanding of equipment operation. This will be helpful in learning the plastics assembly system's potential through practical, hands-on process work.

Watch for Special Paragraphs

Watch for these special kinds of paragraphs in this manual:

NOTE
Note statements highlight procedures or provide information.

CAUTION
***Caution statements identify conditions or practices that could result in damage to the equipment* or other property.**

WARNING
Warning statements point out conditions or practices that could result in personal injury or loss of life.

About this Manual

Contents

This manual:

- explains installation of the Dukane Ultra 15kHz Assembly system (press and thruster),
- provides basic information to operate the equipment,
- gives an orientation to the controls and features you will encounter,
- discusses optional features,
- outlines maintenance procedures, and
- provides troubleshooting information, and specifications.

NOTE

The Ultra System requires two manuals. This manual covers the Ultra Series 15 kHz press/thruster and generator. The Ultra-Com Process Controller is an integral part of the Ultra System, and has its own User's Manual, Dukane Part No. 403-393C. Please refer to that document to program and monitor process control characteristics.

Organization

Before Welding: Sections 1–5

Section 1 Introduction and Safety gives a general explanation of the equipment, and covers safety considerations.

Section 2 Installation explains setup of the press/thruster and shows cable connections for a typical system.

Section 3 Controls and Indicators introduces the control devices on the press/thruster and press base.

Section 4 Press Options provides detailed information regarding the installation and operation of the linear encoder, electronic pressure regulator, pressure transducer, and load cell.

Section 5 Stack/Fixture Setup gives information about removing and installing the stack assembly. Procedures for stack component disassembly and assembly are covered also.

Organization, Before Welding, continued

Basics of Operation: Sections 6–8

Section 6 4000 Watt Generator provides information on.installation, the front panel controls, rear panel connections and basic operation of the generator.

Section 7 System Test provides the testing methods used to ensure that the press system is functioning properly before normal operations start

Section 8 System Operation provides a start-up checklist, start-up and shut down procedures and things to consider when making changes to the system.

Supporting Information: Sections 9 –12

Section 9 Maintenance provides information on maintaining the stack components and the press/thruster.

Section 10 Troubleshooting provides a list of the more common problems that may occur in the various ultrasonic processes. It also provides suggested corrective actions.

Section 11 Dukane Corporation Contacts and Warranty gives contact information for members of the Dukane Ultrasonics factory support team. The warranty also appears in this section.

Section 12 Specifications gives technical specs and information about the 4,000 watt generator and the Advanced Programmer.

The **Index** provides page references for key terms and concepts used in this manual.

System Overview

Ultra Series components are among Dukane Corporation's most technologically advanced. These components can be manufactured for a variety of applications. Each thruster or press can function independently, or a system can also be integrated with a customer's automated machinery.

The 15 kHz assembly system excels in providing superior weld consistency and extensive control when joining larger parts. A typical system includes a thruster, a 4,000 watt generator to supply power, a press, and a Ultra-Com High Power Process Controller. The Ultra-Com is a process controller providing essential control and monitoring features for ultrasonic welding operations. An accessory, the Advanced Programmer, can be added to allow the operator a more efficient method of programming and monitoring the welding process.

Making the System Operational

To operate the system an acoustic stack (or simply, "stack") consisting of transducer, booster, and horn must be added. In addition, a fixture into which the assembly parts are placed and welded is required.

Press/Thruster Similarities and Differences

Both presses and thrusters include the following:

- a housing for the stack assembly,
- a pneumatic system for raising and lowering the stack and for applying pressure to the part,
- gauges, switches, and controls to regulate stack movement, to control the stack clamping pressure on the part, and to start and stop the ultrasound signal.

A press support package is included with a press making it self-supporting by providing a rigid support frame, and machine base.

In its standard configuration, a thruster does not include a support package, and must be mounted to a rigid support of some kind. (The support package is available as a thruster option.) Usually a thruster is used as a part of an automated system where it is mounted within a special configuration.

Key Features of the Press/Thruster

- **Ultra-rigid Square Support Column** with rack and pinion height adjustment and up to 10° of radial alignment capability.

- **Heavy Duty Precision Slide** assembly with 1" (25.4 mm) diameter steel rods and sealed Thomson ball bushings preloaded for reliable, frictionless operation.

- **Height Adjustment Handwheel** is supplied, and it can be specified for mounting on either side of the press.

- **Gas Strut** counterbalence for easy height adjustment.

- **Stroke of 6.75"** (171 mm) with mechanical bottom stop adjustable in .001" (.025 mm) increments.

- **Dual Pressure** allows for an increased clamp force improving melt during the weld cycle, or greater pressure in the Hold portion of the cycle to strengthen the weld.

- **Calibrated Dynamic Trigger** system with LED indicator starts the ultrasonic signal at a precise, user-selectable force.

- **Pre-trigger and End-of-Weld** (lower) limit switches are standard and adjustable in .001" (.025 mm) increments.

- **Top-of-Stroke** limit switch for automated applications.

- **Ergonomic Base** and cycle activation switches reduce operator fatigue; optional opti-touch cycle activation switches are available.

- **Status Indicators** in base for POWER, IN CYCLE, and ABORT clearly communicate system operating status.

- **Twist Release** EMERGENCY OFF switch on the press base meets international safety standards.

- **Advanced Programmer** keyboard and monitor provide an option for more efficient programming.

Health and Safety Recommendations

Please observe these health and safety recommendations for safe, efficient, and injury-free operation of your equipment.

NOTE

These recommendations apply to the welding system. "System" in this manual refers to a complete group of components associated with the welding of parts, also known as an ultrasonic assembly system. A typical Ultra System consists of the Ultra-Com ultrasonic process controller, a generator, a press with thruster, switches, controls, cables, transducer, booster, horn, and fixture.

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

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

Keep the Cover On - Do not remove any equipment cover unless directed to do so by Dukane Corporation.

CAUTION

At some time you may be asked to remove equipment covers by the Dukane Service Dept. personnel. Before doing so, disconnect the unit electrically from the incoming line AC power. If the unit is a press/thruster, lock the Air Lockout Valve, located on the rear panel, in its closed position. See Figure 3-5 on Page 36.

Grounded Electrical Power - Operate this equipment only with a grounded electrical connection. (See *Electrical Safety Grounding Instructions* on Page 8.)

Comply with Regulations - You may be required to add accessories to bring the system into compliance with applicable regulations (OSHA in the USA) for machine guarding and noise exposure.

CAUTION

Parts being joined ultrasonically with the Ultra 15 kHz press will vibrate at audible frequencies. Wear ear protectors to reduce annoying or uncomfortable sounds. In addition, ultrasound baffles, sound enclosures, or materials that absorb sound may be located to surround the system.

Acoustic Stack Hazard - When an acoustic stack (transducer, booster, horn and tip) is energized by the ultrasound signal, it presents a potential hazard. Stay clear of an energized stack.

WARNING

Keep head, hands, limbs and body at least six inches (152 mm) away from an operating press/thruster. A vibrating, descending horn can cause burns and/or crushing injuries.

System Abort Switch - Install a system abort switch at each operator station when ultrasonic plastic assembly equipment is used with automatic material handling equipment in an automated system.

Foot Switch - Using a foot switch in place of dual palm buttons (activation switches) violates OSHA regulations.

Pre-trigger Switch Adjustment - The pre-trigger switch option starts the horn vibrating before contacting the part to be welded. The pre-trigger must be adjusted so that the ultrasound signal will not start if the horn is more than 1/4 inch (7 mm) from the part. This ensures safe operation.

System Electrical Cabling - Electrical power must be off when connecting or disconnecting electrical cables.

CAUTION

When making cable connections to system equipment or disconnecting cables from system equipment, make sure electrical power to the system is turned off, and AC power cords are removed from their receptacles. After the cables have been securely connected and the connections and cable routing checked a final time, the power may be restored.

Special Health Notice – Plastics

Before using any Dukane ultrasonic system, become familiar with applicable regulations about the particular type of plastic(s) you are using. (In the USA check with the U.S. Department of Labor.)

When plastic materials are being processed, they may emit fumes and/or gases that could be hazardous.

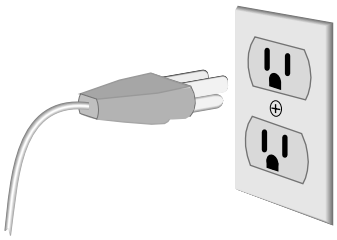
Make sure there is proper ventilation whenever these plastics are processed.

Electrical Safety Grounding Instructions

For safety, the power cords used on all Dukane products have a three-prong, grounding-type plug. The type typically used with the Ultra-Com is shown in **Figure 1-1**. The plug typically used with the 4000 watt generator is shown in **Figure 1-3**.

CAUTION

If you must use 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 1-1 and 1-2.



Approved 2 pole, 3 wire grounding receptacle BRYANT No. 5261 or equivalent to NEMA 5-15R OR 5-20R

Figure 1-1 *Example of 120 V, Grounded, 3-Prong Receptacle*

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.

Extension Cord: If an extension cord is needed, use a three-wire cord that's in good condition. The cord should be large enough to do the job safely. It, too, must be plugged into a grounded receptacle. Do not use a two-wire extension cord with this product.

120 Volt Ground Adapter

If it is impossible to change the wall receptacle to an approved grounding-type, and where local codes permit, you may use an adapter to connect the three-prong grounding plug to the two-prong receptacle. (See **Figure 1-2**.)

1 - Power cord w/ 3 - prong plug
2 - Adapter assembly
3 - Wall Plate
4 - Receptacle
5 - Cold water pipe (metal)
6 - Ground clamp
7 - Mounting screw
8 - Green ground lead
9 - 14 AWG (1.63mm ø) ground wire

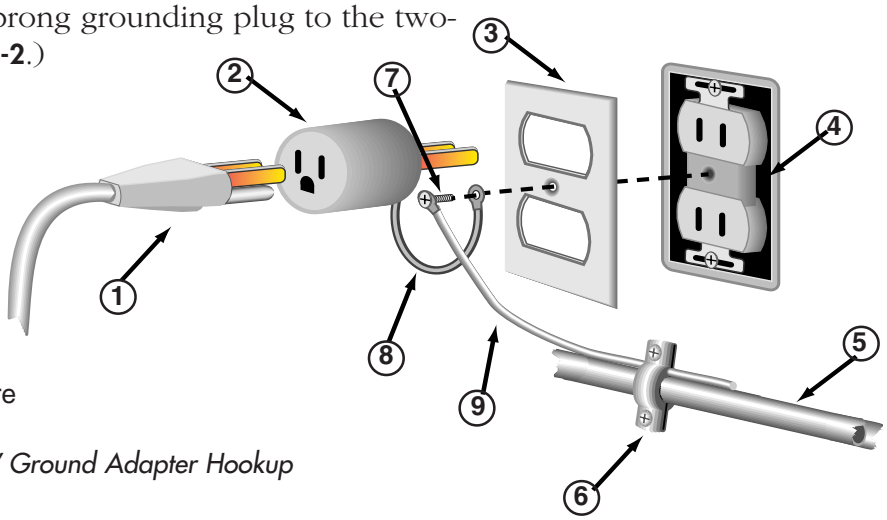


Figure 1-2 *Example of Proper 120 V Ground Adapter Hookup*

CAUTION

The green pigtail on the adapter MUST BE CONNECTED TO GROUND.

If the receptacle is grounded, the pigtail may be connected to it.

If the receptacle is not grounded, connect a separate 14 AWG (1.63mm dia.) ground wire from the receptacle to the nearest effectively grounded metal pipe or equivalent grounding electrode.

30A Generator Plug

The 15 kHz system generator power cord uses the twist-lock type of plug shown in **Figure 1-3**. Make sure its receptacle is grounded properly.

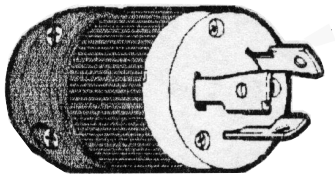


Figure 1-3 *Example of 30A Plug*

Additional Grounding

Grounding lugs have been provided on the Ultra-Com, generator, press base, and thruster (See **Figure 1-4**.) to meet any additional grounding requirements that may arise.
Use 18 AWG ground wire for the ground connection between the press/thruster, the Ultra-Com and the generator.

RFI Filter Considerations

In addition to the safety considerations above, proper grounding at the generator power cord is essential for the effective operation of the RFI (Radio Frequency Interference) filter in every Dukane generator. The filter prevents line noise from entering the control circuitry of the ultrasonic equipment, as well as blocking ultrasonic RFI from the power line.

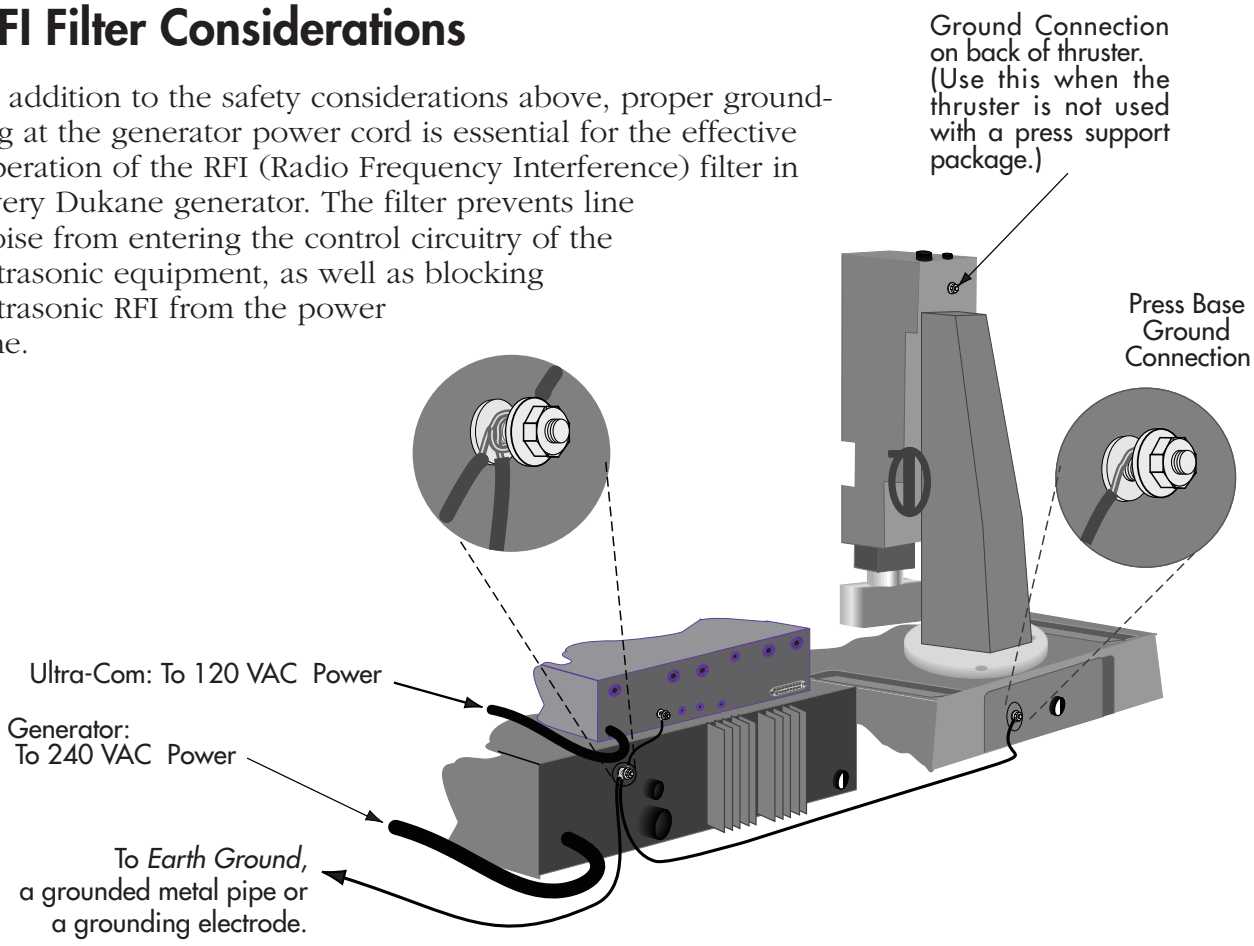


Figure 1-4 *Typical Equipment Grounding Arrangement*

SECTION 2

Installation

- This section deals with basic installation, locating and cabling the equipment.

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Before Unpacking

Before unpacking your equipment:

WARNING

Cartons and their contents are heavy. Use mechanical means to move the cartons. Lifting or carrying them manually could result in personal injury.

1. Move Shipping Cartons: Carefully move the shipping carton(s) as close to the final installation site as practical.

2. Utilities: Make provision for a stable compressed air supply, that is clean and dry between 80 and 100 psi. Also provide for electricity to meet your equipment specifications.

3. Space Requirement: Check that enough space has been set aside for your installation.
   Approximate dimensions of the major system components are given in **Table 2-1**.

NOTE

Compressed air must be delivered at a higher pressure than the expected output pressure, and in a range of 80 - 100 psi.

Component	Dimensions – inches (mm)			Weights – pounds (kg)
	Height	Width	Depth	
Press	78 (1980) High 61 (1550) Low	18.6 (475)	24.8 (630)	322 (146)
Ultra-Com	3.5 (90)	14.5 (370)	13 (330)	16 (7.3)
Generator	5.5 (140)	19.0 (485)	20.5 (520)	50 (22.7)

Table 2-1 *Approximate Dimensions and Weights*

NOTE

Add about 5 inches (125 mm) space above the press, and to the rear of the Ultra-Com and generator for cable connections. Allow 6 inches (150 mm) of space on either side of the Ultra-Com and generator for air circulation. For more information, see Installation *in the* Ultra-Com User's Manual.

Unpacking

WARNING

DO NOT LIFT your press system manually. Lifting and/or carrying a press manually could result in personal injury. Use mechanical means to move and place your press.

System components are packed in a variety of ways depending on what has been ordered. For instance, a typical press system (thruster, column, and ergonomic base with integrated palm switches) comes in a carton resting on a plywood shipping base and the carton bottom. Other system components like the Ultra-Com and generator are packed separately.

To unpack a typical press:

1. Remove the straps from the carton.
2. Open the top of the carton. Carefully remove the packing material and any accessories, cables and documentation.
3. Cut the tape at the bottom corners and unfold the flaps.
4. Carefully remove the carton, as shown in **Figure 2-1**, leaving the press on the shipping base. Inspect the system components before placing them in position. Immediately report any damage found. See the **NOTE** below.

See Section 12 – Specifications. **Table 12-1** lists the standard components for both press and thruster systems.

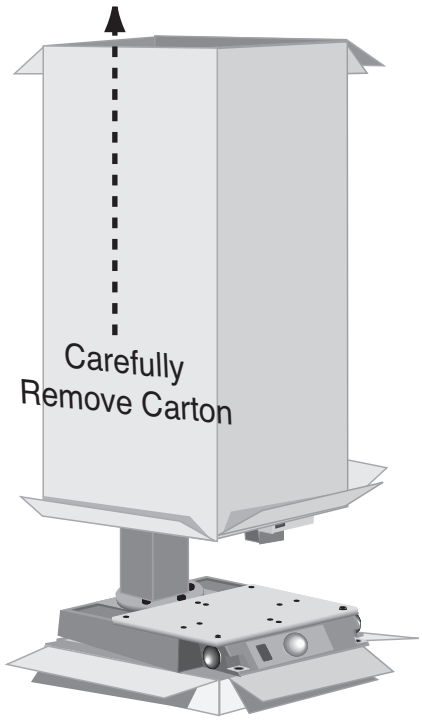


Figure 2-1 *Unpacking*

NOTE

Questions or problems? Call your sales representative or the Sales Department at Dukane Corporation Headquarters for most concerns. If reporting damage, contact the carrier first. Save all shipping containers and packing materials so they can be inspected in processing any claims that may arise. For additional help contact Dukane Support/Service. See Section 11 for contact information.

Placement

Press with Base

Use a pallet lift platform or its equivalent to raise the assembly until the bottom edge of the base is even with the top of the benchtop, as shown in **Figure 2-2**. Then, carefully slide the press system onto the benchtop.

Alternatively, hook the press support on the lifting eye-bolt, and use a mechanical hoist to lift the unit into place.

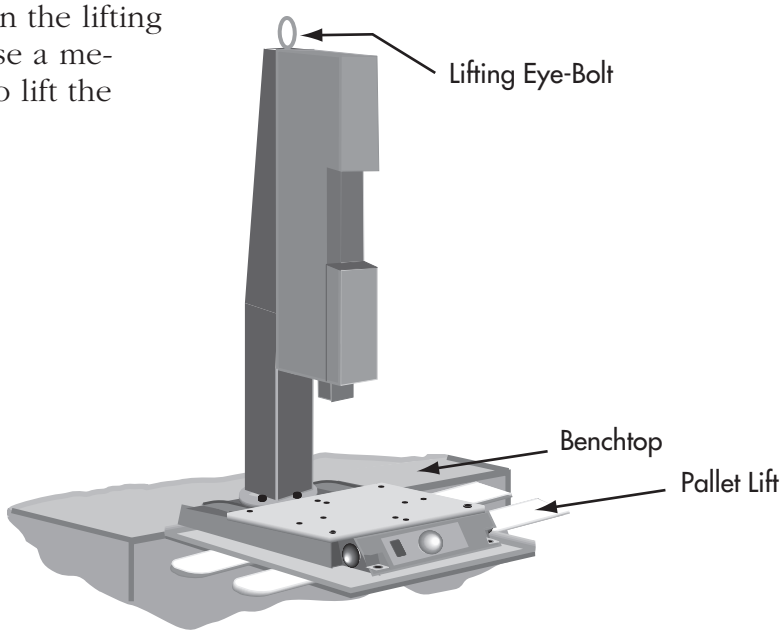


Figure 2-2 *Press Placement*

Press without Base

When the press and thruster have been configured without a base, secure the base flange to a stationary, rigid and level supporting structure. To fasten the flange to the structure, Dukane Corporation recommends using socket-head cap screws: M12-1.75 with a minimum length of 40 mm. Engage the cap screws a minimum of 1 inch (25.4 mm) full thread into the supporting structure. Depending upon the structure's thickness and material, longer screws and/or additional hardware may be required.

Flange Template Provided

A full-scale template of the base flange is provided as Page 25 of this section. Use it to position (and drill) holes in the supporting structure.

Press System Thruster Height Adjustment

Thruster height on the column is adjustable by using the two column clamps together with the height adjustment wheel and the six Allen (locking) screws shown in **Figure 2-4**.

WARNING

Keep hands away from the horn and fixture when loosening the column clamps. When the clamps are loosened, the thruster and acoustic stack could drop toward the fixture and injure the equipment operator. This could happen if the combined weight of the thruster plus the acoustic stack is greater than the air cylinder counterbalance's ability to counteract that weight.

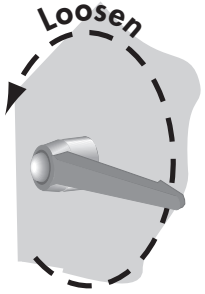


Figure 2-3a *Loosening the Column Clamps*

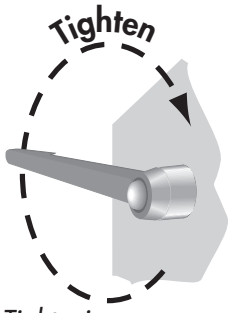


Figure 2-3b *Tightening the Column Clamps*

To make adjustments:

1. Carefully loosen the two clamps on the column by turning the handles counterclockwise, as shown in **Figure 2-3a**. When the clamps are loosened, the air cylinder counterbalance on the column helps to support the weight of the thruster.
2. Grasp the handle on the height adjustment wheel as shown in **Figure 2-4**. Turn the wheel clockwise to raise the thruster. Turn it counterclockwise to lower the thruster.
3. When the thruster is at the desired height, tighten the clamps by turning their handles clockwise, as shown in **Figure 2-3b**.

NOTE

Height of the entire press/thruster can be adjusted with the adjustment wheel as much as 17.5 in (440 mm). The thruster slide assembly stroke is a maximum 6.75 in (170 mm).

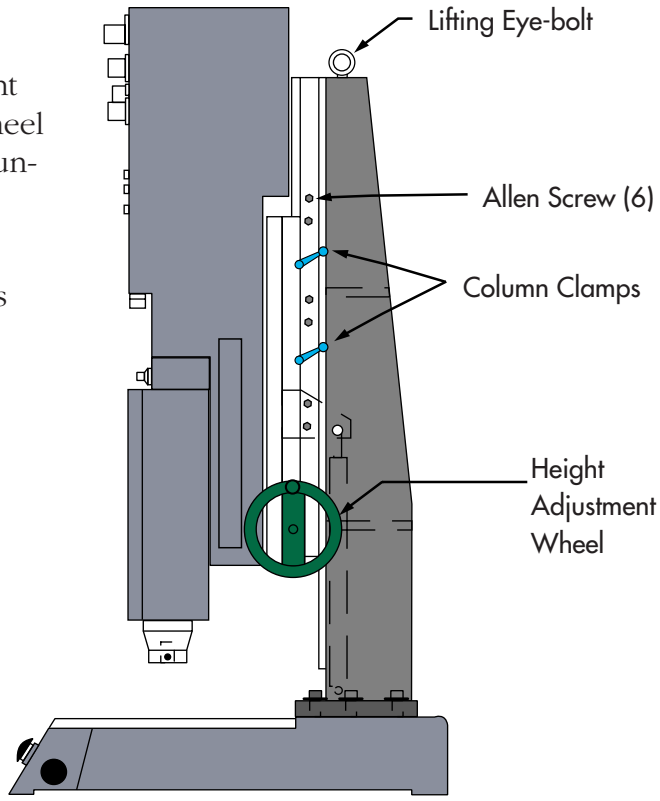


Figure 2-4 *Press Right Side View*

Thruster Height Adjustment, continued

4. After all adjustments are made, tighten the 6 Allen (locking) screws: 2 above the top column clamp, 2 between the column clamps, and 2 below the bottom column clamp.

