

**OPERATING THE**  
***ArcCharger***<sup>™</sup>  
**N550c**  
**DOMESTIC & EXPORT**



## Operations Manual

*For Software Version 1.03*



### CAUTION

**These instructions are for experienced operators.** If you are not fully familiar with the principles of operation and safe practices for arc welding equipment, we urge you to read AWS SP -“Safe Practices” available from the American Welding Society. **Do not permit untrained persons to install, operate or maintain this equipment. Do not attempt to install or operate this equipment until you have read and fully understand these instructions.** If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety section before utilizing this equipment.

## **N550c Arc Charger™ Limited Warranty**

NELSON'S only warranty is that goods being sold will be free from defects in workmanship and material. This warranty is expressly in lieu of other warranties, expressed or implied and whether statutory or otherwise, including any implied warranty of merchantability or fitness for a particular purpose.

NELSON'S liability for breach of warranty shall arise only upon return of the defective goods at Buyer's expense after notice to NELSON of the claimed breach, and shall be limited to furnishing a like quantity of such goods free from such defects or, at NELSON'S option, to refunding the purchase price (less reasonable depreciation based on actual use); provided, however, that NELSON will not accept receipt of equipment returned unless buyer has previously afforded NELSON'S personnel a reasonable opportunity to inspect and repair said equipment at buyer's facility or such other location as is mutually agreeable. Notice to NELSON must be given within 30 days of such defect or failure and within one year or 500,000 welds from the date the equipment was delivered, whichever comes first. No compensation or reimbursement for transportation costs of any kind will be allowed.

Please note that this warranty does not extend beyond the original registered purchaser, and does not warrant equipment that has been modified by any party other than NELSON, or equipment that has been improperly installed, improperly operated, or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of specifications for the equipment. NELSON shall never be liable for consequential damages.

NELSON reserves the right to make engineering and/or part changes, at any time without notice, as a result of our commitment to continuous improvement.

<b>MODEL NO.</b>	
<b>SERIAL NO.</b>	
<b>SHIPPING DATE</b>	
<b>VOLTAGE REQUIRED</b>	



## WARNING

### WARNING

The following Safety section is for your protection. It summarizes precautionary information from the references

listed in the Additional Safety Information section. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe these precautions can result in injury or death.

### PROTECT YOURSELF AND OTHERS



**Some welding, cutting, and gouging processes are noisy and require ear protection. The arc, like the sun, emits ultraviolet (UV) rays and other radiation which can harm the skin and eyes. Hot metal can cause burns. Training in the proper use of the processes and equipment is essential to prevent accidents. Therefore:**

1. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields and goggles are also required.
2. Use a face shield fitted with filter shade #3 per ANSI Z87.1. Cover sparks and rays of the arc when operating or observing operations. Warn bystanders not to watch the arc and not to expose themselves to the rays of the electric-arc or hot metal.
3. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high topped shoes, and a welding helmet or cap for hair protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
4. Hot sparks or metal can lodge in rolled up sleeves, trousers cuffs or pockets. Sleeves and collars should be kept buttoned and open pockets eliminated from the front of clothing.
5. Protect other personnel from arc rays and hot sparks with suitable nonflammable partitions or curtains.
6. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly far. Bystanders should also wear goggles over safety glasses.



### FIRES AND EXPLOSIONS

**Heat from flames and arcs can start fires. Hot slag or sparks can also cause fires and explosions. Therefore:**

1. Remove all combustible materials well away from the work area or cover the materials with a protective nonflammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings, paper, etc.
2. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire or fires on the floor below. Make certain that such openings are protected from hot sparks and metal.
3. Do not weld, cut, or perform other hot work until the workpiece has been completely cleaned so that there are no substances on the workpiece which might produce flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
4. Have appropriate fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket or portable fire extinguisher. Be sure you are trained for proper use.
5. Do not use equipment beyond its ratings. For example, overloaded welding cable can overheat and create a fire hazard.
6. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
7. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes," available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269



### ELECTRICAL SHOCK

**Contact with live electrical parts and ground can cause severe injury or death. DO NOT use welding current in damp areas, if movement is confined, or if there is danger of falling. Faulty or improperly electrified equipment can cause injury or death. Therefore:**

1. Always have qualified personnel perform the installation, troubleshooting, and maintenance unless you are qualified to perform such work.
2. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.
3. Be sure the power source frame (chassis) is connected to the ground system of the input power.
4. Connect the workpiece to a good electrical ground.
5. Connect the work cable to the workpiece. A poor or missing connection can expose you or others to a fatal shock.
6. Use well-maintained equipment. Replace worn or damaged cables.
7. Keep everything dry, including clothing, work area, cables, torch/electrode holder and power source.
8. Make sure that all parts of your body are insulated from work and from the ground.
9. Do not stand directly on metal or the earth while working in tight quarters or a damp area; stand on dry boards or an insulating platform and wear rubber soled shoes.
10. Put on dry, hole-free gloves before turning on the power.
11. Refer to ANSI/ASC Standard Z49.1 for specific grounding recommendations. Do not mistake the work lead for a ground cable.
12. Before performing any work inside a power source, disconnect the power source from the incoming electrical power using the disconnect switch at the fuse box before working on the equipment.



### ELECTRICAL AND MAGNETIC FIELDS

**Electric and magnetic fields may be dangerous. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines. Therefore:**

1. Operators having pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
2. Exposure to EMF may have other health effects which are unknown.
3. Operators should use the following procedures to minimize exposure to EMF:
4. Route the electrode and work cables together. Secure them with tape when possible.
5. Never coil the torch or work cable around your body.
6. Do not place your body between the torch and work cables. Route cables on the same side of your body.
7. Connect the work cable to the workpiece as close as possible to the area being welded.
8. Keep welding power source and cables as far away from your body as possible.



### MOVING PARTS CAN CAUSE INJURY

**Electric fan can start at any time without warning and cause severe injury, therefore:**

1. Always disconnect electrical power prior to service to prevent the fan from starting unexpectedly.
2. Keep all doors, panels, covers, and guards closed and securely in place.
3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
4. Keep hands, hair, loose clothing, and tools away from moving parts.
5. Reinstall panels or guards and close doors when servicing is finished and before reenergizing welder.



### FUMES AND GASES

**Fumes and gases can cause discomfort or harm, particularly in confined spaces. Do not breathe fumes and gases. Shielding gases can cause asphyxiation. Therefore:**

1. Always provide adequate ventilation in the work area by natural or mechanical means. Do not weld, cut, or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes from these materials.
2. Do not operate near degreasing and spraying operations. The heat or arc rays can react with chlorinated hydrocarbon vapors to form phosgene, a highly toxic gas, and other irritant gasses.
3. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work areas. Do not continue to operate if physical discomfort persists.
4. Refer to ANSI/ASC Standard Z49.1 (see listing on next page) for specific ventilation recommendations.



### CYLINDER HANDLING

**Cylinders, if mishandled, can rupture and violently release gas. Sudden rupture of cylinder, valve, or relief device can injure or kill. Therefore:**

1. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors. Maintain hoses and fittings in good condition.
2. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, walls, post, or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
3. When not in use, keep cylinder valves closed. Have valve protection cap in place if regulator is not connected. Secure and move cylinders by using suitable hand trucks. Avoid rough handling of cylinders.
4. Locate cylinders away from heat, sparks, and flames. Never strike an arc on a cylinder.
5. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.



### EQUIPMENT MAINTENANCE

**Faulty or improperly maintained equipment can cause injury or death. Therefore:**

1. Always have qualified personnel perform the installation, troubleshooting, and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.
3. Maintain cables, grounding wire, connections, power cord, and power supply in safe working order. Do not operate any equipment in faulty condition.
4. Do not abuse any equipment or accessories. Keep equipment away from: heat sources such as furnaces, wet conditions such as water puddles and inclement weather oil or grease corrosive atmospheres.
5. Keep all safety devices and cabinet covers in position and in good repair.
6. Use equipment only for its intended purpose. Do not modify it in any manner.



### EYE PROTECTION

**Flying metal can injure eyes. Welding, chipping, wire brushing and grinding can cause sparks and flying metal. As welds cool, they can throw off slag. Therefore:**

1. Wear approved safety glasses with side shields even under your welding helmet.
2. Warn others nearby about flying metal hazard.



### HEARING PROTECTION

**Prolonged Noise from Capacitor Discharge welding applications can damage hearing if levels exceed limits specified by OSHA. Therefore:**

1. Use Approved ear plugs or ear muffs if noise level is high.
2. Warn others nearby about noise hazard.
3. For additional information, refer to OSHA Safety Standards 3074.



### ADDITIONAL SAFETY INFORMATION

**For more information on safe practices for electric arc welding, refer to the following publications.**





1. ANSI/ASC Z49.1 Safety in Welding and Cutting
2. AWS C5.1 Recommended Practices for Plasma Arc Welding
3. AWS C5.6 Recommended Practices for Gas Metal Arc Welding
4. AWS SP Safe Practices (Reprint) Welding Handbook
5. ANSI/AWS F4.1 Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances.

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 <b>SAFETY SYMBOLS</b> <b>ATTENTION!</b> <b>BE ALERT!</b>  <b>WELDING CAN BE HARMFUL TO YOURSELF AND OTHERS.</b>	 <b>DANGER</b>	Used to call attention to immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.
	 <b>WARNING</b>	Used to call attention to potential hazards which could result in personal injury or loss of life.
	 <b>CAUTION</b>	Used to call attention to hazards which could result in minor personal injury.

## 1 Introduction

The following procedure contains instructions for operating and servicing the N550c Arc Charger welding unit.

### 1.1 Unit Description

---

The Nelweld N550c Arc Charger is a compact and portable power unit that welds studs onto workpiece surfaces designed for the construction, industrial and shipbuilding industries.

The Arc Charger works as a constant current switch mode power source using extremely short weld times and is capable of welding studs with up to a 3/8" (9.5 mm) diameter weld base.

### 1.2 Welding Method

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The Arc Charger is a stud welding system designed to use both the drawn arc and short cycle weld process.

The drawn arc method utilizes fasteners with integrated flux balls in conjunction with ceramic ferrules. The flux ball on the tip of the stud acts as a deoxidizing agent during the weld. The ceramic ferrule contains the molten metal in a consistent shape around the weld.

The short cycle method utilizes fasteners without a flux ball and does not require a ceramic ferrule. With the exception of shorter weld time, the operational sequence is identical to the drawn arc method.

The extremely short weld times of the Short-Cycle method allows studs to be welded without ceramic ferrules. To protect the weld pool, especially with aluminum welds, it is advisable to use inert gas. The introduced inert gas displaces the air from the welding zone. If studs are welded under inert gas, a tapered welding tip is preferred. The tranquil arc plunge dampener option should not be used with this process.



### **1.3 Operational Sequence**

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1. Check all cables are connected properly.
2. Turn on Arc Charger.
3. Load stud into chuck and ferrule into grip (if required).
4. Press gun against work piece at 90° angle until either ferrule or spark shield is flush to base material.
5. Initiate weld by pressing gun trigger.
6. The weld process begins with pilot arc, then the stud is lifted. Then the main current welds and just as it shuts off, the stud is plunged into the base metal.
7. Pull the gun up off the stud.
8. Remove the ferrule (if required) from the cooled stud.

### **1.4 Ceramic Ferrules**

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Ceramic ferrules are used with the drawn-arc method. They form a chamber around the weld, which encompasses the arc and shields the user from the weld spatter.

The ferrules also help to reduce the weld cooling rate and to produce an even shaped weld flash.

The following conditions have to be observed:

- An appropriate ceramic ferrule is required for stud diameters greater than 3/8".
- For differing ceramic ferrules, corresponding ceramic ferrule holders are needed.

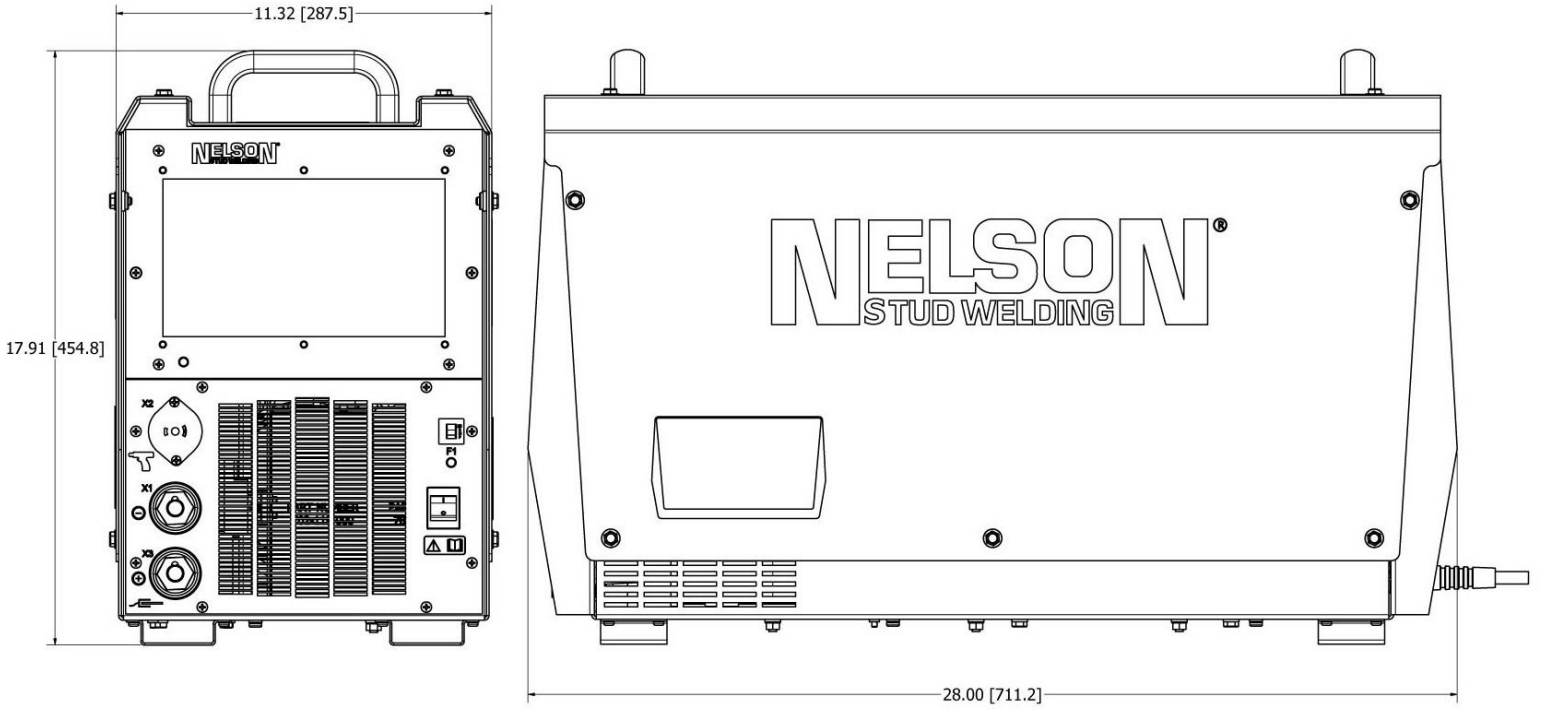
The Nelson Stud Welding catalog offers an overview of the Nelson ceramic ferrule product range.

