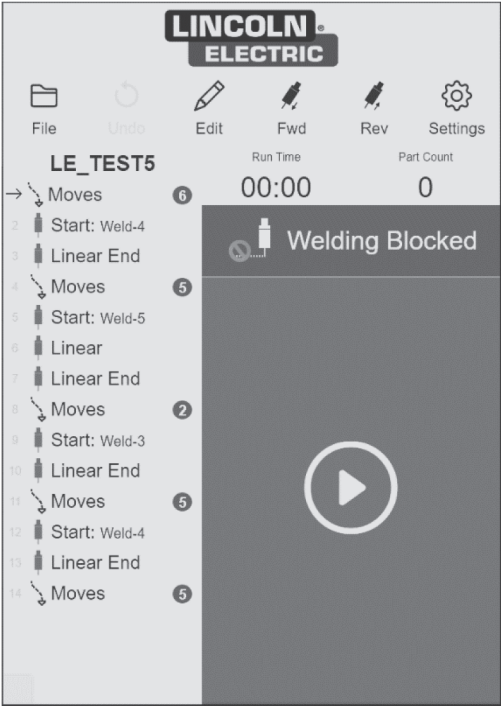


**Operator's Manual**

**Cooper™ App**



**Register your machine:**  
[www.lincolnelectric.com/register](http://www.lincolnelectric.com/register)

**Authorized Service and Distributor Locator:**  
[www.lincolnelectric.com/locator](http://www.lincolnelectric.com/locator)

**Save for future reference**

Date Purchased

Code: (ex: 10859)

Serial: (ex: U1060512345)

**Need Help? Call 1.888.935.3878**  
to talk to a Service Representative

**Hours of Operation:**  
8:00 AM to 6:00 PM (ET) Mon. thru Fri.

**After hours?**  
Use "Ask the Experts" at [lincolnelectric.com](http://lincolnelectric.com)  
A Lincoln Service Representative will contact you no later than the following business day.

**For Service outside the USA:**  
Email: [Cobot\\_Service@LincolnElectric.com](mailto:Cobot_Service@LincolnElectric.com)

**THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.**

**PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY.**

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

## **SAFETY DEPENDS ON YOU**

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety depends upon proper installation and thoughtful operation on your part.

**DO NOT INSTALL, OPERATE, OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.



**This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.**



**This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.**

## **KEEP YOUR HEAD OUT OF THE FUMES**

Don't get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

Read and obey the safety data sheet (SDS) and the warning label that appear on all containers of welding materials.

Use enough ventilation or exhaust at the attic, or both, to keep the fumes and gases from your breathing zone and the general area.

If you have questions about safe working procedures or develop unusual symptoms, see your supervisor. Regularly check and maintain equipment and exhaust.

## WEAR CORRECT EYE, EAR, AND BODY PROTECTION



Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

PROTECT others from splatter, flash, and glare with protective screens or barriers.

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition. Also, wear safety glasses in work areas AT ALL TIMES.

## SPECIAL SITUATIONS

DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

## ADDITIONAL PRECAUTIONARY MEASURES

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire hazards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.

REFER TO AND FOLLOW NFPA 51B.

## CALIFORNIA PROPOSITION 65 WARNINGS

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.

### **WARNING**

Warning: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code § 25249.5 et seq.)

**Warning: Cancer and Reproductive Harm [www.P65warnings.ca.gov](http://www.P65warnings.ca.gov)**

**ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKERS AND OTHER MEDICAL IMPLANT DEVICES WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.**

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

**BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.**

## FOR ENGINE POWERED EQUIPMENT

### CAUTION

**Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.**



Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.



Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

Keep all equipment safety guards, covers, and devices in position and in good repair. Keep hands, hair, clothing, and tools away from V-belts, gears, fans, and all other moving parts when starting, operating, or repairing equipment.

In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary, and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.



Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap, or magneto wire as appropriate.



To avoid scalding, do not remove the radiator pressure cap when the engine is hot.



### Electric and Magnetic Fields May Be Dangerous

Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines.

EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

Exposure to EMF fields in welding may have other health effects which are now not known.

All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

- Route the electrode and work cables together - Secure them with tape when possible.
- Never coil the electrode lead around your body.
- Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.
- Connect the work cable to the workpiece as close as possible to the area being welded.
- Do not work next to welding power source.



## **ELECTRIC SHOCK CAN KILL**

The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground. In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- Semiautomatic DC Constant Voltage (Wire) Welder
- DC Manual (Stick) Welder
- AC Welder with Reduced Voltage Control

In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle, or semiautomatic welding gun are also electrically “hot”.

Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

Ground the work or metal to be welded to a good electrical (earth) ground.

Maintain the electrode holder, work clamp, welding cable, and welding machine in good, safe operating condition. Replace damaged insulation.

Never dip the electrode in water for cooling.

Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard. Also refer to paragraph 8.



## ARC RAYS CAN BURN

Use a shield with proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Head shield and filter lens should conform to ANSI Z87.1, Section 4 Standards.

Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

The International Agency for Research on Cancer (IARC) has determined that ultraviolet radiation from welding is carcinogenic to humans.



## FUMES AND GASES CAN BE DANGEROUS

Fumes and gases can be hazardous to your health.

Fumes from the normal use of this product contain significant quantities of potentially hazardous compounds. See consumable product label/insert.

Keep your head out of fumes.

An approved respirator should be used unless exposure assessments are below applicable exposure limits.

The International Agency for Research on Cancer (IARC) has determined that welding fumes and ultraviolet radiation from welding are carcinogenic to humans.

### **WARNING**

**Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone and keep exposure within applicable limits such as the OSHA PEL and ACGIH TLV. Wear a respirator and use local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. Specific circumstances, such as confined spaces, could also require a respirator.**

The International Agency for Research on Cancer (IARC) has determined that welding fumes are carcinogenic to humans.

The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment, and the specific welding procedure and application within applicable limits, such as the OSHA PEL and ACGIH TLV limits. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA

PEL and ACGIH TLV limits.

Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

Welding hard facing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings, can produce highly toxic fumes, and it is especially important to keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits. Additional precautions are also required when welding on galvanized steel.

Shielding gases used for arc welding and gases created during welding, can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to ensure breathing air is safe.

Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the safety data sheet (SDS) and follow your employer's safety practices. SDS forms are available from your welding distributor or from the manufacturer.

Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

Do not use a welding power source for pipe thawing.



## **WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION**

Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

Do not heat, cut, or weld tanks, drums, or containers until the proper steps have been taken to ensure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

Vent hollow castings or containers before heating, cutting, or welding. They may explode.

Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuff-less trousers, high shoes, and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables, or other alternate circuits. This can create

fire hazards or overheat lifting chains or cables until they fail.

Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101.



## **CYLINDER MAY EXPLODE IF DAMAGED**

Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

Never allow the electrode, electrode holder, or any other electrically "hot" parts to touch a cylinder.

Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way, Chantilly, VA 20151.





## FOR ELECTRICALLY POWERED EQUIPMENT

Turn off input power using the disconnect switch at the fuse box before working on the equipment.

Install equipment in accordance with the U.S. National Electrical Code, all local codes, and the manufacturer's recommendations.

Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

For additional safety information, refer to <http://www.lincolnelectric.com/safety>.



Electric Shock



Fumes & Gases



Fire & Explosions



Misc Welding Safety



Personal Protective  
Equipment

## ELECTROMAGNETIC COMPATIBILITY (EMC)

### Conformance

Products displaying the CE mark are in conformity with European Community Council Directive of 15 Dec 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility, 2004/108/EC. It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

### Introduction

All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc.



**Warning:** This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low voltage supply system. There may be potential difficulties in ensuring electro-magnetic compatibility in those locations, due to conducted as well as radiated disturbances.

### Installation and use

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected, then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note below. In other cases it could involve constructing an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases the electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

**Note:** The welding circuit may or may not be earthed for safety reasons.

Follow your local and national standards for installation and use. Changing the earthing arrangements should only be authorized by a person who is competent to assess whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

### Assessment of area

Before installing welding equipment, the user shall make an assessment of potential electromagnetic problems in surrounding area. The following shall be taken into account:

- Other supply cables, control cables, signaling, and telephone cables; above, below, and adjacent to the welding equipment
- Radio and television transmitters and receivers
- Computer and other control equipment
- Safety critical equipment, e.g., guarding of industrial equipment
- The health of the people around, e.g., the use of pacemakers and hearing aids

- Equipment used for calibration or measurement
- The immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures.
- The time of day that welding or other activities are to be carried out.
- The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

## **Methods of Reducing Emissions**

### **Public supply system**

Welding equipment should be connected to the public supply system according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the system. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

### **Maintenance of the welding equipment**

The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

### **Welding cables**

The welding cables should be kept as short as possible and should be positioned close together; running at or close to the floor level.

### **Equipotential bonding**

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the workpiece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

### **Earthing of the workpiece**

Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, e.g., ship's hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

### **Screening and shielding**

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.

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Section 1PREPARATION AND SETUP**INTRODUCTION TO THE COOPER APP**

The Cooper App allows the user to create multiple forms of welding from single pass welds to structural multi-pass welds in simplified steps. The Cooper App has on-screen steps that allows the user to easily program welds, modify weld positions, weld process tracking, and more. Throughout this manual there will be detailed information and steps on how to set up and run the Cooper App.

The Cooper app offers video tutorials.	
For PC users, please use the URL below:	For mobile users, please use the QR code below:
<a href="https://www.lincolnelectric.com/cobotresources">https://www.lincolnelectric.com/cobotresources</a>	

## NAVIGATE TO THE COOPER APP ON CRX

**Note:** Refer to the installation manual for steps to install the Cooper App.

1. Cycle power on the controller. Refer to the Operators Manual for more information.
2. Select the drop-down menu and expand the PLUGINS menu (1).
3. Select Cooper\_App (2). The user will now be directed to the Cooper App.

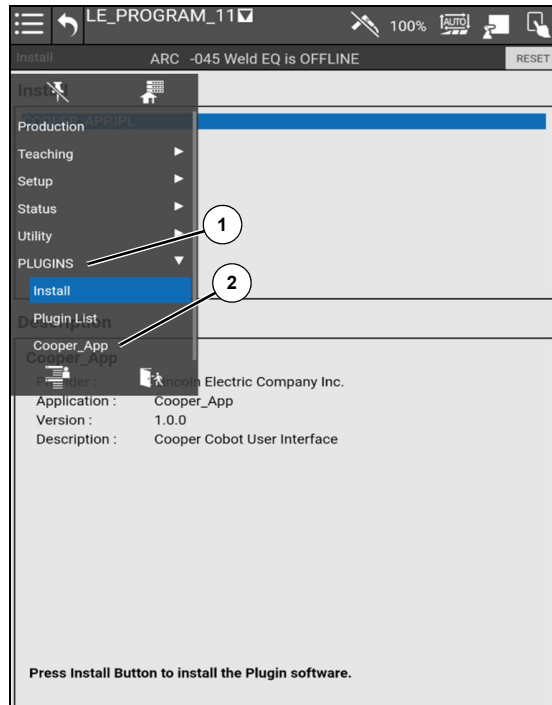


Figure 1-1

## HOW TO CHANGE LANGUAGE

1. Select the Settings icon (1) and select the language (2) that the Cooper App is currently presented in.

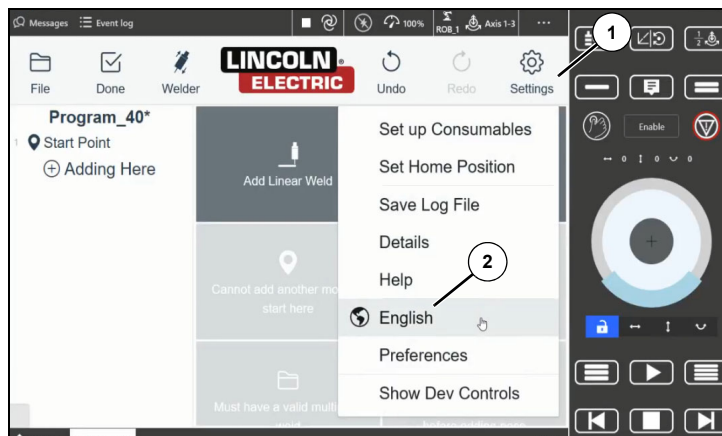


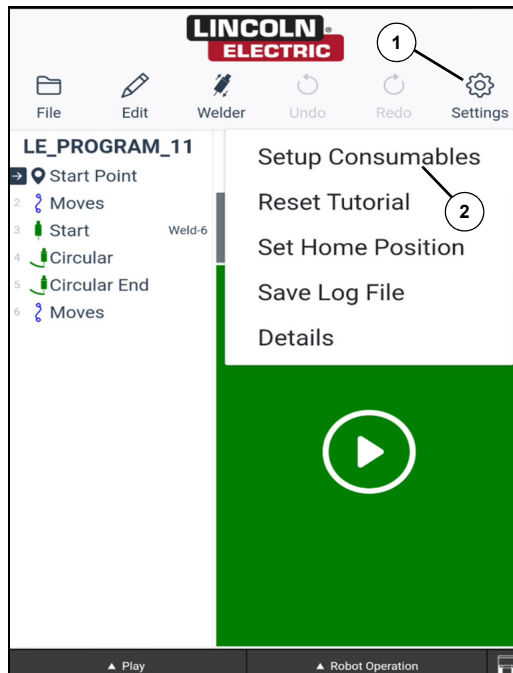
Figure 1-2

2. Select the desired language from the pop-up window. The Cooper App will now reload in the selected language.

## SETTING UP CONSUMABLES

**Note:** The first time the Cooper App is loaded onto the system, the user will need to set up the consumables the environment has.

