Operator's Manual

RealWeld® Trainer

For use with machines having Code Numbers:

AD2438-1

Visit: www.lincolnelectric.com/realweld for initial setup videos and training information.

GENUINE LINCOLN PARTS™

Register your machine:
www.lincolnelectric.com/register

Authorized Service and Distributor Locator:
www.lincolnelectric.com/locator

Save for future reference

Date Purchased

Code: (ex: 10859)

Serial: (ex: U1060512345)

IM10325 | Issue Date 16-Feb

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.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 can be increased by 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.

⚠ WARNING

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

⚠ CAUTION

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 appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).

USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

WEAR CORRECT EYE, EAR & BODY PROTECTION

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 area **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.

SECTION A: WARNINGS

CALIFORNIA PROPOSITION 65 WARNINGS

WARNING: 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.
- Do not idle the engine except as necessary.

For more information go to www.P65 warnings.ca.gov/diesel

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

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER 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.

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

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

1.c. 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.

1.d. 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.

1.e. 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.

1.f. 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.

1.g. 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.

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

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

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

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

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

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

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. 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.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

ELECTRIC SHOCK CAN KILL.

3.a. 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.

3.b. 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.

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

3.d. 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.

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

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

3.g. Never dip the electrode in water for cooling.

3.h. 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.

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

3.j. Also see Items 6.c. and 8.

ARC RAYS CAN BURN.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

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

4.c. 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.

FUMES AND GASES CAN BE DANGEROUS.

5.a. 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. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**

5. b. 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.

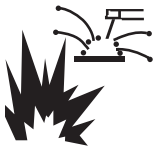
5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

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

5.e. 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.

5.f. Also see item 1.b.

WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



6.a. 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.

6.b. 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.

6.c. 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.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure 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).

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

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless 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.

6.g. 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.

6.h. Also see item 1.c.

6.I. 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 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

CYLINDER MAY EXPLODE IF DAMAGED.

7.a. 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.

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

7.c. 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.

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

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

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

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, "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.

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

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

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

Refer to http://www.lincolnelectric.com/safety for additional safety information.

ELECTROMAGNETIC COMPATABILITY (EMC)

CONFORMANCE

Products displaying the CE mark are in conformity with European Community Council Directive of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (89/336/EEC). 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. Be aware that interference may result and extra precautions may be required when a welding power source is used in a domestic establishment.

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. In other cases it could involve construction of an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases 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 according to national codes. Changing the earthing arrangements should only be authorized by a person who is competent to access 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 the surrounding area. The following shall be taken into account:

a. other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;

b. radio and television transmitters and receivers;

c. computer and other control equipment;

d. safety critical equipment, e.g., guarding of industrial equipment;

e. the health of the people around, e.g., the use of pacemakers and hearing aids;

f. equipment used for calibration or measurement

g. 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;

h. 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

Mains Supply

Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. 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 manufacturers 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 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 work piece 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, not connected to earth because of its size and position, e.g., ships 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 work piece 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 work piece, 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.

[1] Portions of the preceding text are contained in EN 60974-10: "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."

As a rule of thumb, for many mild steel electrode, if the air is visibly clear and you are comfortable, then the ventilation is generally adequate for your work. The most accurate way to determine if the worker exposure does not exceed the applicable exposure limit for compounds in the fumes and gases is to have an industrial hygienist take and analyze a sample of the air you are breathing. This is particularly important if you are welding with stainless, hardfacing or Special Ventilation products. All Lincoln MSDS have a maximum fume guideline number. If exposure to total fume is kept below that number, exposure to all fume from the electrode (not coatings or plating on the work) will be below the TLV.

There are steps that you can take to identify hazardous substances in your welding environment. Read the product label and material safety data sheet for the electrode posted in the work place or in the electrode or flux container to see what fumes can be reasonably expected from use of the product and to determine if special ventilation is needed. Secondly, know what the base metal is and determine if there is any paint, plating, or coating that could expose you to toxic fumes and/or gases. Remove it from the metal being welded, if possible. If you start to feel uncomfortable, dizzy or nauseous, there is a possibility that you are being overexposed to fumes and gases, or suffering from oxygen deficiency. Stop welding and get some fresh air immediately. Notify your supervisor and co-workers so the situation can be corrected and other workers can avoid the hazard. Be sure you are following these safe practices, the consumable labeling and MSDS to improve the ventilation in your area. Do not continue welding until the situation has been corrected.

NOTE: The MSDS for all Lincoln consumables is available on Lincoln's web-site: www.lincolnelectric.com

Before we turn to the methods available to control welding fume exposure, you should understand a few basic terms:

Natural Ventilation is the movement of air through the workplace caused by natural forces. Outside, this is usually the wind. Inside, this may be the flow of air through open windows and doors.

Mechanical Ventilation is the movement of air through the workplace caused by an electrical device such as a portable fan or permanently mounted fan in the ceiling or wall.

Source Extraction (Local Exhaust) is a mechanical device used to capture welding fume at or near the arc and filter contaminants out of the air.

The ventilation or exhaust needed for your application depends upon many factors such as:

- Workspace volume
- Workspace configuration
- Number of welders
- Welding process and current
- Consumables used (mild steel, hardfacing, stainless, etc.)
- Allowable levels (TLV, PEL, etc.)
- Material welded (including paint or plating)
- Natural airflow

Your work area has adequate ventilation when there is enough ventilation and/or exhaust to control worker exposure to hazardous materials in the welding fumes and gases so the applicable limits for those materials is not exceeded. See chart of TLV and PEL for Typical Electrode Ingredients, the OSHA PEL (Permissible Exposure Limit), and the recommended guideline, the ACGIH TLV (Threshold Limit Value), for many compounds found in welding fume.

Ventilation

There are many methods which can be selected by the user to provide adequate ventilation for the specific application. The following section provides general information which may be helpful in evaluating what type of ventilation equipment may be suitable for your application. When ventilation equipment is installed, you should confirm worker exposure is controlled within applicable OSHA PEL and/or ACGIH TLV. According to OSHA regulations, when welding and cutting (mild steels), natural ventilation is usually considered sufficient to meet requirements, provided that:

1. The room or welding area contains at least 10,000 cubic feet (about 22' x 22' x 22') for each welder.
2. The ceiling height is not less than 16 feet.
3. Cross ventilation is not blocked by partitions, equipment, or other structural barriers.
4. Welding is not done in a conned space.

Spaces that do not meet these requirements should be equipped with mechanical ventilating equipment that exhausts at least 2000 CFM of air for each welder, except where local exhaust hoods or booths, or air-line respirators are used.

Important Safety Note:

When welding with electrodes which require special ventilation such as stainless or hardfacing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce hazardous fumes, keep exposure as low as possible and below exposure limit values (PEL and TLV) for materials in the fume using local exhaust or mechanical ventilation. In conned spaces or in some circumstances, for example outdoors, a respirator may be required if exposure cannot be controlled to the PEL or TLV. (See MSDS and chart of TLV and PEL for Typical Electrode Ingredients.) Additional precautions are also required when welding on galvanized steel.

BIBLIOGRAPHY AND SUGGESTED READING

ANSI Z87.1, Practice for Occupational and Educational Eye and Face Protection, American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

Arc Welding and Your Health: A Handbook of Health Information for Welding. Published by The American Industrial Hygiene Association, 2700 Prosperity Avenue, Suite 250, Fairfax, VA 22031-4319.

NFPA Standard 51B, Cutting and Welding Processes, National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9146, Quincy, MA 02269-9959.

OSHA General Industry Standard 29 CFR 1910 Subpart Q. OSHA Hazard Communication Standard 29 CFR 1910.1200. Available from the Occupational Safety and Health Administration at http://www.osha.org or contact your local OSHA office.

The following publications are published by The American Welding Society, P.O. Box 351040, Miami, Florida 33135. AWS publications may be purchased from the American Welding society at http://www.aws.org or by contacting the AWS at 800-443-9353.

ANSI, Standard Z49.1, Safety in Welding, Cutting and Allied Processes. Z49.1 is now available for download at no charge at http://www.lincolnelectric.com/community/safety/ or at the AWS website http://www.aws.org.

AWS F1.1, Method for Sampling Airborne Particulates Generated by Welding and Allied Processes.

AWS F1.2, Laboratory Method for Measuring Fume Generation Rates and Total Fume Emission of Welding and Allied Processes.

AWS F1.3, Evaluating Contaminants in the Welding Environment: A Strategic Sampling Guide.

AWS F1.5, Methods for Sampling and Analyzing Gases from Welding and Allied Processes.

AWS F3.2, Ventilation Guide for Welding Fume Control.

AWS F4.1, Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances.

AWS SHF, Safety and Health Facts Sheets. Available free of charge from the AWS website at http://www.aws.org.

LISTED BELOW ARE SOME TYPICAL INGREDIENTS IN WELDING ELECTRODES AND THEIR TLV (ACGIH) GUIDELINES AND PEL (OSHA) EXPOSURE LIMITS

INGREDIENTS	CAS No.	TLV mg/m3	PEL mg/m3
Aluminum and/or aluminum alloys (as Al)*****	7429-90-5	10	15
Aluminum oxide and/or Bauxite*****	1344-28-1	10	5**
Barium compounds (as Ba)*****	513-77-9	****	****
Chromium and chromium alloys or compounds (as Cr)*****	7440-47-3	0.5(b)	.005(b)
Fluorides (as F)	7789-75-5	2.5	2.5
Iron	7439-89-6	10*	10*
Limestone and/or calcium carbonate	1317-65-3	10	15
Lithium compounds (as Li)	554-13-2	10*	10*
Magnesite	1309-48-4	10	15
Magnesium and/or magnesium alloys and compounds (as Mg)	7439-95-4	10*	10*
Manganese and/or manganese alloys and compounds (as Mn)*****	7439-96-5	0.2	5.0(c)
Mineral silicates	1332-58-7	5**	5**
Molybdenum alloys (as Mo)	7439-98-7	10	10
Nickel*****	7440-02-0	1.5	1
Silicates and other binders	1344-09-8	10*	10*
Silicon and/or silicon alloys and compounds (as Si)	7440-21-3	10*	10*
Strontium compounds (as Sr)	1633-05-2	10*	10*
Zirconium alloys and compounds (as Zr)	12004-83-0	5	5

Supplemental Information:

(*) Not listed. Nuisance value maximum is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxide is 5 milligrams per cubic meter.

(**) As respirable dust.

(*****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

(b) The PEL for chromium (VI) is .005 milligrams per cubic meter as an 8 hour time weighted average. The TLV for water-soluble chromium (VI) is 0.05 milligrams per cubic meter. The TLV for insoluble chromium (VI) is 0.01 milligrams per cubic meter.

c) Values are for manganese fume. STEL (Short Term Exposure Limit) is 3.0 milligrams per cubic meter. OSHA PEL is a ceiling value.

(****) There is no listed value for insoluble barium compounds. The TLV for soluble barium compounds is 0.5 mg/m3.

TLV and PEL values are as of April 2006. Always check Material Safety Data Sheet (MSDS) with product or on the Lincoln Electric website at http://www.lincolnelectric.com

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TECHNICAL SPECIFICATIONS	
MEASUREMENTS	36” LENGTH 36” WIDTH 76” HEIGHT (ADJUSTABLE MINIMUM) 100” HEIGHT (ADJUSTABLE MAXIMUM)
WEIGHT	150 LBS. (68 KGS.)
MONITOR	15” TOUCHSCREEN MONITOR (WITH SCREEN PROTECTOR MOUNTED ON A SWIVEL ARM.
SHIPPING CRATE	86” LENGTH, WIDTH 28”, HEIGHT 31”
ELECTRICAL	110/240 VAC ~ 15A 50/60 HZ SINGLE PHASE. A 3330 JOULE OR HIGHER SURGE SUPPRESSOR IS REQUIRED.
OPERATING SYSTEM	WINDOWS® 7 (32-BIT)
PROCESSOR / MEMORY	INTEL® CORE® I3 / 4GB
HARD DRIVE	HIGH PERFORMANCE 320GB
PORTS (QTY) - USB 2.0/ETHERNET	3 / 1

SELECT SUITABLE LOCATION

Position the RealWeld Trainer in a dry location where there is free circulation of clean air. Dirt, dust or any foreign material that can be drawn into the machine should be kept at a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance trips.

ENVIRONMENTAL AREA

Keep the machine inside and dry at all times. Do not place it on wet ground or in puddles. Never place liquids on top of the machine.

STACKING

The RealWeld Trainer cannot be stacked.

TILTING

Place the RealWeld Trainer directly on a secure, level surface.

LIFTING

If lifting the RealWeld Trainer is required, use two straps; each rated for 200 pounds (91 kg) or more. Do not attempt to lift the RealWeld Trainer with accessories attached to it.

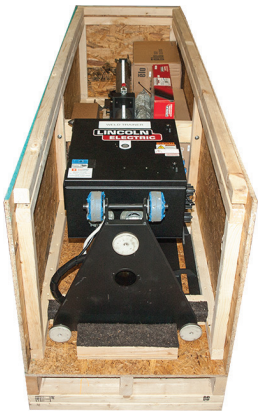
UNCRATING PROCEDURE

1. Remove the four carriage bolts, washers and lock washers securing the end panel to the crate. See Figure A.1. Set end panel aside.

Figure A.1 – End panel removal

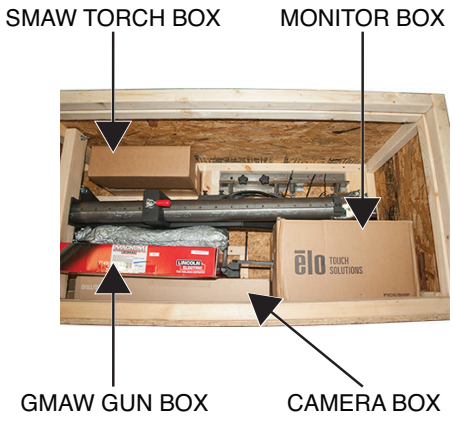
2. Carefully slide the top panel out of the crate and set aside. See Figure A.2.

Figure A.2 – Top panel removal



3. Remove the camera box, GMAW gun box, SMAW torch box, monitor box and packing foam form the crate. See Figure A.3.

Figure A.3 – Box removal



4. Using a 3/8" nutdriver, remove the screw securing each of the three fixtures to the crate. See Figure A.4 and A.5. Remove fixtures and set aside.

Figure A.4 – Fixture removal

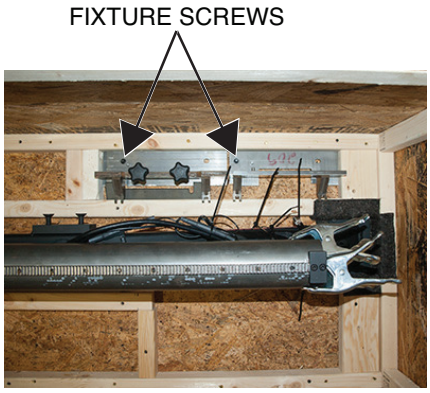
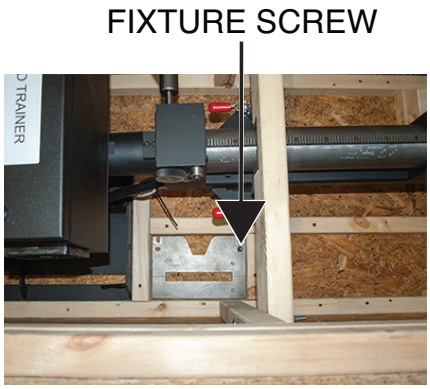
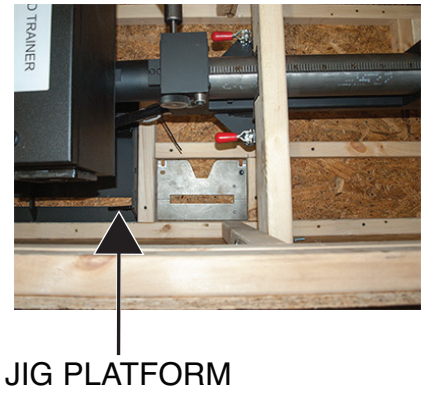


Figure A.5 – Fixture removal



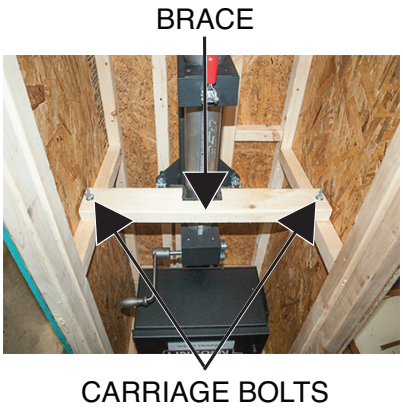
5. Using a 3/8" nutdriver, remove the screw securing the jig platform to the crate. See Figure A.6. Remove the jig platform and set aside.