Press System Basic Cable Connections

Ground the System

Make sure the system is properly grounded.

CAUTION

Is the system properly grounded? Before proceeding, make sure you have followed the instructions of Section 1 relating to electrical grounding.

Continued

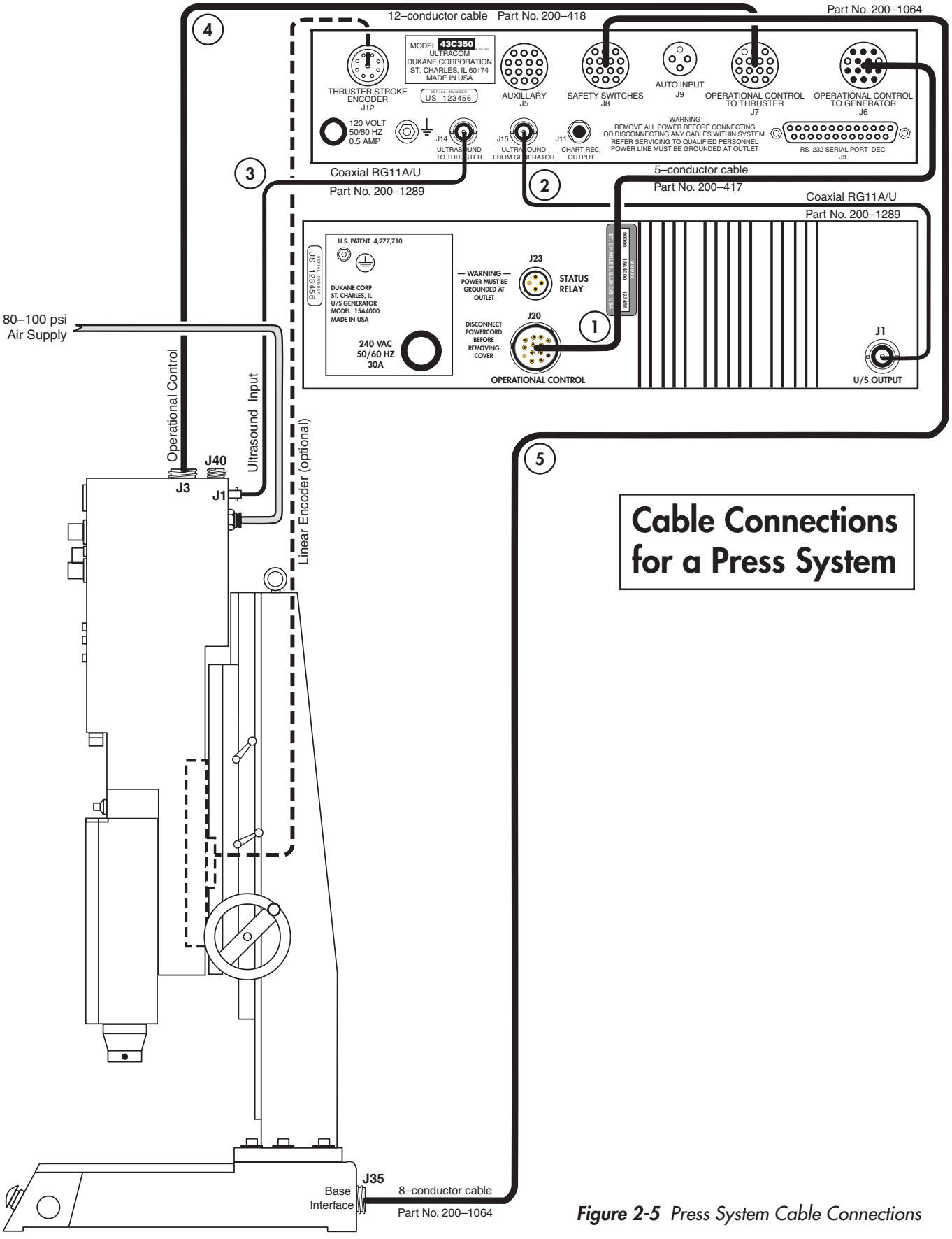


Figure 2-5 *Press System Cable Connections*

Press System, Connections, continued

1. Make the basic cable connections (1) through (5) as shown in **Figure 2-5** and as detailed below. When connections are complete, the press/thruster, the Ultra-Com, and the generator will be interconnected.
2. Make any optional ----- connections.
3. Connect any customer supplied equipment such as automation, chart recorder or printer.
4. Complete basic connections with customer-supplied air and electricity.

   Connect the power cords last, but do not turn on the power yet.

CAUTION

Before connecting or disconnecting cables: Put front panel power switches for the Ultra-Com and the generator in the OFF position; turn off electrical power; and, remove AC power cords from their receptacles.

Cable No.	Part Number	Cable Type	Length (m) **	From	To
1	200-417	5-conductor Oil-resistant	2.4	**J6** Ultra-Com Operational Control	**J20** Generator Operational Control
2	200-1289	Coaxial RGIIA/U	3	**J15** Ultra-Com Ultrasound from Generator	**J1** Generator Ultrasound Out
3	200-1289	Coaxial RGIIA/U	3	**J14** Ultra-Com Ultrasound to Thruster	**J1** Thruster Ultrasound Input
4	200-418	12-conductor Oil-resistant	2.4	**J7** Ultra-Com Operational Control to Thruster	**J3** Thruster Operational Control
5	200-1064	8-conductor Oil-resistant	2.7	**J8** Ultra-Com Activation Switches	**J35** Press Base

Table 2-2 *Press System Basic Connections*

** **NOTE**

Cables are available in longer lengths through the Dukane Sales Department. See Section 11 for contact information.

Continued

Press System,Connections, continued

CAUTION

Run the generator only after:
• the ultrasound signal cable is connected, and
• the transducer is installed in the thruster.
Otherwise an overload condition could occur, with possible damage to the generator.

Compressed Air

Connect a stable supply of clean, dry, compressed air to the air inlet at the back of the thruster as shown below. Make sure the air delivered to the thruster exceeds the expected output pressure and that it is in the range of 80 - 100 psi.

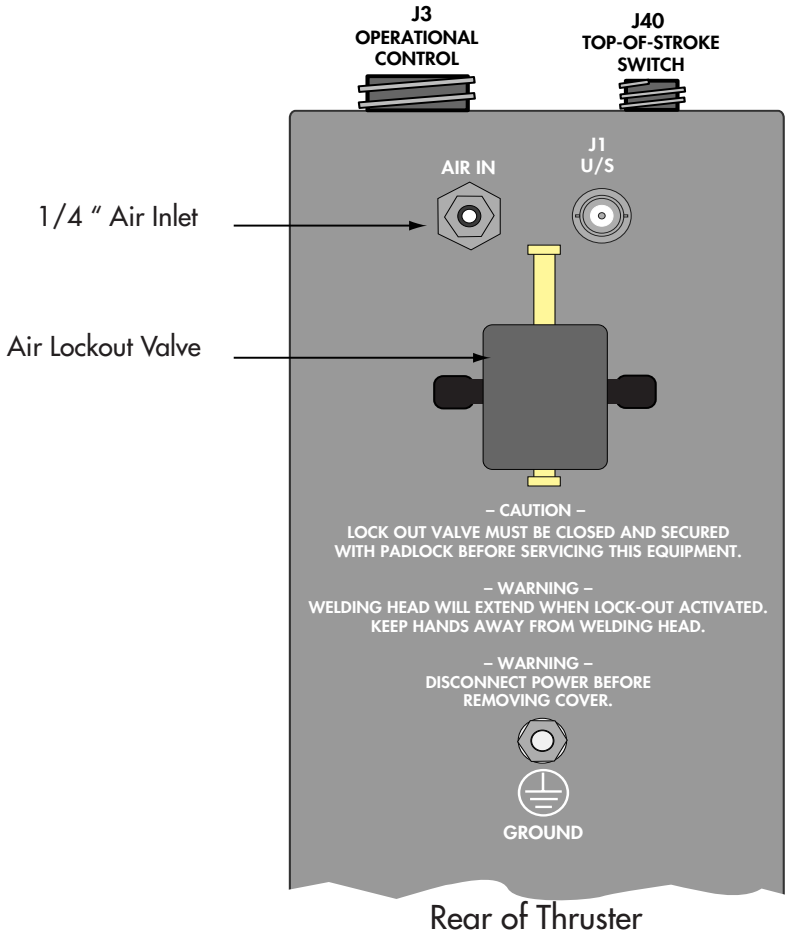


Figure 2-6 *Thruster Air Inlet Detail*

Press System, Connections, continued

Optional Connections

Complete cable connections for any optional features.

Linear Encoder

If your unit has the linear (distance) encoder, connect the encoder's free end to connector J12, THRUSTER STROKE ENCODER on the back of the Ultra-Com. (See Pages 39-42 for more information about the encoder.)

Top-of-Stroke Cable

This optional cable connects the thruster's J40, TOP-OF-STROKE SWITCH connector to the customer's automation system. The switch in the thruster opens when the press/thruster slide assembly returns to the fully retracted, or top-of-stroke position. This contact closure is typically used with automated systems to indicate to the controlling mechanism that the slide assembly is fully retracted.

NOTE

Under normal use, we recommend that the maximum voltage and current applied to the contacts do not exceed 24 VDC @ 2 amps.

Recheck Connections

Recheck all connections, and when they are all secure, you are ready to connect electrical power.

Connect Electrical Power

As a final step in the cabling of your system, connect electrical power to the Ultra-Com and to the generator. See Section 12, *Specifications*, for input power requirements.

Installing the Thruster

NOTE

Each installation presents its own set of conditions for the installer. The information offered here is a general guide to thruster installation.

If installing the thruster by itself, make some decisions about your own setup factors. Then, use the steps outlined below as a guide in mounting the thruster.

Setup Factors

Height Adjustment

Mounting a thruster on a rigid, stationary support structure means the thruster itself cannot move. Therefore, after the thruster is installed its height cannot be adjusted.

NOTE

In its fully extended position, the thruster slide assembly will have moved approximiately 6.75 inches (about 170 mm) from its retracted position.

Space Considerations

If the thruster height cannot be adjusted, position the thruster so that the distance from the tip of the retracted horn to the top of the assembly part in the fixture is less than 6.75 inches. (Extension of the thruster slide is a maximum of about 6.75 inches or about 170 mm.) If the distance is greater, the horn will be unable to reach the part to be welded.

In addition, be certain there is enough space for placing and removing parts.

TIP

A shorter distance to travel (stroke) between the retracted horn tip and the parts in the fixture during operation gives two advantages:

- A thruster that is more stable (than one fully extended) when applying pressure to the parts, and
- A shorter duty cycle for a greater production rate.

Mounting the Thruster

1. Place the back of the thruster onto the support structure.
   Examples of this structure: a weldment, a frame, or a baseplate.
2. Align the thruster with the support structure. This can be done by using the thruster bolt holes and/or dowel pin holes to align with bolt holes and dowel pins of the support structure. See **Figure 2-7**.
   The thruster has three threaded mounting holes.
3. Insert three mounting bolts (3/8-16 x 1-1/4" hexhead or equivalent) with flat washers, as shown in **Figure 2-7**.
4. Adjust the thruster so the horn meets the fixture at the proper angle for your applcation.
5. Tighten the bolts.

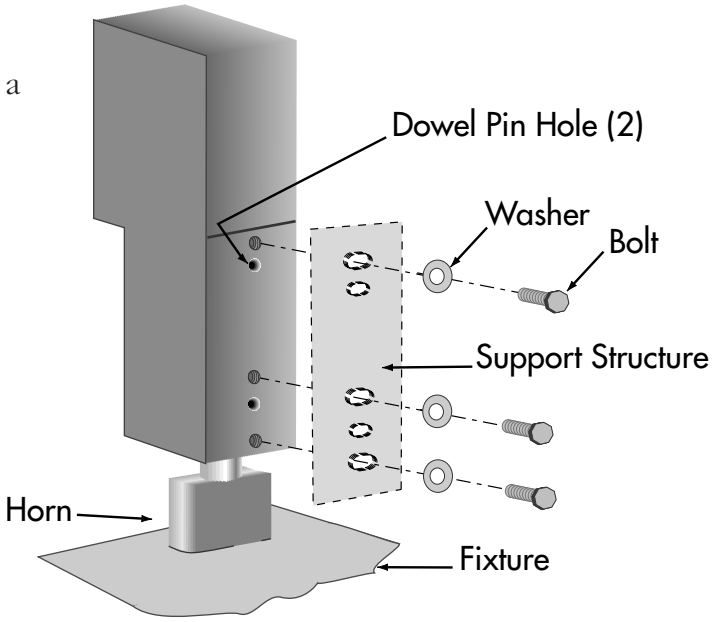


Figure 2-7 *Mounting the Thruster*

Connections for Thruster Only

1. Make the basic cable connections (1) through (7) as shown in **Figure 2-8** and as detailed on the next page. When connections are complete, the thruster, the Ultra-Com, and the generator will be interconnected.
2. Make any optional ▬▬▬▬ connections.
3. Connect any customer supplied equipment such as automation, chart recorder or printer.
4. Complete basic connections with customer-supplied air and electricity.

   Connect the power cords last, but do not turn on the power yet.

CAUTION

Before connecting or disconnecting cables for any system component:
Turn off electrical power.
Remove power cords from receptacles.
Put the front panel power switches for both the Ultra-Com and the generator in the OFF position.

Continued

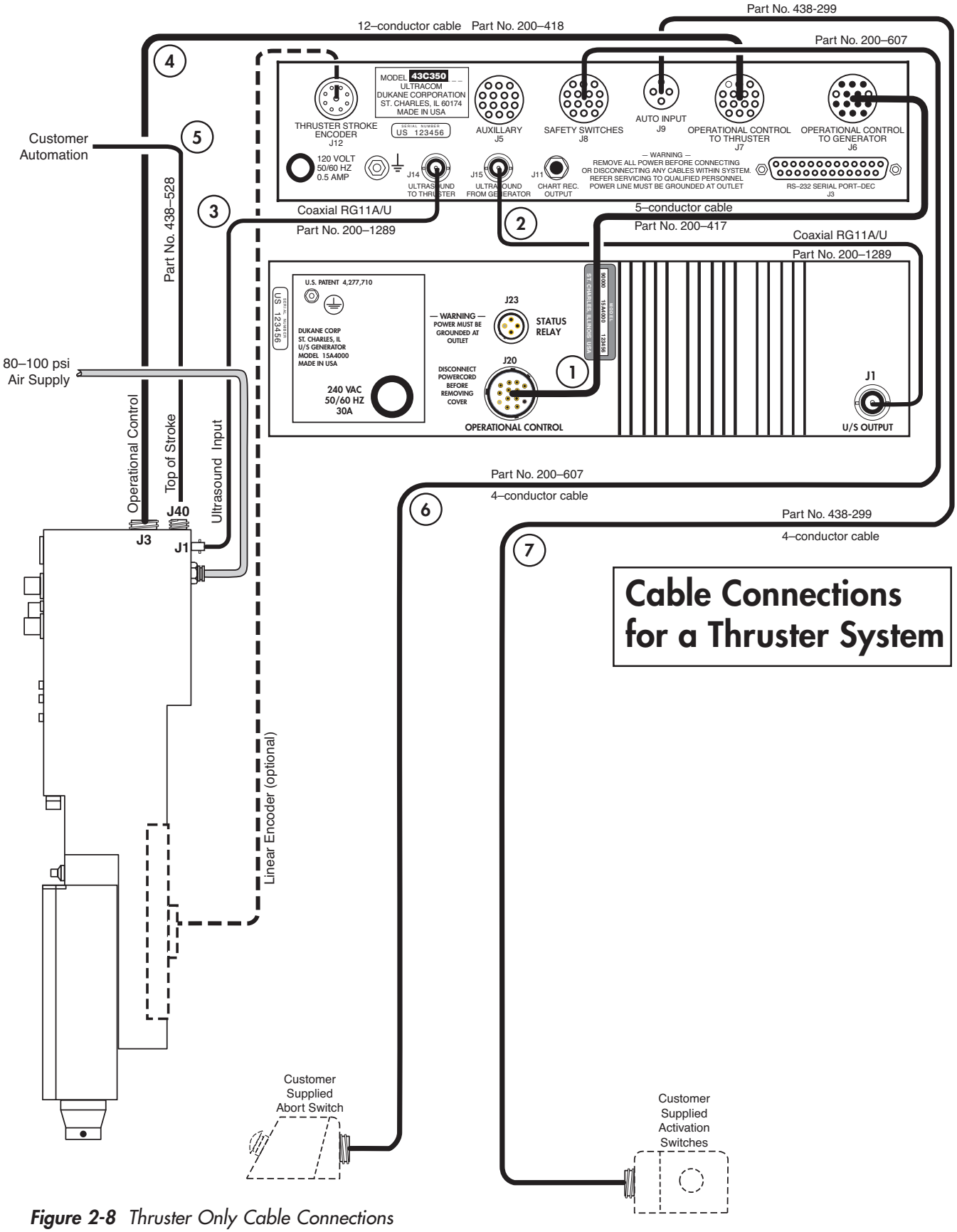


Figure 2-8 *Thruster Only Cable Connections*

Thruster Only, Connections, continued

Cable No.	Part Number	Cable Type	Length (m) **	From	To
1	200-417	5-conducor Oil-resistant	2.4	**J6** Ultra-Com Operational Control	**J20** Generator Operational Control
2	200-1289	Coaxial RG11A/U	3	**J15** Ultra-Com Ultrasound from Generator	**J1** Generator Ultrasound Out
3	200-1289	Coaxial RG11A/U	3	**J14** Ultra-Com Ultrasound to Thruster	**J1** Thruster Ultrasound Input
4	200-418	12-conducor Oil-resistant	2.4	**J7** Ultra-Com Operational Control to Thruster	**J3** Thruster Operational Control
5	438-528	2-conducor Oil-resistant	2.7	**J40** Thruster Top-of-Stroke	User Supplied Automation
6	200-607	4-conducor Oil-resistant	2.7	**J8** Ultra-Com Safety Switches	User Supplied Abort Switch
7	438-299	4-conducor Oil-resistant	2.7	**J9** Ultra-Com Auto Input	User Supplied Activation Switches

Table 2-3 *Thruster System Basic Cable Connections*

**** NOTE**

Cables are available in longer lengths through the Dukane Sales Department. See Section11 for contact information.

CAUTION

Run the generator only after:
- ***the ultrasound signal cable is connected, and***
- ***the transducer is installed in the thruster.***

Otherwise an overload condition could occur, with possible damage to the generator.

Thruster Only, Connections, continued

Compressed Air Connection

Because the thruster does not use a support package, the air source is connected directly to the "100 PSI AIR" fitting on the back of the thruster.

Make sure the air delivered is stable, clean, dry (free of any moisture and lubricant), and between 80-100 psi.

NOTE

Compressed air must be delivered at a higher pressure than the expected output pressure, and in a range of 80 - 100 psi.

Recheck Connections

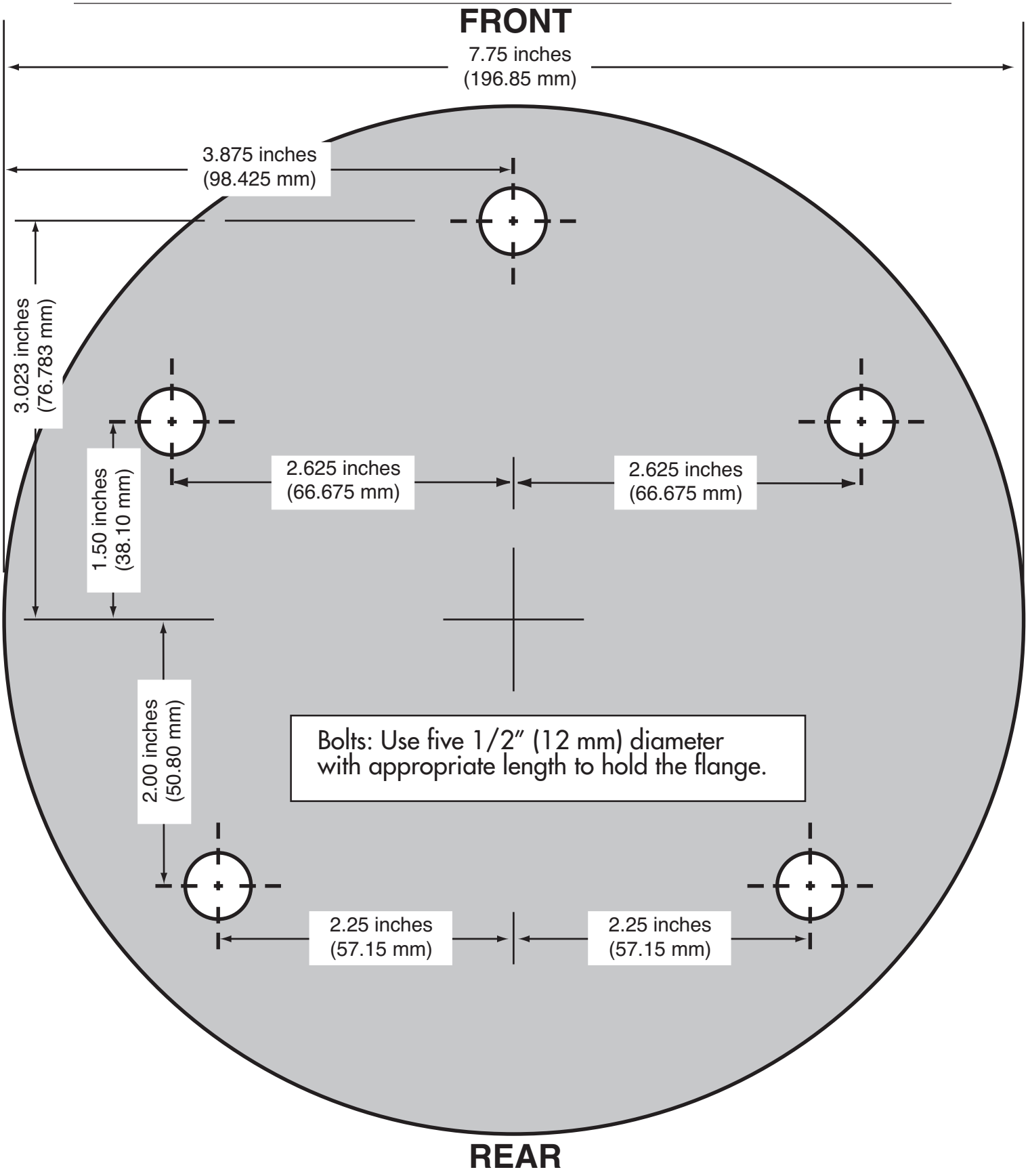
Recheck all connections, and when they are all secure, you are ready to connect electrical power.

Connect Electrical Power

As a final step in the cabling of your system, connect AC electrical power to the Ultra-Com and to the generator. See Section 12, *Specifications*, for input power requirements.

NOTE

See the next page for a flange template to be used in mounting your unit to a baseplate.



Flange Template

Figure 2-9 *Base Flange Template (full scale)*

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SECTION 3

Controls and Indicators

- This section describes press/thruster controls and indicators.

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Overview

Material in this section describes the press/thruster controls and indicators, and it explains what they do. Controls and indicators are presented in this section according to where they are found on the press/thruster:

- Front Panel,
- Rear Panel, or
- Press Base.