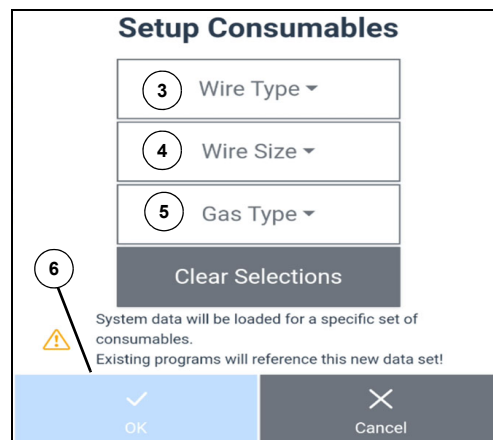
1. Navigate to the top right Settings icon (1) and select Setup Consumables (2).



**Figure 1-3**

Here the user will be able to set up which Wire Type (3), Wire Size (4), and Gas Type (5) the robot will be using to weld. Selecting the wire type first will automate the correct selections of the wire size used on that wire type. The gas type selections will be based off of the selections of the wire type and wire size.

2. Selecting the OK icon (6), the user will load the Lincoln Electric Weldset Database that creates all the weld schedules and procedures associated with the consumables selected which are located in the weld by numbers selections. See *Creating a Custom Weld on page 2-11*.



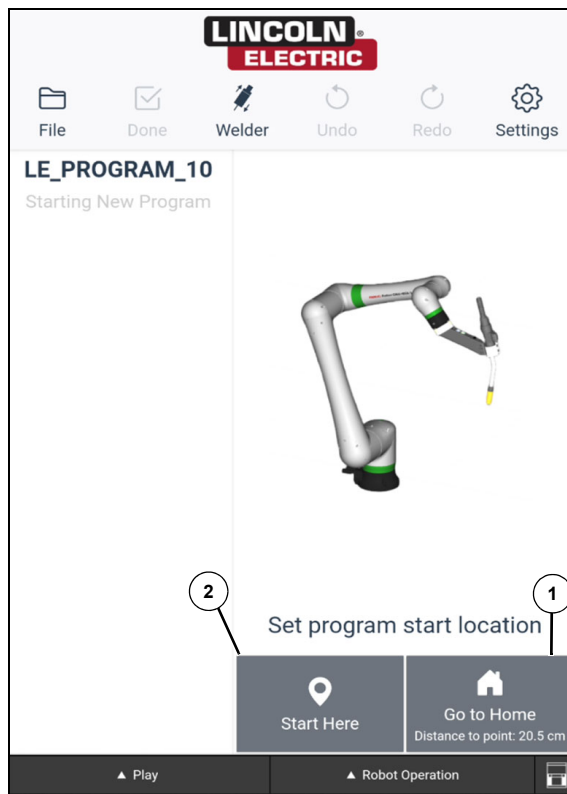
**Figure 1-4**

## Section 2

# USER INTERFACE—STANDARD WELD FEATURES

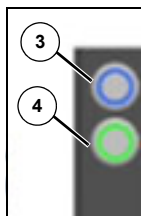
### PROGRAMMING A LINEAR WELD

1. Send the robot to the Home position (1).
2. Select the Start Here icon (2).



**Figure 2-1**

3. Press the blue button (3) to unlock the robot.
4. Move the robot to the weld start position and press the green button (4).
5. Move the robot to the end weld position and press and hold the green button.



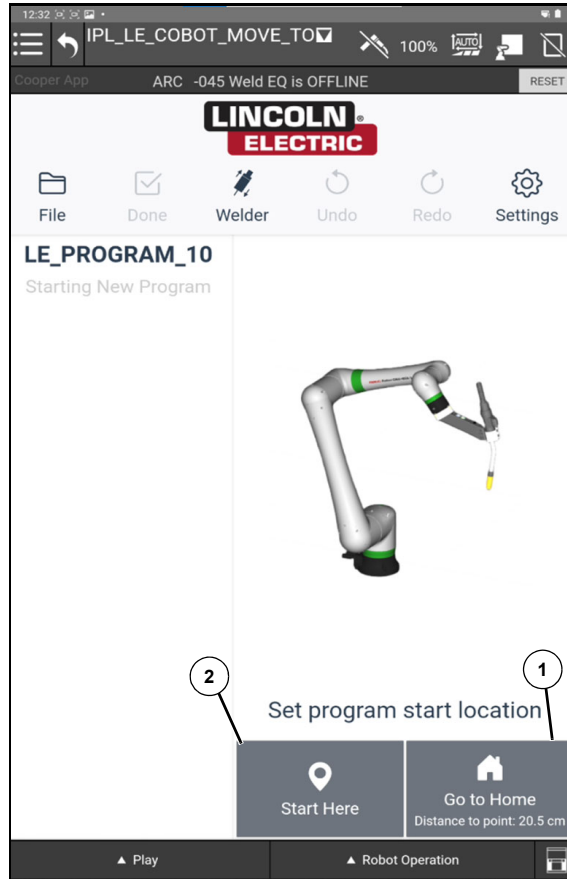
**Figure 2-2**

6. Move the robot away from the part and select the Done icon.



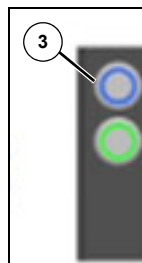
## PROGRAMMING A CIRCULAR WELD

1. Send the robot to the Home position (1).
2. Select Start Here icon (2).



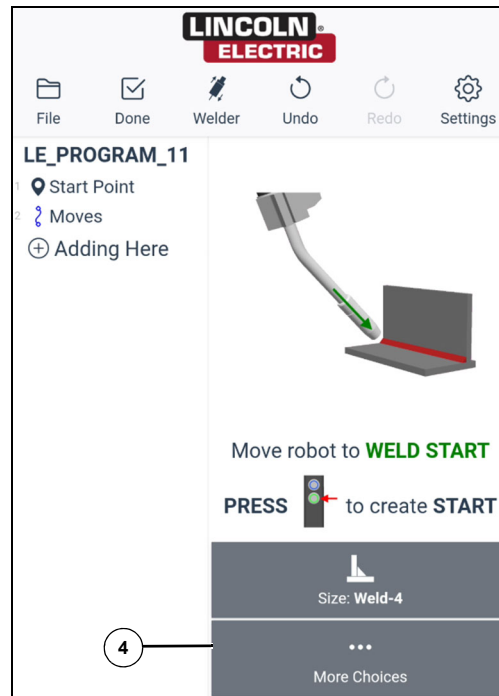
**Figure 2-3**

3. Press the blue button (3) to unlock the robot. Start moving the robot to the desired position.



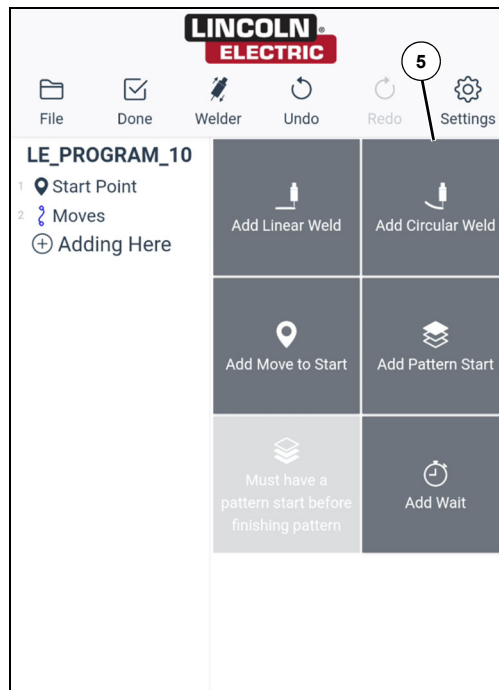
**Figure 2-4**

4. Select the More Choices icon (4).



**Figure 2-5**

5. Select the Add Circular Weld icon (5).



**Figure 2-6**

6. Move the robot to the weld start position and press the green button (5).

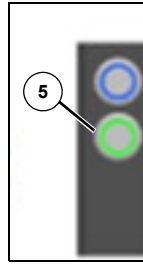


Figure 2-7

7. Move the robot in the desired circular movement, pressing the green button at each weld point.

**Note: To program a full circle, the program needs at least five points. Circle points can not be taught greater than 90 degrees apart.**

8. Move the robot to the end weld position and press and hold the green button.

9. Move the robot away from the part and select the done icon.

## USING WELD BY NUMBERS

When creating a weld point, the operator will be given the option of Size: Weld-4. To change the weld size, select Size: Weld (1).

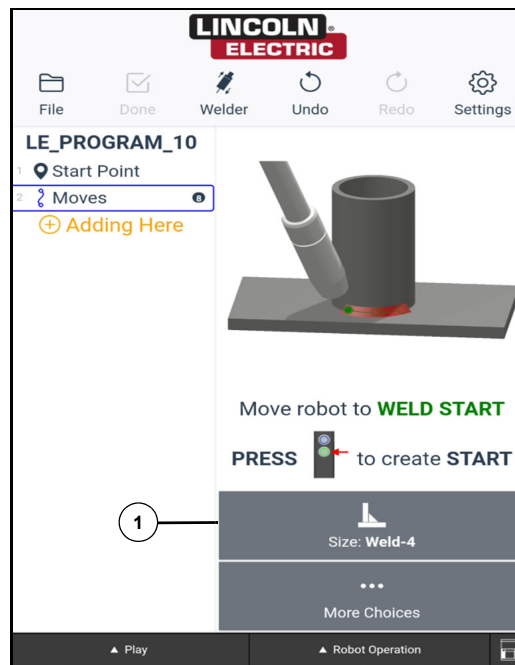
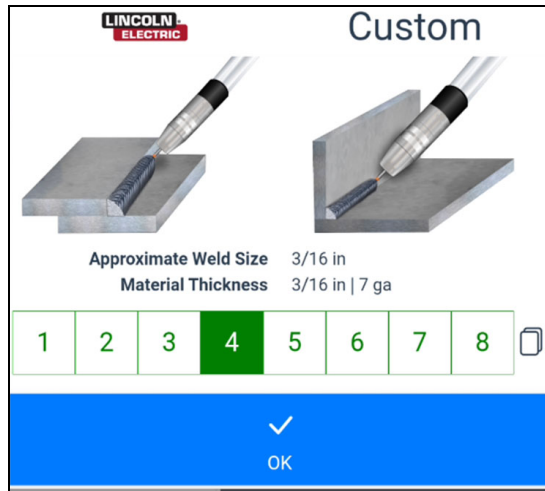


Figure 2-8

The weld by numbers screen is based on the information input from setting up consumables when the Cooper App was initially set up. Each of the numbers on the weld by numbers screen represents a weld size and material thickness. Based on the current welding materials, select the appropriate number. All of the welding parameters in the weld schedule will be automatically populated.