Figure A.6 – Jig platform removal



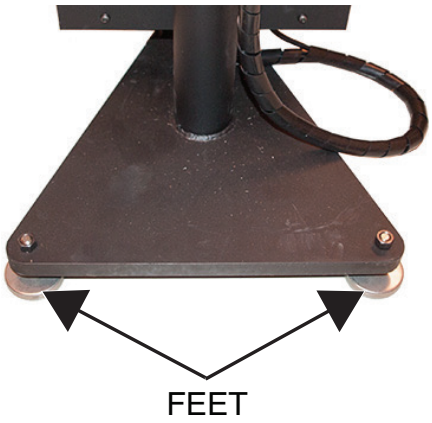
6. Remove the protective tape from the wheels on the bottom of the stand.
7. Remove the two carriage bolts, washers and lock washers securing the brace to the crate. See Figure A.7.

Figure A.7 – Brace removal



8. With the help of an assistant carefully tilt the trainer into the upright position.
9. With the help of an assistant, carefully slide the trainer stand forward a couple of inches, to allow the stand to be removed from the crate.
10. With the help of an assistant, carefully slide the trainer/stand assembly out of the crate.
11. Position the trainer/stand into the desired work area.
12. Adjust the feet on the bottom of the stand so the trainer/stand is level. See Figure A.8.

Figure A.8 – Feet adjustment



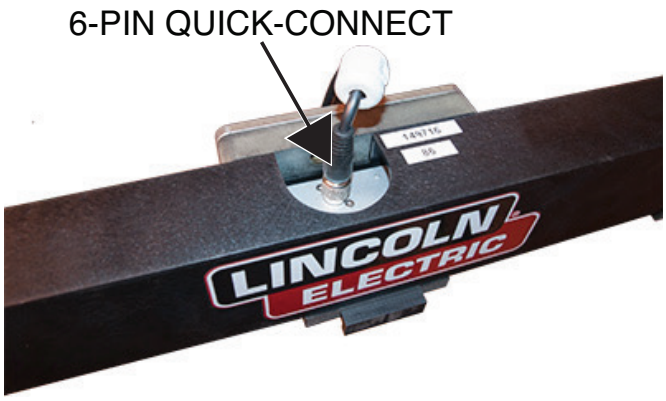
SETUP PROCEDURE

1. Carefully remove the camera assembly from the box.
2. Using a 1/8" allen wrench, attach the three screws securing the camera assembly to the trainer/stand. It may be necessary to use a step stool and an assistant to successfully mount the camera assembly. See Figure A.9.

Figure A.9 – Camera mounting screws

3. Carefully remove the cable ties securing the cables and speaker to the stand.
4. Connect the 6-pin quick-connect to the camera assembly. See Figure A.10.

Figure A.10 – 6-Pin quick connect

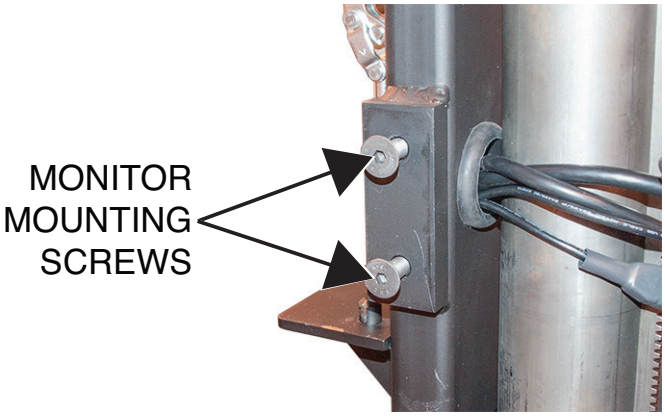


5. Remove the glass lens covers from the accessory pack and install them in the lens trays on the camera. See Figure A.11.

Figure A.11 – Lens cover installation

6. Using a 6mm allen wrench, remove the two screws from the monitor mount on the trainer/stand. See Figure A.12.

Figure A.12 – Monitor mounting screws



7. Carefully remove the monitor assembly from the box. See Figure A.13.

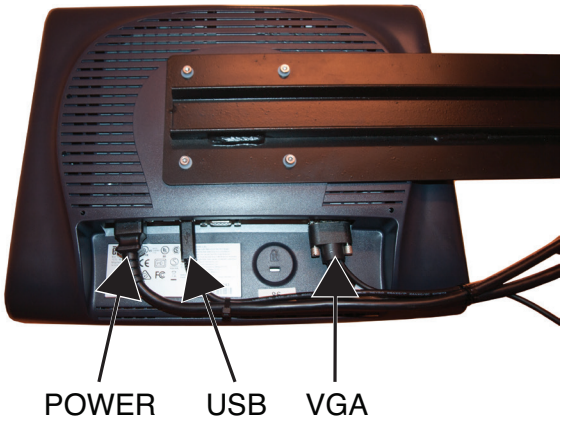
Figure A.13 – Monitor unboxing

8. Carefully position the monitor assembly on the trainer/stand. See Figure A.14.

Figure A.14 – Monitor assembly

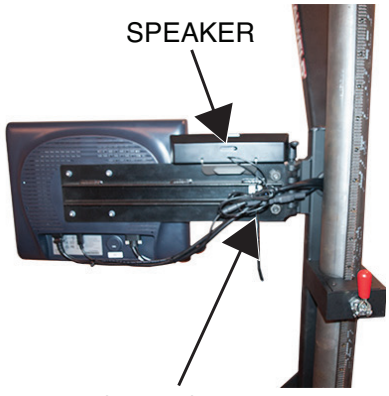
9. Using a 6mm allen wrench, attach the two previously removed screws securing the monitor to the trainer/stand.
10. Connect the monitor cables (VGA, power and USB) to the monitor. See Figure A.15.

Figure A.15 – Monitor cables



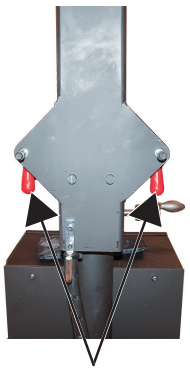
11. Remove the speaker from the storage bag.
12. Using the spring-loaded clip on the bottom of the speaker, attach the speaker to the monitor arm. See Figure A.16.
13. Using the attached cable tie, secure any loose cables to allow for safe operation of the machine. See Figure A.16.

Figure A.16 – Cable management and speaker location



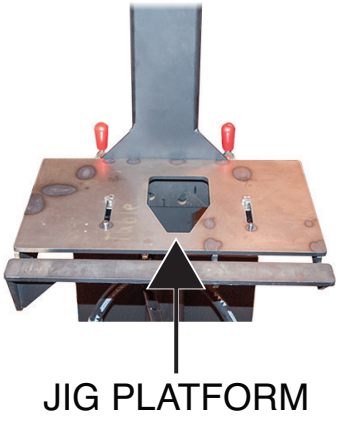
14. Place both jig clamps into the unlocked position. See Figure A.17.

Figure A.17 – Unlocked position



15. Position the jig platform onto the stand. See Figure A.18.

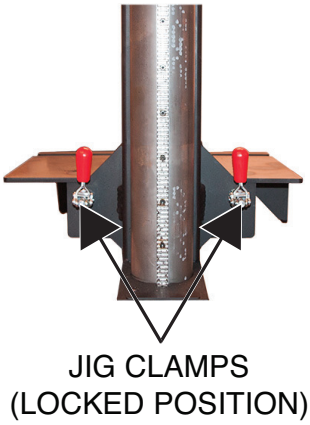
Figure A.18 – Jig platform



16. Place both jig clamps in the locked position to secure the platform. See Figure A.19.

NOTE: It may be necessary to adjust tension screws in order to safely secure platform. If platform is loose after clamp is placed in the locked position, use a 3/8" nutdriver to tighten the tension screws. If clamp will not go into the locked position, use a 3/8" nutdriver loosen the tension screws.

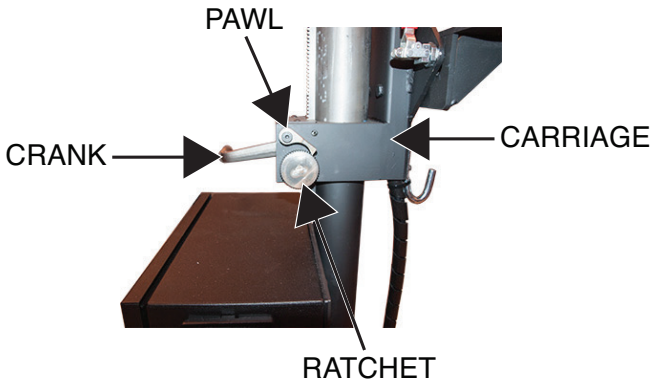
Figure A.19 – Locked position



17. Adjust the platform to suitable height for safe operation.
18. Ensure the pawl is active on the ratchet when raising the carriage. Flip the pawl up so it is not engaged with the ratchet for lowering, this is accomplished by putting a small load on the crank. See Figure A.20.

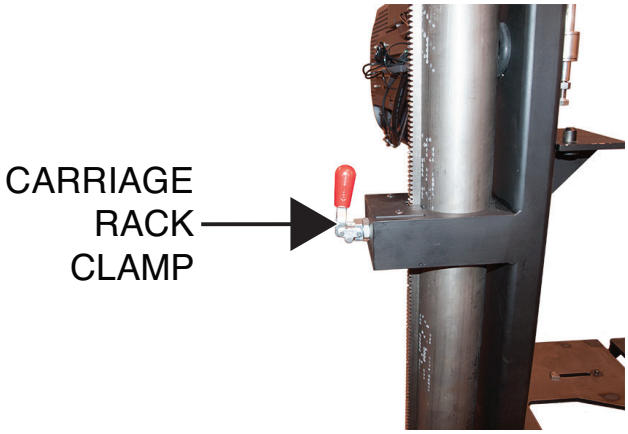
NOTE: The carriage pawl must be active when raising.

Figure A.20 – Pawl and ratchet



19. Release clamp on the carriage rack to unlock the rack and pinion. Be sure to keep one hand on the crank while performing this operation. See Figure A.21.

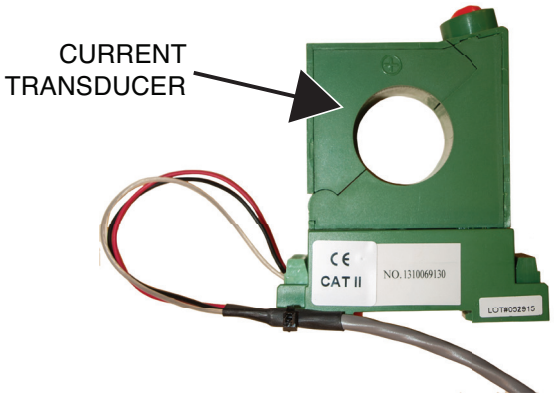
Figure A.21 – Carriage rack clamp



20. With the platform adjusted to the desired height, flip the pawl onto the ratchet and lock the clamp on the rack.
21. Attach the current transducer to the ground cable. If welding polarity is DCEP, the positive (+) side of the current transducer faces the jig platform. If welding polarity is DCEN*, the positive (+) side of the current transducer faces the welder. See Figure A.22.

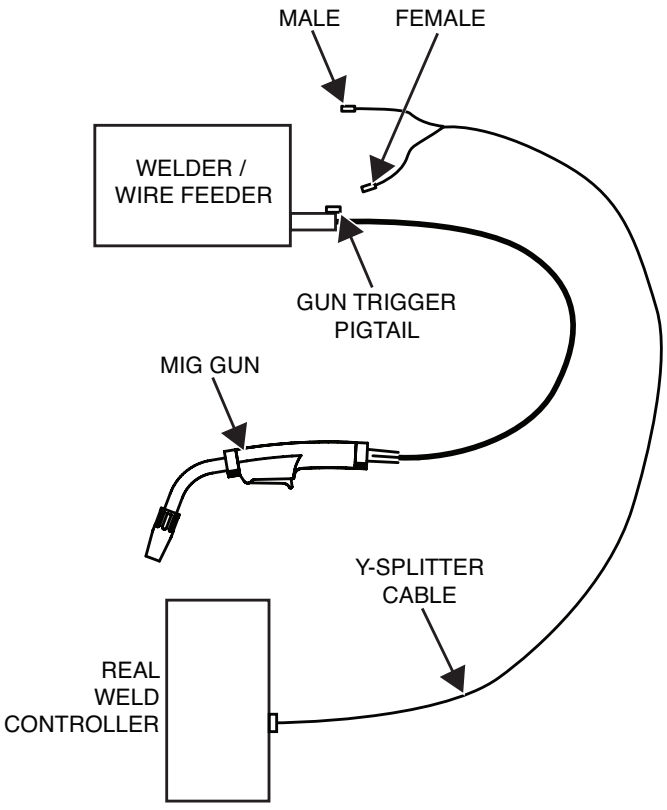
* When welding in DCEN, make certain the ground cable is connected to the positive output stud on the power source.

Figure A.22 – Current transducer



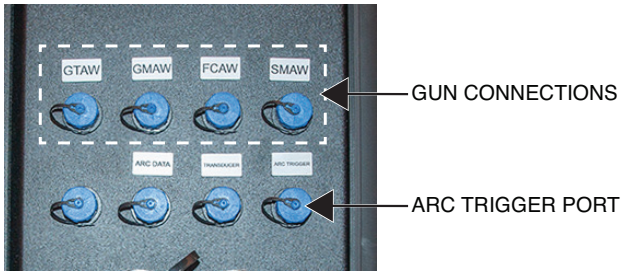
22. Connect the female y-splitter cable connector to the gun trigger pigtail. See Figure A.23.
23. Connect the male y-splitter cable connector to the 4-pin receptacle on the welder. See Figure A.23.

Figure A.23 – Y-splitter cable connection diagram



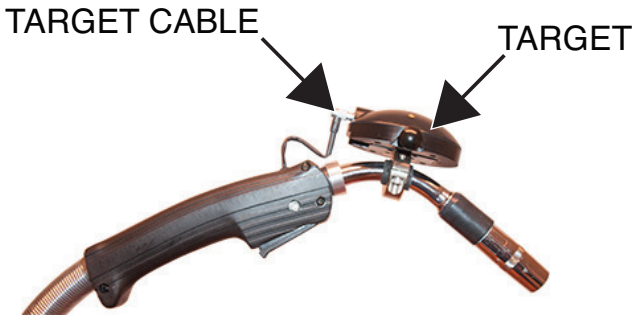
24. Connect the y-splitter cable connector to the “Arc Trigger” port on the CPU. See Figure A.24.

Figure A.24 – CPU connections



25. While pulling outward on the spring-loaded pin, slide the target onto the target mounting plate. Be sure the target is secure. See Figure A.25.
26. Connect the target cable to the target. See Figure A.25.

Figure A.25 – Target mounting



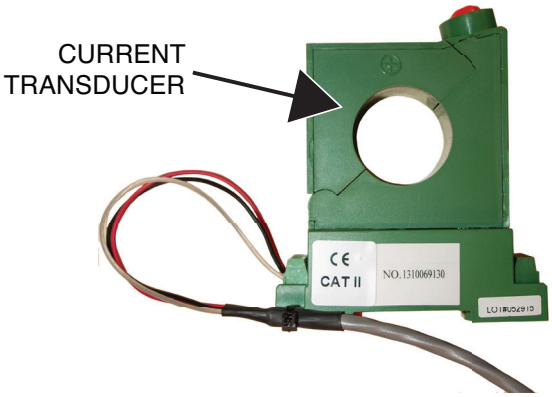
27. Connect the target cable to the appropriate gun connector (GMAW or FCAW) on the CPU. See Figure A.24.
28. Connect the CPU to a standard power outlet.
29. Pair welder to the realweld by connecting work lead to weld table and also connecting the gun to the wire feeder. See welder/wire feeder manual for setup of these components.

SMAW TORCH SETUP

1. Connect the SMAW torch connection to the power source. See welder/wire feeder manual for setup.
2. Connect the ground cable to the power source.
3. Attach the current transducer to the ground cable. If welding polarity is DCEP, the positive (+) side of the current transducer faces the jig platform. If welding polarity is DCEN*, the positive (+) side of the current transducer faces the welder. See Figure A.26.

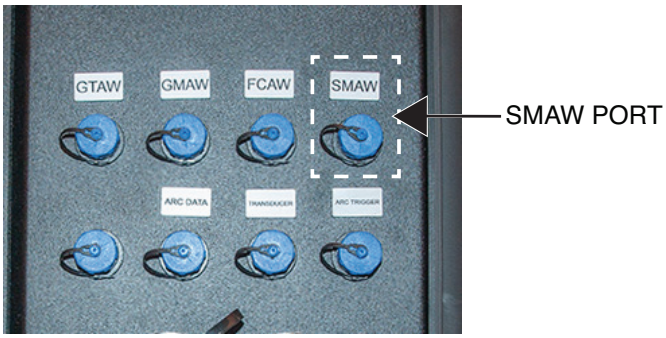
* When welding in DCEN, make certain the ground cable is connected to the positive output stud on the power source.

Figure A.26 – Current transducer



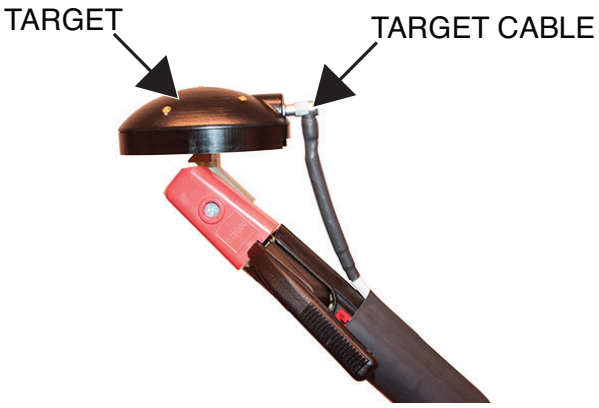
4. Connect the target cable to the “SMAW” port on the CPU. See Figure A.27.