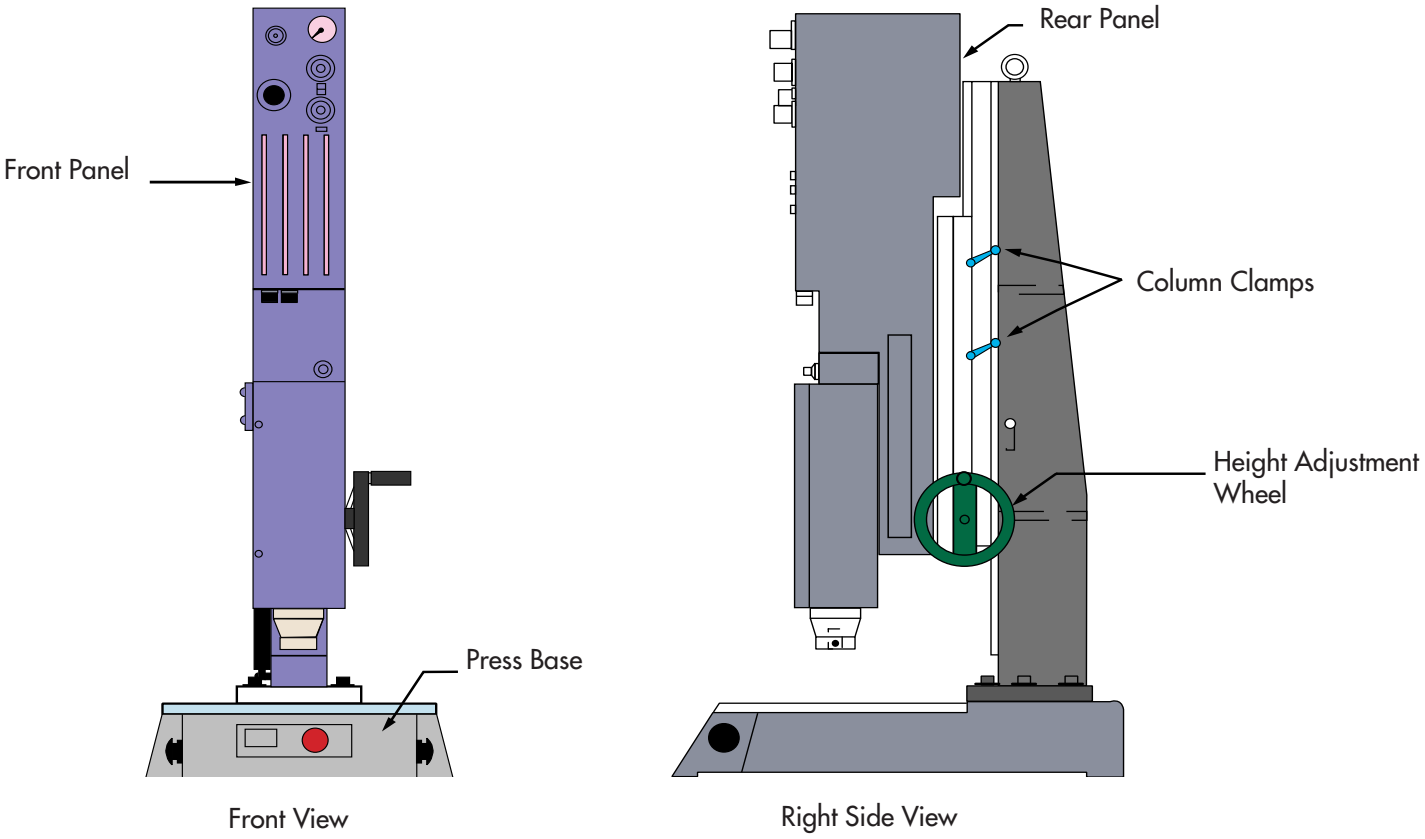

Figure 3-1 *Standard Press Controls Locations*

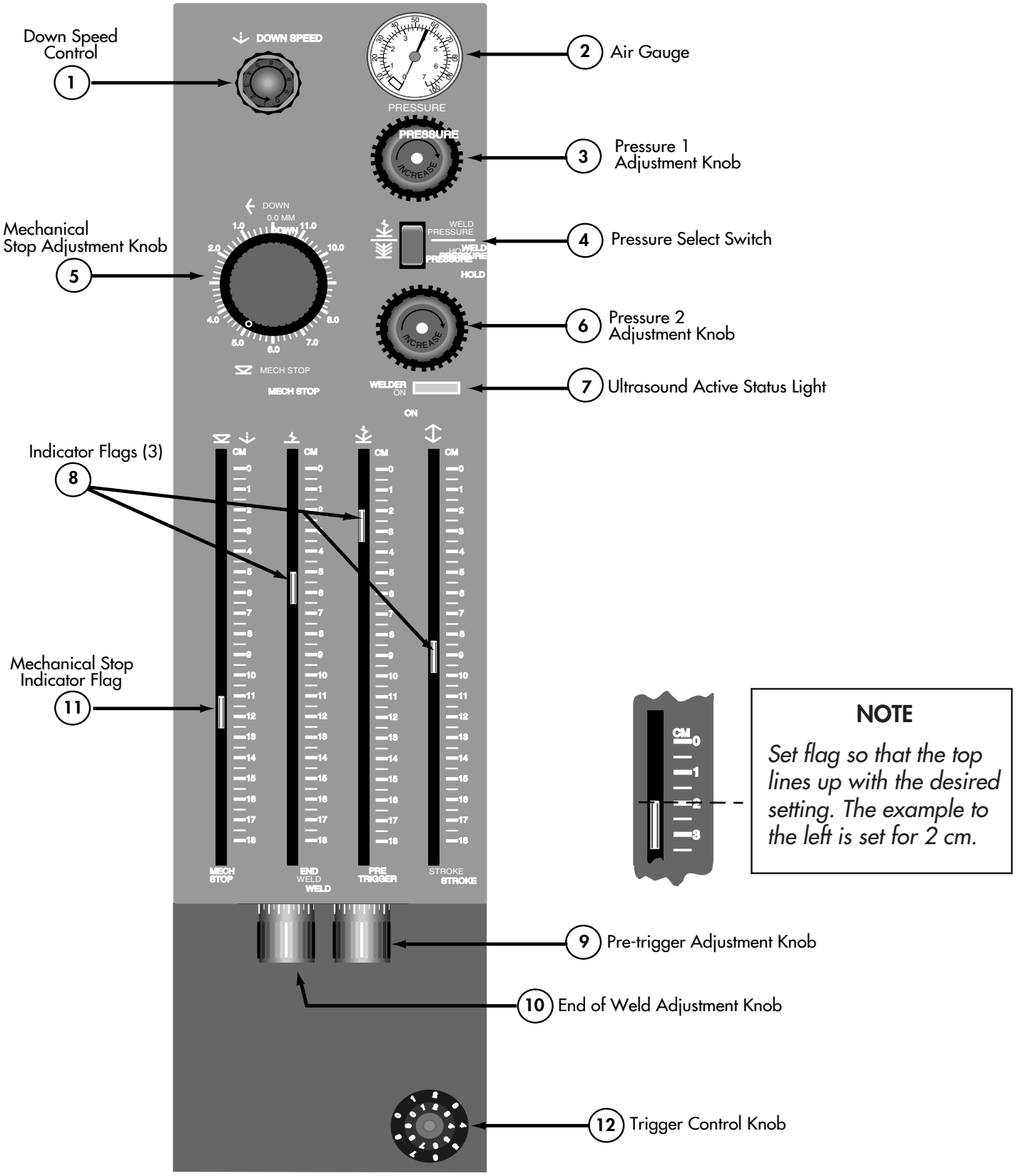

Figure 3-2 *Front Panel 15kHz Thruster*

Front Panel

Symbol	Reference	Symbol	Reference
	Mechanical Stop		Weld Pressure
	Down Speed		End of Weld
	Thruster Stroke		Hold
			Direction

Table 3-1 *Thruster Symbols*

1 Down Speed Control (DOWN SPEED)

This control adjusts the downward velocity of the slide assembly (during Downstroke) by controlling the rate of air exhaust from the lower part of the air cylinder.

Pull the red locking ring out to unlock the control knob. Then, the plastic knob can be turned.

To **increase velocity**, turn the plastic knob counter-clockwise.

To **decrease velocity**, turn the plastic knob clockwise. When you are finished making adjustments, push in the red locking ring.

2 Air Gauge (PRESSURE)

The gauge displays the amount of pressure being applied during the Weld and Hold portions of the cycle. The gauge registers pressure from both Pressure 1 and Pressure 2 regulators respectively.

Continued

3 Pressure 1 Adjustment Knob

Pressure 1 is the pressure inside the air cylinder used: as the slide assembly descends; during the Weld portion of the cycle; and, as the slide assembly retracts. The adjustment knob connects to an air regulator.

To set Pressure 1:

1. The Pressure Select Switch button is normally in the WELD PRESSURE position.
2. Watch the PRESSURE gauge needle, and turn the adjustment knob — clockwise to increase air pressure, and counterclockwise to decrease air pressure.
3. When the air gauge displays the desired welding pressure, Pressure 1 is set.

4 Pressure Select Switch (WELD PRESSURE/HOLD PRESSURE)

This switch is used to select either the Weld Pressure (Pressure 1) regulator or the Hold Pressure (Pressure 2) regulator. This can be done to set the pressures and to montior them.

5 Mechanical Stop Adjustment Knob

To move the stop (and also the indicator flag), turn the Mechanical Stop Adjust knob: counterclockwise to lower it, and clockwise to raise it.

This provides a way to stop the slide:

- at a particular depth of travel relative to the fixture, or
- to prevent the horn from contacting the fixture when there is no part present.

6 Pressure 2 Adjustment Knob

Pressure 2 is the pressure inside the air cylinder used during the Hold portion of the weld cycle. The adjustment knob connects to a second air pressure regulator.

To set Pressure 2:

1. Press and hold the Pressure Select Switch button to HOLD PRESSURE.
2. Watch the PRESSURE gauge, and turn the knob clockwise to increase pressure; turn it counterclockwise to decrease pressure.
3. When the air gauge shows the desired Hold pressure, Pressure 2 is set. Release the Pressure Select Switch.

When welding with dual pressure, both regulators are active though at different times in the weld cycle. Pressure 1 regulator is active as the slide assembly descends and during the Weld portion of the cycle. Pressure 2 regulator is active as the Hold portion of the weld cycle takes place.

(7) Ultrasound Active Status Light (WELDER ON)

This light glows green whenever the ultrasound signal is applied to the stack.

(8) Indicator Flags

The flags can provide visual feedback for three aspects of the weld process: END WELD, PRE-TRIGGER, and STROKE POSITION. Only the STROKE POSITION flag moves with the slide assembly itself.

To find out how far this slide assembly moves:
When the slide is in its "up" or retracted position, note the top edge of the middle flag is aligned with the "00" on the stroke position scale.
Then, when the slide assembly is fully extended, note where the top of the flag is. That is the stroke distance.

See the ***EXAMPLE*** below.

EXAMPLE

The STROKE POSITION flag starts at the 0 mark on the scale. At the extension of the slide assembly, the position of the flag is at the 10 mark.
Subtract 0 from 10, and the result is 10 centimeters. This means that the slide assembly has moved 10 centimeters.

END WELD and PRE TRIGGER flags move when their corresponding adjustment knob is turned. Readings are taken from the top edge of these flags.
See (9) and (10) on the next pages for more information.

Continued

Indicator Flags, continued

9 Pre-trigger Adjustment Knob

Turning the knob clockwise lowers the PRE TRIGGER flag increasing the distance traveled before the ultrasound signal is turned on. The flag shows where the ultrasound signal will be turned on. The signal can start either before the horn contacts the assembly part or after contact is made. As the horn descends, the ultrasound signal stays on until the weld controlling parameter (time, distance, or energy) has been met or until the tops of the STROKE POSITION and END WELD indicator flags are even.

NOTE

To help establish reference points, a scale from 000 to 100 has been put on the Pre-trigger and End Weld adjustment knobs.

NOTE

Refer to the Ultra-Com User's Manual *as you decide on the trigger settings. Make sure your Ultra-Com setup corresponds to the mechanical adjustments you have made to the press itself.*

When pre-trigger is not needed for an application, turn the knob so the indicator is at the bottom of its slot.

CAUTION

Adjust the pre-trigger flag so the ultrasound signal will not start until the horn is 1/4 inch (7 mm) (or less) from the part to be welded.

Continued

Pre-trigger Adjustment Knob, continued

10 End Weld Adjustment Knob

Turning the knob moves the END WELD indicator flag. The top edge of the flag shows where the ultrasound signal will be turned off.

When the pre-trigger control is used to start the ultrasound signal (as the horn descends), the end weld feature can be used to shut off the ultrasound signal. As the horn descends, it will reach the point where the STROKE POS indicator flag is even with the END WELD indicator flag. The ultrasound signal will shut off at that point.

When an application does not require the end weld feature, position the END WELD flag at the bottom of its slot.

NOTE

The End of Weld input for the Ultra-Com comes from the End of Weld press indicator flag, and it is used to end the weld portion of the cycle based on the press head position. The flag can be manually raised or lowered to end the weld at an absolute distance. The End of Weld feature is generally not used with a press or thruster equipped with a distance encoder.

Indicator Flags, continued

11 Mechanical Stop Indicator

This indicator shows where the mechanical stop has been set. The stop ends the press downstroke preventing the slide assembly from moving beyond that point.

TIP

The mechanical stop is used in two ways. On swage and insertion applications it is used to stop the weld at a particular depth.
On all other applications, it is used to prevent the horn from striking the fixture when an assembly part is not in the fixture. This prevents possible damage to horn/fixture.

12 Trigger Control Knob

This control allows the operator to select what "preload" or amount of force will be applied to a part before the ultrasound signal is turned on.
A pressure switch in the slide assembly closes when a specific amount of force applied to the horn is reached.

The trigger control adjusts the amount of force needed to close that pressure switch. When the switch closes, the ultrasound signal starts, and the horn begins to vibrate.

See **Figure 3-3** for trigger knob detail.
To make adjustments, grasp the inner knob, and turn it to make adjustments. This knob can be turned as many as nine revolutions. Each revolution advances the outer dial one number in the direction the knob was turned. A lever between the scales locks the control in position.

The numbers on the scale give the operator only a relative reading. A higher setting indicates more preload force (on the part before the ultrasound signal is turned on). A lower setting means less force.

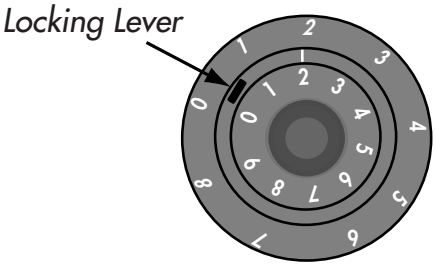

Figure 3-3 *Trigger Control Knob*

NOTE

When a press has a load cell (force transducer), the trigger control knob is not used. The compression force is set electronically. Refer to the Ultra-Com User's Manual *for* "Trigger Type, Force."

Rear Panel

The air handling apparatus is accessible from the press rear panel. The figure below provides some detail for the air lockout valve.

NOTE

The customer supplies the necessary air handling components for the thruster. See Page 24 for thruster's Compressed Air Connection.

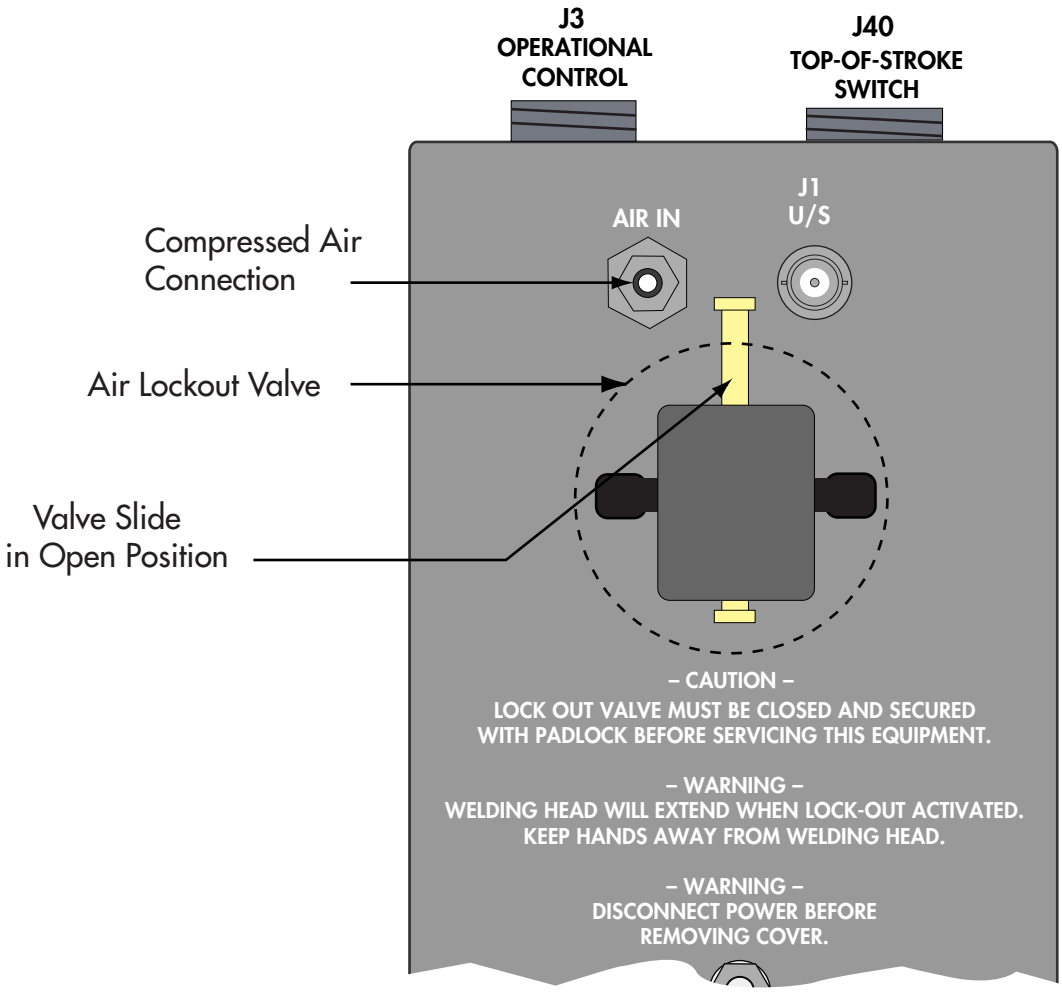

Figure 3-4 *Rear Press Panel*

Rear Panel, continued

The air valve is a lockout valve because it can be locked in the closed position. When the valve is locked, no air will go to the press. **Figure 3-5** shows where a lock can be put.

With the style of valve shown below, the valve slide cannot be moved once the lock is in place.
As part of the start-up procedure, unlock the valve, and push the valve slide to the OPEN position.

NOTE

In the event of unexpected air pressure loss, the check valve keeps air in the press for a brief time. This keeps the press head retracted.

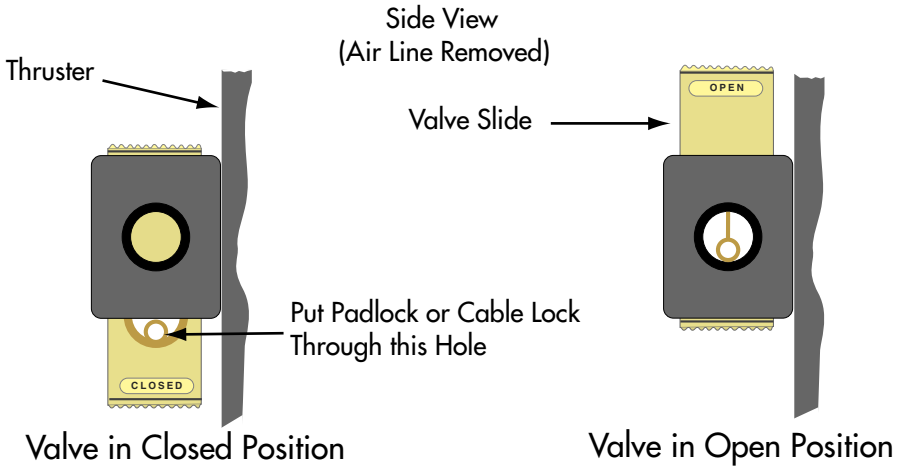

Figure 3-5 *Air Lockout Valve Detail*

Press Base

The ergonomic base, shown in **Figure 3-6**, consists of a base plate, cycle activation switches (black palm buttons), PUSH FOR EMERGENCY OFF switch (red palm button), and a status display screen. At the back of the base is a cable connector for an interface between the Ultra-Com and the base front panel.

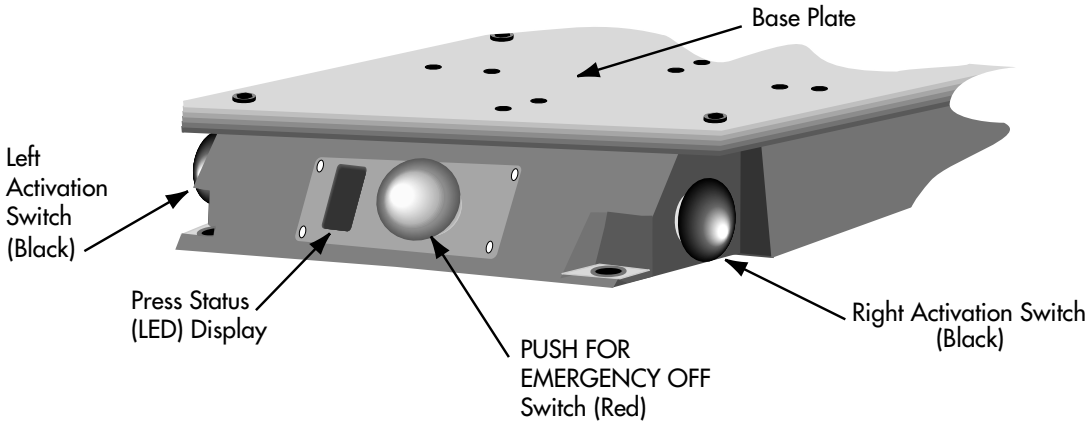

Figure 3-6 *Press Ergonomic Base*

Base Plate

The base plate is bolted to the top of the ergonomic base. It contains drilled and tapped holes that line up with leveling screws in the fixtures. This allows for easy fixture leveling and alignment with the horn. For details on the alignment and leveling of the fixture, see *Fixture Installation*, Pages 54-56.

Emergency OFF Switch

The PUSH FOR EMERGENCY OFF switch applies 24 vdc power to the thruster/press. If the switch is pushed in, the Ultra-Com and the generator begin the following procedure:

- Turns off the ultrasound signal immediately,
- Removes the electrical power from the press, and
- Initiates a software abort sequence.

Activation Switches

To initiate a weld cycle, both the left and right activation switches must be pushed "on" within 350 milliseconds (ms) of each other and held closed for at least 25 ms. This is a mandated safety requirement.

Press Status Display

The display shows one of three press status conditions:

- READY - When the PUSH FOR EMERGENCY OFF switch is twisted and then pulled out, the green READY status light indicates that power is applied to the press. The press is ready for operation.

- ABORT - When the PUSH FOR EMERGENCY OFF switch is pushed in, the red ABORT status indicator lights up. Press operation is no longer possible.

- IN CYCLE - When both left and right activation switches are pressed, IN CYCLE lights up on the press status display for as long as the palm switches are activated.

SECTION 4

Press Options

- This section provides information on the common options available for the press.

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Overview

This section provides information for several common options:

- Linear Encoder,
- Electronic Pressure Regulator,
- Pressure Transducer, and
- Force Transducer.

Linear Encoder

An optional device for your Ultra 15 kHz Assembly System is the linear encoder, also known as the distance encoder. It may have come with the original system purchase, or it may have been purchased as an "add-on" after the initial system installation had been made.

Purpose

The linear encoder accurately measures the distance travelled by the slide assembly and ensures that slide assembly movement can be precisely controlled and monitored.

Components

The linear encoder kit, P/N 438-846. consists of:

- encoder scale,
- encoder head and mounting plate
- modified right side press panel, and
- mounting hardware.

NOTE

The Ultra-Com that controls the system must have the "Distance" option for the encoder to operate.

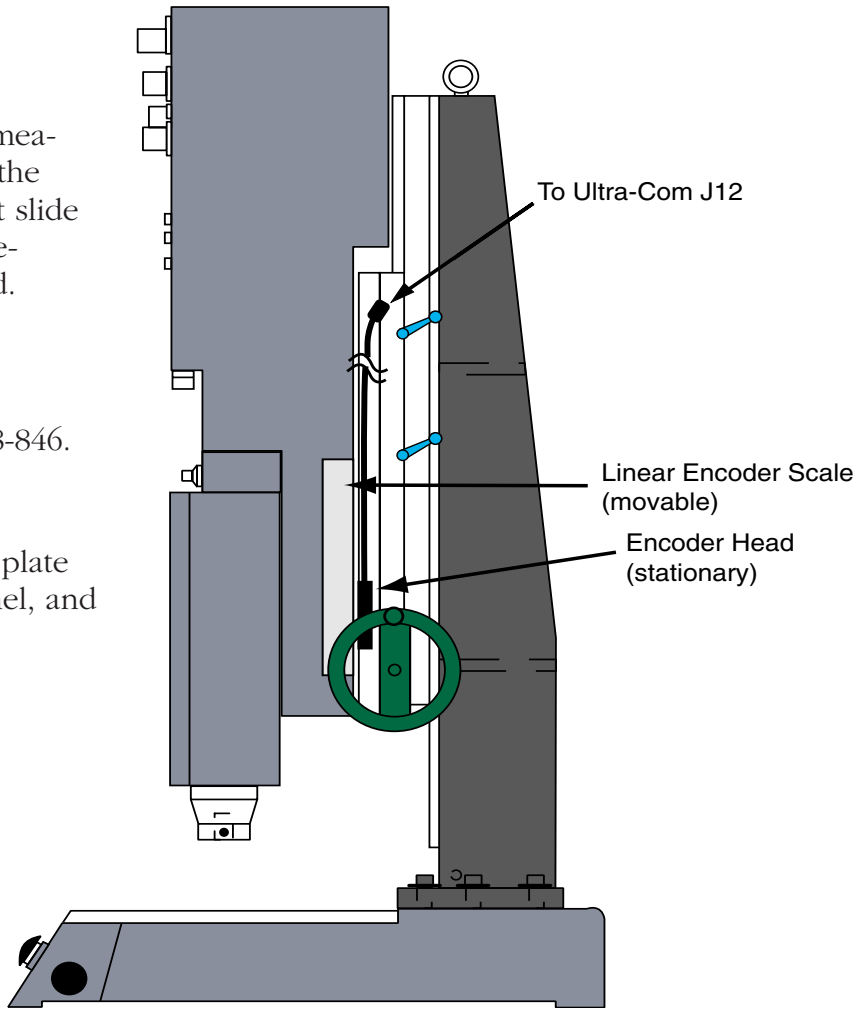

Figure 4-1 *Linear Encoder Components*

Continued

Linerar Encoder, continued

Installing the Linear Encoder Kit

Remove Standard Right Side Panel

1. Close and lock the air lockout valve. (See Page 36.)
2. Turn off the Ultra-Com and the generator. That leaves the press without power.
3. Remove the right side panel (with the ***DUKANE Ultra*** logo on it) from the press.
4. Remove the side cover held by 2 flat-head screws. Save the screws.
5. If a top-of-stroke switch is supplied, remove it from its switch bracket. Then remove the switch bracket from the casting.