## 1.5 N550c Arc Charger™ Technical Data

N550c Arc Charger™		Domestic	Export
Input Voltage (V)		115	230
Input Current (A)*		16	8
Input Line Frequency (Hz)		60	50/60
Weight (welder only)		86 lbs (39 kg)	
Dimensions (L x W x H)		28.0" x 11.3" x 17.9" (711 mm x 287 mm x 455 mm)	
Weld Rate (studs/min)	Drawn Arc	3/8" Pitch	6
		3/16"	15
	Short Cycle	1500A, 50ms	12
		1000A, 100ms	10
		800A, 200ms	6
Maximum Stud Diameter		Steel/Stainless	3/8" Pitch (M8)
		Aluminum	3/8" Pitch (M8)
Maximum Weld Settings		Drawn Arc	550A, 320ms
		Short Cycle <b>Note: Arc Charger SC Units Only</b> These power units allow higher current for a shorter time. They lower time setting accordingly as current is increased per unit's capabilities.	1000A, 100ms 1100A, 90ms 1200A, 80ms 1300A, 70ms 1400A, 60ms 1500A, 50ms
Power Cord		9 ft (2.75 m)	
Input Power Connection*		Standard 120/220 VAC 3-Prong, Grounded	IEC Type E Plug, 3-Conductor, Grounded
Idle Power (W)		25 Max	
Display		Touch Pad w/ Graphical Diagnostics	
Operating Temperature		32°F to 104°F (0°C to +40°C)	
Storage Temperature		-4°F to +140°F (-20°C to +60°C)	
Relative Air Humidity		0% to 50% at 104°F (40°C) 0% to 90% at 68°F (20°C)	
*Input current is a function of the weld rate, which is largely dependent upon the user application. Adjustments to charge current are described later within this document.			

## 1.5.1 Dimensions

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## **2 Delivery & Transport**

### **2.1 Package & Dispatch**

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Unless specified, the type of packing complies with HPE regulations, given by the Federal Association for Wooden Materials, Pallets and Export Packing.

### **2.2 Inspection of Incoming Materials**

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Each Nelson welder is rigorously tested prior to shipment, and includes a copy of the testing protocol.

On arrival, the welding unit must be checked for damage as well as for the completeness of the parts within the extent of delivery.

Any possible transport damage and/or missing parts must be immediately made known to the manufacturer or the authorized forwarding company.

### **2.3 Storage**

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If the welding unit is not operated upon delivery, it must be stored immediately in a secured place.

The Arc Charger must be sufficiently protected against dust and/or moisture. The relative air humidity is acceptable at 0% to 50% in 104°F (40°C) temperature and 0% to 90% at 68°F (20°C).

As for storage temperature, the unit must be stored at a temperature higher than 13°F (-20°C), but no higher than +140°F (+60°C).

Take caution and ensure compliance to prevent damage to the unit.

## 2.4 Transport

In order to avoid damage to the welding unit, the Arc Charger may only be transported by the handle of the unit or by means of suitable lifting gear.

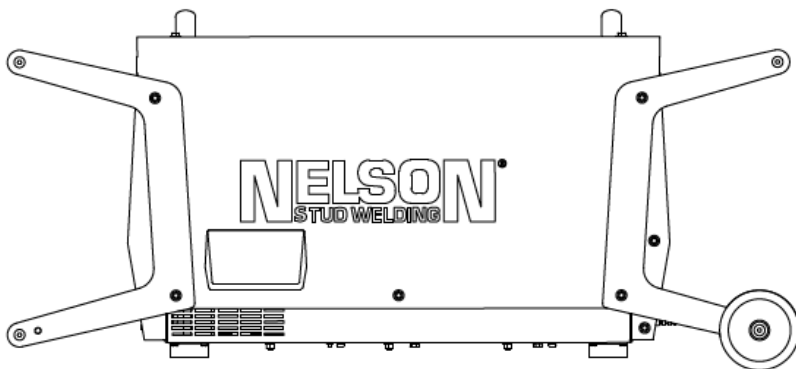
**NOTE: Do not use the input power cable as a handle.**



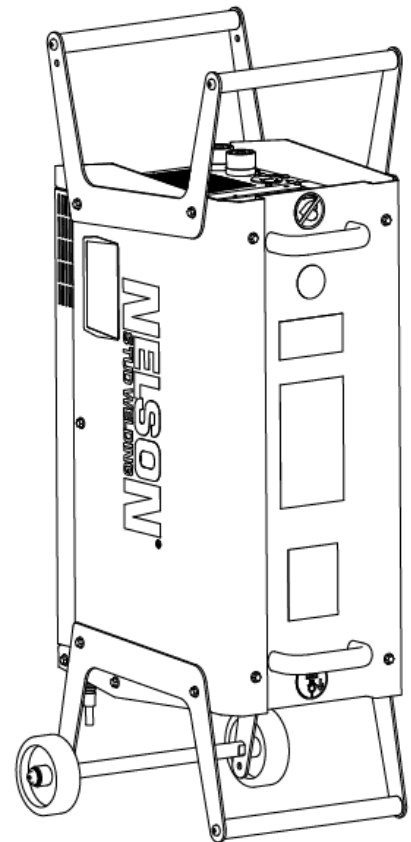
**In order to prevent back injury, do not attempt to lift the Nelweld N550c unit alone. Seek the assistance of at least one other person when moving/lifting the unit.**



Internal damage to the weld unit may occur if operated in the vertical position. The unit may also tip over causing injury. Lie the unit back down horizontally after transporting if using the wheel kit.



**Welding Position**



**Transport Position**

## 2.5 Operating Location

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The operating location of the Nelweld N550c Arc Charger should be limited to restricted areas of industry and manufacturing. **Welding can cause radio interference in residential and commercial areas.**

- Welds that are performed at low temperature may have a negative influence upon the welding result.
- To protect people not involved, the operating location must be amply cordoned off and clearly marked with warning and informatory signs.
- Inflammable and explosive materials must be removed from the danger zone.



### **WARNING**

**We expressly point out that welding in commercial areas, in the open or in open halls is as a general principle forbidden.**

- The power unit will operate in harsh environments. Regardless, it is important to follow simple preventative measures in order to assure long life and reliable operation.
- The machine must be located where there is free circulation of clean air such that air movement in the back, out the sides and bottom will not be restricted.
- Dirt and dust that can be drawn into the machine should be kept to a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance shutdown.
- Keep the machine dry. Shelter it from rain and sun. Do not place on wet ground or in puddles.



### **CAUTION**

**DO NOT MOUNT OVER COMBUSTIBLE SURFACES.** Where there is a combustible surface directly under stationary or fixed electrical equipment, the surface should be covered with a steel plate of at least .063" (1.6 mm) thick, which should extend not less than 5.9" (150 mm) beyond the equipment on all sides.

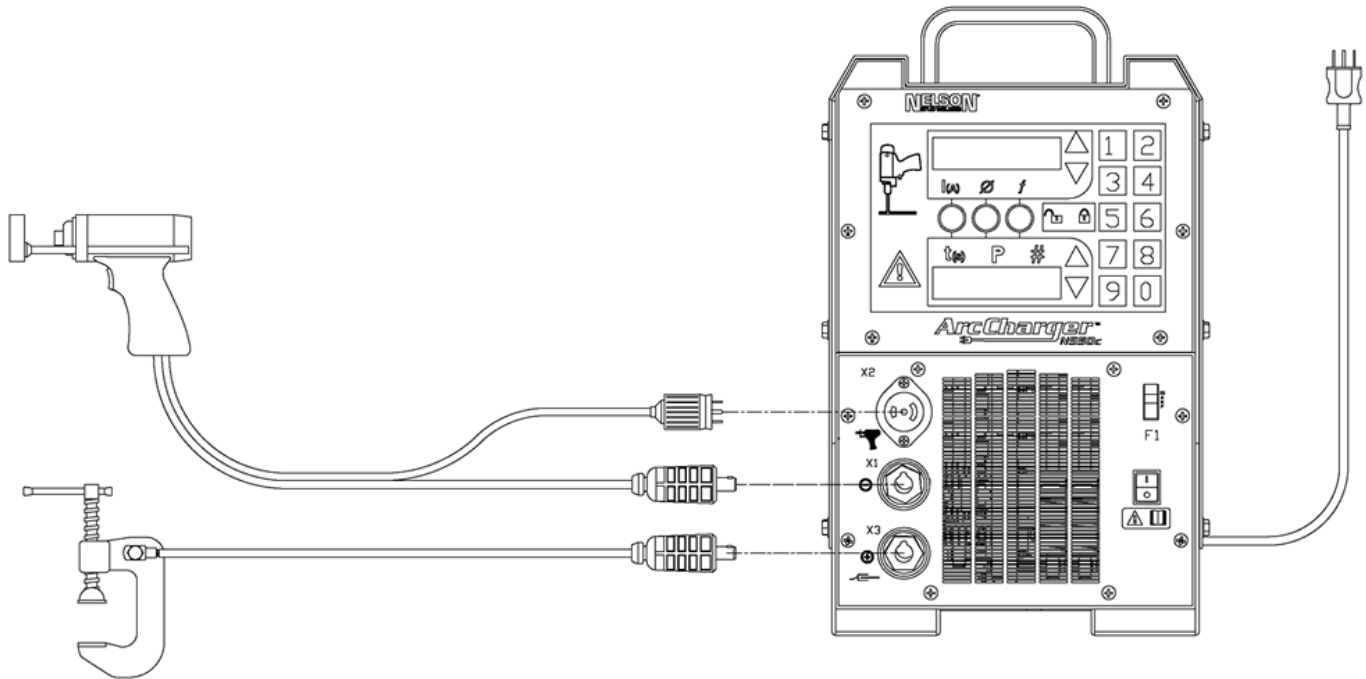


### **CAUTION**

**Incorrect connection may result in equipment damage.**

### 3 Connection & Installation

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#### 3.1 Installation Precautions

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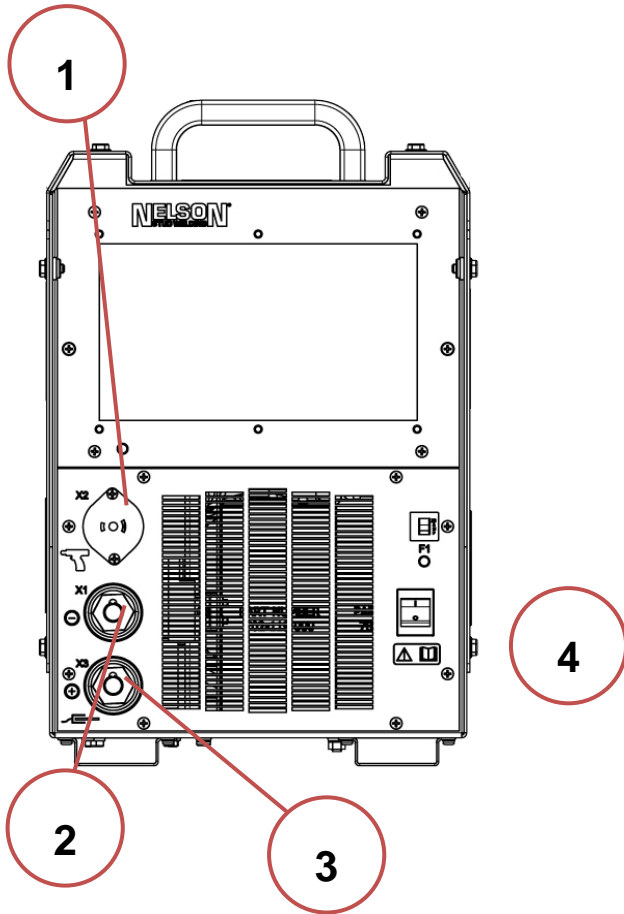
Attention must be paid when installing the welding unit; the surface should be horizontal, vibration-free and non-slip surface. The load-carrying capacity of the floor space should be at least double the weight of the unit. When working in high-lying locations, such as bridges, ladders or platforms, the Nelweld N550c Arc Charger must be secured against the risk of falling.

The Arc Charger must be adequately protected against the intrusion of liquids. It may not be installed on liquid-bearing pipelines.

In order to guarantee unimpeded temperature exchange with the environment, a minimum clearance of 39.4" (1 m) to existing heat sources must be observed.

Attention must be paid to the fact that the ventilation slits on the unit casing are kept free.

## 3.2 Connection



1	X2	Connection of Gun Control Cable to the unit
2	X1	Connection of (-) Weld Cable to the unit
3	X3	Connection of (+) Weld Cable to the unit
4	Input Power	Connection of the Input Power Cable

Figure 3.2.1 N550c Connections



Prior to any connection work, the Nelweld N550c Arc Charger welding unit must be switched off. The input power switch of the unit must be in the >>0<< position



### 3.3 Input Power Connection

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#### **WARNING**

Before connecting ensure that the welder grounding conductor is connected to a proper safety (earth) ground.

Before the Nelweld N550c welding unit is connected to the supply voltage, the following criteria must be observed: *Only tested input power socket outlets with a tested protective conductor function may be used.*

Once these criteria have been met, the switched-off welding unit can be connected to the supply voltage with due regard to the safety advice.

#### **GFCI CONCERNS**

GFCI devices are not recommended to be used with the power unit. If using a GFCI is necessary, note that there are inconsistencies between models and manufacturers. These inconsistencies may cause nuisance tripping in some cases. See F Code list to adjust charging characteristics, which may improve the performance on GFCI protected circuits.

#### **DEDICATED CIRCUIT REQUIREMENTS**

This power unit requires a dedicated 115V/20A circuit that powers nothing but the welding power source. Any current draw from other devices on the same circuit may result in a current overload and cause circuit breakers to trip.


#### **INPUT POWER REQUIREMENTS**

The Nelweld N550c may only be operated with an input power voltage as defined by the rating plate on the back of the unit. See rating plates on the following page.

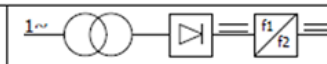


#### **WARNING**

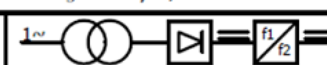
Arc Charger models may exhibit permanent failure or abnormal operation when used in the vicinity of high frequency interference. TIG processes and similar high frequency processes tend to interfere with and damage NCD+ circuit boards, particularly when sharing the same work piece. For more information please consult your local Nelson service support.