Figure A.27 – SMAW connection



5. While pulling outward on the spring-loaded pin, slide the target onto the target mounting plate. Be sure the target is secure. See Figure A.28.
6. Connect the target cable to the target. See Figure A.28.

Figure A.28 – SMAW target mounting



7. Connect the CPU to a standard power outlet.
8. Pair welder to the realweld by connecting work lead to weld table. See welder/wire feeder manual for setup of these components.

PRODUCT DESCRIPTION

The RealWeld Trainer is a welding training solution designed to capture and score proper welding technique while making actual arc-on and/or practice arc-off welds.

The RealWeld Trainer uses a software-based system to manage the entire training process. The software operates with two types of users – the Instructor mode is for instructors to enroll new trainees, establish teaching curricula, assign curricula to each trainee, sign-off on a trainee's progress, calibration of the system and extract data to analyze trainee progress over time. The Trainee mode is for students to monitor their improvement over time while learning from defined curricula as assigned by the instructor. Instructors and trainees are uniquely identified by their username and must supply a password to gain access to the system.

A curriculum is an ordered list of Welding Procedure Specifications (WPSs). As many WPSs can be defined as required and are uniquely identified by their name. If there are well established curricula and WPSs in the training environment, the instructor can quickly configure those in the software. If there are not established curricula and WPSs, having a RealWeld Trainer will move you in that direction.

The student is assigned a curriculum and the result of every welding trial with either the arc-on or arc-off is saved for future reference and is uniquely identified by the trainee, WPS and date/time of that trail. Once a trainee has mastered a WPS, the instructor signs off on their skill level and the trainee will then be presented with the next WPS to learn in that curriculum. Several screens in the system allow either the trainee or instructor to evaluate progress.

The core of the technology is a robust vision system that allows the computer to track the motion of the welding torch or welding electrode holder. A target device is attached to a standard welding gun, so the motion capture cameras can track the gun as the student welds. A patent-pending technology filters out the arc light so the vision system is unaffected by the welding process. The system can automatically measure important welder motion parameters, such as travel speed, work angle, travel angle, contact tip to work distance (CTWD) and alignment with the joint (proximity). These measurements are made more than ten times per second and compared with the desired training procedure to automatically score the students performance. A report is instantly produced and graphically displayed so the student can learn what was done properly and where improvements are needed.

The RealWeld Trainer supports the welding of 6 inch coupons of up to three-eighths inch thickness (optionally supports 18 inch coupons for an additional feature cost) using SMAW (Stick), GMAW (Mig), FCAW (Flux Cored) welding processes. The system includes a work table and jigs that support fillet, lap and groove (butt) welds in the flat, horizontal and vertical positions. Fillet and lap also support overhead position.

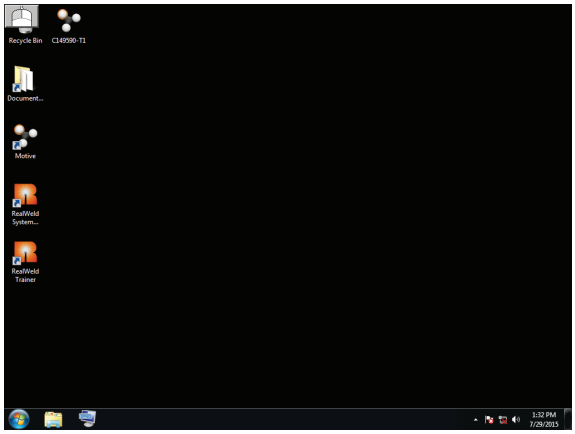
POWER UP / DOWN

1. Turn on the welder. See the Instruction Manual for the welder being used.
2. Press the ON/OFF button on the front panel of the CPU. The button will illuminate to indicate that the power has been turned ON. See Figure B.1.

Figure B.1 – ON/OFF BUTTON

3. The computer will display a series of standard windows startup screens until the main windows desktop is loaded. See Figure B.2.

Figure B.2 – Desktop



4. To power down the unit, quit all programs by tapping the red 'X' icon in the upper right corner of each window.
5. Select the 'Start' icon and select 'Shutdown' to power down the machine.

LOADING REALWELD TRAINER SOFTWARE

1. Using the touchscreen monitor, double tap (using your finger only) the RealWeld Trainer icon on the desktop. The software may take 15-30 seconds to load and will display a RealWeld Trainer splash screen during this process. See Figure B.3.

Figure B.3 – RealWeld trainer software

2. If the RealWeld System Admin application is running, there will be a warning message and the RealWeld Trainer application will shut down. To run the RealWeld Trainer application in this case, shutdown the RealWeld System Admin application.
3. The login window will appear once the software has been opened. See Figure B.4.

Figure B.4 – Login

INSTRUCTOR MODE

To access the features of the instructor mode, the instructor must login with the appropriate username and password.

Default instructor login credentials:

Username: ivan

Password: i

Default student login credentials:

Username: tom

Password: t

1. Using the touchscreen monitor, select the 'Username' text box and enter the assigned username with the on-screen keyboard. Select the 'Enter' icon to apply the username. See Figure B.5.

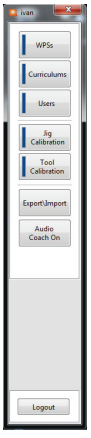
Figure B.5 – Username

2. Using the touchscreen monitor, select the 'Password' text box and enter the assigned password with the on-screen keyboard. Single tap the 'Enter' icon once the password has been entered, this will remove the on-screen keyboard from the screen. See Figure B.6.

Figure B.6 – Password

3. Using the touchscreen monitor, select the 'OK' icon on the login window. Once selected, the user will be logged in and a set of menu options, specifically for an instructor, will be displayed on the left side of the screen. See Figure B.7.

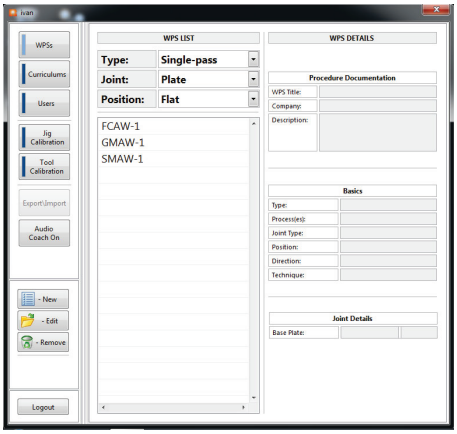
Figure B.7 – Instructor menu



WELDING PROCEDURE SPECIFICATIONS (WPS)

Selecting the 'WPSs' icon will bring up a list of all WPSs currently in the system. There are three pre-loaded curricula (SMAW 101, GMAW 101 and FCAW 101) that contain various WPSs. See Figure B.8.

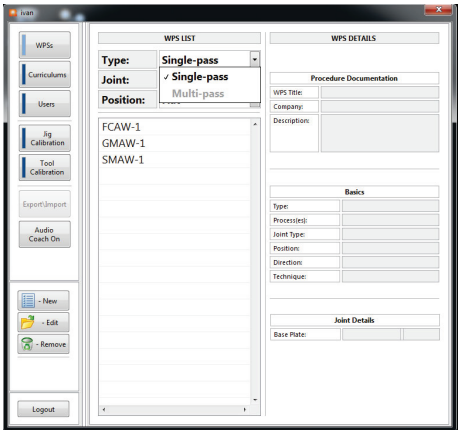
Figure B.8 – Welding procedure specifications (WPS)



Selecting the 'Type', 'Joint' and 'Position' drop down menus will display the various options. Each combination of type, joint and position will display the WPSs that are associated with that selection.

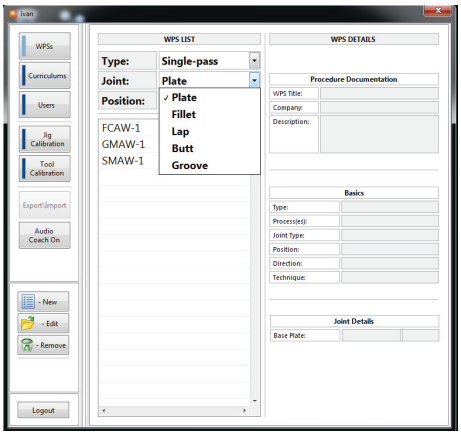
In the 'Type' drop down menu, only single-pass can be selected. See Figure B.9.

Figure B.9 – Type



In the 'Joint' drop down menu, either plate, fillet, lap, butt and groove can be selected. See Figure B.10.

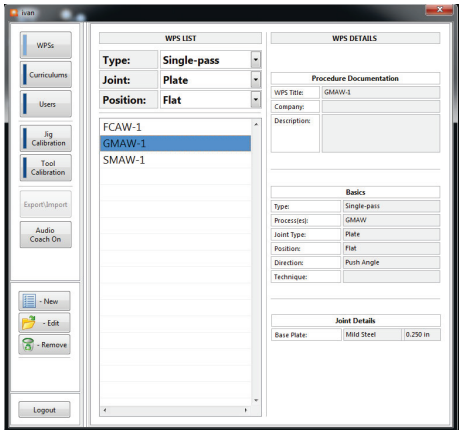
Figure B.10 – Joint



In the 'Position' drop down menu, flat, horizontal, vertical or overhead positions can be selected.

Selecting the desired WPS, the procedure documentation, basics and joint type will be displayed in the WPS details column on the right side of the monitor. See Figure B.11.

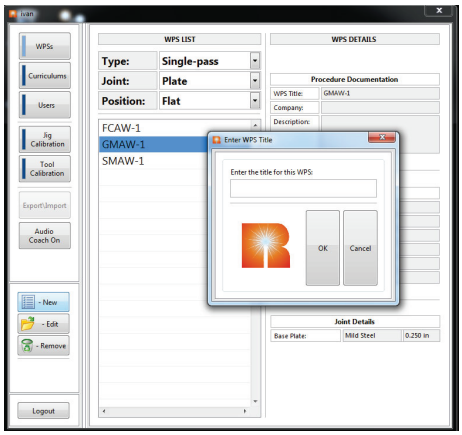
Figure B.11 – WPS details



CREATE A NEW WPS

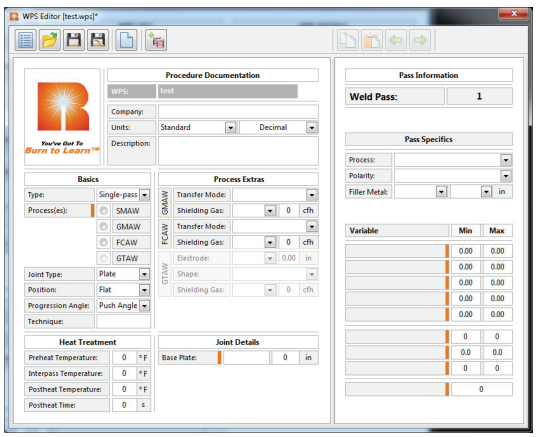
1. Using the touchscreen monitor, select the 'New' icon on the left side of the monitor. See Figure B.12.

Figure B.12 – Create a new WPS



2. Enter the title for the new WPS into appropriate text box and select the 'OK' icon. The WPS editor will now be displayed. In this window, the instructor can set a variety of parameters. See Figure B.13.

Figure B.13 – WPS editor



When setting up a WPS, any item that has an orange highlight is required for creating a WPS. In regards to the variables section on the right hand side of the screen, there are five critical torch motion variables that need to be set that will be used to accurately measure each students results. The five critical torch motion variables are Work Angle, Travel Angle (Push or Drag), CTWD (Contact Tip to Work Distance), Travel Speed and Proximity (aim to the root of the joint).

The best approach to determining these values, if not already known, is to have an experienced welder run several welds with this system until an acceptable weld is created. The data collected from these welds can be used to create the baseline for the five critical torch motion variables as well as current, voltage and wire feed speed.

At the top of the screen, under 'Procedure Documentation', the company name and description can be typed in, as well as the option to select the appropriate units (standard/metric, decimal/fractional).

The first few items to program are listed under 'Basics'. This includes things like joint type, process, position and progression angle. Various other process variables can be programmed as well including transfer mode, shielding gas type flow rate and even specific heat treatment temperatures.

Enter the base plate material type and thickness in the 'Joint Details' section.

On the right hand side of the screen, under 'Pass Specifics', the process, polarity and the filler metal type and size can be programmed.

In the "Variables" section, enter the work angle, travel angle, CTWD, travel speed, proximity, current, voltage wire feed speed and weld. These values need to be entered in order to create the new WPS.

SUPPLEMENTAL MATERIAL

Supplemental material in a WPS can be any document (pdf), image (bmp, jpg, png), video (avi, mp4, mov, wmv) or URL that helps to supplement the selected WPS. Examples could be material that helps demonstrate proper weldment setup, proper welding torch setup, common weldment errors, etc.

To add, edit or remove supplemental material click the 'Add supplemental material' icon. This will display the supplemental material editor. See Figures B.14 and B.15.

Figure B.14 – Add supplemental material

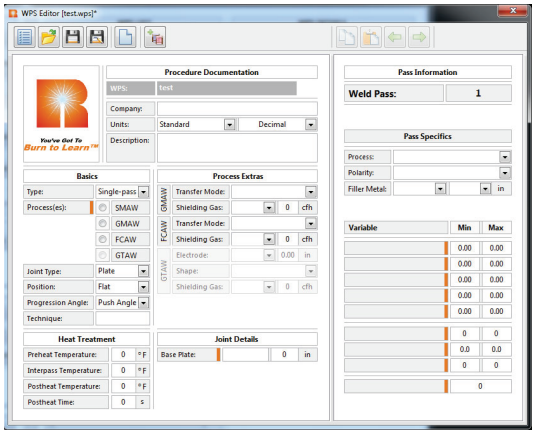
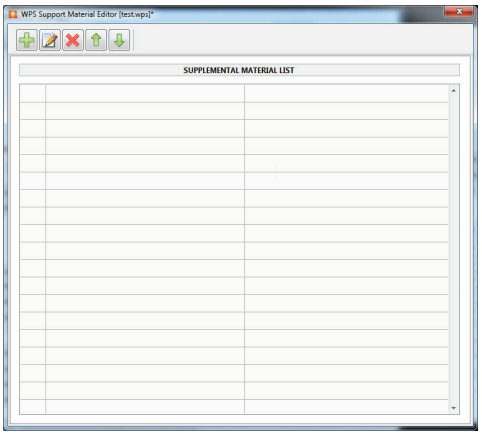


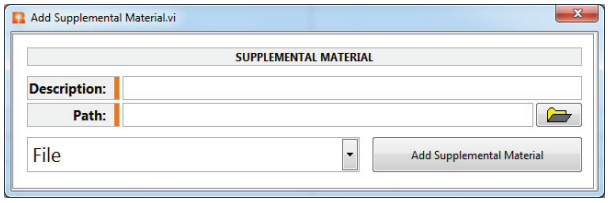
Figure B.15 – Supplemental material editor



Click the 'Plus' icon to add new supplemental material, the 'Edit' icon will add an existing supplemental material, the 'Delete' icon will delete existing supplemental material and the 'Up Arrow' and 'Down Arrow' will re-sequence the order of supplemental materials.

Selecting the 'Plus' icon or the 'Edit' icon will generate a supplemental material secondary editor. See Figure B.16.

Figure B.16 – Supplemental material secondary editor



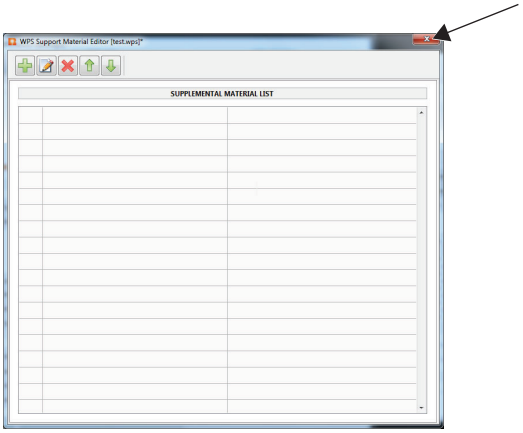
The secondary editor requires a description for the supplemental material (this is the visible description to the student when reviewing the WPS) and a Path or URL of the supplemental material being added.

To change between a file (document, image or video) or a URL, select the drop down box to change values.

When a description and path\URL have been entered, select the 'Add Supplemental Material' icon to add the defined object to the WPS. The secondary editor closes and the supplemental material editor is now updated.