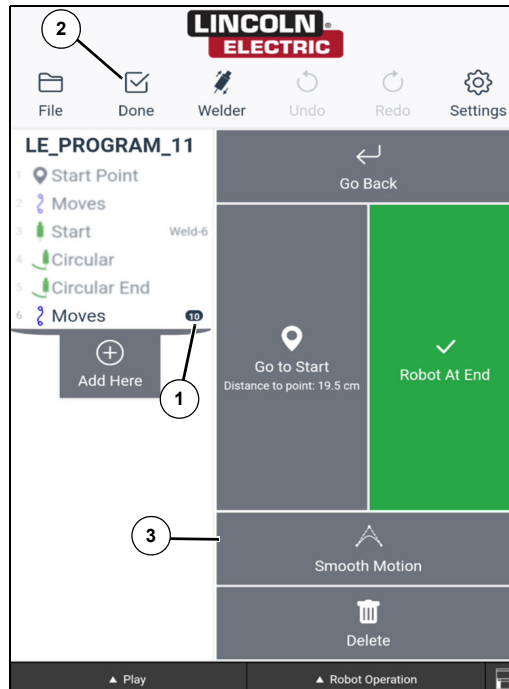


*Figure 2-9*

## CAPTURING AIR MOVES

**Note:** The Cooper App will automatically capture air motion when the robot is in an active workflow at all times except for when the user is being instructed to teach weld points or pattern part points. An active workflow is defined as anytime the Cooper App is directing the user what to do next.

The user can see points being recorded on the move block as they move the robot as indicated by the move blocks counter (1). When the program is complete and the Done icon (2) has been selected, the Cooper App will automatically filter out any unneeded motion. If the captured motion has not met the desired smoothness, go into the Edit mode and select the Smooth Motion icon (3).



*Figure 2-10*

## HOW TO EDIT A PROGRAM

Create a program, see *Programming a Linear Weld on page 2-1*, and enter Run mode and run the program. If one of the points is not at the desired location during the weld, the operator can edit the weld moves by following the steps below:

1. Go into Edit mode.
2. Select the point to be edited.
3. Select Go to Position (1) to view the current taught position of the point.
4. Unlock the robot and move the robot into the position that is to be modified.
5. Select Modify Position (2).



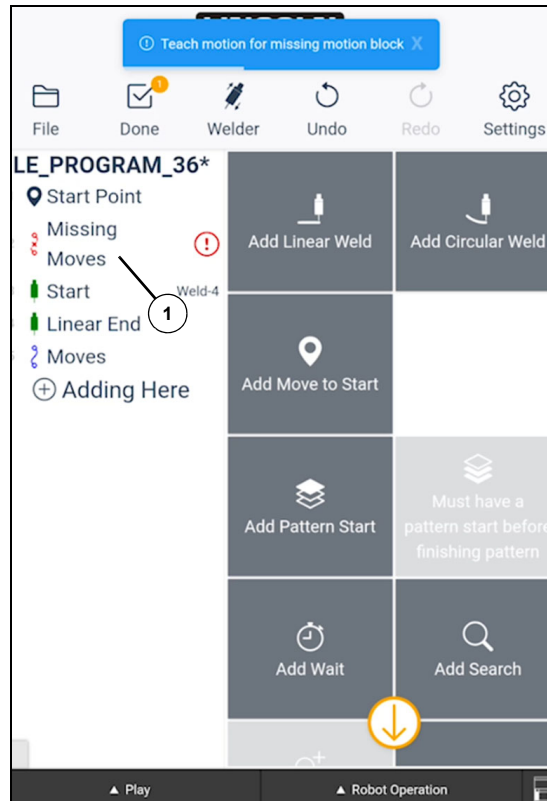
**Figure 2-11**

6. Select Done (3). This will write a new version of the program to the controller.
7. Move the robot to the program start position.
8. Run the program and verify the weld. Repeat steps 1–6 until the weld pattern is at the desired weld motion.

## HOW TO TEACH MISSING MOVES

When writing a program, the operator may find a missing moves error when selecting the Done icon. This means that the robot does not know how to get from one point to the next.

1. To correct this, select the Missing Moves block (1).



**Figure 2-12**

2. Select the Teach Moves icon (2).

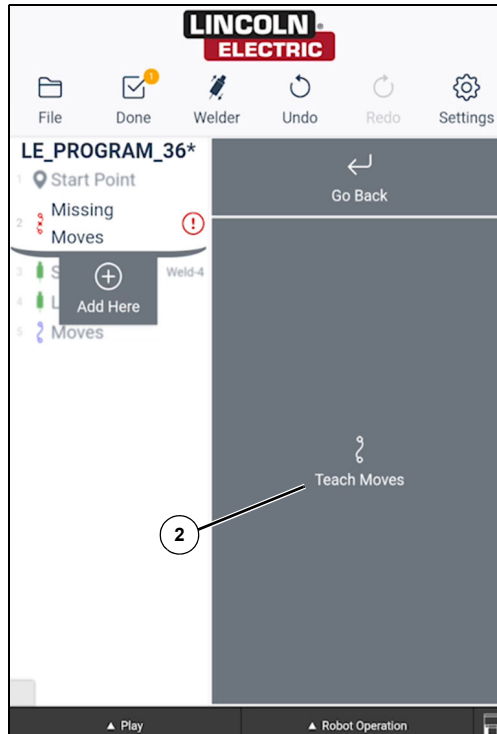


Figure 2-13

**WARNING**

This will bring the robot in a direct path back to the last known point. In this example, the 'Start Point'. If there are any obstacles in a direct path between the robot's current position and the last known point. Ensure to move the robot away from these obstacle before selecting 'Go to Start' in order to avoid a collision.

3. The Cooper App will now instruct the operator to move the robot to the start of the missing motion. Select the Go to Start icon (3).



**Figure 2-14**



4. The Cooper App will now instruct the operator to move the robot to the end of the missing motion (the end of missing motion is defined as the next known point in the program. In this example, the Weld Start is the next known point). This can be completed in three different ways:
  - Selecting the Go to End icon (4) and the robot will take a direct path to the end of the missing motion.
  - Selecting the Go to End icon and stopping the robot before any obstruction, manually moving the robot around the obstruction. Then resuming to the end of the missing motion.
  - Unlock the robot and manually move the robot to the end of the missing motion.

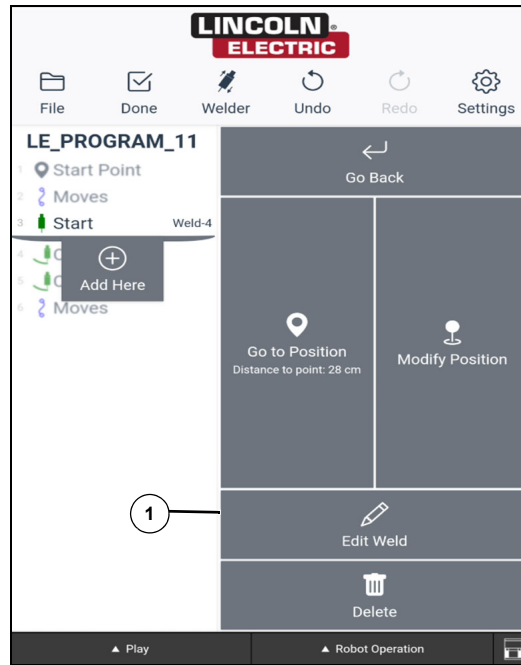


**Figure 2-15**

5. Repeat steps 1–4 until all missing moves have been cleared.
6. Select the Done icon and run the program.

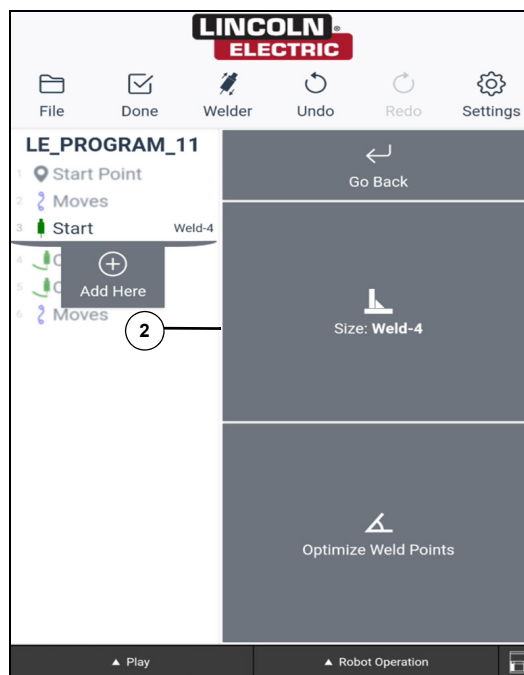
## CREATING A CUSTOM WELD

1. Select the weld that is to be updated.
2. Select the Edit Weld icon (1). This will provide three options: Size: Weld, Optimize Weld Points and Weld Angle Tuner.



**Figure 2-16**

3. Select the Size: Weld icon (2). This will bring up the weld by numbers screen.



**Figure 2-17**

4. Select the weld by number to be customized and then select the copy icon (3). Insert the desired weld name and select copy.

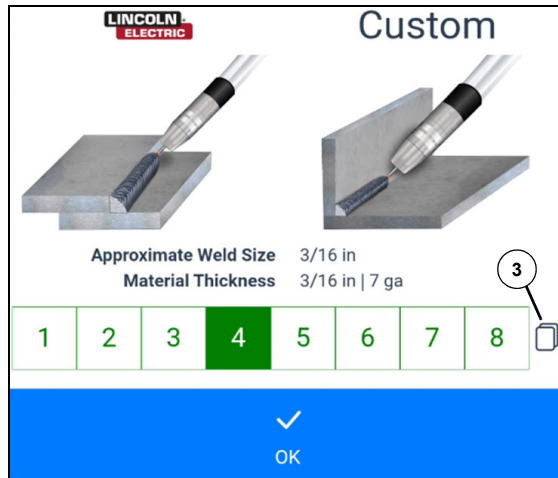


Figure 2-18

5. The Cooper App will display what weld procedure the weld was copied to (4). Then the Cooper App will list it under the custom weld schedule list (5).
6. Select the Edit icon (6).

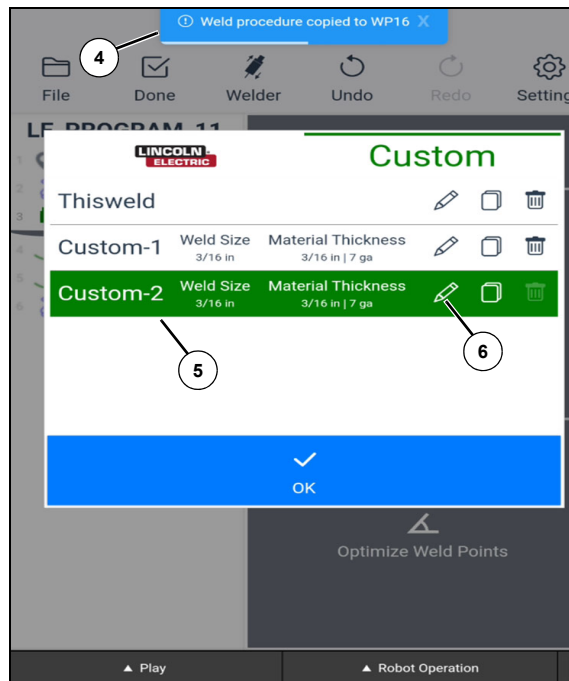
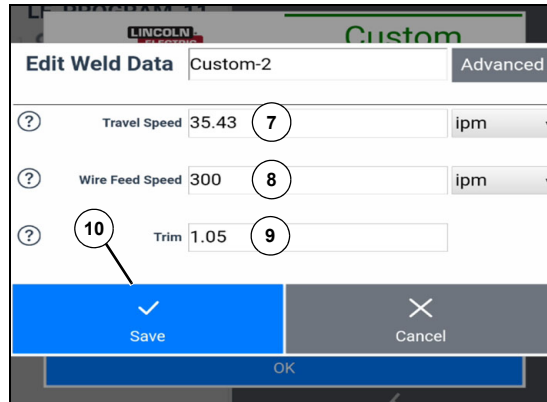


Figure 2-19

- The simple weld editor will provide three editing options: Travel Speed (7), Wire Feed Speed (8), and Trim (9) Value. There is also an advanced tab that the operator can select, see *User Interface—Advanced Weld Features*. The Cooper App will direct the operator to the weld procedure menu in the FANUC timeline to update any further settings for CRX systems and will redirect users to the Tuner App on GoFa systems.
- Select the Save icon (10). To save any adjustments made to the weld parameters and close the Simple Weld Editor. By selecting OK. The operator will now see the updated weld name next to the starting point.



