OM-267357F 2016–09

Processes

MIG (GMAW) Welding

Gas Shielded Flux Core (FCAW-G) Welding

With Optional Equipment:

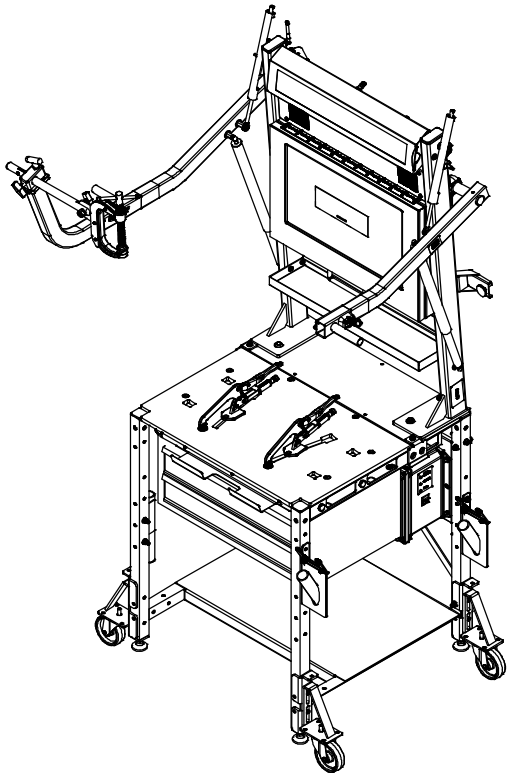
Stick (SMAW) Welding

Description

Arc Welding Training System

LiveArc™

Welding Performance Management System



OWNER'S MANUAL

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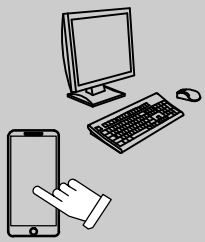

For product information, Owner's Manual translations, and more, visit

www.MillerWelds.com

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite.

ISO 9001 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual specification sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

Miller®

TABLE OF CONTENTS

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SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

Protect yourself and others from injury — read, follow, and save these important safety precautions and operating instructions.

1-1. Symbol Usage

DANGER! – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE *– Indicates statements not related to personal injury.*

☞ *Indicates special instructions.*

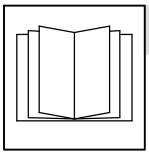
This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Welding Training System Hazards

The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.

Only qualified persons should install, operate, maintain, and repair this unit.

Welding-related hazards are present when using the welding training system. Read the welding power source and wire feeder Owner's Manuals and labels carefully for more information on arc welding hazards. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org).



READ INSTRUCTIONS.

- Read and follow all labels and the Owner's Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform installation, maintenance, and service according to the Owner's Manuals, industry standards, and national, state, and local codes.
- Do not repair, modify, or disassemble the training system or use with parts or accessories not supplied by the manufacturer. Use only approved components and accessories from the manufacturer.
- Be sure all hardware is properly tightened.
- Do not use the training system until you are sure it is correctly assembled and working properly.
- Before each use, inspect the training system for damage and verify it is secure and installed properly.
- Use the training system only as specified in the manual.

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns.

- Do not touch live electrical parts.
- Disconnect input power before installing or servicing this equipment.
- Do not touch grounded surfaces when using this equipment (metal pipes, enclosures, structures, etc.).
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord and ground conductor for damage or bare wiring – replace immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use. Do not leave equipment until it has completely stopped.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to the manual.
- Keep all panels and covers securely in place.
- Do not use the training system during an electrical storm. Turn off equipment and disconnect input power until risk of lightning has passed.
- Always verify the supply ground – check and be sure that cord plug is connected to a properly grounded receptacle outlet.
- Do not use equipment in damp or wet conditions.
- Incorrectly installed or improperly grounded equipment is a hazard. Properly install, ground, and operate this equipment according to its Owner's Manual and national, state, and local codes. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org).

FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Use the training system only for the recommended application or the protection provided by the equipment can be impaired. Do not use the training system table for non-welding operations, such as painting, sawing wood, or any activity that could produce flammable materials.

HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.
- Do not remove gloves to operate touch screen. Touch screen can be activated with gloves on.

FALLING EQUIPMENT can injure.

- Do not exceed the maximum weight rating of welding table, drawers, or shelves (see Specifications). Spread weight evenly on welding table, and in drawers and shelves. Do not use the welding table, tray, drawers, or shelves to stand on or support heavy equipment.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Do not use powered equipment to drag unit.
- Do not move or install training system where it could tip. Install the training system on a firm, level surface and away from flammable materials. Lock wheels to keep table in position.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94–110) when manually lifting heavy parts or equipment.

MOVING PARTS can injure.

- Keep people away from touch screen protective cover when it is being opened. Keep cover closed when welding.
- Keep people away from optional positioning arm when it is being raised or lowered.

ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear body protection made from durable, flame–resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.

1-3. Proposition 65 Warnings

⚠ **Welding or cutting equipment 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 Section 25249.5 et seq.)**

⚠ **This product contains chemicals, including lead, known to the state of California to cause cancer, birth defects, or other reproductive harm. *Wash hands after use.***

1-4. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, is available as a free download from the American Welding Society at http://www.aws.org or purchased from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30329-4027 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH).

Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use — Part 1: General requirements, CAN/CSA Standard C22.2 No. 61010–1–12, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: www.csagroup.org).

SECTION 2 – MESURES DE SÉCURITÉ – À LIRE AVANT UTILISATION

⚠ Pour écarter les risques de blessure pour vous–même et pour autrui — lire, appliquer et ranger en lieu sûr ces consignes relatives aux précautions de sécurité et au mode opératoire.

2-1. Symboles utilisés

⚠ DANGER! – Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.

⚠ Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.

AVIS *– Indique des déclarations pas en relation avec des blessures personnelles.*

☞ *Indique des instructions spécifiques.*

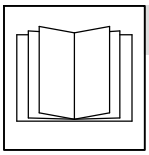
Ce groupe de symboles veut dire Avertissement! Attention! DANGER DE CHOC ELECTRIQUE, PIECES EN MOUVEMENT, et PIECES CHAUDES. Consulter les symboles et les instructions ci-dessous y afférant pour les actions nécessaires afin d'éviter le danger.

2-2. Dangers liés au système de formation en soudure

⚠ Les symboles représentés ci-dessous sont utilisés dans ce manuel pour attirer l'attention et identifier les dangers possibles. En présence de l'un de ces symboles, prendre garde et suivre les instructions afférentes pour éviter tout risque. Les instructions en matière de sécurité indiquées ci-dessous ne constituent qu'un sommaire des instructions de sécurité plus complètes fournies dans les normes de sécurité énumérées dans la Section 2-4. Lire et observer toutes les normes de sécurité.

⚠ Seul un personnel qualifié est autorisé à installer, faire fonctionner, entretenir et réparer cet appareil.

⚠ Le système de formation de soudure présente les mêmes dangers que ceux liés au soudage. Lire les manuels d'utilisation de la source de courant de soudage et du dévidoir pour en savoir plus sur les dangers associés au soudage à l'arc. Lire également la norme ANSI Z49.1 (American National Standard Institute) « *Safety in Welding, Cutting, and Allied Processes* » sur le site de l'American Welding Society (www.aws.org).



LIRE LES INSTRUCTIONS.

- Lire et appliquer les instructions sur les étiquettes et le Mode d'emploi avant l'installation, l'utilisation ou l'entretien de l'appareil. Lire les informations de sécurité au début du manuel et dans chaque section.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer l'installation, l'entretien et toute intervention selon les manuels d'utilisateurs, les normes nationales, provinciales et de l'industrie, ainsi que les codes municipaux.
- Ne pas réparer, modifier ou démonter le système de formation, et ne pas l'utiliser avec des pièces ou accessoires non fournis par le fabricant. Utiliser uniquement des composants et accessoires approuvés par le fabricant.
- S'assurer que toute la quincaillerie est bien serrée.
- Ne pas utiliser le système de formation avant d'être certain qu'il est bien monté et qu'il fonctionne correctement.
- Avant chaque utilisation, inspecter le système de formation pour déceler tout signe de dommage et s'assurer qu'il est bien installé et maintenu correctement.
- Utiliser le système de formation seulement conformément au manuel.

UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

Tout contact avec des pièces électriques sous tension peut causer un choc mortel ou des brûlures graves.

- Ne pas toucher aux pièces électriques sous tension.
- Couper le courant avant d'installer ou de faire l'entretien de cet équipement.
- Ne pas toucher à des surfaces mises à la terre pendant l'utilisation de cet équipement (tuyaux, enceintes, structures et autres pièces métalliques).
- En effectuant les raccordements d'entrée, fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Les câbles doivent être exempts d'humidité, d'huile et de graisse; protégez–les contre les étincelles et les pièces métalliques chaudes.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé. Ne pas laisser l'équipement tant qu'il n'est pas en arrêt complet.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Maintenir solidement en place tous les panneaux latéraux et les capots.
- Ne pas utiliser le système de formation pendant un orage électrique. Mettre l'équipement hors tension et débrancher l'alimentation électrique jusqu'à ce que soit éliminé le risque d'éclairs.
- Toujours vérifier la terre du cordon d'alimentation – Vérifier et s'assurer que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- Ne pas utiliser l'équipement en conditions humides ou mouillées.
- Des matériels mal installés ou mal mis à la terre présentent un danger. Installer, mettre à la terre et utiliser correctement cet appareil, conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux. Lire également la norme Z49.1 de l'American National Standard Institute (ANSI), *Safety in Welding, Cutting, and Allied Processes,* (Règles de sécurité en soudage, coupage et procédés connexes) de l'American Welding Society (www.aws.org).

Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Ne pas installer l'appareil à proximité de produits inflammables.

- Pour ne pas compromettre la protection fournie par l'équipement, utiliser uniquement le système de formation pour ce dont il est conçu. Ne pas utiliser la table du système de formation pour des tâches qui ne sont pas liées à la soudure, comme la peinture, la coupe du bois ou toute autre activité qui pourrait produire des matières inflammables.

LES PIÈCES CHAUDES peuvent provoquer des brûlures.

- Ne pas toucher à mains nues les parties chaudes.
- Prévoir une période de refroidissement avant de travailler à l'équipement.

- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.
- Ne pas retirer les gants pour utiliser l'écran tactile. L'écran tactile peut être activé, même avec le port de gants.

LA CHUTE DE L'ÉQUIPEMENT peut provoquer des blessures.

- Ne pas dépasser les limites de poids de la table de soudure, des tiroirs ou des étagères (se reporter à la fiche technique). Distribuer le poids de manière uniforme sur la table de soudure, dans les tiroirs et sur les étagères. Ne pas utiliser la table de soudure, le plateau, les tiroirs ou les étagères pour soutenir de l'équipement lourd.
- Utiliser un équipement de levage de capacité suffisante pour lever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.
- Ne pas utiliser d'équipement motorisé pour tirer l'unité.
- Ne pas déplacer ou installer le système de formation à un endroit où il pourrait se renverser. Installer le système de formation sur une surface ferme et de niveau, loin des matières inflammables. Verrouiller les roues pour maintenir la table en position.
- Suivre les consignes du Manuel des applications pour l'équation de levage NIOSH révisée (publication nº94–110) lors du levage manuel de pièces ou équipements lourds.

Les PIÈCES MOBILES peuvent causer des blessures.

- Maintenir les personnes à distance lors de l'ouverture du couvercle de protection de l'écran tactile. Maintenir le couvercle fermé pendant le soudage.

- Maintenir les personnes à distance du bras de positionnement en option lorsqu'il est soulevé ou abaissé.

LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

Le rayonnement de l'arc du procédé de soudag génère des rayons visibles et invisibles intense (ultraviolets et infrarouges) susceptibles de provoquer des brûlure dans les yeux et sur la peau. Des étincelles sont projetées pendant l soudage.

- Porter un casque de soudage approuvé muni de verres filtrants approprié pour protéger visage et yeux pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter un équipement de protection pour le corps fait d'un matériau résistant et ignifuge (cuir, coton robuste, laine). La protection du corps comporte des vêtements sans huile comme par ex. des gants de cuir, une chemise solide, des pantalons sans revers, des chaussures hautes et une casquette.

2-3. Proposition californienne 65 Avertissements

⚠ **Les équipements de soudage et de coupage produisent des fumées et des gaz qui contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des malformations congénitales et, dans certains cas, des cancers. (Code de santé et de sécurité de Californie, chapitre 25249.5 et suivants)**

⚠ **Ce produit contient des produits chimiques, notamment du plomb, dont l'État de Californie reconnaît qu'ils provoquent des cancers, des malformations congénitales ou d'autres problèmes de procréation. *Se laver les mains après utilisation.***

2-4. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, is available as a free download from the American Welding Society at http://www.aws.org or purchased from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

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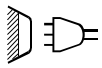
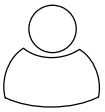
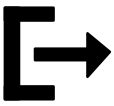
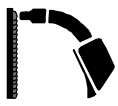
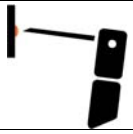
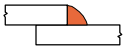
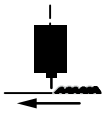
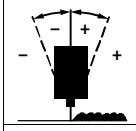
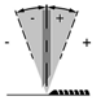
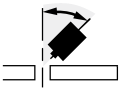
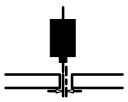
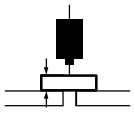
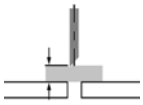
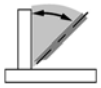
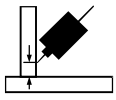
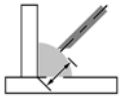
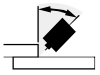
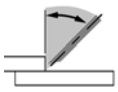
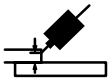
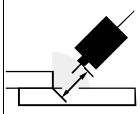
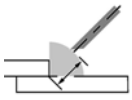
SECTION 3 – DEFINITIONS

3-1. Miscellaneous Symbols And Definitions

A	Amperage
V	Voltage
IP	Internal Protection Rating
	Panel/Local (Power Source Setting)
	Input Plug And Cord
	Welding Enabled
	Welding Disabled
	Arc On Mode
	Arc Off Mode
	GMAW
	FCAW
	SMAW
	Wire Feed

	Touchscreen
	Audio/Sound
	Vibration Feedback
	Target
	User Profile
	Logout
	Arrow Left
	Arrow Right
	Arrow Up
	Arrow Down
	Assignment Success Mark
	Unsuccessful
	Assignment Incomplete

	Scroll Forward In Time
	Scroll Back In Time
	Test History
	Multi-Pass History
	Welding Procedure Specification Summary
	Arc Parameters
	Fillet Weld
	Bevel Weld
	Square Groove Weld
	V-Groove Weld
	Overhead Position (GMAW/FCAW)
	Overhead Position (SMAW)
	Vertical Position (GMAW/FCAW)

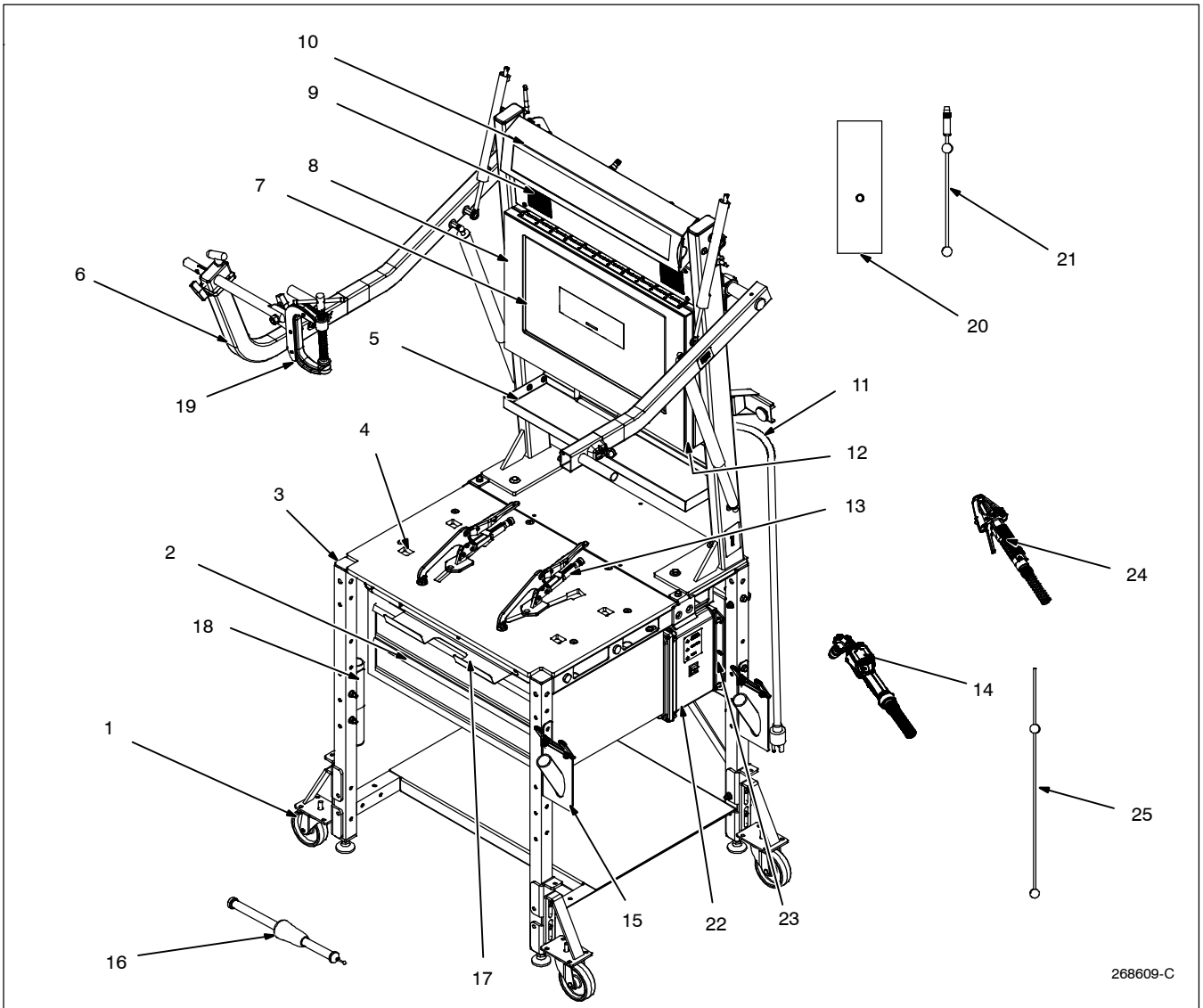
	Vertical Position (SMAW)
	Flat Position (GMAW/FCAW)
	Flat Position (SMAW)
	Horizontal Position (GMAW/FCAW)
	Horizontal Position (SMAW)
	Square Butt Joint
	T-Joint
	Single V-Groove
	Single Bevel Groove
	Lap Joint
	Travel Speed
	Travel Speed
	Travel Angle
	Travel Angle
	Work Angle Butt Joint
	Work Angle Butt Joint
	Aim Butt Joint
	CTWD Butt Joint
	Arc Length Index Butt Joint
	Work Angle T-Joint
	Work Angle T-Joint
	Aim T-Joint
	CTWD T-Joint
	Arc Length Index T-Joint
	Work Angle Lap Joint
	Work Angle Lap Joint
	Aim Lap Joint
	CTWD Lap Joint
	Arc Length Index Lap Joint
AL	Aluminum
S	Steel
SS	Stainless Steel

SECTION 4 – SPECIFICATIONS

Welding-related hazards are present when using the welding training system. Read the welding power source and wire feeder Owner's Manuals and labels carefully for more information on arc welding hazards. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org). Operators must be trained on the proper use of this equipment before using the equipment to train others.

4-1. Introduction

The LiveArc welding training system provides the new student or the experienced welder the opportunity to develop, enhance or verify their welding abilities through an interactive, simulated or live-arc process on a variety of weld joint configurations. The microprocessor-based training system connects to nearly any Miller power source/wire feeder combination and uses a series of cameras, LEDs, and markers on the SmartGun, SmartStinger, and table to monitor the welds being performed. The user puts on personal protective equipment, turns on the welding equipment and training system, selects the desired weld assignment on the touchscreen monitor, and begins either a simulated/practice (GMAW/FCAW only) or live arc weld. The cameras, markers, and LEDs convey the weld data (gun angles, gun speed, CTWD, aim) to the system microprocessor, which compares it to the specified weld parameters of the assignment selected. The system evaluates the weld data and grades the student's performance through a numerical score.



☞ *Unit is shown with optional SMAW upgrade module.*

1 Caster
2 Tool Drawers
3 Weld Table
4 Table Marker (Sensor) (4)
5 Storage Tray
6 Positioning Arm (For Out-Of-Position Welding)
7 Touchscreen Monitor
8 Monitor Cover
9 Speaker (2)
10 Camera (3)
11 Power Cable
12 USB Port
13 Table Clamp (2)
14 GMAW SmartGun (Cables Not Shown)
15 Weld Tool Holder
16 Joint Calibration Tool
17 Storage Tray – Joint Calibration Tool
18 Clamp Holster
19 Clamp
20 Clamp Calibration Block
21 SmartGun Calibration Tool

Optional SMAW Module Components

22 Router Box
23 Router Box Mounting Bracket
24 SmartStinger (Cables Not Shown)
25 SmartStinger Calibration Tool
26 Router Box Power Cable (Not Shown)

4-2. Serial Number And Rating Label Location

The serial number and rating information for this product is located on the side of monitor frame. Use rating label to determine input power requirements and/or rated output, and to register for free software upgrades. For future reference, write serial number in space provided on back cover of this manual.

4-3. Specifications

Monitor And Welding Table	
Dimensions	Unit With Positioning Arm: 45.5 x 31 x 81.5 in. (116 x 79 x 207 cm) Unit With Optional Stick Upgrade Module: 45.5 x 32.75 x 81.5 in. (116 x 83 x 207 cm)
Weight	Base Unit: 480 lb (218 kg) Unit With Optional Stick Upgrade Module: 506 lb (230 kg)
Input Power	120 Volts AC, 15 Amps, 60 Hz
Operating Conditions: Maximum Relative Humidity	80% For Temperatures Up To 88°F (31°C) And Decreasing Linearly To 50% At 104°F (40°C)
Training System Operating Modes	GMAW/FCAW: Simulated (SIM) And Live Arc (WELD) SMAW: SETUP And Live Arc (WELD)
Welding Power Source	GMAW/FCAW: Constant Voltage (CV) SMAW: Constant Current (CC) With Dinse 35 Connector
Recommended Wire Feeder	Any Constant Voltage (CV) Or Voltage Sensing Feeder With Power-Pin Connection And Four–Pin Trigger Receptacle
Software Version	Displayed On Software Updates Screen. See Section 8-3. ☞ *Register for free software upgrades at MillerWelds.com/register.*
GMAW SmartGun	
Processes	MIG (GMAW), Gas Shielded Flux Core (FCAW-G)
Rated Output	400 Amps At 100% With CO2; 400 Amps At 60% With Mixed Gas
Maximum Wire Size	5/64 in.
Measured Parameters	Work Angle, Travel Angle, Travel Speed, Contact Tip To Work Distance (CTWD), Aim, Volts, Amps
Cooling	Air Cooled; SmartGun Displays Message If Gun Overheats
Weight	Gun Only: 3 lb (1.4 kg); Gun With Cable: 11.6 lb (5.3 kg)
Cable Length	15 ft (4.6 m)
SMAW SmartStinger	
Process	Stick (SMAW)
Rated Output	250 Amps At 60% Duty Cycle
Electrode Size	3/32 And 1/8 in. Electrodes, Max. Length 14 in., All Types
Measured Parameters	Work Angle, Travel Angle, Travel Speed, Arc Length Index, Volts, Amps
Weight	Stinger Only: 6.6 lb (3 kg)
Cable Length	12 ft (3.7 m)
☞ *See Section 12 for SMAW connections and operation.*	

4-4. Environmental Specifications

A. IP Rating

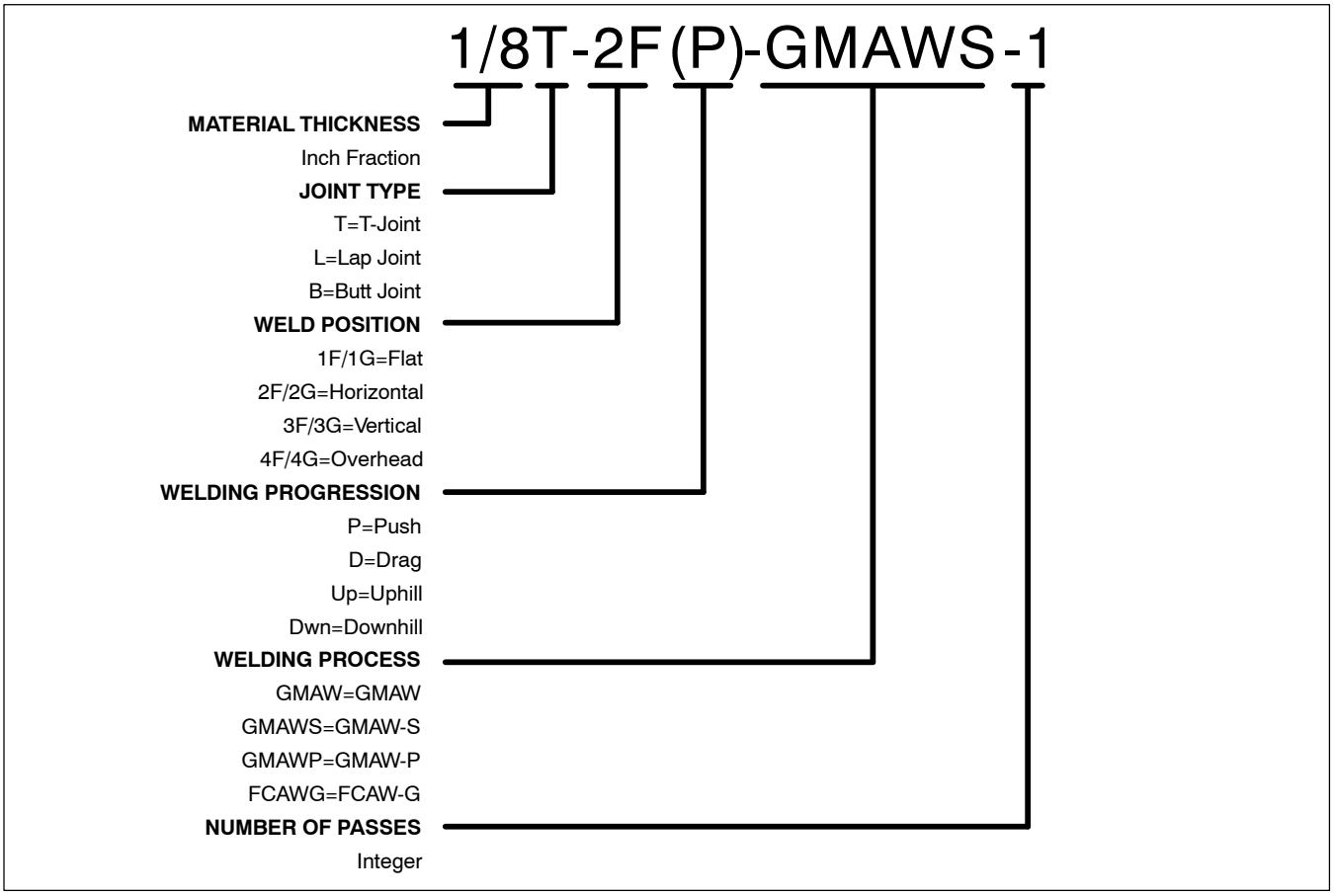
IP Rating
IP21 This equipment is designed for indoor use and is not intended to be used or stored outside. IP21 2014–06