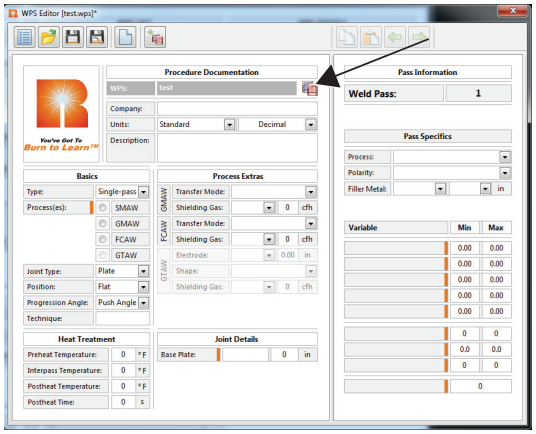
After all supplemental material has been added, select the red “X” in the upper right corner of the supplemental material editor to apply your changes to the WPS. See Figure B.17.

Figure B.17 – Apply changes



Once the supplemental material editor closes the WPS editor will be updated with an icon to indicate that the WPS has supplemental material attached. See Figure B.18.

Figure B.18 – Operation



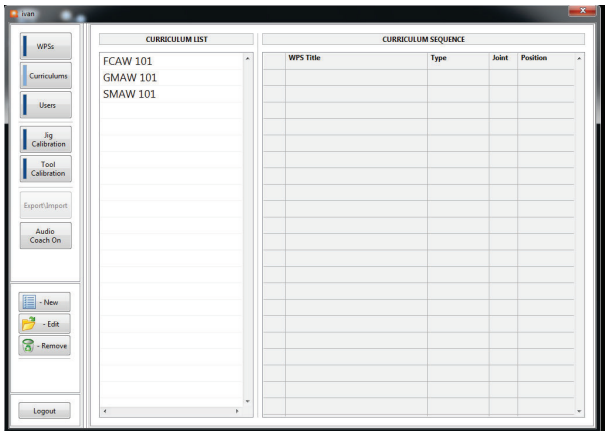
When the WPS parameters have been entered, select the ‘Save’ icon from the toolbar.

CURRICULUM

Select the ‘Curriculum’ icon on the left side of the screen to enter the curriculum section.

The ‘Curriculum List’ will display all the curriculum’s that the instructor has entered. Select any of the curriculum’s to show the corresponding curriculum sequence. The curriculum sequence displays the learning objectives that have been assigned to a particular curriculum. See Figure B.19.

Figure B.19 – Curriculum

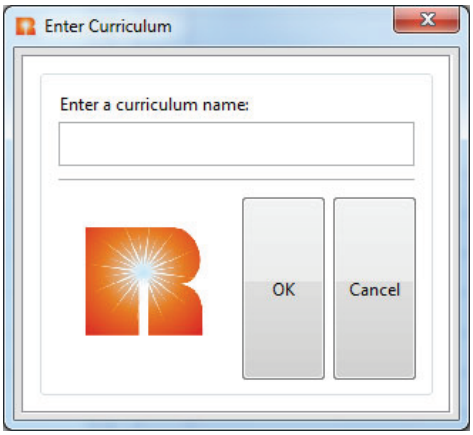


In the curriculum menu the instructor can add, edit or remove curriculum’s from the list.

ADD A CURRICULUM

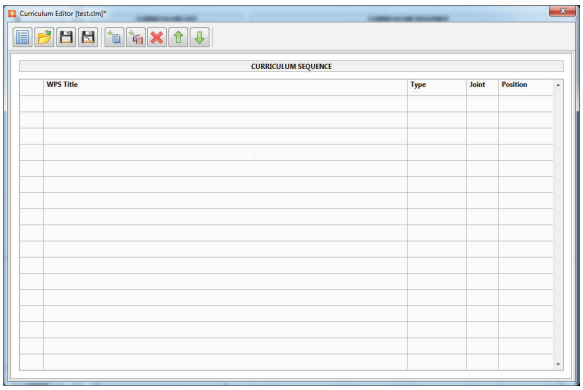
1. Using the touch screen monitor, select the ‘New’ icon on the left side of the screen.
2. In the pop up window, select the text box area to bring up the on-screen keyboard. Enter a name for the curriculum and select the ‘Enter’ on the keyboard. See Figure B.20.

Figure B.20 – New curriculum



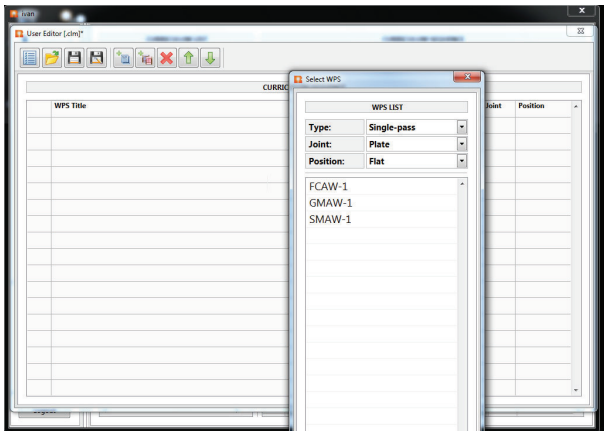
3. The ‘Curriculum Editor’ window will appear. In this window, the instructor can add, remove and rearrange the order of learning objectives associated with this curriculum. See Figure B.21.

Figure B.21 – Curriculum editor



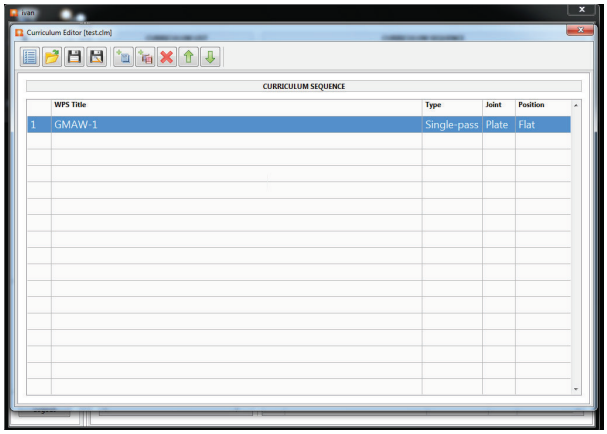
4. To add a WPS, select the 'Plus' icon in the toolbar. This will bring up a list of saved WPSs to choose from. Select the WPSs that are to be associated with the selected curriculum. Once all WPSs are added, select the 'save' icon in the toolbar. The curriculum will be added to the curriculum list. See Figure B.22.

Figure B.22 – Add curriculum



5. Select the WPSs that are to be associated with the selected curriculum. In this example, the curriculum is named "test". To select GMAW-1, select the WPS and it will automatically be added to the curriculum. See Figure B.23.

Figure B.23 – Operation

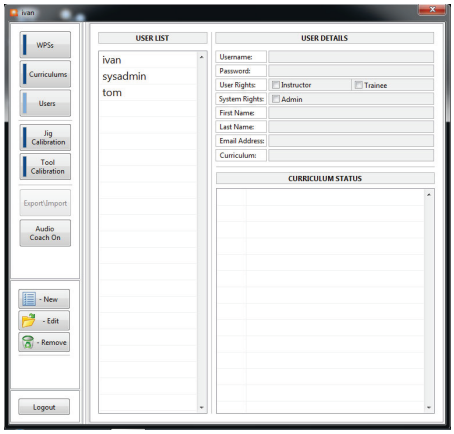


6. Once the WPSs are added to the curriculum, select the 'Save' icon in the Curriculum Editor and the new curriculum will appear in the curriculum list. Existing curriculum's can also be edited by selecting a curriculum and selecting the 'Edit' icon.

USERS

Selecting the 'Users' icon will allow the instructor to add, edit or remove users. See Figure B.24.

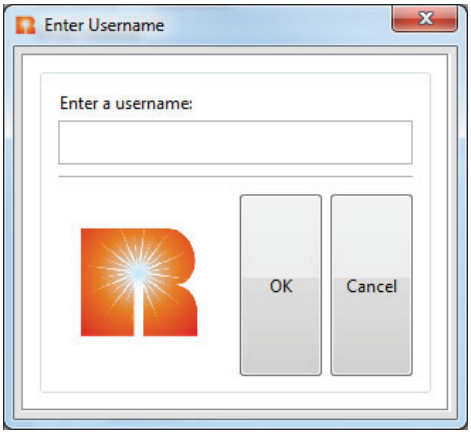
Figure B.24 – Users



ADD A USER

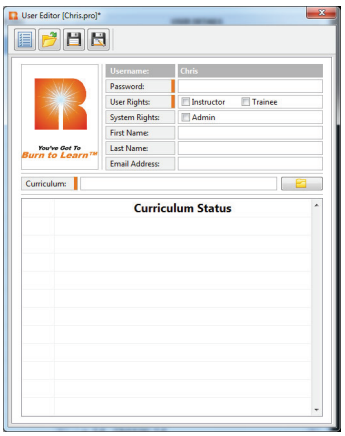
1. Using the touchscreen monitor, select the 'New' icon on the left side of the screen. A pop up box will appear on the screen. See Figure B.25.
2. Enter a username for the new user and select the 'OK' icon. See Figure B.25.

Figure B.25 – Username



3. The 'User Editor' window will be displayed. In this window, the instructor can set the password, user rights, name and curriculum for this particular user. See Figure B.26.

Figure B.26 – User editor



4. Select the password text box to bring up the on-screen keyboard. Enter in a password and select 'Enter' on the keyboard. For security, passwords are stored in an encoded format.
5. In the User Rights section, select either 'Instructor' or 'Trainee'.
6. In the System Rights section, select 'Admin' if the new user should be allowed to modify key settings of the trainer application using the system admin program.
7. Select the 'First Name' and 'Last Name' text boxes to bring up the on-screen keyboard and enter the new users first and last names.
8. A curriculum must be assigned in order to save the user. Select the yellow 'Folder' icon next to the curriculum text box. This will bring up a list of various curriculum's to choose from.
9. Select the curriculum that should be assigned to this user. A pop up window may appear that reads "Changing the curriculum will reset WPS stats." Select 'OK' icon to assign the selected curriculum to the user. The curriculum should now be displayed underneath the curriculum status. See Figure B.27 and B.28.

Figure B.27 – Assign curriculum

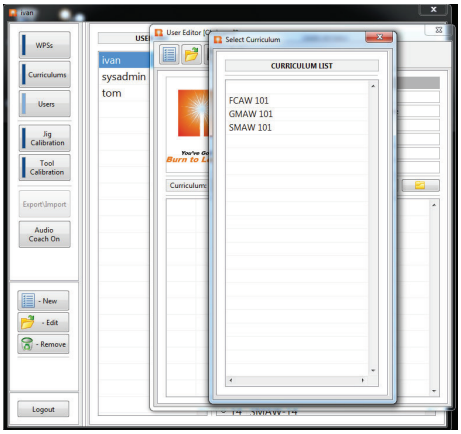
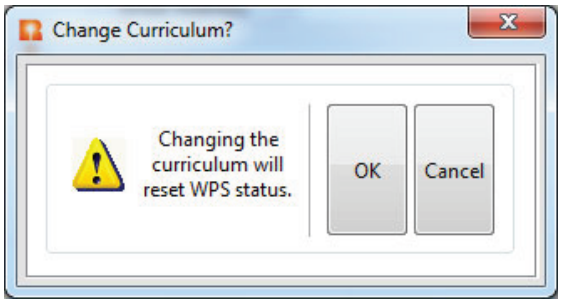


Figure B.28 – Change curriculum

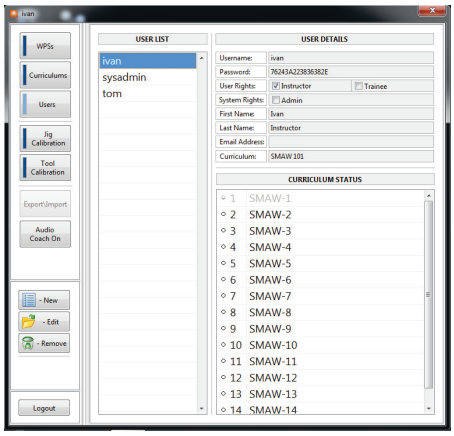


10. Select the 'Save' icon in the toolbar to save the user. If the username needs to be changed, select the 'Save As' icon in the toolbar and change the username.
11. If the instructor wants to change the status of any particular WPS, see the Status section for detailed instructions. The three status conditions are Not Started, In Process and Complete.

EDIT A USER

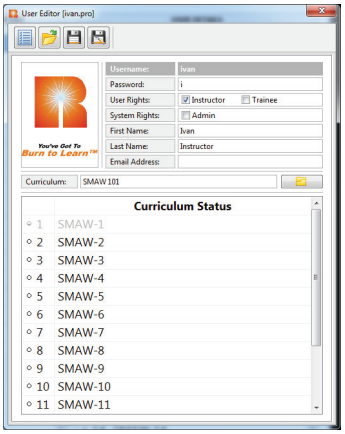
1. Select the desired user under the user list. See Figure B.29.

Figure B.29 – User list



2. Select the 'Edit' icon on the left hand side of the screen. This will bring up the 'User Editor' window. See Figure B.30.

Figure B.30 – User editor

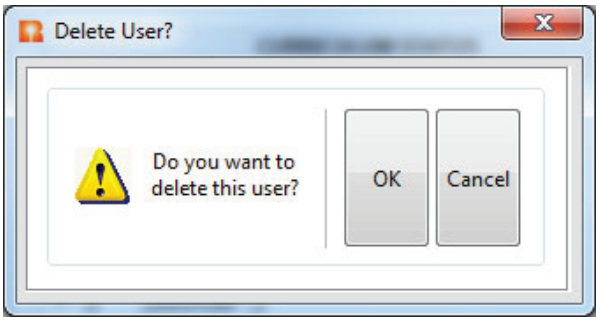


3. In the user editor window, the instructor can modify First and Last Name, User Rights, Password and Curriculum, if necessary.
4. Select the 'Save' icon in the toolbar to save any changes.

REMOVE A USER

1. Select the desired user form the user list.
2. Select the 'Remove' icon on the left side of the screen. A pop up window will appear allowing the instructor to confirm deleting the user.
3. Select the 'OK' icon to delete the user. See Figure B.31.

Figure B.31 – Remove a user

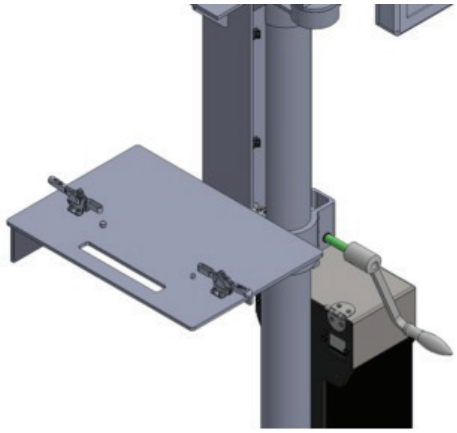


JIG PLATFORM SETUP

The jig platform can be setup in three different positions.

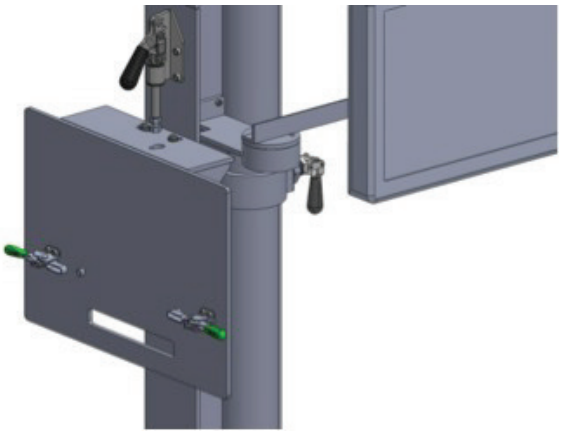
Position 1 - Flat orientation (position 1). See Figure B.32.

Figure B.32 – Position 1



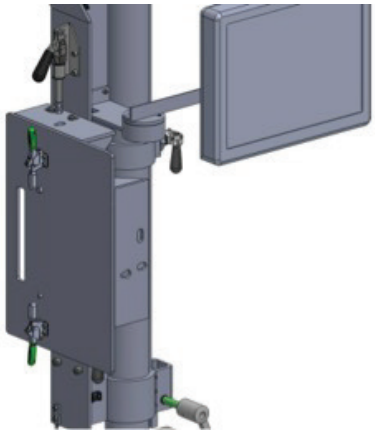
Position 2 - Horizontal and Overhead orientation (position 2). See Figure B.33.

Figure B.33 – Position 2



Position 3 - Vertical orientation (position 3). See Figure B.34.

Figure B.34 – Position 3



CALIBRATION PROCEDURES

JIG CALIBRATION

NOTE: Must be logged in as instructor to perform calibration.

The jig calibration procedure helps ensure that the cameras are always reading the exact location of the jig platform. It is necessary to go through the jig calibration procedure in three different situations.

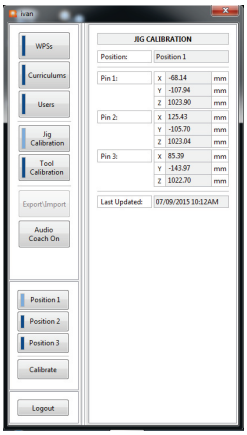
Situation 1 - When the system is first installed.

Situation 2 - If the user is seeing consistent erroneous data that relates to position such as proximity. If the output values seem to be incorrect, the jig may need to be re-calibrated.

Situation 3 - Every 30 days.