<b>NELSON</b> <small>STUD WELDING</small>	Nelson Stud Welding, Inc 7900 West Ridge Rd. Elyria, OH 44035 USA	Part Nr. 750-615-300																															
		Serial Nr.																															
Type: N550c																																	
<b>OUTPUT</b>		<b>INPUT - SINGLE PHASE 60 HZ</b>																															
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I EFF	16																																
kVA EFF	1.84																																
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Arc Charger Rating Plate

<b>NELSON</b> <small>STUD WELDING</small>	Nelson Stud Welding, Inc 7900 West Ridge Rd. Elyria, OH 44035 USA	Part Nr. 750-615-301																															
		Serial Nr.																															
Type: N550c																																	
<b>OUTPUT</b>		<b>INPUT - SINGLE PHASE 60 HZ</b>																															
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DUTY	AMPS	VOLTS																															
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Arc Charger Export Rating Plate

<b>NELSON</b> <small>STUD WELDING</small>	Nelson Stud Welding, Inc 7900 West Ridge Rd. Elyria, OH 44035 USA	Part Nr. 750-615-302																															
		Serial Nr.																															
Type: N550c																																	
<b>OUTPUT</b>		<b>INPUT - SINGLE PHASE 60 HZ</b>																															
<table border="1" style="width:100%; border-collapse: collapse;"><thead><tr><th>DUTY</th><th>AMPS</th><th>VOLTS</th></tr></thead><tbody><tr><td>1%</td><td>1500</td><td>40</td></tr><tr><td>1.5%</td><td>1200</td><td>40</td></tr><tr><td>1.8%</td><td>1050</td><td>40</td></tr><tr><td>2%</td><td>800</td><td>40</td></tr></tbody></table>	DUTY	AMPS	VOLTS	1%	1500	40	1.5%	1200	40	1.8%	1050	40	2%	800	40	<table border="1" style="width:100%; border-collapse: collapse;"><thead><tr><th>INPUT VOLTS</th><th></th></tr></thead><tbody><tr><td>115</td><td></td></tr><tr><td>FUSE</td><td>20</td></tr><tr><td>IMAX</td><td>25</td></tr><tr><td>kVA MAX</td><td>2.9</td></tr><tr><td>I EFF</td><td>16</td></tr><tr><td>kVA EFF</td><td>1.84</td></tr></tbody></table>	INPUT VOLTS		115		FUSE	20	IMAX	25	kVA MAX	2.9	I EFF	16	kVA EFF	1.84	<table border="1" style="width:100%; border-collapse: collapse;"><tr><td style="text-align: center; padding: 5px;">IP=23S</td></tr></table>		IP=23S
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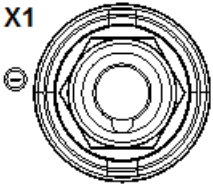
Arc Charger Short Cycle Rating Plate

### 3.3.1 Connection of Welding Cable

---

The Gun Welding Cable plugs into the Gun Welding Cable socket of the Arc Charger.

Note that the procedural safe operation of the system can only be guaranteed when the NS-40 and light duty guns are connected.



#### **GUN WELDING CABLE CONNECTION (X1)**

Align and insert the locking pin of the Gun Welding Cable plug into the locking groove of the Gun Welding Cable socket.

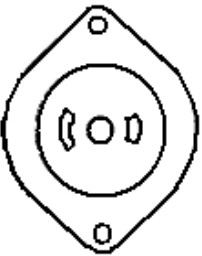
Turn to the Gun Welding Cable plug 1/3 of a turn to the right clockwise to secure the connection.



Connect Gun Welding Cable to X1 for straight polarity and to X3 for reverse polarity.

### 3.3.2 Connection of Gun Control Cable

---



The Gun Control Cable socket permits the connection of the control cable to the Arc Charger unit. The signals to control the gun are transmitted via the control cable.

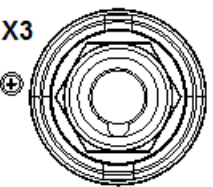
#### **Gun Control Cable Connection (X2)**

Silver Pin: White Wire – Broad Pin

Brass Pin: Black Wire – Narrow Pin

### 3.3.3 Dual Connection of Work piece Ground Cable

---



The welding current return takes place via the Work piece Ground Cable, which must be connected as follows to one of the Work piece Ground Cable sockets on the front panel of the Arc Charger.

#### **Work piece Ground Cable Dual Connection (X3)**

Connect the Work piece Ground Cable plug into one of the proper Arc Charger sockets. Turn the Work piece Ground Cable plug 1/3 to the right clockwise to secure the connection.



Place the 2 ground clamps on the opposite ends of the weld area to minimize arc blow.



**WARNING**

Prior to any connection work, the Arc Charger welding unit must be switched off and the input power switch must be in the >>0<< position.

### 3.3.4 Connection of Work piece

---

When connecting the work piece ground terminals, attention must be paid to the following:

1. The work piece ground terminals must be connected directly to the work piece or to the work piece fixture (welding bench, welding grid).
  - Steel constructions, tracks, pipelines, etc. may not be used as current conductors, unless they themselves are the work pieces to be welded.
2. The welding current circuit may not be earth grounded.

**EXCEPTION: The workpiece itself or the workpiece fixture are earth grounded compulsorily (pipelines, shipbuilding, etc.).**

3. Place the work piece ground terminals, if possible, at the same distance from the point of welding when 2 ground clamps are used.



## WARNING

Prior to connecting the earth ground terminals, the following advice on avoiding arc blowing must be observed.

### 3.4 Arc Blow Effect

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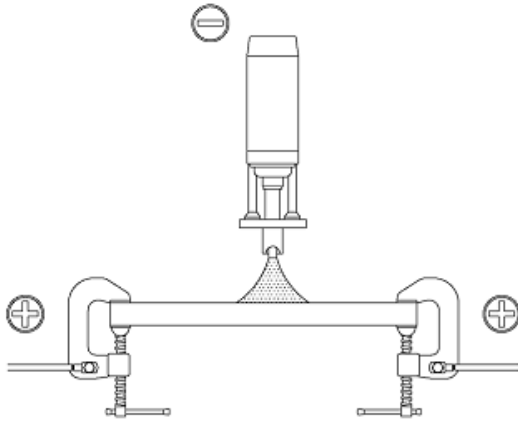
Blowing effect is the designation for the lateral deviation of the arc from a central position. Depending on the cause, a distinction is made between the following blowing effects.

- **Thermal blowing effect.** Deviation of the arc as a result of the expansion and turbulence of heated gases in the combustion area of the arc.
- **Magnetic blowing effect.** Deviation of the arc as a result of the influence of magnetic or electromagnetic fields.

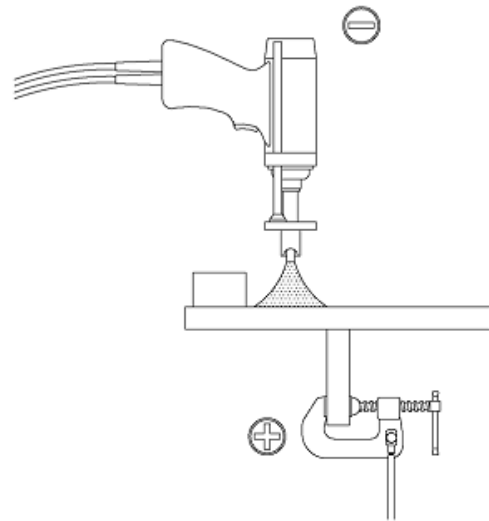
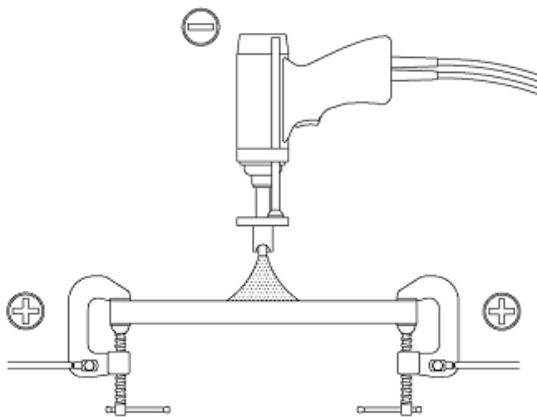
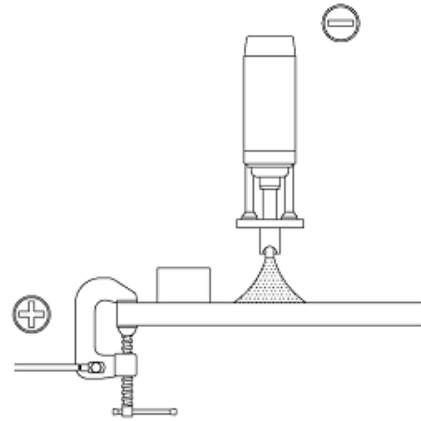
The possibilities of reducing the thermal blowing effect are limited. They are restricted to precise centering of the stud and chuck.

Several remedial measures are available to reduce the consequences of the magnetic blowing effect.

In order to favorably influence the arc, the earth ground terminals must be placed as symmetrically as possible to the point of welding.



In the event of a one-sided earth ground terminal the arc blows away from the terminal. The condition can be eliminated by additional metal plates.



Influences upon the arc as a result of welding cable itself can largely be avoided by turning the weld gun through 90°.

When welding sections, arc blowing can be reduced by repositioning the earth ground terminal and additional metal plates.

The polarity in the illustrations provided refers to ferromagnetic materials. When welding aluminum, reverse polarity is normally used.

### 3.5 Short-Cycle & Drawn Arc Welding Connection Diagram

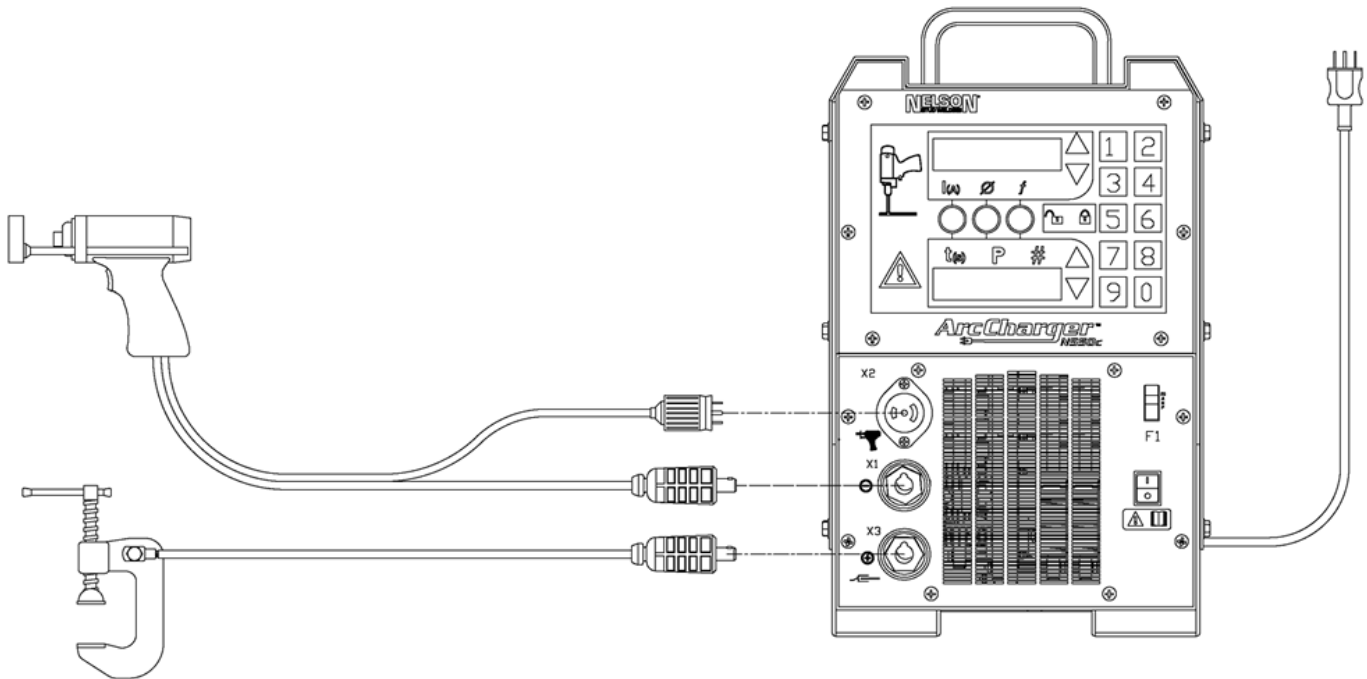
#### LOCATION

The power unit will operate in harsh environments. Regardless, it is important to follow simple preventative measures in order to assure long life and reliable operation.

The machine must be located where there is free circulation of clean air such that air movement in the back, out the sides and bottom will not be restricted.

Dirt and dust that can be drawn into the machine should be kept to a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance shutdown.

Keep the machine dry. Shelter it from rain and sun. Do not place on wet ground or in puddles.



#### CAUTION

**DO NOT MOUNT OVER COMBUSTIBLE SURFACES.** Where there is a combustible surface directly under stationary or fixed electrical equipment, the surface should be covered with a steel plate of at least .063" (1.6 mm) thick, which should extend not less than 5.9" (150 mm) beyond the equipment on all sides.

## **STACKING & TILTING**

This power unit cannot be stacked. Place the machine directly on a secure, level surface or on a recommended undercarriage. The machine may topple over if this procedure is not followed.

## **POWER CORD CONNECTION**

A power cord is provided and wired into the machine. Do not modify the power cord; unless necessary to apply plug needed for outlets in your area.

## **CHANGES TO THE INPUT & GROUNDING CONNECTIONS**

Only a qualified electrician should connect the N550c Arc Charger. Installation should be made in accordance with the appropriate National Electrical Code, all local codes and the information detailed below.

## **TROUBLESHOOTING WITH COVER OFF**

Unlike other welders, the N550c Arc Charger power unit has HIGH VOLTAGE present internally. Always measure the capacitor voltage prior to touching any live components. Ensure the capacitors have been discharged prior to working on the power unit.



**CAUTION**

**Incorrect connection may result in equipment damage.**

## 4 Control & Display Elements

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## 4.1 Front Panel Controls & Displays

1	<b>Time/Current Mode</b>	Enables Time/Current weld parameter selection (As opposed to Stud Expert mode)
2	<b>Stud Expert Mode</b>	Setup selection by stud diameter (As opposed to Time/Current mode)
3	<b>Function Mode</b>	Configuration Change or Troubleshooting
4	<b>Up/Down Arrow Keys</b>	Adjusts time or current
5	<b>Lock/Unlock Keys</b>	The unit has a lockout feature that prevents any changes from being made to the front panel settings. See F19.
6	<b>Preset Values</b>	Factory presets or storage of custom values
7	<b>On/Off Power Switch</b>	The main switch controls the input power to the machine. Upon powering up, the internal control software performs a series of diagnostic tests to ensure correct connection and operation of the power source.
8	<b>Weld Time/Stud Expert Display</b>	The TIME setting is displayed on the front panel LOWER display. It can be changed using the Up/Down arrow keys to the right of the current display in one (1) amp increments.
9	<b>Warning Alert</b>	This indicator turns ON when a fault condition occurs. Please refer to F1 in the troubleshooting section of this guide for fault condition descriptions and resolution.
10	<b>Weld Tool Icon</b>	Graphical representation of gun operation and welding process. See <i>diagram on the following page</i> .
11	<b>Weld Current/Stud Expert Display</b>	The CURRENT setting is displayed on the front panel UPPER display. It can be changed using the + and – arrow keys to the right of the current display in one (1) amp increments.

