

Operating Instructions

LYNX⁴ Titan (Titan GFX) & LYNX Atlas

Revised 2024

Serial Number _____

IWT Stud Welding

*2650 Egg Harbor Road
Lindenwold, NJ 08021*

(856) 435-8004 phone

www.iwtmarketplace.com

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We certify that the contents of this pamphlet correspond to the hard and software described. Deviations, however, cannot be excluded, so that we cannot warrant for absolute compliance. The data in this documentation, however, have been verified regularly and necessary corrections will be incorporated in future impressions. We appreciate any suggestions for improvement.

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Subject to technical alterations

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1 General

1.1 Introduction to Stud Welding

Your new stud welding equipment is carefully constructed of the finest components and materials available. Used properly, this equipment will give you years of service.

The system incorporates the latest in engineering advances, for completely reliable capacitor discharge stud welding of mild steel, stainless steel, aluminum, copper, and lead-free brass fasteners.

A careful study of this manual will enable you to understand how the welder operates to ensure proper performance under all operating conditions.

You have purchased a product which:

- Complies to machinery directives 2006/42/EC
- Conforms to low voltage directives 2006/95/EC
- Complies to IEC 60974 for ARC welding equipment
- Complies to IPC-A-610-Class II
- RoHS Compliant 2002/95/EC

Before putting the stud welder into operation, always observe the following:

- Store the operating instructions in a place accessible to every operator.
- Ensure that the respective operator has read and understood the operating instructions prior to installation. Each operator should confirm this by signature.
- Prevent the stud welder from being operated by unauthorized persons.
- Only trained personnel should operate the stud welder.
- Observe the safety instructions in Section 3.
- Call 911 or Emergency Response in case of an accident.

WARNING

Keep sufficient distance from electronic devices. When stud welding, highly intensive electromagnetic fields are created which may permanently damage these devices (e.g., television sets and laptop computers).



MORTAL DANGER

Persons with pacemakers must not operate the stud welder and must not stay in the vicinity of the stud welder while it is running. Ensure that the stud welder is not operated near electronically sensitive life-supporting equipment, such as in intensive care units in hospitals.

1.2 Application

The *LYNX⁴ Titan, Titan GFX & Atlas Stud Welding Systems* allow for welding of C.D. type fasteners, #4 through 3/8" in various metals (steel, stainless steel, aluminum, copper and lead-free brass).

The visible side of the work piece is spared, to a large extent, from pressure marks or deformations, even thin sheet metals down to 0.060" thick retain their decorative appearance.

If you need consultation or assistance in solving technical problems, please contact either IWT or one of our field engineers.

1.3 Product Information

Manufacturer:

IWT Stud Welding
2650 Egg Harbor Road
Lindenwold, NJ 08021

Tel: 856-435-8004
www.iwtmarketplace.com

Product Designation:

LYNX⁴ Titan (Titan GFX) Stud Welding System
LYNX Atlas Power Supply for use with Production Systems

Country of Origin:

USA

1.4 Serial Plate

The serial plate is located on the rear side of the stud welder. It contains information regarding the manufacturer's name, address, country of origin, product specifications, method of welding, date manufactured, and serial number.

1.5 Documentation

The following operating instructions are supplied with the *LYNX⁴ Titan & LYNX Atlas Stud Welding Systems*:

- *Operating Instructions for the LYNX⁴ Titan*
- *Supplemental Operating Instruction for Titan GFX*
- *1,2,3 Quick Set Up Guide to Gap Welding*
- *LYNX⁴ Control PCB Schematic*
- *LYNX⁴ Fault Indicator List*
- *LYNX⁴ Insulation Supplement*
- *Bill of Materials/Parts List*

1.5.1 Operating Instructions

The contents of these operating instructions are neither part of any former or existing arrangement, pledge or legal relationship nor are designed for modifying the latter. All obligations of INTERNATIONAL WELDING TECHNOLOGIES, INC., result from the respective contract of sale (invoice), which also comprises the complete and generally valid warranties. These contractual warranty terms are neither extended nor restricted by the implementation of these operating instructions.



WARNING

Do not carry out any activities on the stud welding system without specifically knowing the operating instructions or the respective part. Ensure that only qualified personnel familiar with the operating instructions and the necessary technical activities (training) operate the system.

1.5.2 In Case of Malfunction

If malfunctions occur, first try to detect, and eliminate the cause according to the list in Section 8 “Troubleshooting”. In if you are unable to determine the cause, power off the welder and contact International Welding Technologies, Inc. (IWT Stud Welding).

Please make sure that you have the following information:

- Customer contact information
- Welder model
- Serial number
- Date of manufacture
- Options
- Material of stud and work piece
- Method of locating
- Stud dimensions

This information will help save time and unnecessary costs, e.g., caused by delivering the wrong spare parts.

1.6 Contact & Service Address

If you have any questions regarding the operation of the stud welding system, spare parts or if you require service, please contact your distributor, or IWT directly at the following address:

IWT Stud Welding
Attention: Technical Support/Repairs
2650 Egg Harbor Road
Lindenwold, NJ 08021

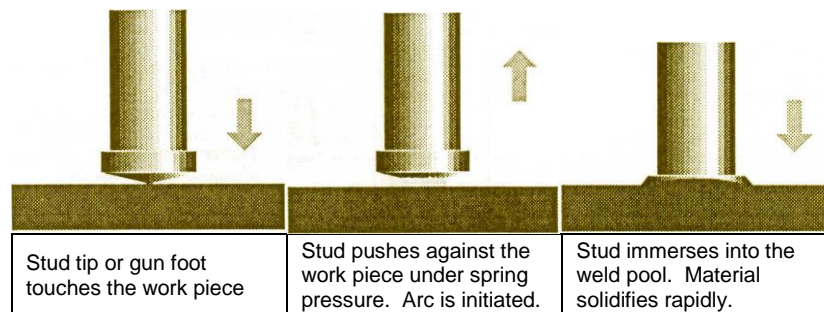
Tel: 856-435-8004

www.iwtmarketplace.com

2 Description of Stud Welder

2.1 Capacitor Discharge Technology

The *LYNX⁴ Stud Welding System* with tip ignition operates according to the principle of capacitor discharge welding as defined in the American Welding Society Welding Handbook. This system uses the abrupt discharge of a capacitor bank to generate and electric arc.



Note the final picture above; for the weld to be good, it should have an even fillet completely around it. Any voids, at all, indicate a weakness in the weld zone that could cause weld failure later. Also, the stud should appear to penetrate the parent material. It should never appear to be “sitting on top” of the weld.

What happens during a capacitor discharge weld?

The work surface (or ground) is connected to one side of the capacitor bank. The stud, through the collet, gun, and an electronic switching device (SCR) is connected to the other side of the capacitor bank. When the stud is placed against the work surface, only the tip touches. When the trigger is squeezed, the SCR conducts, and the capacitor bank is shorted out through the tip of the stud. Because of the high welding current, the tip disintegrates, and an arc is established. The arc melts the interface surfaces and the spring pressure of the gun combined with the velocity of the gun spindle movement, pushes the stud into the parent material to complete the weld. The process lasts about 1-3 milliseconds.

To make a good weld, two things are needed: heat and pressure. A weld must have sufficient heat to melt the weld zone and enough pressure to provide good fusion.

Heat is easily regulated by the voltage on the capacitor bank. The length of the welding cables also effects the heat. You should always use the supplied cables; otherwise, the weld arc can be too erratic. Pressure is controlled by protrusion; the amount of stud that extends beyond the gun’s foot and the spring pressure setting on the gun. In gap welding, adjustments made to the spring pressure will influence the velocity at which the stud is propelled into the work surface. The more pressure the weld has, the shorter the weld time will be. This will result in a cooler weld with less penetration and less reverse side marking.

Grounding and polarity are important. The ground connections must be clean, tight, and positioned properly. If the weld consistently “blows” to one side (referred to as arc blow), the grounding is usually inadequate.

Straight polarity is when the work surface is positive, and the gun is negative. Whenever the work is clean, straight polarity is used. Reverse polarity, or when the work surface is negative, is used for welding brass or whenever impurities are present. See Section 5.10 for more information on polarity.

2.2 Dimensions

The *LYNX4 Stud Welding System* is a powerful yet light-weight and portable system that can easily be carried into the workplace. The base unit(s) weigh 37lbs.

The dimensions are: 13" Wide x 15.5" Long x 6.5" High



The *LYNX Atlas* is a production type power supply with an enhanced duty cycle for use in high volume applications. It is usually purchased in conjunction with an IWT weld head and UVF-2 SmartFeeder. The base unit weighs 63 lbs.

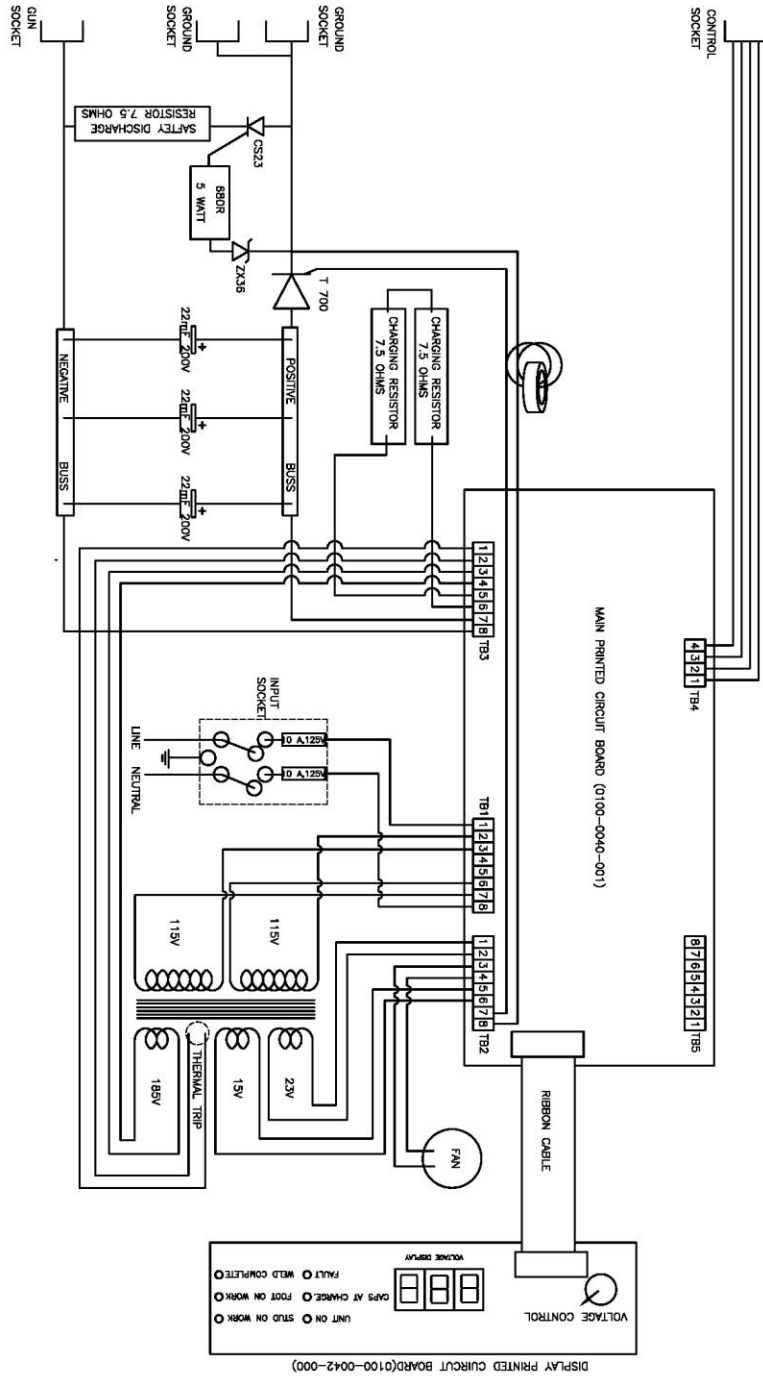
The dimensions are: 14" Wide x 16.5" Long x 10.5" High