B. Temperature Specifications

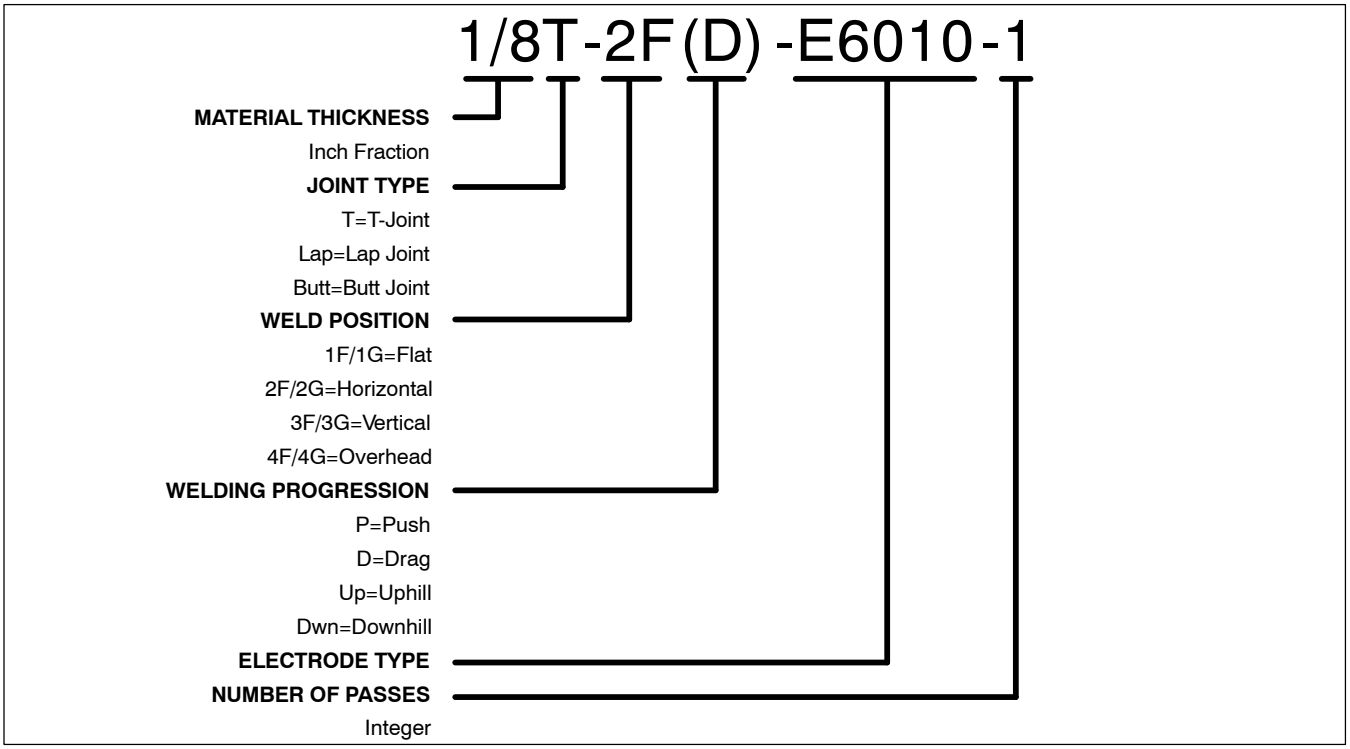
Operating Temperature Range	Storage/Transportation Temperature Range
32 to 104°F (0 to 40°C)	–25 to 180°F (–31 to 82°C)

Temp_2016-07

4-5. Naming Convention For Miller Welding Assignments – GMAW/FCAW



4-6. Naming Convention For Miller Welding Assignments – SMAW



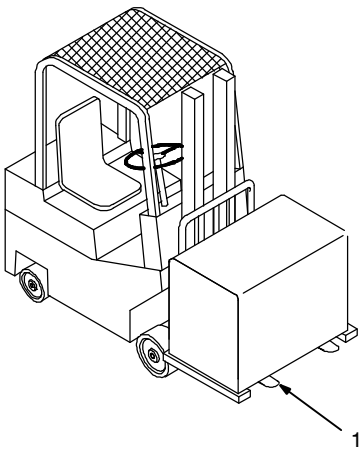
Notes

SECTION 5 – INSTALLATION

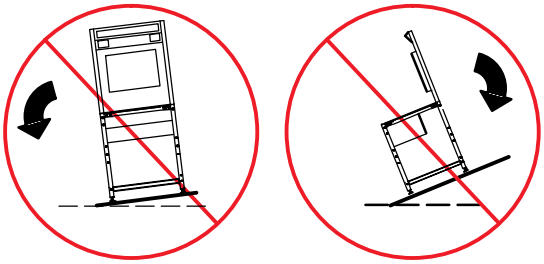
Welding-related hazards are present when using the welding training system. Read the welding power source and wire feeder Owner's Manuals and labels carefully for more information on arc welding hazards. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org). Operators must be trained on the proper use of this equipment before using the equipment to train others.

5-1. Selecting A Location

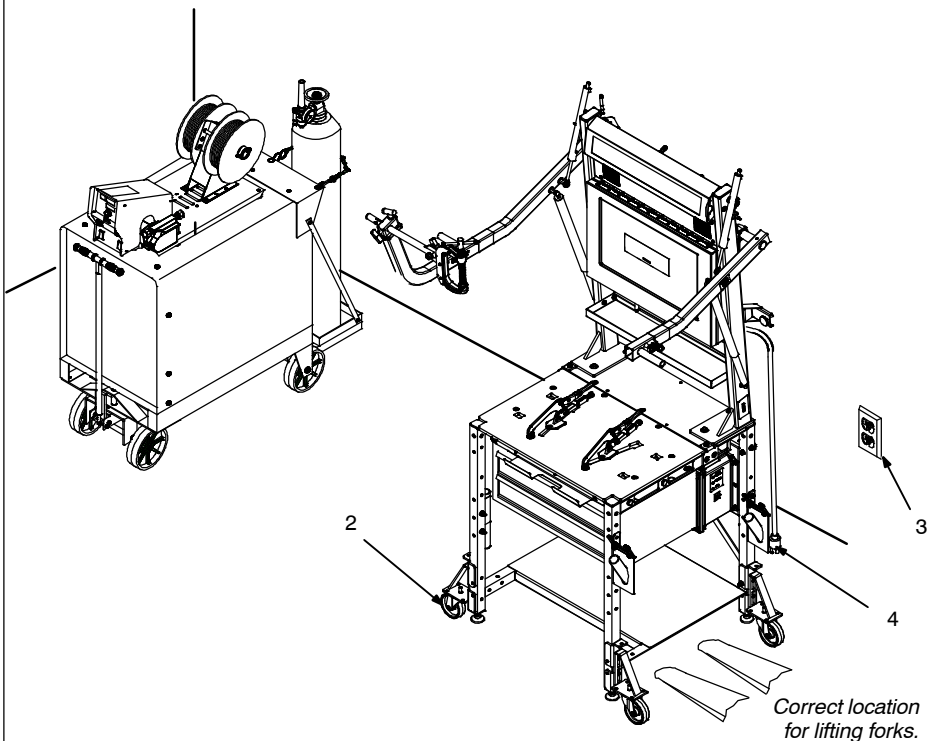
Movement



Do not move or operate unit where it could tip.



Location



Correct location for lifting forks.

Only qualified persons should install, operate, maintain, and repair this unit.

Installation must meet all National, State, and Local Codes – have only qualified persons make this installation.

Do not move unit by pulling on monitor, struts, or positioning arm or equipment may tip. Position lifting forks beneath table top to move unit.

Do not use this equipment to support personnel, large tools, or other material.

Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.

NOTICE *– Use training system only indoors and away from sources of high frequency (TIG welders) and other types of electrical interference. It may be necessary to enclose nearby electrical wiring in conduit if unit is affected by interference.*

NOTICE *– Do not use training system in damp or wet locations. Keep training system table and monitor dry.*

NOTICE *– Do not position training system where the cameras are in direct sunlight. High intensity sunlight can interfere with gun tracking.*

1 Lifting Forks
2 Casters
3 120 Volt, 15 Amp AC Grounded Receptacle
4 Input Power Cord

Use casters or lifting forks to move unit. Insert lifting forks beneath bottom shelf as shown.

If using lifting forks, extend forks beyond opposite side of unit.

Position unit near the welding equipment and close to 120 volt AC receptacle but away from obstructions that may restrict movement of positioning arm.

☞ *A 120 volt AC, 15 amp individual branch circuit protected by time delay fuses or circuit breaker is required.*

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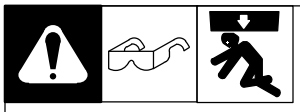
5-2. Installing Monitor Stand On Weld Table

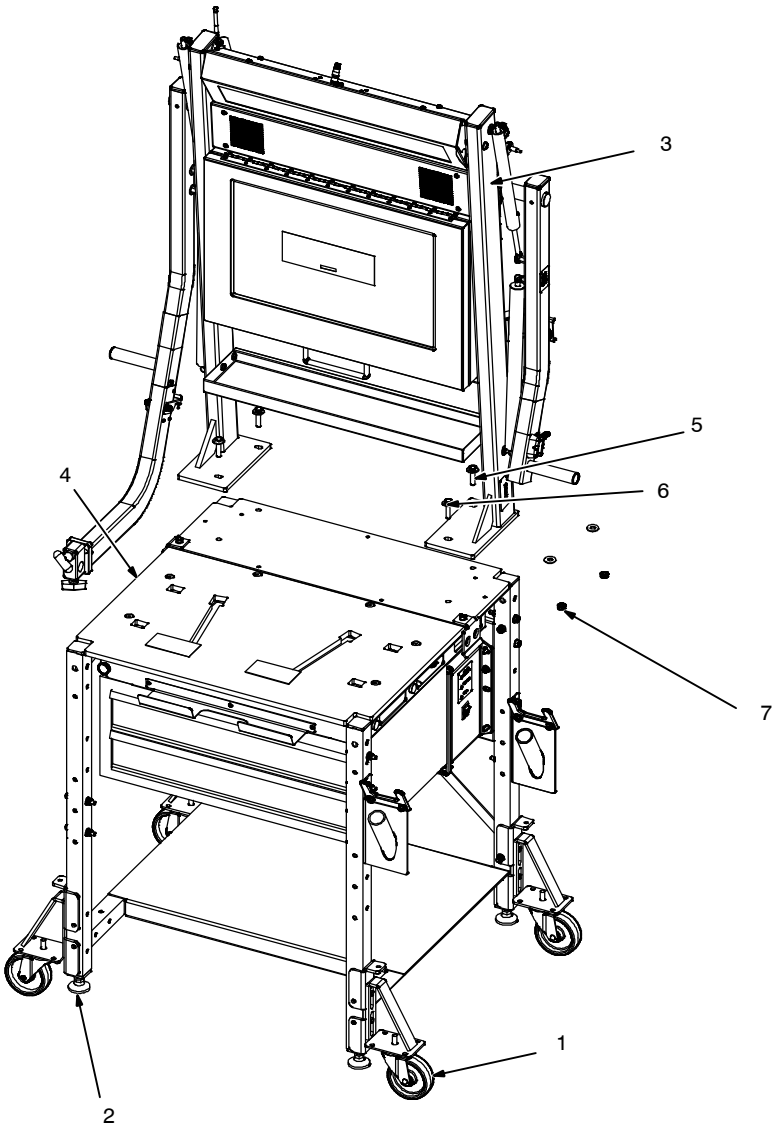


Use equipment of adequate capacity to lift and support monitor stand.

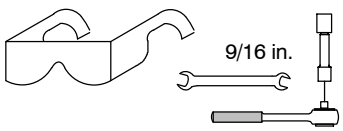
☞ *Stabilize weld table by adjusting leveling feet.*

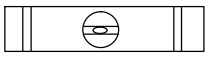
1 Casters
2 Leveling Foot
3 Monitor Stand
4 Weld Table
5 3/8 x 1-1/2 in. Screw
6 3/8 in. Flat Washer
7 3/8 in. Locknut

Place monitor stand on weld table. Align holes in base of monitor stand with holes in weld table. Install four screws in holes and secure with washers and locknuts.



Tools Needed:

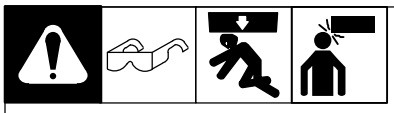




level

Ref. 268609-C

5-3. Positioning Arm

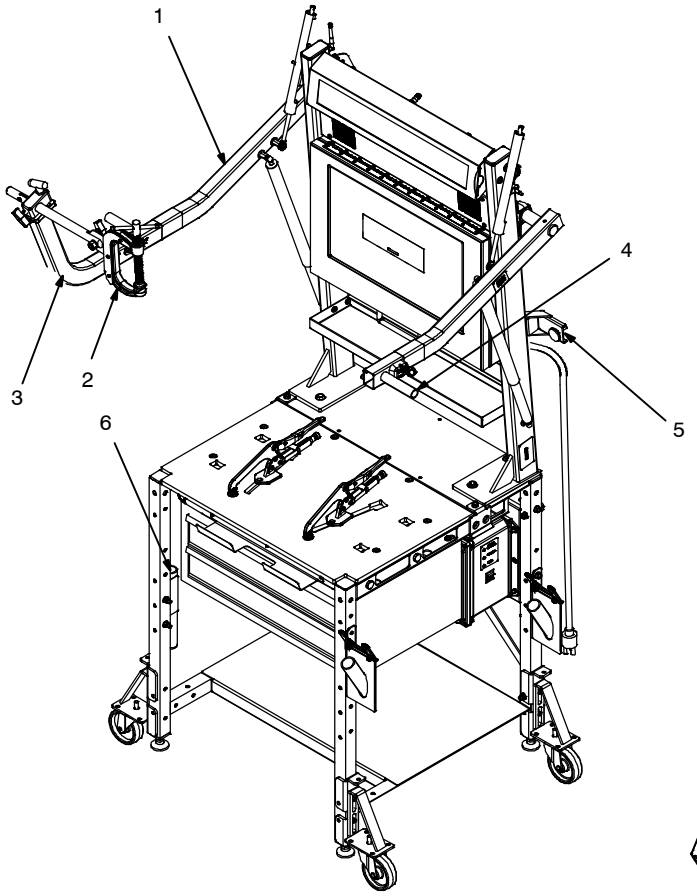


⚠ Keep fingers away from pinch points on positioning arm.

⚠ Before removing positioning arm extension:

- **Remove weld coupon from clamp assembly.**
- **Remove clamp assembly.**
- **Place clamp assembly in storage holster.**

☞ *Stabilize weld table by adjusting leveling feet.*

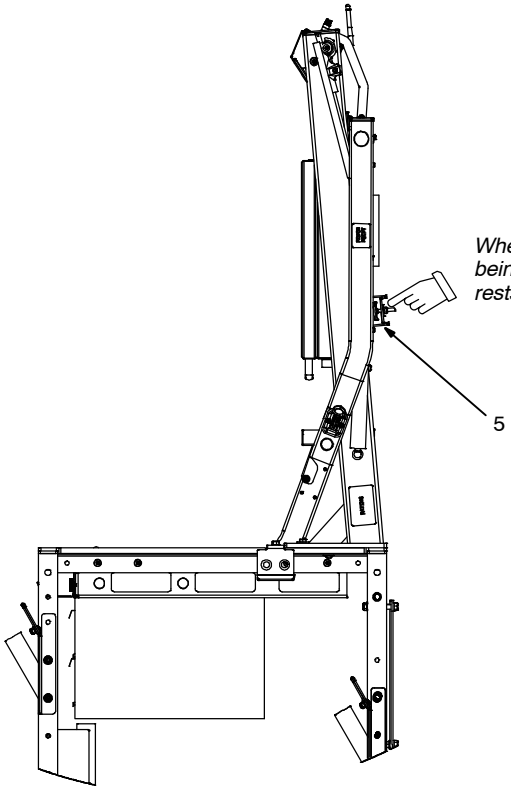


1 Positioning Arm
2 Clamp Assembly
3 Extension Arm (Section 5-4)
4 Adjustment Lever (Above Handle)
5 Arm Stop
6 Clamp Storage Holster

Use the positioning arm to hold the coupons for horizontal, vertical or overhead welding at a variety of heights. The arm accommodates both right and left-handed welders.

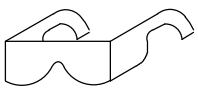
Press lever to release control arm so it can be raised or lowered. When positioning arm is not in use, lower arm so it rests against arm stop.

See Section 5-4 for information on using the extension arm and clamp assembly.



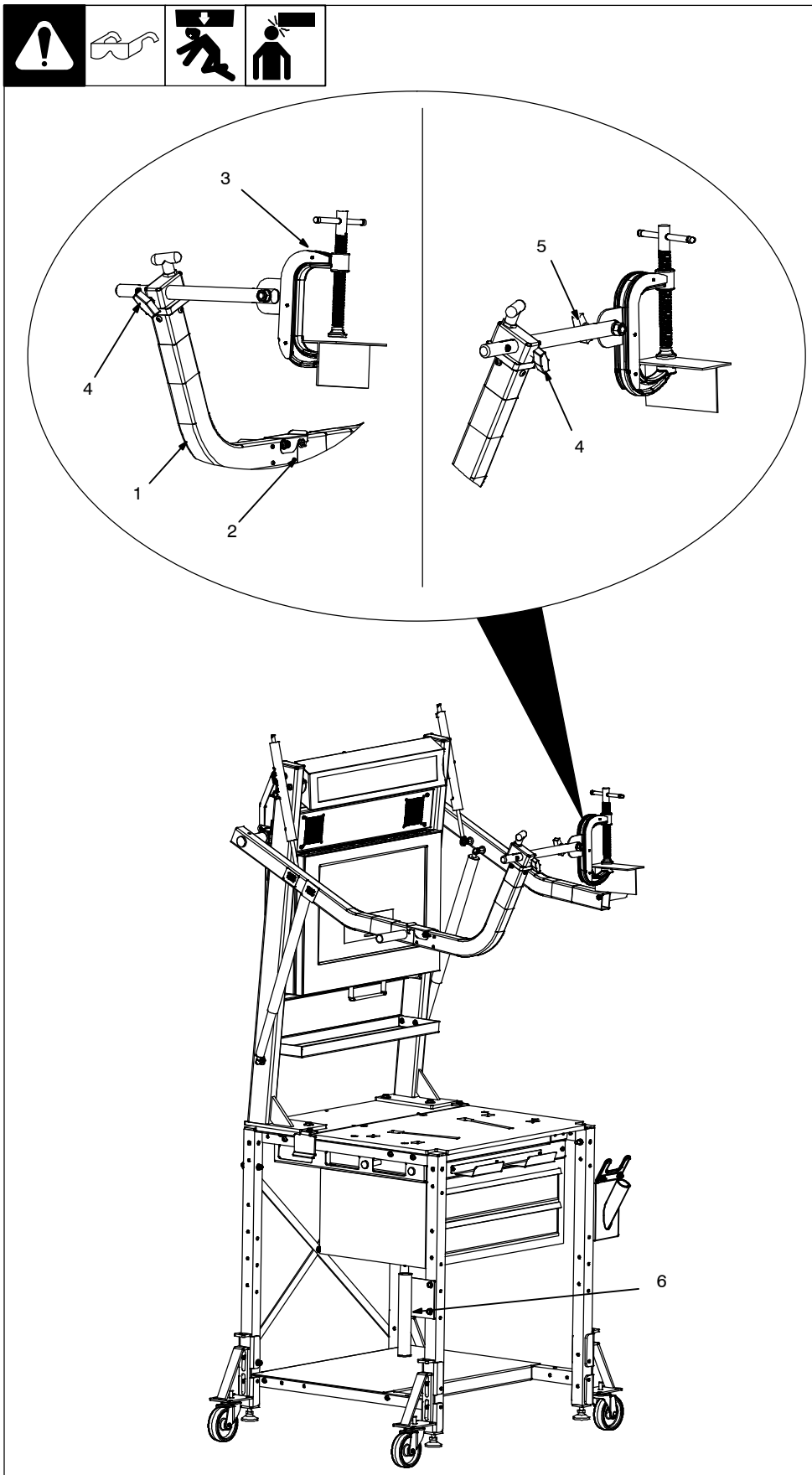
When positioning arm is not being used, lower arm so it rests against stop.

Tools Needed:



Ref. 268609-C

5-4. Extension Arm And Clamp Assembly



⚠ **Keep fingers away from pinch points on positioning arm.**

⚠ **Do not use extension arm and clamp to support objects weighing more than 25 lb (11 kg).**

⚠ **Before removing positioning arm extension:**

- **Remove weld coupon from clamp assembly.**
- **Remove clamp assembly.**
- **Place clamp assembly in storage holster.**

NOTICE *– When welding out of position, position clamp screw on opposite side of weld joint to protect screw from spatter.*

☞ *Stabilize weld table by adjusting leveling feet.*

☞ *Extension arm and clamp assembly may be installed on either positioning arm.*

Use extension arm and clamp assembly for out-of-position weld assignments.

1 Extension Arm
2 Locking Bracket
3 Clamp Assembly
4 Pivot Rod T-Handle
5 Clamp T-Handle
6 Holster

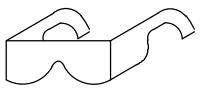
Slide extension arm into opening in positioning arm until locking bracket snaps into place.

Slide clamp assembly shaft through hole in extension arm until latch engages. Rotate clamp assembly to position as instructed on the monitor and tighten T-handle on extension arm.

Lower positioning arm and install weld coupon in clamp. Loosen clamp T-handle and rotate coupon to desired position. Tighten T–handle. Raise positioning arm to desired height.

Place clamp assembly in holster when not in use.

Tools Needed:



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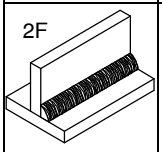
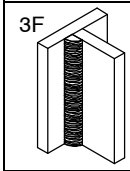
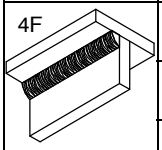
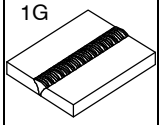
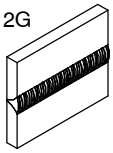
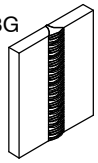
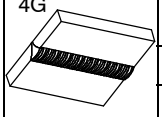
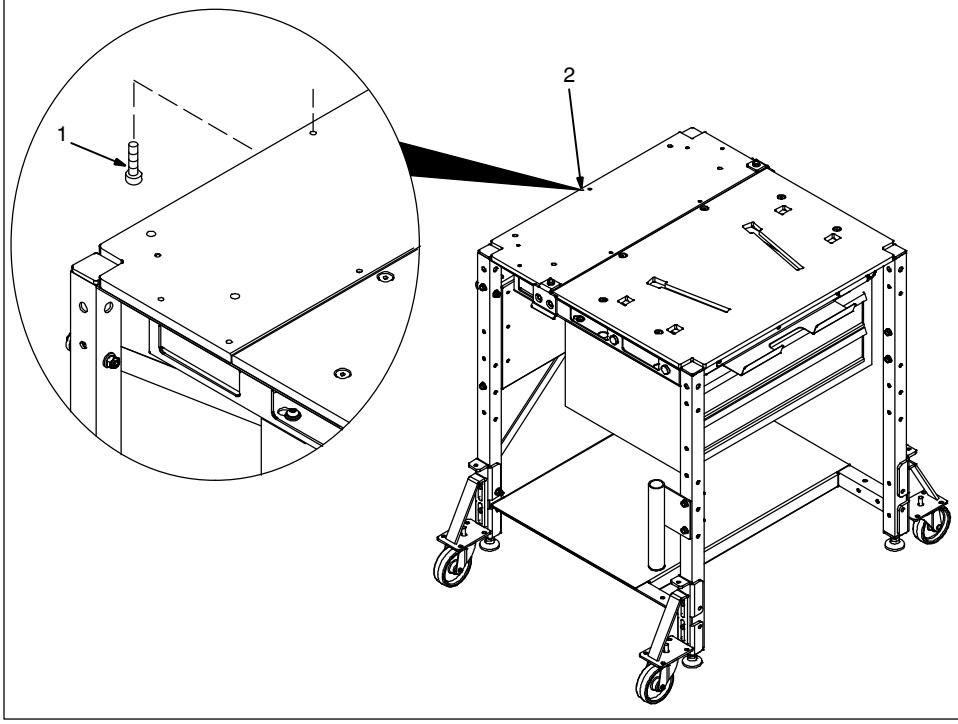
5-5. Clamp Assembly Height Limits By Weld Position (GMAW/FCAW)

Position	Height*		Max. Coupon Length*	Notes
 2F	Table	36 in. (0.91 m)	24 in. (610 mm)	
 3F	Minimum	4 ft. 9 in. (1.45 m)	12 in. (305 mm)	Height measured from top of coupon.
	Average	5 ft. 2 in. (1.57 m)	12 in. (305 mm)	Height measured from top of coupon.
	Maximum	6 ft. 8 in. (2.03 m)	14 in. (356 mm)	Height measured from top of coupon.
 4F	Minimum	4 ft. 9 in. (1.45 m)	18+ in. (457+ mm)	Height measured from clamp pad.
	Average	6 ft. (1.83 m)	18+ in. (457+ mm)	Height measured from clamp pad.
	Maximum	6 ft. 8 in. (2.03 m)	18+ in. (457+ mm)	Height measured from clamp pad.
 1G	Table	36 in. (0.91 m)	24 in. (610 mm)	
 2G	Minimum	4 ft. 5 in. (1.35 m)	8 in. (203 mm)	Height measured from joint.
	Average	5 ft. 2 in. (1.57 m)	12 in. (305 mm)	Height measured from joint.
	Maximum	6 ft. 8 in. (2.03 m)	18+ in. (457+ mm)	Height measured from joint.
 3G	Minimum	4 ft. 5 in. (1.35 m)	8 in. (203 mm)	Height measured from top of coupon.
	Average	5 ft. 2 in. (1.57 m)	10 in. (254 mm)	Height measured from top of coupon.
	Maximum	6 ft. 8 in. (2.03 m)	14 in. (356 mm)	Height measured from top of coupon.
 4G	Minimum	5 ft. 6 in. (1.68 m)	8 in. (203 mm)	Height measured from clamp pad. Longer coupons block tracking of gun at this height.
	Average	6 ft. (1.83 m)	18+ in. (457+ mm)	Height measured from clamp pad.
	Maximum	6 ft. 8 in. (2.03 m)	18+ in. (457+ mm)	Height measured from clamp pad.

*All measurements are approximations. Specific values may vary based on coupon positioning and gun technique. Minimum coupon lengths are 1 inch (25 mm).

5-6. Grounding The Work Table



Connect welding table to a good electrical ground (independent of the welding leads) unless a qualified person assures it is safe to work on an ungrounded workpiece.

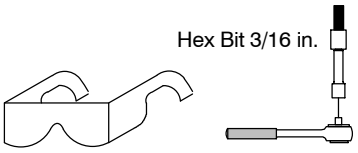
1 Ground Bolt

2 Tapped Hole For Ground Bolt

Use ground bolt (customer supplied) to connect the welding table to a good electrical ground according to national, state, and local codes.