## Weld Tool Icon

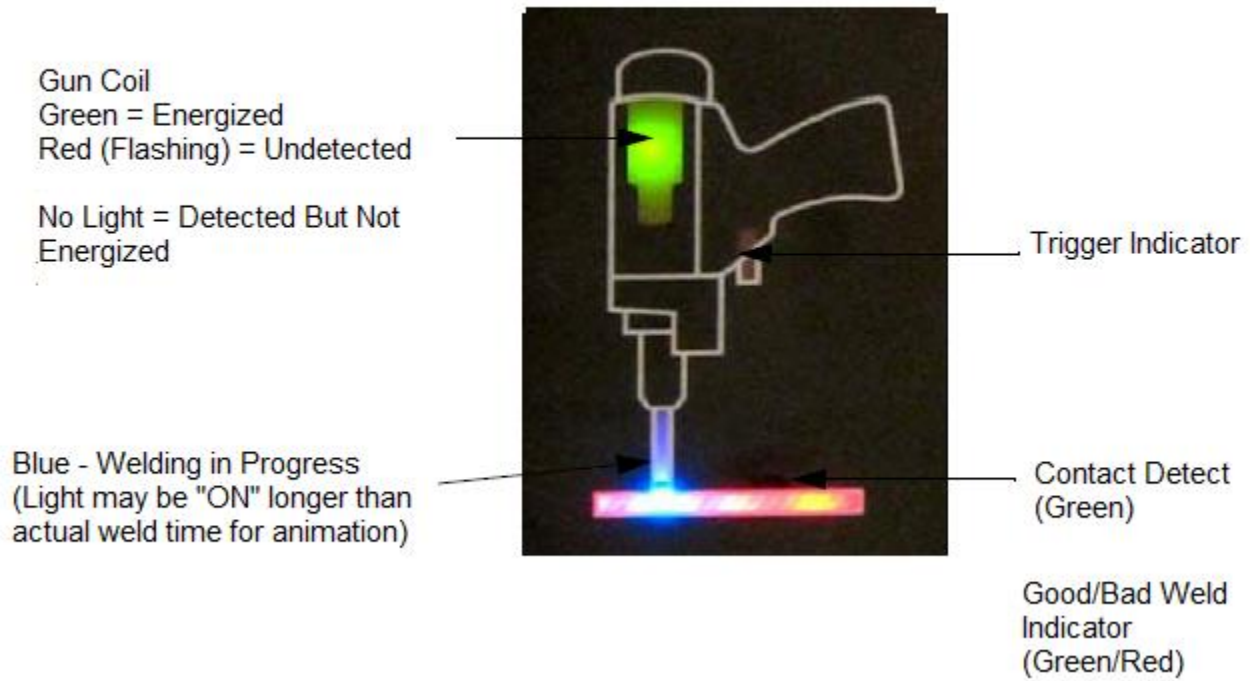


Figure 2 Weld Tool Icon

## 5 Operation

### 5.1 Advice on Stud Welding

---

The advice on stud welding contains information that will help in achieving good welds.

1. Welding elements and work pieces have to be suitable for welding. Only use material combinations, which are specified in the operating and service instructions.
2. The welding zone should be smooth and have a bright metallic finish.
3. Impurities in the welding zone such as rust, forging scales, layout die as well as moisture, and oils should be carefully removed prior to welding. Anodized work piece surfaces must be ground.
4. Work pieces made of aluminum or work pieces with aluminum coating may only be cleaned with a stainless wire brush or abrasive disc or pad.
5. Thin work pieces should be supported and be free from vibrations
6. Poor welding quality due to arc blow can be avoided by careful grounding techniques such as using multiple grounding clamps and symmetrically positioning the grounding clamps or magnetic masses.
7. Ensure that there is good current transfer (low-resistance) in all contact points in the welding circuit (welding cable connections – chuck – grounding clamps).
8. Always lay out the welding and earth ground cable without coils to avoid electromagnetic influences. Check the settings of the N550c welding unit and of the connected gun that you require for the welding task.
9. The position of the weld gun and the work piece may not be altered during the welding process.
10. Welding on one work piece with several welding units must be avoided (electrical danger as a result of higher no-load voltages and possible EMI interference). If welding on one work piece with several welding units cannot be avoided, it is not recommended to weld simultaneously.
11. Care should be taken when using a center punch mark for stud location. Deep punch marks can affect the action of the fluxing agent and working lift height. Center punch location should never be used with the Capacitive Discharge process.
12. Straight polarity (negative stud, positive work) should be used for most stud welding applications. See recommendations for specific applications for exceptions.

## 5.2 Basic Procedure

---

The process to begin welding using a Nelweld unit is very easy, once the proper electrical connections and gun connections are established:

- Turn the main power switch on the front of the unit to the **ON** position. Wait for the unit to complete its startup sequence.
- Set the desired current and time settings using one of the following 3 methods:

**Method 1:** Push **Time/Current Mode** button (**Item 1** in the Front Panel section), and up/down buttons (**Item 4**) to adjust time and current discretely.

**Method 2:** Push **Stud Expert (TM) Mode** button (**Item 2** in the Front Panel section), and up/down buttons (**Item 8**) to adjust stud diameter and the welder automatically sets the weld current and time using a database.

**Method 3:** Push 1 of the 10 preset buttons (**Item 6** in the Front Panel section) to choose one of the factory presets (see **Factory Preset Table** in the next section).

- Adjust other settings by accessing the proper function.
- Perform a lift check to verify proper gun lift.
- Perform test welds to verify the correct welding settings.
- Save any set points, if desired.
- After establishing proper setup, production welding may begin.
- Lock the unit, if desired.

## 5.3 Weld Parameters

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You can program the unit in 2 ways: (1) directly setting the current and time values; or (2) use the Stud Expert (tm) mode based on stud diameter.

### 5.3.1 Setting Current & Reading Current Display

---

The current setting controls the amperage during the weld, and is displayed in the upper display of the front panel. It can be adjusted (in 1 amp increments) using the up/down arrow keys to the right of the current display. As each of these keys re-input power pressed, the current setting will increase or decrease at a faster rate.

After each weld, the actual current and time will be displayed briefly before the set values are displayed again.

If the display shows an actual weld time of the sum of the front panel time and F2 (short circuit on-time), a cold plunge may have occurred which could result in an unsatisfactory weld quality. If this condition persists, it is recommended to set the F31 value, and check the physical condition of the gun for any causes of preventing a normal drop. If the actual weld time is less than the front panel time, it means the arc shorted early, indicating a potential improper gun lift setup.

In normal operating modes, the desired setting and the actual current will be the same. In this situation, the display does not change during or after a weld. However, in conditions where it is not possible for the power source to deliver the desired current, a warning light will light on the front panel display. This condition may occur when using high currents with small or excessively long weld cables.

### 5.3.2 Setting Time & Reading Time Display

---

The time setting is displayed on the front panel lower display. It can be adjusted in 1 millisecond (or 0.001 second) increments using the up/down arrow keys to the right of the time display. As each of these keys re-input power pressed, the time setting will increase or decrease at a faster rate. The time display is used to display both the desired time setting and the actual weld time.

In normal operating modes, the desired setting and the actual weld time will be the same. When this is the case, the display does not change during or after a weld. However, if an error condition occurs, the proper error code will be displayed on the front panel display. This will typically happen if a weld is aborted early.

### 5.3.3 Lift Distance & Plunge Distance Diameters

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- The mechanical parameters must be set on the NS40 Standard Duty or 650 Light Duty drawn arc guns.
- See the operating manual of the corresponding weld gun for the settings.
- See the gun operating instructions and diagrams below for the guide values for the welding method.

### 5.3.4 Calibrate Gun Drop Time F31

---

It is recommended to calibrate the gun so that the welder understands the gun drop time and delivers the precise main arc time programmed. The calibration is a good practice when you exchange the gun, especially when you change process between short cycle mode (max. main arc time is 100 ms) and drawn arc (min. main arc time is 100 ms), or change gun type or plunge dampener (shock absorber). Simply go to F31, and shoot a stud. The actual gun speed is measured and the actual drop time is saved in F31.

When you display F31 on the front panel and make a weld, F31 should automatically update with the actual drop time from the new weld. The newly updated F31 value should match with tD in F32. Another way is to simply read tD in F32 from the previous weld and to adjust F31 to match. This equation should come within a few milliseconds of the actual weld time: Front Panel Time - F31 setting before a weld = tM in F32 - tD in F32.

After calibration, tM in F32 should be fairly close to front panel time within a few milliseconds. If not, then something in your gun, fastener, or else in the process is not exactly repeatable.

### SPECIAL CASES

If the stud shorts out before the gun coil is de-energized, or, if the stud shorts after the weld current is switched off, the drop time (tD) cannot be measured.

In each case, F31 does not update. F32 (tD) shows each of these cases in the text display. If the stud shorts out before the gun coil is de-energized, adjust weld energy (lift, current, time) so that the stud does not short during the weld. If the stud shorts out after the weld current is switched off, increase F2 to give the machine a chance to measure drop time (tD).



**Exit the F31 screen for production welding. Otherwise, F31 may continuously be changing after each weld resulting in inconsistent settings in production.**

**If you accidentally recall a preset, F31 value can be changed to the value associated with the preset. Check F31.**

### 5.3.5 Weld Parameter Presets

---

The power source has 10 available preset configurations. Each of these is assigned a time and current setting for commonly welded stud sizes. To select a preset, simply press one of the keys: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0. When a preset is selected, the time and current are displayed on the front panel, and the LED on the selected preset key lights.

Nelweld users are not restricted to pre-programmed presets, but may save more usable weld settings. To do so, first select the desired time and current settings using the corresponding up/down arrow key. Continue by pressing and holding the desired preset key for 4 seconds. The preset values will be replaced by the desired custom values. When the orange LED of the preset button being pressed turns on, the selected preset has been successfully programmed.

### 5.3.6 Recommended Weld Parameters

---

The values specified in the tables and diagrams must be seen merely as guide values, which were achieved under optimized welding conditions.

The best possible weld parameters must always be determined with proper attention to factors such as the material and surface quality of the workpiece, plate thickness, welding position, stud type, stud dimensions, etc. in trial welds.

Attention must be paid conducting the trial welds under conditions equivalent to the real conditions used for production.

In obtaining the best welding result, the electrical and mechanical weld parameters must be precisely adjusted for the desired welding task.

Upon faulty welds, the settings on the welding unit and the weld gun must be optimized.

**i** The weld parameters in the tables and in Stud Expert™ are provided as is, without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular application. Performance suitability for any specific application should be determined by the user. The user assumes all liability of the use or the results of the use of the recommended weld parameters.

Nelson cannot assume any responsibility for updating or correcting the welding advice or guide values once they have been given, nor does the provision of information create, expand or alter any warranty with respect to the sale of our products.

### 5.3.7 Weld Parameters and Settings



Weld parameters and settings below are developed using Nelson equipment and Nelson studs. It is recommended to use fasteners from one manufacturer (Nelson studs) to ensure weld consistency and compatibility.

#### FACTORY PRESET WELD SETTINGS (DRAWN ARC)

Preset	Stud Size Ø	Current (Amps)	Time (s)
1	3 mm	200	0.150
2	4 mm	280	0.200
3	3/16"	300	0.150
4	5 mm	350	0.230
5	6 mm	410	0.250
6	1/4"	450	0.170
7	7 mm	470	0.300
8	5/16"	500	0.250
9	8 mm	550	0.300
0	3/8"	550	0.320

### 5.3.8 Parameters for Drawn Arc Procedure

\*Assuming a 20 ms short circuit on-time of 20 ms.

Stud Weld Rate				
Parameters listed are those used testing and should be used only when considering operating duty cycle.				
Stud Size Ø		Time (s)	Current (Amps)	Weld Rate (Studs Per Minute)
in	mm			
3/16"	5 mm	0.150	300	15
1/4"	6 mm	0.170	450	12
5/16"	8 mm	0.250	500	8
3/8"	10 mm	0.330	550	6

### 5.3.9 Stud Expert™

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The following Stud Expert weld table is programmed into the power source controls. It allows for automatic weld settings based on stud diameter.

Stud	Current (Amps)	Time (s)
3 mm Pitch Base	200	0.100
3 mm Full Base	220	0.100
3 mm IS-Bolzen	200	0.150
3 mm SC-Bolzen M3	400	0.015
3/16" Pulse	160	0.200
3/16" Pitch Base	280	0.140
3/16" Full Base	310	0.150
4 mm Pitch Base	240	0.120
4 mm Full Base	270	0.130
4 mm IS-Bolzen	280	0.200
4 mm SC-Bolzen M4	500	0.015
5 mm Pitch Base	290	0.140
5 mm Full Base	320	0.160
5 mm IS-Bolzen	350	0.230
6 mm Pitch Base	340	0.170
6 mm Full Base	370	0.190
6 mm SD6,MR M8,S6	410	0.250
1/4" Pitch Base	360	0.180
1/4" Full Base	400	0.210
1/4" Pulse	200	0.300
7 mm Pitch Base	390	0.200
7 mm Full Base	430	0.230
7 mm MP(F) M8	470	0.300
5/16" Pitch Base	440	0.230
5/16" Full Base	490	0.260
5/16" Pulse	250	0.400



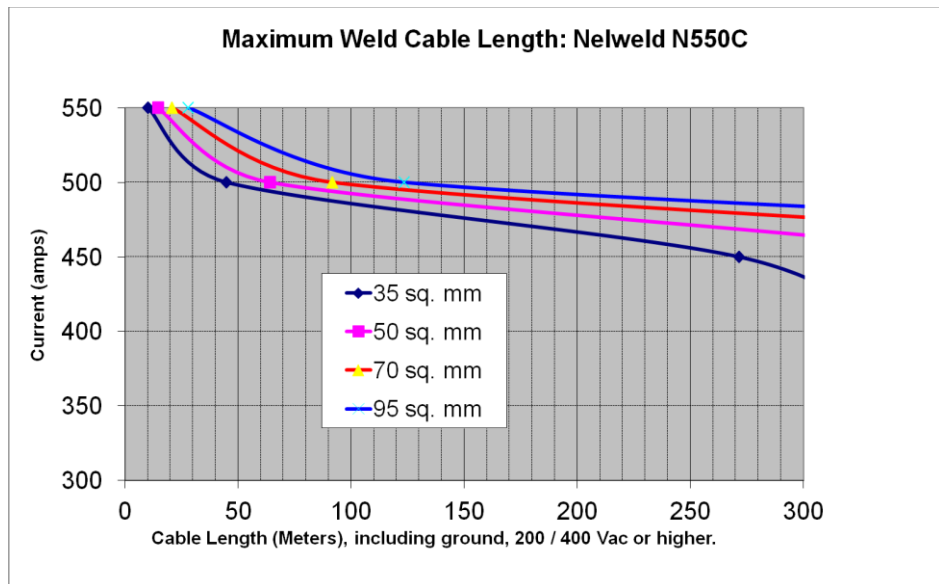
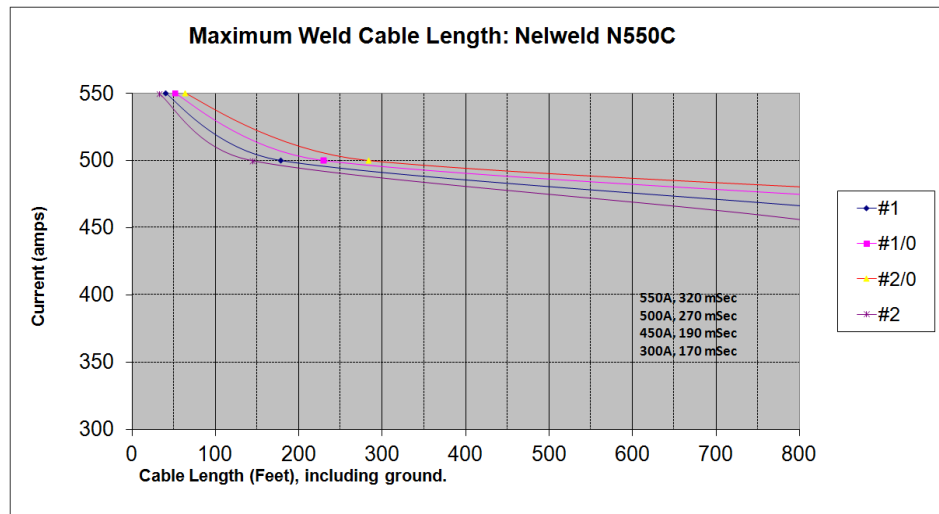
8 mm Pitch Base	440	0.230
8 mm Full Base	500	0.270
8 mm MR M10,S8	550	0.300

## 5.4 Rating Charts

### 5.4.1 Maximum Weld Cable Length

Check with Nelson representative for a Weld Cable Length calculator.