2.3 Technical Data

| | |
|---|---|
| Description | LYNX ⁴ Titan Stud Welding System LYNX Atlas Production Power Supply |
| Welding range | #4/12ga through 3/8" |
| Material | Steel, Stainless Steel, Aluminum, Copper, Lead-Free Brass |
| Welding Method | Capacitor Discharge, Tip Ignition |
| Standard Gun's for Titan | IWT-G1 Gap, IWT-C1, IWT-C2 Contact, IWT-Ci Insulation, IWT-S1, S2, or M1 for tight access |
| Production Tools for Atlas | IWT auto-feed weld head, IWT-CA auto-feed handgun, Gravity Drop weld head and UVF-2 SmartFeeder |
| Current Source | Capacitor Bank |
| Charging Capacity | 162,000 μ F |
| Charging Voltage | 50-195v, adjustable |
| Welding Time | 1 – 3 milliseconds |
| Duty Cycle | Up to 20 studs per minute (depending on size) |
| Voltage Input | 110/220VAC, 50/60 Hz Switchable on main board |
| Transformer Output | Titan 465VA Atlas 1.4KVA |
| Welding Cable* | #2 highly flexible weld cable |
| Ground Cables* | Two, #2 highly flexible weld cables |
| Weight | Titan 37lbs. Atlas 63lbs. |
| Color | Thunder Blue |
| *ALTERING WELDING CABLES MAY DAMAGE THE WELDER AND WILL VOID ITS WARRANTY* | |
| Subject to technical change without notice. | |

2.4 Block Diagram



3 Safety Instructions

This operating manual contains basic instructions that must be complied with during installation and/or operation. It is necessary that the operator and/or welding supervisor reads these operating instructions prior to setup and welding.

Not only the general "safety instructions" listed under this main item, but also the special safety instructions e.g., for high temperatures, voltages, etc. listed under the other main items must be complied with.

3.1 Symbols in the Operating Instructions

The non-observance of safety instructions can cause damage to the operator and observers.

The safety instructions of this manual are marked with the general warning sign in compliance with ISO 7010-W001



Warning of electrical voltage is marked with the electric hazard symbol in compliance with ISO 7010-W012



In addition to these symbols, the words "DANGER TO HEALTH" or "MORTAL DANGER" refer to the degree of a possible danger.

Safety instructions, the non-observance of which, may endanger the machine and its functions are marked with the terms

"CAUTION" or "WARNING".

General instructions are marked with the hand symbol.



3.2 Staff Qualification & Training

The staff responsible for operation, maintenance, inspection, and assembly must have the respective qualifications for carrying out these duties. Field of responsibility, competence and the supervision of staff must be exactly regulated by the user. If your personnel do not have the necessary knowledge they must be trained and instructed. If necessary, this can be done with the guidance of the manufacturer or supplier on behalf of the welding equipment user. Furthermore, the user must ensure that the contents of the operating instructions are fully understood by the staff.

As outlined in ISO (International Organization for Standardization) 14732:2013, only qualified personnel can operate the system.

3.3 Non-Compliance with Safety Instructions

Non-compliance with safety instructions may not only endanger persons, but also the welding system and its environment. Any non-compliance with safety instructions may result in a complete loss and irreparable damage to the batteries.

Non-compliance with safety instructions may have the following consequences:

- Failure of important system functions
- Failure of prescribed methods for maintenance
- Danger to persons through electric, mechanic, thermal and acoustic influences

3.4 Safety-Conscious Working

The user must comply with the safety instructions listed in this manual. As well as existing national accident prevention regulations and possible international working, operating and safety regulations.

3.5 Safety Instructions for the Operator

When stud welding, danger may result from

- Electric current
- Optical radiation (e.g., arc flash)
- Harmful substances (e.g., smoke)
- Acoustic shock
- Spraying sparks

The operator is obliged to restrict the dangers to an inevitable degree and to point these dangers out to other persons involved.



MORTAL DANGER

Persons with pacemakers must not operate the stud welder or be within 36 inches of the unit.

3.6 Before Starting the System

Pay attention to the following information:

- Do not touch live electrical parts including the batteries in the stud welder.
- Juveniles under the age of 18 years must not operate the stud welding system.
- Read all operating instructions before starting the system.
- Prevent unauthorized use of the system by children or unqualified personnel.
- Wear non-combustible, protective clothing.
- Wear a leather apron to protect your clothing from welding splatters that are generated during the process.
- Wear head protection when carrying out welding work above your head
- Wear gauntlet gloves made of leather.
- Never wear rings, watches, or electrically conductive jewelry.
- Wear eye protection to protect against welding splatter and arc flashes that are generated during the process. Safety glasses with 3.0 IR filtered lenses are suggested.
- Never look directly at the weld arc.
- Wear ear protection within 5 feet of welding.
- Turn off all equipment when not in use.
- Disconnect input power before installing or servicing this equipment per OSHA 29 CFR 1910.147.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- Never cut or alter welding cables. Doing so WILL damage the welder and WILL void the warranty.
- Welding on closed containers, such as tanks, drums, or pipes can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot work pieces, and hot equipment can cause fires.

3.7 Before Starting to Weld

- Check the state of all cables.
- Immediately replace defective cables and cable connections with genuine **IWT parts**.
- Ensure that the air louvers are not covered. Heat accumulation may damage the stud welder.
- Look around for potential safety or fire hazards prior to welding.

3.8 Safety Precautions at Installation Site

- When placing the stud welder on tables or similar workshop furniture, ensure that the stud welding system stands firmly and that the table can bear its weight.
- Make sure the power supply and stud welder are properly grounded when in use.
- According to American National Standards Institute (ANSI) Z49.1, "Safety in Welding, Cutting and Allied Processes," the workpiece or the metal table that the workpiece rests on must be grounded. You must connect the workpiece or worktable to a suitable ground, such as a metal building frame. The ground connection should be independent of or separate from the welding circuit connection.
- Comply with fire prevention regulations and do not weld in hazardous locations.
- Make sure room is well ventilated or extract welding fumes, if necessary.



DANGER TO HEALTH

When welding, fumes and suspended matters may be generated. Beware of fumes detrimental to health, particularly when using surface-treated materials. If possible, only weld in well ventilated rooms that are higher than 10 ft.

Special regulations are applicable for confined spaces, see ANSI Z117.1, OSHA 1926.353, ISO 15011-6:2012 and VBG 15.

3.9 Working with the Stud Welder

Comply with all accident prevention regulations which apply to the operation of your stud welder. If an accident happens, switch off the stud welder or disconnect it from the power supply and call 911 or Emergency Response.



Accident prevention regulations applicable for stud welders are ANSI Z49.1:2012 and ISO 17846:2004, "Safety in Welding, Cutting and Allied Processes". For more information, contact the Employer's Liability Insurance Association.



DANGER TO HEALTH

When welding, do not wear clothes soiled with easily combustible substances such as oil, grease, and thinners, etc.

3.10 Safety Instructions for Maintenance, Inspection

The user must ensure that all maintenance, inspection, and assembly work is carried out by authorized and qualified technical personnel.

Only work on the system when it has been switched off and after having disconnected it from the power supply. It is necessary to comply with the procedure for stopping the stud welding system described in the operating instructions.

Immediately after having completed your work, re-install and activate all safety and protective devices.

3.11 Unauthorized Retrofit and Spare Parts

This system should never be retrofitted or modified. Only genuine IWT spare parts and accessories authorized by the manufacturer guarantee safety. The use of other parts will result in the cancellation of warranty.

3.12 Proper Operating Methods

Safe operation of the stud welder can only be guaranteed when it is used in accordance with its purpose. The limit values indicated in section 2.3 "Technical Data" must never be exceeded.

3.13 Storing the Stud Welder

- Switch off the power (section 5.1.2, item 8) with the rocker switch located on the stud welder's rear panel.
- Disconnect the power plug from the socket.

- Disconnect from the stud welder
 - Ground cables (section 5.1.1, item 4)
 - Control cable (section 5.1.1, item 6)
 - Gun cable (section 5.1.1, item 5)
- Check the welding cable and connections of the stud welder for damage such as arcing, mechanical wear etc. and have damaged parts replaced by IWT or an authorized distributor.
- Roll up the cables without buckling them.
- Make sure stud welder cannot be used by unauthorized persons.

4 Installation of Stud Welder

- Only install the stud welder on an even surface. The rubber feet located on the bottom of the stud welder provide vibration resistance and stability.
- Although the stud welder is designed to be resistant to most environmental influences, it should never be sprayed with water or submerged. **Under no circumstances should the unit be placed next to a grinding station.** Metallic particles can be drawn into the enclosure and damage the printed circuit board.
- **The stud welder should not be placed near any high frequency welding equipment, share a common ground and/or common power supply. Doing so could cause damage and will void the stud welder's warranty.**
- Please pay particular attention to the strength of the workshop furniture (or welding carts) and ensure its safe and sturdy. The table should be capable of handling at least the machine's weight.
- Make sure there is sufficient free space around the louvers.
- Do NOT use stud welder in temperatures over 115° Fahrenheit
- Ensure sufficient ventilation of the workroom when operating the system indoors.
- **Never hoist or suspend the machine by the carrying handles.**



The housing of the LYNX⁴ Stud Welding System corresponds to safety class IP 21, IEC 60974-1. Please observe that this system should not be submerged or sprayed with water.

5 **Exterior Components** (see supplemental instructions for Titan GFX & Atlas)

5.1.1 **Front View**



| Item | Description |
|------|-----------------------------|
| 1 | Voltage Control Knob |
| 2 | Voltage Display |
| 3 | Voltage Chart |
| 4 | Ground Connectors |
| 5 | Gun Weld Cable Connector |
| 6 | Gun Control Cable Connector |

5.1.2 **Rear View**



| Item | Description |
|------|---------------------|
| 8 | Power Socket/Switch |
| 9 | Serial Plate |
| 10 | Cooling Louvers |

5.2 Operating Elements

ON/OFF Switch (*Item 8*)

The power switch is located at the back of the unit and serves to switch the welder on and off.

Voltage Control Knob (*Item 1*)

The voltage control knob is located on the front of the stud welder. This knob functions to increase or decrease the capacitors' charge voltage. Refer to the chart on the front of the stud welder to determine the approximate voltage for different diameters. Turning the knob clockwise will increase the voltage. Turning the knob counterclockwise will cause the stud welder to discharge excess voltage to internal resistors and recharge to a lower voltage setting.



WARNING

Repeatedly charging and discharging the capacitors quickly using the voltage control knob may damage the unit. Allow the unit's internal fan sufficient time to cool the resistors upon discharge.

Voltage Chart (*Item 3*)

The voltage chart located on the front panel of the stud welder provides the approximate voltage settings for steel and aluminum fasteners. These numbers are approximate starting values, and the actual voltage should be adjusted either up or down for your particular application. Please note that the voltages are provided for "flanged" fasteners. Voltages for mini-flange, DIN flange or non-flange fasteners will be lower.

5.3 Connection Elements

Ground cable connectors (*Item 4*)

There are two ground cable connectors on the front of the *LYNX⁴ Titan Stud Welding System*. Insert each cable connector into the ground socket and twist in a clockwise direction to tighten. **Ensure these connectors are tight.** These cables provide the path for the welding current. For good grounding, attach each ground cable directly to the work piece. The work piece should be clean and free of paint, scale, or oxidation. Weld between the ground cables to minimize the effects of "arc blow".

Gun weld cable connector (*Item 5*)

The welding gun's weld cable connector attaches to the front of the unit in the gun connector socket. Insert the connector into the socket and twist in a clockwise direction to tighten. **Ensure this connector is tight.**

Control cable connector (Item 6)

The welding gun control cable connector attached to a four-pin connection on the front of the stud welder. This connector provides the gun trigger signal and “foot on work” indicator for gap mode welding.