**Figure 2-20**

- Select the Done icon to write the program.

## WELD ANGLE TUNER

1. To adjust the angle of the torch in the weld, go to the weld start point in the Cooper App.
2. Select the Check Weld Angles icon (1).

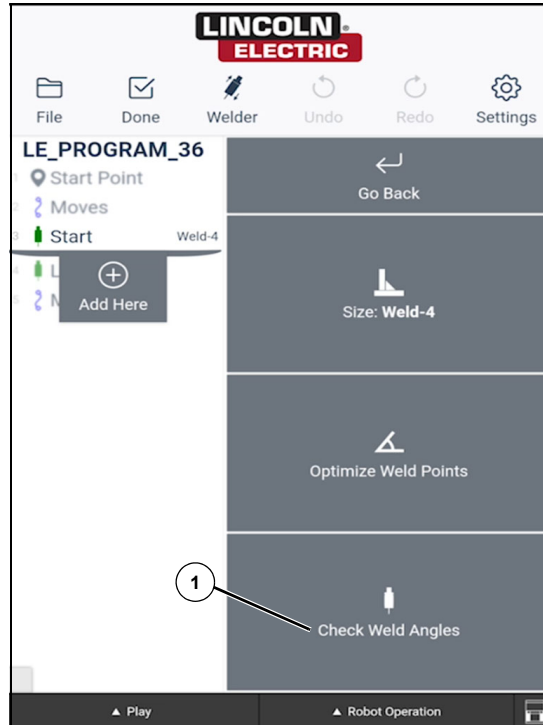


Figure 2-21

- The operator can adjust the Work Angle (2) (angle of the torch around the seam of the weld), Travel Angle (3) (degree of the torch as it moves along the weld), and Spin Torch (4) (rotation around the axis of the torch).
- Adjust the angles with micro adjustments by selecting the single arrow icons (5) or macro adjustments by selecting the multiple arrow icons (6).

**Note: Micro adjustments are made in 1 degree increments and macro adjustments are made in 5 degree increments.**

- Select the Update Weld Angles icon (7).

**Note: Updating weld angles may cause a missing moves error. To correct this, please see, *How to Teach Missing Moves on page 2-7.***

- Select the Done icon to complete the adjustment of angles in the program.

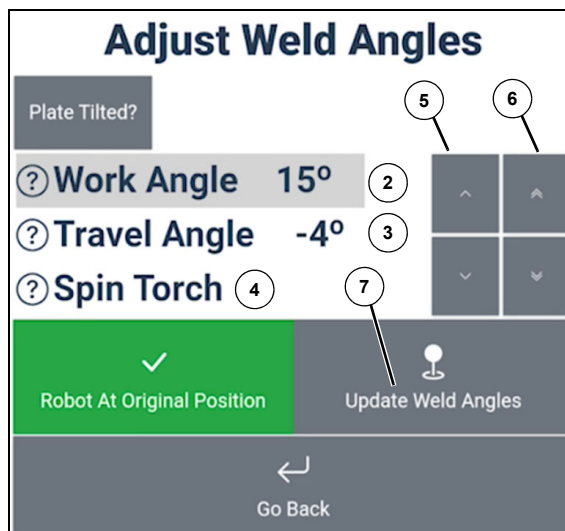


Figure 2-22

## OPTIMIZING WELD POINTS

When creating a weld schedule, the operator may notice that the weld angle is not consistent throughout the welding process.

1. To correct this inconsistency, select Edit and then select the Weld Start block (1) of the weld to apply the consistent angle to.
2. Select the Edit Weld icon (2).

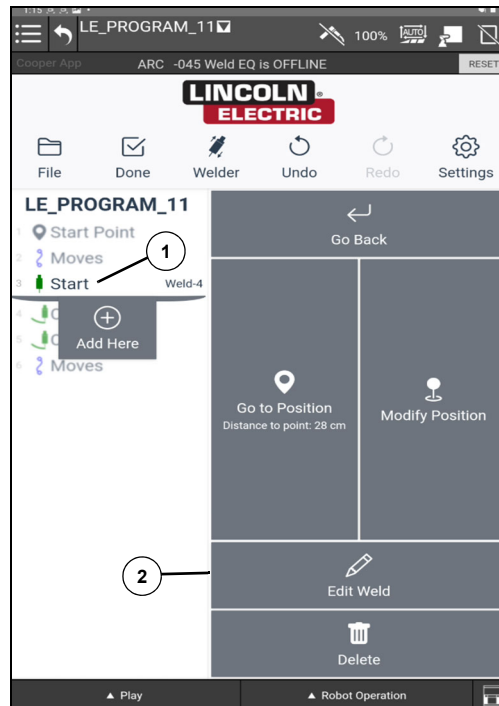
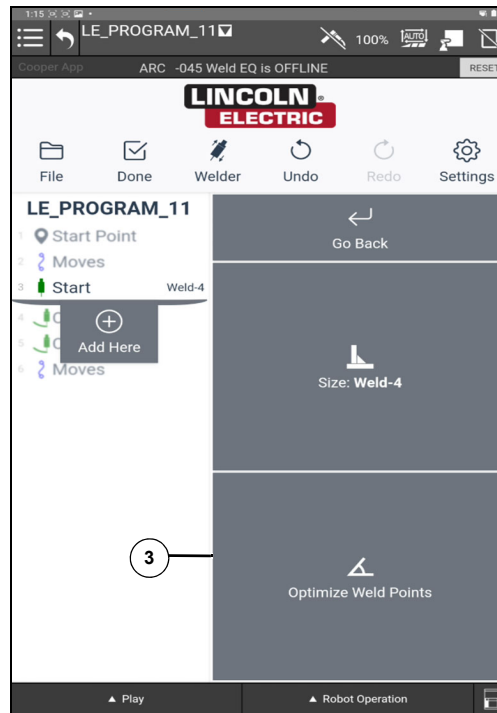


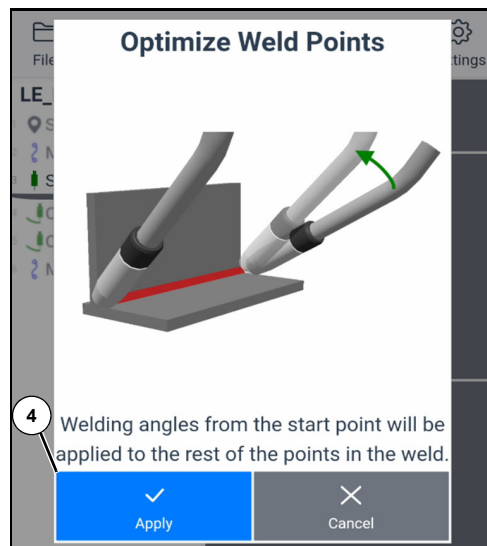
Figure 2-23

3. Select the Optimize Weld Points icon (3).



**Figure 2-24**

4. Select the apply icon (4). This will adjust the angles of the weld to match the starting point angle.



**Figure 2-25**

5. Select the Done icon to write the program. Run the program and verify that the weld angle is now consistent.



## PROGRAMMING A PATTERN

1. To program a pattern, first the operator will need to define a home position that is up and out of the way of the part. Select Start Here icon (1).

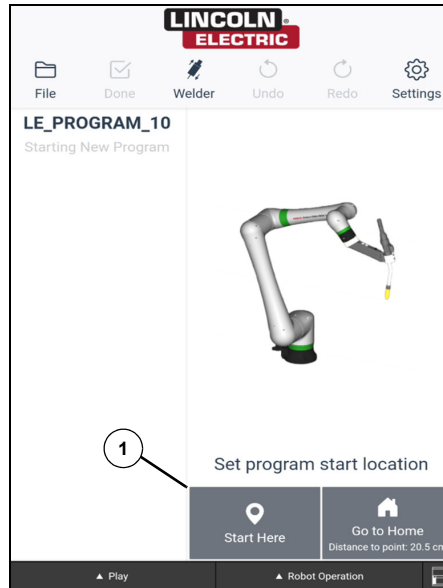


Figure 2-26

2. Unlock the robot by pushing the blue button (2) on the robot.
3. Move the robot above where the weld start should be.
4. Instead of programming the weld, select the More Choices icon (3).

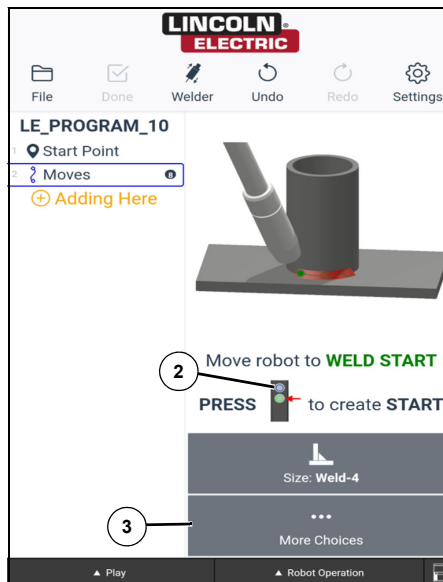
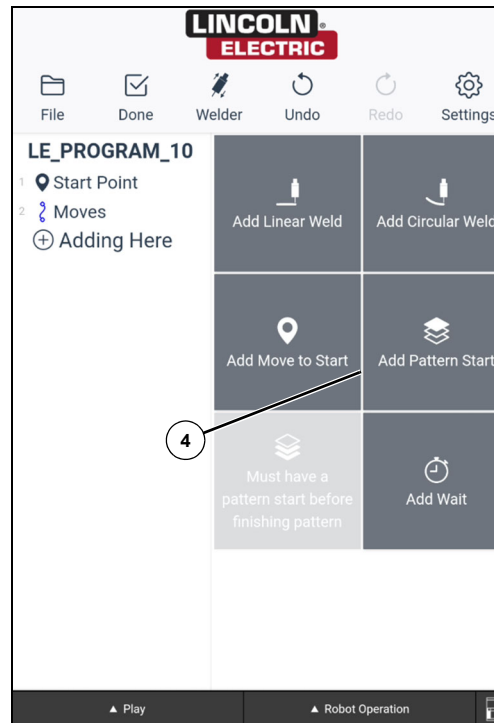


Figure 2-27

5. Select the Add Pattern Start icon (4).



**Figure 2-28**

**Note:** The pattern start point is the approach into the pattern. The pattern start point should be up and out of the way, clear of any obstacles.

6. The Cooper App will ask the operator to define the pattern start point. To teach the pattern start point, press the green button. The operator is now able to teach the weld.

7. Select the Add Linear Weld icon (5).

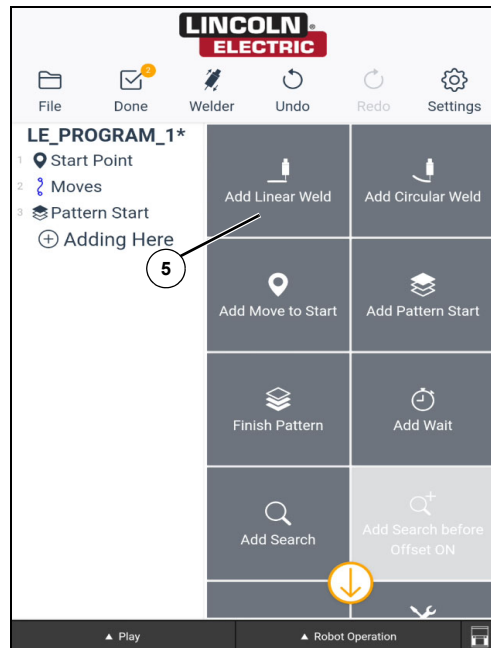


Figure 2-29

8. Unlock the robot and move the robot into the weld start point. To teach, press the green button.
9. Move the robot along the part. Complete a long press of the green button to teach the weld end.
10. Move the robot up and out of the way of the part.
11. Instead of continuing to teach more welds, select the More Choices icon (6).