NOTE

The encoder scale and head are joined, so please, do not attempt to separate them unless directed to do so.

Install Kit Components

1. Attach the new black bracket to the thruster casting using two #10-32 x 3/8" pan head screws. (If you removed the top-of-stroke switch bracket, you can use the screws saved in Step 5 above.) Place the new black bracket on the casting, and put the top-of-stroke switch bracket on top of the black bracket. Secure the bracket(s) with the screws.
2. Apply Loctite to the threads of two #10-32 x 1/2" flat head screws. Attach the rectangular machined aluminum plate to the lower part of the thruster casting using those screws.
3. Put the stationary encoder head on top of the aluminum plate so its top and bottom holes line up with matching holes in the plate. Temporarily attach the encoder head with two #6-32 x 3/4" pan head screws and washers. Screws will be tightened later during alignment.
4. Secure the encoder cable to the black bracket using two nylon cable clamps, two #10-32 lock washers, and two #10-32 nuts. Loosen (or remove) the presss support panel (if supplied), and feed the cable and connector through the notch in the thruster casting. Use "edge guard" to protect the cable from any sharp edges on the press support sheet metal.

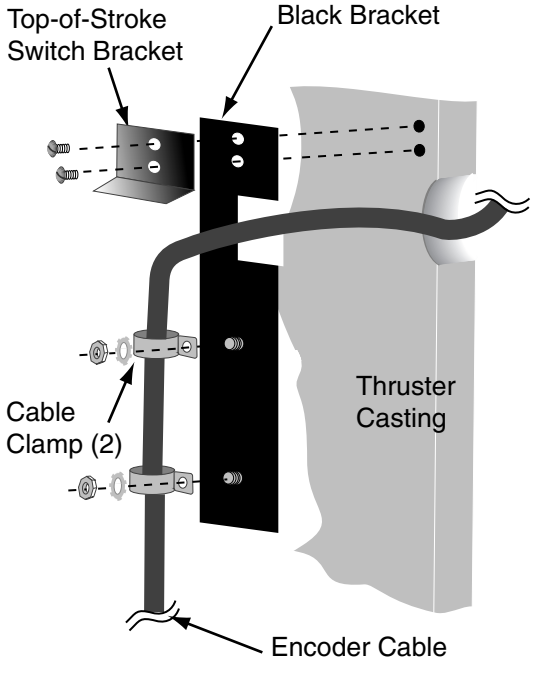

Figure 4-2 *Linear Encoder Mounting Detail*

Installing Linear Encoder Kit, continued

5. Remove the encoder head, and allow it to hang free. Attach the new scale mounting plate to the casting using the screws saved when the standard thruster side panel was removed. Use Loctite or a comparable adhesive on the screw threads.
6. Again attach the encoder head to its aluminum plate. Remove the screw that holds the stationary encoder head to the (movable) encoder scale. Carefully slide the encoder scale so its top and bottom holes match with holes in the scale mounting plate. Use two #8-32 x 5/8" pan head screws to attach the encoder scale to the plate.

Alignment

Aligning the linear encoder sets the internal reference mark for the encoder. This reference mark resets the distance register in the Ultra-Com after each cycle, and ensures repeatable distance measurements from cycle to cycle.

1. Align the encoder scale with the encoder head so that a 1 mm (.039") gap exists between them along the entire stroke range. Because this is a critical measurement (in prolonging the life of the optical linear encoder) use a feeler gauge to check the gap width.
2. Check to see that the thruster slide moves up and down without interference. Adjust encoder head and body as necessary. After making final adjustments, tighten all screws.

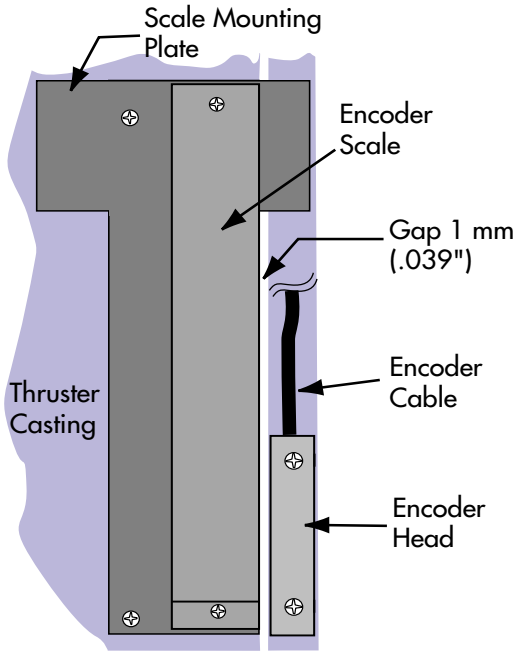

Figure 4-3 *Linear Encoder Alignment*

WARNING

Keep hands and clothing away from the press when it is activated.

Continued

Linear Encoder Alignment, continued

Testing

1. Unlock the padlock used on the air lockout valve.
2. Connect the encoder cable to connection J12 at the rear of the Ultra-Com (THRUSTER STROKE ENCODER).
3. Turn on the Ultra-Com. This restores power to the press as well. Set the Ultra-Com to measure distance.
4. Set the air pressure to the desired level.
5. Perform the following procedure to test the encoder for the proper setting:
   a. Run one weld cycle. If the encoder position reads negative (-.xxx) then the encoder is above the "0" reference point used to measure distance by the Ultra-Com. This is the correct setting. Secure the two screws on the encoder head, and proceed to Step 6.

      xxx = approximately -.125 to -.250

   b. If, after running one cycle, the encoder position reads positive (+.xxx), loosen the two encoder head screws, and slide the head down until the reading goes negative (-.xxx). Secure the two screws. Proceed to Step 6.
6. Set the gap between the encoder scale and head, using a .039 inch (1 mm) feeler gauge blade.
7. Measure the gap at the top and bottom of the stroke. Allowable tolerance, as specified by the encoder manufacturer, is ±.005 (range from .034 to .044 inches or .864 to 1.12 mm).
8. Loosen and tighten all the screws as necessary, and check the measurements again after tightening them.

Attach Side Panel

Install the modified right side panel with its five (5) 1/4 turn retaining pins. Route the encoder cable through the notch in the thruster's aluminum casting.

Connect the cable to the J12 connector on the Ultra-Com.

Electronic Pressure Regulator

The electronic pressure regulator, (I/P transducer) is an electro-pneumatic replacement for the manually adjusted air regulator on the press. The I/P transducer converts electrical signal current (I) into air pressure (P). The Electronic Regulator takes an electrical signal sent by the Ultra-Com, and converts it to the programmed air pressure.

The pressure value settings, "Pressure 1" (P1) and "Pressure 2" (P2), are stored in the Process Setup under Pressure in the Ultra-Com. P1 and P2 are set in pounds per square inch (PSI), or BARS.

To monitor Pressure 1 and Pressure 2 values, use the CHECK PRESSURE parameter, contained in the Utilities menu under User Parameters (on the Ultra-Com).
The Ultra-Com uses a pressure transducer to measure the I/P output pressures.

Calibration

The I/P transducer installed in this thruster/press does not require on-site calibration. The unit is equipped with self-correcting, closed-loop circuitry.

Pressure Transducer

The pressure transducer (P/I transducer) performs the same function as the air gauge on the press. The P/I transducer converts the air pressure (P) to an electrical signal current (I). It then sends the signal to the Ultra-Com. The Ultra-Com displays this signal as pressure.

Two sets of upper and lower limits can be monitored with the pressure transducer:

- One set of limits is used to monitor the air pressure before a cycle starts. Using the bad parts limits, the unit will not begin a cycle if the air pressure is outside the pressure window that has been set.This set of limits is used to ensure that air pressure from the input line has not dropped below the pressure required for an acceptable weld force.

Continued

Pressure Transducer, continued

- The other set of limits is used to monitor the air pressure when the ultrasound is turned on.

This feature can be used as an indicator when checking for a trigger or load cell malfunction.

A more precise method to monitor trigger force is to use a load cell.

Calibration

The pressure transducer does not require any on-site calibration.

Load Cell

A load cell (force transducer) is a device that measures force. The load cell converts mechanical force into an electrical signal. The load cell monitors the force applied to the part. It sends a signal to the Ultra-Com to indicate when the mechanical pressure is equal to the programmed "Trigger Force". The trigger is the point at which the ultrasound is turned on.

The Trigger Force parameter can be viewed from the Utilities menu with the Ultra-Com. Choose USER PARAMETERS, then choose TRIGGER FORCE. The values for this parameter are in pounds or Newtons.

A force versus time graph can be generated if a printer is connected to the Ultra-Com.

Load Cell Calibration

The load cell is calibrated at the factory. It does not require any on-site calibration.

SECTION 5

Stack/Fixture Setup

- This section outlines steps needed to remove and assemble an acoustic stack. It also discusses fixture installation.

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Overview

The Dukane Ultra 15 kHz Assembly System is used to assemble parts in a wide variety of applications. The ease with which acoustic stack components can be installed and exchanged helps make this possible. In addition, this flexibiltity makes regular inspections and maintenance of the stack easier to perform.

This section tells how to change stack components. Removing the stack, disassembly, assembly and installing the stack are covered. The information applies to a first-time installation as well as when a change to an existing setup is called for.

Stack Description

The stack consists of three primary components (see **Figure 5-1**):

- Transducer,
- Booster, and
- Horn.

For an original equipment system, the transducer and booster are usually shipped assembled and installed in the thruster. The horn, horn tips, and fixture are shipped separately.

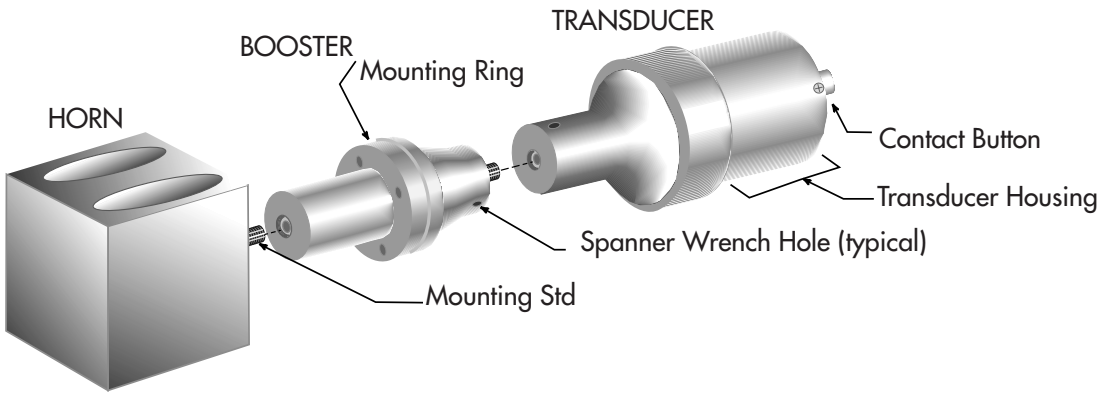

Figure 5-1 *Stack Components*

Changing Stack Components

Figure 5-2 gives an illustrated overview of stack component disassembly and assembly.

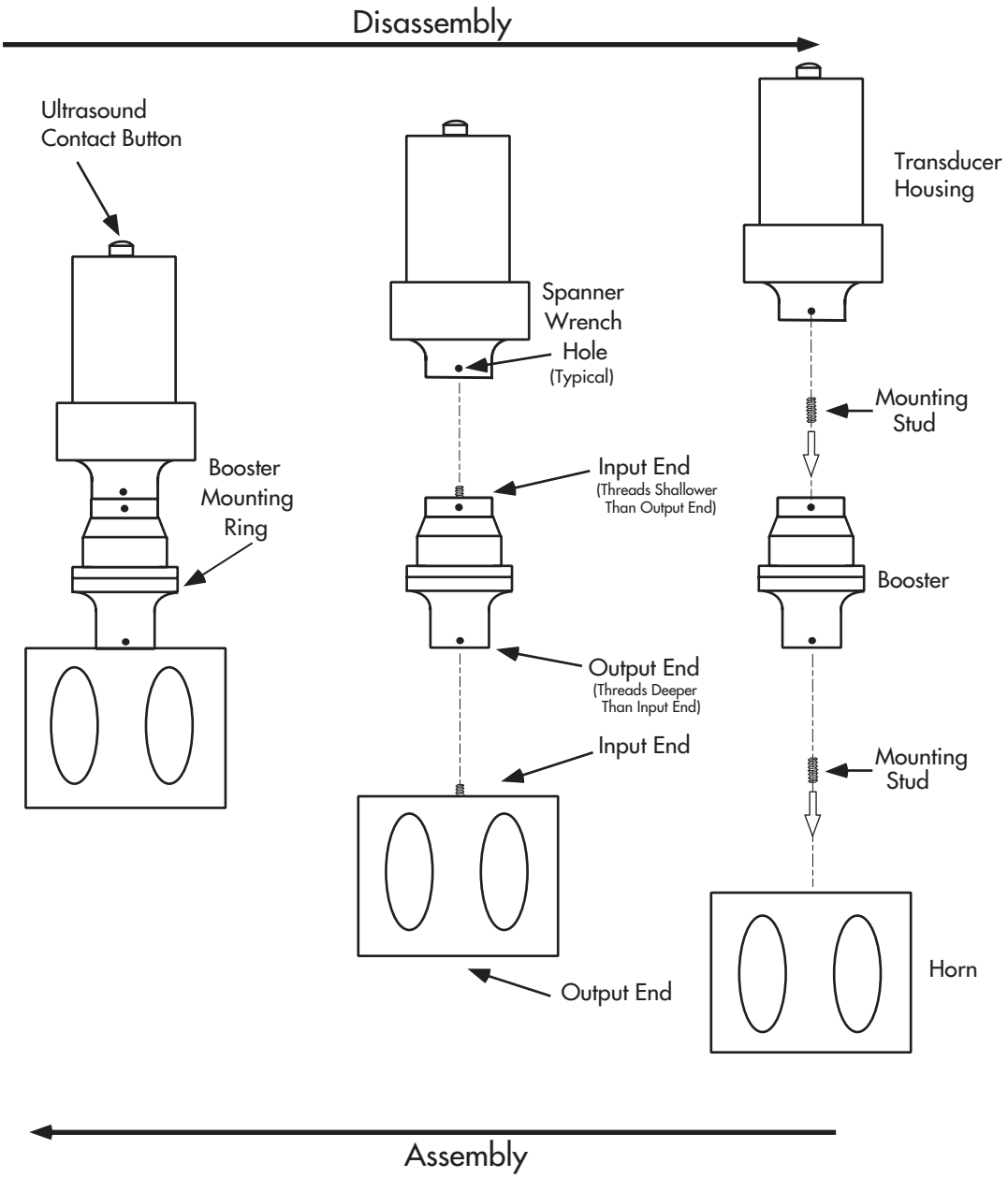

Figure 5-2 *Stack Disassembly and Assembly*

Stack Removal

1. Push the PUSH FOR EMERGENCY OFF button on the front of the press base.
2. Turn off power to the generator and to the Ultra-Com.

NOTE

These two steps are necessary to insure that no power would be accidentally applied while removing the stack.

3. While supporting the stack with one hand, loosen the two socket head bolts that secure the stack access door.

CAUTION

When opening or closing the stack access door, support the stack by the horn or the exposed part of the booster This will keep it from falling and from being damaged. The access door holds the stack in place when it is closed.

4. Swing the access door open, and pull the stack toward you until the transducer and booster mounting rings clear the stack housing monting ring slots.
5. Pull the stack forward and down until the transducer contact button clears the press/thruster electrical contact leaf. Refer to **Figure 5-3**.

WARNING

Electrical Shock Potential!
Do not touch the contact button when removing the stack. There may be an electrical charge stored in the transducer. (See "Explanation", next page.)

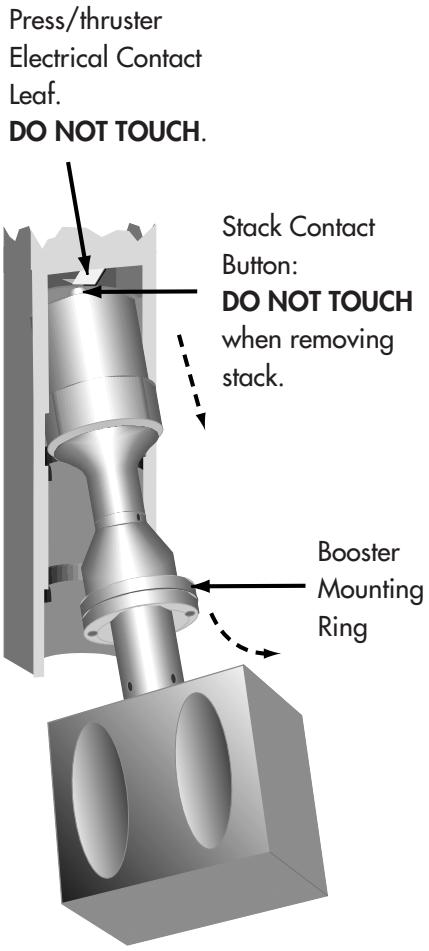

Figure 5-3 *Stack Removal*

6. Lift the stack out of the housing.

NOTE

When changing or inspecting any of the stack components, ALWAYS remove the stack from the thruster.

Continued

Stack Removal, continued

Electric Shock Potential Explanation

Transducer performance depends on the nature of its piezoelectric makeup. Electrical energy is converted to mechanical energy when the stack is in use inside a press/thruster. After the press has been turned off, and handling the stack becomes necessary, keep in mind that any electrical charge that has built up inside the transducer will discharge from the contact button. So, when removing a stack from the press/thruster, do not touch the transducer's contact button. Set the transducer aside. Wait a few minutes, and usually the charge will dissipate completely.

Once removed from the press/thruster, the transducer is capable of converting mechanical energy to an electrical charge.

For instance, electrical energy might be produced if the transducer experiences a change in temperature or if the transducer receives a physical blow of some kind. Again, any electrical charge that results from these kinds of mechanical forces would be focused at the contact button.

Receiving a transducer shock would be similar to a shock you may experience when touching a household light switch after crossing a carpeted floor.

Stack Disassembly

Use the two spanner wrenches (wrenches A and B) provided with the press. To separate the stack components, read and carefully follow the instructions below:

1. Place wrench A on the component to be removed, and place wrench B on the component next to it. Refer to **Figure 5-4**.
2. Turn wrench A in the direction indicated.

CAUTION

Avoid injury when using the spanner wrench(es). Press down with the palm of the hand on the wrench handle.

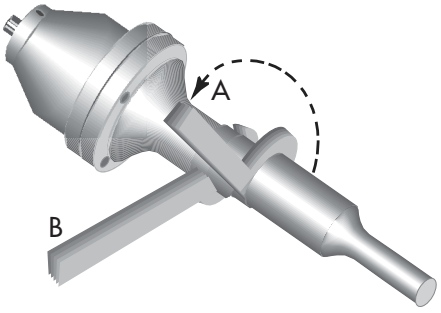

Figure 5-4 *Stack Disassembly*

3. When the component is loose, it can be removed by hand.

NOTE

To maintain structural integrity, when separating components NEVER hold a transducer by the housing or the booster by its mounting rings. Doing so will damage the holding pins in both the transducer and the booster.

NOTE

Use only the tools recommended by Dukane. NEVER clamp a horn, booster, or transducer in a vise or use tools such as pliers, visegrips, etc. Doing so will scratch and/or gouge the surfaces and introduce stress risers in the stack. The irregular surfaces would affect the stack operation, and that could lead to failure of each stack component. The stress risers could develop into cracks causing the stack components to fail.

Stack Assembly

Preassembly Check

Before assembling a stack, inspect all of the components for possible damage. Take a few moments to inspect the surfaces to be joined. They should be smooth and clean.
Look for surfaces that are uneven (concave, convex), have stress cracks, chips, or gouges. Any of these irregularities will affect the operation of the stack, and could cause further damage. Refer to Section 9 – Maintenance, for steps to take in cleaning or smoothing the mating surfaces.

If the components have no damage, continue with the following steps:

NOTE

A pitted surface or one that has a buildup of old grease and dirt, will interfere with the transfer of energy from one component to another.

1. Remove any foreign matter from the threaded stud and the mating hole.
2. Put a thin coat of high-pressure grease (A small packet is supplied with the system.) on one of the mating surfaces. If high-pressure grease is not available, then use a thin coat of petroleum jelly.

NOTE

Do not apply grease or lubricant to the stud or to its corresponding mating hole.

3. Thread the components together, and tighten them (**Figure 5-6**) by applying torque as follows:

250 inch-pounds = 20.8 foot-pounds, or 28.2 Newton-meters.

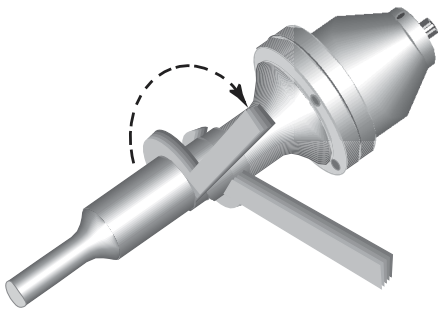

Figure 5-5 *Assembling Stack Components*

CAUTION

Do not overtighten. Overtightening components can cause stress cracks, stud loosening, or unexplained power supply overloading.

Continued

Stack Assembly, continued

Mounting Studs

Thread the mounting stud into the "input" end of the horn or the input end of the booster. Tighten with an Allen wrench in the socket head of the stud to the following specifications:

200 inch-pounds = 16.6 foot-pounds, or
22.5 Newton-meters for a 3/4"–16 threaded stud.

NOTE

Always assemble the mounting studs that mate boosters, transducer and horns to the input end of the horn or booster. Never thread a stud into the transducer or into the output end of the booster first.

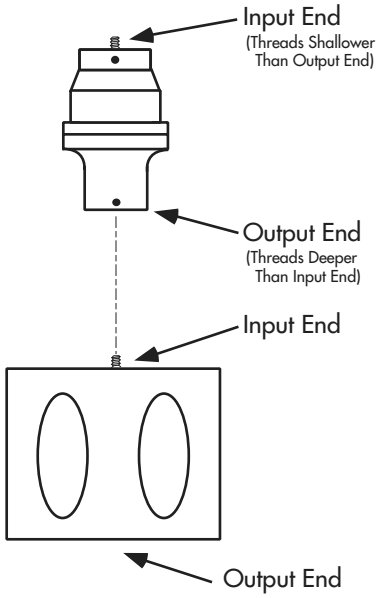

Figure 5-6 *Input/Output Ends Identified*

Horn to Booster or Booster to Transducer Assembly

Always remove a transducer-booster assembly from the thruster before attaching a horn.

Inspect all surfaces of the components to be joined for stress cracks, chips, or gouges. Any of these irregularities will affect operation and could lead to further equipment damage. Refer to Section 9 – /Maintenance, for steps to take in cleaning or smoothing the mating surfaces.

Be especially sure that the mating surfaces of the two components are clean and flat. These surfaces must make good contact for energy to be transmitted properly from one component to the next. Pitting, corrosion or a build-up of grease or dirt on a mating surface will interfere with this energy transfer.

Make sure the stud in the horn or booster is tight. Then, clean the stud and its mating hole.

Coat one of the mating surfaces with a thin layer of high pressure grease. See the **NOTES** on this page.

Use correctly sized spanner wrenches for components with spanner wrench holes. Use an open end wrench on components with wrench flats. Use of a canvas strap wrench, or other holding means are acceptable if the tooling will not be gouged.

NOTE

DO NOT apply grease or any other lubricant to the stud.

NOTE

Dukane recommends using silicon-based Dow-Corning #4 or Dow-Corning #111 as an alternate to coat one of the mating surfaces. If a silicon-based grease cannot be used, one that is petroleum-based is acceptable. However that type of grease is likely to leave carbonaceous deposits on the surfaces requiring more maintenance than would the silicon-based product.

Changing Stack Components, continued

Installing the Stack

1. **Figure 5-7** shows the relationship of the stack to the thruster just before stack installation.
2. Place the stack inside the thruster with the transducer and booster resting on grooves designed to match with their mounting rings. Make sure the contact button on the top of the transducer meets the electrical contact leaf of the thruster.
3. Support the stack in this position with one hand on the horn. Close the stack access door with the other hand. Start to thread the two socket head bolts that secure the access door.
4. If the horn is not properly aligned with the fixture, rotate the stack until horn and fixture are aligned.
5. Finish threading the two socket head bolts on the access door until they are snug.
   DO NOT OVERTIGHTEN!

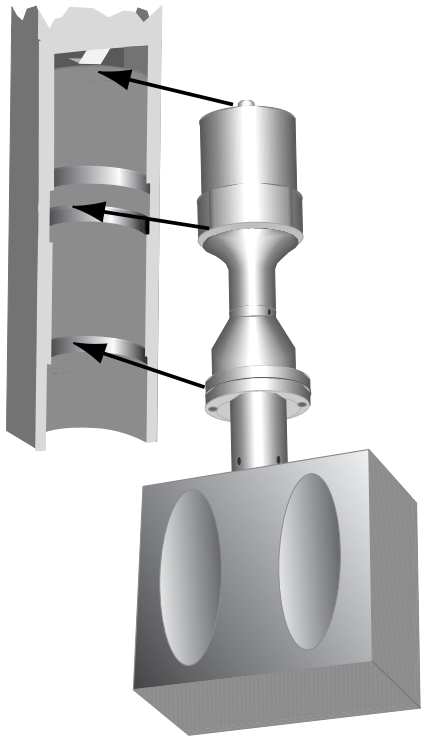

Figure 5-7 *Installing the Stack*

Fixture Installation

To install a fixture, you need to do three things:

1. Align the fixture with the horn.
2. Level the fixture to provide the necessary support.
3. Secure the fixture to the mounting surface.