Main power connector (Item 8)

The main power connector is in the rear of the stud welder. Use the power cable supplied to connect the stud welder to the power supply. The stud welder is configured at the manufacturer to use a 12amp, 120V 50/60Hz supply.

5.4 Display Elements

The LYNX4 Stud Welding System is equipped with seven indicator displays:

- **Charge Voltage**

This three panel RED digital LED displays the actual charge voltage on the capacitor bank. **See section 5.9 for suggested weld settings.**

- **“Power” LED**

This AMBER single LED indicates the power switch is on and is connected to the power supply.

- **“READY” LED**

The GREEN single LED indicates that the capacitors have successfully charged to the correct voltage as determined by the voltage selection knob.

- **“Fault” LED**

The RED single LED indicates a fault with the stud welder. A solid fault LED indicates a safety circuit is activated. A blinking fault LED indicates the transformer has overheated.

See section 8.2 for additional fault conditions.

- **“Stud on Work” LED**

The GREEN “stud on work” LED indicates a complete electrical path from the stud welding system. When this LED is activated, the unit is ready to weld a fastener. This LED is used in contact welding mode.



The operator will note that when welding with an IWT-G1 gap gun, the “stud on work” LED will be activated, then when the trigger is pulled the “foot on work” LED will be activated. When welding with an IWT-C1 or C2 contact gun, only the “stud on work” LED will be activated.

- **“Foot on Work” LED**

The GREEN “foot on work” LED indicates a complete electrical path from the gun foot piece to the welding system. When this LED is activated, the unit is ready to weld a fastener in gap mode.

- **“Weld Complete” LED**

The GREEN “weld complete” LED is a momentary LED activated at the end of the weld cycle and after the gun is removed from the welded fastener. This LED indicates that the weld has been completed and the selected energy has been completely discharged within the time requirements. It also indicates the stud welder is working as designed.

5.5 Fuse Elements

The *LYNX⁴ Titan*, *Titan GFX* and *Atlas Stud Welding System* are protected by the following fuses:

Mains fuse: 2 x 15A 250V Slow Blow (IWT PN: 1-EP500150)

Charging fuse: 10A 250V Slow Blow (IWT PN: 1-EP500166)

Control fuse: 1A 250V (IWT PN: 1-EP500145)

SCR Gate fuse: 2A 250V (IWT PN: 1-EP500141)



MORTAL DANGER

Always replace fuses with the correct replacement value. Do not use oversized fuses that may damage the unit.

Always disconnect the stud welder from the mains power supply when replacing fuses or servicing the stud welder.

5.6 Preparing to Weld

Connect the stud welding gun and the ground cables to the stud welder as indicated in Section 5.3.

5.6.1 Ground Connections

- Connect the ground cables into the indicated ground sockets.
- Turn the connectors clockwise until they stop.
- Connect the clamps to the work piece.

5.6.2 Gun Connections

- Connect the welding cable of the stud welding gun into the indicated socket.
- Turn the connector clockwise until it stops.
- Connect the control cable connector into the four-pin socket.
- Turn the screw connector on the outside of the plug to secure the plug to the socket.

5.6.3 Power Supply Connection

Connect the supplied power cable into the rear of the stud welder. Connect the three-pronged plug into a grounded, shock proof supply. **Do not use an extension cord with this stud welder.**

5.7 Gun Setup

Figure 1 depicts the optimal set up for the fastener in the chuck. To set the stud in the chuck, loosen the backstop screw until the fastener extends approximately 1/8" from the front of the chuck. Tighten the back stop locking nut to preserve this setting. For fasteners longer than 1-1/2", back the stop all the way out to obtain as much engagement in the chuck as possible.

If you are welding to aluminum, the set-up of the gun will be as depicted in Figure 2. First follow the directions for Figure 1. Then fully insert the chuck into the gun and tighten the chuck locking nut. Loosen the two legs by releasing the four (4) set screws in the faceplate. Adjust the legs so that only the flange (approximately 1/32") of the fastener is observed beyond the brass ring. Tighten the four (4) set screws in the legs. Finally, adjust the spring pressure at the slot screw in the rear of the gun. The pressure should be set to positive (+).

If you are welding to mild steel or stainless steel, the set-up of the gun will be as depicted in Figure 3. First follow the directions for Figure 1. Then fully insert the chuck into the gun and tighten the chuck locking nut. Loosen the two legs by releasing the four (4) set screws in the faceplate. Adjust the legs so that approximately 3/32" of fastener is observed beyond the brass ring. Tighten the four (4) set screws in the legs. Finally, adjust the spring pressure at the slot screw in the rear of the gun. The pressure should be set to negative (-).

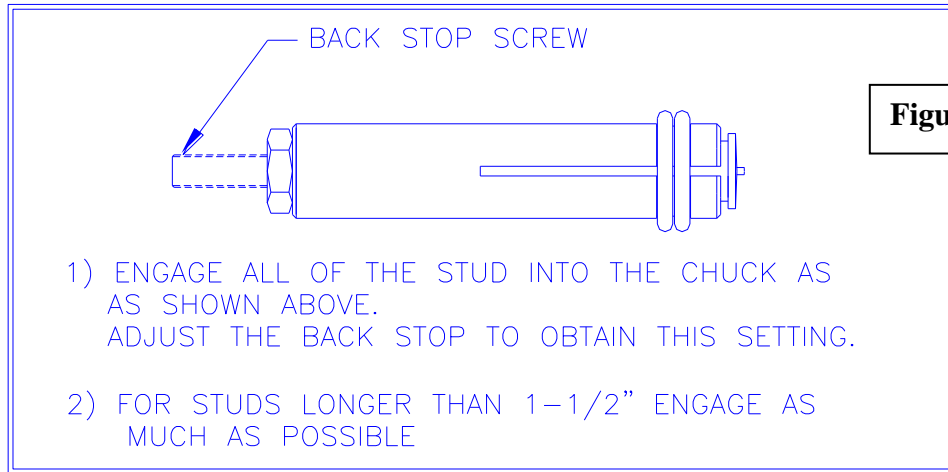


Figure 1

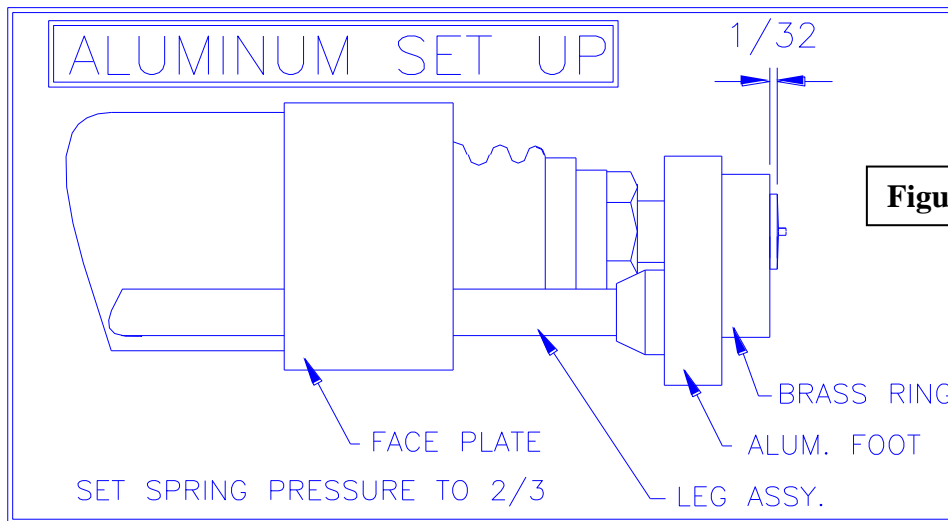


Figure 2

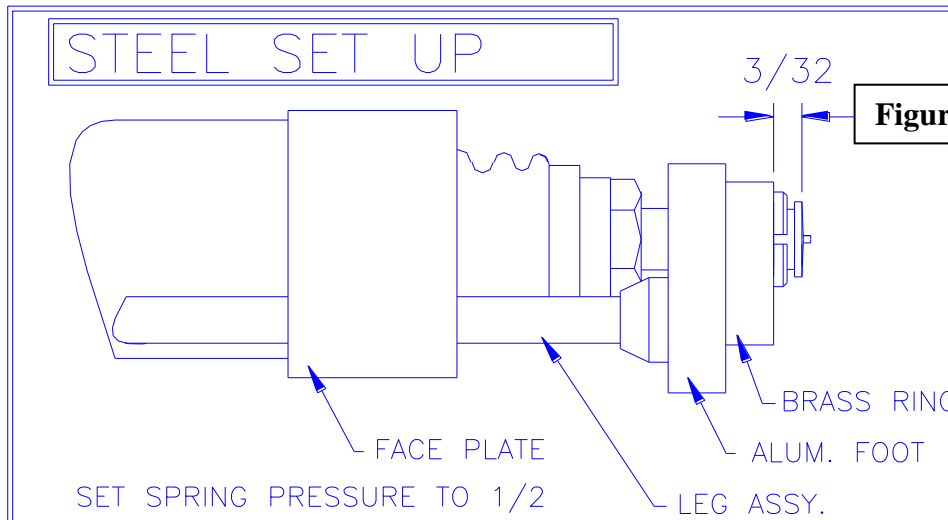


Figure 3

5.8 Operation

Switch on the power switch. The unit will illuminate all LED's and run a diagnostic check. The amber LED will then illuminate indicating line voltage (110VAC or 220VAC). The digital display will indicate the charge voltage. Once the charge voltage is reached, the "ready" LED will illuminate.

Adjust the charging voltage by the front panel knob. Refer to the table on the front panel to establish the approximate voltage setting for the selected fastener and material.

Position the welding gun with loaded fastener on the work piece. The "stud on work" LED will illuminate.

Depress the trigger on the welding gun. In gap mode only, the "foot on work" LED will illuminate. Pull the trigger to rapidly discharge the stud welder.

After the stud is welded, remove the gun from the stud by pulling the gun away, perpendicular to the work surface. The "weld complete" LED will momentarily illuminate and the stud welder will recharge to your last voltage setting. Upon successful recharge, the "ready" LED will illuminate.

5.9 Welding Parameters

The table on the front of the *LYNX⁴ Stud Welding System* provides standard values for welding different size fasteners. The charge voltage is selected based on the diameter and material of the fastener. These estimated voltages are for *flanged* fasteners and may not be appropriate for *mini-flange, DIN flange or non-flange* fasteners. Voltage should be adjusted for your particular application.

| DIA. | #6/10GA | #8 | #10 | 1/4" | 5/16" | 3/8" | GUN |
|-------|---------|-----|-----|------|-------|------|-----|
| STEEL | 50 | 60 | 75 | 110 | 140 | 170 | (-) |
| ALUM | 60 | 100 | 115 | 130 | 180 | N/A | (+) |

**When using IWT-Ci Insulation gun, please refer to the insulation supplement on page 34.*

In the above chart, "GUN" indicates the spring pressure setting on the IWT-G1 gap gun. "-" indicates decreased spring pressure on the gun spindle. "+" indicates increased spring pressure on the gun spindle which results in greater velocity when the weld is made.

5.10 Polarity

Straight Polarity, under normal circumstances, straight polarity is used in stud welding. In straight polarity, the work surface is the positive electrode and the fastener is negative. Current flows from the negative electrode to the positive electrode. Typically, the positive electrode runs approximately 20% hotter than the negative electrode. This increase in temperature is caused by the electron bombardment in the positive electrode. Using straight polarity concentrates the heat on the work and gives maximum penetration into the base material.

Reverse Polarity, Sometimes, it may be beneficial to use reverse polarity. Reverse polarity is often recommended when welding to brass or through galvanized materials. It is used to enhance the welding of galvanized steel by changing the current flow. Current will flow from the work surface to the stud. This direction of current has a tendency to lift off and expel impurities from the work surface, thereby providing a stronger weld.