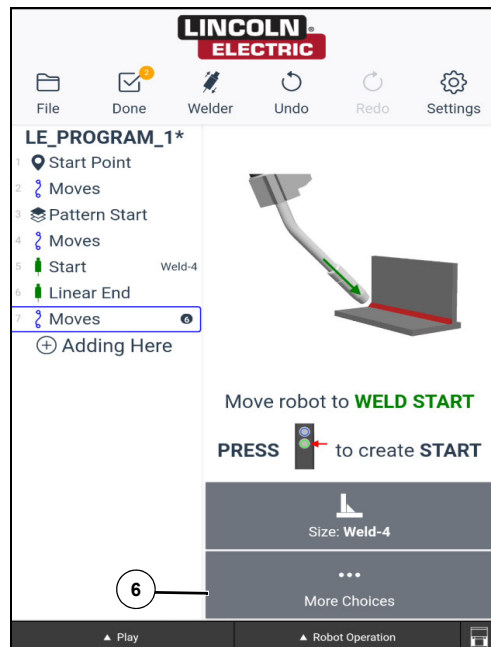
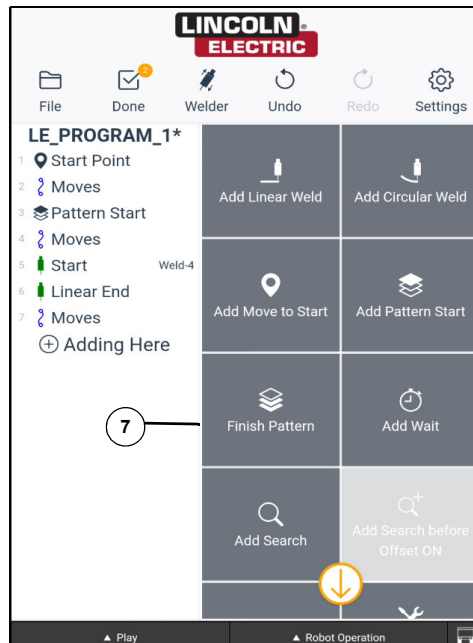


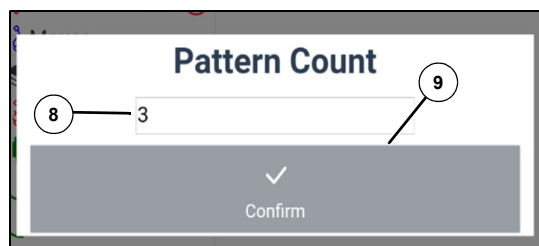
Figure 2-30

12. Select the Finish Pattern icon (7).



**Figure 2-31**

13. The Cooper App will ask the operator to teach the pattern end. This will be the departure point from the pattern, a position up and away from any parts. To teach this, press the green button.
14. The Cooper App will now instruct the operator to teach the part points. these will be equivalent datums on the first and last part in the pattern.
15. Unlock the robot and move the robot to the first part point. To record the point, press the green button.
16. Move the robot to the last part. To record the part, press the green button.
17. The Cooper App will now ask to define the Pattern Count (8). Insert the correct Pattern Count and select the Confirm icon (9).



**Figure 2-32**

18. Teaching the pattern is now complete. Move the robot up and away from the parts and select the Done icon. The Cooper App will now write the program to the controller. To run the program, select the green play button.

## PROGRAM BATCHER—SCHEDULER

The Cooper App has the ability to run multiple programs in any order back-to-back that fits the operator's needs. This is called batching.

1. To schedule batching, select the File icon (1) and then select Production Mode (2).

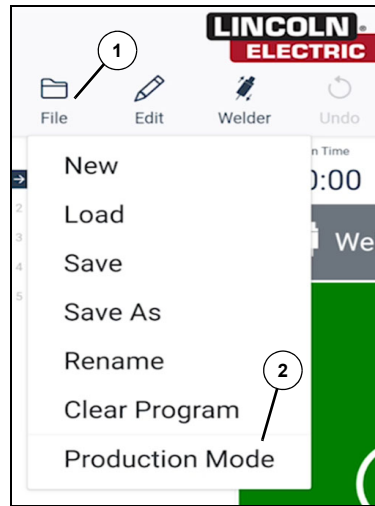


Figure 2-33

2. Select the Add icon (3) to add the desired programs into the scheduler.

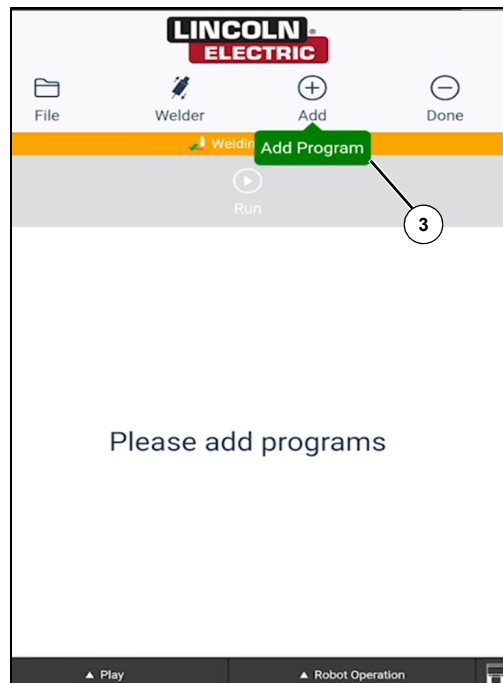
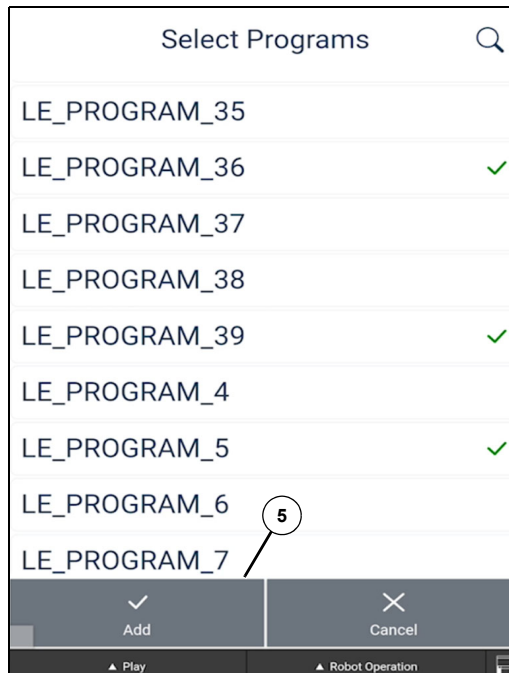


Figure 2-34

3. Select the appropriate programs to be added and then select the Add icon (5).

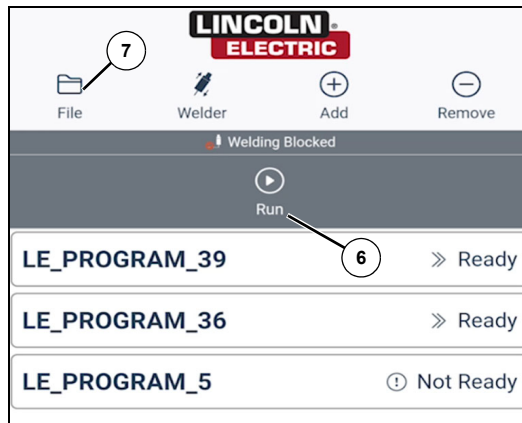


**Figure 2-35**

4. Queue the programs in any order by selecting or deselecting the program.
5. Select the Run icon (6). The welder will now run through the queued programs until the operator selects the pause icon or there is no longer any programs ready in the queue.

**Note: The operator can reorder the program list as the welder is running.**

6. Select File (7) and Create Mode to return to the editing mode and dry run mode.



**Figure 2-36**

## SERVICE ROUTINES SCHEDULER

1. The operator can add in a service routine into an existing program by selecting the location in the program where the service routine will be placed. Then select the Add Here icon (1).

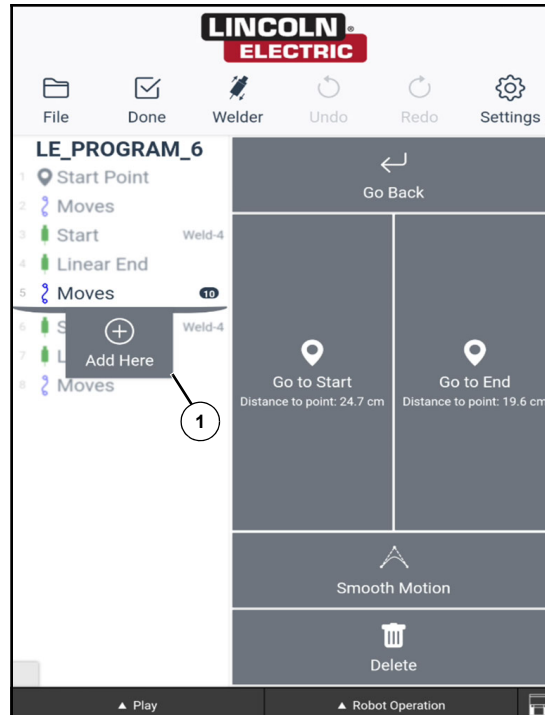


Figure 2-37

2. Scroll down on the right side icons and select the Add Service Routine icon (2).

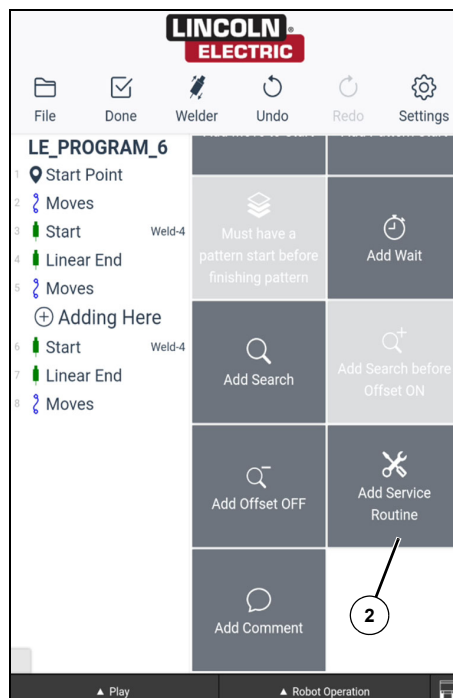


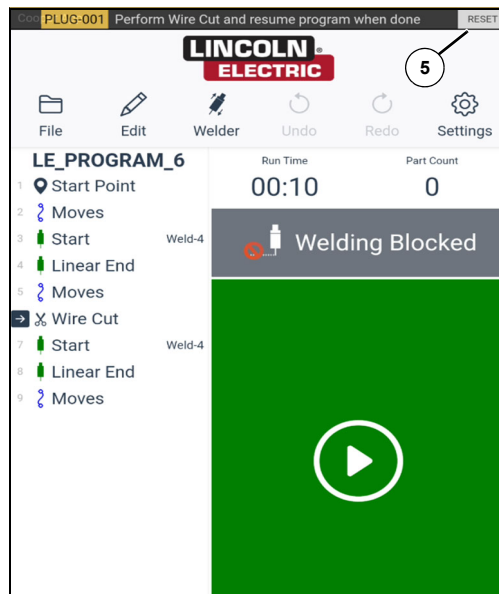
Figure 2-38

- The operator will be presented with two service routine options: Wire Cut (3) and Torch Clean (4). Select the appropriate option.



**Figure 2-39**

- Select the Done icon to write the service routine into the program.
- Run the program.
- When the program reaches the service routine step, complete the service routine that was selected in step 3 and select RESET (5).