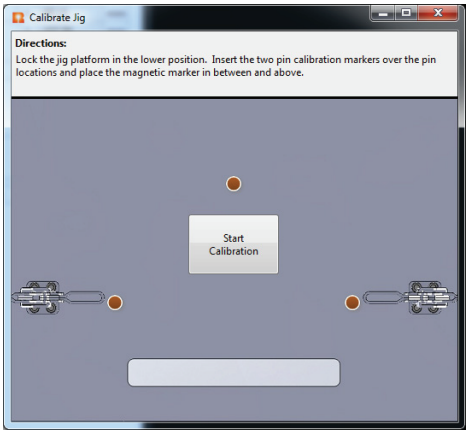
1. Before beginning the calibration procedure, remove the jig and any clamps (including the ground clamp) from the jig platform.
2. **Open all camera lenses**.
3. Select the 'Jig Calibration' icon on the left of the screen to begin the calibration procedure. See Figure B.35.
4. Select the 'Position 1' icon on the left side of the screen. See Figure B.35.

Figure B.35 – Tool calibration



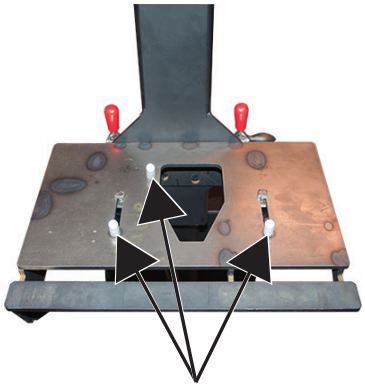
5. Select the 'Calibrate' icon on the left side of the screen. This will bring up the 'Calibrate Jig' window. See Figure B.36.

Figure B.36 – Calibrate jig



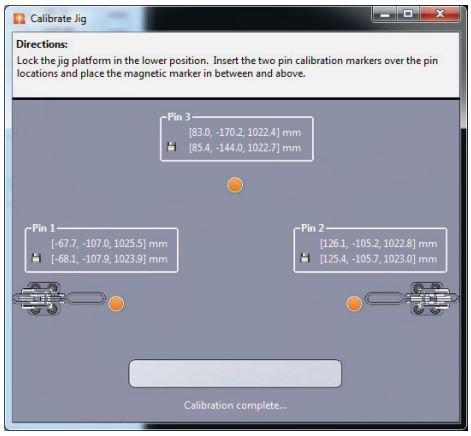
6. The calibrate jig window has directions that show where to place the LED markers. Two of the LED markers need to be placed over the 2 pin locations on the platform and the 3rd marker is magnetic and should be placed in between and above the other two markers (towards the back of the jig platform but no more than halfway back). See Figures B.37.

Figure B.37 – Jig platform calibration markers



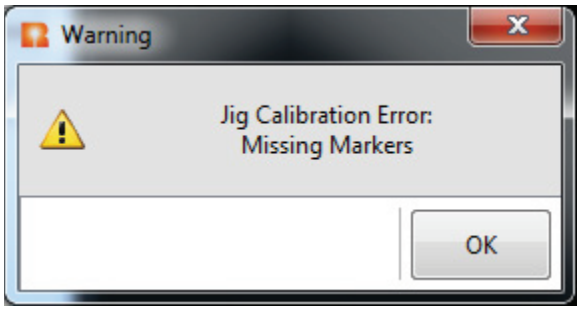
7. With the LED markers in place, select the 'Start Calibration' icon on the screen. The LED markers on the screen will start to blink while various numbers appear above them. During this time, the equipment is determining the position of the jig platform. See Figure B.38.

Figure B.38 – Start calibration



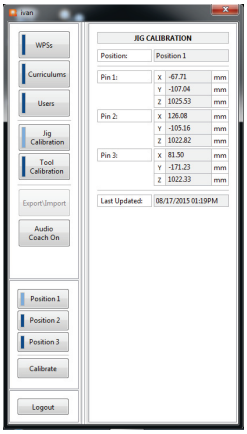
8. In some cases, there might be an error with the calibration due to the markers not being within the field of view or if there is a bright light in the area. Also, in some instances the ambient lighting can cause an error stating 'too many markers recognized'. If this happens, select the 'OK' icon, verify that the markers are placed correctly and that there aren't any sources of bright light in the area and repeat the calibration steps. See Figure B.39.

Figure B.39 – Calibration error



9. When the calibration is complete, the calibrate jig window will automatically close. The jig calibration menu will still be displayed and the numerical values for pins 1-3 will be updated. The date and time of the calibration will also be updated and displayed. See Figure B.40.

Figure B.40 – Calibration complete



10. Repeat this calibration for each of the three jig platform positions, by adjusting the jig platform to the corresponding position and selecting the position from the menu on the left side of the screen.
11. When calibration is complete, remove the LED markers from the jig platform and store them properly.
12. **Close the camera lenses**.

TOOL CALIBRATION

NOTE: Must be logged in as instructor to perform calibration.

The tool calibration procedure ensures that the cameras know the exact configuration of the welding torch or tool that's being used. It's necessary to go through the tool calibration procedure in three different situations.

Situation 1 - When the equipment is first installed.

Situation 2 - If the user is seeing consistent erroneous data that relates to position such as proximity. If the output values seem to be incorrect, the jig may need to be re-calibrated.

Situation 3 - Every 30 days.

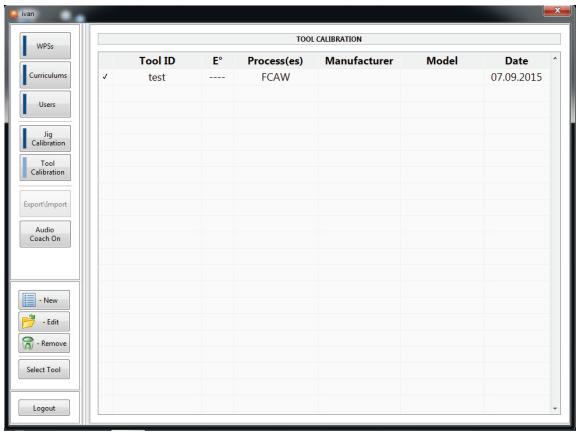
GMAW GUN CALIBRATION

1. Before beginning the tool calibration procedure, place the jig and work piece onto the jig platform and **open camera lenses**.
2. Carefully attach the calibration markers to the GMAW gun. See Figure B.41.

Figure B.41 – Calibration markers

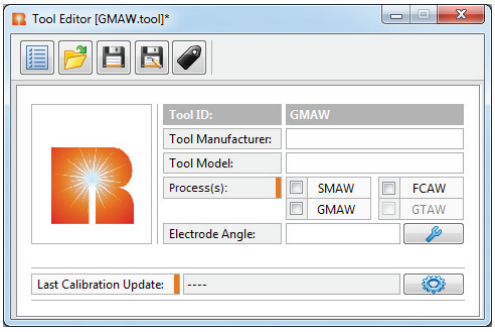
3. Select the 'Tool Calibration' icon. This will bring up a list of tools that has been saved to the system. See Figure B.42.

Figure B.42 – Tool calibration



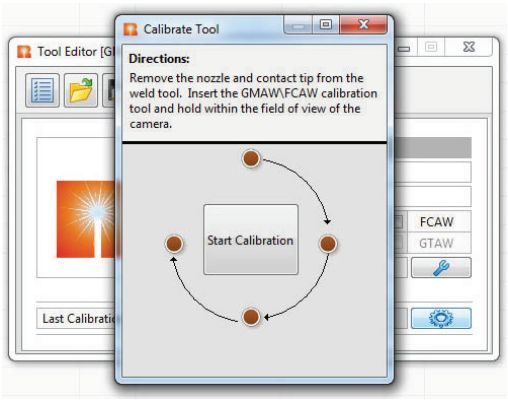
4. Select the tool to be calibrated which should highlight the tool.
5. Select the 'Edit' icon on the left side of the screen. This will bring up the 'Tool Editor' window. See Figure B.43.

Figure B.43 – Tool editor



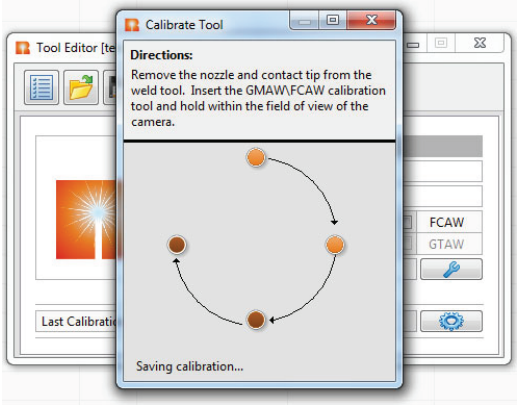
6. Select the 'Gear' icon next to the Last Calibration Update field. This will bring up a Calibrate Tool window that has instructions on how to prepare the tool for calibration. This includes removing the nozzle and contact tip from the weld tool. See Figure B.44.

Figure B.44 – Start calibration



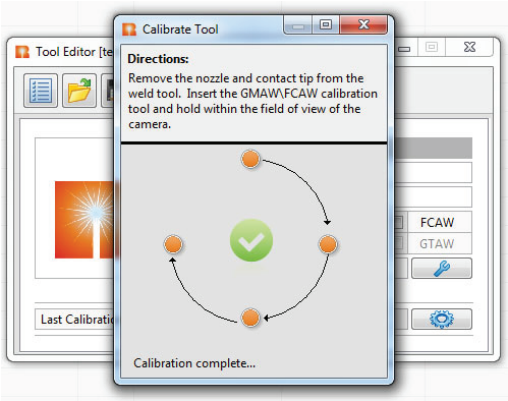
7. During calibration be sure to hold the tool steady and be sure at least three of the five tool markers and all tip markers are visible to the cameras.
8. Select the 'Start Calibration' icon on the Calibrate Tool window. The LEDS on the screen will start to blink. See Figure B.45.

Figure B.45 – Blinking LEDs



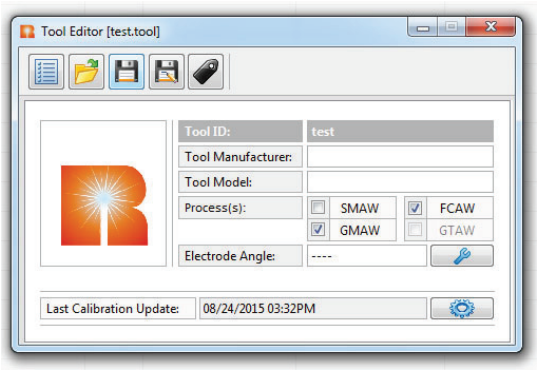
9. When the calibration has been completed, the Calibrate Tool window will display a checkmark and will say 'Calibration Complete'. This window will automatically close. After the Calibrate Tool window automatically closes, the tool editor window will remain open. See Figure B.46.

Figure B.46 – Calibration complete



10. The calibration needs to be saved and this is done by selecting the 'Save' icon in the tool editor window. This will automatically update the 'Last Calibration Update' field with the current calibration date. See Figure B.47.

Figure B.47 – Last calibration update



11. Close the tool editor window by selecting the red "X" icon in the top right corner of the tool editor window.
12. Remove the calibration markers from the GMAW gun.
13. Place the nozzle and contact tip onto the weld tool.
14. **Close the camera lenses**.

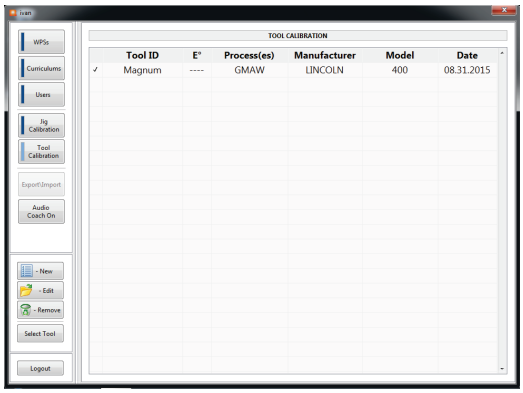
SMAW TORCH CALIBRATION

1. Before beginning the tool calibration procedure, place the jig and work piece onto the jig platform.
2. Carefully attach the calibration markers to the SMAW torch. See Figure B.48.
3. **Open the camera lenses**.

Figure B.48 – SMAW torch calibration markers

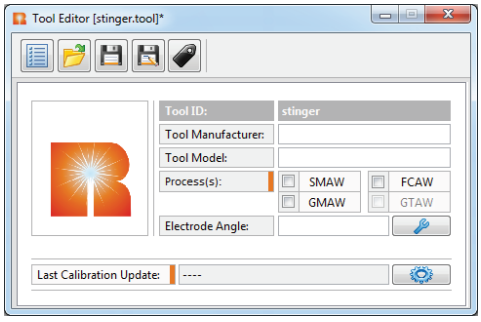
4. Select the 'Tool Calibration' icon. This will bring up a list of tools that has been saved to the system. See Figure B.49.

Figure B.49 – Tool list



5. Select 'SMAW' from the list of tools.
6. Select the 'Edit' icon on the left side of the screen. This will bring up the 'Tool Editor' window. See Figure B.50.

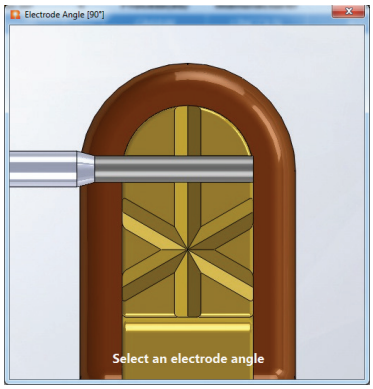
Figure B.50 – Tool editor



7. Select the electrode angle (90º, 45º, 135º).

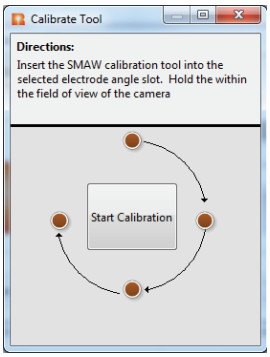
8. Carefully position the calibration markers for the desired angle. See Figure B.51.

Figure B.51 – Electrode angle



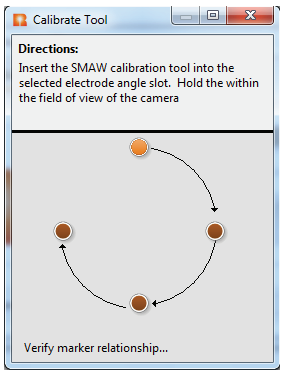
9. Select the 'Gear' icon next to the Last Calibration Update field. This will bring up a Calibrate Tool window that has instructions on how to prepare the tool for calibration. See Figure B.52.

Figure B.52 – Calibrate tool



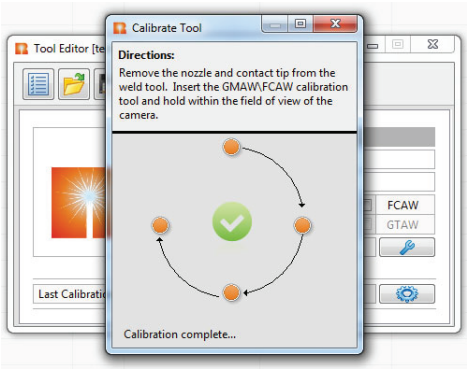
10. During calibration be sure to hold the tool steady and be sure at least three of the five tool markers and all tip markers are visible to the cameras.
11. Select the 'Start Calibration' icon on the Calibrate Tool window. The LEDS on the screen will start to blink. See Figure B.53.

Figure B.53 – Blinking LEDs



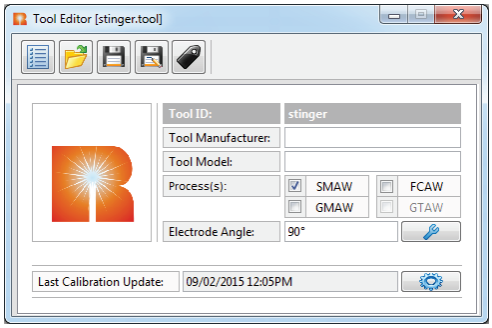
12. When the calibration has been completed, the Calibrate Tool window will display a checkmark and will say 'Calibration Complete'. This window will automatically close. After the Calibrate Tool window automatically closes, the tool editor window will remain open. See Figure B.54.

Figure B.54 – Calibration complete



13. The calibration needs to be saved and this is done by selecting the 'Save' icon in the tool editor window. This will automatically update the 'Last Calibration Update' field with the current calibration date. See Figure B.55.

Figure B.55 – Last calibration update



14. Repeat the SMAW device calibration for each angle (90º, 45º and 135º).
15. Close the tool editor window by selecting the red "X" icon in the top right corner of the tool editor window.
16. Remove the calibration markers from the SMAW torch.
17. **Close the camera lenses**.

EXPORT AND IMPORT

This feature allows the import/restore or export/backup of the data associated with the trainer application. This data [WPSs, Curriculum's and Users] can be transferred to a laptop (running the RealWeld Instructor Application) and can be modified offline. These modifications can then be imported back into the trainer to update them with changes made from the instructor admin application. Through the entire process of backup and restore, the trainer is the foundation of data used for the instructor admin application. This means that the exports from the trainer are used to import into the instructor admin application are then modified and returned to the respective trainer system. If more changes are required the changes can be performed locally on the trainer or must be exported again to the instructor admin application.