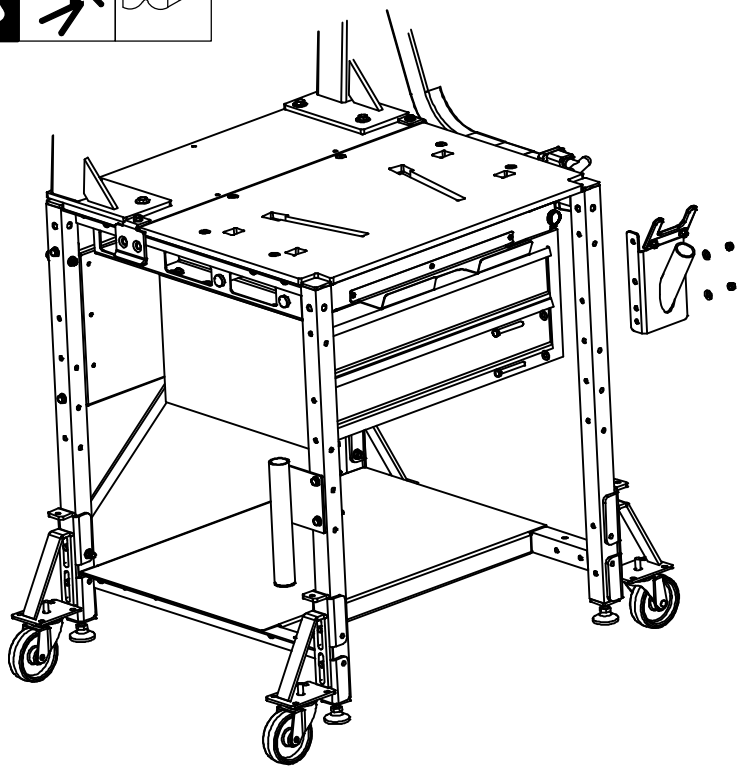
Tools Needed:

Hex Bit 3/16 in.



Ref. 268609-C

5-7. Installing Front Weld Tool Holder

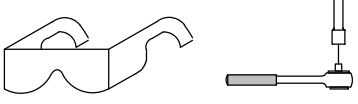


☞ *For packaging reasons, the front weld tool holder is shipped installed upside down. It must be turned over to function correctly.*

Install front weld tool holder in the position shown with provided hardware.

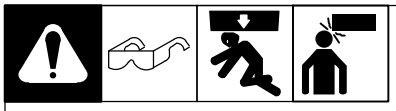
Tools Needed:

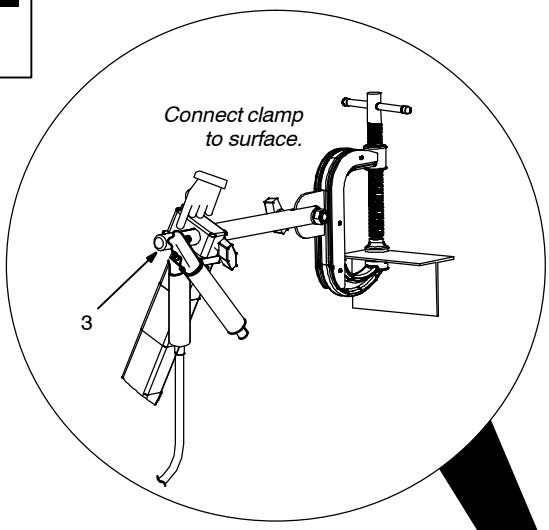
Hex Bit 3/16 in.



Ref. 268609-C

5-8. Installing Power Source Work Clamp





Keep fingers away from pinch points on positioning arm.

1 Work Clamp

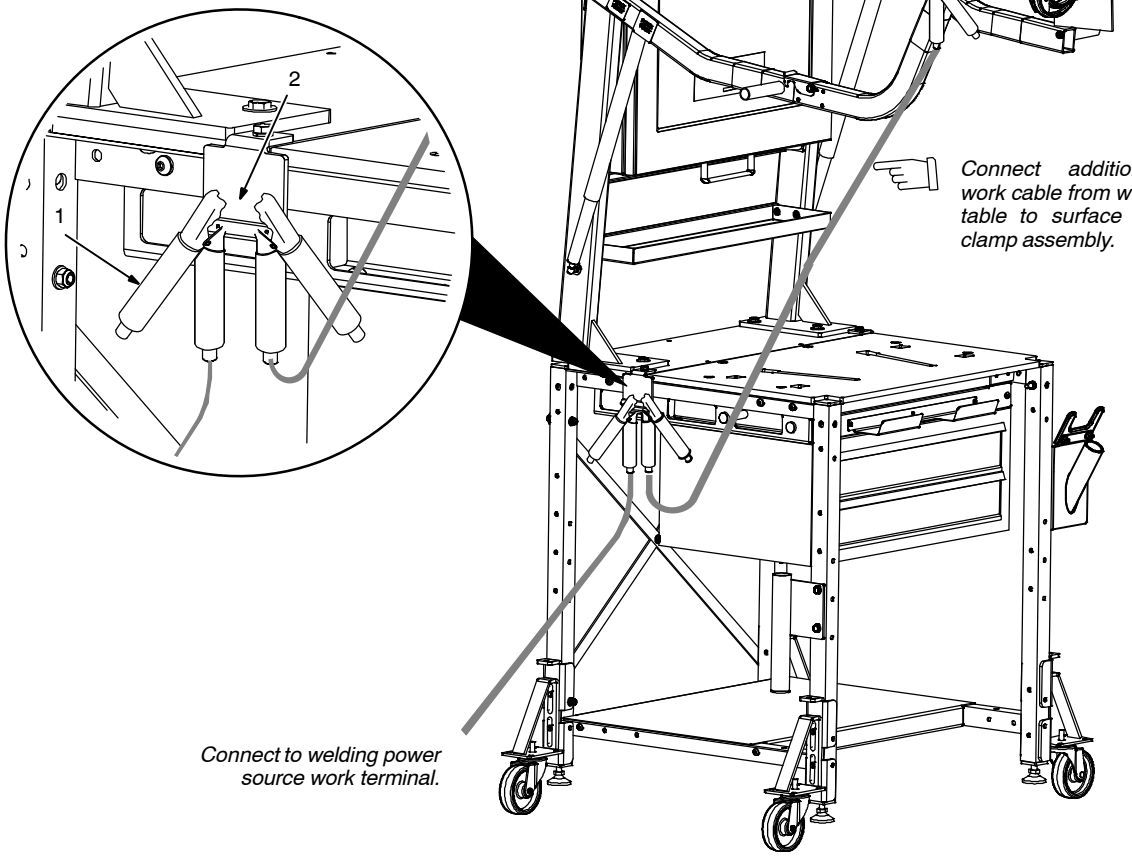
2 Connection Plate For Weld Table Work Clamp

3 Work Clamp Connection On Clamp Assembly

☞ *Work clamp plates are located on both sides of weld table.*

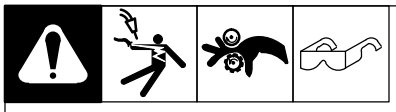
Connect work clamp from welding power source to connection plate on weld table.

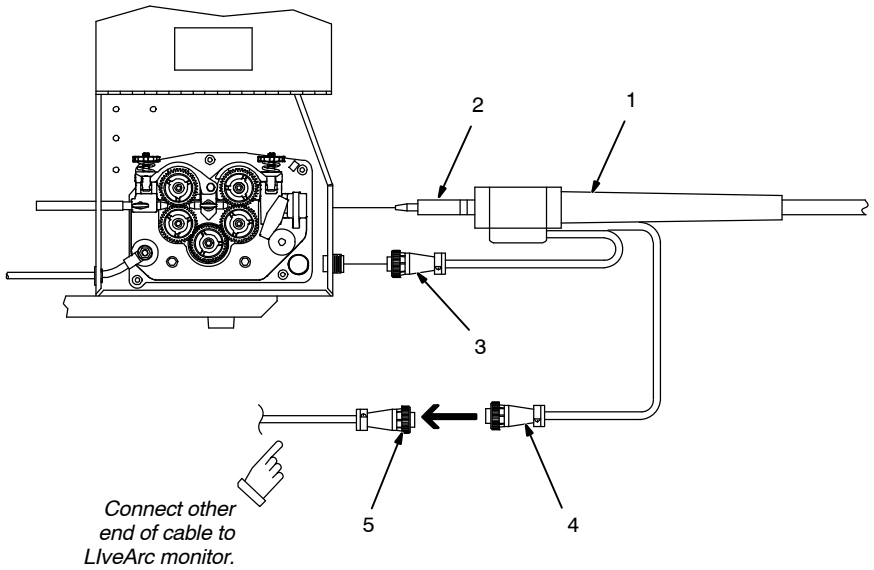
When using positioning arm to perform out-of-position welds, connect additional work cable from weld table to round bar through extension arm.



Ref. 268609-C

5-9. Installing GMAW SmartGun





☞ *The SmartGun is compatible with Miller wire feeders that use a power pin connection and four−pin trigger receptacle.*

1 GMAW SmartGun

2 Gun Power Pin

3 Gun Trigger Plug

4 SmartGun Power Plug

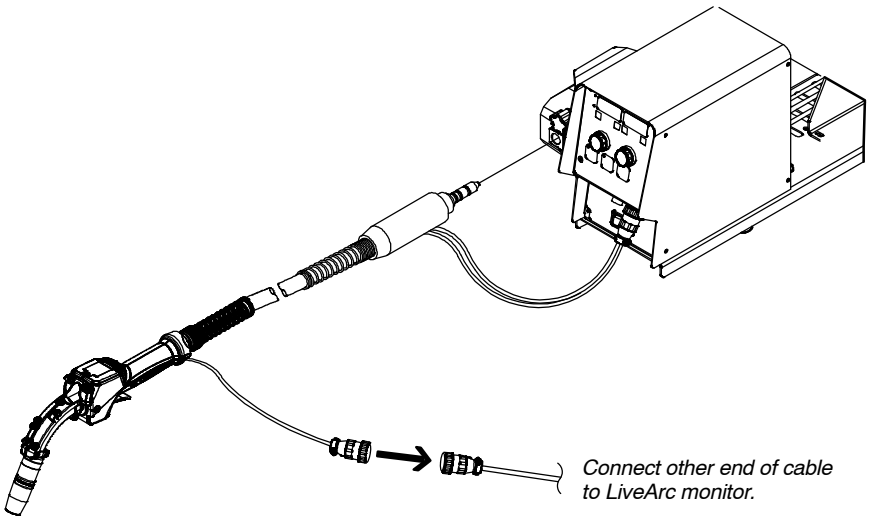
5 SmartGun Power Cable

Install SmartGun power pin and thread wire according to wire feeder Owner's Manual. Connect trigger plug to feeder. Connect SmartGun power cable to plug on gun. Connect other end of SmartGun power cable to receptacle on back of LiveArc monitor.

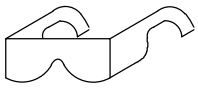
6 Gun Holder

Place SmartGun in holder when gun is not in use (see Figure 4-1).

☞ *See Section 12-1 to install GMAW SmartGun with optional router box.*

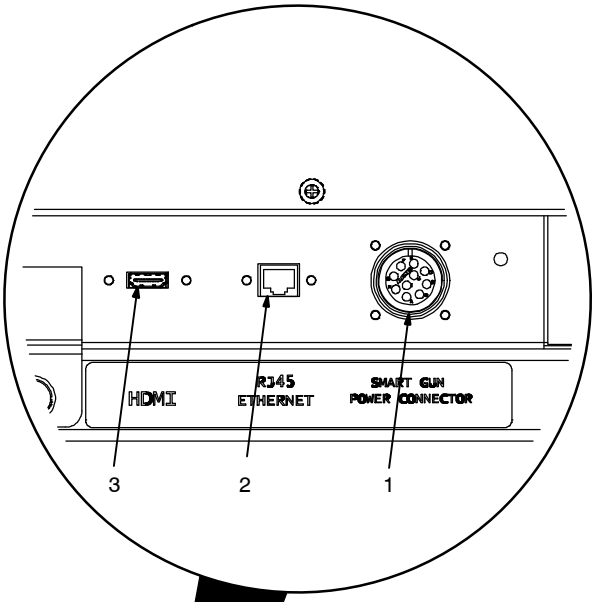


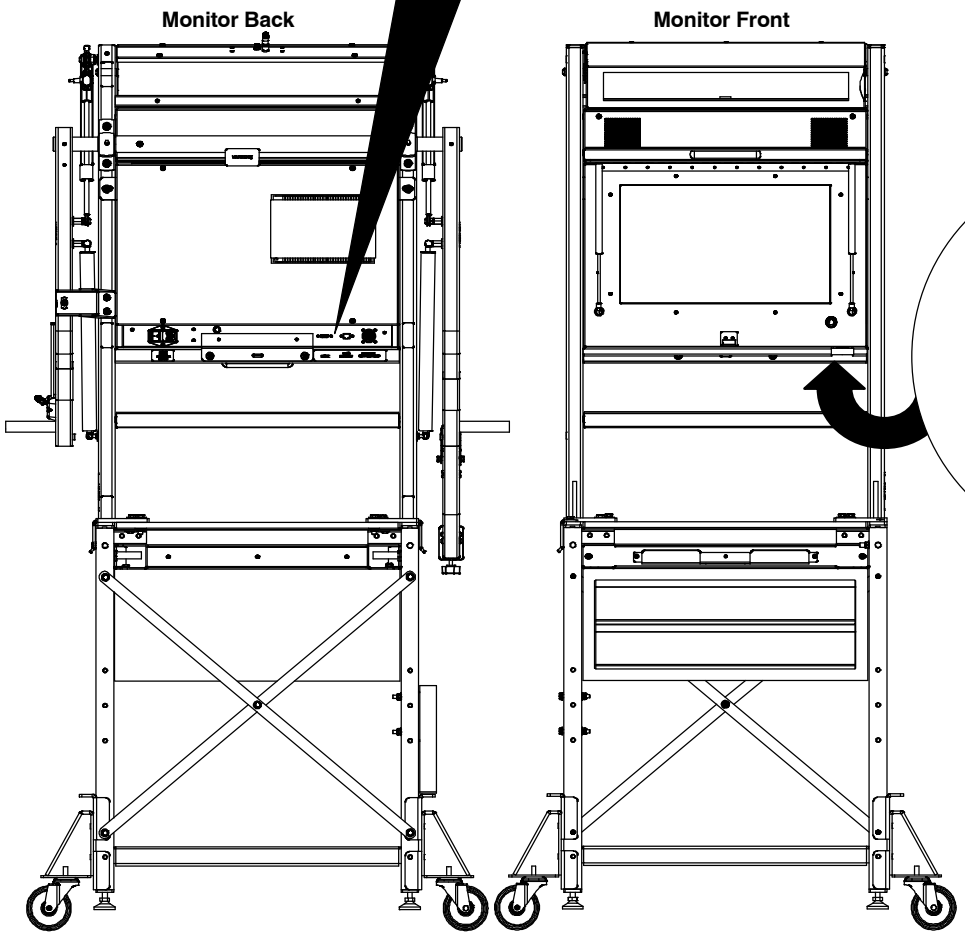
Tools Needed:

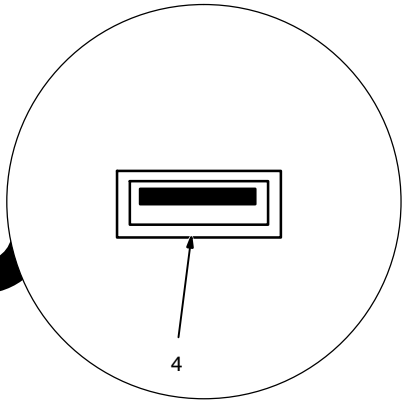


268 609-B / Ref. 245 985-A / Ref. 246 040-A

5-10. Making Connections To Touchscreen Monitor







☞ *See Section 12 for making connections to monitor for units equipped with optional SMAW module.*

1 SmartGun Power Receptacle

2 RJ45 Ethernet Receptacle

3 HDMI Receptacle

4 USB Receptacle

Connect data cable from SmartGun to receptacle on back of monitor. Tighten plug screws.

Use ethernet receptacle to connect training system to a computer network or connect via wifi.

Use HDMI receptacle to connect training system to an external monitor.

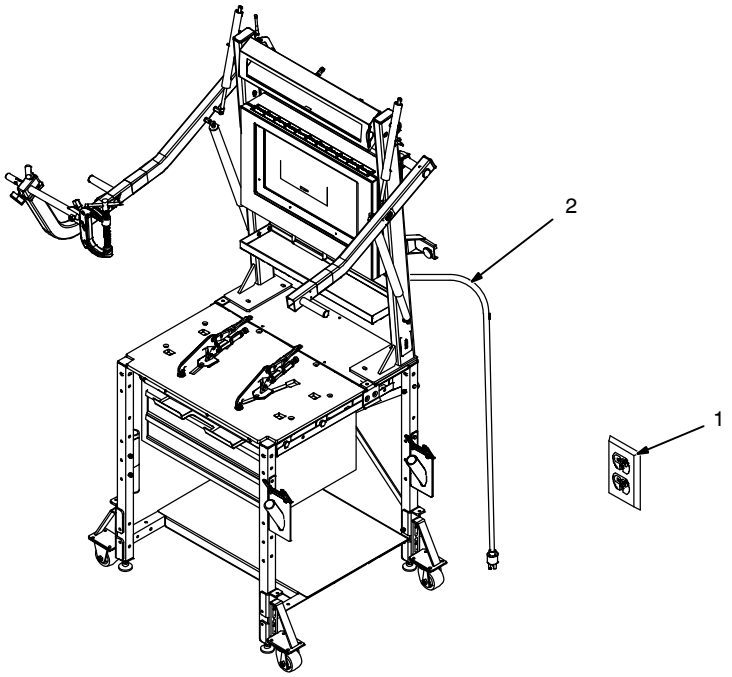
☞ *If the training system is connected to an external monitor, restart the application to enable the monitor. (Section 8).*

☞ *If the external monitor displays the warning screen during welding, it is incorrectly configured. Go to* System Admin *and select* Extend Display *to configure correctly.*

Use USB receptacle to connect computer mouse and keyboard, save test results, and backup and install software updates (see Section 8-3).

Ref. 268609-B

5-11. Connecting Input Power To Monitor



The input power cord is the means for disconnection from the electrical supply source and the cord must be readily available. Be sure the training system does not block access to the input power cord.

1 120 Volt, 15 Amp AC Grounded Receptacle

2 Input Power Cord

A 120 volt AC, 15 amp individual branch circuit protected by fuses or circuit breaker is required.

Select 14 AWG three−conductor extension cord for distances up to 50 ft (15 m) or 12 AWG three−conductor extension cord for distances up 100 ft (30 m).

☞ *It is recommended not to use a GFCI receptacle to power the training system. If a GFCI receptacle must be used, do not use an extension cord.*

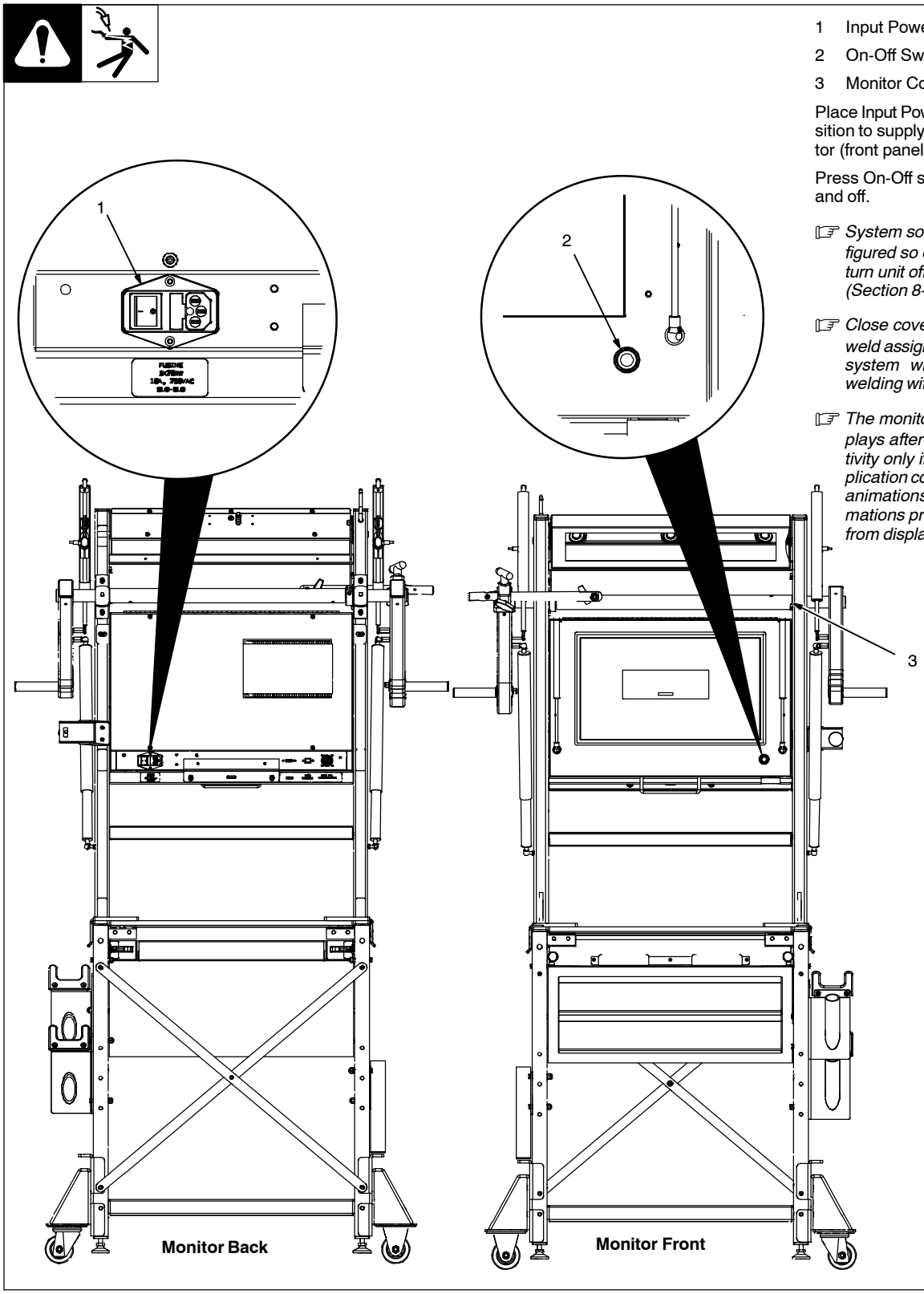
Ref. 268609-C

Notes

SECTION 6 – SYSTEM CONTROLS AND COMPONENTS

Welding-related hazards are present when using the welding training system. Read the welding power source and wire feeder Owner's Manuals and labels carefully for more information on arc welding hazards. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org). Operators must be trained on the proper use of this equipment before using the equipment to train others.

6-1. Touchscreen Monitor Controls



1 Input Power Switch

2 On-Off Switch/LED

3 Monitor Cover

Place Input Power switch in On position to supply power to the monitor (front panel LED turns on).

Press On-Off switch to turn unit on and off.

☞ *System software may be configured so only instructors can turn unit off with On-Off switch (Section 8-2).*

☞ *Close cover before beginning weld assignment. The LiveArc system will not permit live welding with cover open.*

☞ *The monitor screensaver displays after four hours of inactivity only if the on-screen application contains no videos or animations. (Videos and animations prevent screensaver from displaying.)*

Ref. 268609-B

6-2. Training System Cameras And Markers

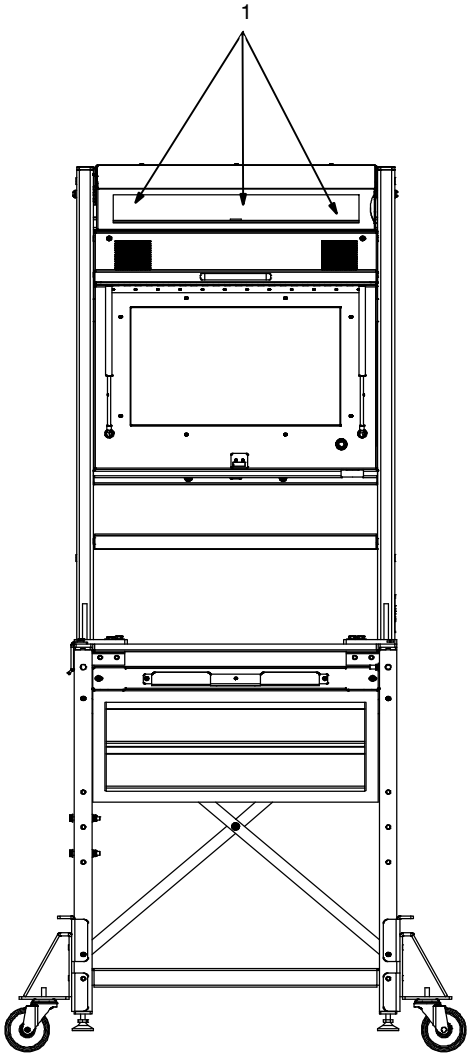
☞ *Keep cameras, markers, and LEDs free of tools, coupons, weld spatter and other debris. If table is clear and cameras cannot locate table markers, clean marker tubes with a damp cloth. (Do not use chemicals, solvents, or abrasives to clean markers.)*

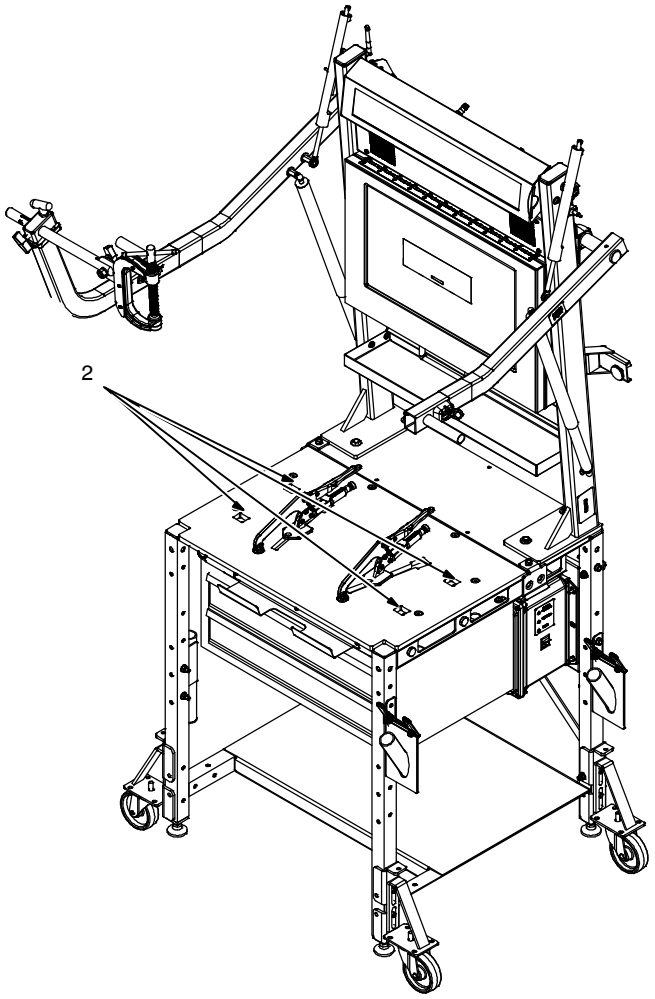
☞ *Table markers can be covered after completion of table calibration for each welding assignment.*

1 Data Collection Cameras (3)

2 Table Markers (4)

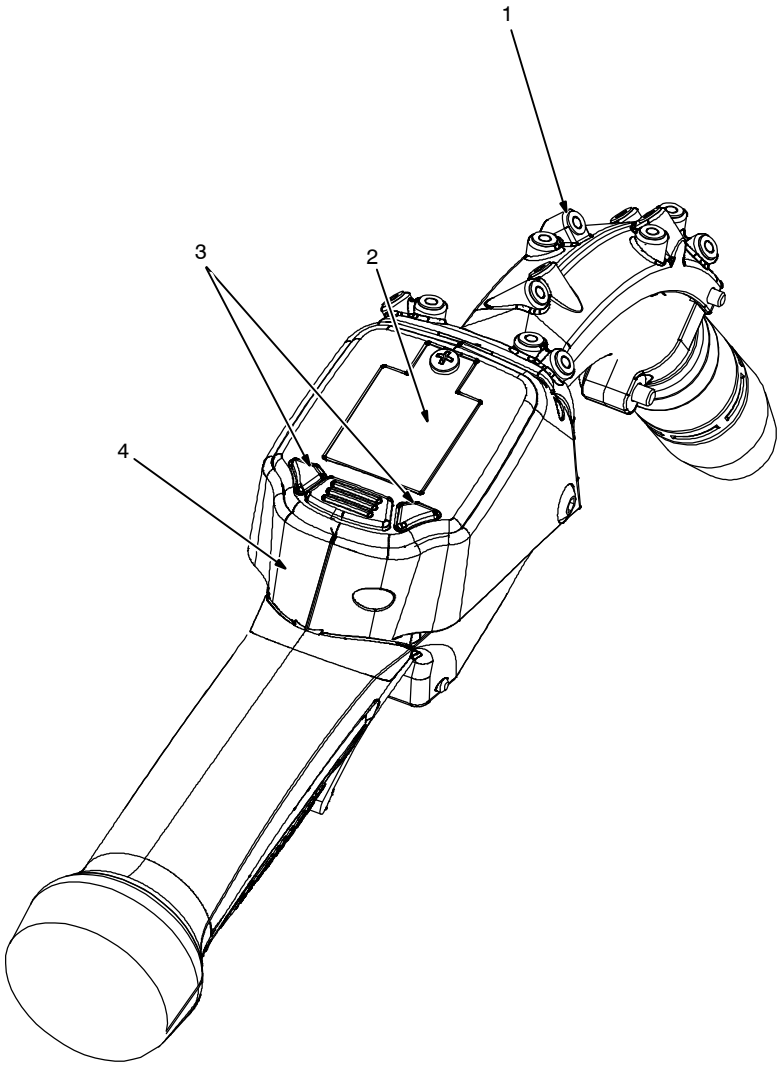
The training system uses a combination of monitor−mounted cameras, markers on the weld table, and LEDs on the SmartGun (and SmartStinger, if equipped) to monitor table placement, gun speed, gun angles, gun direction, and other data. There are also markers on the clamp for out-of-position assignments.