To initiate reverse polarity, unplug all weld cables from the stud welder. Then, plug the gun weld cable into one of the ground sockets. LEAVE THE OTHER GROUND SOCKET VACANT. Plug one ground cable into the gun weld cable socket. Alternatively, contact IWT for a “Y” connector so that two ground cables can be used in this configuration, allowing the current to flow from the ground to the gun.

6 Quality Control

The *American Welding Handbook* and *0905 DVS Guideline* contain specifications regarding quality assurance of stud welded joints. The tests described in the sections below are chosen from these publications. These tests should be carried out prior to and during welding.

Provided that the *LYNX⁴ Stud Welding System(s)* is used properly, and the materials are appropriately selected, the strength of the welding joint (welding zone) will always be stronger than that of the stud base material. The best method of quality control for capacitor discharge welding is to destructively test studs that have been welded to the same base material to be used in actual production.

6.1 Standard Work Test

Standard work tests must be carried out by the user before welding to the production parts. The number of welds required is agreed upon with the customer.

The standard work test is constrained by the stud diameter, base material and type of equipment used. It is comprised of the following tests:

- Visual inspection (all samples)
- Tensile test
- Torque test
- Bend test

In case of doubt, the test scope should follow *AWS Welding Handbook* or *DVS Guideline 0905*, part 2, section 5.1.1.

6.2 Simplified Work Test

Simplified work tests serve to check the correct setting and function of the equipment. They are carried out at the beginning of every working shift and after several hours of inactivity.

- Simplified work tests include:
- Visual inspection (all samples)

6.3 Production Samples

The studs for the work test should be welded on the same metal using the same welding positions and edge distances as on the component to be welded later. If it is possible and sensible from an economical point of view, use parts that are identical to those used in production. The uniformity of a weld should always be visually assessed to check for major defects. When in doubt, tensile and bend tests should be carried out.

7 Maintenance

7.1 Stud Welder

The stud welder is constructed in such a way that only a minimum of maintenance is required. The interior of the stud welder should, however, be cleaned at regular intervals, depending on the environmental conditions at the location of use. Clean the unit with dry compressed air only.

7.2 Replacement of Components

Defective components may only be replaced by trained IWT personnel. The function of your stud welder can only be guaranteed when original IWT parts are used.

7.3 Fuses

The *LYNX⁴ Titan, Titan GFX and LYNX Atlas Stud Welding Systems* are protected by the following fuses:

Power fuse: 2 x 15A 250V Slow Blow

Charging fuse: 10A 250V Slow Blow

Control fuse: 1A 250V

SCR Gate fuse: 2A 250V



MORTAL DANGER

Always replace fuses with the correct replacement value. Do not use oversized fuses that may damage the unit.

Always disconnect the stud welder from the mains power supply when replacing fuses or servicing the stud welder.

7.4 Electronic Waste (WEEE), Directive 2002/96/EC

Please help minimize the effects we have on the environment by not disposing of electronic waste (e-waste) with household trash. Please follow your local guidelines for proper disposal of electronic equipment and batteries.



8 Trouble Shooting

8.1 Trouble Shooting the *LYNX⁴ Stud Welding System*

There are a few basic rules to follow when trouble shooting a Capacitor Discharge Stud Welding System. They are as follows:

Studs “not sticking”:

- Review the workstation
- Check for correct polarity
- Check for proper grounding
- Check for coiled/damaged cables
- Check collet/chuck condition
- Check for stable power supply

Once you have determined the external components above are in working order, examine the cables. This is the part of the welder that receives the most wear and is naturally the most subject to failure. If possible, switch the cables and use a set that you are certain is good.

Inconsistent Welds:

- Check welder set up
- Check gun set up
- Check parent material

Inconsistent welds are very rarely the fault of the welding unit. If the welding unit were defective, it would very seldom fire at all.

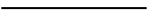



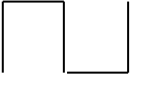
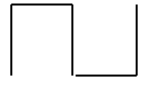
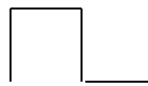





Usually, when inconsistency occurs, it means that the set-up is marginal, or there may be a problem in the parent material. This could account for the differences in the welds.


If the problem cannot be corrected by adjustments on the welder, you should check the gun. Ensure the gun is set up for the correct material, stud size, engagement of stud in chuck and freely moving.

If you are still having difficulty, contact an authorized IWT service center.

8.2 Fault Light Indications

The LYNX4 Stud Welding Systems are powered by an intelligent microcontroller which can notify the operator if a problem occurs during welding by indicating a fault code. Some fault codes will reset within a few seconds, while others will require the operator to power down the machine. If a particular fault code continues, please contact an authorized IWT service center for information on servicing your system.

| Condition | LEDs | | | | |
|------------------------|--|---|---|---|---|
| | Fault | Ready | Stud | Foot | Weld Complete |
| Safety Actuated Fault |   | X | X | X | X |
| High Temperature Fault |  | X | X | X | X |
| Low 28V Fault |  |  | X | X | X |
| Charge Fault |  |  |  | X | X |
| Discharge Fault |  | X | X |  | X |
| Gun Not Removed Fault |  | X | X | X |  |

On Continuous 

Fast Flash 

Slow Flash 

Off X

*A **HIGH TEMPERATURE FAULT** (fast blinking fault light) indicates that the transformer is over its operational temperature. In this case **DO NOT TURN OFF THE MACHINE**. Instead let the internal cooling fan cool the transformer until it automatically resets.

8.3 Causes of poor or erratic welds

- 1. Loose collet/collet does grip the stud tightly**
Solution: Change collet
- 2. Not enough engagement of the stud in the collet**
Solution: Remove the collet from the gun, loosen the backstop so that approximately 1/8" of the stud is protruding from the collet and reinstall the collet in the gun.
- 3. Faulty or loose ground connection**
Solution: Repair or tighten ground connectors
- 4. Poor surface condition**
Solution: Grind the surface to be welded. Grind through mill scale or anodizing.
- 5. Broken or loose cables**
Solution: Repair cables.
- 6. Dirt in gun/gun binding**
Solution: Clean gun with compressed air.
- 7. Incorrect polarity**
Solution: Change cable hookup as described in Section 5.10
- 8. Use of center punch**
Solution: Do not use punches that leave a deep indentation. Do not use permanent markers or grease pencils. Use a graphite pencil or scribe line only.
- 9. Cables coiled**
Solution: Uncoil cables.
- 10. Arc blow**
Solution: Weld between the two provided ground cables.
- 11. Fastener stick out**
Solution: Adjust the backstop and/or foot piece so that approximately 3/32" (for aluminum) or 1/8" (for steel) of the fastener sticks beyond the foot piece.
- 12. Incorrect spring pressure**
Solution: Set spring pressure to "-" (negative) for steel and to "+" (positive) for aluminum.
- 13. Poor stud quality**
Solution: Use only IWT's, clean fasteners to ensure quality.

8.4 Troubleshooting poor welds

1. Weld too hot

- Decrease voltage
- Set protrusion as indicated in Section 5.7
- Increase spring pressure

2. Weld too cold

- Increase voltage
- Set protrusion as indicated in Section 5.7
- Decrease spring pressure

3. Arc blow

- Use both ground cables
- Change ground cable(s) position

4. Weld not perpendicular

- Use supplied foot piece
- Use template or template adaptor



9 Warranty

IWT's mechanical components are warranted against manufacturer's defects in material and workmanship for a period of one (1) year from the time of shipment from IWT's facility. IWT's electrical components are similarly warranted for a period of one (1) year from the time of shipment from IWT's facility. IWT's sole obligation under this warranty is limited to repairing the product or, at its option, replacing the product without additional charge, provided the item is properly returned to IWT for repair as described below. The provisions of this warranty shall not apply to any product that has been subjected to tampering, abuse, improper setup or operating conditions, misuse, lack of proper maintenance, or unauthorized user adjustment. IWT makes no warranty that its products are fit for any use or purpose to which they may be put by the customer, whether or not such use or purpose has been disclosed to IWT in specifications or drawings previously or subsequently provided, and whether or not IWT's products are specifically designed and/or manufactured for such a purpose.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED. ALL OTHER WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHETHER EXPRESSED, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING, ARE HEREBY DISCLAIMED. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

LIMITATION OF REMEDY

In no event shall IWT be liable for any incidental, consequential, or special damages of any kind or nature whatsoever. IWT is in no way liable for any lost profits arising from or connected to this agreement or items sold under this agreement, whether alleged to arise from breach of contract, expressed or implied warranty, or in tort, including, without limitation, negligence, failure to warn, or strict liability.

RETURN PROCEDURE

Before returning any equipment in or out of warranty, the customer must first obtain a return authorization number and packing instructions from IWT. No claim will be allowed, nor credit given for products returned without such authorization. Proper packaging and insurance for transportation is solely the customer's responsibility. After approval from IWT, the product should be returned with a statement of the problem and transportation prepaid. If, upon examination, warranted defects exist, the product will be repaired or replaced at no charge, and shipped prepaid back to the customer. Return shipment will be by common carrier (i.e., UPS). If rapid delivery is requested by the customer, then such transport is at the customer's expense. If an out-of-warranty situation exists, the customer will be notified of the repair costs immediately. At such time, the customer must issue a purchase order to cover the cost of the repair or authorize the product to be shipped back as is, at the customer's expense. In any case, a restocking charge of 20% will be charged on all items returned to stock.

FIELD SERVICE

Repairs are ordinarily done at IWT's, Lindenwold, New Jersey facility where all necessary tools are available. Field service is only supplied at IWT's discretion. If field service is required and is performed at IWT's sole discretion, all relevant expenses, including transportation, travel time, subsistence costs, and the prevailing cost per hour (eight hour minimum) are the responsibility of the customer.

UNFORESEEN CIRCUMSTANCES

IWT is not liable for delay or failure to fulfil any obligations hereunder by reason of circumstances beyond its reasonable control. These circumstances include, but are not limited to, accidents, acts of God, strikes or labor disputes, laws, rules, or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials, and any other event beyond IWT's control.

ENTIRE AGREEMENT/GOVERNING LAW

The terms and conditions contained herein shall constitute the entire agreement concerning the terms and conditions for the limited warranty described hereunder. No oral or other representations are in effect. This Agreement shall be governed in all respects by the laws of State of New Jersey. No legal action may be taken by any party more than one (1) year after the date of purchase.

LYNX⁴ OPERATION SUPPLEMENT - WELDING INSULATION PINS and CHPS

The **LYNX⁴ Stud Welding System(s)** is a state-of-the-art welding system(s) capable of welding pins, threaded fasteners and insulation fasteners. Depending on your application, your system may have been shipped with IWT's Gap (IWT-G1), Contact (IWT-C1), or Insulation Gun (IWT-Ci). This supplement addresses only the setup and operation of the **LYNX⁴** with the IWT-Ci. Please also refer to Section 5.7 for gap or contact mode welding.

BACKGROUND/TECHNICAL INTRODUCTION

For welding cupped head pins (CHP) and 10GA or 12GA insulation nails, the **LYNX⁴** is supplied with *IWT-Ci Insulation Gun* with 33-ft lead and one 25-ft ground cable. The leads on both the gun and ground cable are integral to the successful welding of insulation fasteners as discussed below. Since the condition known as "arc blow" (see section 8.2) is not a concern with insulation fasteners, only one long ground cable is required. The gauge and length of the gun and ground cables are specifically selected to increase the time of the capacitor discharge weld pulse. This weld pulse is typically increased from 2 milliseconds to 11 milliseconds using this special cable set. While many stud welding systems that are designed only for insulation fasteners use internal resistance to extend this pulse, IWT has chosen to provide an extended cable set thereby providing the operator with increased working flexibility (up to 50ft working radius).