EXPORT

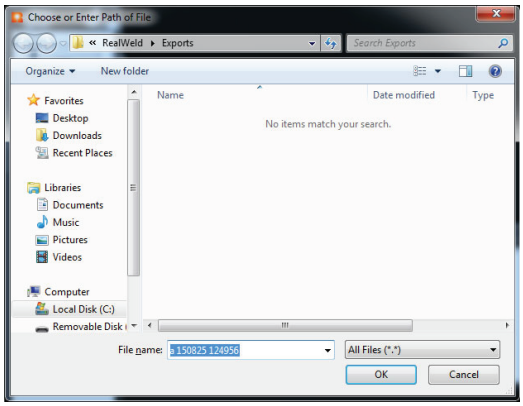
Exporting allows data to be systematically transferred from the RealWeld trainer to a RealWeld defined sync folder, USB drive or to a network drive (requires network access).

1. From the instructor main menu select the 'Export\Import' icon. The Export\Import menu will display, select the 'Export' icon to export all user and system configuration files associated with the respective trainer. See Figure B.56.

Figure B.56 – Export

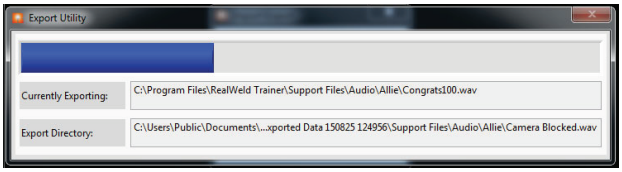
2. Selecting export will generate a dialog window requiring a path and filename to save the exported data. RealWeld designates a default sync folder that resides in the Documents folder under RealWeld and then Exports (C:\Users\<username of computer>\Documents\RealWeld\Exports). RealWeld also defines a default filename titled Exported Data <Date\Time Stamp>. This directory can be changed to a USB drive or network drive if preferred. See Figure B.57.

Figure B.57 – Exported data



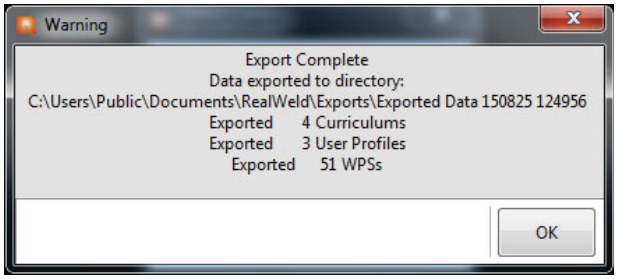
3. While the data is being exported the system will display a status window describing the file being exported, the directory to which the data is being exported to and a total progress bar displaying the progress of the entire export process. See Figure B.58.

Figure B.58 – Export progress



4. Upon completion of the export, a dialog will be displayed confirming the completion with a status of data exported. See Figure B.59.

Figure B.59 – Export complete



IMPORT

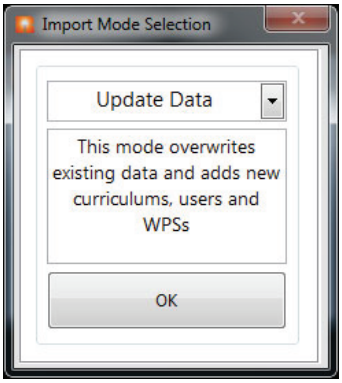
Importing allows exported trainer data to be correctly populated into an instructor admin or trainer application. See Figure B.60. This data can fall into three categories defined during the import process. Selecting the import icon will bring up the Import Mode Selection window. See Figure F.60. Choose the appropriate import process (Update Data, Restore Data, Restore All Data) and select the "OK" icon.

Figure B.60 – Import

UPDATE DATA

This import mode **will overwrite** any existing WPSs, curriculum's and users data that already exist on the respective system and add any new WPSs, curriculum's and users existing in the export directory that do not currently exist on the system the import is being performed on. All other files are left unchanged (deleted users will not be deleted on the trainer). See Figure B.61.

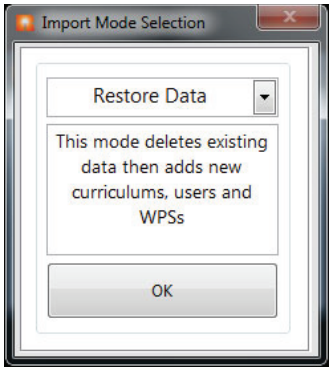
Figure B.61 – Update data



RESTORE DATA

This import mode will remove any existing WPSs, curriculum's and users that already exist on the respective system and add all WPSs, curriculum's and users existing in the export sync folder. This mode allows WPSs, curriculum's or users to be deleted from the instructor admin application and not remain on the trainer. See Figure B.62.

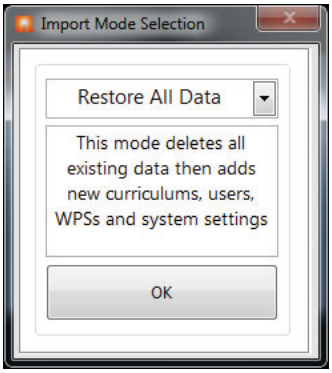
Figure B.62 – Restore data



RESTORE ALL DATA

Like the restore data mode, this import mode will remove ALL user generated data that already exists on the respective system as well as ALL system configuration files. All files will then be restored from the sync folder used for this import mode. This is the same as performing a restore of backup data. See Figure B.63.

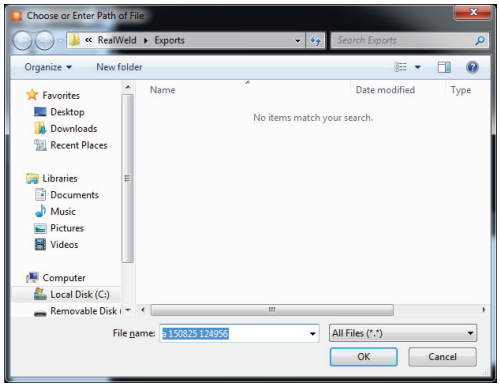
Figure B.63 – Restore all data



NOTE: If this export data is not that of the trainer this import mode is being performed on, there could be some additional steps needed to correct Camera and calibration differences.

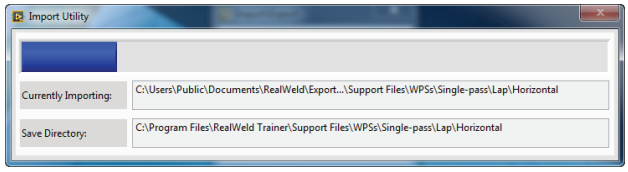
Selecting the import mode will generate a dialog window requiring a path and filename to the exported data to import from. RealWeld designates a default sync folder that locally on the trainer system. The directory is as follows: C:\Users\<username of computer>\Documents\RealWeld\Exports. See Figure B.64.

Figure B.64 – Import data



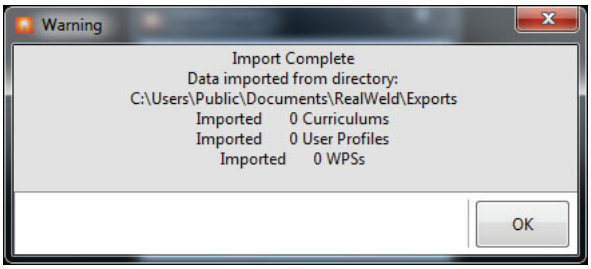
When the data is being imported the system will display a status window describing the file being imported, the directory to which the data is being imported to and a total progress bar displaying the progress of the entire import process. See Figure B.65.

Figure B.65 – Import progress



Upon completion of the import, a dialog will be displayed confirming the completion with a status of data imported. See Figure B.66.

Figure B.66 – Import complete



TRAINEE MODE

PRODUCT DESCRIPTION

The RealWeld Trainer, is a welding training solution designed to capture and score proper welding technique while making actual arc-on and/or practice arc-off welds.

The RealWeld Trainer uses a software-based system to manage the entire training process. The software operates with two types of users – the Instructor mode is for instructors to enroll new trainees, establish teaching curricula, assign curricula to each trainee, sign-off on a trainee's progress, calibration of the system and extract data to analyze trainee progress over time. The Trainee mode is for students to monitor their improvement over time while learning from defined curricula as assigned by the instructor. Instructors and trainees are uniquely identified by their username and must supply a password to gain access to the system.

A curriculum is an ordered list of Welding Procedure Specifications (WPSs). As many WPSs can be defined as required and are uniquely identified by their name. If there are well established curricula and WPSs in the training environment, the instructor can quickly configure those in the software. If there are not established curricula and WPSs, having a RealWeld Trainer will move you in that direction.

The student is assigned a curriculum and the result of every welding trial with either the arc-on or arc-off is saved for future reference and is uniquely identified by the trainee, WPS and date/time of that trail. Once a trainee has mastered a WPS, the instructor signs off on their skill level and the trainee will then be presented with the next WPS to learn in that curriculum. Several screens in the system allow either the trainee or instructor to evaluate progress.

The core of the technology is a robust vision system that allows the computer to track the motion of the welding torch or welding electrode holder. A target device is attached to a standard welding gun, so the motion capture cameras can track the gun as the student welds. A patent-pending technology filters out the arc light so the vision system is unaffected by the welding process. The system can automatically measure important welder motion parameters, such as travel speed, work angle, travel angle, contact tip to work distance (CTWD) and alignment with the joint (proximity). These measurements are made more than ten times per second and compared with the desired training procedure to automatically score the students performance. A report is instantly produced and graphically displayed so the student can learn what was done properly and where improvements are needed.

The RealWeld Trainer supports the welding of 6 inch coupons of up to three-eighths inch thickness (optionally supports 18 inch coupons for an additional feature cost) using SMAW (Stick), GMAW (Mig), FCAW (Flux Cored) welding processes. The system includes a work table and jigs that support fillet, lap and groove (butt) welds in the flat, horizontal and vertical positions. Fillet and lap also support overhead position.

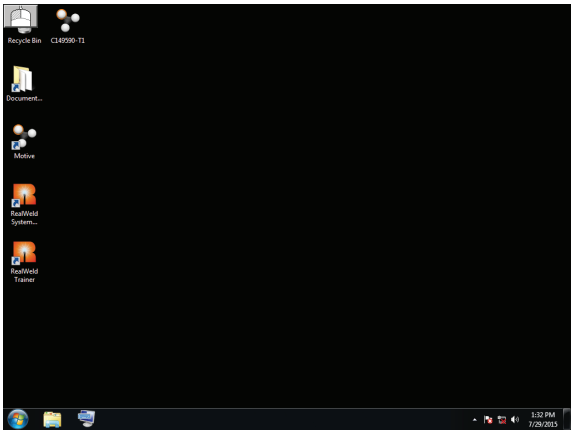
POWER UP / DOWN

1. Turn on the welder. See the Instruction Manual for the welder being used.
2. Press the ON/OFF button on the front panel of the CPU. The button will illuminate to indicate that the power has been turned ON. See Figure B.67.

Figure B.67 – ON/OFF BUTTON

3. The computer will display a series of standard windows startup screens until the main windows desktop is loaded. See Figure B.68.

Figure B.68 – Desktop



4. To power down the unit, quit all programs by tapping the red 'X' icon in the upper right corner of each window.
5. Select the 'Start' icon and select 'Shutdown' to power down the machine.

LOADING REALWELD TRAINER SOFTWARE

1. Using the touchscreen monitor, double tap the RealWeld Trainer icon on the desktop. The software may take 15-30 seconds to load and will display a RealWeld Trainer splash screen during this process. See Figure B.69.

Figure B.69 – RealWeld trainer software

2. If the RealWeld System Admin application is running, there will be a warning message and the RealWeld Trainer application will shut down. To run the RealWeld Trainer application in this case, shutdown the RealWeld System Admin application.
3. The login window will appear once the software has been opened. See Figure B.70.

Figure B.70 – Login

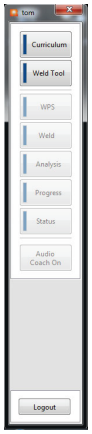
To login and access the features of Trainee Mode, the student must login with the appropriate username and password. The username and password are assigned in 'Instructor Mode' by the instructor.

4. Using the touchscreen monitor, select the 'Username' text box and enter the assigned username with the on-screen keyboard. Select the 'Enter' icon to apply the username.
5. Using the touchscreen monitor, select the 'Password' text box and enter the assigned password with the on-screen keyboard. Single tap the 'Enter' icon once the password has been entered, this will remove the on-screen keyboard from the screen. See Figure B.71.

Figure B.71 – Password

6. Using the touchscreen monitor, select the 'OK' icon on the login window. Once selected, the trainee will be logged in and a set of menu options, specifically for a trainee, will be displayed on the left side of the screen. See Figure B.72.

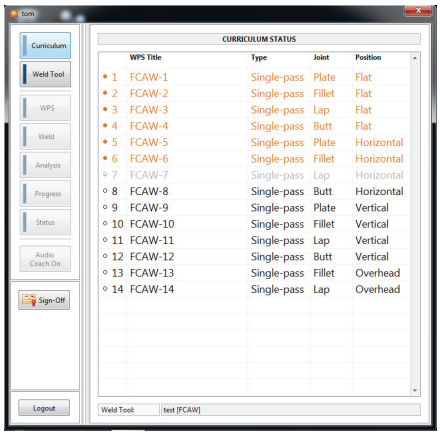
Figure B.72 – Trainee menu



CURRICULUM

Select the 'Curriculum' icon on the left side of the screen to bring up the curriculum assigned to the trainee. See Figure B.73.

Figure B.73 – Curriculum list



The curriculum status contains a list of various learning objectives that are assigned to the selected trainee. There are three modes to each of the learning objectives in the assigned curriculum:

COMPLETED

If the learning objective has been completed, the text will be highlighted in **orange** and there will be an orange circle placed in front of the WPS number

IN PROCESS

If the learning objective is currently in process, the text will have a **grey colored** background and there will be a half shaded circle placed in front of the WPS number.

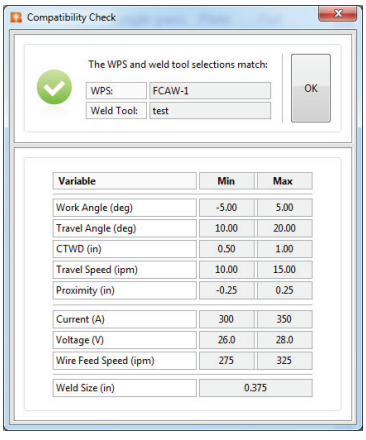
NOT STARTED

If the learning objective has not been started, the text will be **black** and there will be an open circle in front of the WPS number.

The trainee can only select the WPSs that are marked as Complete or In-Process. The trainee will not be able to view any WPS that has not been started.

Select the desired WPS from curriculum status list to view a Completed or In-Process WPS. This will bring up a compatibility check window that will list the selected WPS, weld tool and a few variables associated with that WPS. If the WPS requires a different weld tool, proceed to the Weld Tool menu and select the correct weld tool. See Figure B.74.

Figure B.74 – Compatibility check

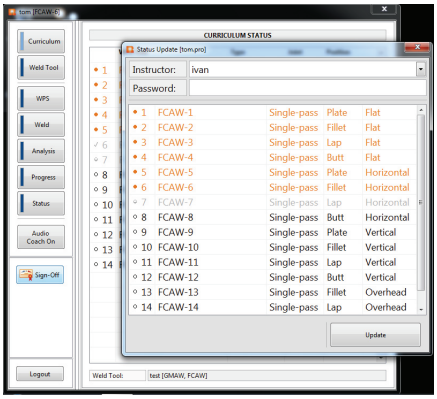


SIGN OFF

In this mode, the instructor can also approve the trainee's test results on the current WPS. If the results meet the requirements, the instructor can sign off on the WPS and mark it complete (Sign off can also be performed in instructor mode).

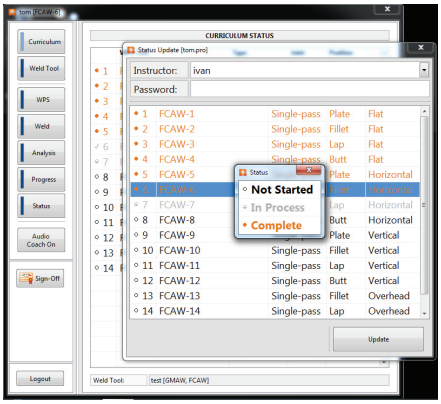
1. Select the instructor 'Sign-Off' icon on the curriculum screen. See Figure B.75. A pop-up window will appear that shows the Curriculum Status for the trainee.

Figure B.75 – Curriculum status



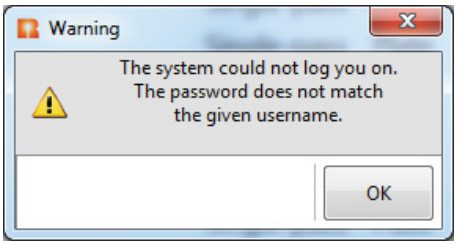
2. The instructor can select the appropriate learning objective. This will bring up another window showing three options – Not Started, In Process and Complete. See Figure B.76.