Ref. 268609-C

6-3. SmartGun Controls



☞ *Keep cameras and sensors free of weld spatter and other debris.*

☞ *The SmartGun LEDs may cause auto-darkening welding helmets to turn on (darken) before welding starts. Set lens sensitivity to a level that prevents premature darkening of the lens (see helmet owner's manual).*

☞ *The SmartGun will occasionally switch between LED sets, which may cause auto-darkening helmets to blink momentarily.*

☞ *See Section 8-5 for SmartGun calibration procedure.*

1 SmartGun LEDs

2 Display Screen

3 Control Buttons

4 Internal Vibrator

LEDs on the SmartGun allow the monitor–mounted cameras to track gun speed, gun angles, gun direction, and other data.

The display screen helps the user navigate through the user interface. The screen displays warning statements, indicates the training mode (simulation or live arc) and helps the user position the gun properly (see examples below),

Use the Mode selection button to select the training mode (simulation or weld), navigate through setup screens, enable real-time vibration and audio, and modify other weld parameters.

- Weld Mode – arc–on weld tests
- SIM (Simulation) Mode – arc-off simulation tests

Use the guide button to change gun positioning data being displayed and select parameter for real-time vibration feedback. Real-time audio feedback for selected guide parameter may also be enabled (see Section 8-2).

The SmartGun internal vibrator provides the user with real-time feedback for the parameter selected.

☞ *SmartGun screensaver appears after five minutes of inactivity. Move SmartGun or press button to restore interface screen.*

Press Guide button to change gun positioning data being displayed and to select parameter for real-time vibration feedback.

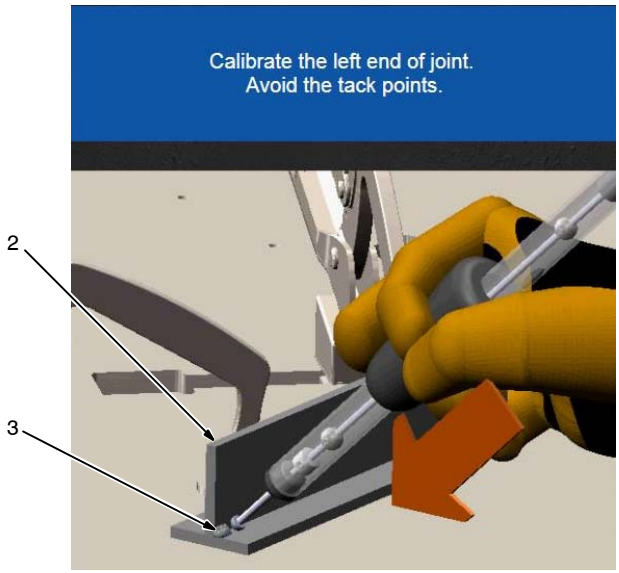
CTWD Guide (Circle changes in size to indicate CTWD.)

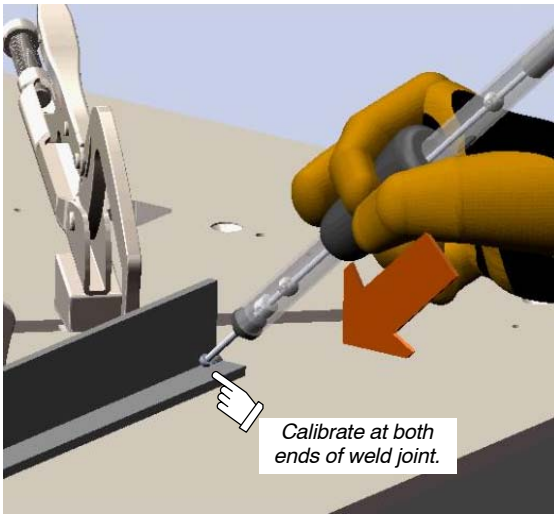
Aim Guide

Angle Guide

268609-C

6-4. Using The Joint Calibration Tool





☞ *Clamp workpiece to table before calibrating.*

1 Joint Calibration Tool

2 Workpiece

3 Weld Joint

At the beginning of each weld assignment you will be asked to use the joint calibration tool to establish setpoints on the workpiece joint. Setpoints are necessary for the training system cameras to learn the precise location of the joint. Establish setpoints as follows:

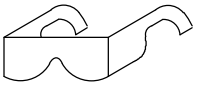
- Tack weld the weld coupons in the configurations specified in the weld assignment.
- Clamp the workpiece to the work table.
- Place the tip of the joint calibration tool at the beginning of the weld joint. Press down on the tool until the internal spring is fully compressed. Be careful not to cover joint calibration tool markers. Hold tool in position for one second or until audio/visual confirmation is received.
- Establish the ending setpoint by repeating procedure at other end of the weld joint.

☞ *If the workpiece is moved, it will be necessary to recalibrate the joint.*

☞ *Calibrate both ends of joint. The order of joint calibration (left to right or right to left) does not matter.*

☞ *For multi-pass welds, the interface will direct you to calibrate the joint for each pass.*

Tools Needed:



SECTION 7 – OPERATION

Welding-related hazards are present when using the welding training system. Read the welding power source and wire feeder Owner's Manuals and labels carefully for more information on arc welding hazards. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org). Operators must be trained on the proper use of this equipment before using the equipment to train others.

☞ *See Section 12 for setup and operation instructions specific to the optional SMAW module. Unless specified, GMAW/FCAW and SMAW operation are the same. Nothing is shown on the SmartGun display during SMAW welding. There is no SIM (Simulation) mode for SMAW welding.*

7-1. Equipment Setup

1. Assemble LiveArc training system. Install in proper location and near welding power source (see Section 5-1).
2. Ground weld table as specified in Section 5-6.
3. Connect welding power source work clamp to welding table and positioning arm (if applicable). See Section 5-8.
4. Connect SmartGun to wire feeder (see Section 5-9). Connect SmartGun data cable to back of monitor.

☞ *Ensure the cable is fully threaded into the connector. Be careful not to cross–thread the connector.*

5. Connect monitor power cord to 120 volt AC receptacle.
6. Place Input Power switch in On position (on back of monitor). Press and hold On-Off switch on front of monitor (LED lights) until monitor turns on.
7. Put on personal protection equipment (welding helmet, safety glasses, leather gloves, body protection, cap).
8. Turn on welding power source and wire feeder.

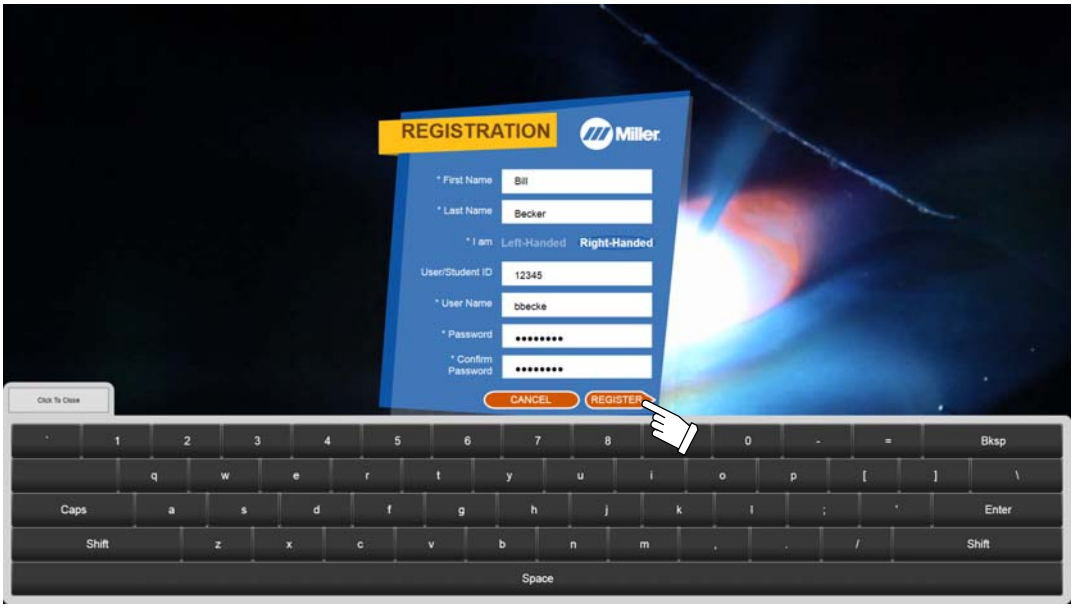
7-2. Getting Started

7-2A. Login Screen

1. Touch *User Name* window to access keyboard.
2. Use keyboard to enter user name and password. The default login is *admin* and *admin* (Figure 7-1).

Figure 7-1. Login Screen

3. To create a new account, touch *Register Here* (Figure 7-2*).* Enter first name, last name, user/student ID (optional), user name, and password in window, and indicate if you are left-handed or right-handed. Touch *Register* to save information, close window, and be automatically logged in.



Corresponding SmartGun Display

Figure 7-2. Registration Screen

4. Depending on the equipment settings selections (see Section 8-2), language options may be displayed on the login screen (see Figure 7-3). Once a language is selected, text on the LiveArc monitor and SmartGun display will be displayed in the selected language. To select a different language, the user must log out and select the desired language.
   To enable additional language options, the US-International keyboard must be enabled in in Windows. To do so, exit the LiveArc software to view the Windows OS. Open the Control Panel and select **Language**. In the Language window, select **Options**. In the Language Options window, select **Add an input method**. Scroll down to the **United States-International Touch keyboard layout** (in most cases, this should be the ninth option on the list). Select it to highlight it, then select **Add**. In the Language Options window, select **Save**. After logging into the LiveArc software as an instructor, select *System Admin*, then *Settings*. Change the setting called *Show language selection option on user login screen* to *Show*.

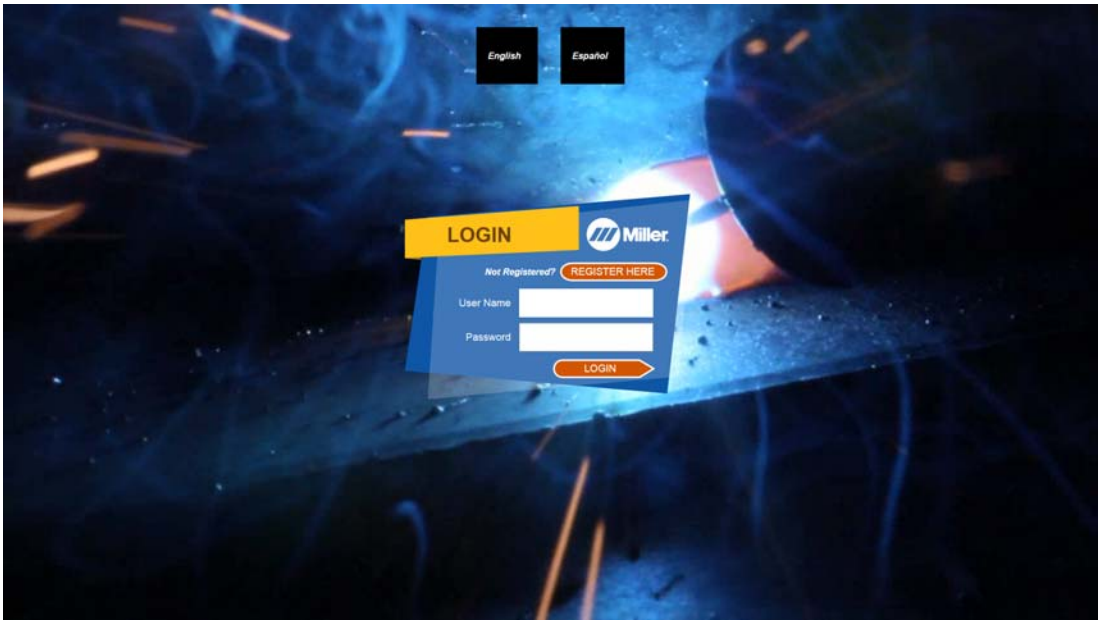
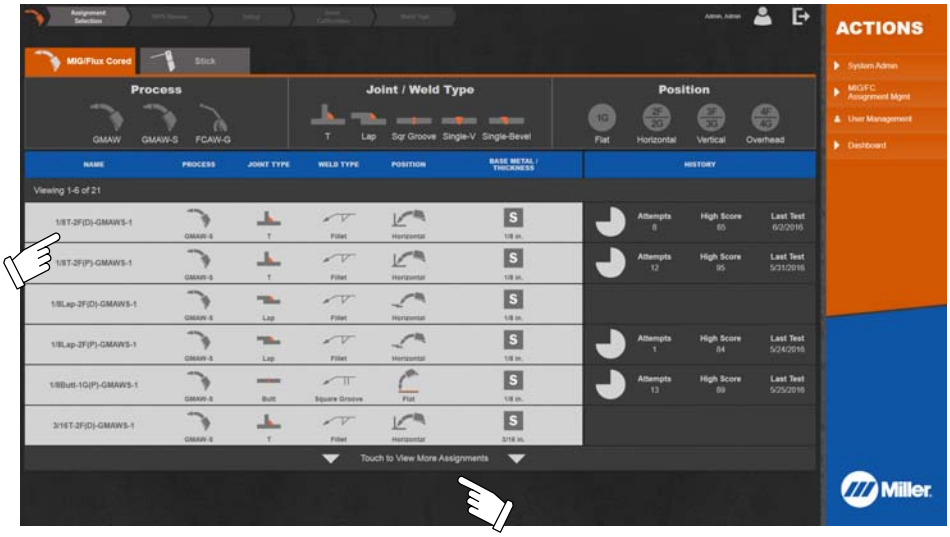


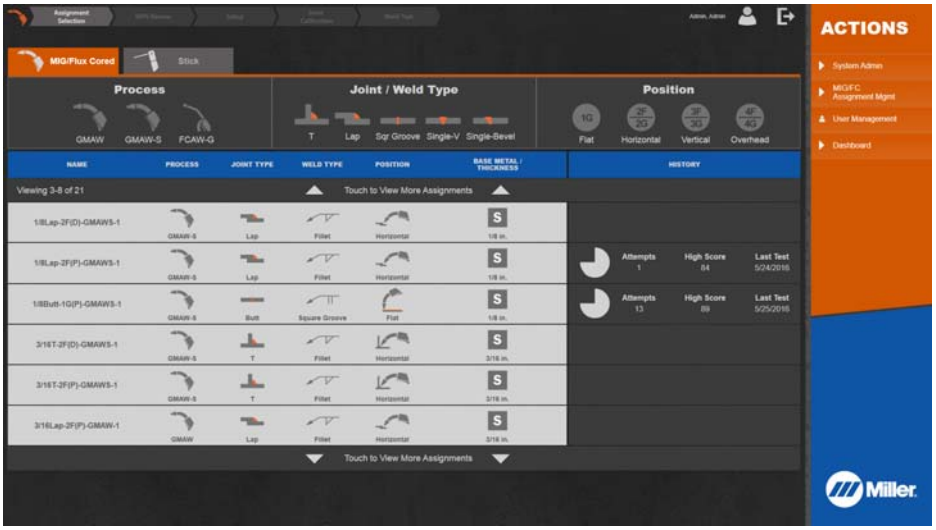
Figure 7-3. User Login Screen

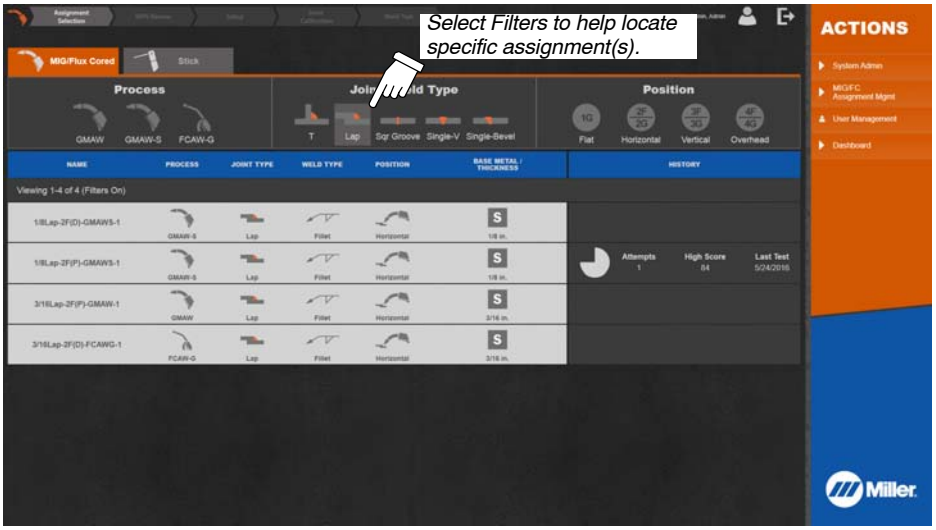
7-2B. Select Assignment

1. Select desired assignment (Figure 7-4). Note the corresponding weld process, joint type, and position (flat or horizontal). View more assignments by touching link at bottom of screen. Screen also displays history of previous tests. Select *Filters* to narrow your search for specific assignments.



Corresponding SmartGun Display

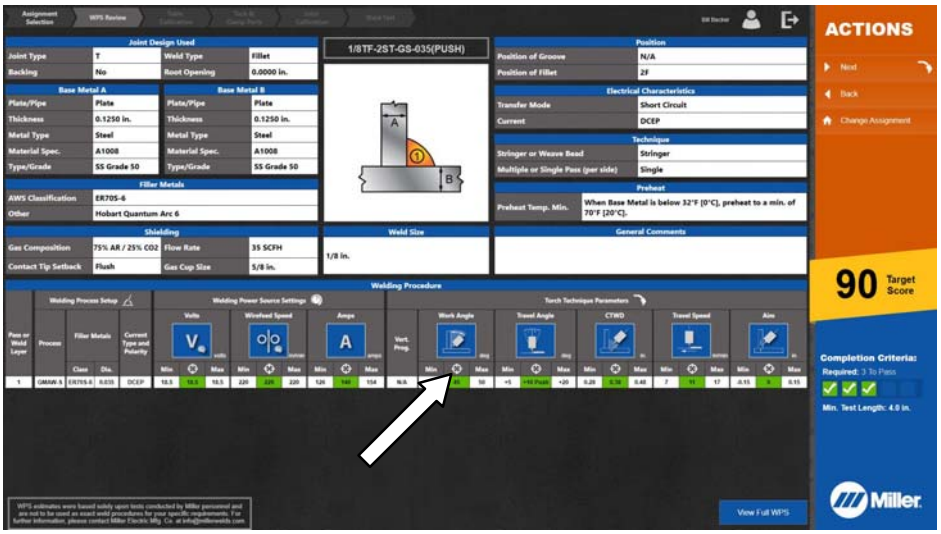




☞ *Screens shown are representative. Specific options may vary with weld process.*

Figure 7-4. Welding Assignment Screen

2. Review weld assignment specifications. See Figure 7-5.



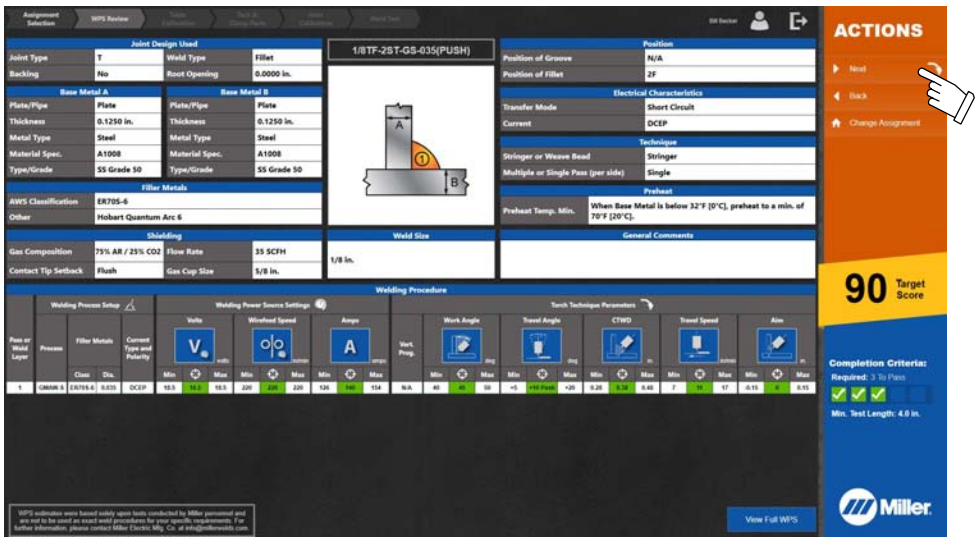
Corresponding SmartGun Display

Use button to navigate LiveArc screens.

☞ *Screen shown is representative. Specific options may vary with weld process.*

Figure 7-5. Welding Assignment Specifications

3. Select *Next* (to continue with assignment), *Back* (previous page), or *Change Assignment* (to select a new assignment). See Figure 7-6.



Corresponding SmartGun Display

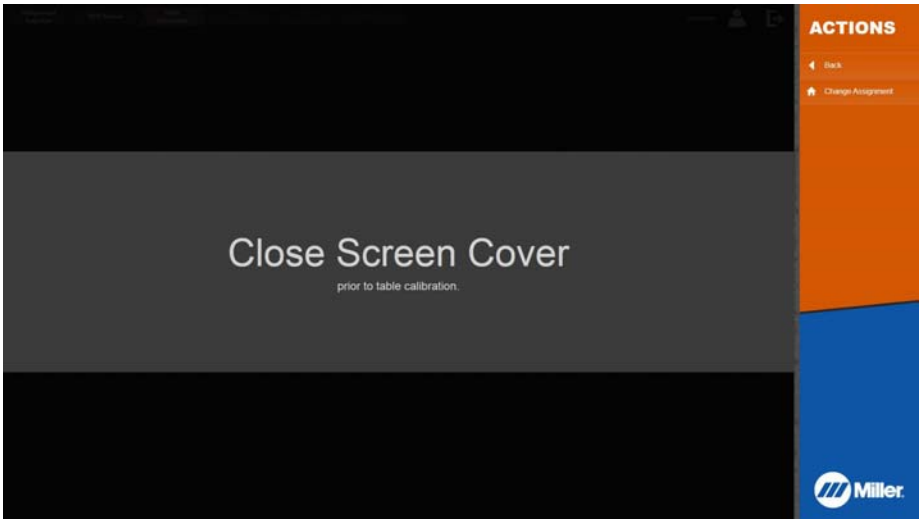
Use button to navigate LiveArc screens.

☞ *Screen shown is representative. Specific options may vary with weld process.*

Figure 7-6. Advancing To The Next/Prior Page Or Changing Assignment

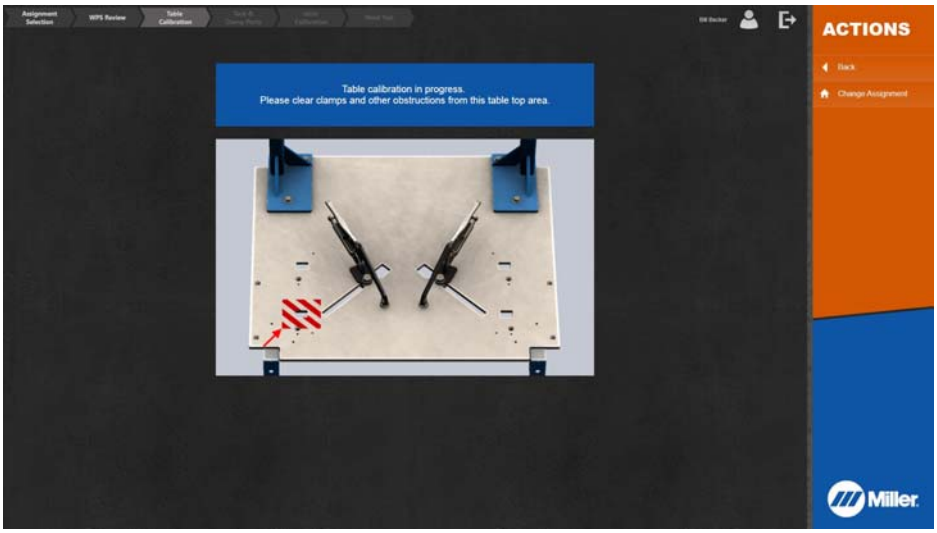
7-2C. Table Calibration

1. Close touchscreen cover to enable table calibration process. Remove any objects blocking markers on table. See Figure 7-7, Figure 7-8, and Figure 7-9.



Corresponding SmartGun Display

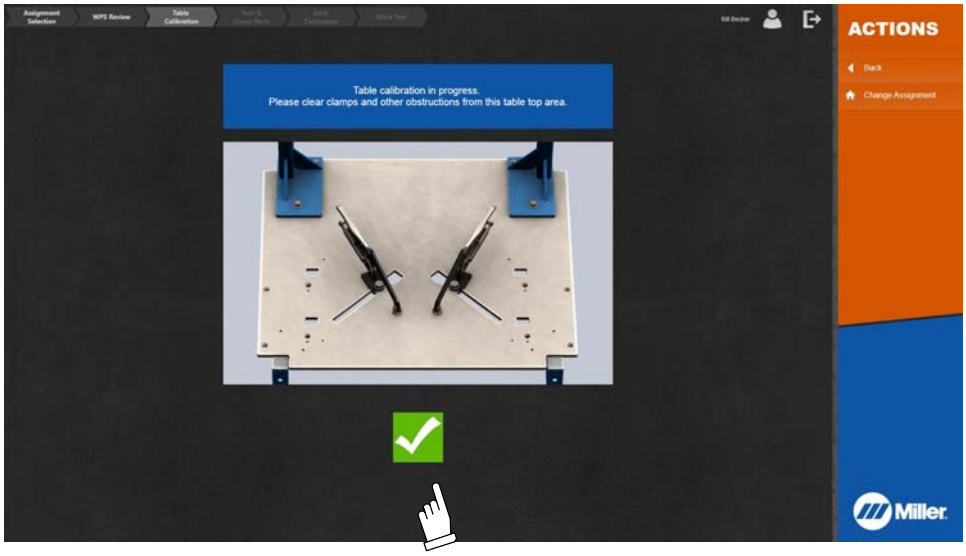
Figure 7-7. Close Cover To Begin Table Calibration



Corresponding SmartGun Display

161-049

Figure 7-8. Example Of Message From Unsuccessful Table Calibration

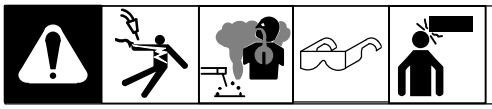


Corresponding SmartGun Display

161-049

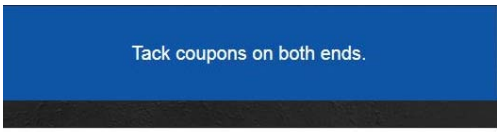
Figure 7-9. Successful Table Calibration

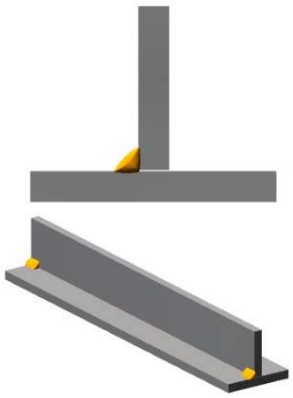
7-2D. Preparing To Weld



1. To tack weld coupons, press and hold Weld button on SmartGun until system enters Weld mode (about two seconds). (Monitor displays warning message.) Tack weld coupons on both ends. (See Figure 7-10 and Figure 7-11). Press Done button on SmartGun when finished. For tacking with the SMAW process, see Section 12-5.