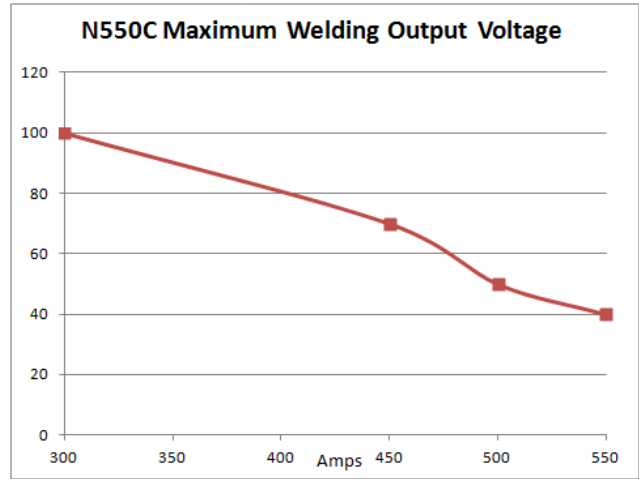
**NOTE:** Cable lengths described in the chart (Figure 6) assume weld times shown in the chart text. Longer weld times may not be possible holding all other variables constant due to the fixed energy available in the power unit capacitors.



## 5.4.2 Maximum Welding Output Voltage

Check with Nelson representative for a Weld Cable Length calculator.

Nelweld N550c Rated Output Voltage (Figure 7) is 40V.



## 5.4.3 Supply Cable Lengths

Based on 3% drop and maximum 7% below nominal at mains connection during weld.

The same guideline applies to power drops from the mains high current breaker box or fuse box to disconnect boxes and/ plug in for machine connection.

115 VAC Domestic	
Up to X feet	AWG Cable, copper
35	12
60	10

230 VAC Export		
Up to X feet	AWG Cable, copper	mm <sup>2</sup> , copper
35	14	2
60	12	3.5

## 5.5 N550c Weld Cycle Timing

The Arc Charger series controls the main current and the weld gun using a combination of settings. For short cycle welding, the gun drop time and plunge time are critical components in the weld timing, so they must be configured, understood, and used correctly to get the optimum results.

Here are the relevant settings for welding on the N550c:

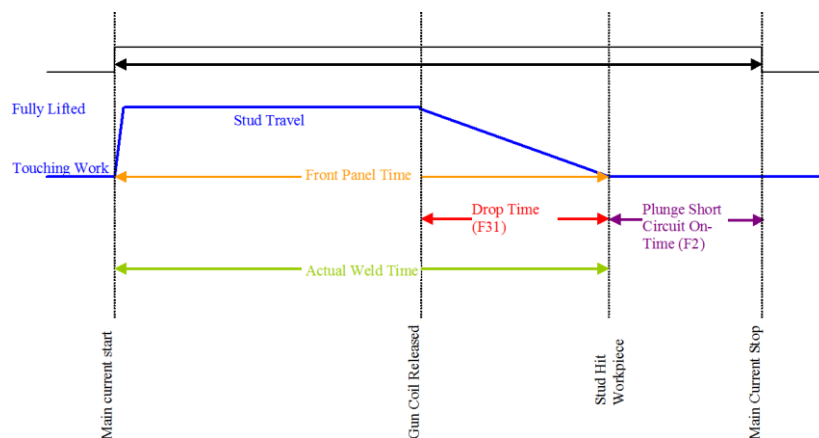
**F31 – Drop time.** Use this function to measure \ configure the drop time of the gun. While viewing this function (that is, with F31 on the display), attempt a weld. The gun will lift and drop, but no weld current will pass. The gun's drop time is measured, stored, displayed, and used in weld timing as will be described later in this document.

**F2 – Plunge short circuit on-time.** This is the time that the weld current re-input power on after the stud is scheduled to have made contact with the workpiece.

**Front Panel Time.** This is the (weld) time set on the front panel.

Here are some other definitions:

**Main current time = Front panel time + Plunge short circuit on-time (F2).** The main current time is the total time that weld current is delivered. See below. Under normal conditions, critical times and events throughout the main current time can be described in the following weld profile.



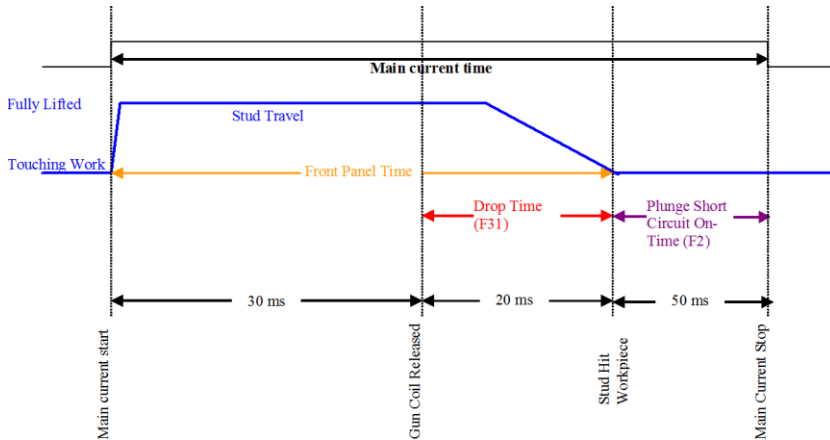
**The Actual Weld Time is the time from the start of the main current to the time that the stud hits the workpiece.** Under normal conditions, it will be equivalent to the Front Panel Time. This time measurement is reported after the weld is complete.

For example:

Front Panel Time = 50 ms

Drop Time (F31) = 20 ms

Plunge short circuit on-time (F2) = 100 ms



**The resulting Actual Weld Time is 50 ms.** The main current would be on for the Front Panel Time + Plunge short circuit on-time (F2) = 50 ms + 50 ms = 100 ms, but the arc would exist only during the Actual Weld Time, or 50 ms.

The important thing to note is that normally, the stud begins to drop at Front Panel Time Drop Time. But if the Drop Time exceeds the Front Panel Time, the stud would need to begin to drop prior to the start of the weld in order to make the Actual Weld Time to be the same as the Front Panel Time. This is done by releasing the gun coil during the pilot arc stage.

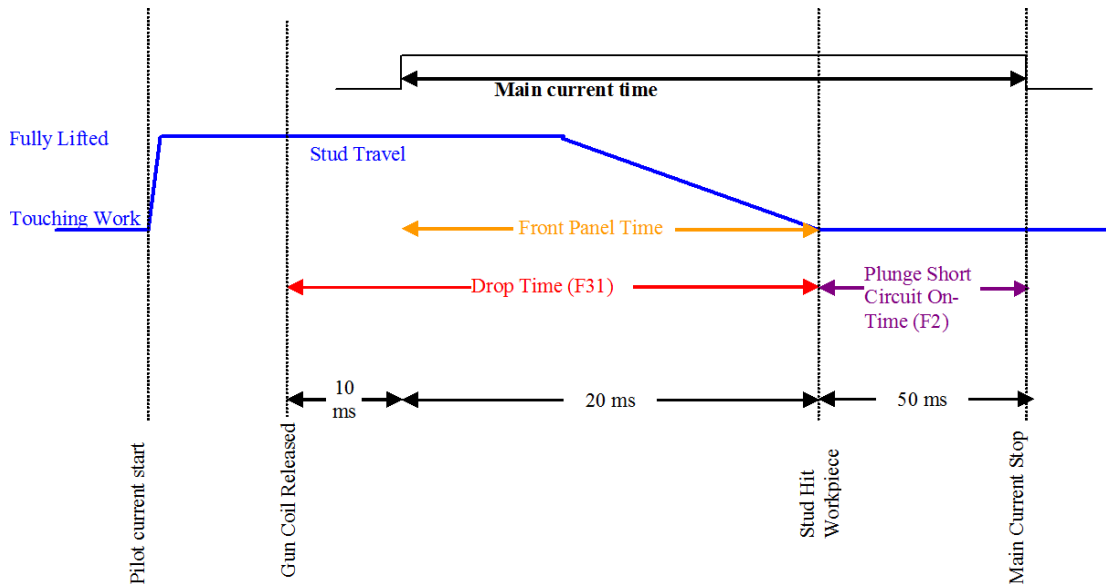
For example:

Front Panel Time = 20 ms

Drop Time (F31) = 30 ms

Plunge short circuit on-time (F2) = 100 ms

Since  $[20 \text{ ms} - 30 \text{ ms}] < 0$ , the the gun coil is released prior to starting the main current.



The resulting Actual Weld Time is 20 ms.

The stud would still take 30 ms to drop, but the main current and main arc would only be 20 ms.

## 5.6 Drop Time Variables

Several different conditions affect drop time. The drop time duration will vary under the conditions outlined below.

### Power Source Gun Control and Trigger Switch Circuit

The rate in which the gun coil energy is removed plays a large part in how fast the stud will drop. If the coil **only** has an anti-parallel diode (in either the gun itself or inside the power source), it will drop much later than a configuration with a diode/resistor since the energy is dissipated in the resistor after the coil is de-energized.

### PLUNGE DAMPENERS

Tranquil arc dampeners will slow the rate of stud travel speed (in the downward direction). Dampeners can adjust this rate for up to a few hundred milliseconds of travel time. Plunge dampeners should not be used with the Short-Cycle process.

### TEMPERATURE

As temperatures rise, dampeners have less of an impact. They allow the stud to fall nearly 65% faster at 90°F (32°C) than at 0°F (-18°C).

### MOLTEN STUD SHAPE

As the stud melts during the weld, it has the potential to change shape. It may elongate or even drip. The molten shape of the stud will vary as the weld heat varies. These factors can change the timing of the weld short circuit.

## TROUBLESHOOTING INCONSISTENT DROP TIMES

1. **Eliminate excessive lift.** Too much lift increases the possibility of stud hang up.
2. **Be sure the weld energy is appropriate for the application.**
3. **Inspect foot alignment.** Adjust if necessary. A misaligned foot will almost guarantee stud hang-up. Ensure that the stud is centered within the ferrule.
4. **Inspect chuck.** Replace if necessary. Check for a good grip of the stud in the chuck. A good grip is needed to eliminate slipping of the stud.
5. **Tighten foot-retaining screws.** These screws hold the foot in place during a weld while pressure is placed on the foot. Slippage of the foot will lead to a faster drop time.
6. **Inspect and clean gun housing and related parts.** Replace parts as needed. Debris in the housing will resist travel.

## 5.7 Inspection and Testing of the Weld

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To assure the quality of stud welds, the following testing must be carried out before, during and after production:

- standard work testing
- simplified work testing
- continuous production monitoring

### STANDARD WORK TESTING

For welding according to the drawn-arc and short-cycle method ten studs must be welded and the following tests carried out on them:

- Visual inspection (all studs<sup>1</sup>)
- Bending test (5 studs)
- Macro section (2 studs)

The test results must be documented and attached to the quality documentation.

### SIMPLIFIED WORK TESTING

In order to check the setting and functionality of the unit three studs must be welded prior to beginning the shift and the following tests are to be carried out on them:

- Visual inspection (all studs)
- Bending test (all studs)

The test results must be documented and attached to the quality documentation.

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<sup>1</sup>See the following pages for information on visual inspection

## Continuous production monitoring

In continuous production monitoring, visual inspection of all welded studs is typically sufficient. On suspicion of a faulty weld, a bending test or a tension test must be carried out.

If the requirements are not met, a bending or tension test must be carried out on the 2 previous welds and on the 3 subsequent welds. The test results must be recorded in the production log.



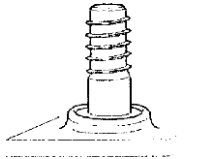
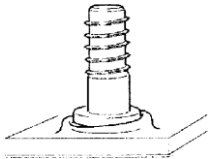
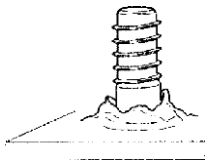
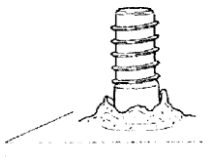
## WARNING

It must be noted that the welding work may only be continued when the test results are satisfactory.

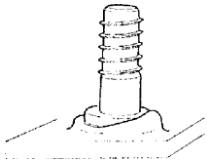
### 5.7.1 Short Cycle Method - Visual Inspection

Inspection and testing of the weld is restricted in this manual to the visual inspection of welds. A description of the mechanical and technological tests involved would go beyond the scope of the manual.

+ See EN ISO 14555<sup>2</sup> for detailed information in this regard.

<p><b>Perfect weld.</b> Even bead, no perceptible errors.</p>	<p><b>Corrective measures:</b> Not necessary. No alteration to the electrical and mechanical parameters.</p>	
<p><b>Faulty weld #1.</b> Cross section not fully welded.</p>	<p><b>Corrective measures:</b> Increase weld current and/or time, possibly change polarity.</p>	
<p><b>Faulty weld #2.</b> Large, uneven bead.</p>	<p><b>Corrective measures:</b> Reduce weld time.</p>	
<p><b>Faulty weld #3.</b> Pores in bead.</p>	<p><b>Corrective measures:</b> Reduce weld time or increase weld current, weld in shielding gas.</p>	

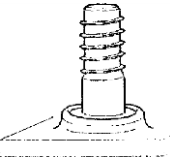
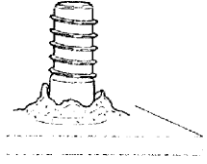
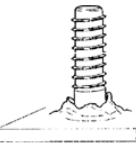
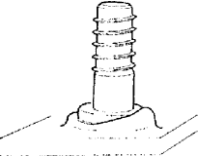
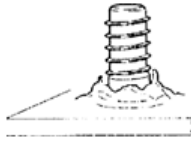
<sup>2</sup>EN ISO 14555: Welding Arc stud welding of metallic materials (2006)

<b>Faulty weld #4.</b> Bead single-sided.	<b>Corrective measures:</b> Eliminate blowing effect by applying compensation earth ground or correcting earth ground terminals.	
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## 5.7.2 Drawn Arc Method – Visual Inspection

Inspection and testing of the weld is restricted in this manual to the visual inspection of welds. A description of the mechanical and technological tests would go beyond the scope of the manual.

+ See EN ISO 14555<sup>3</sup> for detailed information in this regard.

<b>Perfect weld.</b> Bead is even, glossy and closed. Stud length after welding within tolerance.	<b>Corrective measures:</b> Not necessary. No alteration to the electrical and mechanical parameters.	
<b>Faulty weld #1.</b> Constriction of the weld, stud too long.	<b>Corrective measures:</b> Increase plunge distance; check lift; check centering of the ceramic ferrule. Decrease weld current and/or weld time.	
<b>Faulty weld #2.</b> Feebly formed, uneven bead with a dull surface. Stud too long.	<b>Corrective measures:</b> Increase weld time and current. Possibly dry ceramic ferrules in oven.	
<b>Faulty weld #3.</b> Bead single-sided, undercutting.	<b>Corrective measures:</b> Eliminate blowing effect, check centering.	
<b>Faulty weld #4.</b> Bead low, surface glossy with intense spattering. Stud too short.	<b>Corrective measures:</b> Decrease weld time and current; adjust plunge distance and/or damping.	