GUN SETUP FOR INSTALLATION FASTENERS

First determine which type of insulation fastener will be welded and select the appropriate collet supplied with your gun:

| <u>Fastener Type</u> | <u>Appropriate Collet</u> | <u>Part Number</u> |
|----------------------|---------------------------|--------------------|
| Cupped Head Pins | Magnetic Chuck | 1-CH039613 |
| 10GA Nails | #6/10GA Std Chuck | 1-CH500001 |
| 12GA Nails | #4/12GA Std Chuck | 1-CH500038 |

If previously installed, remove the adjustable leg assembly from the gun by loosening 4 set screws in the base of the assembly (you will not need this foot piece assembly for CHP). Insert the correct collet into your gun and tighten the locking nut with either a 17mm or 11/16 wrench. If you are welding 10GA or 12GA nails, you may wish to re-install the adjustable leg set at this point. Set the foot piece so that approximately 3/16" of the nail head extends beyond the foot piece.

Attach the *IWT-Ci Insulation Gun* to the locking terminals indicated on the front panel of the unit. Install the ground cable in either of the indicated ground terminals. Ensure that all connections are tight. Attach the clamp end of the ground cable to your work piece.

Switch the unit on and set the voltage on the **LYNX⁴** unit as follows:

| | |
|-------------------------|----------|
| 10GA Nails and 10GA CHP | 125-150V |
| 12GA Nails and 12GA CHP | 100-125V |

You are now ready to weld. Press the gun against your work piece or pierce through the insulation with the CHP. Once the pin contacts the work piece, the "Stud on Work" light will be lit. The gun spring should compress; however, it is not necessary to "bottom the gun out". You may now make a weld by depressing the trigger on the gun. Inspect the weld to ensure the fastener is attached firmly. If necessary, adjust the weld voltage and/or the gun spring pressure to achieve desired results. Excessive voltage will not produce a better weld.

See also Section 5.10 for a discussion of reverse polarity welding.

Supplemental Operating Instructions For Titan GFX and Atlas Stud Welders with GFX Graphical Interface



IWT Stud Welding
2650 Egg Harbor Road
Lindenwold, NJ 08021

(856) 435-8004 phone
(856) 435-4004 fax

www.iwtmarketplace.com

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We certify that the contents of this pamphlet correspond to the hard and software described. Deviations, however, cannot be excluded, so that we cannot warrant for absolute compliance. The data in this documentation, however, have been verified regularly and necessary corrections will be incorporated in future impressions. We appreciate any suggestions for improvement.

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Subject to technical alterations

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1. GENERAL

1.1 Introduction to LYNX Graphical Interface (GFX)

LYNX welders with *GFX Graphical Interface* are the most advanced capacitor discharge stud welders available. The GFX Graphical Interface is a large full color display which can graph each weld pulse and compare it to a reference weld. Some other key features include fastener diameter and material presets, weld counters and the ability to work with IWT's LZ-4 four gun switch box. In this manual we will discuss how to operate these features.

1.2 Boot Screen

Once power is applied to the *GFX Graphical Interface* by switching "on" the power switch located on the rear panel, the *IWT* and *LYNX⁴* logos will be displayed. It is important to understand that the unit's microcontroller is initializing and the welder should not be powered down during this time. SWITCHING OFF THE MACHINE DURING BOOT UP COULD CORRUPT ITS MEMORY OR MAY AFFECT THE IMAGES DISPLAYED ON THE SCREEN. You can safely power down the *GFX* when the Home Screen is displayed.



1.3 Home Screen

The Home Screen displays the machine's "Weld Status". On this screen the operator has an overall view of the machine condition, including: capacitor bank set point, welding voltage and weld count.

Below the weld "Voltage" is the machine status and weld count. Feedback is provided for:

- *READY (capacitors at charge or set point)*
- *STUD ON WORK (stud in contact with welding surface)*
- *GUN ON WORK (gun foot on the work for gap welding)*
- *TRIGGER (fire)*
- *WELD COMPLETE (reload) and/or*
- *FAULT*

1.4 Selecting Voltage

The arrow keys to the left of the LED screen adjusts weld voltage up and down.

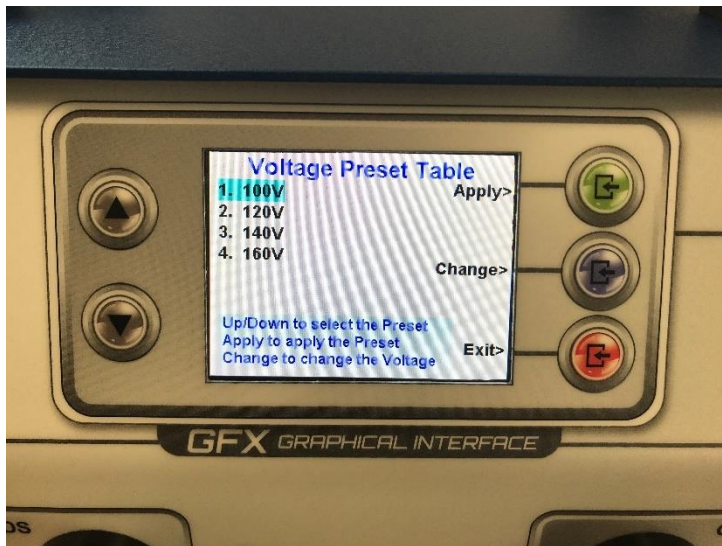
The buttons to the right of the screen are hot keys or shortcuts that take the operator directly to voltage "Preset", weld "Monitor" and the main "Menu".



2. VOLTAGE PRESETS (Hot Key, Green Button)

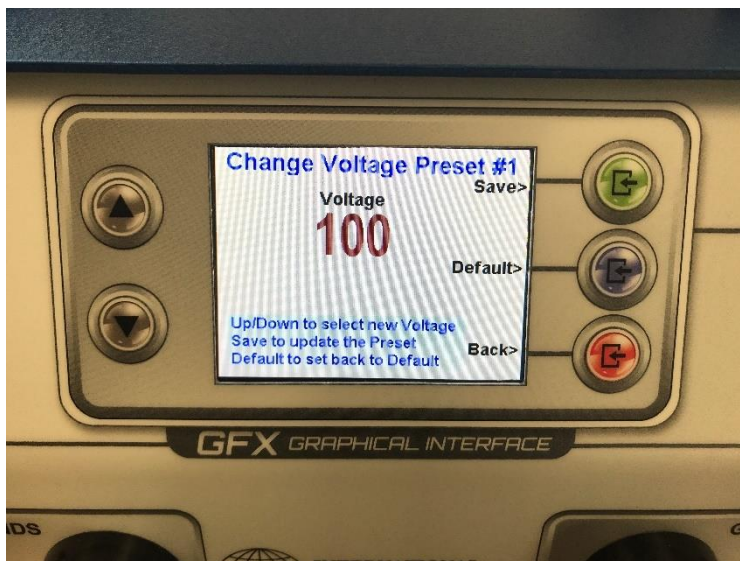
2.1 Selecting a Preset

The Voltage Preset Screen can be accessed by pressing the green *hot key* marked “Preset” located on “Weld Status” screen. It can also be accessed from the main “Menu” by selecting line 1. Once the operator is in the “Preset” screen the operator has the option to select one of four presets by highlighting a voltage and pressing “Apply”. Alternatively an operator can reassign that preset by pressing the “Change” button.



2.2 Reassigning a Preset

Upon selecting “Change”, the following screen will be displayed. At this time the weld voltage can be adjusted up or down and reassigned to the preset by selecting “Save”. Selecting “Default” will default back to the factory settings. The back button accesses the previous screen without making any changes.



3. WELD MONITORING (Hot Key, Purple Button)

What sets the **GFX** Graphical Interface apart from all other capacitor discharge stud welders is its ability to graphically plot each weld and compare it to a reference weld ensuring weld consistency. This allows the operator to identify poor or suspect welds prior to assembly or reaching the end customer. This intelligent stud welder can graph each weld pulse and provide important details such as: tip ignition, weld voltage, current profile, fastener set down, and weld time.

This data is displayed after each weld in full color. The operator can choose to record the weld for future reference and use its unique signature to compare against future welds. It is possible for the operator to set deviation limits to determine if subsequent welds are consistent to the benchmarked weld or if the weld needs further inspection (see page 12).

It is important to realize that the weld monitor is NOT telling the operator that the weld is good or bad but rather that a change has occurred and the weld is different. There are many factors that change the weld pulse other than the voltage and the guns downward force (i.e. spring pressure):

- Stud tip configuration (tip length, diameter and shape)
- Cabling (length, cross section, condition)
- Chuck condition (arcing/burning on threads)
- Work surface flexing
- Center punching
- Grounding (single ground, dual ground or arcing at grounds)

3.1 Understanding the Weld Graph

It is critical to identify and understand what is being displayed. The “X” or the horizontal axis is displaying actual weld time (in milliseconds) while the “Y” axis is displaying a representation of the weld current. The last 50 welds are archived.

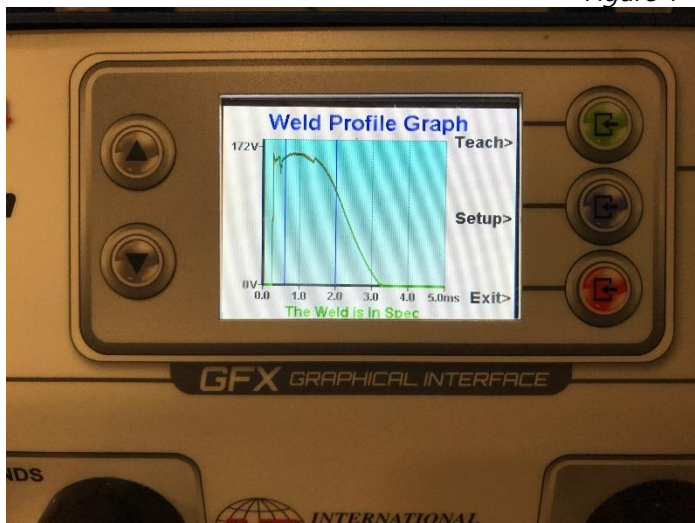
3.2 What is Actually Happening?

When the weld starts, the current is 0 and rapidly approaches its peak. At the peak current (approximately .4 milliseconds into the weld cycle), the tip on the stud vaporizes, creating an ionized path. This path allows the weld current to travel between work surface and stud while capacitors continue to discharge and the stud continues to move towards the work. At about 1.4 milliseconds the stud hits the work surface, this point is called “set down”. The area between tip vaporization and fastener “set down” is referred to as the “weld time”. The capacitors continue to fully discharge through the welded connection (see *Figure 1*).

The overall time for a complete weld cycle is as follows:

- .4 milliseconds for tip vaporization
- 1.4 milliseconds for weld time
- 1.45 milliseconds for discharge between welded connections

Figure 1



(A sample of a gap weld with a IWT gravity drop welding head)

The time it takes for the fastener to “set down” into the molten material is the most critical occurrence when monitoring weld consistency. Understanding “set down” time can help answer important questions regarding weld quality and determining how consistent a C.D. welding system is performing:

- Is the weld a gap or contact weld?
- Is the appropriate force (spring pressure) being applied?
- Is the gun/weld head free from binding?
- Is the work surface or tooling fixture flexing?

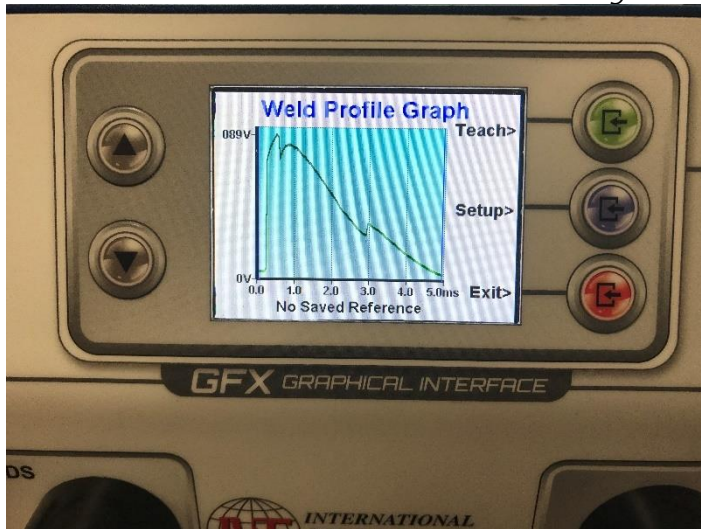
3.3 Understanding Weld Processes, Gap vs Contact

Contact welds differ from gap welds. The application and material generally determine whether the “Gap” or “Contact” stud welding process is used. Welding cable sets and gun velocity are different for each process.