Fixture Alignment

To safely align the fixture under the horn, use the following procedure. Refer to **Figure 5-8** and **Figure 5-9**.

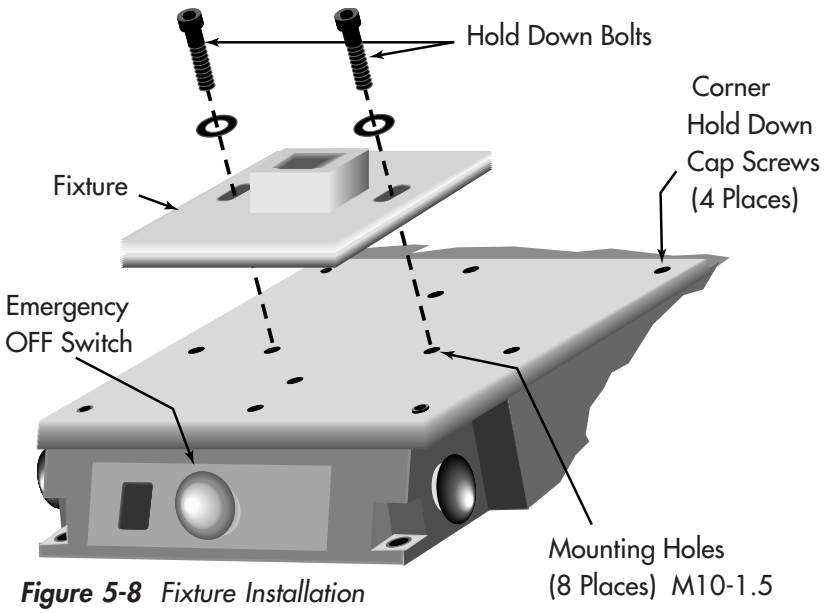

Figure 5-8 *Fixture Installation*

1. Press the PUSH FOR EMERGENCEY OFF switch on the press base. This allows the acoustic stack assembly to be lowered by hand while preventing the system from accidentally cycling.
2. Turn off the power to the generator and to the Ultra-Com to prevent accidental ultrasound operation.
3. Place the fixture, including the parts to be assembled, under the horn.
4. Initially align the two fixture slots over two of the eight mounting holes (size: M10-1.5), located on the base plate.
5. Install the two hold down bolts with washers. Finger tighten them.

NOTE

The fixture should be flat on the base. If the fixture is equipped with leveling screws, adjust the screws so that they do not interfere with the seating of the fixture on the base plate.

Continued

Fixture Alignment, continued

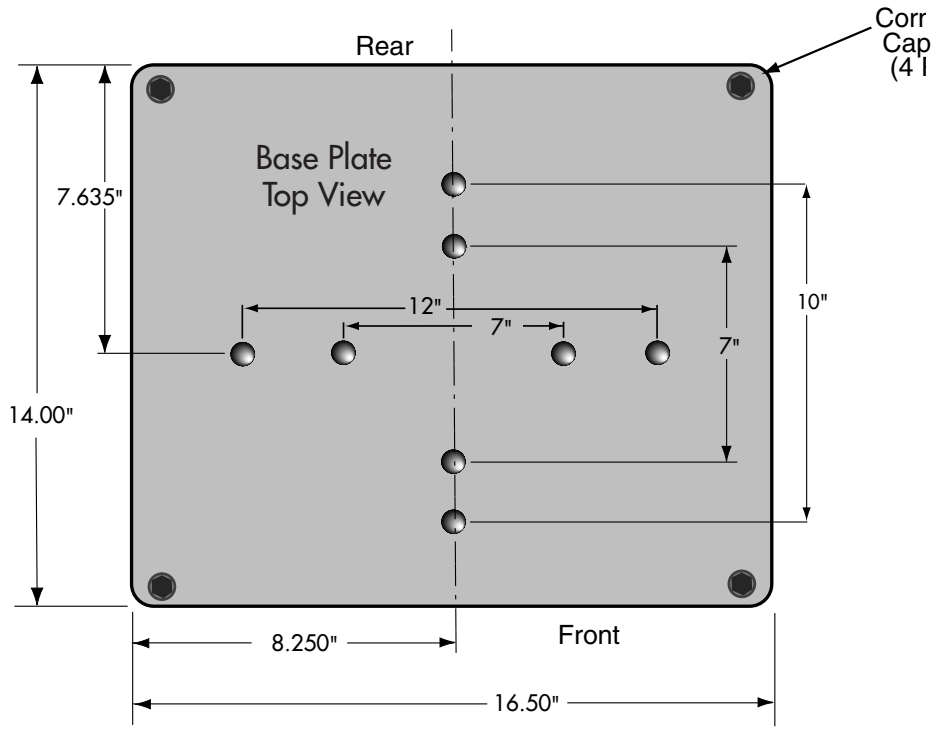

Figure 5-9 *Fixture Mounting Hole Measurements*

6. Place a part in the fixture.
7. Grasp the horn firmly, and pull the acoustic stack assembly down until the horn is as close to the part as necessary to align the fixture.
8. Tighten the fixture hold down bolts to secure the fixture.
9. Adjust the mechanical stop (See Section 3, *Controls and Indicators*.) so the horn will stop above the fixture. This will prevent horn damage if the acoustic stack assembly descends when a part is not in the fixture.

NOTE

Some applications may require the horn to be a few thousandths of an inch from contact with the fixture.
Special applications may require the mechanical stop to be lowered so the horn makes contact with the fixture or anvil. When this is required, then a ground detect circuit is needed to terminate the weld cycle. Refer to the Ultra-Com User's Manual *for more information about providing a ground detect circuit.*

Leveling the Fixture

The following procedure may be helpful, in some applications, in leveling the fixture. To perform this procedure, you'll need a piece of carbon paper and a piece of white paper.

1. Put a sample part in the fixture.
2. Place a piece of white paper on top of the sample part.
3. Place a piece of carbon paper, carbon side down, on top of the white paper.
4. Enter the following into the Ultra-Com:
   Weld time = 0.05
   Hold Time = 0.00
   Pressure = 20-40 psi
   System parameters = Use default settings.
5. Set the trigger control, on the thruster, so the pressure switch closes after some pressure is applied.
6. Turn on the power to the generator and to the Ultra-Com.
7. Make sure the Mode Selection Keyswitch on the Ultra-Com Front Panel is in the OPERATE position.
8. Cycle the equipment, normally, by depressing the left and right base activation switches or by triggering the automation switch.

When one cycle is complete, the pressure developed between the horn and the sample part will have left marks from the carbon paper on the white paper. If the fixture is not level, the carbon markings will be darker in some areas than in others. All carbon markings will be uniform when all the proper adjustments have been made.

Make adjustments, and repeat this procedure as necessary until you are confident that the fixture is level.

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SECTION 6

4000 Watt Generator

- This section describes the connections and controls for the ultrasonic generator.

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4000 Watt Generator

Overview

The 4000 Watt generator converts 60 Hz/240 Volts AC power into a 15,000 Hz signal with an amplitude exceeding 1,000 volts. This signal is fed through the Ultra–Com unit which controls it, to the horn assembly in the thruster/press.

Safety Consideration

To avoid possible injury and to operate the equipment in a safe and efficient manner, please observe the following safety measures. Note that some of the items are also applicable to system components other than the generator, such as the acoustic stack assembly or ultrasonic press.

- **Do not operate any system components before they are properly installed.**
- **Do not make any unauthorized modifications to the control circuitry or other parts of the system. This could cause damage to the equipment and/or injury to the operator. Unauthorized modifications may also void the equipment's warranty.**
- **Do not operate this equipment without a properly grounded connection.**
- **Accessories may be required for compliance with applicable OSHA regulations for machine guarding and noise exposure.**
- **When ultrasonic plastic welding equipment is used with automatic material handling equipment such as an automated system, a SYSTEM ABORT SWITCH should be used and located at each operator station.**
- **Do not use of a foot switch in place of dual push button switches. This violates OSHA regulations.**
- **The Ultra 15 kHz Assembly System will produce audible frequencies. Ear protectors may be worn to reduce annoyance or discomfort from the resulting sound. In addition, sound baffles, sound enclosures, or acoustical absorbing material may also be needed.**

Safety Considerations, continued

CAUTION

To reduce the risk of fire or electric shock, do not expose the generator to rain or moisture.

CAUTION

To reduce the risk of electric shock, do not disassemble the generator. There are no user-serviceable parts inside. Refer servicing to Dukane service personnel only.

Electrical Safety Grounding Instructions

The power cord used on the Dukane generator Ultra 4000 (Dukane Part Number: 15A4000) is equipped with an in-line connector assembly.

The cord must be rated for at least 30 Amps at 240 VAC with a power line frequency of 50/60Hz.

For your safety and for the safety of others, the power receptacle must be grounded. If there is any question as to whether or not the receptacle is properly grounded, please have it checked by a qualified electrician.

In addition to the safety considerations above, proper grounding at the generator power cord is essential for the effective operation of the RFI (Radio Frequency Interference) filter in every Dukane generator.

CAUTION

This generator operates only on 240 VAC. Do not connect the generator to any other type of electrical service.

RFI Filter

The Radio Frequency Interference (RFI) provides the necessary control, filtration and distribution of the input power to meet regulatory requirements. The filter is required to prevent high frequency noise produced by the generator from interfering with the operation of nearby equipment. This RFI has a leakage current less than 3.5mA @ 50/60Hz line frequency.

Regulatory Agency Compliance

CAUTION

DO NOT make any modifications to the generator or to its associated cables because the changes may result in violating one or more regulations under which the equipment is manufactured.

The Ultra 4000 ultrasonic generator has been tested and found to comply with:

The limits for FCC measurement procedure MP-5, “Methods of Measurement of Radio Noise Emissions From ISM Equipment”, pursuant to FCC “code of Federal” Title 47 Part 18 for Ultrasonic Equipment.

Installation

Site Selection

1. Review the generator's relationship to other system components, its power requirements, dimensions, and weight (See *Specifications* in Section 12) before choosing a place for it.

2. Follow the *Safety Considerations* listed above.

Connections

Make sure the basic generator connections listed in **Table 6-1** below are completed. See Figures 2–5 and 2–8 in Section 2 of this manual for detailed diagrams and more information.

FROM	TO
J20 OPERATIONAL CONTROL Generator	J6 OPERATIONAL CONTROL Ultra-Com
J1 ULTRASOUND OUTPUT Generator	J15 ULTRASOUND FROM GENERATOR Ultra-Com
LINE IN Generator	AC Power Source 240 VAC 50/60 Hz
J23 STATUS RELAY Generator	Optional Customer Automation

Table 6-1 *Generator Connections*

CAUTION

Before connecting or disconnecting cables for any system component: turn off electrical power; remove cables from receptacles; and, put the front panel power switches for both the Ultra-Com and the generator in the OFF position .

Front Panel Controls

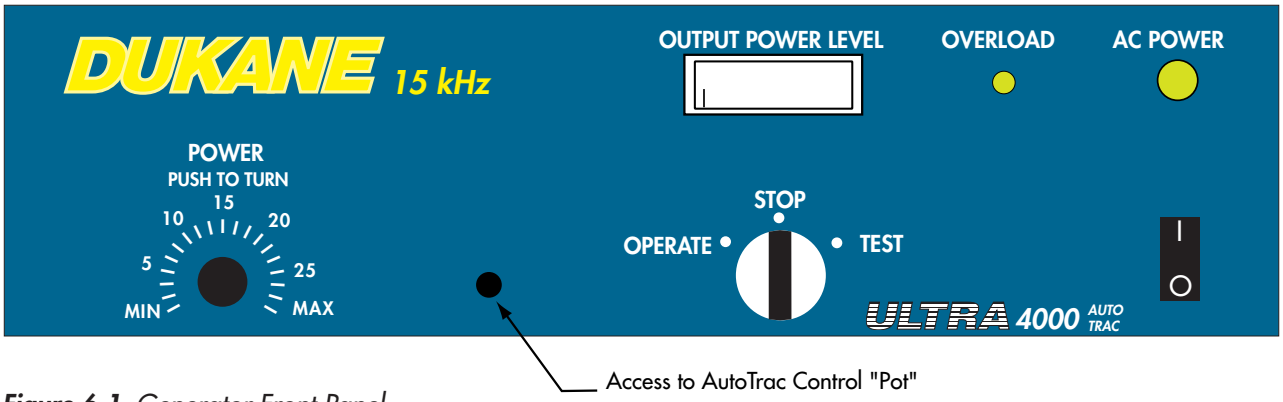

Figure 6-1 *Generator Front Panel*

AC Power ON/OFF Switch — This rocker switch under the AC POWER light controls electrical power to the generator. When the power is on, the indicator light, AC POWER is illuminated. This switch is also a circuit breaker for overload protection. When the circuit breaker opens, the switch rocks back to the off position. When the circuit breaker rocks the switch to the off position, the equipment requires servicing.

OPERATE/STOP/TEST Switch — This switch provides a means of turning on and off the generator's ability to produce ultrasound. The three switch positions are explained below.

OPERATE Position — This is a ready position. With the switch in this position, the generator will start the ultrasound when it receives a signal from the digital timer (timed systems) or a switch closure (continuous firing systems).

STOP Position — This is an off position. The generator cannot generate ultrasound when the switch is in this position.

TEST Position — Use this position only for evaluating the vibrational characteristics of the stack with the "Operational Stack Test." See Section 7. This position activates the generator ultrasound. **DO NOT** use this position unless an acoustic stack (or probe) is connected to the generator, or damage to the genera-

Front Panel Controls, continued

tor may result. The O/S/T switch is spring loaded to return from this position to the STOP position automatically when released. Therefore, the switch must be manually held in the TEST position.

OUTPUT POWER LEVEL — The front panel meter indicates the percentage of power drawn from the generator when the ultrasound is on. The power drawn varies with each operation. The meter scale, ranging from 0 to 10, represents 0% power drawn. For instance, 2 represents 20% power drawn, and 10 represents 100% power drawn. If the meter reading is in the red portion of the scale, beyond 100%, a power overload exists, and the red OVERLOAD light will be lit. Turn the system off. Then, retest the stack using the "Operational Stack Test" in Section 7.

Red OVERLOAD Light — The red OVERLOAD light is lit to indicate a mismatch between the ultrasound signal and the vibrational characteristics of the stack that the generator is driving. It also lights when too much power is drawn from the generator, and the meter reading is in the red. At either time, damage to the generator may occur. When the OVERLOAD light glows or flickers, stop operation, and retest the stack using the "Operational Stack Test".

POWER Control Knob — This control provides for fine adjustment of the stack amplitude. To achieve optimum efficiency from this generator, set this control to as high a setting as possible. Use an exchange of boosters, whenever possible, to vary the amplitude so that this control may remain at a high setting.

Auto-Trac Range Control Potentiometer — A small plug between the POWER knob and the O/S/T selector switch conceals the Range Control "Pot". Section 7 of the User's Manual, explains how this potentiometer may need adjustment in the process of matching characteristics of an acoustic stack to the generator output.

Rear Panel

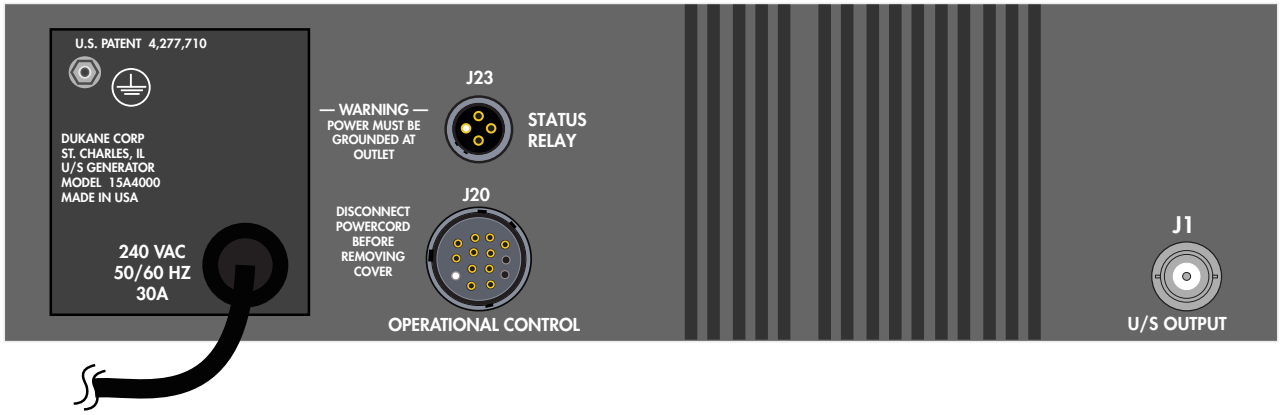

Figure 6-2 *Generator Rear Panel*

Power Cord — All electrical power for the generator is obtained through the generator power cord. The plug on the Ultra 4000 generator fits a 3-wire, 2 pole, grounded, 240 VAC, 50/60 Hz, 30A single phase outlet. The receptacle is a locking type NEMA L6-30R.

J1 U/S Output — This receptacle connects to the Ultra-Com via a coaxial ultrasound cable. Through this cable the generator delivers the 15 kHz ultrasound (U/S) signal to the Ultra-Com.

CAUTION

DO NOT run the generator unless the U/S Output cable is connected to the Ultra-Com unit, or damage to the generator may occur.

In 15 kHz probe systems this cable is an integral part of the probe. Through this cable the generator delivers the 15 kHz ultrasound (U/S) signal to the probe. **DO NOT** run the generator unless this cable is connected to the 15 kHz probe or damage to the generator may occur.

J20 OPERATIONAL CONTROL — The J20 receptacle is only used in continuous firing systems. The switch closure that starts and

Rear Panel, continued

stops the ultrasound is connected to this receptacle in those systems.

J23 STATUS RELAY — The J23 receptacle is connected to the status relay output circuit board mounted inside the generator. It provides a SPDT relay contact output on the rear panel. This output is useful when a floating (non-grounded) mechanical switch is needed. The user must provide a load to be switched and the power source for the load. The power source can be AC or DC within the voltage switching capabilities of the internal relay. The load current must also be within the relay switching capacity.

Ground — This terminal provides a location for connecting the generator to earth ground as a backup to the ground connection at the generator power cord. Connect this terminal to earth ground via a customer-provided ground strap prior to operating the equipment.

Space Requirements

Allow 6 inches (153 mm) of space on either side of the generator for air circulation. Allow 5 inches (127 mm) of space to the rear for cable connections.

See *Dimensions* to calculate space needed for base placement.

Generator Dimensions – inches (mm)

Height: 5.50 (140)

Width: 19.00 (483)

Depth: 20.50 (521)

Weight

Generator: 50 lb (22.7 kg)

Operating Environment

Operate the generator within these guidelines:

Temperature:	**40 - 100° F (5 - 38° C)**
Pressure:	**Ambient**
Air Particulates:	**Keep the equipment dry.**
	Do not expose to rain or moisture.
	Minimize exposure to, dust, dirt, smoke and mold.

Identification Numbers

Use **Figure 6-3** to help you locate the model and serial number tags on the rear of the 4000 Watt generator. The serial number tag is on the left side near the grounding nut. The model number tag is in the center, next to or on the heat sink.

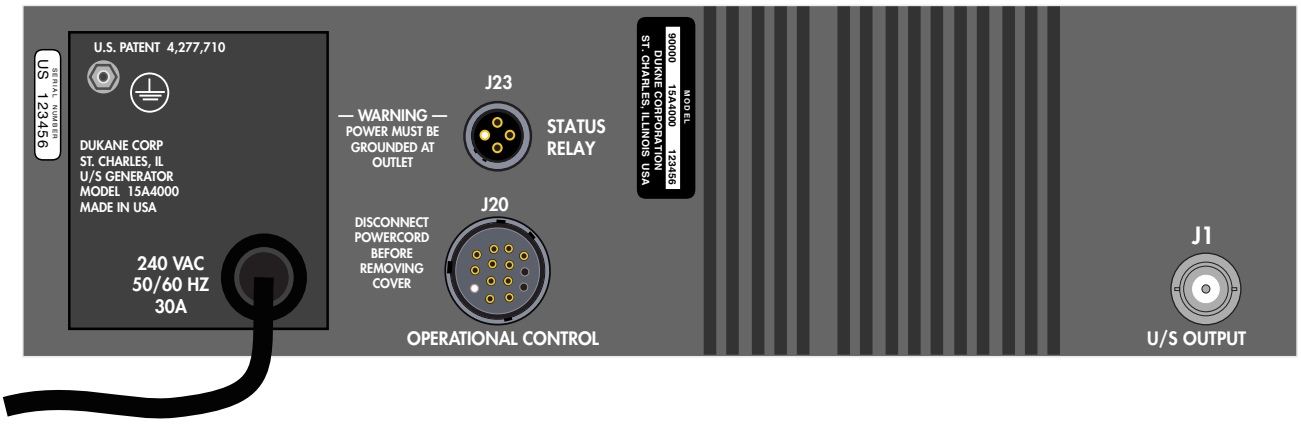

Figure 6-3 *Generator Identification Number Locator*

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SECTION 7

System Test

- This section explains how to test the stack before the press is put into full production.

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Overview

To operate a Dukane ultrasonic assembly system efficiently, the ultrasound signal from the generator must match the frequency and phase characteristics (vibrational characteristics) of the acoustic stack it drives. Each stack has unique vibrational characteristics depending on the combination of its components. In addition, the characteristics of a particular stack may vary slightly from cycle to cycle because of temperature and loading factors.

Auto-Trac Tuning

The generator's Auto-Trac feature in combination with Dukane's patented Phase Lock Loop-Pulse Width Modulation circuitry enables a match between the generator's signal and the characteristics of a particular stack.

The Auto-Trac feature automatically adjusts the ultrasound signal to match the stack's vibrational characteristics. The moment the ultrasound turns on during each operating sequence, the Auto-Trac monitors stack motion on a cycle by cycle basis adjusting the ultrasound signal to an optimal level.

Because the Auto-Trac continuously monitors each operating sequence, it compensates for vibrational changes that occur during repeated operations due to heating of the stack components. It also compensates for aging of the piezoelectric crystals in the transducer and for horn wear.

The Auto-Trac feature excels in environments hostile to reliable operation such as high stress, continuous duty applications, or high duty cycles in bursts. With this ability to automatically determine the optimal setting for a stack during each operation, the Auto-Trac feature permits the use of one generator with multiple, sequence-fired stacks. In such a situation, the Auto-Trac compensates for the unique, vibrational characteristics of each stack due to differences in aging, loading, temperature, and to the many differences in horn configurations.

Operational Stack Test

Before beginning to operate the system for a "full production run", verify that the stack's vibrational characteristics fall within the Auto-Trac's range. To do this, complete the *Pre-test Checklist* and the *Acoustic Stack Test* explained below.

NOTE

All Dukane stack components are manufactured to specifications within the generator's Auto-Trac range. A non-Dukane horn, an improperly assembled stack, or a stack component that is worn or damaged can produce vibrational characteristics outside these specifications.

Pre-test Checklist

1. Make sure that the correct booster and horn, specified for the application, are installed in the thruster.
2. Check the press, Ultra-Com, and generator for proper grounding.
3. Check the ultrasound cable connections, on the generator, Ultra-Com, and thruster for proper seating and security.
4. Verify that the horn is not under load (in contact with a fixture or part).

Stack Test, continued

Acoustic Stack Test

1. Turn the generator's AC POWER switch ON.
2. Perform a test by manually holding the spring-loaded OPERATE/STOP/TEST (O/S/T) selector switch in the TEST position. Compare the generator's indications with **TABLE 7-1** below.
3. Release the selector switch, and it will go back to the STOP position.

TEST PROCEDURE INDICATIONS		
ITEM	GOOD	BAD
Overload LIght	Light is off.	Light glows or flickers
Meter	Reading of 5-15%	Reading over 15%
Vibration at Horn	Vibration observed.	No vibration apparent

Table 7-1 *Test Procedure Indications*

If the first three steps of the test were completed successfully, the stack is operational. Proceed to Step 4 on the next page.

If the displays show other results, there may be a problem with the stack.

NOTE

If the ultrasound signal should stop due to an overload condition, the meter will indicate "0", and the OVERLOAD light will glow. The generator overload protection circuit has shut down the ultrasound signal.

** **NOTE**

The generator is operating at the optimum setting for this stack when the meter, during this test, is between 5% and 15% of the full meter scale. Horn and booster amplitude and the mass of the horn determine the amount of energy needed to vibrate the stack. This combination of factors for a particular stack determines whether the optimum setting is closer to 5% or to 15%.

TIP

To monitor stack performance while in the SETUP mode, record data from the Ultra-Com POWER display, a menu item on the Utilities Page, when equipment is new, and also on a regular basis over the life of the unit. This "history" will be valuable in tracking system performance.

Continued

Operational Stack Test, continued

4. To see if the ultrasound signal is being transmitted to the horn: First, fold a small scrap of paper once (ordinary 20# copy paper will work for this purpose), and place it on the press base or fixture about an inch from the tip of the horn.
   Turn the selector switch to TEST.

   The paper should "bend" slightly away from the horn as shown in **Figure 7-1**. If no movement is seen, there may be a problem with the stack. Release the selector switch so that it returns to the STOP position.