<sup>3</sup>EN ISO 14555: Welding Arc stud welding of metallic materials (2006)



## 5.8 Weld Process Monitor

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The power source has a built-in weld quality monitor to identify suspect welds, also known as Not In Order (NIO) welds. This function works without the use of a computer. It monitors actual weld process signals. When programmed, it will compare weld process parameters to target values and report unsatisfactory welds when the actual signals deviate from the target values. The actual welding current and voltage are recorded at 1 A and 1 ms resolution, and the arc energy and gun drop time are calculated for each weld.

### 5.8.1 Actual Weld Process Signals

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Actual process signals are recorded and displayed after each weld, shown in F32, weld results. Use the up / down button to scroll through current, voltage, main current time, energy, drop time, pilot time and pass/fail indicator. F32 is refreshed after each weld, and no weld history is recorded. To save actual signals for all welds in production permanently as record keeping, contact Nelson for Nelware PC software.

### 5.8.2 Setup Good Weld Target

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To save target without preset association (i.e. for welding without any preset), exit any presets by manually changing the time and/or current if necessary, so that no preset buttons are backlit. Make a good weld, go to F32, press and hold the "Lock" key until the display says the target is saved.

A target can be created for each preset. Choose a preset, make a good weld, and go to F32. While viewing F32, press and hold the "Lock" key until the display says the target is saved for the backlit preset.

To clear a target stored in a preset, exit F mode by selecting I\T mode, then press both the Lock button and the desired preset button simultaneously.

To clear a target that doesn't have a preset association, exit any preset by manually changing the time\current, exit F mode by selecting I\T mode, then press both the Lock button and the Time-down arrow simultaneously.

## 5.9 Understanding Lock Modes

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The Lock Mode configuration (F19) determines how the unit responds to the LOCK key when in the Time\Current mode or Stud Expert mode. It lets the user configure the level of security as required for the circumstances.

### LOCK MODE 1

This is the minimal security mode, whereby the user may lock or unlock the panel by simply pressing the LOCK key in the Time\Current mode or Stud Expert mode. This is the default mode and is intended to prevent accidental weld setting changes due to inadvertent key presses (i.e. leaning on object or hand on the panel).

**No PASSWORDS** are used in this mode.

## 6 Operational Function Codes & Error Codes

### 6.1 Function Codes

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#### FIRMWARE VERSION 1.02

F Code	Description	Possible Values	Default	Unit	Notes
F0	Language	ENGLISH	ENGLISH	x	
F1	Error Display	E--- to E021	E---	x	
F2	Plunge Short Circuit On-Time	0 to 100	20	ms	
F7	Calibration Values	0 to 200	100	Clock Cycles	Used by manufacturing; Do not change.
F8	Chuck Saver	OFF ON	ON	X	
F9*	Gas Enable	OFF ON	OFF	X	
F10*	Gas Preflow Time	10 to 2000	500	ms	
F11*	Gas Postflow Time	10 to 2000	500	ms	
F12*	Stud Feed Enable	OFF ON	OFF	X	
F13*	Stud Feed Time	10 to 2000	50	ms	Pulse width of stud feed signal. This only applies when Stud Feed is enabled.
F14*	Stud Feed Normal Level	NORMAL CLOSED, NORMAL OPEN	NORMAL OPEN	X	This only applies when Stud Feed is enabled.
F15*	Stud Feed Style	AFTER CONTACT BREAK, AFTER WELD	AFTER CONTACT BREAK	X	When to get the signal. This only applies when Stud Feed is enabled.
F16*	Stud Feed on Air Trigger	OFF ON	OFF	X	To feed a stud even when triggering the gun while not welding. This only applies when Stud Feed is enabled.
F17	Loadbank Enable	OFF	OFF	x	For manufacturing. This is a read-only function used for burn-in testing.
F19	Lock Mode	1 to 1	1	x	Mode 1: Use lock key to toggle blocking on all keys - no password protection.

F Code	Description	Possible Values	Default	Unit	Notes
F21	User Counter	0 to 4.3G	0	Welds	While in this F code, press and hold the time-down button to reset the counter
F22	Total Counter	0 to 4.3G	0	Welds	(Non-resettable)
F25	Software Versions		1.03	x	Includes hardware version of control board in brackets
F26	Restore Factory Defaults	HOLD TIME DOWN BUTTON	HOLD TIME DOWN BUTTON	x	While in this F code, press and hold the time-down button to reset all F codes to default.
F31	Drop Time	0 to 100	20	ms	This is a drop time measurement function.
F32	Weld Results	I= Current (Amps) V= Voltage (Volts) tM=Main current time (ms) E= Energy (Joules) tD=Drop Time (ms) tP=Pilot Time (ms)	NA	x	This F code gives information about the last weld.
F45	Calibration Offset Value	0 to 200	100	X	Used by manufacturing. Do not change.
F46	Plunge Current Enable	OFF ON	OFF	X	When enabled, the current will change to the selected value while the stud is plunging.
F47	Plunge Current	100 to 550, or higher for Short Cycle Model	500	Amps	When Plunge Current (F46) is enabled, this current will be used during the plunge state. MAX_CURRENT will depend on the power unit model.
F49	Pulse Weld Enable	OFF ON	OFF	X	Enable this to use pulse welding, where the main current pulses to a high and low current setting at variable time settings per F codes F50-F52.
F50	Pulse Weld High Current	100 to 800	800	Amps	This is the current used for as the lower of the two currents during the weld. (The front panel current setting will be the high current).

<b>F51</b>	Pulse Weld High Time	5 to 5	5	ms	This is the time the weld will deliver the front panel current (F50 current).
<b>F52</b>	Pulse Weld Low Time	20 to 25	25	ms	This is the time the weld will deliver the low current.
<b>F67</b>	Charge Intensity	10 to 100	90	%	<p>Controls charge current. Use this F code to reduce charge current for compatibility with GFCI devices.</p> <p><b>NOTE: Reducing this value increases the time it takes to recharge between welds.</b></p> <p>ESA Mode: Fixed at 75% International Mode: Max 90%</p>

\* These F Codes will only appear and apply to short cycle power units.

## 6.2 Diagnostic Error Codes

\* Fatal, meaning you have to power down to continue welding

\*\* Acknowledge, meaning the error will exist as long as the unit is powered on. (Note, welding can continue while the error exists)

Error Display	Description	Fatal*	Welding Can Continue**
<b>E - - -: No Errors</b>	No errors.	NA	NA
<b>E001 Shorted Control Cable – Fix Control Cable and/or Gun</b>	The gun drive circuit sensed a current spike of 10A or greater for at least 10us. When this condition is sensed, the gun drive turns off and the user interface displays this error. The gun may be retriggered and the unit does not need to be powered down.	No	No
<b>Problems (Most Likely to Least Likely)</b>			
<ul style="list-style-type: none"> <li>• A cable short in the combo cable external to the unit.</li> <li>• A wiring or switch short in the gun.</li> <li>• Internal wiring from the control to the output board, output board to the front panel gun connector. Reconfigure wiring as needed.</li> <li>• Failure of the control board. Replace control board.</li> </ul>			
<b>E004 Regulation Error – Arc Went Out</b>	If the control board senses that the current was more than 50% low while the control to the power system was at the maximum for 15ms, it will abort the weld and display this error. This will happen if the current sensing failing for any reason (wiring, power supply, etc). This exists as a safety mechanism in case current sensing fails. This is most likely caused by the arc actually popping out.	No	No
<b>Problems (Most Likely to Least Likely)</b>			
<ul style="list-style-type: none"> <li>• Arc actually popped out. Check gun lift and try again. If it's consistent, it is an internal failure.</li> <li>• Pilot arc board failure. Sometimes will also indicate contact with workpiece incorrectly. Replace pilot arc board.</li> <li>• Damaged/broken connection from the current sensor to JP5 of control board.</li> <li>• Pilot arc circuit. Look for evidence of pilot arc. If there is no pilot arc mark on the work material, replace the pilot arc board.</li> <li>• Check main relay pulled in during start up process. When the main relay is closed, there should be 0V between the two power terminals of the input board. If the voltage is higher, the input board main relay in not energized. Replace the input board.</li> <li>• Low cable inductance. Increase cable inductance, using a longer ground cable (#1AWG, 25 (#722-000-124) or 2/O AWG, 25 (#722-000-151) combo cables), to eliminate faulty welds.</li> </ul>			

<b>E005 Regulation Error – Short Circuit</b>	If the control board senses that the current was 150% or higher of the setting while the control to the power system was at the minimum for 15ms, it will abort the weld and display this error. This will happen if the current sensing failing for any reason (wiring, power supply, etc). This exists as a safety mechanism in case current sensing fails.	No	No
<b>Problems (Most Likely to Least Likely)</b>			
<ul style="list-style-type: none"> <li>• Damaged connection from current sensor.</li> <li>• Missing voltage supplies at current sensor.</li> </ul>			
<b>E009 Could Not Establish Pilot Arc</b>	At the beginning of the weld, the pilot arc supply is turned on and the gun is energized. The gun has 20ms to lift (usually lifts in 3ms) and to draw a pilot arc. If no stud voltage is sensed after 20ms, it is assumed that the gun didn't lift and the control throws this error. Note - If the gun lifts and no arc exists, it will try to turn the main current on (and will end up with an E004 because no arc exists).	No	No
<b>Problems (Most Likely to Least Likely)</b>			
<ul style="list-style-type: none"> <li>• Shorted gun control cable.</li> <li>• Mechanical binding of the gun.</li> <li>• Pilot arc board failure. Sometimes will also indicate contact with workpiece incorrectly. Replace pilot arc board.</li> <li>• Workpiece not directly clamped to output of unit.</li> <li>• Pilot arc circuit. Look for evidence of pilot arc. If there is no pilot arc mark on the work material, replace the pilot arc board.</li> <li>• Lift height too high or plunge depth (stick-out) is too much. Perform a lift test by pressing the gun against an insulated surface. Air lift test will not fully test the lift capability of the welder gun coil circuit.</li> <li>• Workpiece vibration sniffing out pilot arc.</li> </ul>			
<b>E011 Unit Too Hot – Please Wait</b>	When the internal temperature sensor trips, the control board disables welding so as not to allow damage to the unit. This error is displayed while the unit is in the overtemperature condition and disappears when it is ready for more welding.	No	No
<b>Problems (Most Likely to Least Likely)</b>			
<ul style="list-style-type: none"> <li>• Fan is not functional or is blocked. Check that fan can physically turn and the wiring to the fan. Short the fan sensor to manually activate the fan. Make sure it works.</li> <li>• Incorrect wiring from overtemp thermostat to control board. Inspect wiring. Measure ~22VDC while open, near 0VDC while closed.</li> <li>• Overtemp Thermostat sensor failed. Replace sensor.</li> <li>• Faulty wiring connection. Replace wiring.</li> </ul>			

<b>E013 Weld Failed – Out of Tolerance</b>	If the unit is configured to compare each weld results (Actual current, voltage, time, etc) to a given weld 'target', it will display this error when the last weld is out of the configured tolerance range. Change weld setup as appropriate, set a new target, or disable this error as necessary.	No	No
<b>Problems (Most Likely to Least Likely)</b>			
<ul style="list-style-type: none"> <li>Requires reconfiguration of weld setup.</li> <li>Target configuration needs redefined. Configure new target by selecting F32 and holding the Lock button.</li> <li>Requires adjustment of tolerance. Adjust tolerance either by using Weld Energy F35 or Drop Time F34.</li> </ul>			
<b>E017 Pilot Blew Out</b>	During the pilot arc stage, the gun lifted as expected. The arc voltage would be within a window of 12V and 60V (typically 30-40V). This error is generated if the arc voltage exceeds 60V, representing a condition where the pilot arc blew out.	No	No
<b>Problem</b>			
Debris on the work material. Check surface conditions and clean the workpiece of any ferrule dust or debris.			
<b>E018 Drop Time is Too Long for Short Cycle</b>	The Configuration of the drop time (F31) and the front panel time make it such that the pilot arc supply must be on for more that 40ms. The Maximum time the pilot arc will stay on is 40ms, so it is possible the arc will go out before the main arc starts.	No	No
<b>Problem</b>			
Requires reconfiguration of drop time and/or front panel time.			
<b>E020 Voltage on Output Studs</b>	A voltage higher than normal appeared on the weld terminals. When this is used, the capacitors are discharged and the unit must be shut down.	No	Yes
<b>Problems (Most Likely to Least Likely)</b>			
<ul style="list-style-type: none"> <li>External connections from weld terminals need removed and isolated. Use meter to confirm voltage on terminals.</li> <li>If &gt; 42 V for &gt; 1 second, check wiring to chopper modules (gate wires).</li> <li>Incorrect wiring to chopper modules (gate wires). If damaged/cracked, replace modules and control board.</li> <li>Failure of the control board. Replace control board.</li> </ul>			
<b>E021 Unable to Charge</b>	The unit is unable to charge.	No	No
<b>Problems (Most Likely to Least Likely)</b>			
<ul style="list-style-type: none"> <li>Fuse F2, Inspect and measure to find reason for the over-current.</li> <li>Incorrect wiring to bridge, charge IGBT and/or choke. Reconfigure wiring where needed.</li> <li>Faulty charge IGBT. Replace charge IGBT.</li> <li>Failure of the control board. Replace control board.</li> <li>Failure of the power supply board. Replace power supply board.</li> </ul>			

## 6.2.1 Additional Warning – Rebooting/Tripping of GFCI

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Check AC Power Supply specifications are in compliance with this power unit's requirements.

If using an Auto Transformer, test on a standard input supply.

Reduce F67. It will reduce charge current and possibly eliminate the problem, but will increase charging time.

## 6.2.2 Additional Warning - Front Panel Gun Coil Indicator Blinks RED As If No Gun Connected, But Gun is Connected

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Check the wire connections to the front panel gun connector. Try a different gun connected directly in to the front panel. Beyond this, check that 15VDC exists on the control board connector JP6 pins 6 and 13.

- **If the 15VDC at the control board is present**, try replacing the control board first, then the output board if necessary.
- **If the 15VDC at the control board is not present**, trace it back to the transformer wires that connect to J1 pins 1 and 2 of the power supply board. They should read ~18VAC. If 18VAC is present, replace the power supply board. If the 18VAC is not present, replace the transformer.

## 6.2.3 Additional Warning - F32 Actual Weld Time

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Actual weld time in F32 is different than front panel weld time setpoint: See [Operational Function Codes & Error Codes](#), F31 must be calibrated for each preset.

## 6.2.4 Additional Warning – Continuous Tripping of Breaker

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If the breaker repeatedly trips with a unit operating with 230V input power, the model might not be configured for the correct operating mode.

To configure for International Mode whereby F67 (Charge Intensity) is reduced to 70%:

1. Power unit off
2. Press and hold [“I” down key] and [6] simultaneously
3. Power on while still holding the keys
4. Release keys
5. Use any key to toggle the display to “ON”
6. Wait approximately 5 seconds and unit will reboot

To start the system without charging it,

1. Power unit off
2. Press and hold [“I” down key] and [3] simultaneously
3. Power on while still holding keys
4. Release keys

Unit will reboot having not charged. This allows the operator to make F67 changes. Once ready, power system down, then back up to charge normally.