☞ *For tacking with the SMAW process, see Section 12-5.*





Corresponding SmartGun Displays

Press and hold Weld button for several seconds to enable welding.

Tools Needed:

Personal Protective Equipment Including:

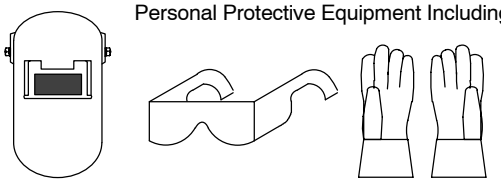
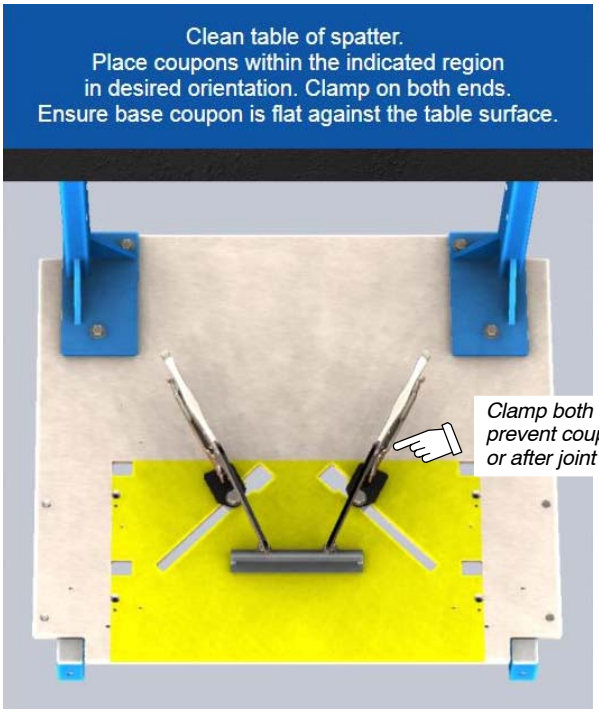


Figure 7-10. Tack Welding Coupons

Corresponding SmartGun Display

Figure 7-11. Warning Message Displayed When Welding

2. Clean table of spatter and clamp coupons to table on both ends (Figure 7-12). Press *Weld* button if additional tacking is needed or *Next* button if finished clamping.



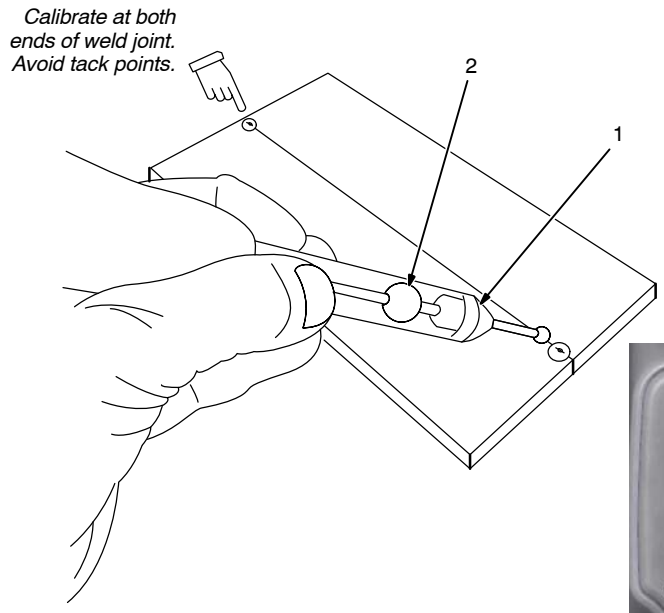
Clamp both ends of weld joint to prevent coupon from moving during or after joint calibration.

Corresponding SmartGun Display

NOTICE *– Do not subject table to excessive grinding. If grinding makes table surface uneven, remove mounting screws and install new table top or flip table top and use other side. Reinstall screws.*

Figure 7-12. Clamping Coupons To Table

3. Calibrate both ends of weld joint. System chimes and touchscreen displays checkmark to indicate successful calibration. See Section 6-4 and Figure 7-13.



Corresponding SmartGun Display

161-047

☞ *Clamp weld coupons before calibrating. (Weld clamps are not shown.)*

☞ *See Section 4-1 for joint calibration tool storage location.*

1 Joint Calibration Tool

2 Joint Calibration Tool Marker

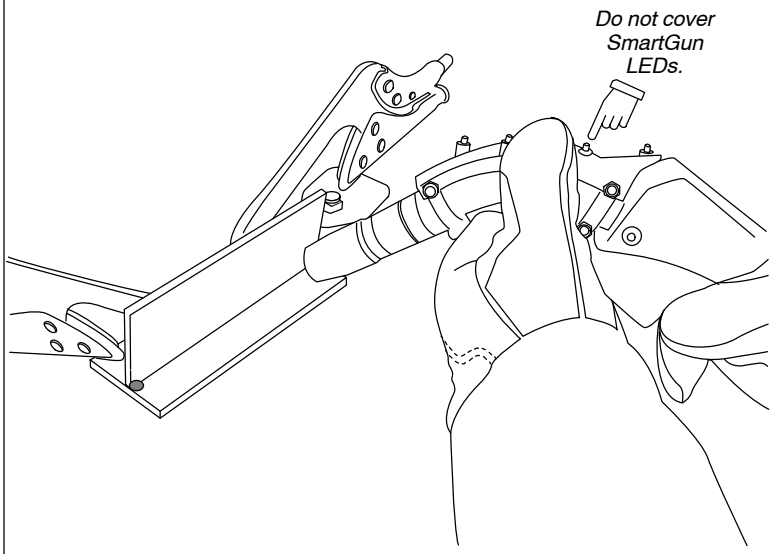
The joint calibration tool has three markers. Hold tool at slight angle as shown so markers are visible to cameras. Be sure hands do not block markers.

For single-bevel groove welds, the joint calibration tool must be angled toward the square (non-beveled) part. The workpiece may have to be rotated to accommodate.

For single-V welds, if the target work angle is not 0, the joint calibration tool must be angled toward the pass. The workpiece may have to be rotated to accommodate.

Figure 7-13. Calibrating Weld Joint

4. Close cover and move gun near weld joint to view real-time, pretest, and gun positioning guides (Figure 7-14).



Corresponding SmartGun Display

SmartGun Information

Press and hold Mode button to switch between modes.

WELD Mode Arc-On weld tests

SIM Mode Arc-Off simulation tests

Visual guides indicate proper gun positioning prior to tests. Move gun near the weld joint to view now.

Use Guide button to select parameter for vibration feedback.

161-049 / 049

Figure 7-14. Using SmartGun Position Guides

7-2E. Practicing In SIM (Simulation) Mode (GMAW/FCAW Only)

5. System is now in the SIM (simulation) mode (as indicated on SmartGun display screen) (Figure 7-15 and Figure 7-16). Move SmartGun near the weld joint; gun positioning recommendations are displayed on the touchscreen and the SmartGun display screen. (If you wish to relocate the weld coupons on the weld table, touch *Move Part* on the touchscreen.) Press Guide button to cycle through the parameters (work angle, travel angle, travel speed, aim, CTWD, and Guide Disabled). The target on the SmartGun screen indicates if the gun is positioned correctly.
   Whether the software detects pushing or dragging motion depends on starting position. If you start to the right of the midpoint of the two joint calibration points, it expects you to travel left. If you start to the left of the midpoint, it expects you to travel right.

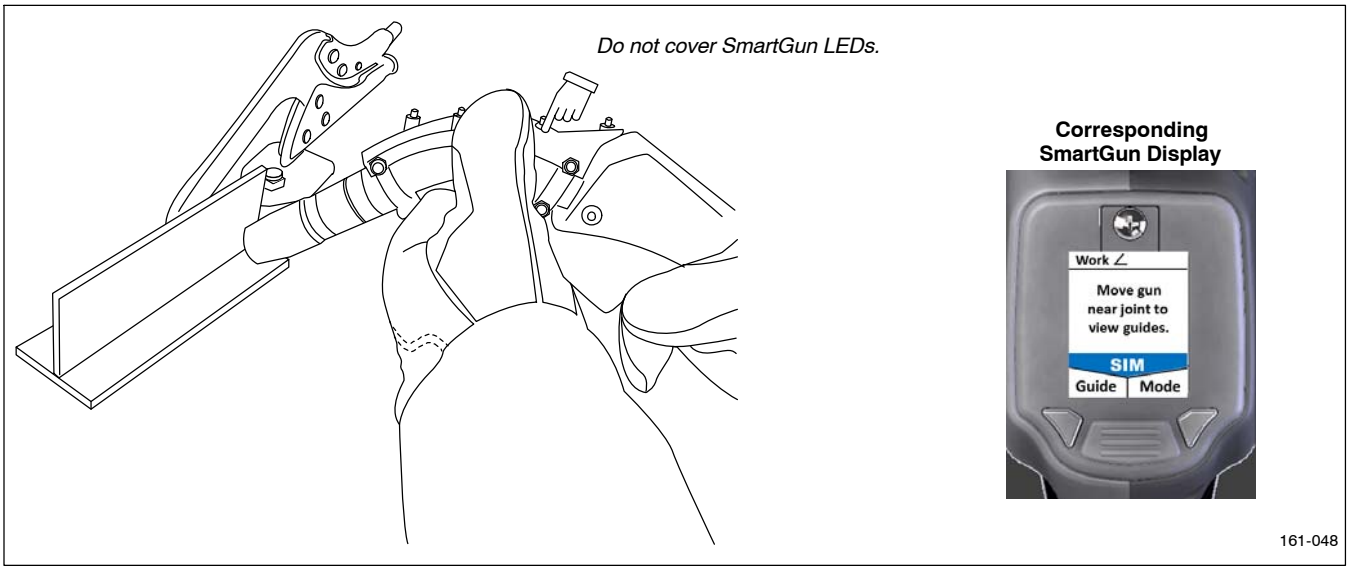


Figure 7-15. Performing Simulated (SIM) Weld Test

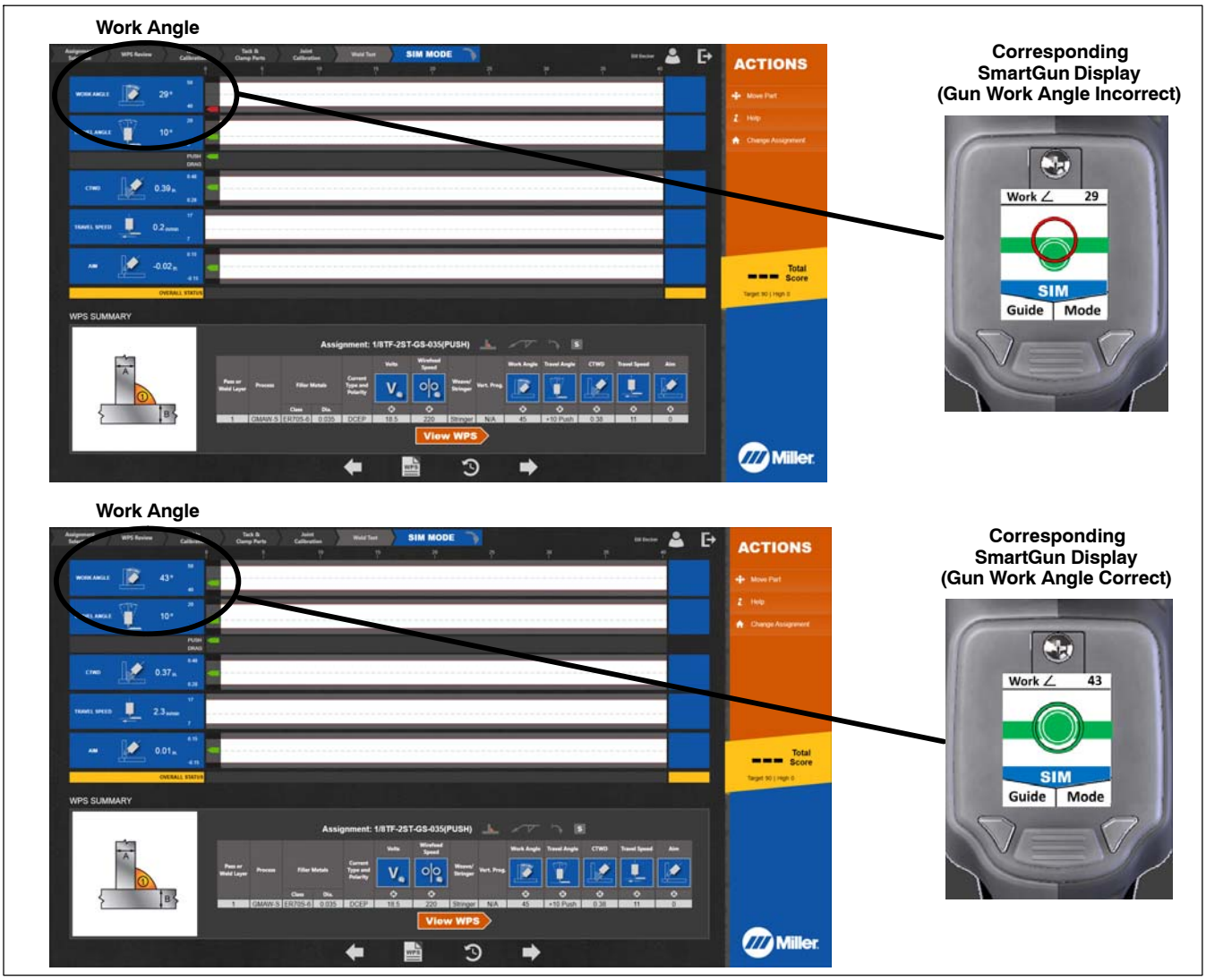


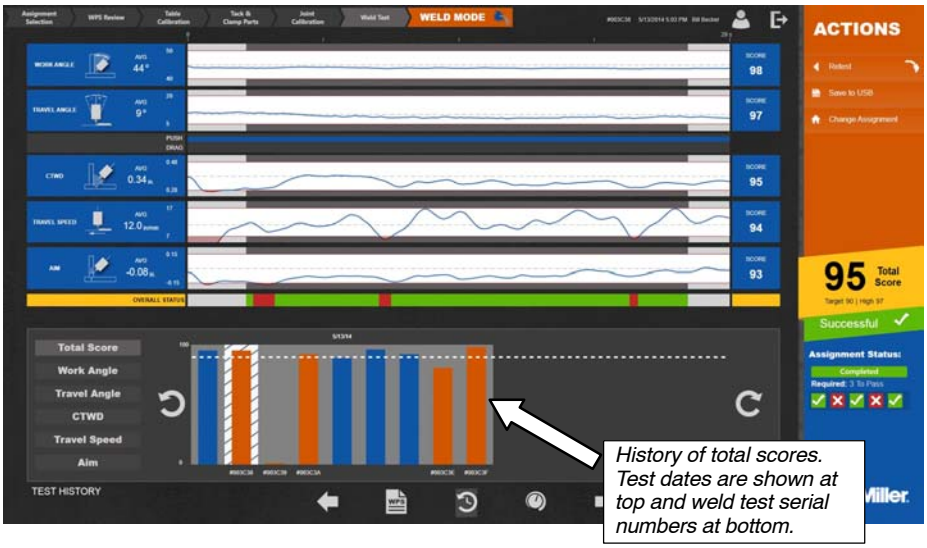
Figure 7-16. Example Of Work Angle Guide In Simulated (SIM) Mode

6. Position SmartGun near weld joint. Pull trigger and move gun along entire length of weld joint (4 in. [101 mm] for Miller assignments) in the correct orientation and speed as specified on the touchscreen. Release trigger and check score (Figure 7-17). If you fail the simulated test (score less than 90 for Miller assignments), examine scores in individual categories (gun angle, gun speed, contact tip to work distance [CTWD], etc.) to determine areas of failure.

☞ *The requirements for weld joint length, passing test score, and number of passing tests required can be changed by the system administrator (Section 9).*

☞ *Touch WPS on screen to review WPS assignment. Touch clock symbol on screen to see test history (Figure 7-18).*

Figure 7-17. Examining Simulated Weld Test Score



Corresponding SmartGun Display

Corresponding SmartGun Display

Figure 7-18. Viewing Test History

7. Touch *Retest* to perform another simulated test, or choose a different assignment. Touch to log out, save test results to USB, or view history and prior test results.

7-2F. Testing In Weld Mode

1. Verify work clamp is properly connected to table and positioning arm (if equipped). See Section 5-8.
2. Press and hold Mode button on SmartGun until system enters weld mode (about two seconds). The warning message is displayed when the SmartGun nears the weld joint (Figure 7-19).

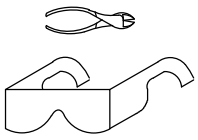
Corresponding SmartGun Display

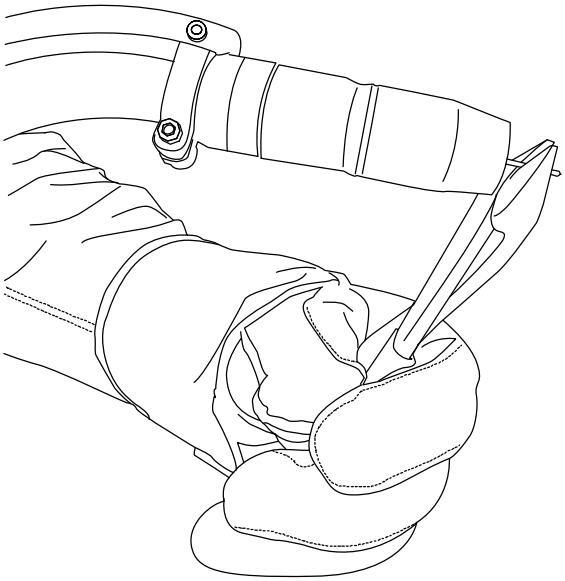
☞ *The warning screen is displayed when SmartGun nears weld joint.*

Figure 7-19. Selecting LiveArc Mode

3. With SmartGun more than 3 in. (76 mm) from weld joint and SmartGun LEDs in view of camera, pull trigger to jog wire. Cut wire to length appropriate for the weld process (Figure 7-20).

Tools Needed:





Corresponding SmartGun Display

161-050

Figure 7-20. Cutting Wire To Specified Length

4. Pull trigger to begin welding. Weld must be a minimum 4 in. (101 mm) in length to satisfy Miller weld test. You must achieve a passing score (90 and above for Miller assignments) three times to advance to the next assignment (Figure 7-21). Select another assignment or touch to logout.

☞ *The requirements for weld joint length, passing test score, and number of passing tests required can be changed by the system administrator (Section 9).*

Figure 7-21. Successfully Completing The Welding Assignment

5. During weld mode tests, arc parameters (Volts, Amps) are captured in addition to the gun technique parameters. Select the Arc Parameters icon to view associated graphs and scores.

☞ *These captured parameters do not affect the Total Score or the Completion Status of the test or assignment.*

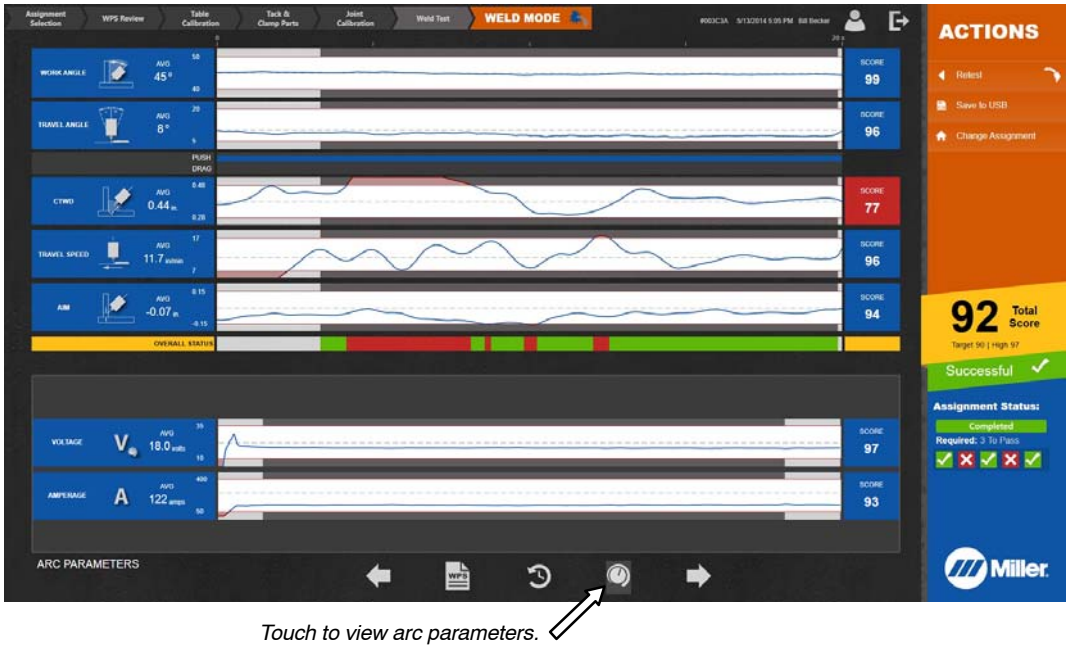


Figure 7-22. Viewing Arc Parameters

SECTION 8 – ADMINISTRATION TOOLS

Welding-related hazards are present when using the welding training system. Read the welding power source and wire feeder Owner's Manuals and labels carefully for more information on arc welding hazards. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org). Operators must be trained on the proper use of this equipment before using the equipment to train others.

8-1. Administration Mode

Touch *System Admin* to enter Administration mode (Figure 8-1). Administration mode is only available to users designated as instructors.

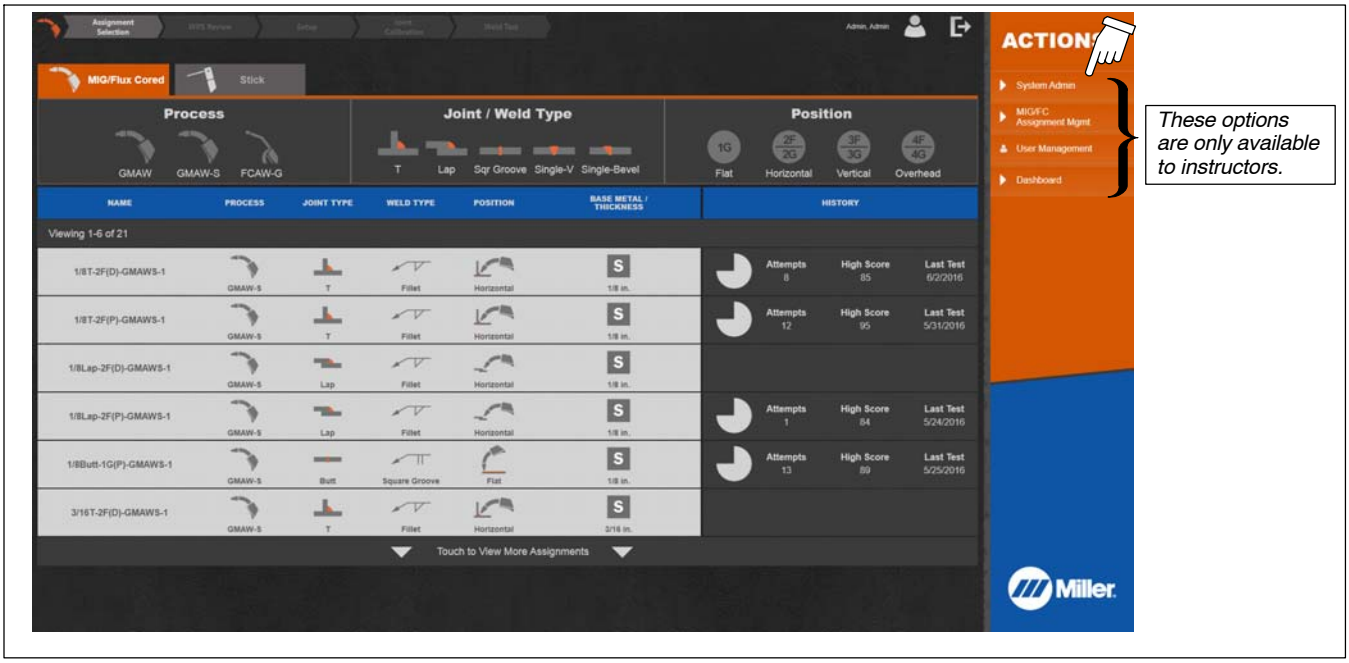


Figure 8-1. Administration Mode Screen

8-2. Equipment Settings

Use Settings screen to change system preferences:

- System volume: Volume Up or Volume Down.
- Cursor visibility: Hidden or Visible.
- Audio feedback: On or Off (real–time test audio).
- Options for who can save to USB from test feedback screen: Instructor and students, or Instructors only.
- Options for who can turn off the system: Instructor and students, or Instructors only.
- Option for saving tests to USB or for printing. To print directly from the LiveArc system, the printer must be installed on the LiveArc PC through the Windows 8 OS and configured as the default printer.
- Option to enable/disable sound effect for unsuccessful tests.
- Option to show or not show help messages to newly registered users.
- Option to show or not show available language selection options on user login screen.

8-3. Software Updates

Use the Software Updates screen to determine the LiveArc software version currently installed and to install software updates. Download software updates from www.MillerWelds.com/LiveArcSoftware, unzip the contents of the download, and save to a USB flash drive or similar device. Install flash drive in USB receptacle at bottom of monitor (see Section 5-10), select *Install software updates from USB*, then follow instructions displayed on monitor.

To conveniently manage assignments and users, and to review test history, the LiveArc software can be installed on any computer meeting the minimum requirements. Certain features such as conducting assignment tests and system calibration are disabled for computers. The software must be installed on a computer the first time by running the installation program included in the software download from www.MillerWelds.com/LiveArcSoftware. All other software updates on the computer must be done from within the Software Updates section of the software. To enable usage of the LiveArc software on a computer, the ownership authentication file must be downloaded from your LiveArc system to a USB drive. Insert that USB drive into the computer and then start the LiveArc software by double-clicking on the LiveArc icon on the desktop. The ownership authentication file will be detected and the LiveArc software on the computer will be permanently unlocked. Detailed instructions with screen shots are also available at www.MillerWelds.com/LiveArcSoftware.

8-4. Data Backup And Restoration

Use Data Backup And Restoration screen to backup or restore assignments, user data, and test histories through a USB device. See Section 4-1 for location of the USB port. Data backup can also be saved to a selected network location. To enable, your IT representative will have to configure the LiveArc system to communicate on your local network.

Backups made with an earlier software version cannot be restored directly on a LiveArc system running a later software version. However, such backups can be restored on a computer running the later version of LiveArc software. After doing so, a new backup can be created on the computer and then restored onto the LiveArc system.