3.3.1 Contact Weld (IWT-C1 and IWT-C2 hand guns)

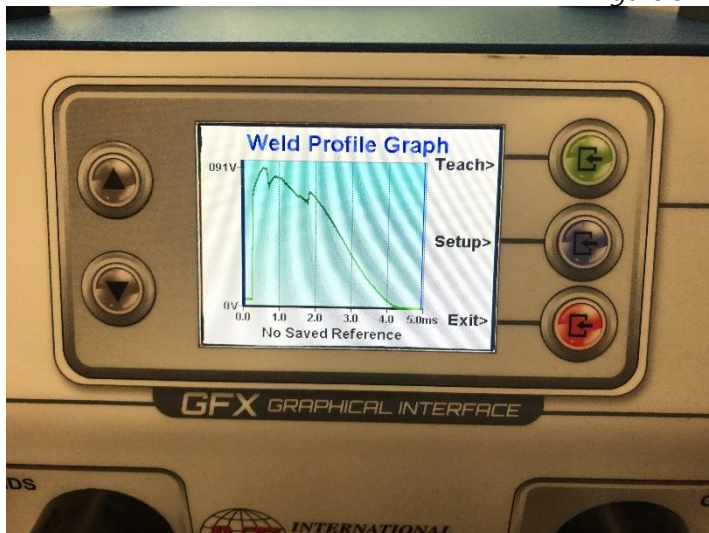
The contact process is suitable for welding steel and/or stainless steel. *Figure 2* and *Figure 3* illustrate adjustments made to the spring pressure on an IWT contact gun.

Figure 2



(Contact weld, minimum spring pressure)

Figure 3

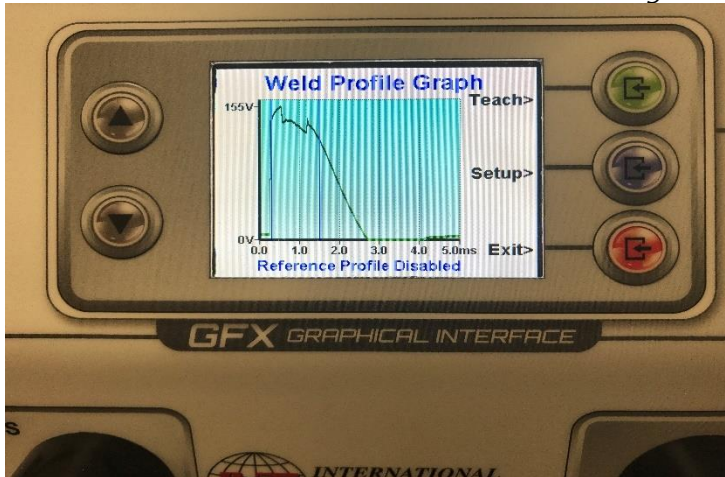


(Contact weld, maximum spring pressure)

3.3.2 Gap Weld (IWT-G1 hand gun)

Welding aluminum, brass, or other exotic metals will find the gap process to be most suitable. This type of welding system applies more force to the fastener and has a shorter weld time (see *Figure 4*).

Figure 4



(Gap weld, maximum spring pressure)

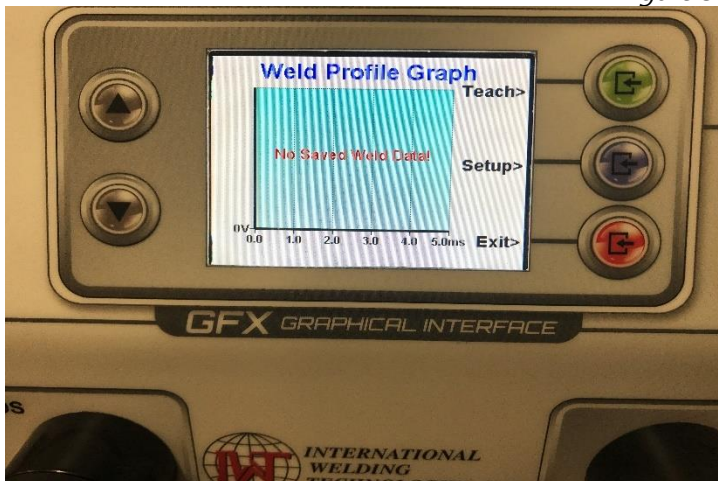
3.4 Teaching a Reference Weld

To monitor C.D. welds, start by making a series of sample welds and testing them. Testing should include a visual inspection of the weld for full fusion. This should then be followed by a mechanical or destructive test. More information on testing procedures can be found in AWS welding handbook or section 6 of a Titan manual (see page 31).

Once a weld schedule is determined, it is time to begin teaching a reference weld. IWT has included the AWS welding procedure sheet in the rear of the manual for reference.

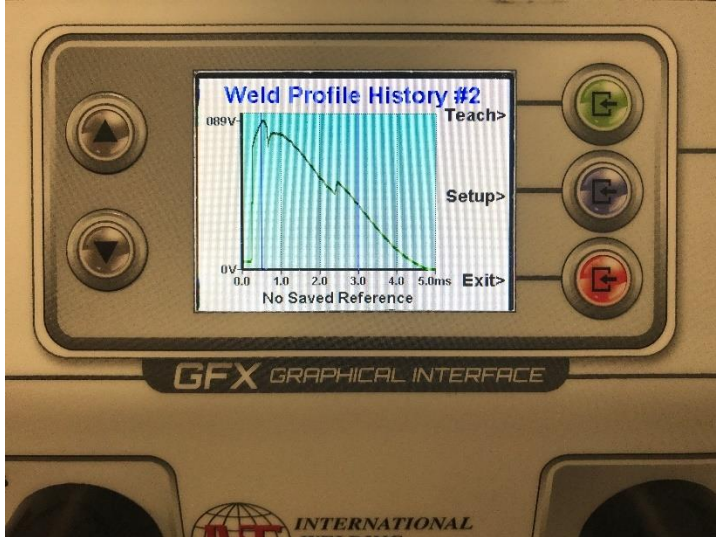
Start by pressing the purple hot key from the Weld Status screen. This will display the “Weld Profile Graph” screen. If welds have not yet been made or the weld data is deleted, the screen will show “No Saved Weld Data” (see *Figure 5*).

Figure 5



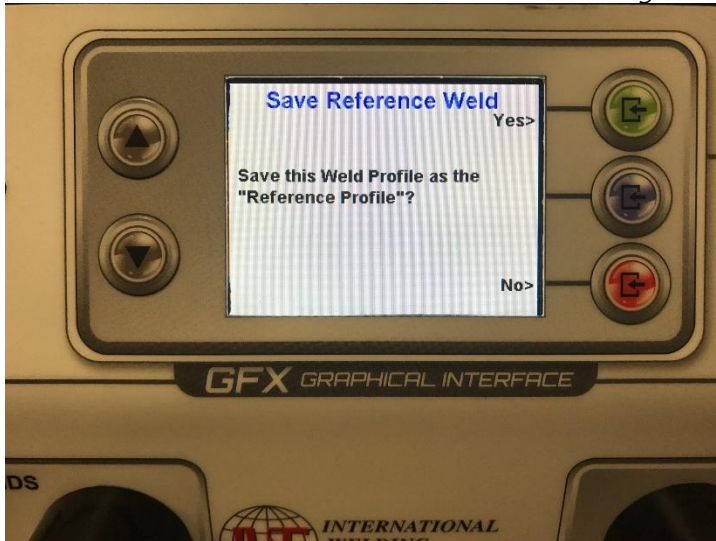
Once a weld is made, its signature will be displayed on the screen (see *Figure 6*).

Figure 6



Pressing the top right green hot key marked "Teach" displays the following screen (see Figure 7).

Figure 7

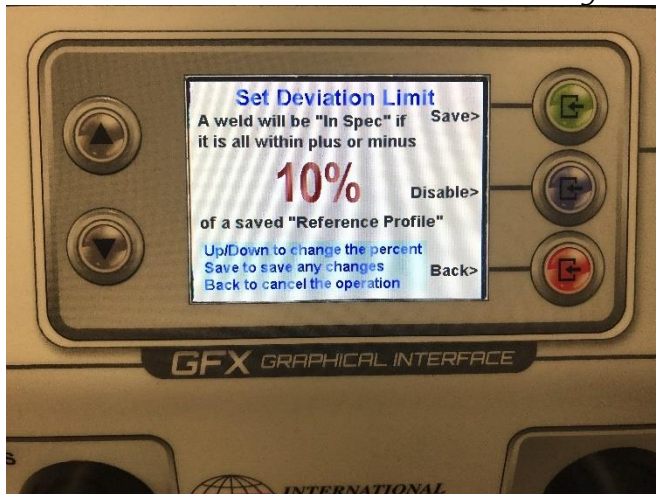


Confirm that this is now the reference weld by selecting "Yes".

3.5 Setting a Deviation

Once a reference weld is taught, the operator can select a percentage of deviation in 5% increments. To adjust the deviation, select the “Setup” button in the “Weld Profile Graph” screen, then select “Set Deviation Limit” using the up/down arrow keys (see Figure 8). **Note that hand guns and contact weld heads are less consistent than production style gravity drop heads. A good starting point is a 5-15% deviation for a gravity drop head and a 10-25% deviation for a hand tool.**

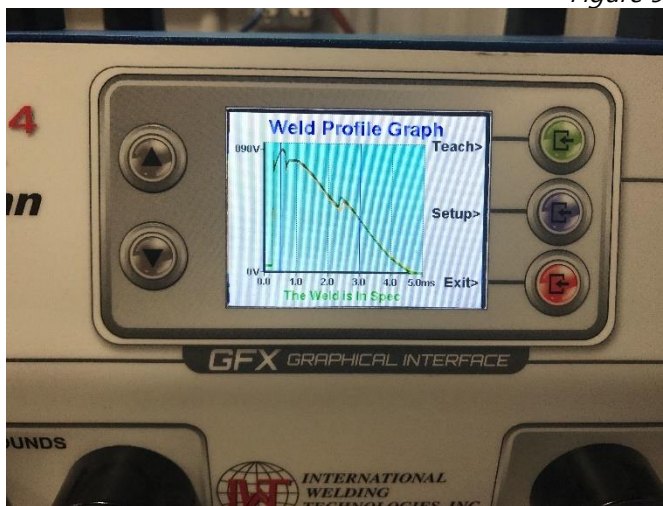
Figure 8



3.6 The Weld is in Spec.

The reference weld is displayed in yellow while the new weld is displayed in green. In this example, this weld is considered in specification “The Weld is in Spec.” because it does not deviate more than 10% (see Figure 9)

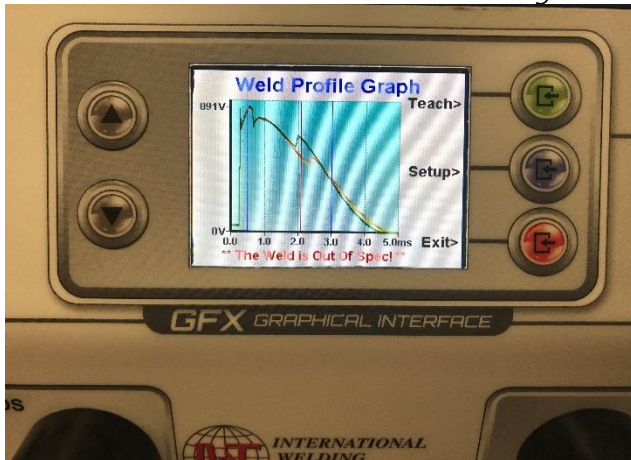
Figure 9



3.7 The Weld is Out Of Spec.

In Figure 10 the weld is “Out of Spec.” as deviation is greater than 10%. The red line indicates deviation occurred at set down. The set down time for the current weld (green graph) occurred at approximately 2.0 milliseconds while the set down time for the reference weld (yellow graph) happened at approximately 2.4 milliseconds.