“I” down key

6



### **6.2.5 Additional Warning – First Charge is Slow**

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This is intentional in order to give the operator a chance to adjust F67 as appropriate.

### **6.2.6 Additional Warning – Unit Fails to Charge**

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Fuse F2 is located in the 723-248-011 wire harness and meant to protect the charging circuit.

### **6.2.7 Additional Warning – Inconsistent Drop Times**

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1. **Eliminate excessive lift.** Too much lift increases the possibility of stud hang up.
2. **Be sure the weld energy is appropriate for the application.**
3. **Inspect foot alignment.** Adjust if necessary. A misaligned foot will almost guarantee stud hang-up. Ensure that the stud is centered within the ferrule.
4. **Inspect chuck.** Replace if necessary. Check for a good grip of the stud in the chuck. A good grip is needed to eliminate slipping of the stud.
5. **Tighten foot-retaining screws.** These screws hold the foot in place during a weld while pressure is placed on the foot. Slippage of the foot will lead to a faster drop time.
6. **Inspect and clean gun housing and related parts.** Replace parts as needed. Debris in the housing will resist travel.

## 6.3 Weld Quality Problems

Problem	Possible Cause	Solution
<b>Weld appears HOT</b>	<b>Time setting or current setting is too high.</b>	Check the stud burn-off. If the burn-off is much greater than what is typical for that diameter stud, the time and current settings may not be correct. Consult <a href="#">Setting Current and Reading the Current Display</a> to ensure proper current and time settings are being used. Reduce the current setting and perform weld inspections as described in <a href="#">Inspection and Testing of the Weld</a> .
	<b>Plunge is too short.</b>	Plunge is measured by the amount of stud protruding beyond the bottom edge of the ferrule. Consult <a href="#">Lift Distance and Plunge Distance Parameters</a> to ensure proper plunge settings are being used, and correct, if necessary.
	<b>Incorrect ferrule.</b>	Ensure that the ferrule being used in the welding process is the proper ferrule for the stud size and application.
<b>Weld appears COLD</b>	<b>Time setting or current setting is too low.</b>	Check the stud burn-off. If the burn-off is much less than what is typical for that diameter stud, the time and current settings may not be correct. Consult <a href="#">Setting Current and Reading the Current Display</a> to ensure proper current and time settings are being used.
	<b>Incorrect ferrule.</b>	Ensure that the ferrule being used in the welding process is the proper ferrule for the stud size and application.
	<b>Inconsistent gun lift.</b>	Perform a Lift Check, as specified in <a href="#">Basic Procedure</a> . Consult <a href="#">Lift Distance and Plunge Distance Parameters</a> to ensure proper lift settings are being used. Correct the lift to the proper setting if the lift is improperly set.  Perform weld inspections as described in <a href="#">Inspection and Testing of the Weld</a> .

Problem	Possible Cause	Solution
<b>Weld appears COLD</b>	<b>Not enough gun lift.</b>	Perform a Lift Check, as specified in <a href="#">Basic Procedure</a> , several times. Consult <a href="#">Lift Distance and Plunge Distance Parameters</a> to ensure proper lift settings are being used. If lift results are inconsistent, disassemble and clean the gun.
	<b>Too much plunge.</b>	Plunge is measured by the amount of stud protruding beyond the bottom edge of the ferrule. Too much plunge will keep the gun from lifting. Consult <a href="#">Lift Distance and Plunge Distance Parameters</a> to ensure proper settings are being used. Correct the plunge to the proper setting if the plunge is improperly set.
<b>Stud HANGS-UP during the weld</b>	<b>Plunge is too short.</b>	Plunge is measured by the amount of stud protruding beyond the bottom edge of the ferrule. Consult <a href="#">Lift Distance and Plunge Distance Parameters</a> to ensure proper lift settings are being used. Correct the lift to the proper setting if the lift is improperly set.
	<b>Mechanical bind in accessories or ferrule.</b>	Position the foot or ferrule grip of the gun so that the stud is centered in the ferrule opening. If the stud is off-center, it can restrict the plunging motion of the stud during welding.
	<b>Time setting or current setting is too high.</b>	Check the stud burn-off. If the burn-off is much greater than what is typical for that diameter stud, the time and current settings may not be correct. Consult <a href="#">Setting Current and Reading the Current Display</a> to ensure proper current and time settings are being used. Correct the settings and perform weld inspections as described in <a href="#">Inspection and Testing of the Weld</a> .

Problem	Possible Cause	Solution
<b>Stud HANGS-UP during the weld</b>	<b>Mechanical bind in gun.</b>	<p>Manually depress chuck adaptor and release. Chuck adaptor must return to the full out position rapidly without binding. If necessary, disassemble and clean the gun.</p> <p>On Heavy Duty guns, ensure that the weld cable is centered between the legs and does not rub on them.</p>
	<b>Base material contamination.</b>	<p>Contamination of the base plate or stud may cause the arc to become erratic. Ensure that there is no rust, scale, oil, water, residue, paint, galvanization, etc. present between the stud and the workpiece. Welding to a clean plate can help diagnose if there is any foreign substance on the base material or studs.</p>
	<b>Incorrect ferrule.</b>	<p>Ensure that the ferrule being used is the proper ferrule for the stud size and application.</p>
<b>Actual main arc time is different than programmed weld time set-point. No error code displayed.</b>	<b>F31 gun drop time is not calibrated against the gun in use. Go to F31 and perform calibration.</b>	<p>Short circuit in the middle of a weld, due to low lift height, out of position welding, or welding into angle iron.</p>

## 7 Maintenance

### 7.1 Care and Cleaning

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The stud welding system requires no special care.

See the operations manual specific to the units for the necessary cleaning work to the gun and if need be to the feeder.

The cleaning work specified below is necessary for the Nelweld N550c unit. In this connection, pay attention to the following:



#### **WARNING**

**Prior to commencing any cleaning work the welding unit must be switched off, disconnected from the input power and secured against restart!**

- Perform preventive maintenance procedures at least once every six months. It is good practice to keep a preventive maintenance record; a record tag attached to the machine works best.
- Neither aggressive or alcoholic agents nor combustible liquids may be used for the cleaning work.
- The unit casing of the N550c must be wiped down with a dry cloth. Type plate and safety advice must be very legible.
- The front plate of the N550c must be cleaned with a fat-dissolving cleansing agent. The LED display elements must be recognizable.
- The electrical connecting cables must be cleaned with a dry cloth. Scorching or mechanical faults can thus be easily detected.
- Cleaning inside the unit is required in keeping with the operating conditions and the degree of soiling.
- Impurities inside the welding unit, such as metallic dust or conductive debris, must be wiped out or vacuumed off.



#### **WARNING**

Opening the welding unit as well cleaning inside the unit may only be carried out by an authorized electrical specialist!

Blowing down the welding unit with air pressure is not recommended due to the risk of injury to lungs and eyes.

## 7.2 Routine Maintenance

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### **WARNING**

Prior to commencing any maintenance work the welding unit must be switched off, disconnected from the input power and secured against restart!

Once cover is removed, check Capacitor Voltage with Volt Meter (DC). Voltage is accessible across busses. **DO NOT TOUCH** anything inside until Capacitor Voltage is well below 40VDC.

Only a qualified electrician should perform any work inside the units casing. Any work done should be made in accordance with all local and national electrical codes. Failure to do so may result in bodily injury or death.

1. Remove the machine wrap-around cover after disconnecting input connector.
2. Keeping the machine clean will result in cooler operation and higher reliability. Be sure to clean the following areas with a low pressure air stream. See figure D.1 for component locations.

Power and control printed circuit boards

- Power switch
- Input rectifier
- Heat sink fins
- Output terminals

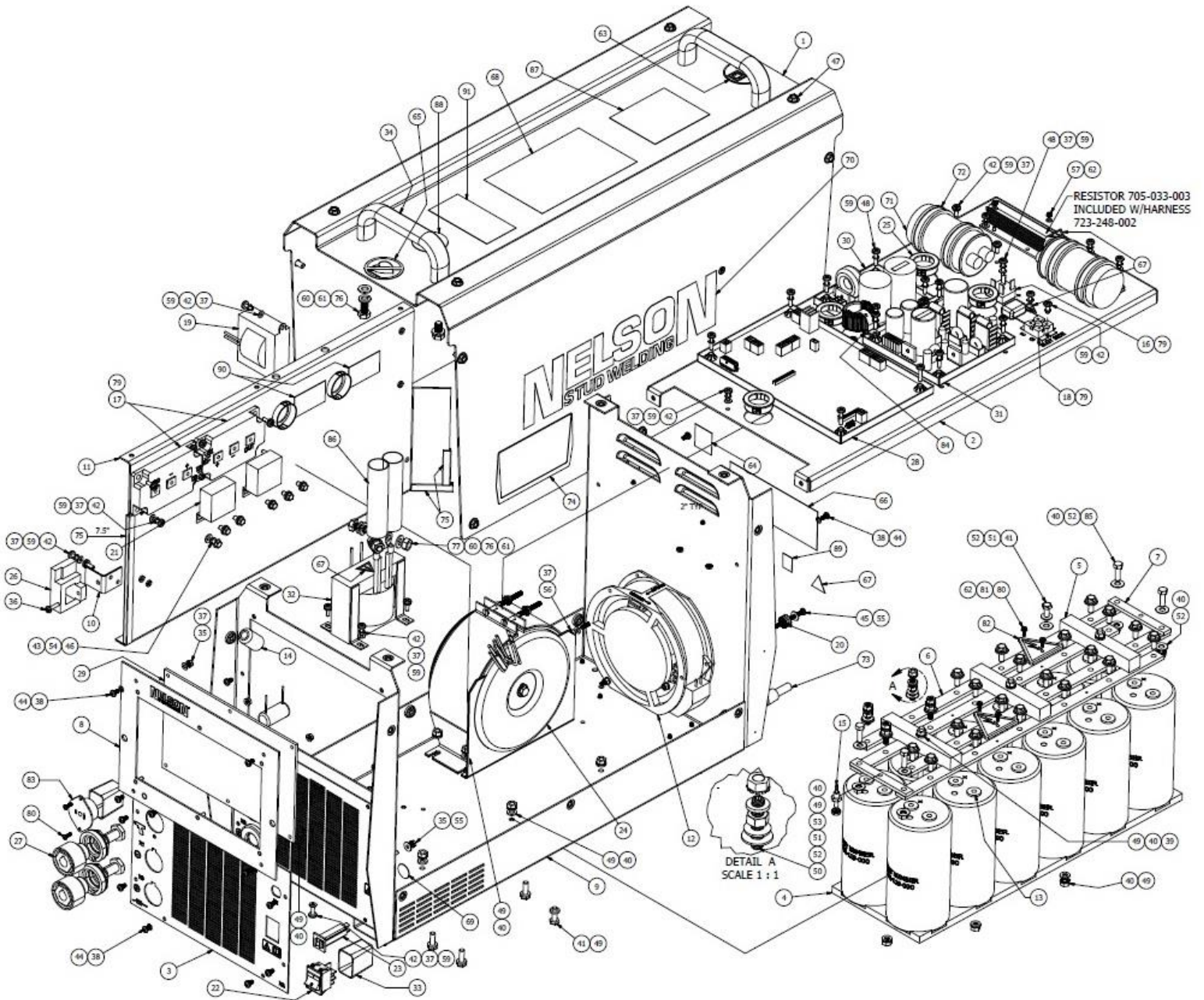


### **WARNING**

**Heatsinks may be hot.**

1. Examine capacitors for leakage or oozing. Replace if needed.
2. Examine the sheet metal case for dents or breakage. Repair the case as required. Keep the case in good condition to ensure that high voltage parts are protected and correct spacing is maintained. All external sheet metal screws must be in place to assure case strength and electrical ground continuity.
3. Replace machine cover and screws.
4. When PCB connectors are disconnected, please use silicone-free electrical grade grease (Nyogel 760G from Nye Lubricants) to all PCB connectors prior to reconnecting. This forms a corrosion\moisture barrier that will protect the contacts for reliable operations.

## 7.3 Explosion Drawing Domestic/Export N550c Final Assembly



### 7.3.1 Parts List N550c Final Assembly

Item	Qty	Domestic	Export	Description	Torque (in/lbs)	Comment
1	1	750-615-201		COVER, N550c		
2	1	750-615-202		SHELF, N550c		
3	1	750-615-204		PANEL, CONN, DINSE/HUBBELL, N550c		
4	1	750-615-207		BASE, CAPACITOR, N550c		
5	3	750-615-208		CLAMP, CAPACITOR, N550c		
6	4	750-615-209		BUSBAR A N550c		
7	2	750-615-210		BUSBAR B, N550c		
8	1	750-615-211		PANEL, DISPLAY, N550c		
9	1	750-615-217		CHASSIS, SUB-ASSEMBLY		
10	1	750-615-216		BRACKET, LEM, N550c		
11	1	750-615-203		PANEL, VERTICAL, N550c		
12	1	717-999-013	717-999-015	FAN, COOLING 115V (230V)		
13	12	702-119-000		CAPACITOR , MAIN, 27mF	40	
14	1	716-050-101		FERRITE, CLAMP ON Ø 9MM		
15	1	701-187-000		DIODE, STUD (INCL W/HARNESS 723-248-002)		
16	1	701-182-000		BRIDGE		
17	2	701-186-000		MODULE, CHOPPER, OUTPUT		
18	1	701-185-000		MODULE, CHOPPER, CHARGING		
19	1	700-147-001		CHOKE, ASM, CHARGING, N550c		
20	3	717-140-010		GROMMET		
21	2	702-120-000		CAPACITOR, SNUBBER, OUTPUT MODULE		
22	1	709-274-010		SWITCH, POWER		
23	1	709-276-001	709-276-005	BREAKER, 20A (10A)		
NS	1	715-060-006		FUSE, CHARGING, 16A, 500v, 6.3 x 32mm		
24	1	700-145-000	700-148-000	ASM, TRANSFORMER, N550c, 115 VAC IN (230 VAC IN)		
25	6	714-028-004		BUSHING, WIRE PROTECTOR		
26	1	700-142-003		LEM		
27	2	714-166-099		CONNECTOR, DINSE	100	
28	1	750-615-010		PCB ASM, CONTROL, MAIN		
29	1	750-615-080		PCB, USER INTERFACE		
30	1	750-610-062		PCB, PILOT ARC		
31	1	750-610-042		PCB ASM, CONTROL, POWER		
32	1	700-146-000		CHOKE, OUTPUT		
33	2	727-029-219		COVER, SWITCH/CONNECTOR		
34	2	729-114-103		HANDLE, PULL		
35	7	524-005-210		NUT, KEPS, M4 SS	17	
36	1	524-005-279		SCREW, PHMS, M4 x 16 SS	17	
37	36	524-005-120		WASHER, FLAT, M4 SS		
38	16	524-005-344		SCREW, PHMS, M4 x 8 BLACK SS	17	
39	3	524-005-345		ROD, THREADED, M6 x 210 SS		