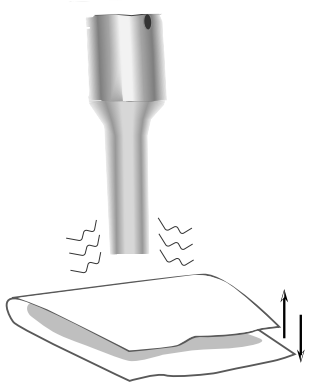

Figure 7-1 *Paper Test*

NOTE

Under normal conditions, the 15 kHz ultrasound signal can be easily heard. The paper test provides a visual confirmation of the active ultrasound signal.

Acceptable Results

If all the indicators from Steps 1-4 are acceptable, the stack is within the Auto-Trac range. Proceed to *Running Sample Parts* and *Making Adjustments*.

Unacceptable Results

If one or more of the indicators are unacceptable, go to Step 5.

5. Turn the generator and Ultra-Com off. Check the stack for correct assembly, damaged components, or dirty mating surfaces. Make any repairs or adjustments to the stack. Re-check the ultrasound cable for proper connections. Repeat Steps 1 through 4. If the test still fails, go to Step 6.

6. Turn the generator off. Remove the stack from the thruster, and remove the horn from the stack. Resinstall only the transducer-booster assembly into the thruster. Repeat Steps 1-4 of the previous page.

Stack Test, continued

Good Indications with Horn Removed

If good indications are given with the horn removed, it means that the horn is outside the specifications required to operate within the Auto Trac preset range.

Reassemble the horn to the stack, and go to the "*Range Adjustment of the Auto-Trac Feature*" that follows.

Bad Indications with Horn Removed

If bad indications are present with the horn removed, check the booster and the transducer for the following:

- any visible damage,
- loose or cracked stud, or
- pitted or dirty mating surfaces.

Make any necessary repairs or adjustments.

Go to Step 7.

7. Repeat Steps 1-6. If the bad indicators disappear, reattach the horn to the stack, and repeat Steps 2-4.

   - If any bad indications are still present, do not run this stack. ***Call Dukane Service for assistance***.

Range Adjustment of the Auto-Trac Feature

NOTE

Do not adjust the Auto-Trac range unless the preceding Stack Test procedure directs you to do so. New Dukane horns are designed to operate with "home" for the Auto-Trac range control being set at the three o'clock/nine o'clock position. If you adjust this control to operate an older or non-Dukane horn, return it to the home position before trying to run another horn.

The goal of this adjustment is to run the horn without any of the bad indicators shown in **Table 7-1**.

Continued

Auto-Trac Range Adjustment , continued

1. Make sure that the correct booster and horn, specified for the application, are installed in the thruster.

   Check the press, Ultra-Com, and generator for proper grounding.

   Check the ultrasound cable connections, on the generator, Ultra-Com, and thruster for proper seating and security.

   Verify that the horn is not under load (in contact with a fixture or part).

2. Remove the plug button from the front of the generator to reveal a slot on the Auto-Trac range control potentiometer hereafter referred to as a "pot." If the pot has never been adjusted, it should be in the 3 o'clock/9 o'clock position as shown in **Figure 7-2**.

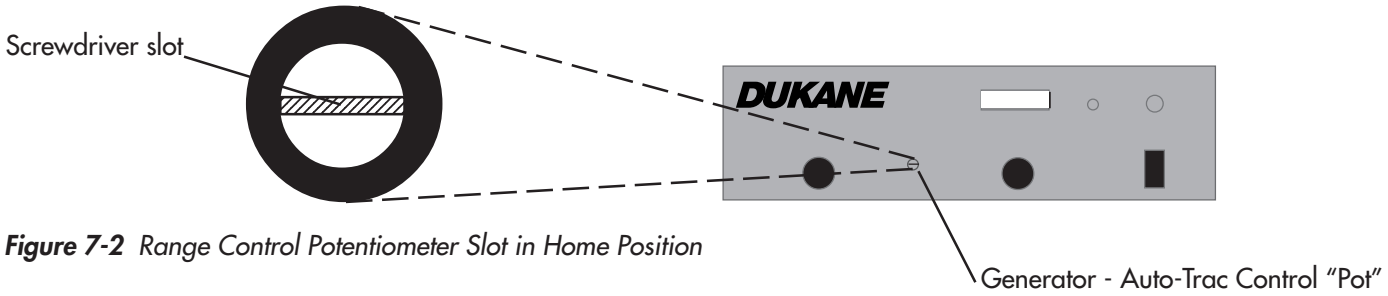

Figure 7-2 *Range Control Potentiometer Slot in Home Position*

3. Turn the generator's AC POWER switch ON.

4. Manually hold the spring-loaded O/S/T (OPERATE/STOP/ TEST)selector switch in the TEST position.

   If the ultrasound signal remains on, go to Step 6.

   If the ultrasound signal stops, the meter's needle will drop to zero, and the OVERLOAD light will glow. Release the switch so that it moves to the STOP position, and go to Step 5.

5. Use a flat blade screwdriver to turn the control pot about 1/8 of a turn in either direction. Repeat Step 4.

Auto-Trac Range Adjustment , continued

NOTE

Each time you return to Step 5, turn the pot another 1/8 turn in the same direction it was turned at first. (The pot has a mechanical stop just short of 180 degrees from the home position in both directions.) If the stop is met in one direction and the ultrasound signal will not stay on, return the pot to the home position. Then repeat Steps 4 and 5 turning the pot the other way.

If the signal will not stay on after followng the above steps, ***do not run the horn until it is evaluated and the situation resolved***. Discuss the details with Dukane personnel. The horn may need to be sent in for evaluation.

Move the slot on the control pot to the home position, and replace the plug button in the generator front panel.

6. While holding the O/S/T switch in the TEST position, slowly turn the control pot in one direction, and then the other direction. Find a position where all of the bad indicators disappear. If the ultrasound signal shuts off, release the O/S/T switch. Return the pot to a position where the signal stayed on. Repeat this step while turning the pot in the oppostite direction. The pot has a mechanical stop just less than 180 degrees from the home position (either direction).

If the signal will not stay on after completing the above steps, ***do not run the horn until it is evaluated.*** Discuss the details with Dukane personnel.

Move the slot on the control pot to the home position, and replace the plug button in the generator front panel.

If there is a position where the bad indicators disappear, try turning the pot a bit more to find the position with the lowest possible meter reading. Release the O/S/T switch to the STOP position when this is done, and go to Step 7.

7. Record the position of the range control pot to operate this particular stack with your Ultra-Com/generator. When using this stack in the future, adjust the range control before completing the Operational Stack Test. Put the plug button back into the generator front panel, and remember to leave the control pot in the 3 and 9 home position before using another horn.

Cycling the System

1. Check that you have correctly performed the following:
   a. Installed the stack in the thruster and securely closed the stack access cover.
   b. Secured the fixture in place.
   c. Completed the *Operational Stack Test*.
2. Select the Ultra-Com OPERATE mode with the Front Panel mode select keyswitch. Also set the OPERATE/STOP/TEST switch on the generator to the OPERATE position.
3. Verify that all controls, on the press/thruster and the Ultra-Com, are set as required for this operation.
4. Place a part in the fixture.
5. Cycle the system. If using the dual push button activation switches to start the system cycle, press them both simultaneously, and hold them until the ultrasound signal starts. Releasing the activation switches before the ultrasound starts will abort the cycle.

Running Sample Parts

When monitoring an application, two elements that should always be observed are *Power Draw* and *Assembled Part Quality*. If sample parts are made using an acceptable power draw, and if they meet quality standards and any other application-dependent criteria, then a full production run can be initiated.

TIP

The most important elements to monitor are always dependent on the application.

For instance, Time, Distance, and Energy can be critical elements to watch.

For more information, refer to Table 10-1 which gives examples of weld characteristics and their relation to system components.

Power Draw

Before cycling the system, get in position to watch the Ultra-Com Front Panel display where POWER can be shown. From the Ultra-Com SETUP menu choose UTILITIES, then POWER UTILITIES, then POWER.

How much power is being drawn from the generator?

Discontinue operation if the meter needle moves into the red area or if the OVERLOAD light glows at all. The generator will no longer produce an ultrasound signal while in an overload condition.

CAUTION

Repeated operations that draw too much power from the generator can damage system equipment.

If Overloading Occurs

If overloading occurs, discontinue the operation.

Perform the *Operational Stack Test* (described above) or see Section 9, *Troubleshooting* for more information.

Assembled Part Quality

Check assembled part quality for the following:

a. Strength of the joint or seam, and
b. Appearance: Does the assembled part meet the quality standards for appearance?

Making Adjustments

If the samples are not acceptable, make adjustments as necessary. If further assistance is needed, contact Dukane. Section 11 lists the Dukane contacts.

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SECTION 8

System Operation

- This section provides a start-up checklist, procedures for starting and stopping, and suggestions when considering system changes.

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Overview

When system installation is complete, and sample parts have been successfully assembled, the system is ready for an extended run.
This section of the *User's Manual* provides a checklist to use before start-up, and it gives some basic operating instructions on starting and stopping the system.

Daily Start-up Checklist

✓ = YES Answer each question with a "Yes", before starting:

- ☐ 1. **Cables** (pages 15-25)
  Are all cables properly connected with retaining rings screwed tightly in place?
- ☐ 2. **Grounding** (pages 8-10)
  Is the customer-supplied "source ground" properly connected to the Ultra-Com, generator, and press/thruster?
- ☐ 3. **Air Filter** *For units equipped with the press support package.*
  Is the air filter at the rear of the thruster clean ?
- ☐ 4. **Air Lockout Valve** (page 36)
  Is the valve unlocked and in the "open" position?
- ☐ 5. **Acoustic Stack** (pages 45-53)
  Is the stack properly assembled and installed in the thruster, and is the stack access cover securely bolted?
- ☐ 6. **Horn, Booster, Fixture**
  Are the horn, booster and fixture correct for the application to be performed? Check all three items for cracks, chips and alignment.
- ☐ 7. **Mechanical Stop** (page 34)
  Will the mechanical stop prevent the horn from hitting the fixture (when a part is not in the fixture)?
- ☐ 8. **Ultra-Com and Generator** (Ultra-Com: See User's Manual P/N 403-393C; Generator: See Section 6 of this manual.)
  When power to the Ultra-Com and generator was turned on, did the units complete start-up sequences successfully?

Start-up, continued

Start-up

After completing the *Daily Start-up Checklist*, you are ready for system start-up. See the previous page for the *Checklist*.

1. Turn air power on.
2. Perform the *Operational Stack Test* as outlined in Section 6 of this *User's Manual*.
3. Verify that all controls, on the press/thruster, on the Ultra-Com and on the generator are set as required for your particular application.
4. Place a part in the fixture.
5. Start the system manually or automatically.

Manual Start

If using the dual push button activation switches to start the system cycle, press them both at the same time, and hold them until the ultrasound signal starts.

NOTE

Releasing the buttons before the ultrasound starts causes an error in the start-up sequence, and the cycle will stop.

Automatic Start

The system may be activated using customer-supplied controls that are linked through the Ultra-Com to start the cycle automatically based on a predetermined sequence of events.

6. After the system has started, monitor the Ultra-Com and the generator output for overload indications.

Stopping the System

Normal Conditions

The press stops when the programmed cycle ends.
A programmed cycle can have one step or multiple steps.

Emergency Conditions

Manual System

Press the red PUSH FOR EMERGENCY OFF switch (palm button) on the press base plate.

See **Figure 8-1**.

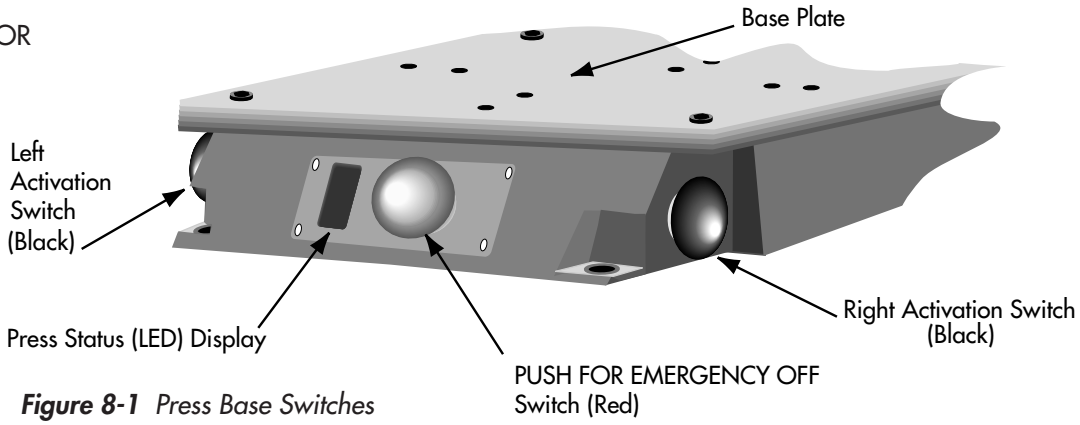

Figure 8-1 *Press Base Switches*

Four things happen when the switch is pressed:

- the ultrasound signal is turned off immediately,
- electrical power to the press is removed,
- a firmware emergency stop sequence is begun, and
- the word ABORT appears in the Press Status Display.

As long as the PUSH FOR EMERGENCY OFF switch is pushed in, these conditions are active.

Twist and pull the PUSH FOR EMERGENCY OFF button to allow the press to reactivate.

Automated System

An automated system has external controls supplied by the customer that will stop the cycle automatically. Those controls are connected to the rear of the Ultra-Com at the AUTO INPUT connector, J9.

Making Changes to the System

Your 15 kHz assembly system is versatile, but before making changes to your system or setup, refer to the appropriate documentation. **Figure 8-2** indicates the primary reference documents for the four major subsystems.

CAUTION

Before connecting or disconnecting any of the system cables: Turn off electrical power to the Ultra-Com and to the generator, and remove AC power cords from their outlets.

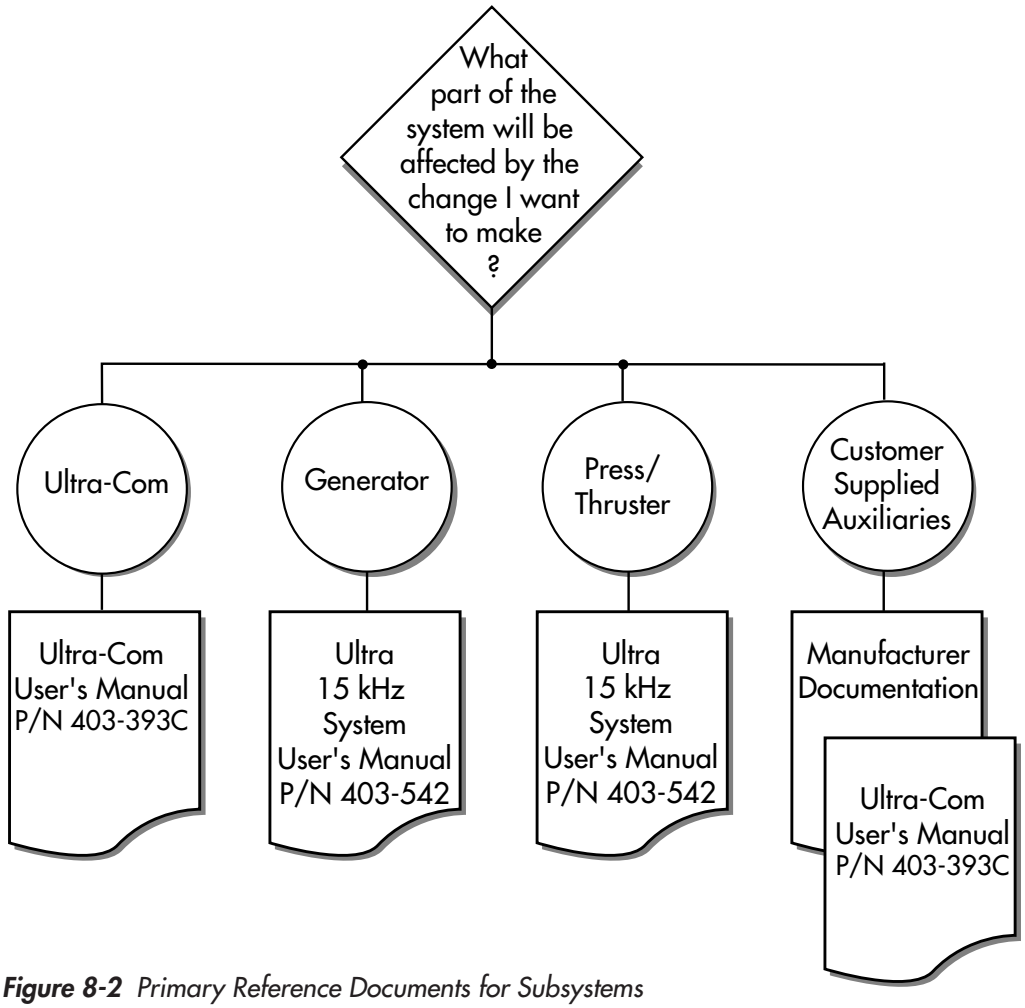

Figure 8-2 *Primary Reference Documents for Subsystems*

SECTION 9

Maintenance

- In this section maintenance for the major system components is outlined.

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Overview

Maintenance information is organized under these headings:

- Stack Maintenance,
- Reconditioning Stack Components,
- Torque Values, and
- Press/Thruster Maintenance.

NOTE

See Section 6 for generator maintenance, and see the Ultra-Com User's Manual for that unit's maintenance requirements.

Stack Maintenance

Overview

It is essential that the mating surfaces of all stack components (transducer, booster, and horn) are flat and smooth. When the surfaces of the components are joined and tightened, there must be no "air gap" between them.

If a gap of any kind remains, no matter how small, there will be a loss in power, output, and efficiency. In some cases, the union of the mating surfaces could be so poor as to prevent a stack from starting. That would happen because excessive power draw occurred as a result of the bad surface contact.

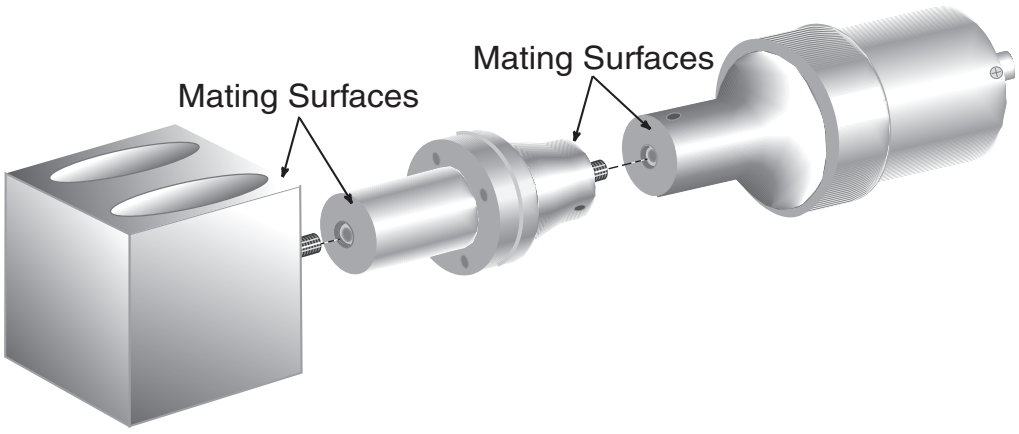

Figure 9-1 *Location of Stack Mating Surfaces*

Continued

Inspecting the Stack

Look at the mating surfaces to see where the shiny, burnished areas are. These areas show where the surfaces have been in contact, and indicate that the surfaces themselves are either flat or uneven.

Surfaces with Even Contact

A flat surface has made even contact, and will be uniformly burnished across its entire contact area. **Figure 9-2** illustrates that type of contact.

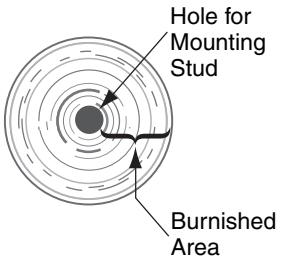

Figure 9-2 *Burnished Area Indicates Flat Mating Surfaces*

Surfaces with Uneven Contact

A surface that is not completely flat makes uneven contact, and will be burnished in only part of its contact area. **Figure 9-3** shows what a surface would look like if only the inner area had been making contact, because that is where burnishing has taken place. The outer area has no marks at all, indicating there has been no contact there.

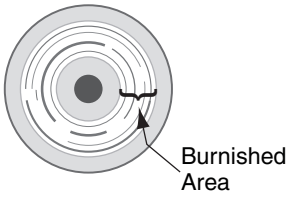

Figure 9-3 *Burnished Area Indicates Uneven Mating Surfaces*

Crowning

As shown in **Figure 9-3** the burnished area appears only around the mounting stud area, and not at the edges. This is evidence of "crowning" illustrated in **Figure 9-4**.

To get some idea of the extent of the problem, put a straight edge along the surface of the stack element being inspected. Because the stack element as shown in **Figure 9-4** is crowned at the center, there are gaps along the outer edge of the element.

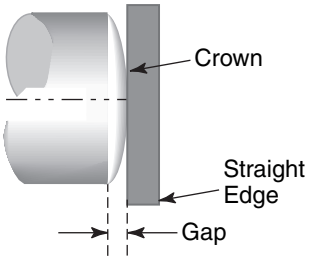

Figure 9-4 *Example of Crowning*

Center Depression

An element's surface may also be depressed in the mounting stud area. See **Figure 9-5**. This element would make contact only at the outer edge.

Again, a straight edge placed along the mating surface of the stack element gives an idea of the extent of the problem. A gap visible beneath the straight edge near the center of the element shows how deep the depression is.

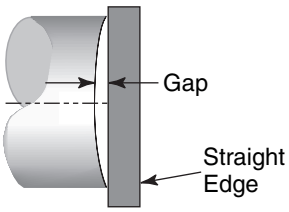

Figure 9-5 *Center Depression*

Surfaces with Uneven Contact, continued

Corrosion

Corrosion is another factor to consider in determining overall system performance. In time, corrosion can build up on stack mating surfaces, and contribute to a loss in performance. Evidence of corrosion includes discolored mating surfaces or surfaces that are encrusted with hard deposits.

NOTE

To extend equipment life and to keep performance levels high, minimize the system's exposure to any corrosive source.

Reconditioning Stack Components

Overview

Stack components need reconditioning when mating surfaces become uneven or corroded. These conditions cause poor contact between the mating surfaces. This wastes power, makes tuning of the acoustic stack difficult, can cause heat damage to the transducer, and can contribute to a higher system noise level.

NOTE

Before deciding to recondition mating surfaces on your own, consider calling Dukane Corporation's Tooling Support to discuss the situation. This is especially true if the mating surfaces are uneven because machining of the components may be required. Factory personnel can offer their skills and experience for your situation.
See Section 11 for a list of Dukance contacts.

Reconditioning the Mating Surfaces

Machining

Instruction to machine the stack components is beyond the scope of this *User's Manual*. Please call Dukane's Tooling Support team for machining information. See Section 11 for a list of Dukane contacts.

Manual Resurfacing

Follow the steps below to manually resurface the stack components' mating surfaces.

1. Disassemble the acoustic stack, and wipe all the mating surfaces with a clean cloth or paper towel.
2. Examine all of the surfaces. If any is corroded (discolored or coated with hard deposits), it should be reconditioned.

Continued

Resurfacing Components, continued

3. If the surfaces appear as if they are in good condition, go to Step 11.
4. If necessary, remove the mounting studs.
5. Tape a clean sheet of #400 grit (or finer) emery cloth to a clean, smooth, flat surface (such as a piece of plate glass) so the grit side is up.
6. Hold the stack component with one hand as shown in **Figure 9-6**. This view shows the thumb covering one of the three spanner wrench holes.
   Without applying any downward pressure, carefully stroke the part **IN ONE DIRECTION** across the emery cloth. (The component's weight alone will be enough as the part is moved.) Complete a second stroke across the cloth just like the first one.

Figure 9-6 *Manual Resurfacing*

CAUTION

Use extreme care to keep the part level when moving it across the emery cloth. Do not tilt it. An uneven mating surface could leave the welding system inoperative.

7. Keep the element's surface flat against the emery cloth, and turn it 120° (one-third of a complete rotation) so the thumb covers the next spanner wrench hole. Again, move the part twice across the emery cloth as outlined in Step 6.
8. Give the part a final one-third turn, and repeat the two strokes described in Step 6.

CAUTION

It is important to perform only 2 strokes each time the component is rotated 120°. Performing more or fewer strokes affects whether the surface remains flat. If the surface loses its perpendicularity in relationship to the component's centering axis, the welding system may become inoperative.

Resurfacing Components, continued

9. Reexamine the mating surfaces, and repeat Steps 6 – 8 until the corrosion has been removed. Typically this takes no more than three complete rotations of the component.
10. Mounting studs need to be reinserted, but before that is done get proper thread engagement by:
    - inspecting and cleaning the stud,
    - cleaning the threaded hole with a cloth, and
    - threading the stud into the hole, and tightening it to the torque specifications shown in **Table 9-1** on the next page.

NOTE

Threads may deform if the studs are overtightened. Removing a stud that has been overtightened could damage the threads in the horn.
If this should happen, retap the horn threads, and replace the stud with a new one.

11. Reassemble the stack and install it using the procedure shown in Section 5.
12. Complete the *Operational Stack Test* shown in Section 7.

Torque Values

Overview

Apply torque values from the three categories listed below when reassembling stack components:

- Stack assembly values (below)
- Booster and horn stud values (Table 9–1)
- Tip torque values (Table 9–2)

CAUTION

Do not overtighten stack components. Overtightening may cause studs to loosen, causing the generator to go into an OVERLOAD condition.