Figure 10



3.8 Adjusting the Monitoring Window

The monitoring window is noted by two blue lines running vertically down the screen. Data that falls between the two blue lines is checked against the reference weld. This useful feature allows irrelevant data to be ignored such as data happening before tip ignition or after set down. To adjust the Weld Limit Window select the “Setup” button then select the line labeled “Set Monitoring Window”. Choose the start and the end time in milliseconds. Finalize the selection by pressing the “Save” button (see Figure 11).

Figure 11

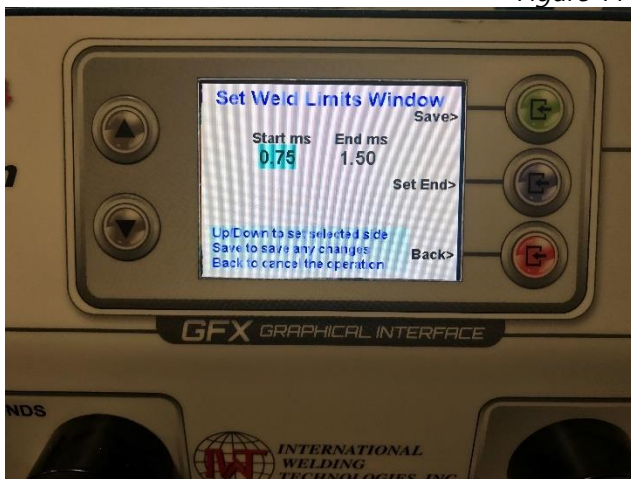


Figure 12 and Figure 13 show two images of aluminum gap welds. Notice that the change in tip ignition causes the weld to fall out of spec. This was most likely due to the aluminum fastener's ignition tip vaporizing at slightly different times. Both welds had the same appearance and both passed a destructive test. Since both welds passed the testing procedure, the weld limit window was adjusted to only focus on the most critical part of the weld, "set down".

Figure 12

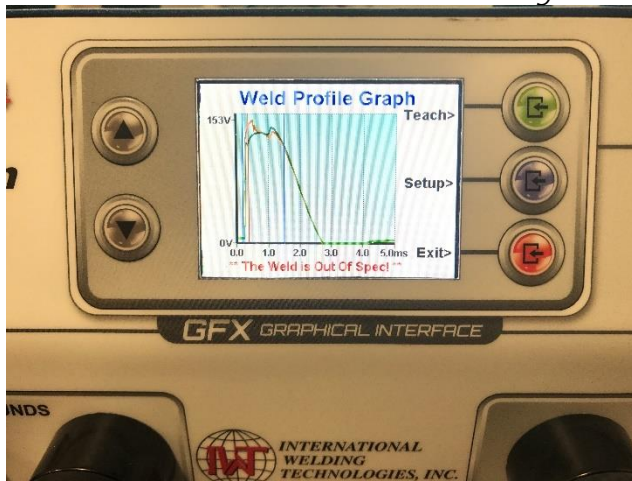
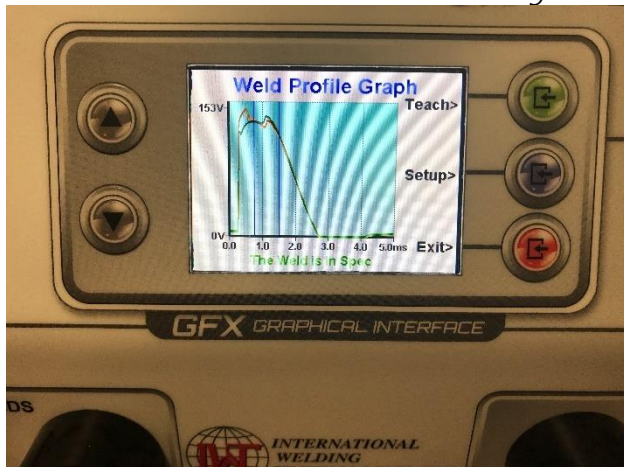


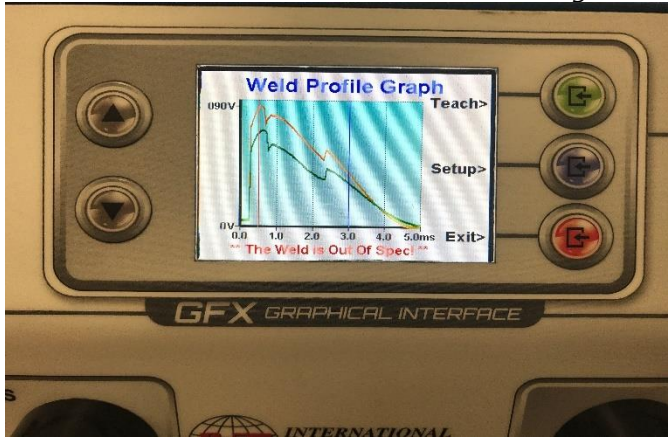
Figure 13



3.9 Variables that Change Weld Pulses

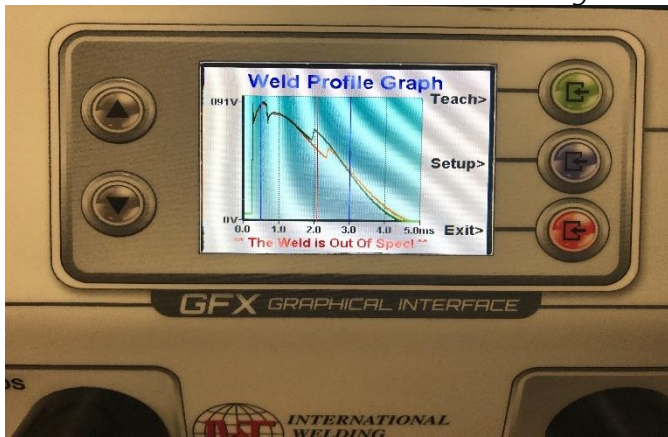
Figure 14-16 show examples of variables that affect the weld pulse.

Figure 14



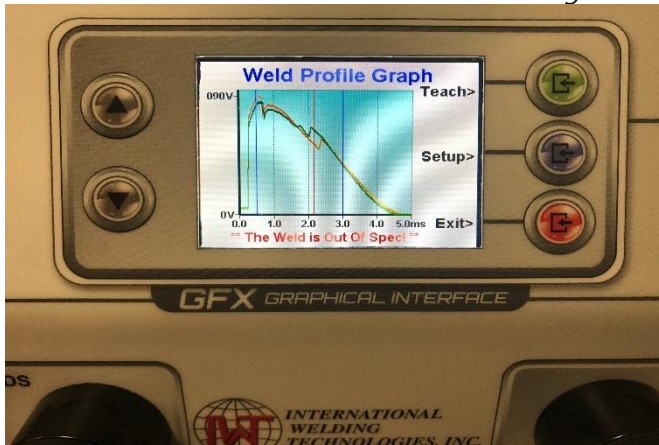
(Change in weld voltage, change in cable set, poor grounding, or poor chuck)

Figure 15



(Change in spring pressure or flexing in the work surface)

Figure 16



(A center punch, the operator holding the gun poorly or inconsistencies in fastener tip)

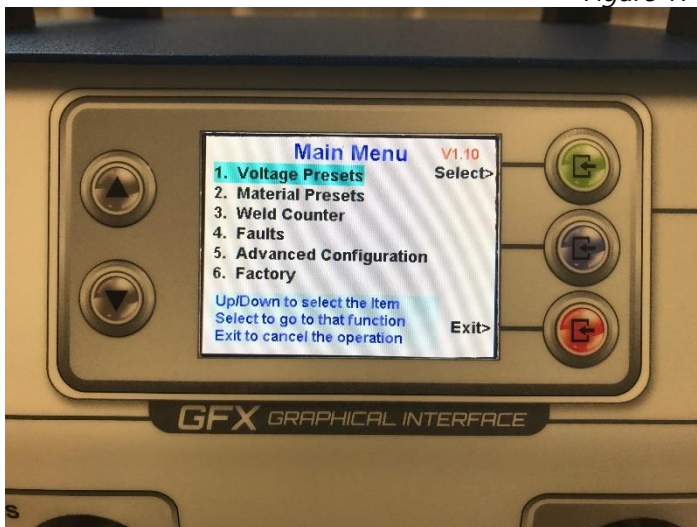
4. MAIN MENU (Hot Key, Red Button)

The main menu allows the operator to select from the full list of GFX functions, including the “Hot Keys” mentioned earlier in this manual.

Additional options in the main “Menu” include:

- *Material Presets – A table of suggested weld settings for Steel(s) and Aluminum.*
- *Weld Counter – A resettable counter for a project and a non-resettable counter for total welds on the machine*
- *Fault Codes – Displays the cause of the fault code in easy-to-read text and shows the solution/corrective action*
- *Advanced Configuration – Options for supervisor lock out giving operator access to only the preset voltages.*

Figure 17



4.1 Voltages Presets

Please refer to Section 2, Voltage Presets

4.2 Material Presets

The GFX has an option to change welding voltages based on stud diameter in the “Material Preset Table”. In this table an operator can select the fastener size and its corresponding material (S= Steel, A= Aluminum) to automatically change the machines voltage (see *Figure 18* and *Figure 19*). These voltages are estimated settings base on IWT standard off the shelf fasteners. Adjustments will need to be made for special fasteners such as mini flanged and non-flanged weld studs. The “Voltage Preset,” discussed in Section 2, allows the operator to make their own changes and save to the factory default sizes.

Figure 18

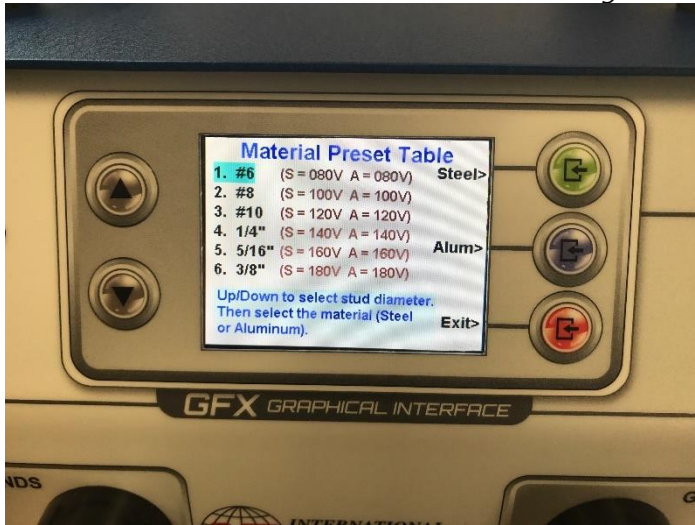


Figure 19



4.3 Managing Weld Count

The **GFX** is equipped with three weld counters- the “Project Weld Count”, “Maintenance Count” and “Total Weld Count” (see Figure 20).

The project counter is able to track how many welds are made during a certain project or shift. The project counter is resettable. To clear the “Project Count,” press the purple hot key marked “Clear” (see Figure 21).