8-5. Weld Tool Calibration

Use screen to calibrate a new SmartGun or SmartStinger, or to recalibrate or restore communication with an existing gun or stinger. Follow procedures explained on screen.

8-6. Joint Calibration Tool

Use screen to enter measurements for a new or existing joint calibration tool. See Section 6-4 for joint calibration tool information. Use a precise calipers to measure tool dimensions; tool must be in a relaxed position (uncompressed spring). Select tip type (rounded or pointed) and enter three measurements as shown. Save dimensions (measurements) when finished.

8-7. Table Calibration

Use screen to recalibrate the table surface. Table must be properly calibrated for system to function properly. Place calibration plate on table top, making sure it is flush with the table top. (Table top must be free of debris and spatter to ensure accurate calibration.) Touch *Calibrate* to begin calibration process.

8-8. Camera-To-Arms Linkage Adjustment

Use screen to set the proper camera angle after installing the welding positioning arms.

8-9. Clamp Calibration

Use screen to calibrate a new clamp, or recalibrate an existing clamp (only used with welding positioning arms).

8-10. Camera Settings

Use screen only as directed by Miller technical support to adjust camera settings in order to resolve technical difficulties.

8-11. Tracking Optimization

Use screens to optimize gun calibration accuracy and camera tracking settings individually for each welding position (SmartGun only. Not applicable for SmartStinger.)

8-12. Restore System Defaults

Use this screen to restore the LiveArc system to factory default settings. Use this option with caution because it will delete all custom assignments, user profiles, and test history.

Notes

SECTION 9 – ASSIGNMENT MANAGEMENT

Welding-related hazards are present when using the welding training system. Read the welding power source and wire feeder Owner's Manuals and labels carefully for more information on arc welding hazards. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org). Operators must be trained on the proper use of this equipment before using the equipment to train others.

9-1. Administration Mode

Administration mode is only available to users designated as instructors. Select either *MIG/Flux Cored* or *Stick*, then touch *MIG/FC Assignment Mgmt* or *Stick Assignment Mgmt* to begin.

Use Assignment Management screen to create new assignments, edit/modify assignments, delete assignments, and select (hide/show) which assignments are displayed. The new assignment can be tailored to meet the specific training needs of the students by modifying the parameters for Name, Joint Design, Base Metals, Filler Metals/Shielding, Position/Electrical Characteristics, Technique, Preheat/Postweld Heat Treatment, Welding Procedure, and Completion Criteria.

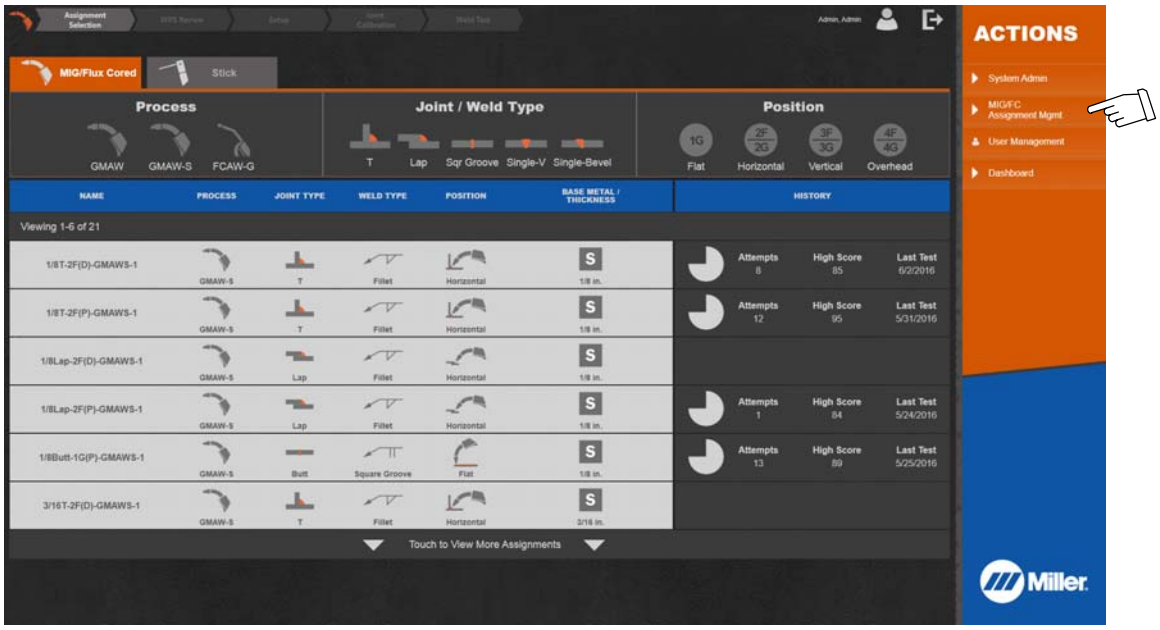


Figure 9-1. Administration Mode Screen

Notes

9-2. Creating New Assignments

☞ *Red text indicates a field contains unacceptable data.*

1. To create an entirely new assignment (all required parameters and values must be entered), touch *Create New Assignment* (Figure 9-2). To use an existing assignment as a template for a new assignment (parameters/values are already entered but can be edited), touch *Copy* on an existing assignment similar to the assignment being created.
   Miller assignments cannot be edited; however, a copy can be created and then edited. The visibility status of each assignment can be adjusted to hide or show assignments in the assignment selection list available to all users.
   Assignments with incomplete Data Completion will remain hidden until all required fields are completed with valid data.
   Assignments can be imported from or exported to a USB drive to transfer between LiveArc systems or between a computer and a LiveArc system.

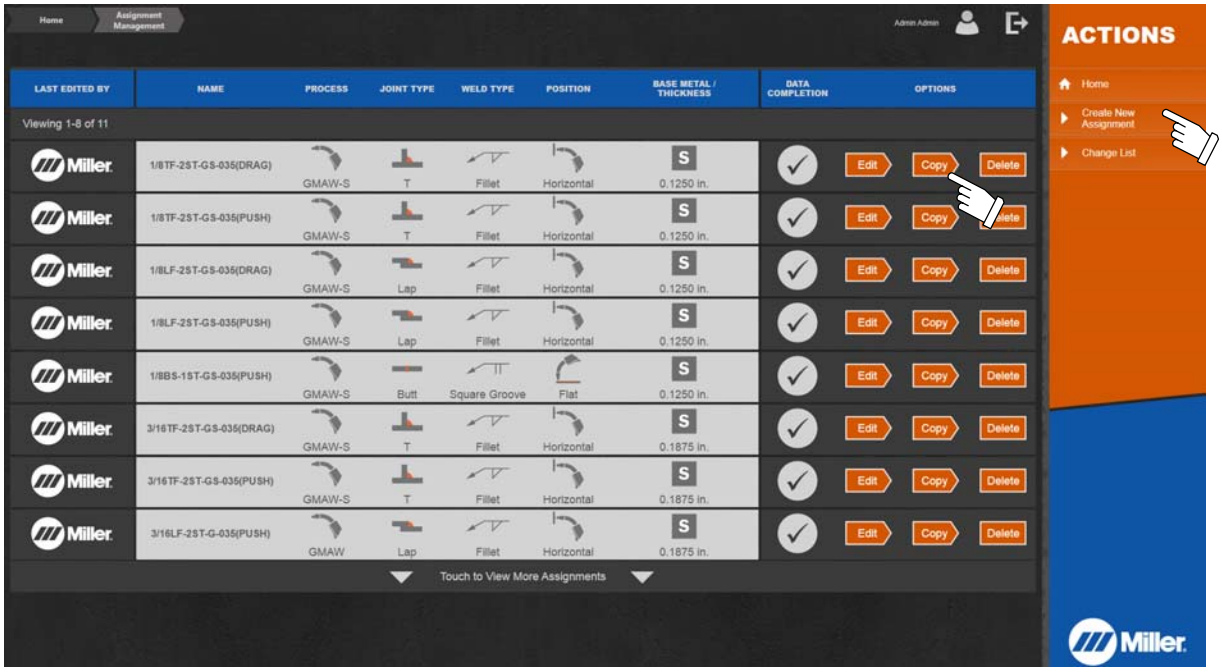


Figure 9-2. Assignment Management Homepage

2. Touch *Assignment Name* text field (shaded white) to open keyboard and change name of new assignment (Figure 9-3). (Assignment name is limited to 25 characters.) When finished, select (touch) the next parameter category (Joint Design), touch *Save* (to save name and proceed with additional changes to assignment), or touch *Save and Exit* (if no additional changes will be made). Touch *Cancel* to delete changes and restore original settings. Incomplete assignments can be saved but will not be displayed on assignment list on home screen.

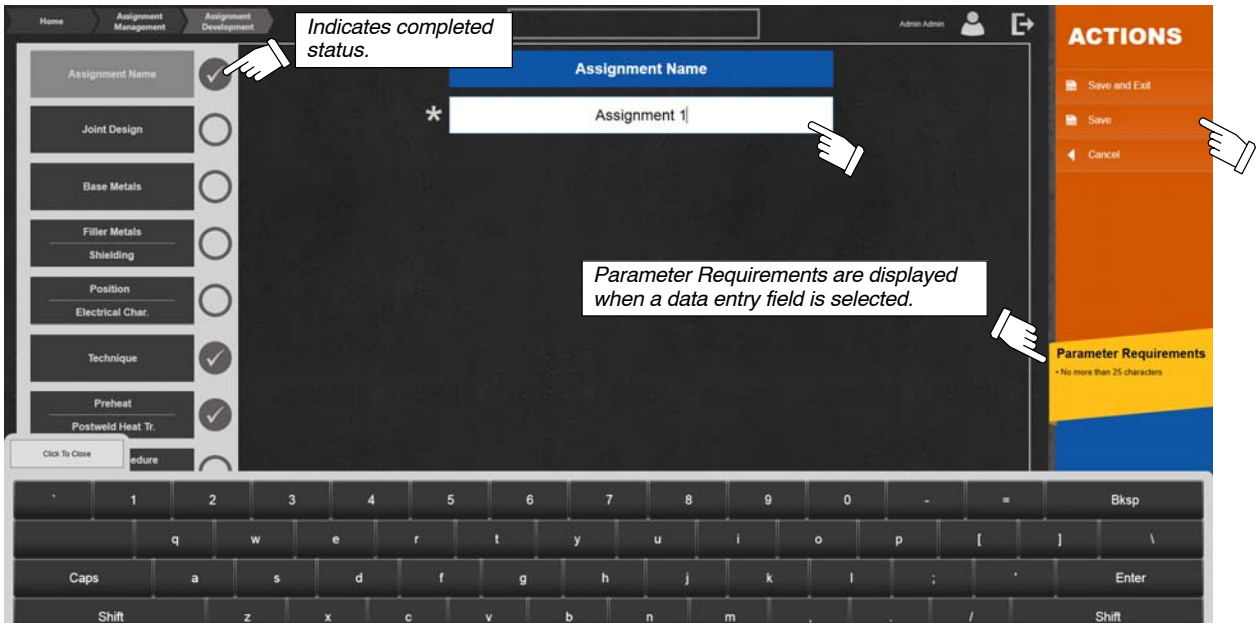


Figure 9-3. Changing Assignment Name

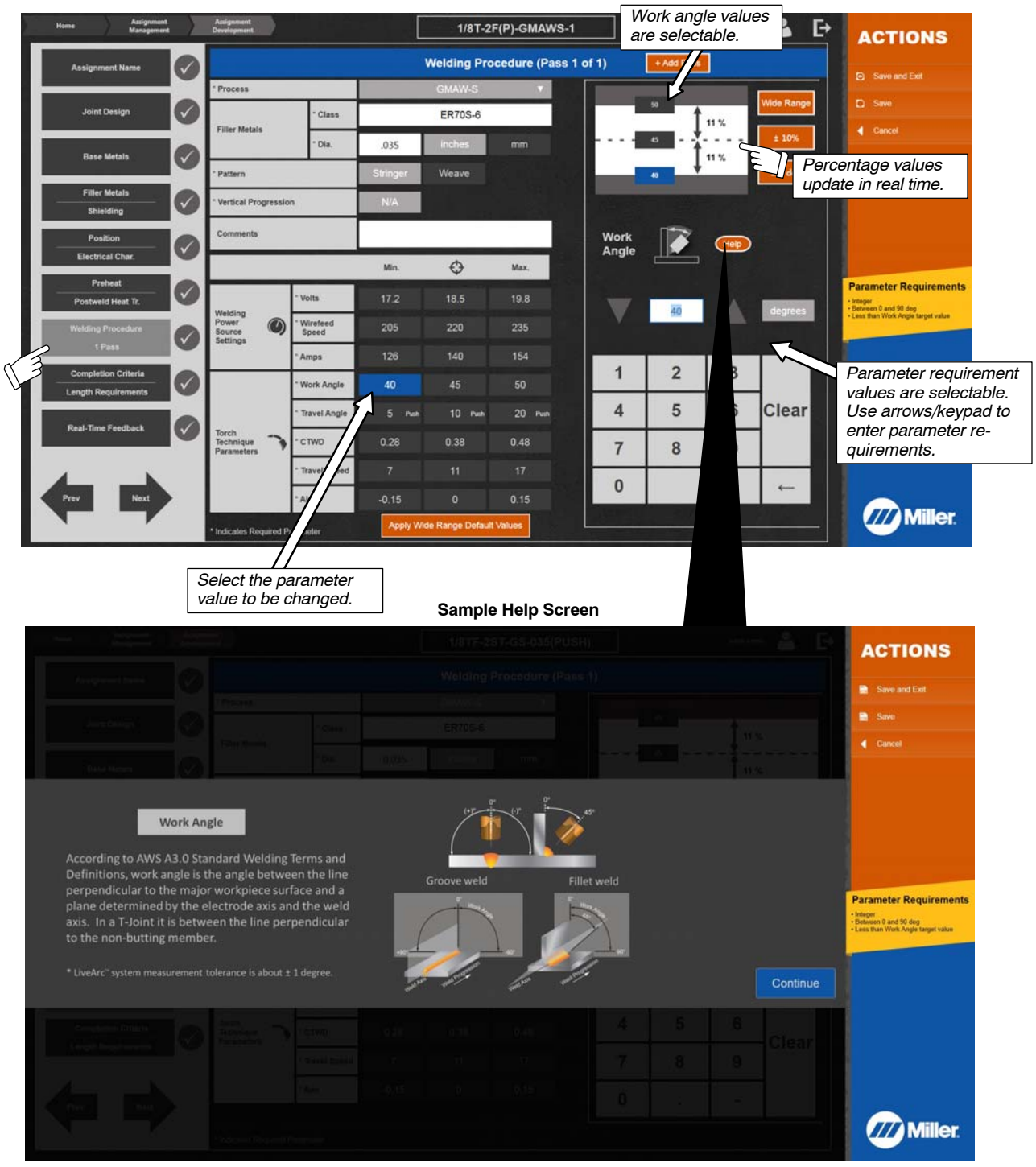
3. Ensure each required parameter is filled out. Parameters may differ based on welding process.

☞ *It is not necessary to save settings before proceeding to the next parameter screen.*

4. To modify the Welding Procedure parameters of the new assignment, touch *Welding Procedures/1 Pass* (Figure 9-4). All applicable parameters can be changed; an asterisk (*) indicates a required parameter. Select *Apply Wide Range Default Values* to automatically apply wide ranges to welding power source settings and torch technique parameters. *Wide Range* values can be applied to each individual parameter or a default ± value or % applied to each individual parameter.
   To create a multi-pass assignment, select *Add Pass* and update the parameter data as needed for the new pass. Repeat as necessary until the desired number of passes is reached. When finished, touch *Next* arrow to move to the next parameter screen (Completion Criteria), touch *Save* (to save name and proceed with additional changes to assignment), or touch *Save and Exit* (if no additional changes will be made). Touch *Cancel* to delete changes and restore original settings.

☞ *A single multi-pass assignment cannot mix GMAW/FCAW and SMAW processes.*

☞ *Touch any data field to open numeric keyboard and Help screen. Help screen defines work angle, travel angle, CTWD and other parameters.*



☞ *Screens shown are representative. Specific options may vary with weld process.*

Figure 9-4. Changing Assignment Welding Procedure (Pass 1) Parameters

SECTION 10 – USER MANAGEMENT

Welding-related hazards are present when using the welding training system. Read the welding power source and wire feeder Owner's Manuals and labels carefully for more information on arc welding hazards. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org). Operators must be trained on the proper use of this equipment before using the equipment to train others.

10-1. Administration Mode

Administration mode is only available to users designated as instructors. User Management records are password protected and can only be accessed by the user and the administrator/instructor. Touch *User Management* to begin.

Access *User Management* screen to view current users, add users, edit user information, delete users, review user history for each assignment, search weld test serial numbers, and export report files.

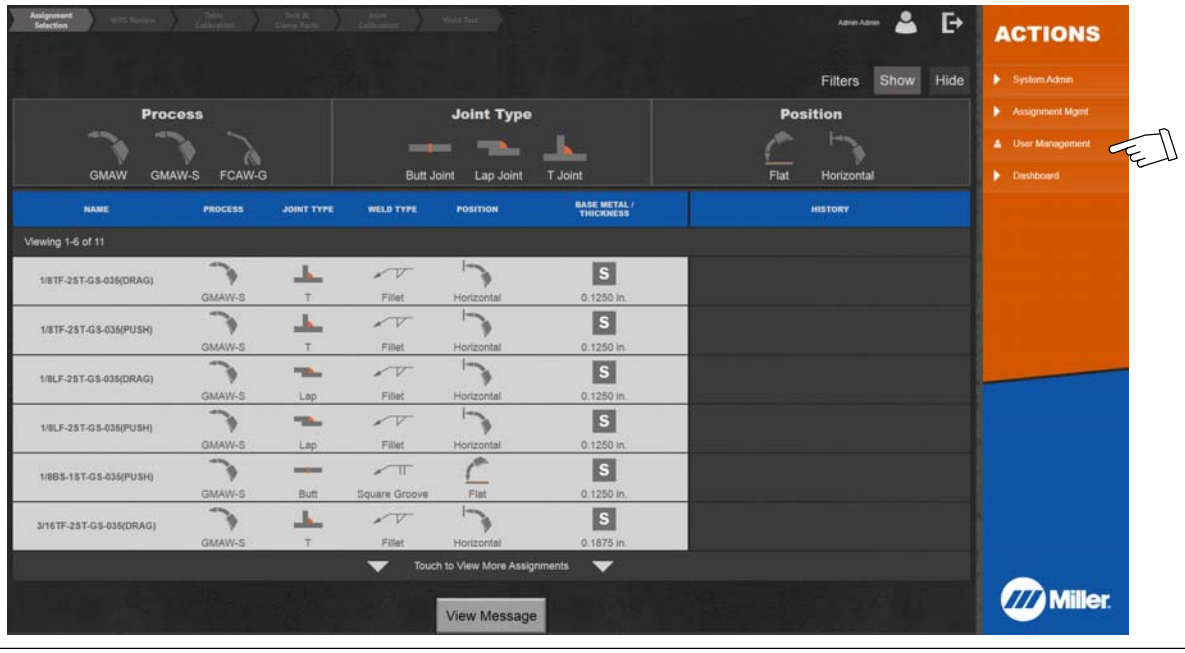


Figure 10-1. Administration Mode Screen

10-2. Creating New User

1. To enter new user data, touch *Add New User* (Figure 10-2 and Figure 10-3).

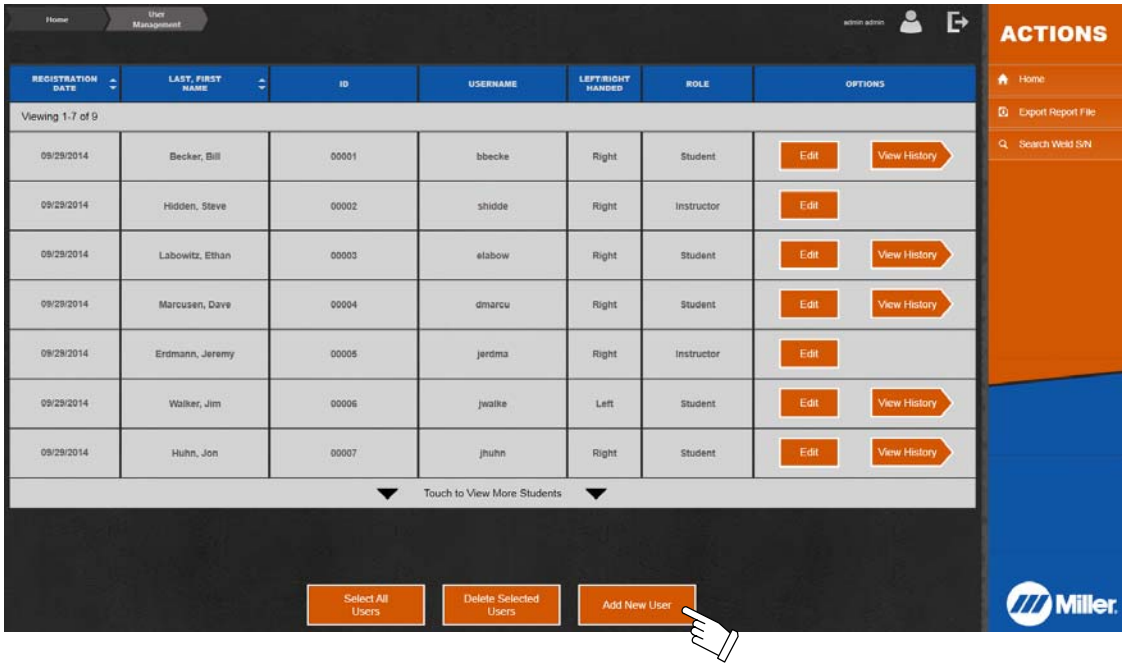


Figure 10-2. Accessing New User Screen

2. Enter first name, last name, user name, and user/student ID number. Designate whether the user is left-handed or right-handed and if the user is a student or an instructor. Touch *Add* when finished.

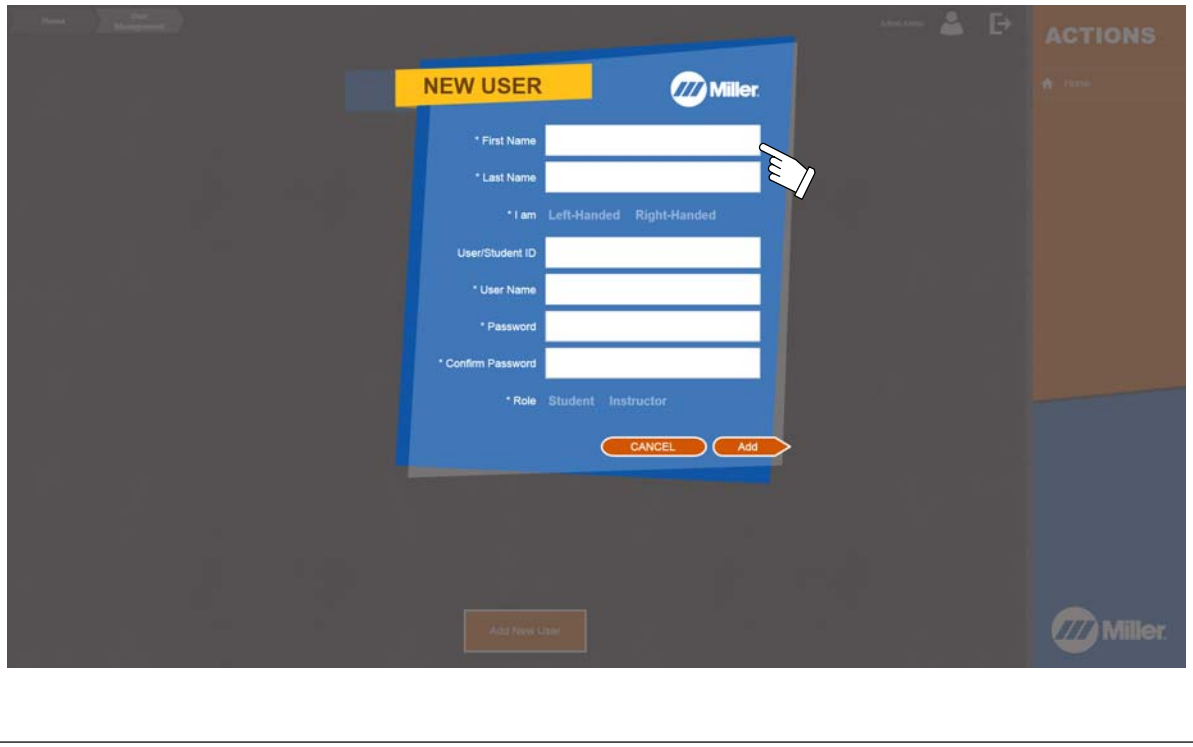


Figure 10-3. Entering New User Information

10-3. Editing User Information

1. To edit user information, touch *Edit* on row corresponding to specific user (Figure 10-4). To delete users, select users to delete (in first column) and then touch *Delete Selected Users*. When a new instructor (user) is created the *Admin,Admin* user may be deleted.

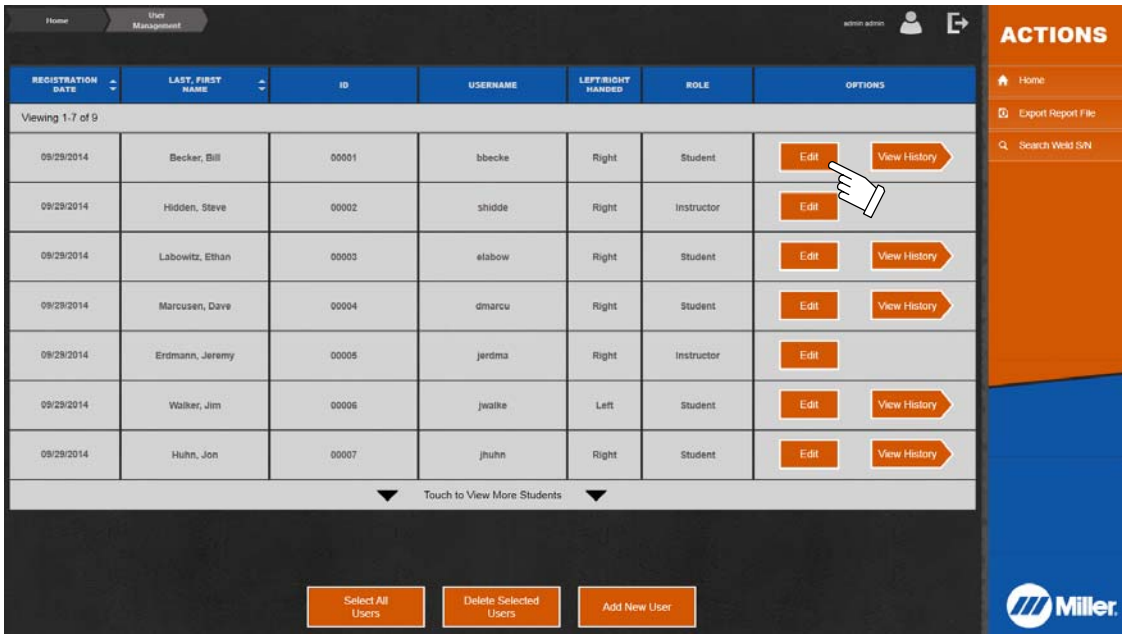


Figure 10-4. Editing User Information

2. Revise first name, last name, user name, user/student ID number, left-handed or right-handed status, and if the user is a student or an instructor. Touch *Update* when finished.