Stack Assembly Torque Value

A 15 kHz acoustic stack consists of a transducer, a booster, and a horn. Use the following torque value when assembling the stack.

- **250 inch-pounds**
- **20.8 foot-pounds**
- **28.2 Newton-meters.**

Booster and Horn Stud Torque Values

Use the torque values shown in **Table 9-1** when installing studs into either a booster or horn to be used in a 15 kHz stack.

Stud Thread Size	Torque		
	Inch-pounds	Foot-pounds	Newton-meters
3/4 - 16	200	16.7	22.5

Table 9-1 *Booster and Horn Stud Torque*

Press/Thruster Maintenance

NOTE

Several factors determine how often the equipment needs attention. The material being welded, duty cycle and the manufacturing environment are primary factors in deciding how frequently inspections and maintenance should occur.

Daily Inspection

1. Check the entire unit for oil and dirt accumulation, and wipe any away.
2. Inspect the air filter bowl and filter element on the rear of the press. Clean the filter bowl and clean or replace the filter element when needed.
3. Inspect wires and cables for signs of wear. Reroute them if necessary to eliminate the problem.

CAUTION

Air lockout valve must be closed and secured with padlock before servicing this equipment. See Page 36.

Six-Month Periodic Maintenance

1. Disconnect the Ultra-Com and generator AC power cords from the AC receptacles.
2. Remove the left and right press housing covers.
3. Make sure all socket head cap screws are tight.
4. Check the air cylinder mounting to make sure it is secure.
5. Wipe away oil and dirt accumulation from the entire unit.
6. Inspect the transducer housing and air exhaust opening for signs of dirt or oil. Wipe away any accumulations.

WARNING

Welding head will extend when air lockout is activated. Keep hands away from welding head.

NOTE

Because the pressurized air going to the press/thruster is specified as free of moisture and oil, there should be no oil accumulation on the transducer. If oil is present on the transducer housing, it means oil is coming through the air line. Eliminate oil and moisture in the air line.
One suggestion: Try routing the air line for the press through an "oil mist reclassifier".

Press/Thruster Maintenance, continued

7. Check the thruster slide for smooth downward operation. Wipe away any accumulated grease, but do not apply any solvents. If movement is not smooth, apply a small amount of 30 weight oil to a rag, and wipe the two slide rails with it.
8. Ensure that all wires and cable connections for the entire system are secure. If cables or wires show wear, reroute them to eliminate the problem.
9. Replace the left and right press housing covers.
10. Reconnect the Ultra-Com and generator AC power cords to their respective AC receptacles.

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SECTION 10

Troubleshooting

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Overview

Process Troubleshooting

This first part of this troubleshooting section provides information to help identify causes and to recommend solutions for problems you may have during:

- Welding,
- Inserting,
- Staking, or
- Continuous Welding.

The *Process Troubleshooting* material, on Pages 93-107, has these three elements:

- Problem,
- Probable Cause, and
- Solution.

Equipment Troubleshooting

Beginning on Page 108, the second part of this section gives information focused on equipment troubleshooting.

Continued

Troubleshooting Overview, continued

Process Troubleshooting

Primary Weld Characteristics

Dukane Corporation's Ultra Systems support those primary weld characteristics for which they have been configured. Solutions offered here may or may not apply to your particular welding system.

Primary weld characteristics such as Time, Distance, Absolute Distance, Energy, and Peak Power are used to control the welding process. Each characteristic needs certain system components to support it. **Table 10-1** shows each characteristic with corresponding equipment requirements.

Characteristic	Equiment Requirements
Time	Ultra-Com with a time function.
Distance	Ultra-Com with a distance measurement function (distance module) and a press or thruster equipped with a linear encoder.
Absolute Distance	Ultra-Com with a distance measurement function (distance module) and a press or thruster equipped with a linear encoder, or a press/thruster with and End of Weld limit switch installed.
Energy, Peak Power	Ultra-Com with an energy measurement function (energy/power module).

Table 10-1 *Equipment Requirements for Primary Weld Characteristics*

NOTE

The End of Weld limit switch is used to end the ultrasound signal during a weld cycle based on the press head's stroke position. In general, the switch is not used when a system has an Ultra-Com with distance measurement function and a press/thruster equipped with a linear encoder.

Welding

Problem

Flash occurs.

(See also *Uneven welding occurs*, on Page 96.)

Probable Cause	Solution
Energy director is too large.	Reduce the size of the energy director. Reduce the weld time/primary weld characteristic. Reduce the gauge pressure. Use an interrupted energy director.
Shear interference is too great.	Reduce the amount of interference.
Weld time is too long.	Reduce the weld time.
Nonuniform joint dimensions.	Re-dimension the joint. Redesign the joint to be a shear joint or a tongue-in-groove joint. Check the processing conditions.
Part fit or tolerances.	Loosen the part fit. Loosen the part tolerances.

Problem

Welded assembly is misaligned.

Probable Cause	Solution
Parts are not self-aligning.	Design a way to align parts as they go into the tooling (fixturing). Add a means of alignment (e.g., pins and sockets) to the mating part halves.
Improper support in the fixture.	Redesign the fixture for proper support.
Wall flexure.	Add ribs or gussets to the part. With a resilient fixture, if large sections of urethane are deflecting, add a rigid backup.
Joint design is not properly dimensioned.	Re-dimension the parts.
Incorrect part tolerance/poor molding.	Tighten the part tolerance. Check the processing conditions.

Welding

Problem

Internal components are being welded together.

Probable Cause	Solution
The internal components are made of the same material.	Make the internal components out of another material. Carefully lubricate the internal parts. Reduce amplitude by changing to a lower gain booster.

Problem

Diaphragmming* occurs.

** Diaphragmming occurs when the center of a part vibrates to cause stress, cracking, or melting of that part.*

Probable Cause	Solution
Excessive amplitude.	Reduce the amplitude. Dampen the welding area to absorb the amplitude.
Excessive exposure to ultrasound.	Reduce the weld time by increasing the amplitude and/or the gauge pressure.
Improper gate location/design/thin wall sections.	Check gate placement. Change the shape of the gate. Add stiffening ribs to the part. Increase the thickness of the material on the underside of the gate area.
The type of horn and/or its placement.	Check for the proper horn/part fit. Change the horn.

Problem

Overwelding occurs.

Probable Cause	Solution
Too much energy is being transmitted to the part.	Reduce the gauge pressure. Reduce the weld time/primary weld characteristic. Change to a lower gain booster to reduce the amplitude. Reduce downstroke speed.

Welding

Problem

Internal components were damaged during welding.

Probable Cause	Solution
Excessive amplitude.	Reduce the amplitude by changing to a lower gain booster. Otherwise dampen the excess amplitude.
Excessive exposure to ultrasound.	Reduce the primary weld characteristic. Increase the amplitude by changing to a higher gain booster.
Too much energy transmitted into the part.	Reduce the amplitude. Reduce the gauge pressure. Reduce the weld time/primary weld characteristic.
The components are improperly mounted–E.g.: Parts are mounted too close to the joint area.	Make sure internal components are mounted properly. Isolate internal components from the part. Move the internal components away from areas of high energy. Use an external device to dampen energy locally.

Problem

Melting or fracturing of the part occurs. (outside of the joint area)

Probable Cause	Solution
Sharp internal corners/thin sections.	Radius all sharp corners. Dampen any damaged area, if possible.
Excessive amplitude.	Reduce the amplitude by changing to a lower gain booster.
A long weld time.	Decrease the weld time. Increase the amplitude. Increase the gauge pressure.
Inherent stress.	Check the molding conditions. Check the part design. Reduce the amplitude.

Welding

Problem

Underwelding occurs.

Probable Cause	Solution
Insufficient energy is being transmitted to the part.	Increase the gauge pressure. Increase the weld time/primary weld characteristic. Change to a higher gain booster to increase the amplitude. Use a more powerful assembly system.
Energy is being absorbed into the fixture.	Change the type of fixture being used.

Problem

Uneven welding occurs.

Probable Cause	Solution
Warped part(s).	Check part dimensions. Check the molding conditions. Use a higher trigger pressure. Use a higher hold pressure.
The energy director varies in height.	Redesign the energy director to ensure uniform height. Use an interrupted energy director.
Horn, fixture and the part are not properly aligned with each other.	Make sure the thruster is perpendicular. Check the part dimensions.
Wall flexure is occurring.	Add ribs to the part. Modify the fixture to prevent outward flexure.
The knockout pin location is in the joint area.	Redesign the part so the knockout pin is not in the joint area. (Make sure knockout pins are flush with the surface.)
There is insufficient support in the fixture.	Redesign the fixture to improve the support in critical areas. Change to a rigid fixture. With a resilient fixture, if large sections of urethane are deflecting, add a rigid backup.

Welding

Problem

Uneven welding occurs. *(continued)*

Probable Cause	Solution
Part dimensions are incorrect.	Check the part dimensions. Re-dimension the part, if necessary. Check the molding conditions.
The parts are improperly aligned.	Check for part shifting during welding. Check the alignment of mating parts. Check for alignment of the horn, the part, and/or the fixture.
There is a lack of intimate contact around the joint area.	Check the part dimensions. Check the part tolerances. Check for knockout pin marks in the joint area. Check for misalignment of the mating part halves. Check for sinks.
Nonuniform horn contact is occurring.	Check the fit of the part to the horn. Check for proper support in the fixture.
Mold release is on the joint surface(s).	Clean the mating surfaces.
There is a non-uniform distribution of filler in the plastic material.	Check the molding conditions. Check the mold design.
The joint design is incorrect.	Redesign the joint.
There is a materials or resin grade incompatibility problem.	Consult with the resin supplier(s).
There is a regrind problem.	Check with the molder. Check the molding conditions.
There is moisture in the molded parts.	Specify the parts to be “dry as molded”. Dry parts by heating them before welding.

Welding

Problem

The parts are marking.

Probable Cause	Solution
The horn heats up.	Check for a loose stud, tighten if loose. Loosen and then retighten the horn tip. (Refer to *Stack/Fixture Setup*, Section 5.) Reduce the weld time. Ensure that the horn and booster are coupling well. (Refer to Section 5.) Visually check the horn for cracks.
There are high spots in the part.	Check the part dimensions. Check the fit of the horn to the part.
Use of raised lettering.	Use recessed lettering or relieve the horn around the lettering.
The part does not fit the fixture properly.	Check the fixture for proper support. Check for cavity-to-cavity variations. Redesign the fixture.
Oxide from the horn is being transferred to the part.	Place polyethylene film between the horn and the part. Use a chrome-plated horn and/or fixture.
The parts contain fillers.	Check the processing conditions. Reduce the amount of filler in the plastic.

Problem

Welding process is not in control. (inconsistent weld results on a part-to-part basis)

Probable Cause	Solution
A mold release agent is used.	Clean the mating surfaces. If a mold release agent is necessary, use a paintable/printable grade.
Incorrect part tolerances.	Tighten the part tolerances. Check the part dimensions. Check the molding dimensions.
There are cavity-to-cavity variations.	Check the part dimensions and tolerances. Check for cavity wear. Check the molding conditions.

Welding

Problem

Welding process is not in control. (inconsistent weld results on a part-to-part basis) *(continued)*

Probable Cause	Solution
Part dimensions vary due to mold cavity variations.	Perform a statistical study to see if a pattern develops with certain cavity combinations.
The resin contains regrind or degraded plastic.	Consult with the molder. Check the molding conditions. Reduce the percentage of regrind. Improve the quality of the regrind.
Fluctuations in the AC line voltage supplied to the generator.	Upgrade to a generator with line regulation.
Fluctuations in the air line pressure.	Upgrade to a system with electronic pressure regulation. Add a surge tank with a check valve to the air line. Raise the compressor output pressure.
The plastic's filler content is too high.	Reduce the percentage of filler in the plastic. Check the processing conditions. Change the type of filler (i.e., from short to long glass fibers).
The horn doesn't fit the part correctly.	Check the part dimensions. Check for cavity-to-cavity variations. Obtain a new horn.
The weld cycle is too long.	Reduce the weld cycle time by increasing the amplitude or pressure. Change the dynamic trigger force.
There is misalignment between the horn, part, and/or fixture.	Check for alignment between the horn, part, and fixture. Check the horn/part fit. Check the part/fixture fit. Level the fixture, where necessary.
Rigid fixture reflects vibratory energy.	Dampen the energy by using teflon, neoprene, cork, or urethane in the nest of the fixture.

Insertion

Problem

The insert pulls out easily in use.

Probable Cause	Solution
There is insufficient interference between the hole and the insert.	Reduce the size of the molded hole in the plastic.
The screw bottoms out in the hole.	Use a shorter screw (applies to internally threaded insert).
	Deepen the hole.
The insert gets pushed into the plastic before the plastic melts.	Use hydraulic speed control. Increase the amplitude and/or decrease the gauge pressure. Use pre-triggering.
The ultrasound remains on after insertion is complete.	Reduce the primary weld characteristic.
The horn retracts before the plastic around the insert is solidified.	Increase the hold time.

Problem

Inconsistent insertion of multiple inserts on the same part occurs.

Probable Cause	Solution
The plastic is not melting consistently around all inserts.	Increase the amplitude.
Inserts are pushed into the plastic before the plastic has melted.	Use hydraulic speed control. Reduce the down speed. Use pre-triggering.
Inserts are seated at different heights within the same part.	Evaluate the support provided by the fixture. If required, re-level or shim the fixture.
	Measure the horn tip length to check for dimensional consistency. If varying lengths are found, send the horn to Dukane for modification.

Insertion

Problem

The boss or the plastic around the boss cracks after insertion.

Probable Cause	Solution
The insert is pushed in before the plastic has melted.	Reduce the down speed, gauge pressure, and or the amplitude. Use pre-triggering.
The gauge pressure is set too high.	Reduce the gauge pressure.
The boss wall is too thin.	Increase the thickness of the boss wall.
There is too much interference between the insert and the hole.	Increase the hole diameter. Use a smaller insert.

Problem

The insert is not driven to the desired depth.

Probable Cause	Solution
The ultrasound is not on long enough.	Increase the primary weld characteristic. Check the bottom stop setting.
Flash fills the hole. (Applies to an internally threaded insert.)	Increase the depth of the hole.
There is insufficient gauge pressure and/or power.	Increase the gauge pressure, the power or increase the amplitude.

Problem

The cycle time is too long.

Probable Cause	Solution
There is insufficient ultrasonic power or the generator overloads.	If using a power control, increase the power. Use a more powerful generator.
There is too much interference between the hole and the insert.	Increase the hole diameter, if possible. Use a smaller insert.
The area of the part being inserted is not being rigidly supported.	Support the part directly under the boss. Install a metal post directly under the part being inserted.
The down speed is slow.	Increase the down speed.

Insertion

Problem

Plastic flows over the top of the insert.

Probable Cause	Solution
The weld time is too long.	Decrease the primary weld characteristic.
The insert is being driven too deep.	Reset the bottom stop.
There is too much interference between the hole and the insert.	Increase the hole diameter, if possible. Use smaller inserts.

Problem

Melted plastic fills the hole. (Applies to internally threaded inserts.)

Probable Cause	Solution
The insert is too long or the hole is too shallow.	Use a shorter insert or make the hole deeper.
There is too much interference between the hole and the insert.	Increase the hole diameter. Use smaller inserts.
The insert is being driven too deep. Decrease the primary weld characteristic.	Reset the bottom stop.

Staking

Problem

A ragged or irregularly shaped stake head is formed.

Probable Cause	Solution
The staking cavity is too large.	Change to a smaller cavity in the horn.
The volume of plastic in the stud is insufficient.	Increase the stud height/diameter.
The stud is melting at the base.	See the problem on the next page titled, *The base is melting before the head forms.*

Problem

There is excessive flash around the stake head.

Probable Cause	Solution
The staking cavity is too small.	Use a larger cavity in the horn.
The volume of plastic in the stud is excessive.	Decrease the stud height and/or the diameter.
The stud is not centered in the horn cavity.	Center the stud under the horn cavity.

Problem

The surface below the stake head is distorted.

Probable Cause	Solution
The part is not supported directly beneath the stud being staked.	Support the fixture with a metal post under the stud being staked.
The trigger force is too high.	Reduce the trigger force. Use pre-triggering.

Problem

There is a loose fit between the staked head and the part being attached.

Probable Cause	Solution
The hole diameter relative to the stud diameter is too large.	Reduce the hole diameter.

Continued

Staking

Problem

There is a loose fit between the staked head and the part being attached. *(continued)*

Probable Cause	Solution
The holding force was removed before the stud head could solidify.	If using a dual pressure system, use Pressure 2 in the hold portion of the weld cycle (Pressure 2 should be higher than Pressure 1). Increase the hold time/distance. Increase the stud diameter. Reduce the size of the staking cavity.
Insufficient force is being applied to the staked head during the hold time.	Lower the bottom stop.

Problem

The stud is collapsing at its base.

Probable Cause	Solution
There is a sharp corner near the base of the stud.	Radius the stud at the base.
The stud is not centered in the horn cavity.	Center the stud under the horn cavity. Use a knurled tip.
The base is melting before the head forms.	See the problem section below titled, *The base is melting before the head forms.*
Too much pressure is applied before the ultrasound is activated.	Use pre-triggering.

Problem

The base is melting before the head forms.

Probable Cause	Solution
The trigger force is too high.	Reduce the trigger force. Pre-trigger the ultrasound.
The amplitude is insufficient.	Increase the amplitude.
The downstroke speed is too fast.	Use hydraulic speed control. Use a slower downstroke speed.

Staking

Problem

The formed stud stays in the staking cavity as the horn retracts.

Probable Cause	Solution
The head has not solidified before the horn retracts.	Increase the hold time.
The horn tip is heating and not allowing the head to solidify.	Cool the horn tip. Use afterburst.

NOTE

The use of a knurled horn tip and a pointed stud can help solve many of the staking problems noted above.

Continuous Welding

Problem

Seal does not meet strength requirements.

Probable Cause	Solution
Material traveling too quickly.	Decrease speed.
Not enough amplitude.	Increase booster ratio.
Inconsistent blends of synthetic material.	Evaluate material.

Problem

Welding is inconsistent.

Probable Cause	Solution
Nonuniform amplitude horn.	Have horn analyzed for amplitude uniformity.
Variations in anvil (fixture).	Check fixture design and dimensions.
Inconsistency of material.	Evaluate material.

Problem

Seal area too great, causes flash.

Probable Cause	Solution
Material traveling too slowly.	Increase speed.
Too much amplitude.	Reduce booster ratio.
Excessive air pressure.	Reduce air pressure.

Problem

Transducer and/or horn heating up.

Probable Cause	Solution
Not enough air flow to dissipate heat buildup.	Continuous duty applications require cooling air (in some applications refrigerated air). Supply air to the stack interfaces and the horn tips.

Continuous Welding

Problem

Excessive horn wear.

Probable Cause	Solution
Metal-to-metal contact between the horn and anvil.	Use carbide inserts or coat horn face with carbide. Reduce metal-to-metal contact.

Problem

Overloading generators.

Probable Cause	Solution
Loose stack components.	Disassemble, clean and reassemble stack.
Horn failure.	Replace horn.
Transducer failure.	Replace transducer.
Booster failure.	Replace booster.
Stack frequency shifted out of tolerance.	Cool stack with air.

Equipment Troubleshooting

Problem

Generator Output Power Level Meter indicates OVERLOAD. System components may be hot.

Probable Cause	Solution
Stack vibrating outside Auto-Trac range.	Perform the *Operational Stack Test* found in Section 6.
Horn loose at booster.	Tighten.
Booster loose at transducer.	Tighten.
Ultrasound cable connections loose.	Tighten.
Horn contacts fixutre during weld cycle.	Adjust fixture. Adjust stack components. Raise the mechanical stop. Also recalculate measurements of part, energy director, etc. Make necessary programming changes to the Ultra-Com.
Welding pressure too high.	Adjust pressure setting.

Problem

Ultrasound signal does not start.

Probable Cause	Solution
No power to generator or Ultra-Com.	Restore power.
ON/OFF AC power switches in OFF positon.	Turn power switches ON.
Overload protection circuitry in generator shuts down the ultrasound signal because stack is vibrating outside the Auto-Trac range.	Perform the *Operational Stack Test* found in Section 6.
Generator ultrasound signal indicator light does not glow.	Restore power to the generator, and twist the OPERATE/STOP/TEST selector switch to the TEST position for a moment.

Problem

Ultrasound signal does not start (continued).

Ultrasound cable is loose, not connected, or not conducting.	Make sure cable is connected and snug. May need to replace it.
Press/thruster contact leaf not making proper contact with transducer's contact button.	Clean any dirt or corrosion from contact leaf and contact button. Check that there is proper alignment of contact leaf with transducer contact button.

Problem

Press/thruster does not move down.

Loose power cord(s), or not plugged in to the receptacle.	Tighten the power cord(s) and make sure it is plugged in to the receptacle.
Cables not connected or loose.	Connect and/or tighten the cables. See *Cable Connections* in Section 2.
Down speed valve adjusted for no air flow.	Adjust down speed valve for proper air flow.
Mechanical Stop adjusted for no travel.	Adjust Mechanical Stop knob counterclockwise.

CAUTION

Turn OFF electrical power before connecting or disconnecting cables from any device. Equipment damage may occur.

AC power switch(es) on the Ultra-Com and/ or generator are in the OFF position.	Make sure AC power switches are switched ON.

If using push button activation switches to start cycle:

Activation switch cables not connected properly.	Connect cables properly.
Activation switches are defective.	Replace switches.
Activation switches not held closed for the correct amount of time.	These normally open switches must be held closed until the ultrasound signal starts.
Activation switches held closed preventing next cycle from starting.	Switches must be released between cycles.
Activation switches are not depressed at the same time.	Depress the switches simultaneously.
Ultra-Com INITIATE MODE not properly set.	From PROCESS CONTROL, select INITIATE MODE, then MANUAL. See Ultra-Com *User's Manual.*
Air filter clogged.	Clean/replace air filter. Source air: clean, dry and at a higher pressure than expected output pressure in the 80-100 psi range.

Continued

Problem

Press/thruster does not move down. (continued)

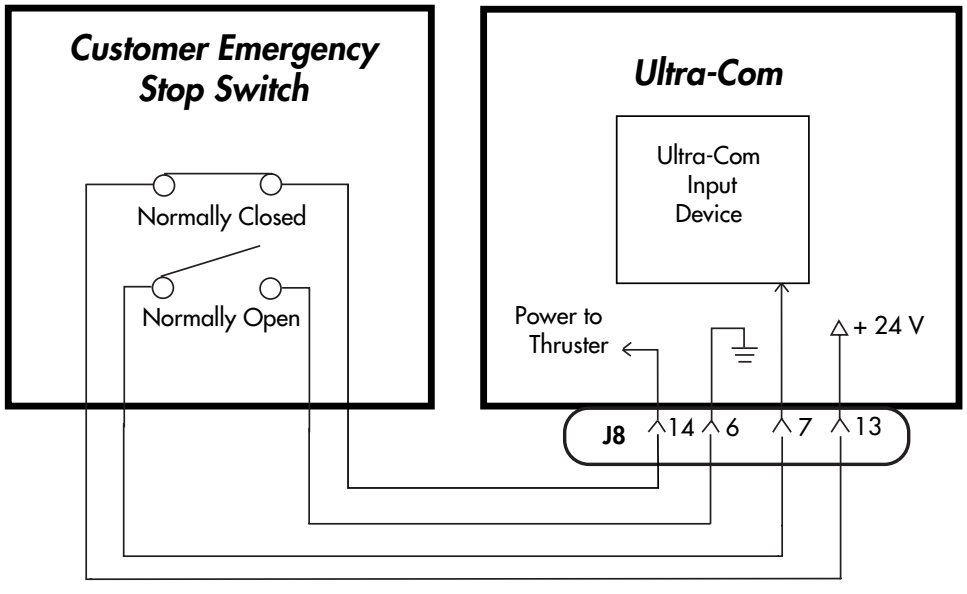
If using an automation switch to start cycle:

Automation cable is not properly connected.	Connect cable properly.
Ultra-Com INITIATE MODE not properly set.	From PROCESS CONTROL, select INITIATE MODE, then AUTO. See Ultra-Com *User's Manual.*
A system abort switch is closed.	Look at the press LED base display to see if an ABORT condition exists. Try to clear the condition, and make sure the red PUSH FOR EMERGENCY OFF button is in the "up", or ON position.

The J8 receptacle on the rear panel of the Ultra-Com must be connected to either the emergency stop switch incorporated in the Dukane ergonomic base plate or a customer provided emergency stop switch. The customer provided emergency stop switch must be configured as indicated in **Figure 10-1** below.

Power to the Dukane thruster is routed through the normally closed contact of the emergency stop switch.

Failure to connect an emergency stop switch will disable the Dukane thruster assembly.



NOTE: *If J5 connections utilize the abort inputs on Pin 6 and Pin 9, then the normally open contacts connected to Pin 7 of J8 are not required.*

Figure 10-1 *Ultra-Com Input for Emergency Stop Switch*

Problem

Generator shut down due to overload.

Troubleshooting Checklist:

Are cables properly connected?	Make sure equipment is properly connected.
Are cables damaged?	Replace cables.
Are connector pins bent?	Straighten pins.
Are there any short circuits?	Find source of short circuit, and repair.
Is acoustic stack visibly damaged, and is it assembled properly?	Perform the *Operational Stack Test* outlined in Section 7.