**Figure 2-40**

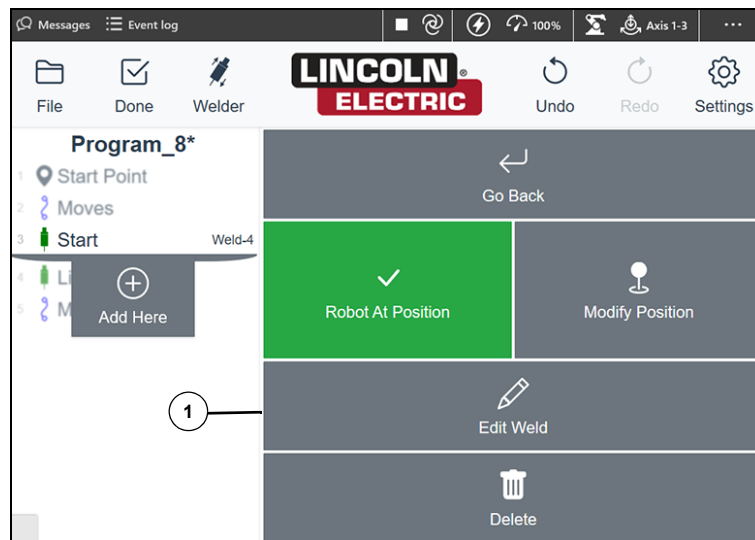
- Press the play button to resume and complete the program.



**Section 3****USER INTERFACE–ADVANCED WELD FEATURES****PROGRAMMING A STITCH WELD (ABB GOFA ONLY)**

To program a stitch weld, first program a linear or circular weld. See *Programming a Linear Weld on page 2-1* or see *Programming a Circular Weld on page 2-2*.

1. Select the weld to be edited, and press the Edit Weld icon (1).



**Figure 3-1**

2. Select the Convert to Stitch icon (2).

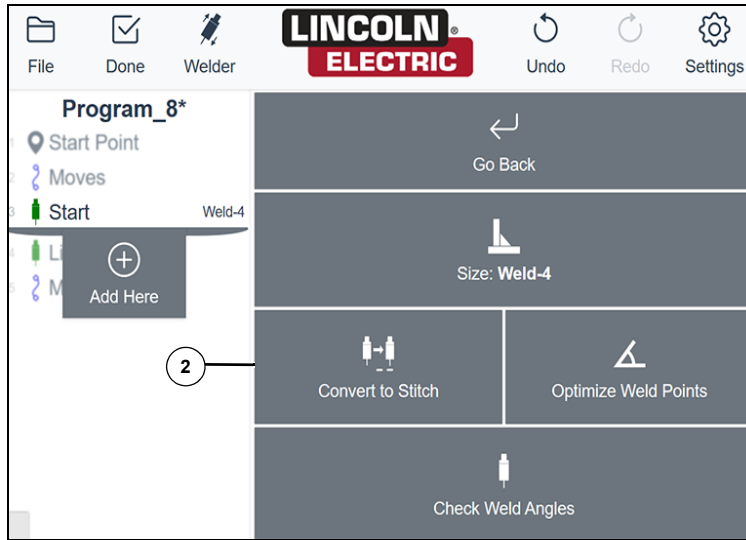


Figure 3-2

3. Here the operator will be able to adjust the Stitch Length (3) and Center to Center (4) to the desired measurements.

4. Select the Apply icon (5).

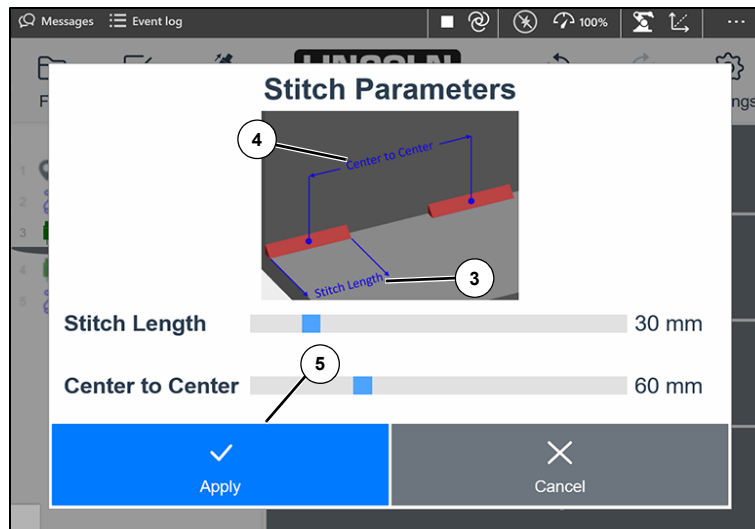
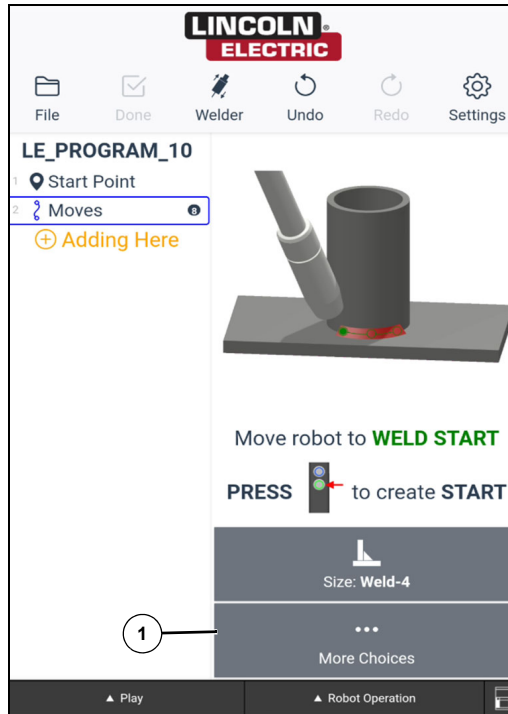


Figure 3-3

5. Select the Done icon to write the program.

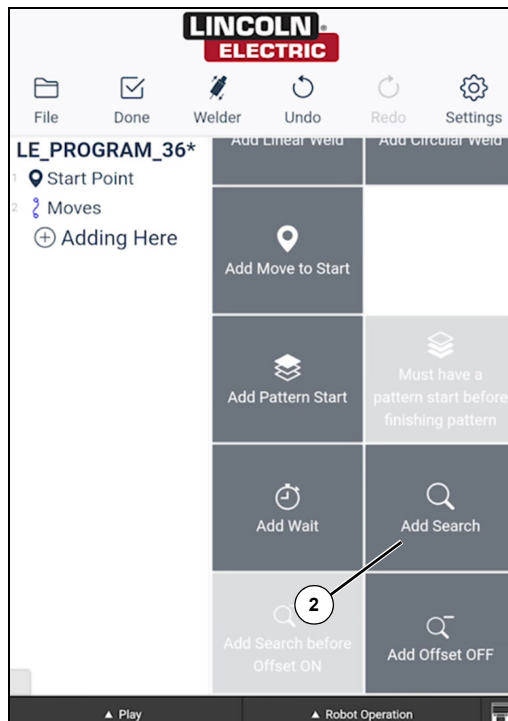
## SEARCH

1. Define the start location and select the More Choices icon (1).



**Figure 3-4**

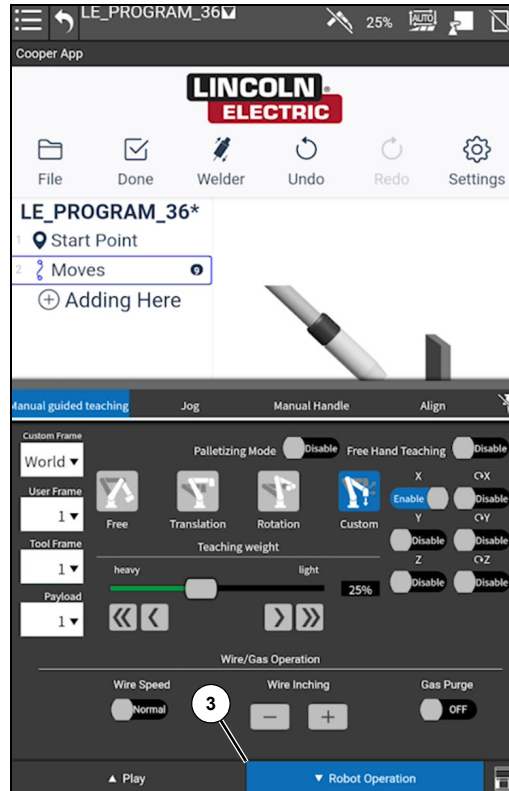
2. Select the Add Search icon (2).



**Figure 3-5**

**Note:** The robot will search two times the distance from the search point start to the part.  
**Note:** Ensure there is enough stick out on the wire to make contact with the part.

3. Move the robot to point on part that robot will touch during searching.
4. Lock out the robot joints in the Robot Operation tab (3) so the robot will only move in one direction.



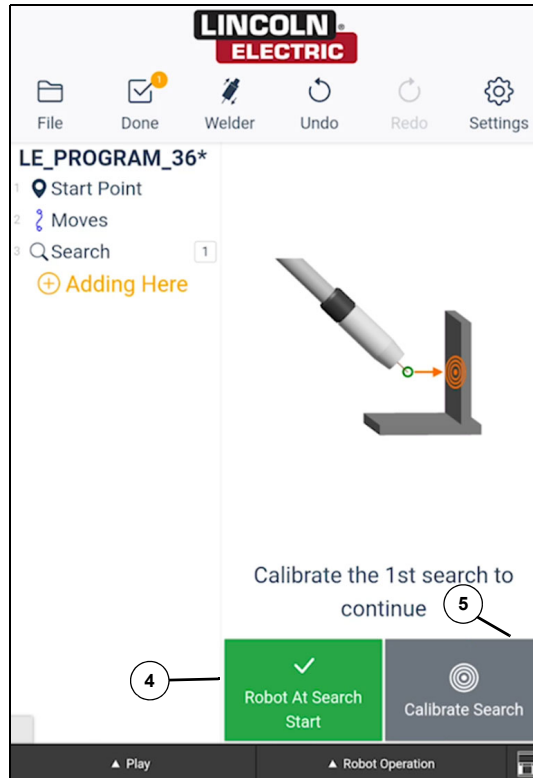
**Figure 3-6**

5. Move robot away from the part to the search start point.
6. Record the first point by pressing the green button.
7. Move the robot to the search end point and press the green button to record the search end point. The search end point is the point touching the part.

**⚠ WARNING**

**Warning:** Part Search process applies current to weld wire. Wear proper personal protective equipment (PPE) when operating the robot with the welder active. Failure to wear proper PPE will result in serious injury or death.

8. Ensure the welder is on.
9. Select the Go to Search Start icon (4).
10. When the robot reaches the Search Start position, select the Calibrate Search icon (5).



**Figure 3-7**

11. The operator can now add a different search in another dimension or continue teaching the program. To continue teaching the program, select more choices icon (6).

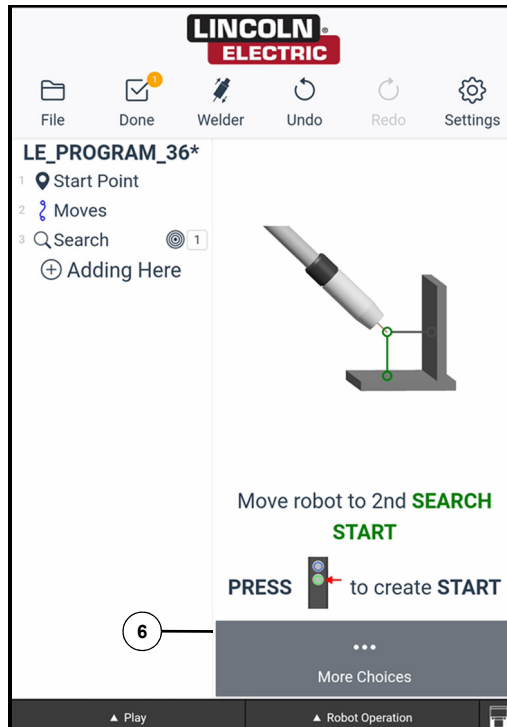


Figure 3-8

**Note: Adding an offset to the search group will add the previously created search to the next weld being created.**

12. The operator will now be presented with an option to add an offset for the search group. Select the Yes icon (7) to use the offset found in the search or No icon (8) to ignore this offset.