Item	Qty	Domestic	Export	Description	Torque (in/lbs)	Comment
40	22	524-005-273		NUT, KEPS, M6 SS	60	
41	24	524-005-314		SCREW, HHCS, M6 x 16 SS	60	
42	28	524-005-155		SCREW, PHMS, M4 x 12 SS	17	
43	6	524-005-304		WASHER, LOCK, M5 SS		
44	16	524-002-619		WASHER, LOCK, #8 BLACK SS		
45	3	524-005-347		SCREW, PHMS, M4 x 70	17	
46	6	524-005-315		SCREW, SHCS, M5 x 10 HWHCS	17	
47	14	524-005-350		SCREW, HHCS FLGD, M6 x 12 BLK SS	60	
48	13	524-005-209		SCREW, PHMS, M4 x 20 SS	17	
49	22	524-005-276		WASHER, FLAT, M6 SS		
50	4	524-005-351		SCREW, FPSSS, M6 x 30 SS	60	
51	24	524-005-311		WASHER, BELLVILLE, M6 SS		
52	32	524-001-309		WASHER, FLAT, 1/4"		
53	4	524-005-339		NUT, M6 SS	60	
54	6	524-005-291		WASHER, FLAT, M5 SS		
55	4	524-005-284		WASHER, FENDER, M4 SS		
56	3	524-005-153		NUT, LOCK, M4	17	
57	2	524-005-272		NUT, KEPS, M3 SS	7	
59	41	524-005-121		WASHER, LOCK, M4 SS		
60	8	524-005-287		WASHER, FLAT, M8 SS		
61	6	524-005-288		WASHER, LOCK, M8 SS		
62	6	524-005-302		WASHER, FLAT, M3 SS		
63	1	87-05-19		LABEL, UNPLUG BEFORE SERVICE		
64	1	724-576-015		LABEL, MADE IN USA		
65	1	87-09-35		LABEL, CARDIAC PACEMAKER		
66	1	724-577-004		LABEL, RATING PLATE, N550c		
			724-577-007	LABEL, RATING PLATE, N550c EXPORT		
		724-577-008		LABEL, RATING PLATE, N550c SHORT CYCLE		
		724-577-009		LABEL, RATING PLATE, N550c R&S/CAMLOCK		
67	6	724-485-015		LABEL, SMALL HIGH VOLTAGE		
68	1	724-569-000		LABEL, GENERAL WARNING		
69	2	724-485-010		LABEL, ELECTRICAL GROUND		
70	2	724-569-004		DECAL, NELSON LOGO, 3" WHITE		
71	2	702-122-000		CAPACITOR, MOTOR-RUN		
72	4	727-029-220		CLAMP, CAPACITOR, MOTOR-RUN		
73	1	723-247-003	723-248-003	CORD ASSEMBLY, POWER DOMESTIC (EXPORT)		
74	2	724-577-005		EMBLEM, ARC CHARGER 550c		
75	1'	727-029-212		EDGE TRIM		
76	6	524-005-354		SCREW, M8 X 16 HHCS, SS		
77	2	524-005-289		NUT, M8 SS		
79	1.5'	103-479-000		TAPE, THERMAL		
80	6	524-005-356		SCREW, M3 X 10 PHMS SS		
81	4	524-005-301		WASHER, LOCK, M3, SS		
82	2	750-615-008		PCB ASM, BUS VOLTAGE INDICATOR		

Item	Qty	Domestic	Export	Description	Torque (in/lbs)	Comment
83	1	714-174-004		CONNECTOR, HUBBELL		
84	1	717-091-000		HANGER, CABLE		
85	4	524-005-341		SCREW, M6 X 20 HHCS, SS		
86	8"	727-029-221		SLEEVING, 5/8 HIGH TEMP RUBBER		
87	1	724-572-004		DECAL, HOIST LIFT		
88	1	724-485-012		DECAL, TWO PERSON LIFT		
89	1	724-569-013		LABEL, TRASH CAN, CE, RoHS		
90	2	724-577-006		LABEL, CHOPPER DIAGRAM, N550c		
91*	1	750-615-021		PCB, ASM, ARC CHARGER AUMOTATED ACCESSORY		
92	1	724-485-016		LABEL, TIP OVER HAZARD		

\* Short –cycle units only

# 8 Nelweld Diagram

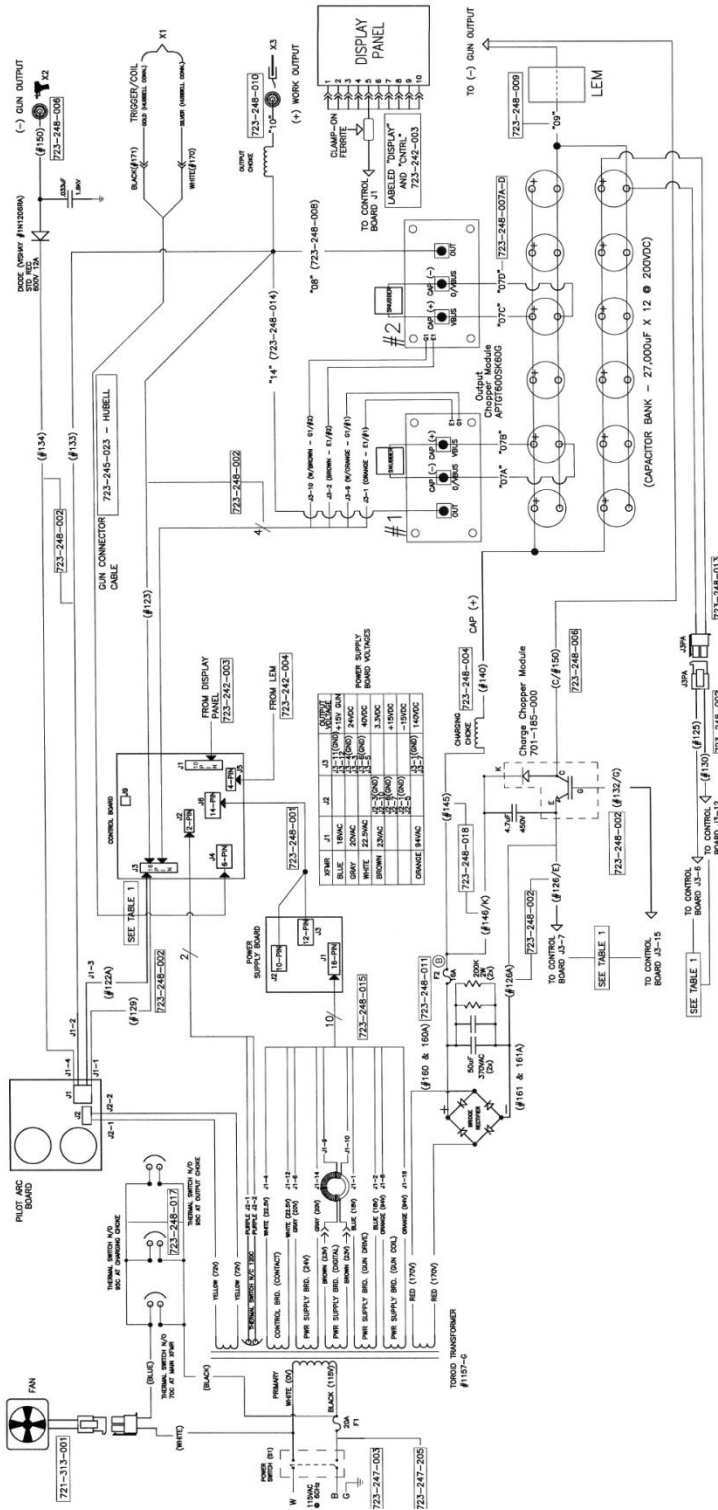
## 8.1 Domestic

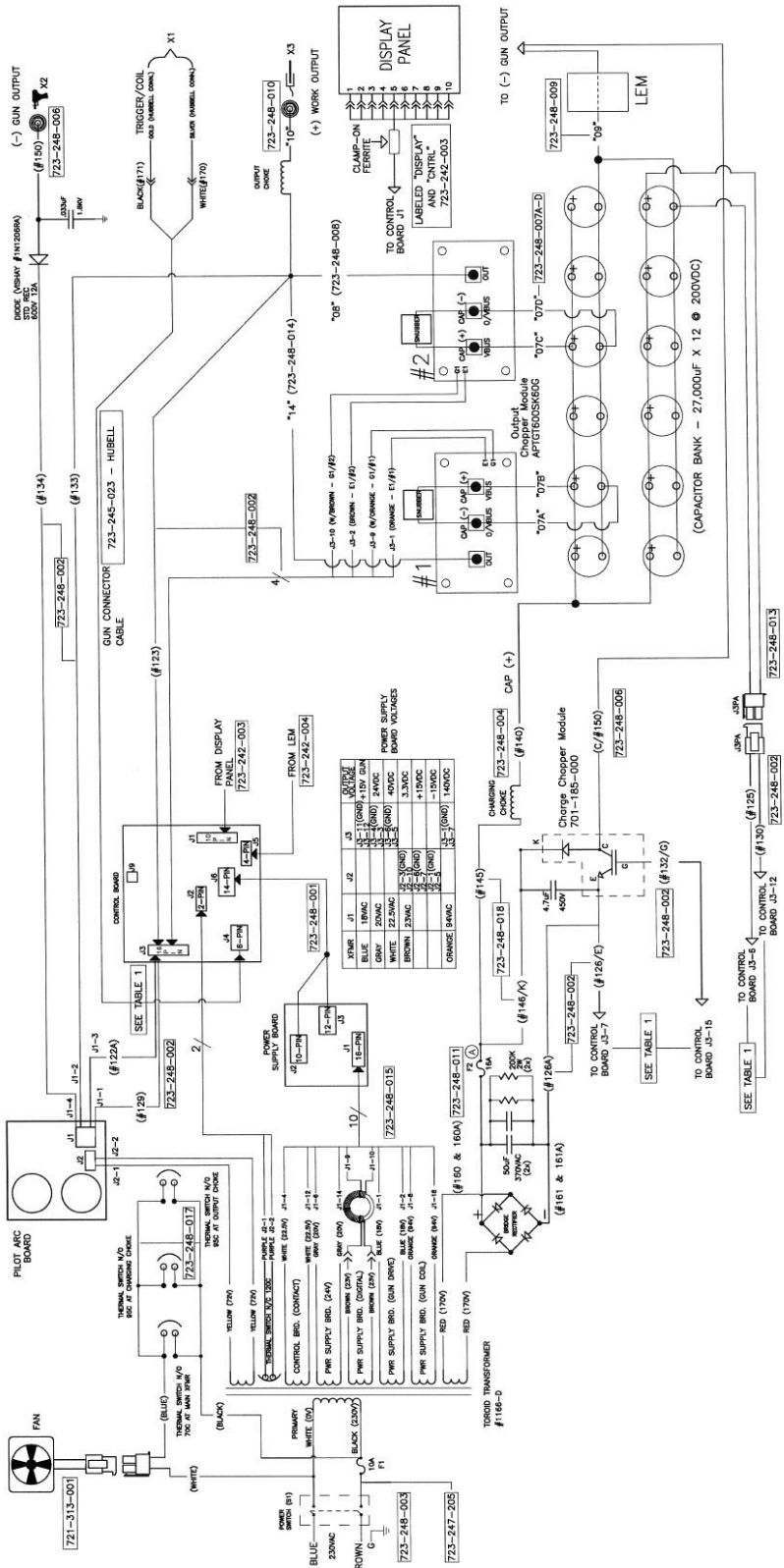
## 8.2 Export

# N550c Wiring

## Wiring Diagram

## Wiring Diagram





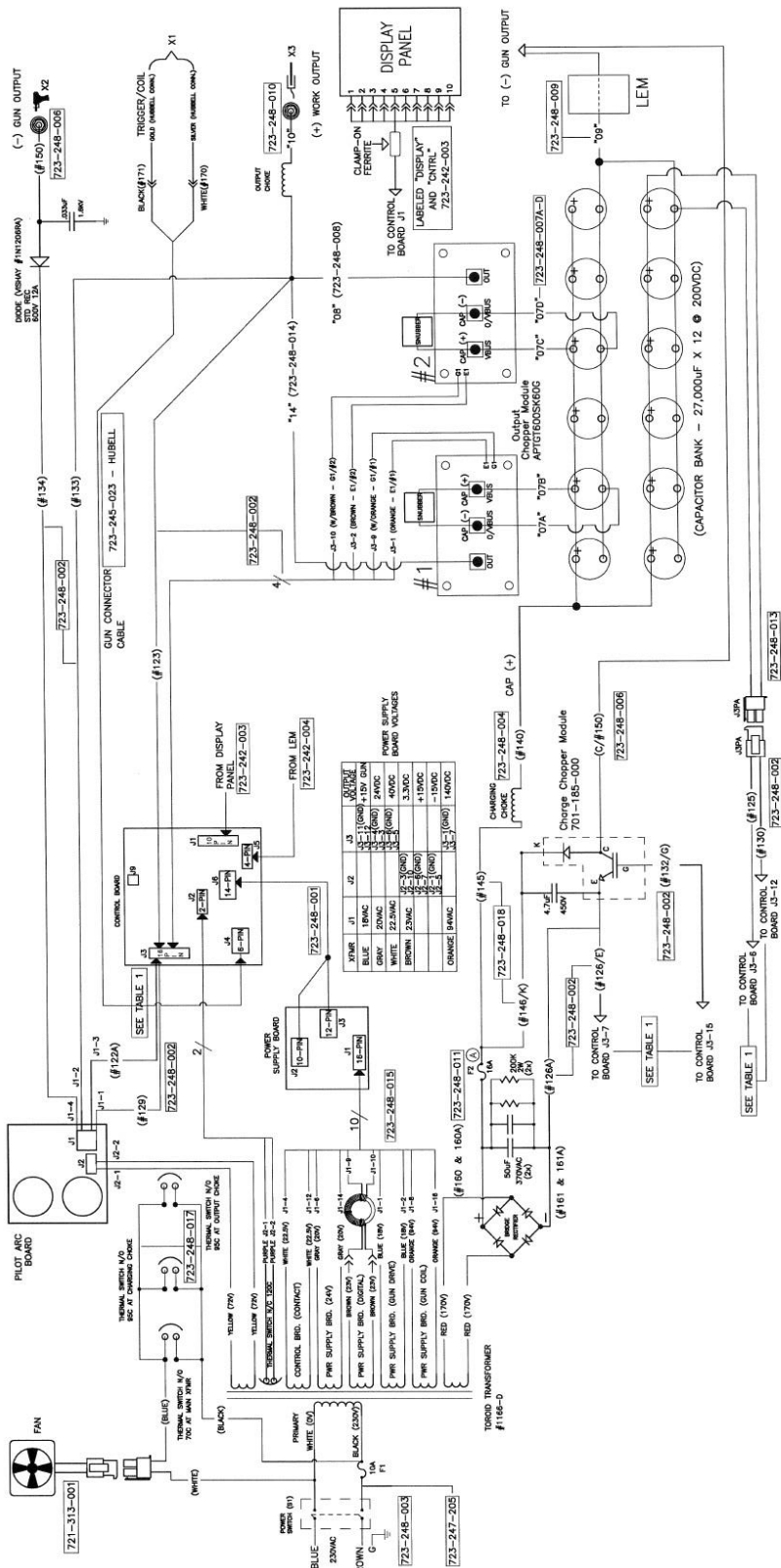
# 8.3 Domestic Short Cycle Wiring Diagram

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# 8.4 Export Short Cycle Wiring Diagram

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