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SECTION 11

Dukane Corporation Contacts and Warranty

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Contacting Dukane Corporation

When contacting Dukane, especially if calling about a service-related problem, be prepared to give this information:

- DPC model number, firmware version, serial number, and line voltage.
- Any messages from the DPC display
- MMI model number and firmware version
- Description of the problem and steps taken to resolve it

Local Support

Your local Dukane representative can answer all of your questions regarding Dukane equipment, as well as provide information on pending orders and quotations. Each Dukane representative has received factory training and can assist you in all phases of project life cycle.

Try our Website

Dukane Corporation is on the worldwide web at:

http://www.dukcorp.com/us

and then go to your area of interest.

TIP

At the website you can:

- Get an introduction to a variety of joining technologies.
- Learn about our products and see layout drawings.
- Check out the Frequently Asked Questions section.
- Order literature.
- View a list of educational seminars.

Contacts in the Ultrasonics Division

Main Phone:	**(630) 797–4900**
Sales:	**(630) 797–4918**
Fax:	**(630) 797–4949**
Service & Parts Fax:	**(630) 584–0796**

See the next page for department extensions.

Mailing Address: **Dukane Ultrasonics**
2900 Dukane Drive
St. Charles, IL 60174 USA

Ultrasonics Division E-mail Addresses:

Applications: . . . . . usapps@dukcorp.com
Engineering: . . . . . useng@dukcorp.com
Food Processing: . . . . . usfoodproc@dukcorp.com
International Sales: . . . . . usintl@dukcorp.com
Marketing: . . . . . usmktg@dukcorp.com
Sales: . . . . . ussales@dukcorp.com
Support/Service & Parts: . . . . usservice@dukcorp.com
Technical Writing: . . . . . ustechwriting@dukcorp.com
Tooling: . . . . . ustooling@dukcorp.com
Training: . . . . . ustraining@dukcorp.com

Ultrasonics Division Phone Numbers:

Application Support (630) 797–4930
For applications and/or process technology questions.

Engineering (630) 797–4950
For engineering of standard and customized systems.

Food Processing (630) 797–4920 or –4938
For information about using ultrasonics in food processing.

International (630) 797–4915
For questions about international locations, support, etc.

Marketing (630) 797–4906
For product literature, and trade show information.

Metal Welding (630) 797–4953
For information about any aspect of metal welding.

Sales (630) 797–4918
Although your local Dukane representative is the main source of Dukane product and order information, you may want to contact the Sales Department.

Service & Parts (630) 762–4987
For a service-related problem with your equipment.

24-hour Emergency Service
Effective May 10, 2004
(630) 797–4987

Technical Writing (630) 797–4907
For information and comments about user's manual content.

Tooling Support (630) 797–4930
For information about tooling, horns, and fixturing.

Training Hotline (630) 797–4904
We offer a curriculum of educational programs at our corporate headquarters in St. Charles, Illinois.
Please call the Dukane Ultrasonics Training Hotline for a free Education Catalog or with any questions you may have.

DUKANE CORPORATION *NORTH AMERICAN WARRANTY POLICY*

Subject to the terms, limitations and exclusions set forth below, Dukane Corporation IAS Division (Dukane) warrants to the original Purchaser, unless otherwise expressly agreed to in writing by Dukane, that all equipment and tooling designed and built by Dukane will be free from defects in material or workmanship. Normal wear items are not covered by this warranty. Warranty duration shall be defined as documented herein and in conjunction with any exceptions or exclusions in the accompanying Dukane quotation to the Purchaser.

Equipment Type	Equipment Warranty Duration	Other Comments
Custom Systems	12 months on all Dukane designed and built content that is not part of our standard product.	Dukane standard product included in custom systems are covered by the applicable product warranty.
Hot Plate Welder	24 months	none
Laser Welder	For all laser sources, Original equipment manufacturer (OEM) warranty is applicable.	All internal laser optics and external beam delivery optics are warranted for only 30 days.
Spin Welder	24 months	none
Thermal Press	24 months	none
Ultrasonic Welder	36 months	See WARRANTY EXCLUSIONS OR EXCEPTIONS below.
Vibration Welder	24 months	none
All Production Tooling	12 months, one-time replacement. (6-month, one-time replacement for carbide tipped horns)	none
Prototype Tooling	• All tooling made from Renshape 460 (Renwood) are only warranted for 200 part-cycles. • All other prototype tooling is warranted as described in each specific proposal.	Prototype Renshape 460 (Renwood) tools employ reusable content, and therefore remain the property of Dukane.

All Dukane warranties commence on the date of the original shipment of the equipment or tooling, and duration is based upon a single shift per day, five day per week operation. The warranty period on rentals of new equipment that are converted to a purchase are deemed to have commenced on the initial date of rental.

These warranties are limited to equipment and tooling operated and maintained per Dukane's written instructions, and used under normal operating conditions. These warranties do not include normal wear or normal wear items, and do not cover damage attributable to misuse, improper installation, faulty repair, unauthorized alteration or modification, neglect, or accident. Misuse includes operation of equipment with tooling that is not qualified for the equipment or properly installed on the equipment.

The warranty on all Dukane equipment and tooling purchased and installed in North America is a parts and labor warranty only. Equipment installed outside of North America, regardless of where it was purchased, is covered by Dukane's International Warranty Policy. In all cases, when on-site service is required, Travel & Living (T&L) expenses will be billed at cost. Warranty service labor (including travel time) at the customer's site is provided on a Monday through Friday (excluding holidays), 7 a.m. to 7 p.m. basis. Any warranty service requested outside of these hours is available on a charge basis equal to 150% of Dukane's prevailing rate for technical service work.

Any equipment or tooling that proves to be defective in material or workmanship during the stated warranty period will be repaired or replaced at the sole discretion of Dukane Corporation when Dukane is promptly notified in writing. During the warranty period, defective equipment, components, or tooling that are returned properly packed with all transportation charges prepaid will be repaired or replaced and returned to the end-user without charge. Shipments of warranty parts will be via standard, non-expedited delivery service. Expedited shipment requests are subject to freight charges to the Purchaser.

Computers, PLCs, CRTs, LCDs, touch screens, and keyboards separate and/or incorporated as an integral part of a system will carry a one (1) year warranty from the date of shipment when used under normal operating conditions, and not subjected to misuse, abuse, or neglect. For all other equipment, components, or parts included in equipment or systems from Dukane, but not manufactured by Dukane or its affiliates, this warranty shall be limited in time and extent to the warranty given to Dukane by the OEM.

EQUIPMENT WARRANTY EXCLUSIONS OR EXCEPTIONS:
When specified in our quotation, a limited warranty may apply to certain components of the equipment, and/or for certain types of applications of the equipment, including those noted below.

- ❑ This warranty is void if the ultrasonic welder and/or tooling [i.e., horn(s) and fixture(s)] are used for applications requiring metal-to-metal contact, when the ultrasonic exposure period (weld cycle) exceeds 250 milliseconds.
- ❑ Ultrasonic Equipment and tooling used in continuous duty cycle modes such as, but not limited to, continuous cut and seal, and food processing are warranted for 2000 hours or 12 months from shipment, whichever occurs first.
- ❑ Any ultrasonic horn or tool quoted and sold as "Experimental" is not warranted.
- ❑ This warranty does not cover failures of equipment and components attributable to improper cooling or overheating of the transducer.
- ❑ Ultrasonic Horn Analyzers have a 12-month warranty.
- ❑ Ultrasonic Transducers have a one-time replacement warranty.
- ❑ Normal wear items and consumables excluded from any warranty coverage include, but are not limited to, filters, fuses, light bulbs, lubricants, gaskets and seals, cast urethane fixture components, laser flashlamps, laser beam delivery optics, and lasing gases.

The forgoing warranty is the sole and exclusive warranty and is made in lieu of all other warranties, express, implied or statutory, including without limitation any warranties of merchantability, fitness for a particular purpose, description, quality, productiveness or any other warranty. The remedy set forth in this warranty policy is the sole and exclusive remedy of Purchaser and in no event shall Dukane be liable for any compensatory, consequential, special, punitive or contingent damages or for damages arising from any delay in performance by Dukane under this warranty.

DUKANE CORPORATION — INTERNATIONAL WARRANTY POLICY

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Equipment Type	Equipment Warranty Duration	Other Comments
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Hot Plate Welder	12 months	none
Laser Welder	For all laser sources, Original equipment manufacturer (OEM) warranty is applicable.	All internal laser optics and external beam delivery optics are warranted for only 30 days.
Spin Welder	12 months	none
Thermal Press	12 months	none
Ultrasonic Welder	12 months	See WARRANTY EXCLUSIONS OR EXCEPTIONS below.
Vibration Welder	12 months	none
All Production Tooling	12 months, one-time replacement. (6-month, one-time replacement for carbide tipped horns)	none
Prototype Tooling	• All tooling made from Renshape 460 (Renwood) are only warranted for 200 part-cycles. • All other prototype tooling is warranted as described in each specific proposal.	Prototype Renshape 460 (Renwood) tools employ reusable content, and therefore remain the property of Dukane.

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These warranties are limited to equipment and tooling operated and maintained per Dukane's written instructions, and used under normal operating conditions. These warranties do not include normal wear or normal wear items, and do not cover damage attributable to misuse, improper installation, faulty repair, unauthorized alteration or modification, neglect, or accident. Misuse includes operation of equipment with tooling that is not qualified for the equipment or properly installed on the equipment.

The warranty on all Dukane equipment and tooling purchased and installed in North America is a parts and labor warranty only. Equipment installed outside of North America, regardless of where it was purchased, is covered by Dukane's International Warranty Policy. In all cases, when on-site service is required, Travel & Living (T&L) expenses will be billed at cost. Warranty service labor (including travel time) at the customer's site is provided on a Monday through Friday (excluding holidays), 7 a.m. to 7 p.m. basis. Any warranty service requested outside of these hours is available on a charge basis equal to 150% of Dukane's prevailing rate for technical service work.

Any equipment or tooling that proves to be defective in material or workmanship during the stated warranty period will be repaired or replaced at the sole discretion of Dukane Corporation when Dukane is promptly notified in writing. During the warranty period, defective equipment, components, or tooling that are returned properly packed with all transportation charges prepaid will be repaired or replaced and returned to the end-user without charge. Shipments of warranty parts will be via standard, non-expedited delivery service. Expedited shipment requests are subject to freight charges to the Purchaser.

Computers, PLCs, CRTs, LCDs, touch screens, and keyboards separate and/or incorporated as an integral part of a system will carry a one (1) year warranty from the date of shipment when used under normal operating conditions, and not subjected to misuse, abuse, or neglect. For all other equipment, components, or parts included in equipment or systems from Dukane, but not manufactured by Dukane or its affiliates, this warranty shall be limited in time and extent to the warranty given to Dukane by the OEM.

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When specified in our quotation, a limited warranty may apply to certain components of the equipment, and/or for certain types of applications of the equipment, including those noted below.

- ❑ This warranty is void if the ultrasonic welder and/or tooling [i.e., horn(s) and fixture(s)] are used for applications requiring metal-to-metal contact, when the ultrasonic exposure period (weld cycle) exceeds 250 milliseconds.
- ❑ Ultrasonic Equipment and tooling used in continuous duty cycle modes such as, but not limited to, continuous cut and seal, and food processing are warranted for 2000 hours or 12 months from shipment, whichever occurs first.
- ❑ Any ultrasonic horn or tool quoted and sold as "Experimental" is not warranted.
- ❑ This warranty does not cover failures of equipment and components attributable to improper cooling or overheating of the transducer.
- ❑ Ultrasonic Horn Analyzers have a 12-month warranty.
- ❑ Ultrasonic Transducers have a one-time replacement warranty.
- ❑ Normal wear items and consumables excluded from any warranty coverage include, but are not limited to, filters, fuses, light bulbs, lubricants, gaskets and seals, cast urethane fixture components, laser flashlamps, laser beam delivery optics, and lasing gases.

The forgoing warranty is the sole and exclusive warranty and is made in lieu of all other warranties, express, implied or statutory, including without limitation any warranties of merchantability, fitness for a particular purpose, description, quality, productiveness or any other warranty. The remedy set forth in this warranty policy is the sole and exclusive remedy of Purchaser and in no event shall Dukane be liable for any compensatory, consequential, special, punitive or contingent damages or for damages arising from any delay in performance by Dukane under this warranty.

SECTION 12

Specifications

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Specifications

Regulatory Agency Compliance

The Ultra-Com complies with the following requirements:

- the limits for FCC measurement procedure MP-5, “Methods of Measurement of Radio Noise Emissions from ISM Equipment”, pursuant to FCC Title 47 Part 18 for Ultrasonic Equipment

CAUTION

DO NOT make any modifications to the Ultra-Com, to the generator, to the press/thruster or to associated cables because the changes may result in violating one or more regulations under which the equipment is manufactured.

Systems Standard Components

The table below lists the standard and optional components available for both the basic press system and the thruster system.

Configuration		Standard Components	
Press Systems	**Thruster Systems**	**Description**	**Model/ Part No.**
Contact Dukane for Model Numbers			
I	**I**	4000 Watt 15kHz Generator	15A4000
I	**I**	Ultra-Com High Power	43x350 **
I	**I**	Thruster (includes Top-of-Stroke Switch, Dual Pressure Regulators and Limit Switches)	43A215
I	**I**	Operation Control Cable	200-417
I	**I**	Thruster Control Cable	200-418
I	**I**	High Power Ultrasound Coax Cables (2 included)	200-1289
I	**I**	Transducer	110-3806
I	**O**	Press Support Package	43A216
O	**I**	Top-of-Stroke Cable	438-528
O	**I**	Abort Cable	200-607
O	**I**	Automation Cable	438-299
I	**I**	Tools & User's Manual	
I	**I**	Aluminum booster w/ 3/4-16 threads on both ends	
		Optional Components	
O	**O**	Linear Optical Encoder	438-846
O	**O**	Electronic Pressure Regulator	Contact Dukane
O	**O**	Force Transducer	
O	**O**	Pressure Transducer	

I = Included Component **O** = Optional Component Available

Table 12-1 *Standard & Optional Components for Ultra 15 kHz Systems*

**** NOTE**

The High Power Ultra–Com unit features an extended power range input capable of measuring the higher power levels of the 15 kHz system.
The standard High Power Ultra–Com unit has a Model No. of 43T350. By adding optional components, it then becomes a 43C350, 43D350 or a 43E350.

System Requirements

Compressed Air

The thruster requires 80-100 psi of clean, dry air.
Maximum available clamp pressure is 175 lb @100 psi with a standard 1.5 inch diameter (38.1 mm) air cylinder.

NOTE

Compressed air must be delivered at a higher pressure than the expected output pressure and in a range of 80-100 psi.

Electrical

Ultra-Com – 120 VAC 50/60 Hz @ 0.5 A

Press/Thruster – 24 vdc @ 2 amps, obtained from the Ultra-Com

Ultra 4000 Generator – 240 VAC 50/60 Hz single phase@ 30 A 3 wire, 2 pole, grounded outlet, with locking type NEMA L6-30R receptacle.

Generator will meet 4000 Watt specification only at 240VAC. Operation at less than 240VAC will result in reduced output. Operation above 240VAC may result in excessive power output.

Space

Component	Dimensions – inches (mm)		
	Height	Width	Depth
Press	62.25 (1580)	18.6 (475)	24.8 (630)
Ultra-Com	3.5 (90)	14.5 (370)	13 (330)
Generator	5.5 (140)	19.0 (485)	20.5 (520)

Table 12-2 *Component Dimensions*

NOTE

Add about 5 inches (125 mm) space above the press, and to the rear of the Ultra-Com and generator for cable connections. Allow 6 inches (150 mm) of space on either side of the Ultra-Com and generator for air circulation.

Press dimensions are shown in detail on the next page.

Weight

Ultra-Com – 16 lb (7.3 kg)

Press & Thruster – 322 lb (813 kg); thruster only-93 lb (49 kg)

Generator – 50 lb (22.7 kg)

Dimensions inches (mm)

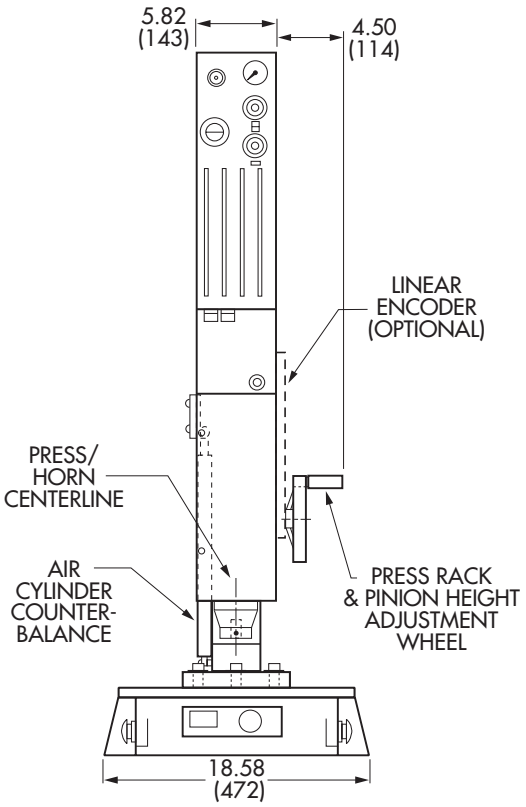

Figure 12-1 *Press Front View*

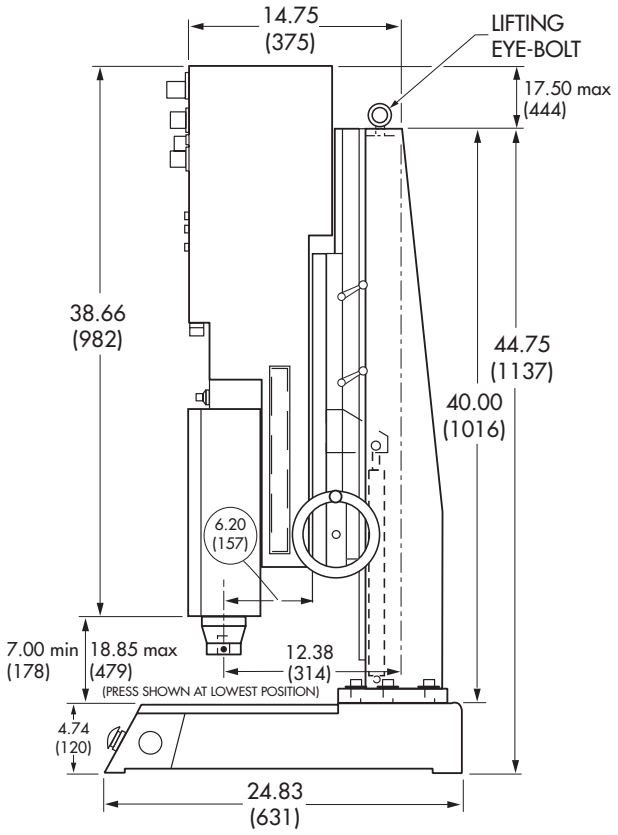

Figure 12-2 *Press Left Side View*

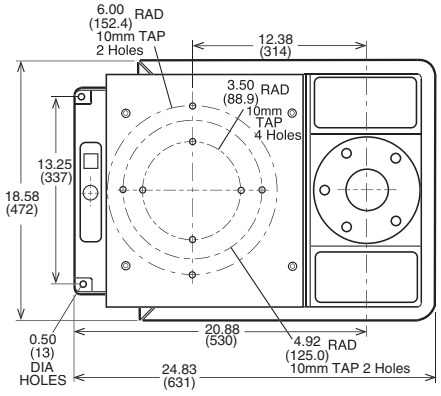

Figure 12-3 *Top View, Press Base*

Item	Inches (mm)			
	Height	Width	Depth	Other
Thruster	38.66 (982)	5.82 (143)	At deepest point: 10.00 (254)	
Base	4.74 (120)	18.56 (471)	24.83 (631)	
Column	40.00 (1016)	Diameter at base: 7.50 (191)		
Column C.L. to Horn C.L.				12.38 (314)
Horn C.L. to Rear of Thruster				6.20 (157)
Usable Throat				8.50 (216)
Stroke				7.00 (178)

Table 12-3 *Miscellaneous Dimensions*

Operating Environment

Operate the press/thruster within these guidelines:

Temperature: **40 - 100° F (5 - 38° C)**

Pressure: **Ambient**

Air Particulates: **Keep the equipment dry.**

Do not expose to rain or moisture.

Minimize exposure to, dust, dirt, smoke and mold.

CAUTION

Make sure the compressed air feeding the press/thruster is clean and dry.
Damage to the equipment will occur if the air contains moisture or oil.

Identification Numbers

Use **Figure 12-4** as a guide to locate model and serial numbers for your Ultra-Com, generator, thruster and press.

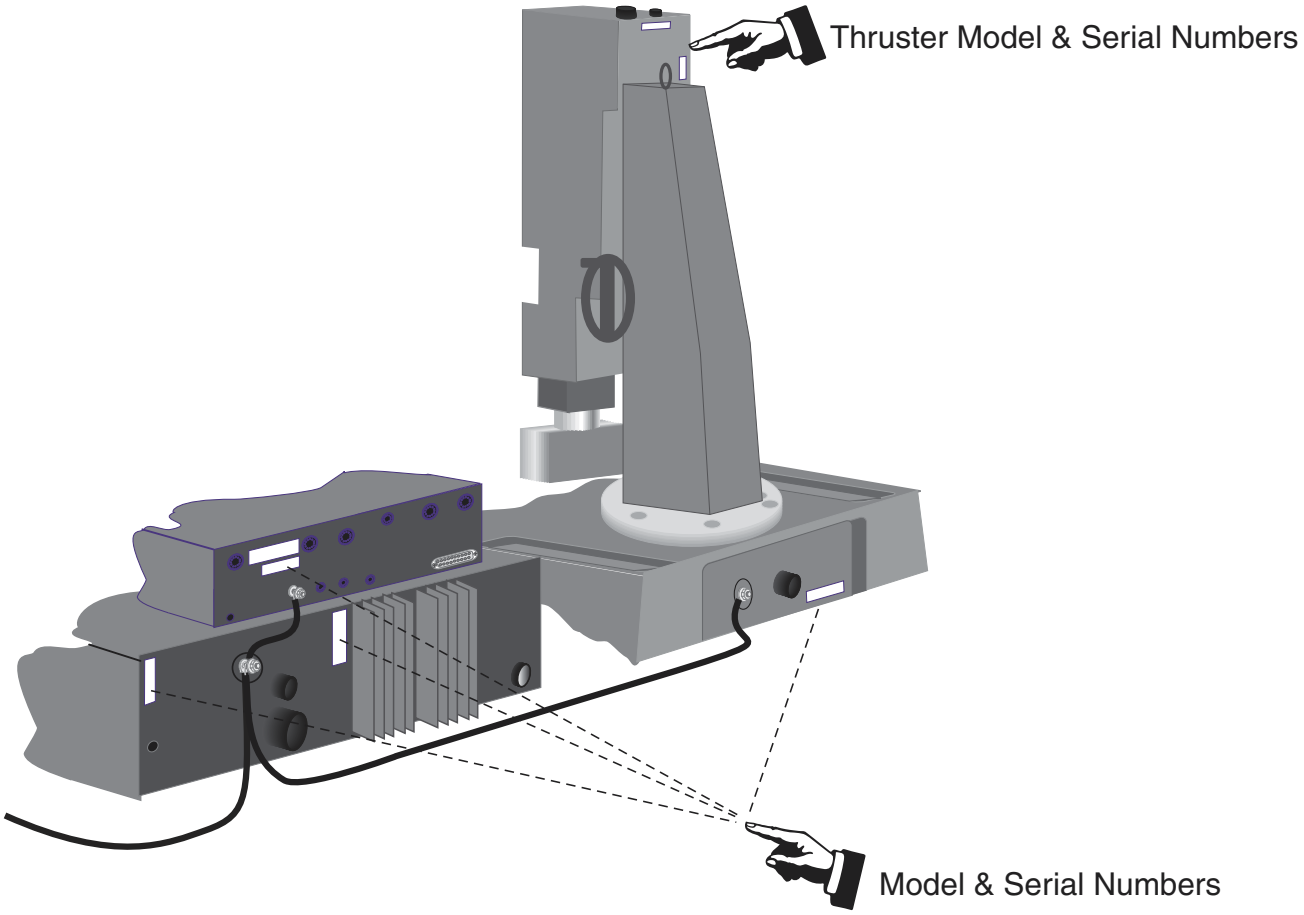

Figure 12-4 *Locating Model and Serial Numbers*

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Dukane ISO

ISO CERTIFICATION

Dukane chose to become ISO 9001 certified in order to demonstrate to our customers our continuing commitment to being a quality vendor. By passing its audit, Dukane can assure you that we have in place a well–defined and systematic approach to quality design, manufacturing, delivery and service. This certificate reinforces Dukane's status as a quality vendor of technology and products.

To achieve ISO 9001 certification, you must prove to one of the quality system registrar groups that you meet three requirements:

1. Leadership
2. Involvement
3. Quality in Line Organizations and Quality System Infrastructure.

The ISO 9001 standard establishes a minimum requirement for these requirements and starts transitioning the company from a traditional inspection–oriented quality system to one based on partnership for continuous improvement. This concept is key in that Dukane no longer focuses on inspection, but on individual processes.

Dukane's quality management system is based on the following three objectives:

1. Customer oriented quality. The aim is to improve customer satisfaction.
2. Quality is determined by people. The aim is to improve the internal organization and cooperation between staff members.
3. Quality is a continuous improvement. The aim is to continuously improve the internal organization and the competitive position.

ISO 9001
CERTIFIED

Dukane products are manufactured in ISO registered facilities

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