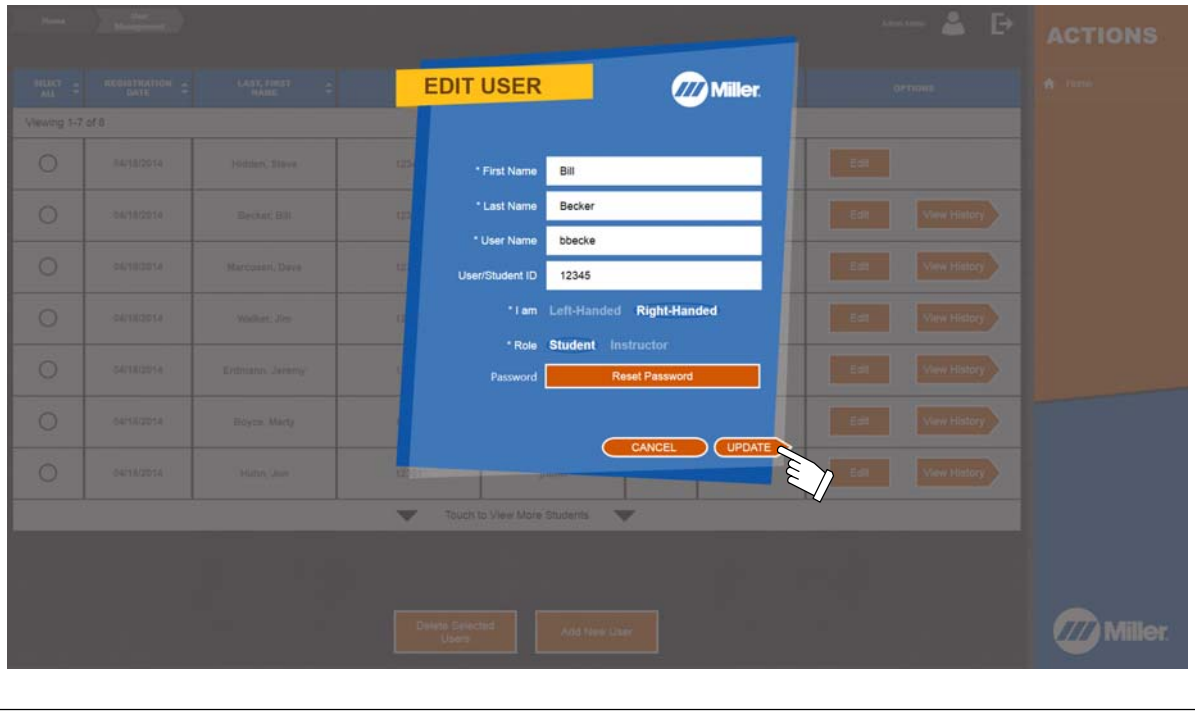


Figure 10-5. Editing User Information

10-4. Searching For Weld Serial Number

If the serial number of a weld is written on the weld coupons, an instructor can retrieve the test data associated with that weld by searching for the weld serial number. Do not enter the symbol # that precedes the serial number. For SMAW welds, the leading S must be entered.

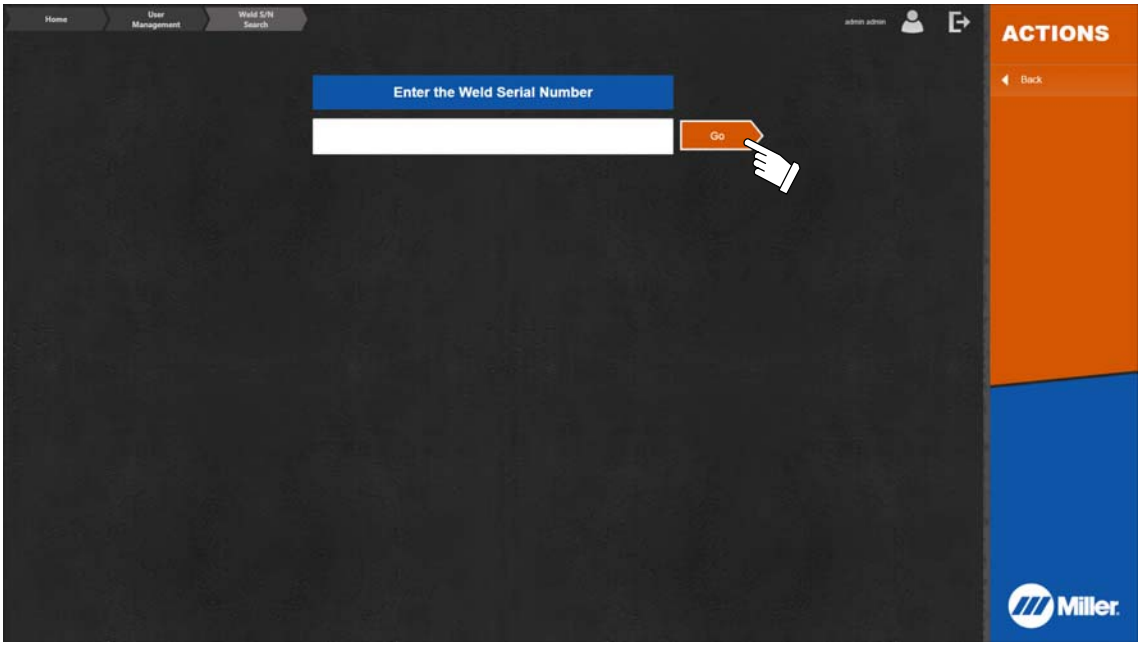


Figure 10-6. Searching Weld Serial Number

10-5. Exporting Report File

Selecting this will output two .csv files to the USB drive. One file is a log of each test (sim or weld) conducted on the system and associated user, assignment score, and related information. The other file is the completion status (not started, in progress, complete) of each assignment by each user.

SECTION 11 – VIEWING DASHBOARD

Administration mode is only available to users designated as instructors. User Management records are password protected and can only be accessed by the user and the administrator/instructor. Touch *Dashboard*.

Use *Dashboard* screen to review total usage of the LiveArc system, including number of tests and duration of tests (in Weld and Sim modes). Touch *Home* when finished.

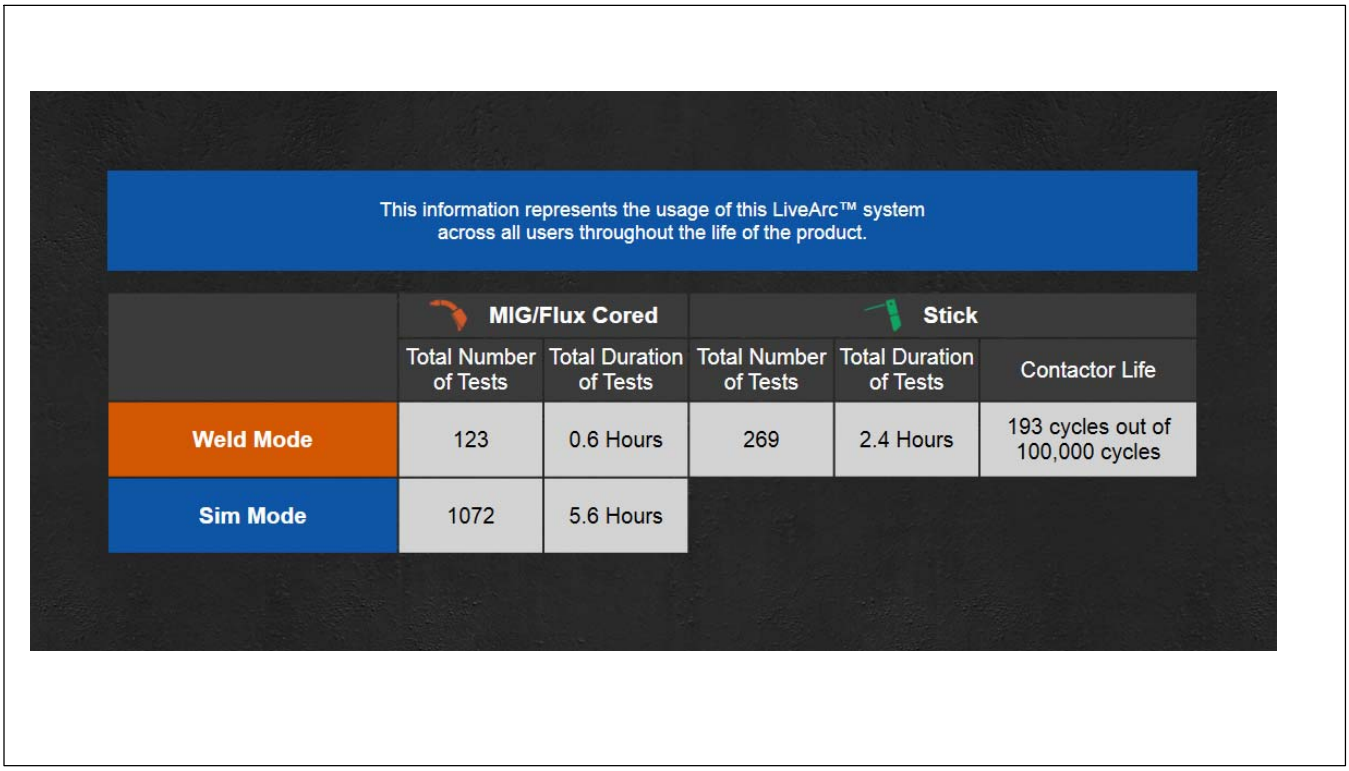
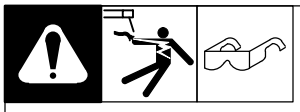


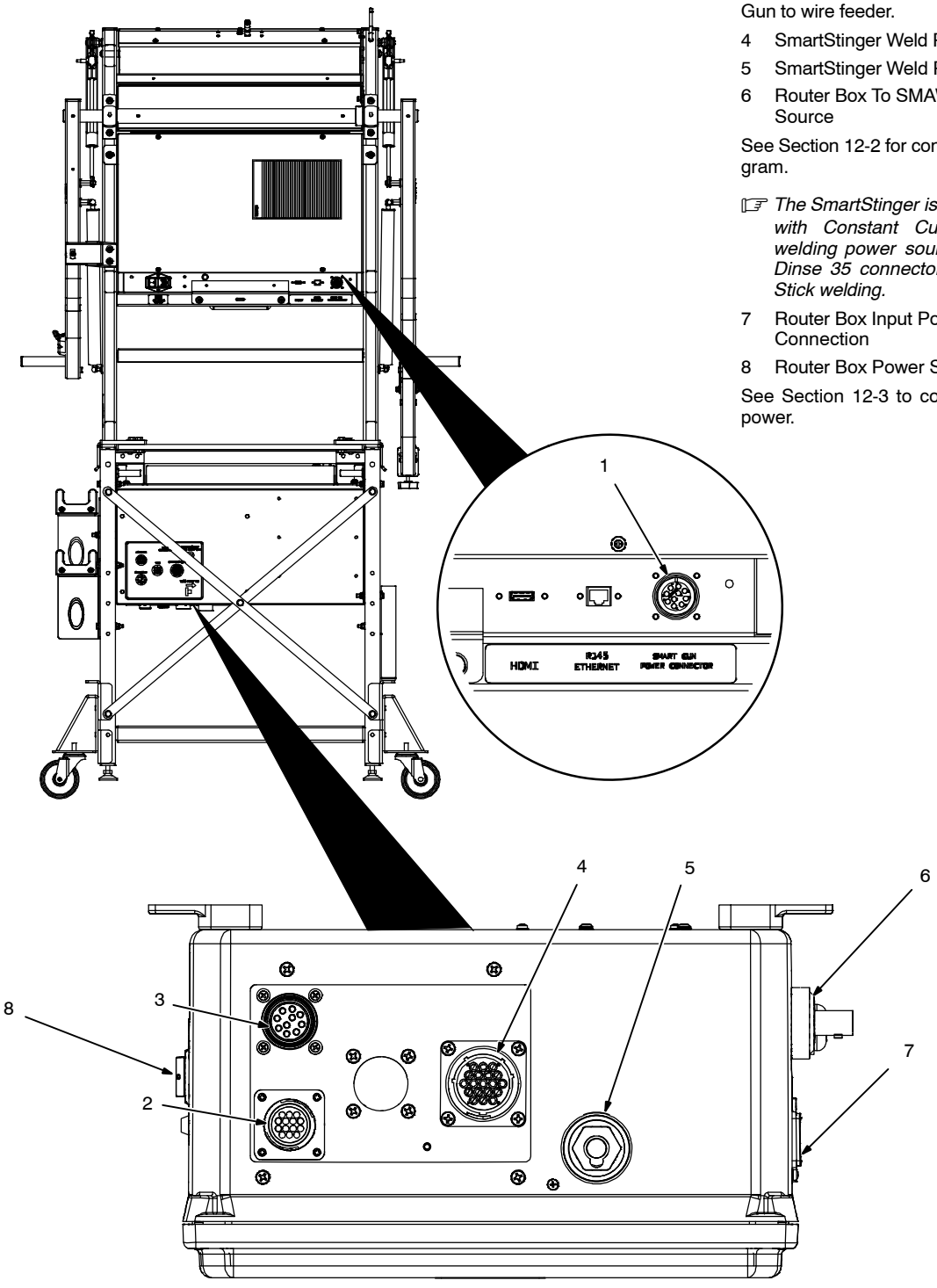
Figure 11-1. LiveArc System Dashboard Screen

Notes

SECTION 12 – OPTIONAL SMAW MODULE OPERATION

12-1. SMAW Router Box Connection Points





View from underside of router box

1 LiveArc Monitor Communication Receptacle

2 Router Box To LiveArc SmartGun Receptacle

3 Router Box Connection To Wire Feeder

See Section 5-9 to connect SmartGun to wire feeder.

4 SmartStinger Weld Power In

5 SmartStinger Weld Power Out

6 Router Box To SMAW Power Source

See Section 12-2 for connection diagram.

☞ *The SmartStinger is compatible with Constant Current (CC) welding power sources with a Dinse 35 connector for DCEP Stick welding.*

7 Router Box Input Power Connection

8 Router Box Power Switch

See Section 12-3 to connect input power.

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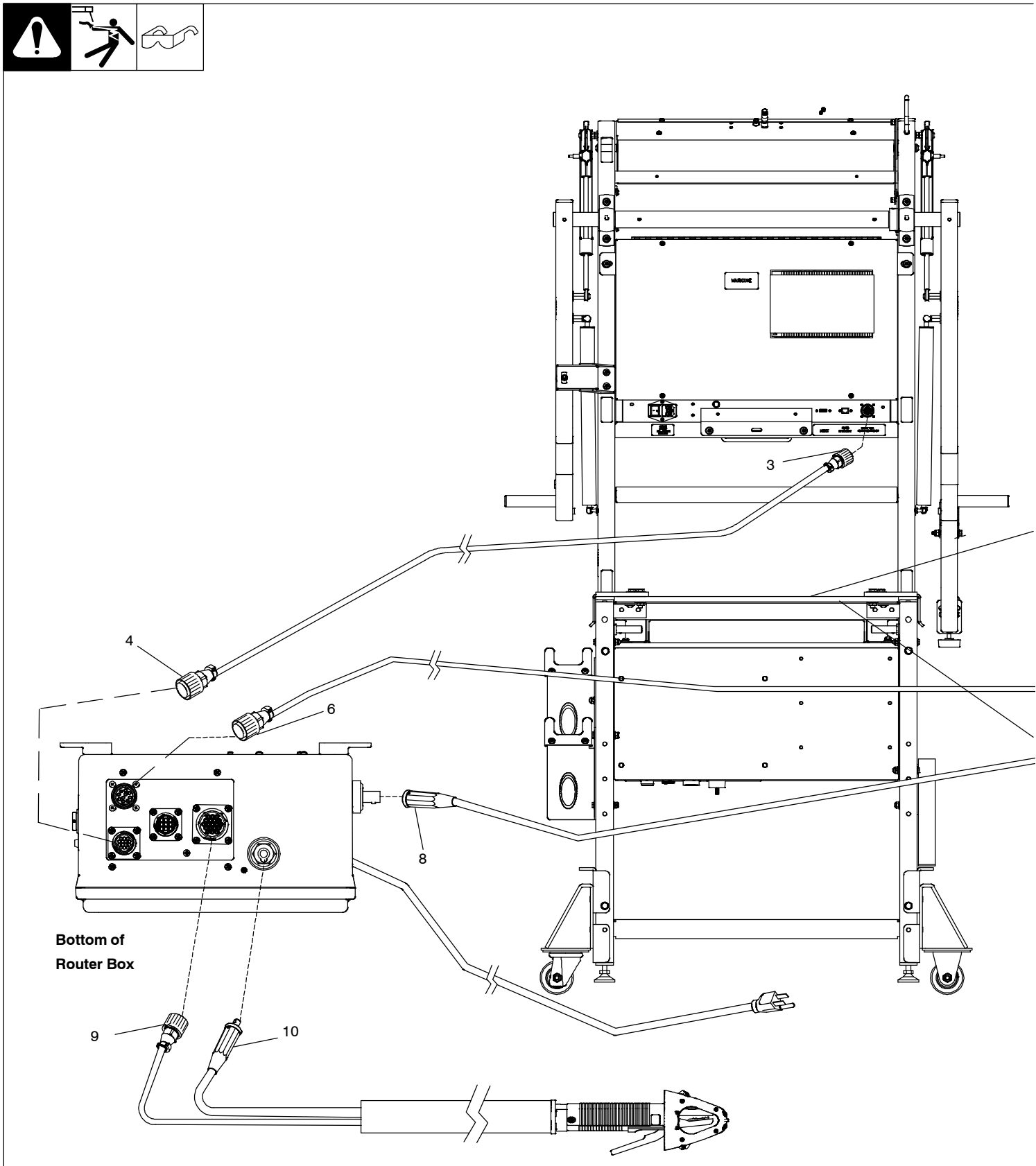
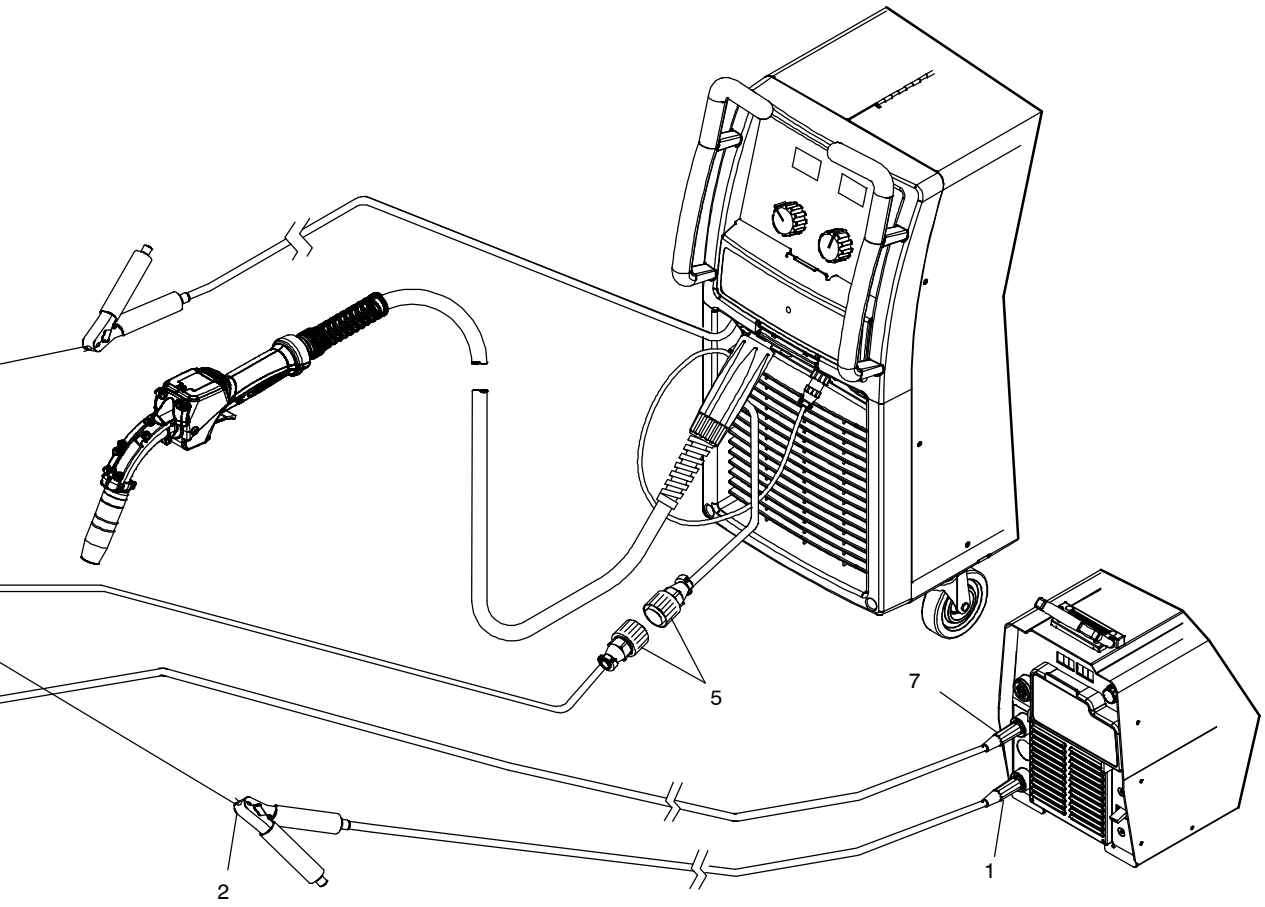
12-2. Connecting Training System With Optional SMAW Module





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⚠ The input power cord is the means for disconnection from the electrical supply source and the cord must be readily available. Be sure the training system does not block access to the input power cord.

Connect cables in order listed. Work cables are not included with training system.

See Section 5-9 to connect SmartGun to wire feeder. Disconnect all cables from the back of the training system monitor before beginning.

1 Work Cable To SMAW Power Source

2 SMAW Work Clamp To Weld Table

3 Communication Cable To LiveArc

4 Communication Cable To Router Box (14-Pin Connection)

5 Small SmartGun Communication Cable to Large SmartGun Communication Cable

6 Large SmartGun Communication Cable To Router Box (10-Pin Connection)

If the training system was originally configured for GMAW only, this is the connection that was originally made to the back fo the LiveArc monitor.

7 Positive Cable To SMAW Power Source (Dinse Connection)

8 Communication Cable To Router Box

9 SmartStinger Weld Power In (Gray Cord) To Router Box (19-Pin Connection)

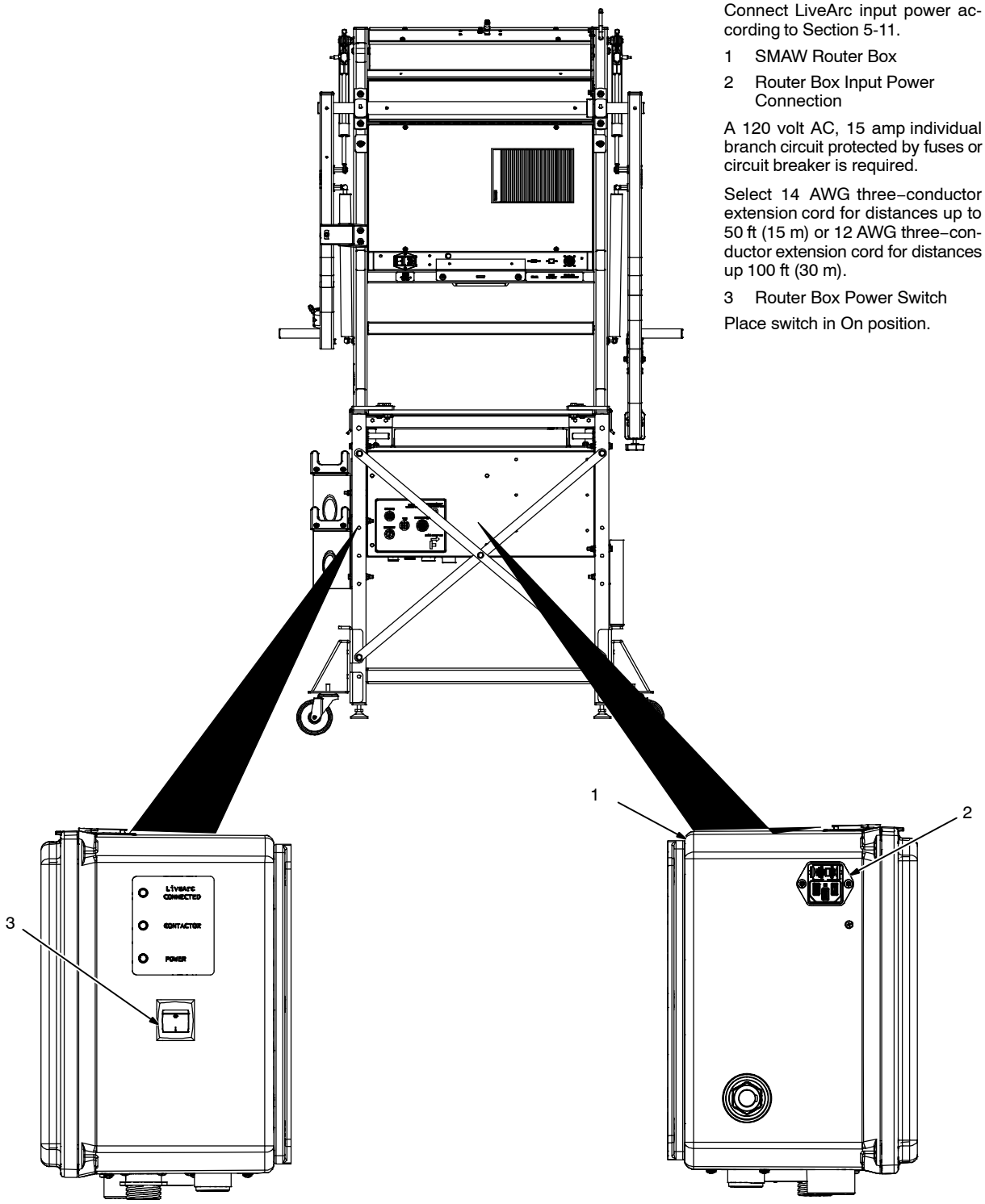
10 SmartStinger Weld Power Out (Black Cord) To Router Box

See power source Owner's Manuals to connect input power.

12-3. Connecting SMAW Router Box Input Power

The input power cord is the means for disconnection from the electrical supply source and the cord must be readily available. Be sure the training system does not block access to the input power cord.

Monitor Back



Connect LiveArc input power according to Section 5-11.

1 SMAW Router Box

2 Router Box Input Power Connection

A 120 volt AC, 15 amp individual branch circuit protected by fuses or circuit breaker is required.