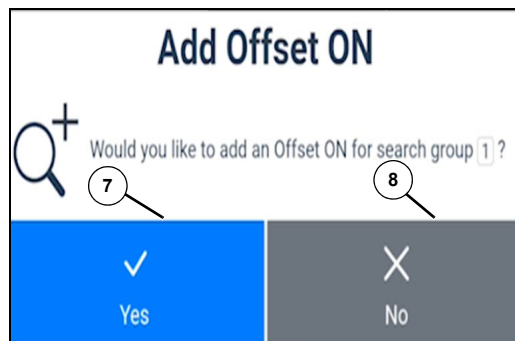
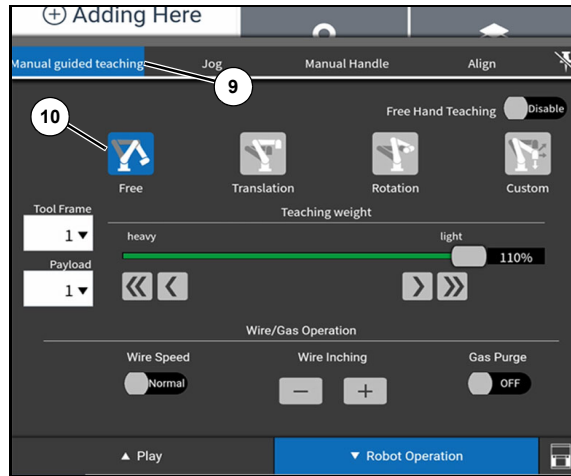


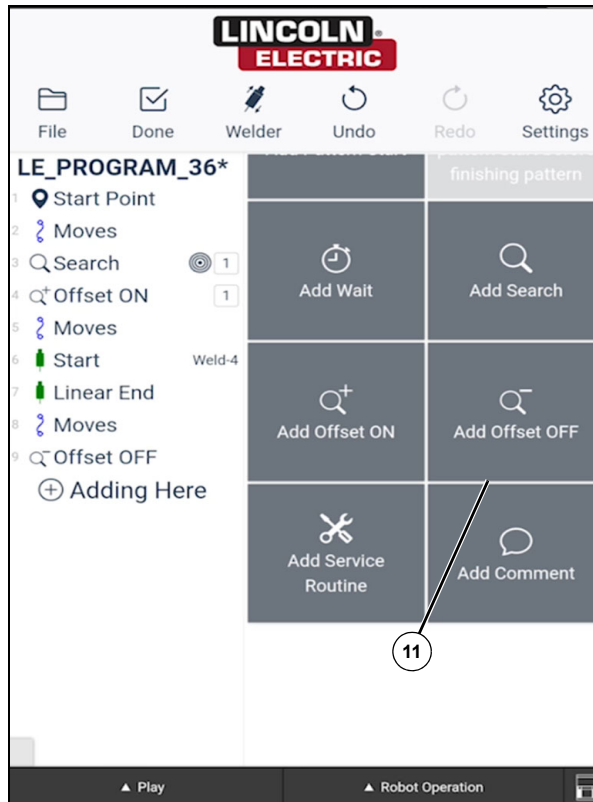
Figure 3-9

13. Unlock the axis on the robot. In the Robot Operations Tab, change the Manual Guided Teaching (9) mode back to Free (10).



**Figure 3-10**

14. Program a weld, see *Programming a Linear Weld on page 2-1* or see *Programming a Circular Weld on page 2-2*.  
15. Select the More Choices icon and then select Add Offset OFF (11).



**Figure 3-11**

16. Select the Done icon and run the program.

## THRU-ARC™ TRACKING

1. To track the weld, go through the weld by numbers process. For more information, see *Using Weld By Numbers* on page 2-4 and see *Creating a Custom Weld* on page 2-11.
2. Select the edit icon (1) on the Custom list page.

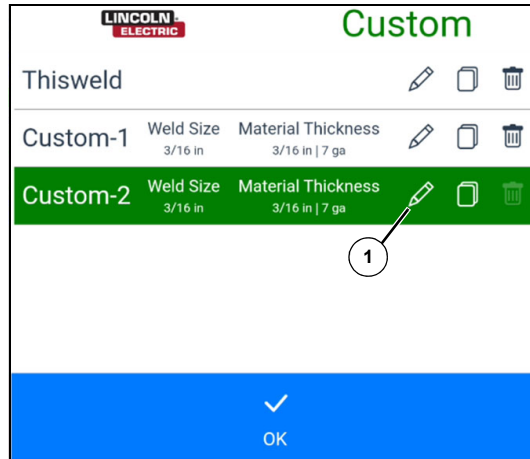


Figure 3-12

3. Here the operator will be presented with three tracking options: Off (2), Center (3), and Height (4). Select the appropriate tracking.

**Note: Centerline tracking is only available on weld schedules that use a weave.**

4. Select the Save icon (5). The program will now be updated with tracking enabled.

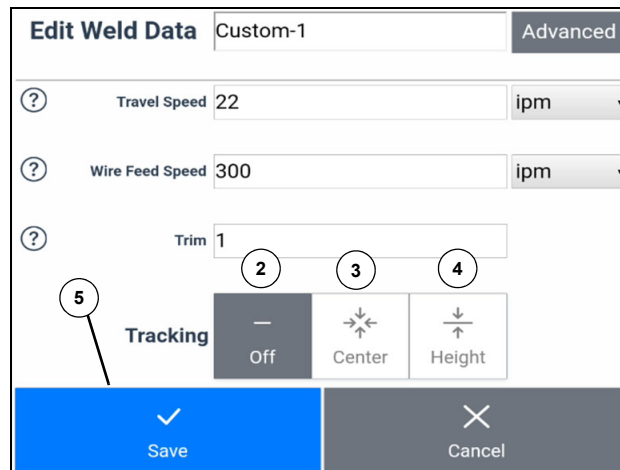


Figure 3-13



## MULTI-PASS WELDING

### WARNING

**Warning: Wear proper personal protective equipment (PPE) when operating the robot with the welder active. Failure to wear proper PPE will result in serious injury or death.**

1. To program a multi-pass weld, first program a linear weld. See *Programming a Linear Weld on page 2-1* and weld the part.
2. After the weld is complete, go into edit mode and select the Add Pass icon (1). This will provide a selection for the root weld.

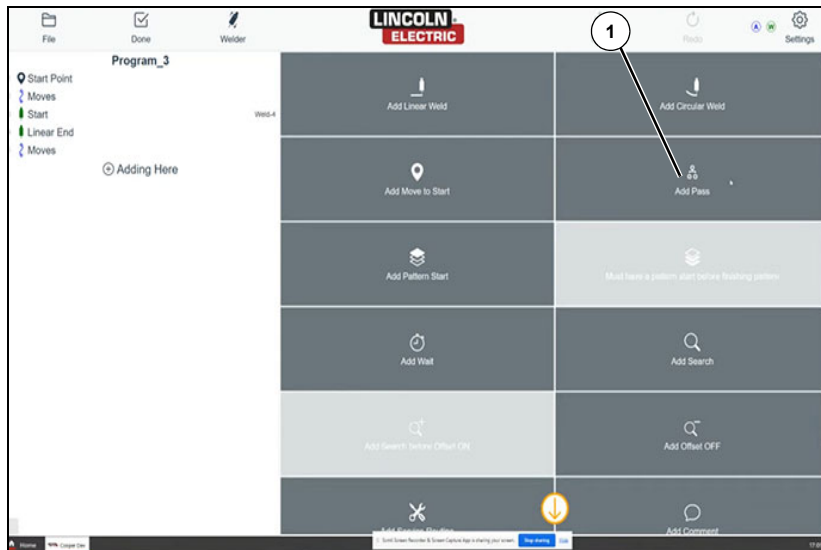


Figure 3-14

3. Select the weld to have a multi-pass applied.

**Note: The operator will have the option to press the Go to Weld Start icon on any of the available root passes to determine the correct root pass.**

4. Once the correct root pass has been selected, press the Confirm icon (2). Now the operator will be able to teach the next pass. The pass can be taught to weld in either direction by moving the robot to the side of the weld to be started on.

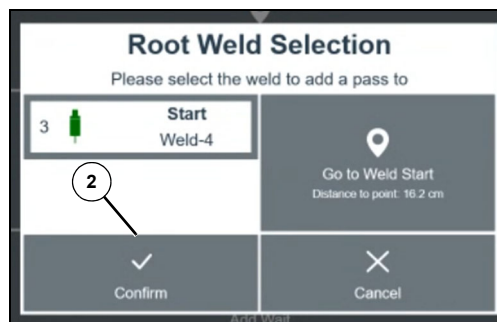


Figure 3-15

5. Unlock the robot and move the robot to the start position; off of the root seam pass.

6. Teach the pass start by pressing the green button on the robot.

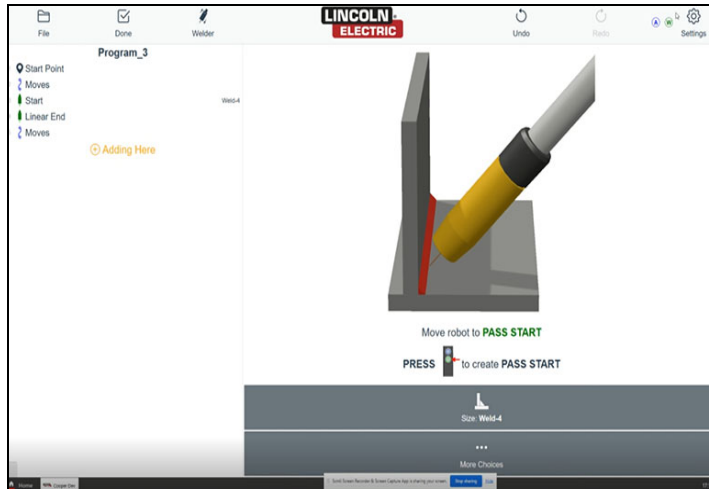


Figure 3-16

7. Move the robot to the end of the weld; off of the root seam pass. Press and hold the green button to record the pass end location.

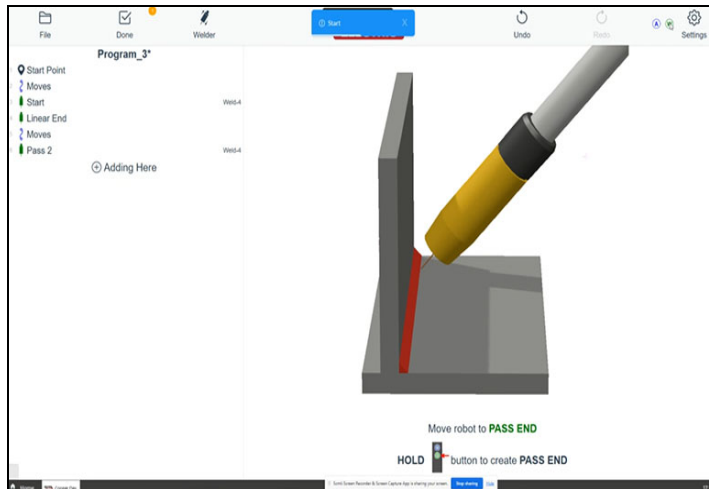


Figure 3-17

- 8. Move the robot up and out of the way of the part. Pass 2 has now been completed.
- 9. Select the Done icon and weld the pass 2.
- 10. Repeat steps 2–9 for any additional passes.

## CREATE A MULTIPASS TEMPLATE

**Note: A multipass template is used in a case where a multipass weld has been created and the stacking pattern and offsets are to be reused.**

1. Go into edit mode and select the insert location (1). The insert location is a point that is below the root weld that has passes associated with it.
2. Select the Create Multipass Template icon (2).