Figure 20

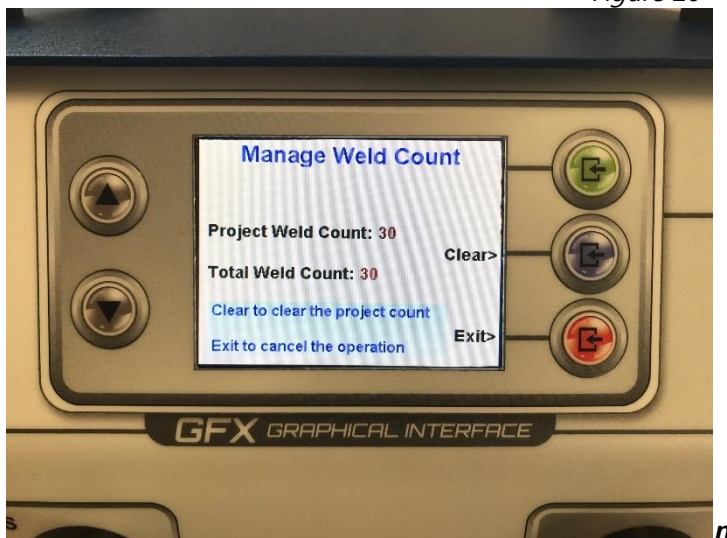
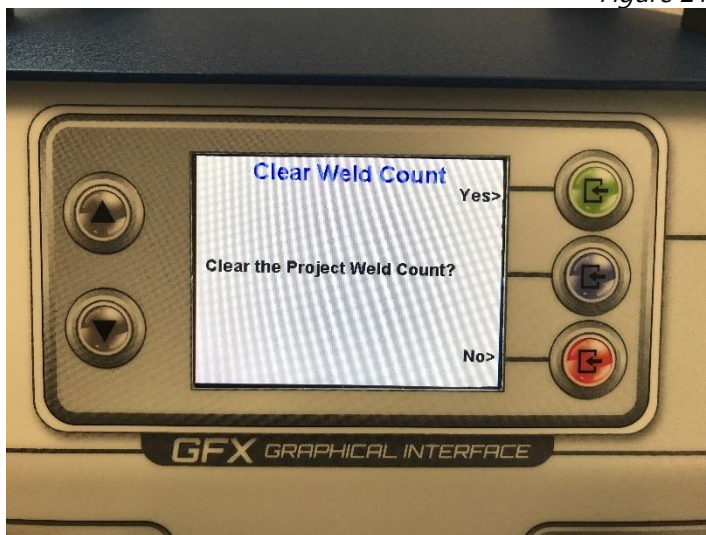


Figure 21



The operator will be prompted to confirm that it is OK to clear the count.

The maintenance counter can be used to determine service intervals, for example, it could be used to indicate a collet change should happen every 1,000 welds. This counter can be “disabled” or set from 100-50,000 welds. For more information on how to set a maintenance count, please refer to section 4.5, in **Advanced Configurations**.

The “Total Weld Count” displays the number of welds on the machine. This counter is not resettable.

4.4 Fault Codes

The **GFX** is programmed to display IWT standard fault codes on the “Weld Status” screen automatically (see *Figure 22*). Machine faults are also displayed on the “Fault” screen, accessible from the main menu. Below the condition, a suggested corrective action is displayed. If a fault continues, send the system to an authorized IWT Service Center for evaluation. A “Fault Code Quick Reference” sheet is provided with the machine. The GFX currently monitors six fault conditions:

- High Temperature Fault
- Charge Start Fault
- Main SCR Leak Fault
- Charge Fault
- Low 28V Fault
- Discharge Fault

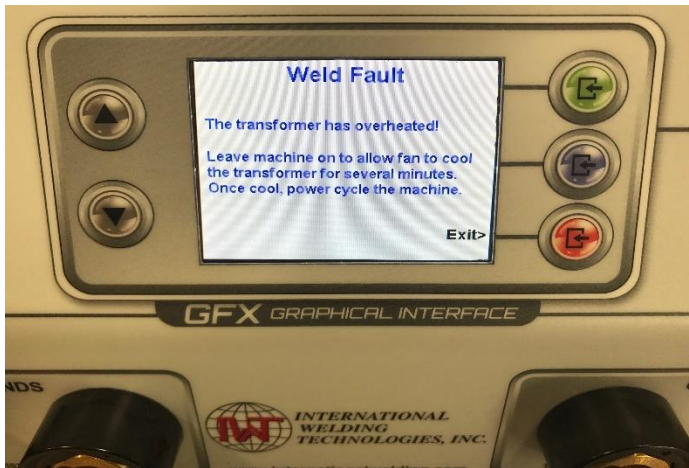
Figures 23-26 show displays for “High Temperature Fault”, “Charge Start Fault” and “No Fault Detected”.

Figure 22



(Transformer Thermal Protection on Weld Status Screen)

Figure 23



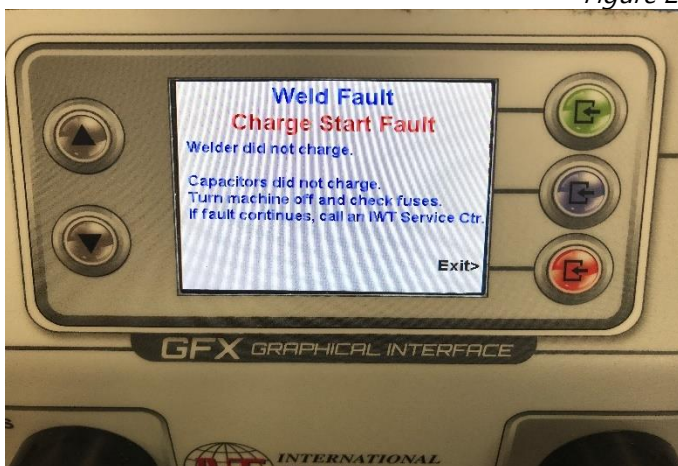
(View of Thermal Protection Fault "High Temp" from the fault screen)

Figure 24



(Charge Start Fault on Weld Status Screen)

Figure 25



(View of Charge Start Fault from the Fault Screen)

Figure 26



(View of No Fault Detected from the Fault screen)

4.5 Advanced Configuration

The Advanced Configuration Screen allows a supervisor to either lockout the operator and/or enable the maintenance counter.

4.5.1 Operator Lockout Mode

When this option is selected the operator has access to only the preset voltages. To gain full access to the system, the supervisor must hold down both arrow keys and the middle Hot Key (purple button) during the system boot screen.



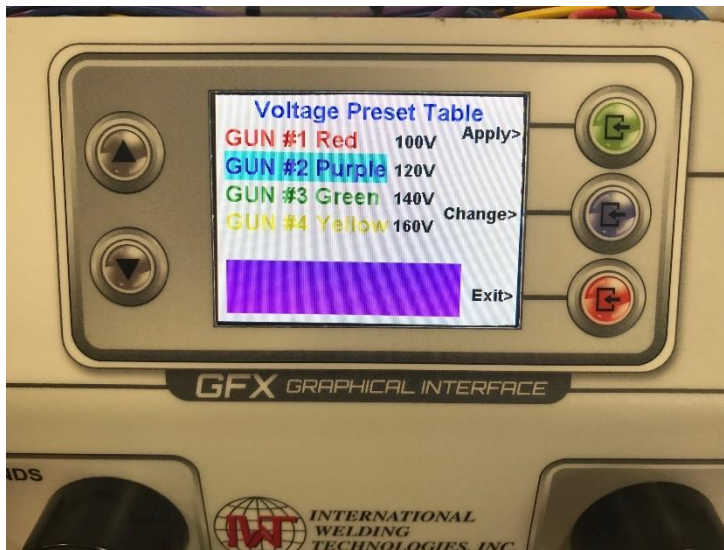
4.5.2 Maintenance Count

On the “**Set Maintenance Count**” screen a supervisor will be able to set a maintenance interval based on a certain number of welds made. This feature is particularly useful to indicate a collet change or to alert the operator that it is time to perform scheduled maintenance. This feature operates in the following manner:

1. The supervisor can select a maintenance interval between 100-50,000 welds.
2. If the supervisor scrolls below a count of 100, the counter will be “**Disabled**”.
3. After selecting a maintenance interval, that number would be displayed on the “Weld Count Screen and the system would count down after each weld.
4. Once the maintenance count reaches zero, the screen that would flash “**Maintenance Required**” in red. *The operator will still be able to continue to operate the welder, but the screen will lock and the count will continue into negative numbers.*
5. The “**Maintenance Required**” screen would continue to be displayed, even after power cycling until the supervisor holds down both arrow keys and top Hot Key (green button) during the system boot screen. This action will refresh the count to the current configured value without any additional actions.

LZ-4 GUN SELECTOR

The GFX can be factory configured to work with IWT's LZ-4 gun selector switch box. The LZ-4 allows the attachment of four contact welding guns to a single GFX power supply. The LZ-4 is designed to recognize which gun the operator is using and automatically disable the other three guns that are not in use. When this option is active, the operator has four color coordinated choices, one for each gun. A status bar showing which gun is active is displayed on the bottom of the screen. For more information, please contact International Welding Technologies or an authorized distributor. A specification sheet for the LZ-4 can be downloaded at www.iwtmarketplace.com



4 WARRANTY

IWT's mechanical components are warranted against manufacturer's defects in material and workmanship for a period of one (1) year from the time of shipment from IWT's facility. IWT's electrical components are similarly warranted for a period of one (1) year from the time of shipment from IWT's facility. IWT's sole obligation under this warranty is limited to repairing the product or, at its option, replacing the product without additional charge, provided the item is properly returned to IWT for repair as described below. The provisions of this warranty shall not apply to any product that has been subjected to tampering, abuse, improper setup or operating conditions, misuse, lack of proper maintenance, or unauthorized user adjustment. IWT makes no warranty that its products are fit for any use or purpose to which they may be put by the customer, whether or not such use or purpose has been disclosed to IWT in specifications or drawings previously or subsequently provided, and whether or not IWT's products are specifically designed and/or manufactured for such a purpose.

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LIMITATION OF REMEDY

In no event shall IWT be liable for any incidental, consequential, or special damages of any kind or nature whatsoever. IWT is in no way liable for any lost profits arising from or connected to this agreement or items sold under this agreement, whether alleged to arise from breach of contract, expressed or implied warranty, or in tort, including, without limitation, negligence, failure to warn, or strict liability.

RETURN PROCEDURE

Before returning any equipment in or out of warranty, the customer must first obtain a return authorization number and packing instructions from IWT. No claim will be allowed nor credit given for products returned without such authorization. Proper packaging and insurance for transportation is solely the customer's responsibility. After approval from IWT, the product should be returned with a statement of the problem and transportation prepaid. If, upon examination, warranted defects exist, the product will be repaired or replaced at no charge, and shipped prepaid back to the customer. Return shipment will be by common carrier (i.e., UPS). If rapid delivery is requested by customer, then such transport is at the customer's expense. If an out-of-warranty situation exists, the customer will be notified of the repair costs immediately. At such time, the customer must issue a purchase order to cover the cost of the repair or authorize the product to be shipped back as is, at the customer's expense. In any case, a restocking charge of 20% will be charged on all items returned to stock.

FIELD SERVICE

Repairs are ordinarily done at IWT's, Lindenwold, New Jersey facility where all necessary tools are available. Field service is only supplied at IWT's discretion. If field service is required and is performed at IWT's sole discretion, all relevant expenses, including transportation, travel time, subsistence costs, and the prevailing cost per hour (eight hour minimum) are the responsibility of the customer.

UNFORESEEN CIRCUMSTANCES

IWT is not liable for delay or failure to perform any obligations hereunder by reason of circumstances beyond its reasonable control. These circumstances include, but are not limited to, accidents, acts of God, strikes or labor disputes, laws, rules, or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials, and any other event beyond IWT's control.

ENTIRE AGREEMENT/GOVERNING LAW

The terms and conditions contained herein shall constitute the entire agreement concerning the terms and conditions for the limited warranty described hereunder. No oral or other representations are in effect. This Agreement shall be governed in all respects by the laws of State of New Jersey. No legal action may be taken by any party more than one (1) year after the date of purchase.