Figure B.76 – Status options



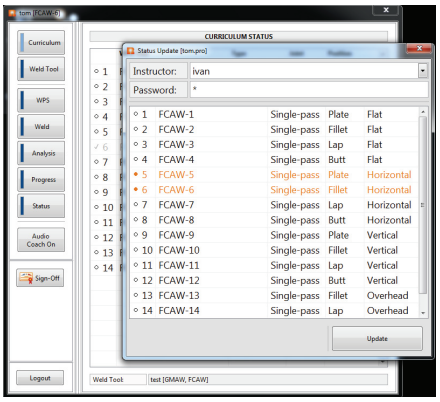
3. To sign off on the learning objective, the instructor can select complete. However, in order to properly sign off on the learning objective, the instructor has to enter their username and password. If the instructor tries to sign off the learning objective without entering their password, an error window will pop up. See ***Figure B.77***.

Figure B.77 – Error message



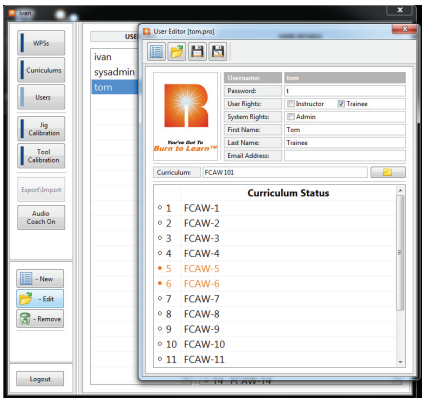
4. Once the instructor name and password are entered, select the 'Update' icon. See Figure B.78.

Figure B.78 – Update icon



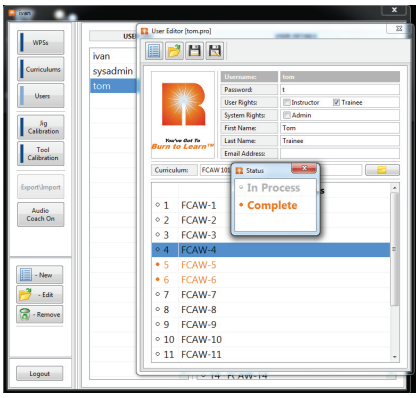
5. The sign-off operation can also be performed while in instructor mode. While in the Users menus, the instructor can select the appropriate user and select the 'Edit' icon. See Figure B.79.

Figure B.79 – Edit user status



6. Select the appropriate learning objective. Upon doing so the status window will pop up allowing the instructor to change the status of the selected learning objective. In the following example, WPS FCAW-4 is selected. See Figure B.80.

Figure B.80 – Change user status

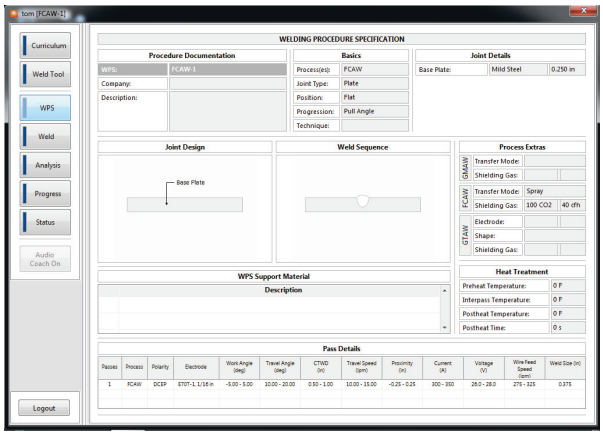


7. The instructor can change the status of this learning objective simply by tapping the appropriate status. Once the status condition has been selected, select the 'Save' icon in the tool bar. This finalizes the status update. The instructor can also select which learning objective they want the trainee to work on next, using the same procedure. While updating the status, the instructor can select a learning objective and then select In Process to indicate that they want the trainee to work on the selected learning objective. The next time the trainee logs in, they will see this learning objective labeled as In Process, evidenced by the grey colored text and the half shaded circle in front of the learning objective number.

WELDING PROCEDURE SPECIFICATIONS (WPS)

When the compatibility check window shows that the WPS and the weld tool are a match, select the 'OK' icon and then select the 'WPS' icon on the left side of the screen. This will bring up the selected WPS and all of its details. It is important for the trainee to note the five critical torch motion variables listed as Pass Details. These include Work Angle, Travel Angle, CTWD, Travel Speed and Proximity. The trainee's ability to stay within the acceptable range for each of these variables during Arc Off and Arc On mode will determine their score. See Figure B.81.

Figure B.81 – WPS details

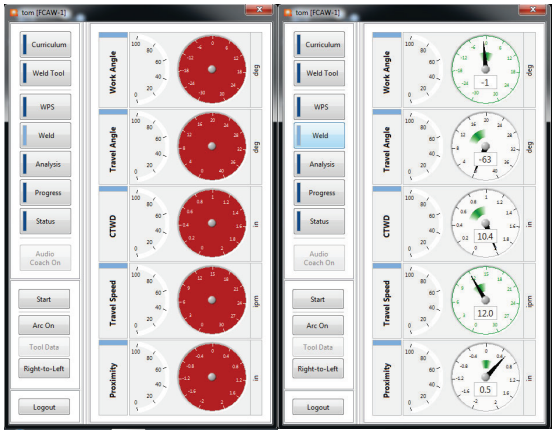


NOTE: Make certain the welder is set according to the proper parameters for the selected WPS to avoid injury or damage.

WELD MODE

When the trainee has selected a WPS, select the 'Weld' icon to enter weld mode. Once the 'Weld' icon is selected, five motion gages will be displayed. If the torch is not within the field of view of the cameras, the gages will be red in color. The system will not record any data if the gages are red. Move the torch until the gages turn white. This indicates that the torch is within the camera's field of view. See Figure B.82.

Figure B.82 – Weld mode

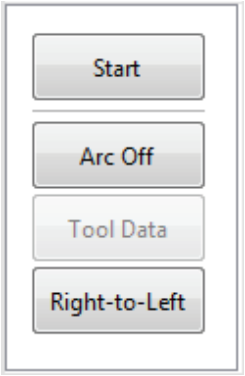


There are two different modes of operation – 'Arc On' and 'Arc Off'. When in Arc Off mode, the trainee can practice moving the torch along the weld joint without actually creating a weld. The program will record their movements and display them on the screen. In Arc On mode, the trainee can create an actual weld and the program will record their movements and display them on the screen.

ARC OFF MODE

When in the weld screen, select the 'Arc On/Off' icon until it displays "Arc Off". This will indicate that the arc is off. At this point, the trainee should put on the appropriate welding gear and safety equipment. In Arc Off mode the trainee will not be making an actual weld, but should be wearing all the typical gear so they can simulate the actual welding conditions. See Figure B.83.

Figure B.83 – Operation



When ready, simply pull the trigger. The program will start recording data. The trainee can now start moving along the joint. Make sure the gages are not red prior to or during Arc Off welding. If the trainee is leaning over the torch and happens to cover the target, the gages will turn red and data will not be saved.

The trainee can just let go of the trigger of their torch to stop recording their weld just like they would when they are welding with arc on.

When welding in Arc OFF mode with SMAW, the 'Start' icon must be selected for the system to begin collecting data.

ARC ON MODE

When in the weld screen, select the 'Arc On/Off' icon until it displays "Arc On". This indicates that the arc is on. At this point, the trainee should put on the appropriate welding gear and safety equipment. In Arc On mode, the trainee will be making an actual weld, so all standard welding safety procedures must be followed. See Figure B.84.

Figure B.84 – Arc on

In Arc On mode, 'Start' and 'Stop' icons are disabled. When the trainee is ready to weld, they can just start welding. The program will automatically start recording data once an arc is struck and it will save that data once stopped. Make sure the gages are not red prior to or during Arc On welding. If the trainee is leaning over the torch and happens to cover the target, the gages will turn red and data will not be saved.

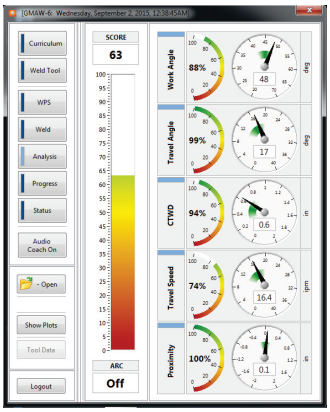
Once the trainee has stopped welding, results will be shown in Analysis mode.

ANALYSIS

When the 'Stop' icon is selected in Arc Off mode or welding is stopped in Arc On mode, the program will enter Analysis Mode, as indicated by the light blue color next to the 'Analysis' icon. The gages will freeze and will display a variety of numerical values.

Directly next to the white gages, there are several percentage value gages for each torch motion. The percentage value displayed after the test is the amount of time that the trainee kept that motion in the sweet spot. For example, if the travel speed gauge says 25%, that means that for 25% of the time during the test, the trainee was able to maintain a Travel Speed that was within the sweet spot. See Figure B.85.

Figure B.85 – Analysis



The score, which is displayed as a number and a bar graph, is a calculated value based on the amount of time that all five torch motions are within the sweet spot at the same time.

For example, let's assume the following:

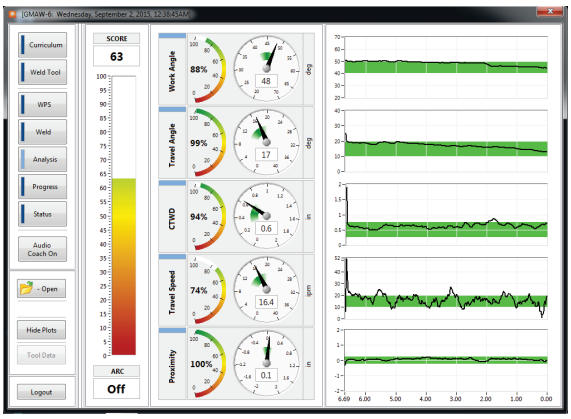
Work Angle, Travel Angle, CTWD are all within the sweet spot for the entire weld (100%). Travel Speed was in the sweet spot during the 1st half of the weld, but not the second half (50%). The Proximity was not in the sweet spot during the 1st half of the weld, but was in the second half (50%). In this scenario, the resulting score would be 0 (zero). All five torch motions were not in the sweet spot at the same time.

For another example, let's assume the following:

Work Angle, Travel Angle, CTWD and Travel Speed are in the sweet spot 100% of the time. However, Proximity is within the sweet spot 12% of the time. In this scenario, the resulting score would be 12% since all five torch motions were operating within the sweet spot at the same time for only 12% of the time.

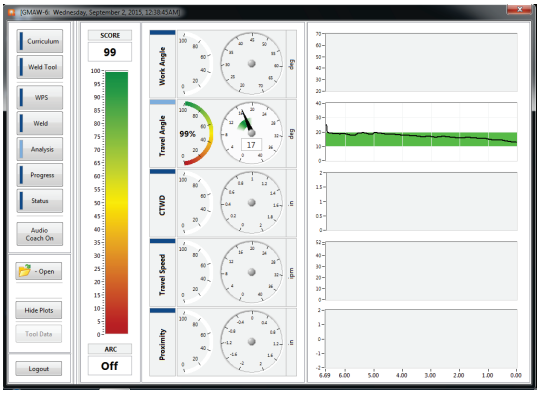
To view a graphical representation of the trainee's results, select the 'Show Plots' icon on the left side of the screen. This will display five different plots corresponding to each torch motion. The green shaded area on the plot represents the sweet spot and the goal for the trainee is to produce results that stay within this area for the entire weld. The black line represents the values that the trainee actually produced. In the following example, the trainee was within the sweet spot for Proximity for most of the weld, but had some areas where the Travel Speed was not within the sweet spot. These plots help the trainee understand what areas they need to focus on. See Figure B.86.

Figure B.86 – Analysis graph



Each torch motion can also be displayed independently. This is a helpful feature if the trainee only wants to work on one torch motion. Select the torch motions the trainee does not want to see and they will no longer be displayed on the screen. See Figure B.87.

Figure B.87 – Independent torch motion graph

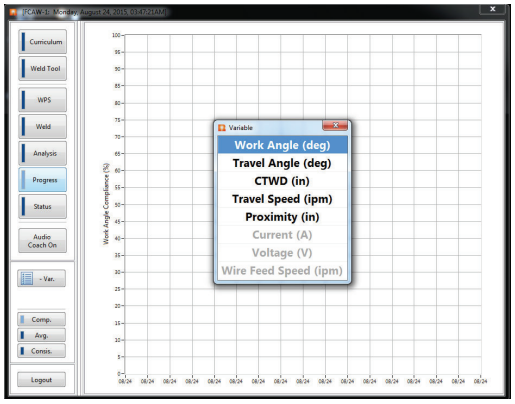


PROGRESS

In trainee mode, Progress can be viewed by selecting the 'Progress' icon on the left side of the screen. This mode can display three different formats of progress – Compliance, Average and Consistency.

Select the desired variable to view the corresponding progress. See Figure B.88.

Figure B.88 – Progress



When a variable is chosen, the program will create a plot of that variable versus date. The green shaded area on the plot represents the sweet spot for that particular variable. This feature gives the trainee a visual representation of their progress. The trainee can see on which days they were operating in the sweet spot. Ideally, as time goes on, there should be more data points within the sweet spot indicating that the trainee is becoming better at maintaining that torch motion. Examples for work angle consistency, average and compliance are shown below. See Figures B.89, B.90 and B.91.

Figure B.89 – Consistency

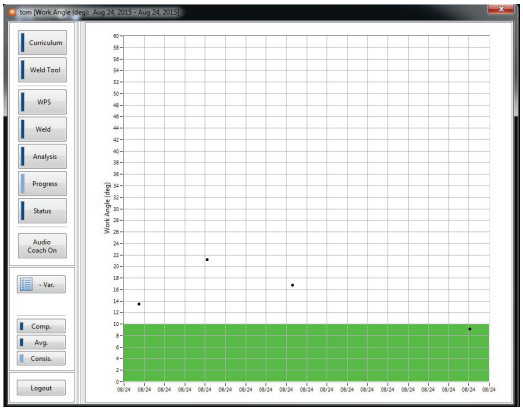


Figure B.90 – Average

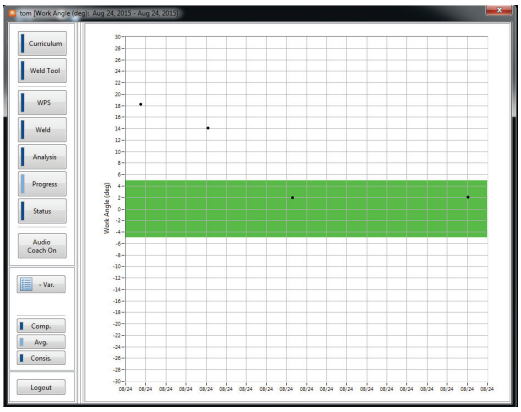
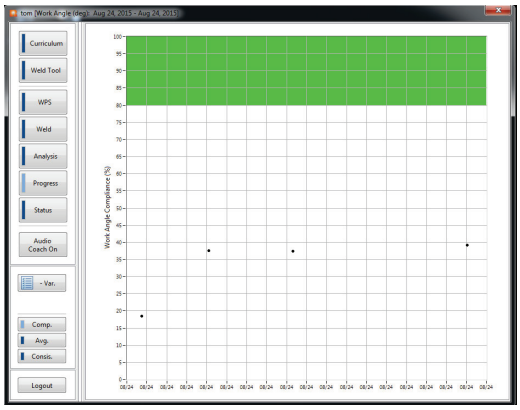


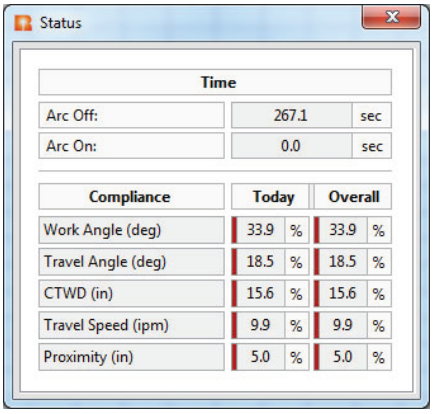
Figure B.91 – Compliance



STATUS

In status mode, the trainee's current and overall compliance is displayed. The compliance is based on the five torch motions. Compliance is shown as a percentage value, with 100% being the best. See Figure F.92.

Figure B.92 – Status



AUDIO COACHING

Audio Coaching is a teaching tool for trainees to receive coaching on proper torch setup and welding techniques. The Coach ("Allie") will state positive commands, based on a priority listing, while the trainee is setting up to weld and welding in arc off or arc on modes. Instructors also have the possibility to record their own voice and not use the default coach of Allie. The priorities are checked every three and a half seconds during setup and two seconds while welding, so that the trainee is not overwhelmed.

SETUP PRIORITIES

These are the setup priorities. This is the default ordering.

- Proximity
- CTWD (Contact Tip to Work Distance)/Deposition
- Work Angle
- Travel Angle

WELDING PRIORITIES

These are the welding priorities. This is the default ordering.