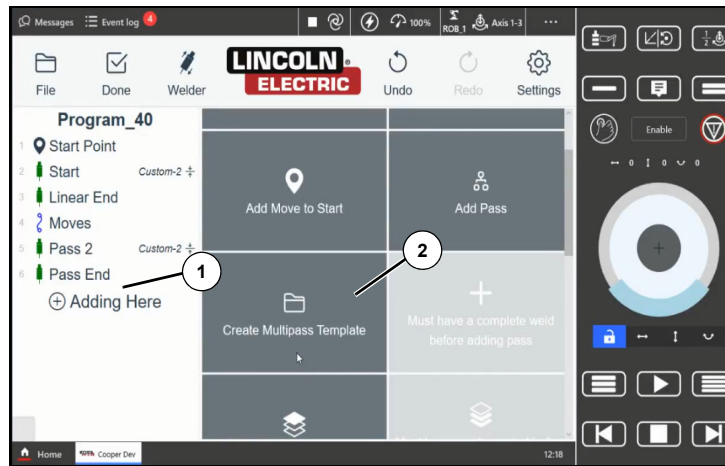


Figure 3-18

**Note: The Cooper App will provide a selection of the available root welds with the associated passes that the user can select to create a template from.**

3. Select the desired root weld then go to the Weld Start position (3) and select Confirm (4).

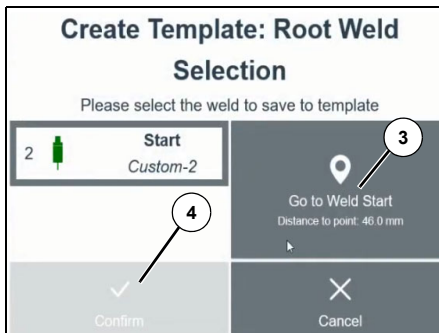
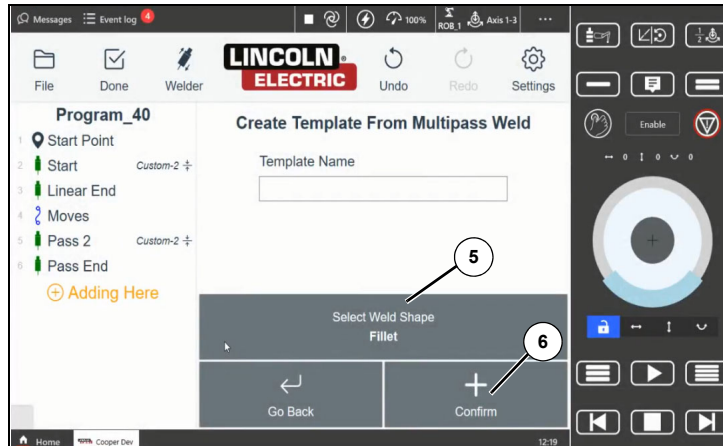


Figure 3-19

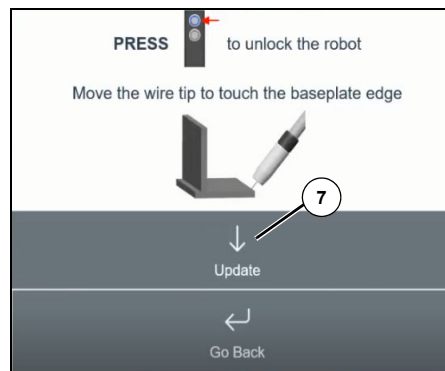
- The Cooper App will now prompt the user to create a name for the template.
- Select the appropriate Weld Shape (5) then select the Confirm icon (6).

**Note: This is not an inclusive list. Select the shape that matches the welding shape the closest.**



**Figure 3-20**

- Move the robot so the tip of the wire is touching the edge of the base plate. Press the green button or select the Update icon (7) to record this point.



**Figure 3-21**

- The Cooper App will now inform the operator that the template is now saved to disk. The template can now be applied to any other multipass welds.

## APPLYING A MULTIPASS TEMPLATE

1. In order to apply a multipass, template, at least one template must have previously been created. If none have been created, create a multipass template, see *Create A Multipass Template on page 3-11*.
2. Go into Edit Mode and teach a root weld. Ensure the insert location is below the root weld and select the Add Passes From Template icon (1). This will give the operator an option to select the desired root weld.

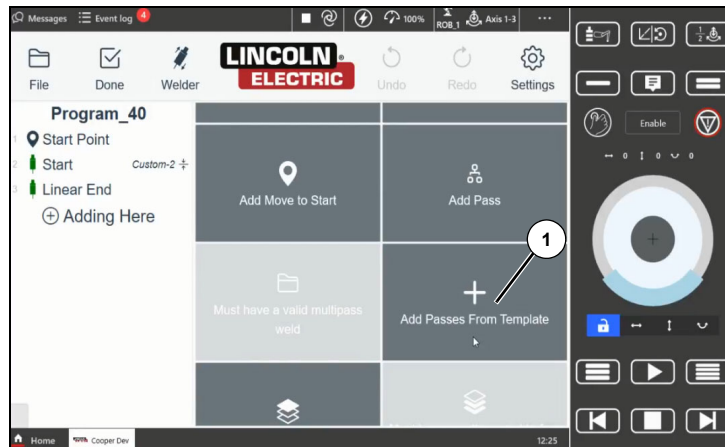


Figure 3-22

3. Go to the weld start of the root weld and select Confirm. The Cooper App will now provide the operator with a list of templates (2) to choose from.
4. Select the desired template and select the Next icon (3).

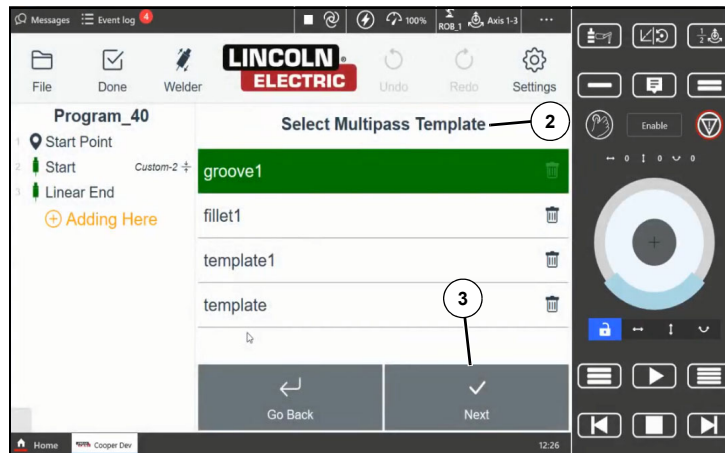
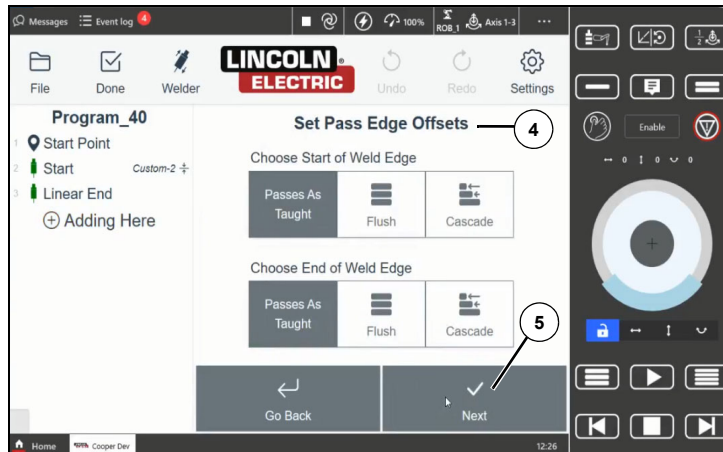


Figure 3-23

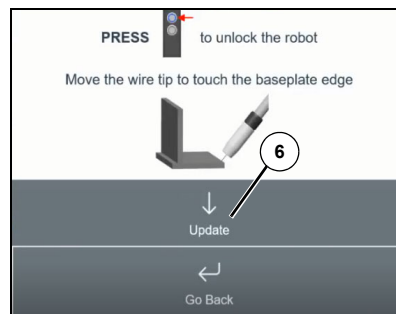
5. Specify the offset effect for the start and end edges of the passes (4) then select the Next icon (5).

**Note:** The options for the edge offsets are to leave the passes as they were taught in the template, to create a flush effect where all passes have the same elongation, or a cascade effect. These can be selected individually for the start and the end of the weld.



**Figure 3-24**

6. Teach the base plate of the root weld. Unlock the robot and move the wire so that the wire tip touches the edge of the base plate and press the green button or select the Update icon (6).



**Figure 3-25**

7. The Cooper App will now show the passes have been added from the template.
8. Move the robot up and out of the way of the part. The operator can now run the program with the passes that have been applied from the template.

## GLOSSARY

### **Cooper App**

A Lincoln Electric Company proprietary software interface, designed to deliver a simplified user experience when programming weld sequences on a collaborative robot.

### **Consumables**

During the welding process there are materials like welding gas and welding wire that is consumed. Defining the correct consumables used during set-up is critical to the delivery of a consistent quality weld.

### **Linear Weld**

A weld that is arranged in or extending along a straight or nearly straight line.

### **Circular Weld**

Any weld path that isn't a linear path including Circles, Arcs and Bends etc.

### **Weld by Numbers**

A Lincoln Electric Company proprietary software feature that simplifies the welding process by predefining a multitude of weld parameters needed to produce a quality weld and allowing the user to easily select the number that best represents the intended weld.

### **Custom Weld**

In the off case where the "Weld by Number" settings do not deliver an optimum weld users can modify the predefined weld settings to deliver the best possible weld for the materials used.

### **Air Moves**

The motion of a robot arm during a weld program where arc welding is not being conducted. This can consist of motion between a home position to the first weld or from the last weld in a program. Movements between welds can also consist of 'air moves'.

### **Weld Points**

Every robotic weld program has a series of points or targets that define the tool path trajectory in which the robot arm will follow. This can include Weld Start Point, Weld End Point and Via Points.

### **Angle Tuner**

When performing a weld the angle in which you teach your robot to perform has a significant impact on the quality of the weld that is produced. The Angle Tuner provides users with a tool to simplify the adjustment of the Work Angel, Travel Angle and Torch Spin.

### **Weld Pattern**

In situations when multiples of the same part can be positioned within a fixture providing equal spacing between parts or when a single part has a repetitive design with equal spacing between weldments the Weld Pattern feature can be utilized to easily duplicate a single taught weld path over the subsequent weldments.

# Glossary

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## **Batcher / Scheduler**

When multiple weld programs are present for either a single part or multiple parts the batcher feature found within production mode can be used to select and group all relevant programs required to complete the entire job. Programs can also be easily scheduled to be performed at different intervals within the overall job.

## **Service Routines**

When conducting continuous welding operations within a robotic welding environment it is often necessary to perform regular preventative maintenance services like, cleaning torch gas cup or cutting weld wire. The Service Routine feature allows you to easily schedule a service routine within a program. When the service routine is reached the program will pause and the user prompted to perform the service and then allowed to resume the program.

## **Stitch Weld**

An intermittent weld where a weld is applied to a defined portion of the joint followed by a defined space which is then followed by a defined portion of joint. This is repeated along the duration of the programmed weld. Stitch welds are used to limit the amount of heat transferred to the part to prevent or reduce part distortion. Stitch welds can also reduce the cost by reducing the amount of consumables used.

## **Search**

Imperfect tooling and part inconsistencies can cause weld joints to deviate greatly from the programmed weld path. Touch Sensing works by using the welding electrode to make electrical contact with the part and identify its location. The robot stores the position data and then makes offset adjustments automatically to the entire weld path to accommodate for inconsistencies in the seam location between alike parts.

## **Thru-Arc™ Tracking**

Thru-Arc™ Tracking, also known as Seam or Joint Tracking, involves real-time tracking just ahead of where the weld path has been programmed. This tracking information is used to automatically adapt the trajectory of the robot arm during the welding operation, ensuring that the weld path correctly follows any deviations within the seam of the part.

## **Multipass Welding**

Multipass welding is a process in which more than one pass of the weld is made on a joint. A pass is a single bead of weld metal that runs along the length of the joint. Multipass welding allows you to fill a large gap or groove with multiple layers of weld metal, each one covering the previous one. Multi-pass welds are often found in industries such as structural fabrication, pipeline and shipbuilding.



## **CUSTOMER ASSISTANCE POLICY**

The business of Lincoln Electric is manufacturing and selling high quality welding equipment, automated welding systems, consumables, and cutting equipment. Our challenge is to meet the needs of our customers, who are experts in their fields, and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or technical information about their use of our products. Our employees respond to inquiries to the best of their ability based on information and specifications provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment, or to provide engineering advice in relation to a specific situation or application. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or communications. Moreover, the provision of such information or technical information does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or technical information, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose or any other equivalent or similar warranty is specifically disclaimed.

Lincoln Electric is a responsive manufacturer, but the definition of specifications, and the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

## **WELD FUME CONTROL EQUIPMENT**

The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.



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