- Camera Blocked
- Proximity
- CTWD (Contact Tip to Work Distance)/Deposition
- Work Angle
- Travel Angle
- Travel Speed

COMMANDS

PRIORITY	SPOKEN COMMANDS	POSITION	ACTION
CAMERA BLOCKED	CAMERA BLOCKED	ANY	MOVE HELMET OUT OF CAMERA VIEW
PROXIMITY	AIM BACK	FLAT / HORIZONTAL / OVERHEAD	AIM BACK INTO ROOT OF JOINT
	AIM DOWN	FLAT / HORIZONTAL / OVERHEAD	AIM DOWN INTO ROOT OF JOINT
	AIM UP	OVERHEAD	AIM UP INTO ROOT OF JOINT
	AIM LEFT	VERTICAL	AIM LEFT INTO ROOT OF JOINT
	AIM RIGHT	VERTICAL	AIM RIGHT INTO ROOT OF JOINT
CTWD	TIP IN	ANY	MOVE TIP INTO ROOT OF JOINT
	TIP OUT	ANY	MOVE TIP OUT ROOT OF JOINT
DEPOSITION	STICK IN	ANY	MOVE STICK INTO ROOT OF JOINT
	STICK OUT	ANY	MOVE STICK OUT OF ROOT OF JOINT
WORK ANGLE	ANGLE DOWN	FLAT / HORIZONTAL / OVERHEAD	MOVE TORCH ANGLE DOWN
	ANGLE UP	FLAT / HORIZONTAL / OVERHEAD	MOVE TORCH ANGLE UP
	ANGLE LEFT	VERTICAL	MOVE TORCH ANGLE LEFT
	ANGLE RIGHT	VERTICAL	MOVE TORCH ANGLE RIGHT
TRAVEL ANGLE	ANGLE DOWN	VERTICAL	MOVE TORCH ANGLE DOWN
	ANGLE UP	VERTICAL	MOVE TORCH ANGLE UP
	ANGLE LEFT	FLAT / HORIZONTAL	MOVE TORCH ANGLE LEFT
	ANGLE RIGHT	FLAT / HORIZONTAL	MOVE TORCH ANGLE RIGHT
TRAVEL SPEED	GO FASTER	ANY	WELD FASTER
	GO SLOWER	ANY	WELD SLOWER

MISCELLANEOUS COACHING

COACHING TYPE	SPOKEN COMMAND	WHEN PLAYED
SCORE 100	CONGRATULATIONS YOU SCORED A 100. TAKE A PICTURE AND SEND IT TO REALWELD.	WHEN A TRAINEE SCORES A 100.
SCORE 0	WAH-WAH-WAH-WAHHHHH	WHEN A TRAINEE SCORES A 0
SHORT WELD	SHORT WELD, PRESS OK TO CONTINUE WELD	WHEN A TRAINEE MAKES TOO SHORT OF A WELD.
TORCH SETUP START	I SEE YOU	WHEN TRAINEE PLACES TORCH CLOSE TO ROOT OF JOINT DURING TORCH SETUP.
TORCH SETUP ALL IN	BURN TO LEARN™	WHEN TRAINEE HAS SETUP TORCH WITHIN ALL FOUR PARAMETERS CHECKED DURING TORCH SETUP. THIS IS CONFIRMING THE TRAINEE IS READY TO BEGIN WELDING.

COMMAND FILENAMES

All command files are located in directory: C:\Program Files\RealWeld Trainer\Support Files\Audio\<Coach Name>.

<Coach Name> - must be name of coach.

PRIORITY	FILENAME
CAMERA BLOCKED	Camera Blocked.wav
PROXIMITY	Proximity Aim Back.wav
	Proximity Aim Down.wav
	Proximity Aim Left.wav
	Proximity Aim Right.wav
	Proximity Aim Up.wav
CTWD	CTWD Tip In.wav
	CTWD Tip Out.wav
DEPOSITION	Deposition Stick In.wav
	Deposition Stick Out.wav
WORK ANGLE	Work Angle Angle Down.wav
	Work Angle Angle Up.wav
	Work Angle Angle Left.wav
	Work Angle Angle Right.wav
TRAVEL ANGLE	Travel Angle Angle Down.wav
	Travel Angle Angle Up.wav
	Travel Angle Angle Left.wav
	Travel Angle Angle Right.wav
TRAVEL SPEED	Travel Speed Go Faster.wav
	Travel Speed Go Slower.wav
SCORE 100	Congrats100.wav
SCORE 0	Zero.wav
TORCH SETUP START	Setup Inside Torch Envelope.wav
TORCH SETUP ALL IN	Burn To learn™.wav

These commands can be overwritten by custom commands recorded by the instructor.

Creating Custom Commands

1. Backup all current command audio files by copying them to a folder on the desktop.
2. Record the desired command in ".wav" format.
3. Replace current audio file in directory C:\Program Files\RealWeld Trainer\Support Files\Audio\<Coach Name> with the new file.
4. Rename the command exactly as you see it in the above 'Filename' table.

ENABLE/DISABLE AUDIO COACHING

To enable or disable audio coaching follow these instructions.

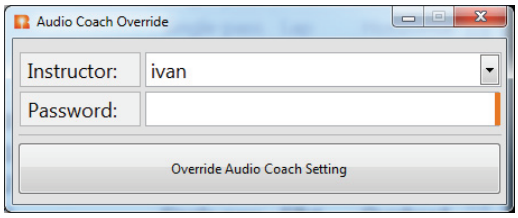
When logged in under an instructor or trainee mode, the main menu will show "Audio Coach On" or "Audio Coach Off" button. See Figure B.93.

Figure B.93 – Audio coaching

The audio coaching state is defined by the button title. If the button reads "Audio Coach On" then audio coaching is enabled. If the button reads "Audio Coach Off" then audio is disabled.

If the instructor has disabled audio coaching, the trainees must have the instructors override the default off setting set by the instructor. This means that if the instructor has turned off audio coaching, the trainees must have the instructor enable it by using their (instructor) password. See Figure B.94.

Figure B.94 – Audio coach override



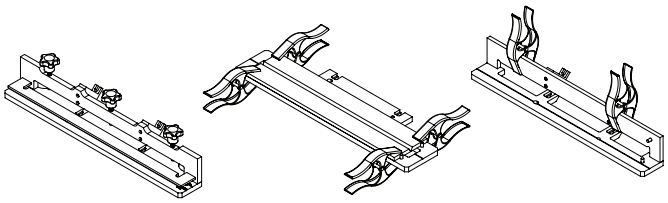
ACCESSORIES

18” FIXTURES

The 18” fixtures allows for practicing of longer welding procedures. Three 18” fixtures are included in the upgrade kit (fillet, lap and butt/groove).

An upgrade kit can be purchased to allow longer coupon lengths to be accepted by the RealWeld system. Contact Lincoln Electric Automation for more information.

Figure C.1 – 18” Fixtures



18” LAP JIG 18” GROOVE-BUTT JIG 18” FILLET JIG

ROUTINE MAINTENANCE

Routine maintenance on the RealWeld Trainer should be performed on an as needed basis dependent on machine usage and environment. The screen protector on the monitor should be replaced as it becomes damaged or shows signs of wear. The target should be cleaned with a soft cloth if it becomes dusty or dirty. The lenses (in the pull out trays) for the cameras should be cleaned if they become dirty or interfere with the performance of the cameras. Remove any slag or spatter from the weld area (jig, platform, etc.) as needed. Inspect cables for burns, cracks or other welding and heat related issues, replace as necessary.

PERIODIC MAINTENANCE

Confirm the tightness of the jig platform hold downs before use and after changing the platform position. The fan filters on the CPU should be cleaned/changed every six months.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

Service and repair should be performed by only Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).

Look under the column labeled "PROBLEM (SYMPTOMS)." This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.

The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION

This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local Lincoln Authorized Field Service Facility.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

TROUBLESHOOTING GUIDE

SYMPTOMS	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
Low or NO audio from the speaker. Machine functions normally.	1. Possible faulty speaker, bad connection.	1. Check audio cable and power cable connections to speaker. 2. Check power button and volume dial located on speaker.
Trainer has problem recognizing the 18" jig.	1. Be certain the 18" jig option is licensed for the machine.	1. Check the Extended Length License in the System Admin Software.
Jig platform will not calibrate.	1. Debris or tools on the jig platform. Clear tools from jig platform. 2. Ground clamp connected to jig platform. 3. Lens covers are not open.	1. Recalibrate with lens covers open and jig platform clean.
Consistently low or NO scoring, regardless of quality of weld.	1. Improper jig and/or tool calibration. 2. Improper jig platform position. 3. Improper machine setup.	1. Recalibrate jig and/or tool. 2. Place the jig platform in the correct position. 3. Verify that the machine is setup properly, according to WPS in RealWeld software.
Target not found.	1. Check all plugs and connections. 2. Possible light interference. 3. Check target LEDs for faint red illumination.	1. Open lens covers. 2. Position unit to reduce the effects of overhead lighting.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

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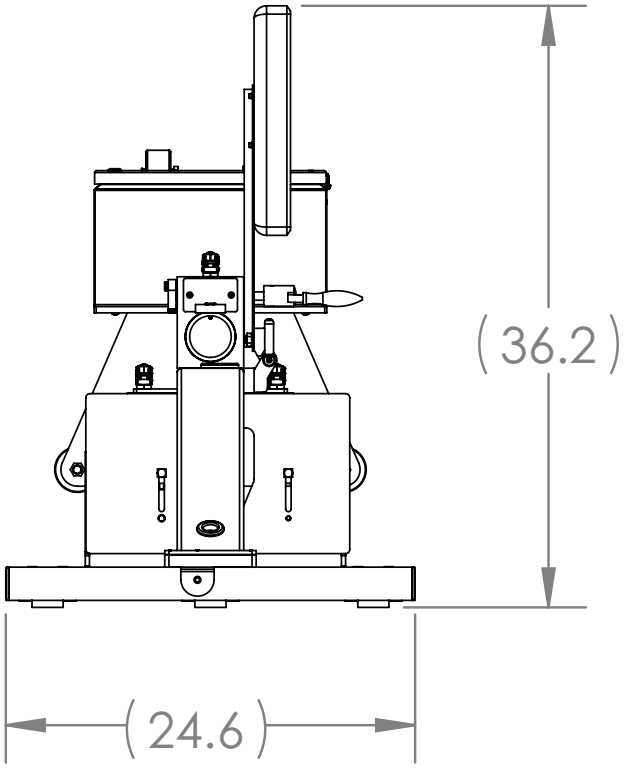
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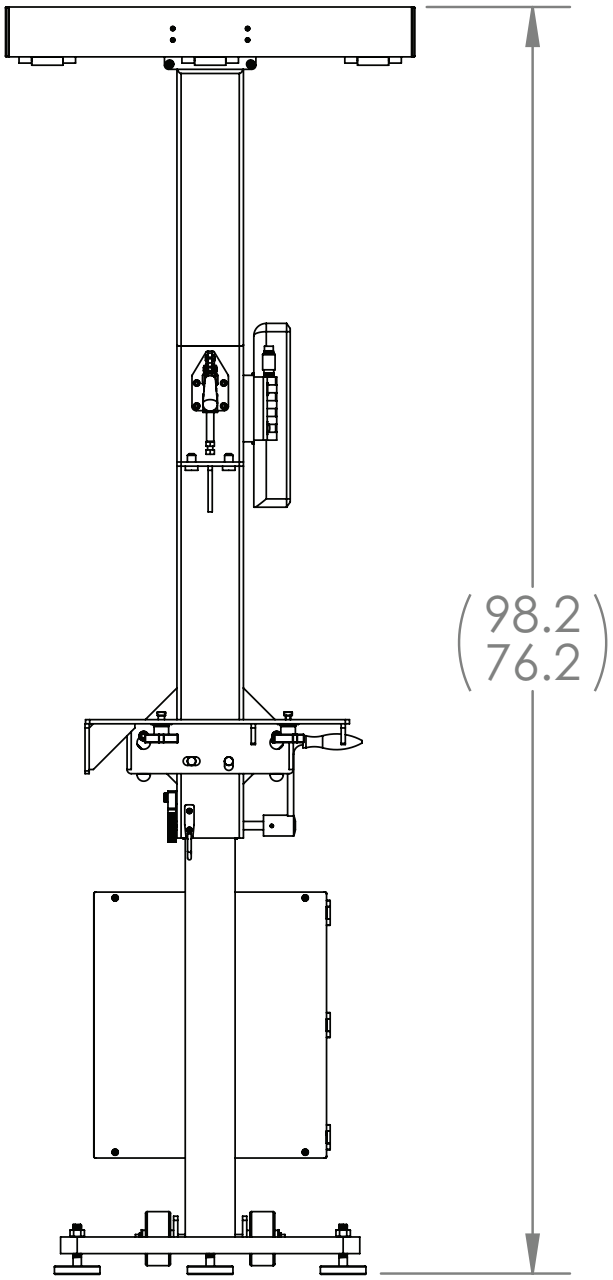
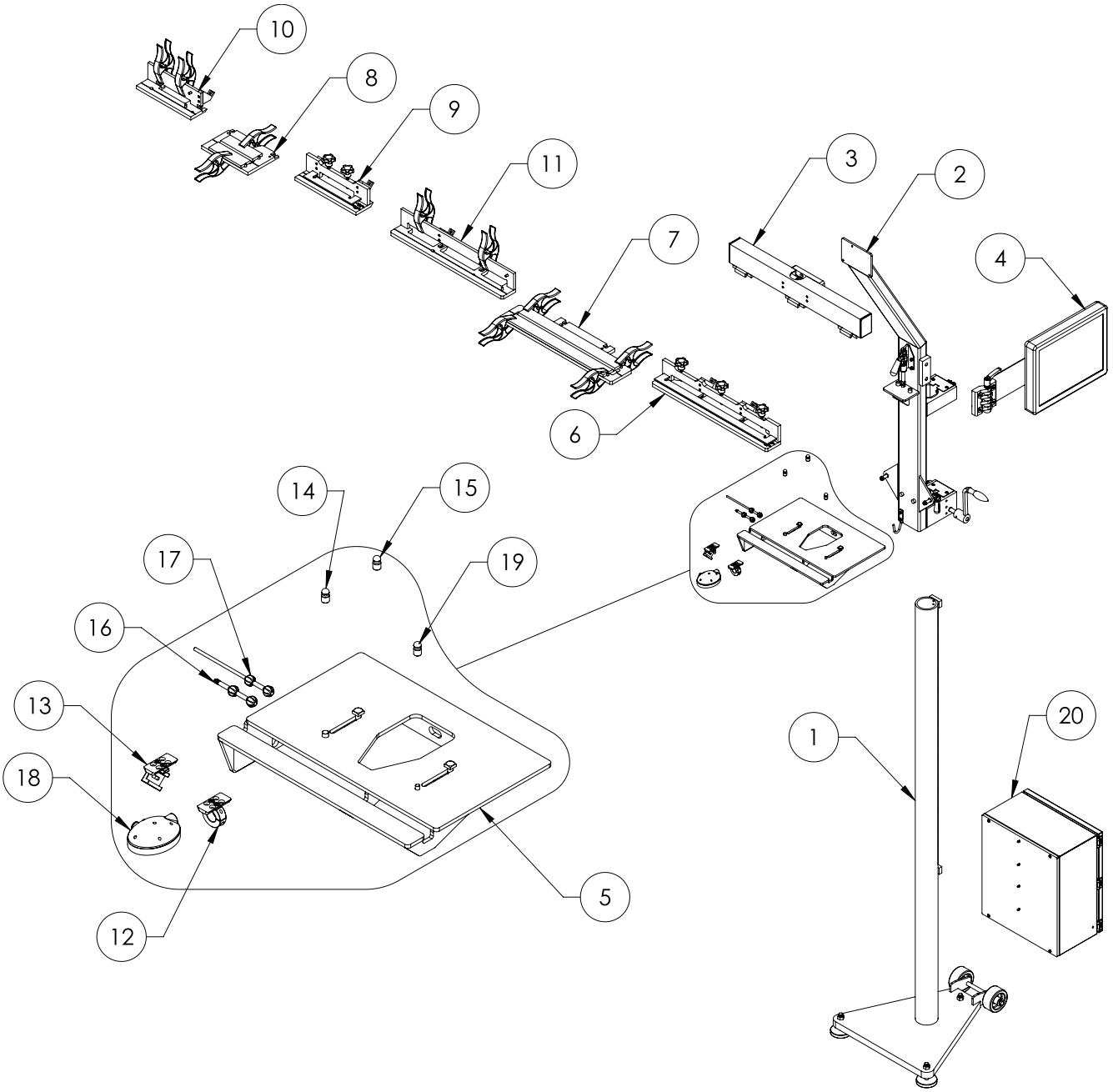

98.2
76.2

MAJOR COMPONENT LOCATIONS

1. Base sub assembly
2. Carriage sub assembly
3. Camera mount assembly
4. Monitor assembly
5. Weld table assembly
6. 18” Lap jig
7. 18” Groove-butt jig
8. 6” Groove-butt jig
9. 6” Lap jig
10. 6” Fillet jig
11. 18” Fillet jig
12. GMAW target adapter
13. SMAW target adapter
14. Calibration post - 3/8” base
15. Calibration post - mag base
16. GMAW calibration tip
17. SMAW calibration tip
18. Active target head
19. Calibration post - 1/4” base
20. Controller



CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but 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.

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