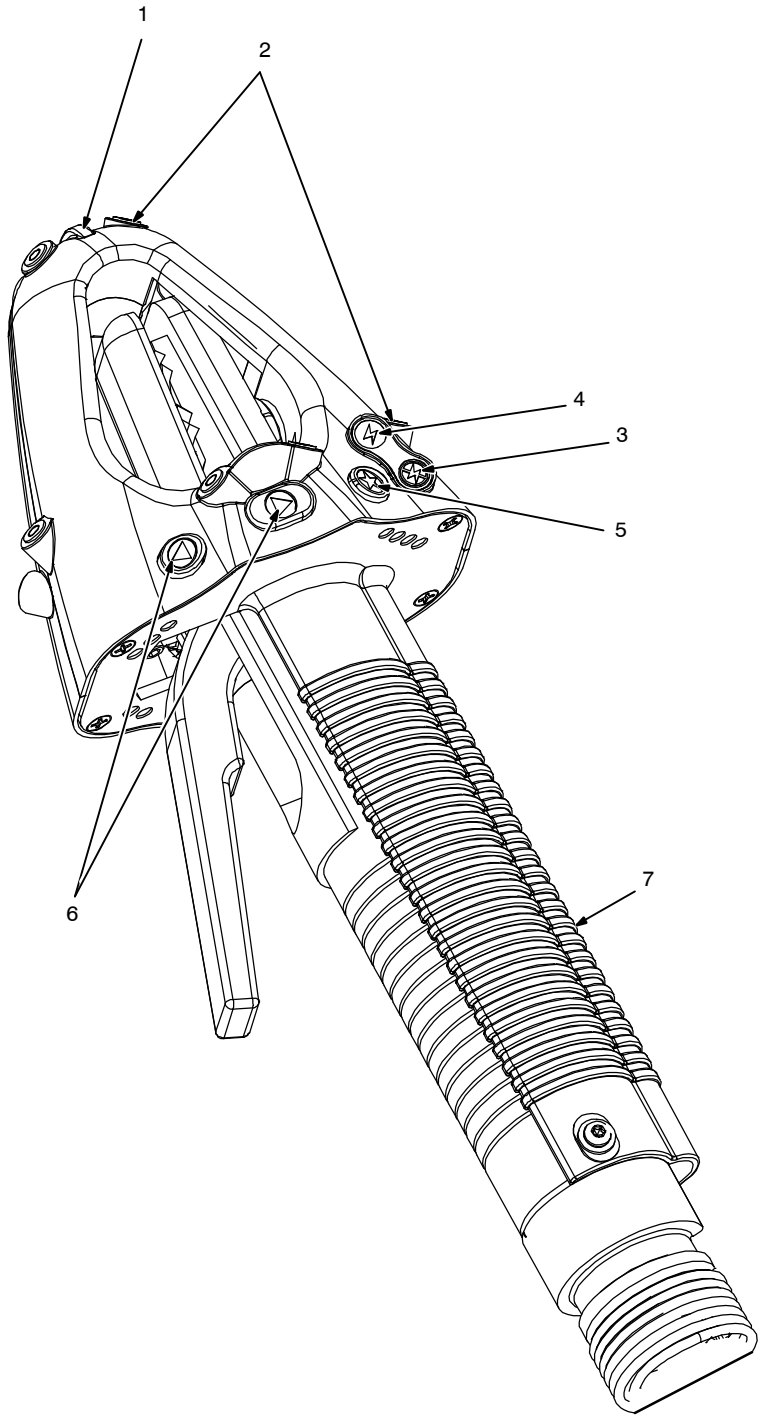
Select 14 AWG three−conductor extension cord for distances up to 50 ft (15 m) or 12 AWG three−conductor extension cord for distances up 100 ft (30 m).

3 Router Box Power Switch

Place switch in On position.

268609-C / 275484

12-4. SmartStinger Controls



☞ *Keep cameras and sensors free of weld spatter and other debris.*

☞ *The SmartStinger LEDs may cause auto-darkening welding helmets to turn on (darken) before welding starts. Set lens sensitivity to a level that prevents premature darkening of the lens (see helmet owner's manual).*

☞ *The SmartStinger will occasionally switch between LED sets, which may cause auto-darkening helmets to blink momentarily.*

☞ *Use screen to calibrate a new SmartStinger, or recalibrate an existing stinger.*

1 Stinger Status Light

The status light turns green to indicate both work and travel angles are correct. When the camera sensors cannot see the stinger, the status light blinks red. The status light is off when the camera is tracking the stinger but the work and travel angles are not both correct.

2 SmartStinger LEDs (12)

LEDs on the SmartStinger allow the monitor–mounted cameras to track stinger speed, stinger angles, stinger direction, and other data.

3 SETUP Mode Indicator

4 WELD Mode Indicator

5 Star (★) Button

6 Left And Right Arrow Navigation Buttons

The main LiveArc display screen helps the user navigate through the user interface. The screen displays warning statements, indicates the training mode (SETUP or WELD) and helps the user position the stinger properly.

Use the Star (★) button to select the training mode (SETUP or WELD). Use the left and right arrow navigation buttons to navigate through setup screens, enable real-time vibration and audio, and modify other weld parameters.

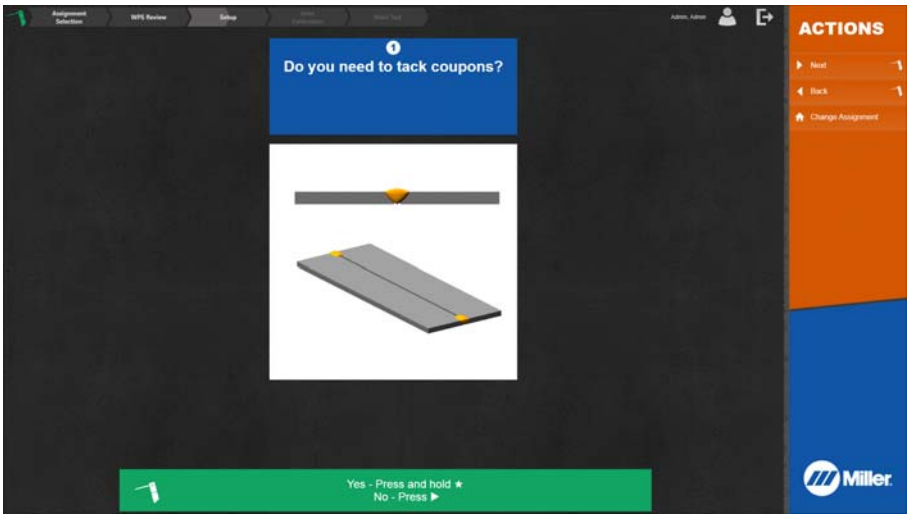
7 Internal Vibrator

Use the right arrow button to select parameter for real-time vibration feedback. Real-time audio feedback for selected guide parameter may also be enabled (see Section 8-2).

The SmartStinger internal vibrator provides the user with real-time feedback for the parameter selected.

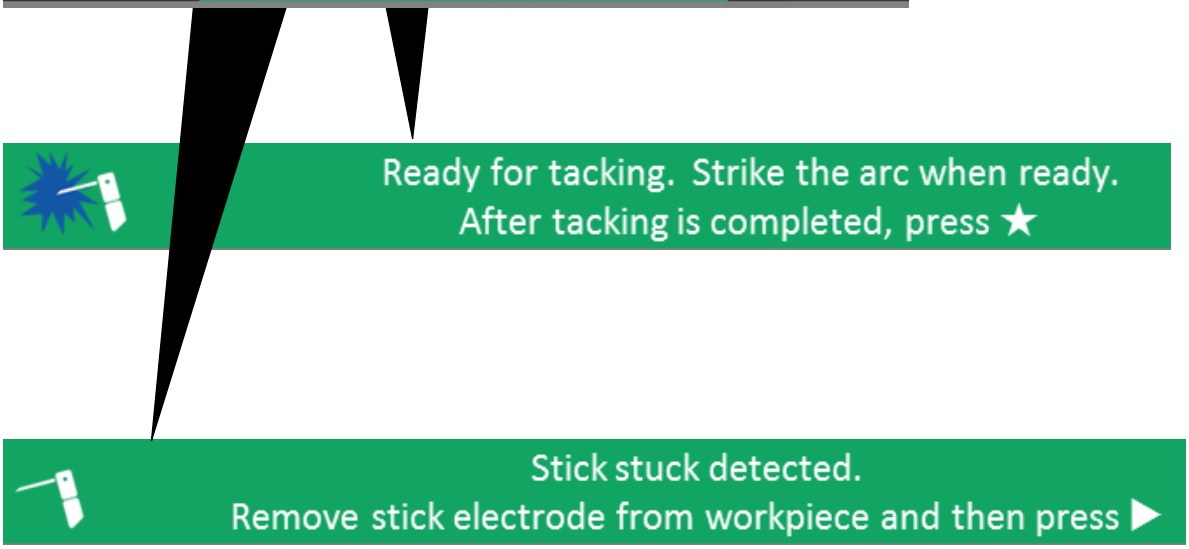
Ref. 275089-A

12-5. Tacking Weld Coupons

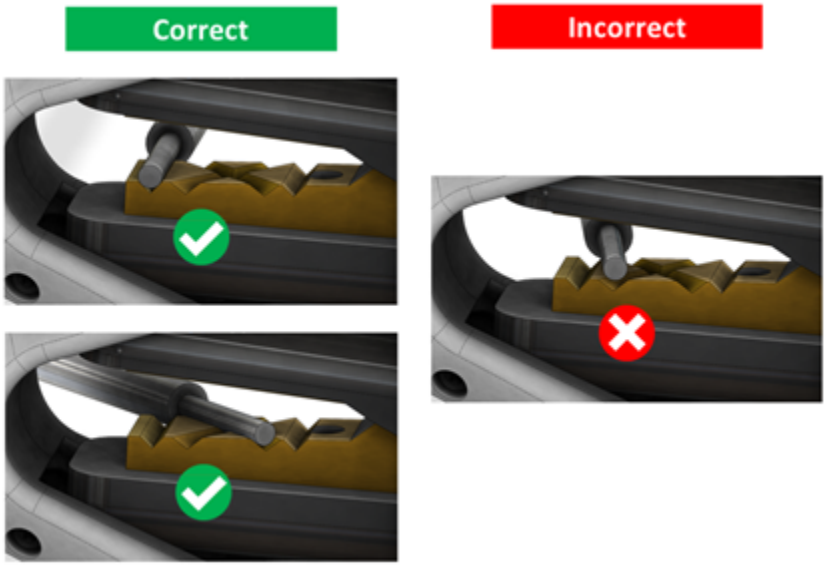


To tack weld coupons, press and hold Star (★) button on SmartStinger until system enters WELD mode (about two seconds). Monitor displays warning message. Tack weld coupons on both ends. Press Star (★) button on SmartStinger when finished.

The LiveArc system can detect when a stick electrode becomes stuck to the workpiece. If stick stuck is detected, the welding power turns off and a message is displayed below the warning. Remove the stuck electrode from the workpiece and then press the right arrow button on the SmartStinger to re-enable welding power.



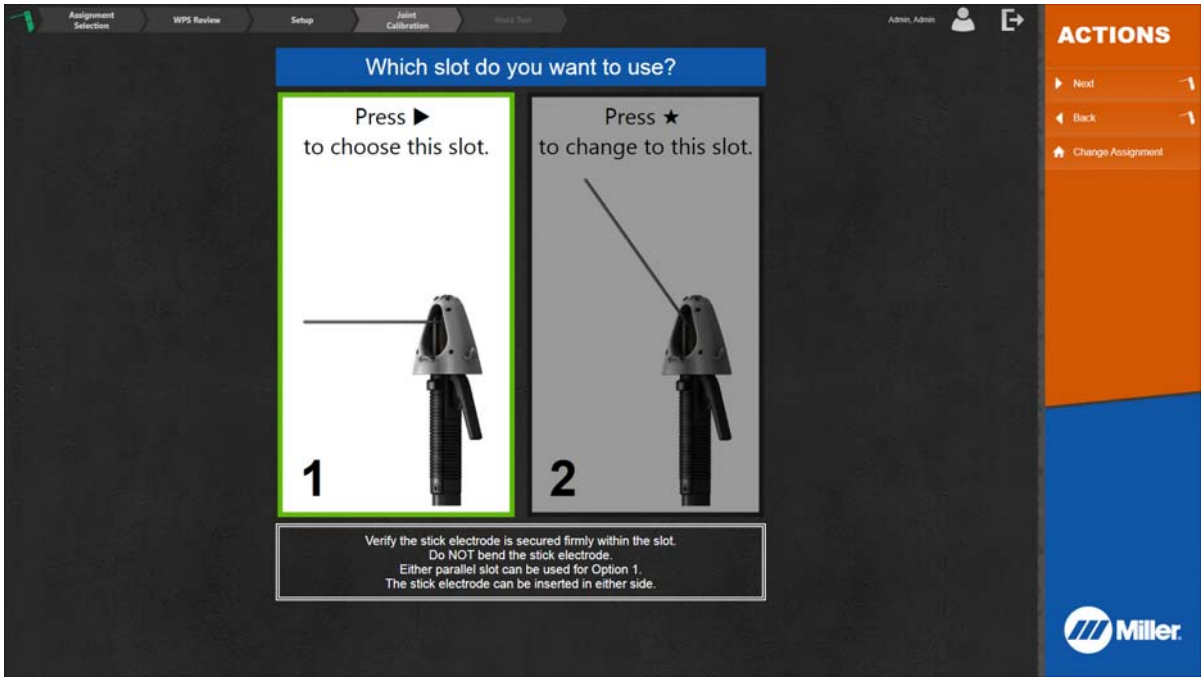
12-6. Stick Electrode Slot Confirmation



Stick electrode must be firmly seated in one of the two slots in the electrode holder. Incorrect electrode placement prevents accurate tracking of the SmartStinger.

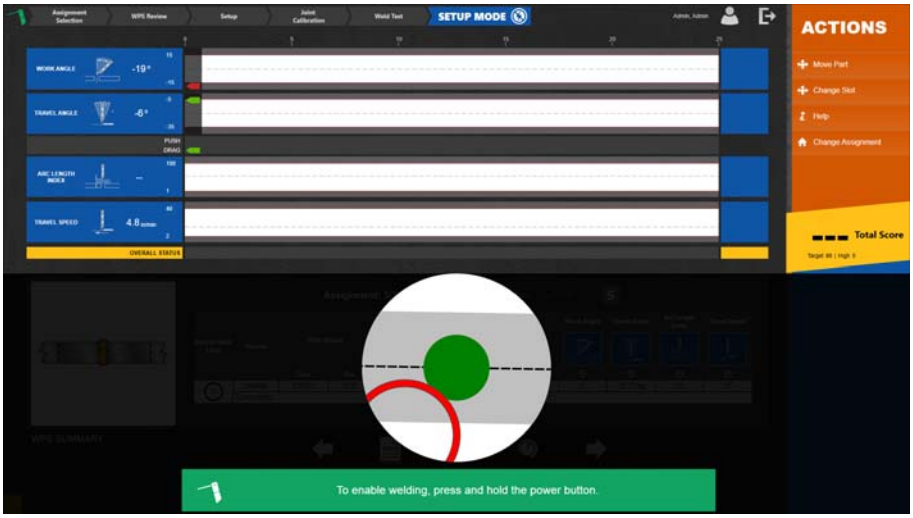
The stick electrode can be inserted in either side of SmartStinger for 1G and 2F positions. For all other positions (out-of-position welds), the stick electrode must be inserted into the side of the SmartStinger with no buttons.

After tacking and calibrating the weld joint, but before beginning to weld, the user will be prompted to confirm which electrode configuration is being used. Follow the instructions on the monitor.



12-7. Using SmartStinger Position Guides

SETUP Mode



WELD Mode

The SmartStinger tracks Work Angle, Travel Angle, Travel Speed, Arc Length Index, Volts, and Amps. These parameters will be graphed and scored just as in GMAW welding.

Prior to welding, the user will be provided with visual guides for Work Angle and Travel Angle using the touch screen monitor. The status light on the end of the SmartStinger provides confirmation that both work and travel angle are correct.

On the stinger, the internal vibrator will also provide real-time feedback on technique parameters.

Arc Length Index

Arc Length Index is a value from 0–100 that is proportional to arc length, which is calculated using measured arc voltage.

12-8. Equipment Setup

1. Assemble LiveArc training system. Install in proper location and near welding power source (see Section 5-1).
2. Ground weld table as specified in Section 5-6.
3. Connect welding power source work clamp(s) to welding table and positioning arm (if applicable). See Section 5-8.

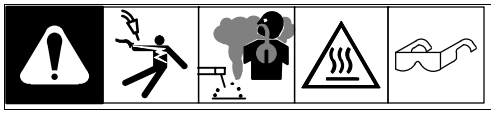
☞ *Ensure the cables are fully threaded into the connector. Be careful not to cross–thread the connectors.*

4. Use communication cable to connect router box and LiveArc. See Section 12-2.
5. Make connections between SmartStinger and router box, and welding power source and router box. See Section 12-2.
6. Connect router box to 120 volt AC receptacle. See Section 12-3.
7. Place Input Power switches in On position (on back of monitor and on side of router box). Press and hold On-Off switch on front of monitor (LED lights) until monitor turns on.
8. Put on personal protection equipment (welding helmet, safety glasses, leather gloves, body protection, cap).
9. Turn on welding power source.

SECTION 13 – MAINTENANCE

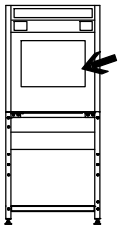
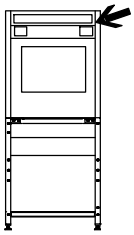
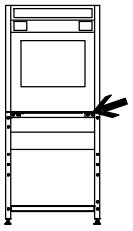
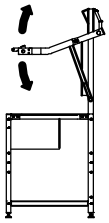
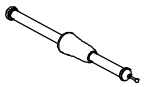
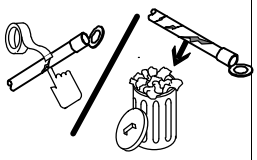
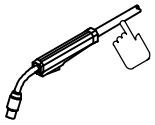
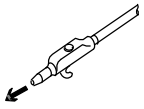
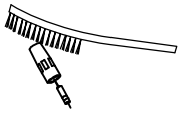
Welding-related hazards are present when using the welding training system. Read the welding power source and wire feeder Owner's Manuals and labels carefully for more information on arc welding hazards. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org). Operators must be trained on the proper use of this equipment before using the equipment to train others.

13-1. Routine Maintenance

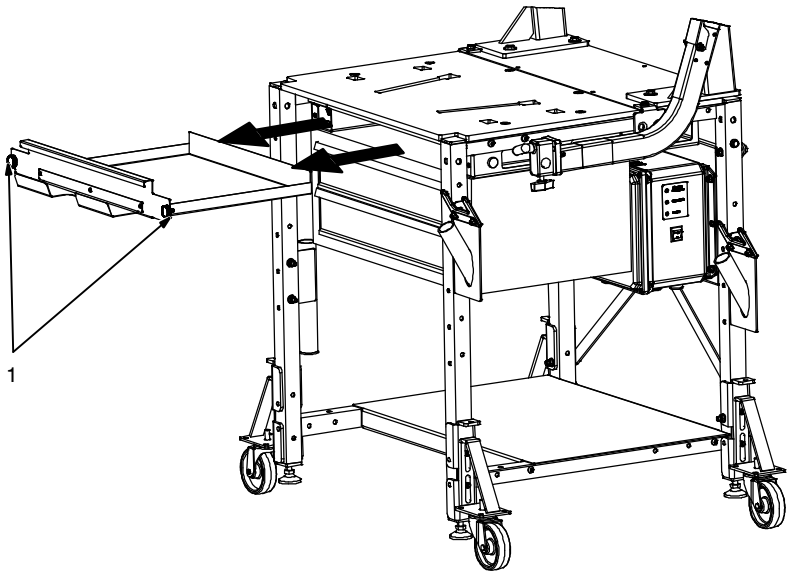


Disconnect Power before maintaining.

☞ *Service equipment more often if used in severe conditions.*

	✓ = Check ◇ = Change ● = Clean ☆ = Replace * To be done by Factory Authorized Service Agent				
Daily	 ● Touchscreen With Clean, Damp Cloth. ***NOTICE*** *– Do not use chemicals, solvents, or abrasive cleaning solutions to clean touchscreen or lens covers.*	 ● Camera Lens Cover With Clean, Damp Cloth. ***NOTICE*** *– Do not use chemicals, solvents, or abrasive cleaning solutions to clean touchscreen or lens covers.*	 ● Work Table Surface And Markers, And Remove Debris. ***NOTICE*** *– Do not use chemicals, solvents, or abrasive cleaning solutions to clean table markers.* ***NOTICE*** *– Do not subject table to excessive grinding. If grinding makes table surface uneven, remove mounting screws and flip table top to use other side. Reinstall screws.*	 ✓ Free Movement Of Positioning Arms	 ● Joint Calibration Tool With Clean, Damp Cloth. ***NOTICE*** *– Do not use chemicals, solvents, or abrasive cleaning solutions to clean joint calibration tool.*
Every 3 Months	 ☆ Damaged Or Unreadable Labels	 ☆ Repair Or Replace Cracked Weld Cable	 ✓ Gun Cable ✓ Stinger Cable	 ● Outer Surfaces ● Inside Unit	
After Each Spool Of Wire	 ● Gun Liner	 ● Nozzle And Contact Tip			

13-2. Emptying Work Table Particle Tray



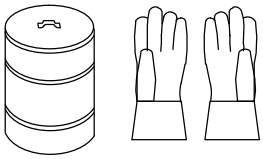
⚠ **Before each use, check tray and empty the particles into a fire-proof container.**

⚠ **Do not operate unit without particle tray.**

1 Hand Knobs

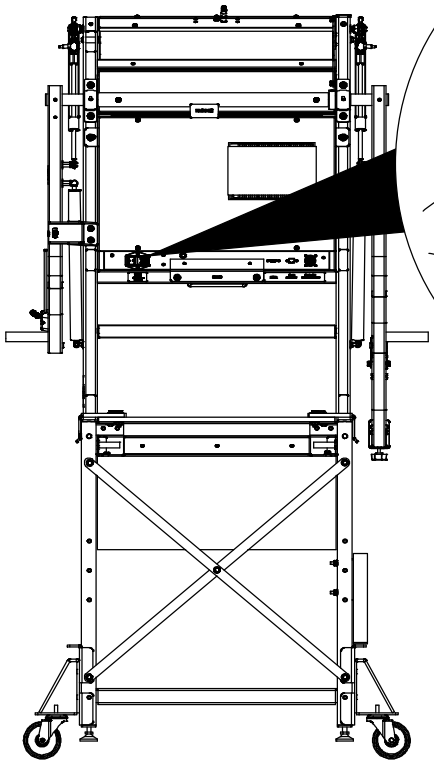
After emptying particle tray, reinstall and tighten hand knobs.

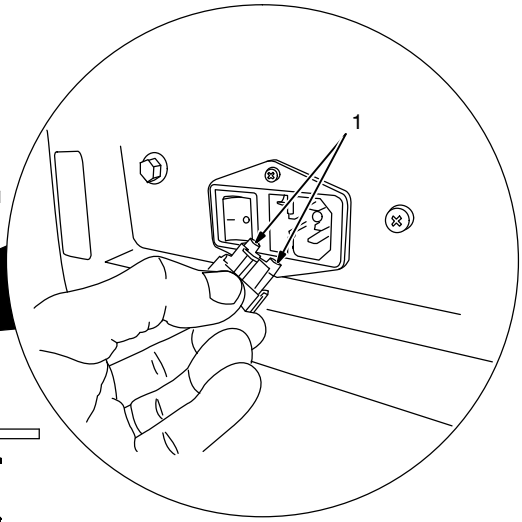
Tools Needed:



Ref. 268609-C

13-3. Overload Protection





⚠ **Turn off power and disconnect input power cord.**

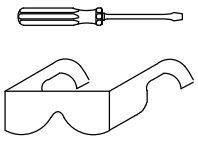
1 Fuses F1, F2
(See Parts List For Rating)

F1 and F2 protect the internal computer and power supply from overload. If either of these fuses open the unit does not operate. Check fuse(s) and replace if open.

To access fuses, use a screwdriver to remove the power receptacle cover plate.

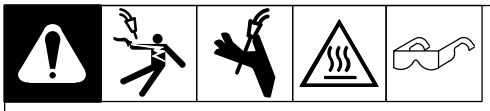
☞ *If a fuse opens, it usually indicates a more serious problem exists. Contact a Factory Authorized Service Agent.*

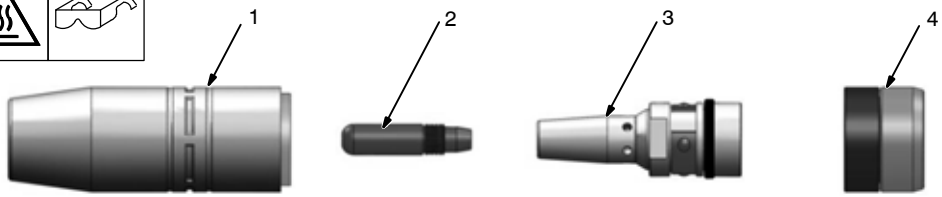
Tools Needed:



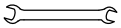
Ref. 268609-B / 161-051

13-4. SmartGun Consumable Removal And Replacement





Tools Needed:



5/8 in. (16 mm)

Ref. Bernard 156 203

☞ *See Section 16 for lists of consumable part numbers.*

NOTICE *– Check all parts to ensure that connections are tight before welding.*

1 Nozzle

Pull slip-on nozzles off with a twisting motion. Ensure nozzle is fully seated.

2 Contact Tip

Thread the contact tip into the retaining head. Torque to 30 in-lb (3.5 N·m). Use the Tregaskiss tip tool (part no. 450–18 for heavy duty tips) or a pair of weld pliers for contact tip installation.

3 Retaining Head

Thread the retaining head onto the neck with a 5/8 in. (16 mm) wrench. Torque to 80 in-lb (9 N·m).

NOTICE *– Do not use pliers to remove or tighten the heavy duty retaining head or scoring may result.*

NOTICE *– The heavy duty retaining head must be tightened with a 5/8 in. (16 mm) wrench to prevent the contact tip from overheating.*

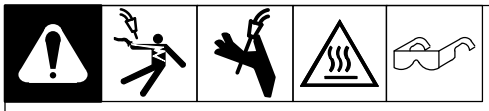
4 Neck Insulator

Press the neck insulator onto the neck by hand with the aluminum side toward the neck and the black insulation toward the nozzle.

NOTICE *– Neck insulator must be in place before welding to properly insulate the neck armor.*

Notes

13-5. SmartGun Quick Load Liner Replacement



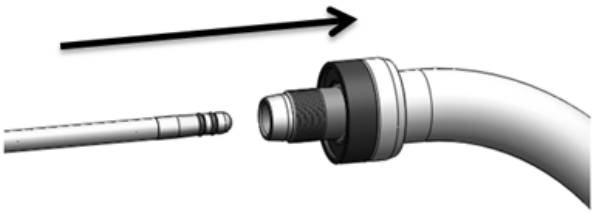
Tools Needed:

Turn Off welding power source and wire feeder.

Quick Load liners feed from the front of the GMAW gun. There is no need to disconnect the SmartGun from the welding power source when changing liners.

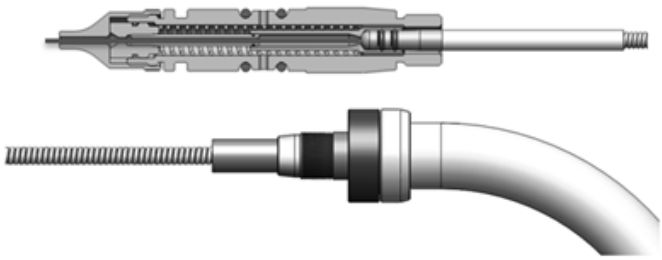
☞ *See Section 16 for lists of liner part numbers.*

Trim wire to remove any ball present on tip. Remove nozzle, contact tip, and retaining head.



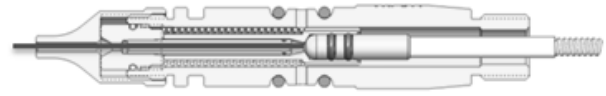
Straighten gun cable. Remove existing Quick Load liner by pulling it out of the neck with pliers.

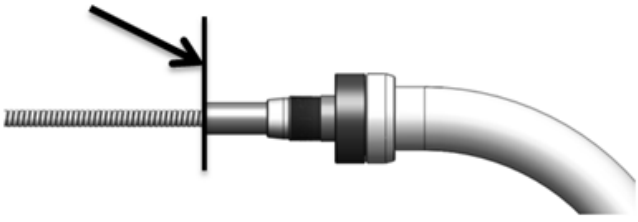
Remove the protective cap from the new Quick Load liner and insert it through the gun neck, over wire. Use short strokes to prevent liner from kinking. Feed liner into gun until it engages with retainer inside the AutoLength pin.



Push liner into gun neck as far as possible. Release. Repeat several times to ensure liner springs back freely.

Slide liner trim gauge over the end of the Quick Load liner and press flush with the end of the neck.





Push the Quick Load liner into the gun until liner will not go forward any further. Liner will be pushed in by approximately 1 in. (25 mm). Trim liner flush with gauge. After trimming, liner will stick out of neck by approximately 1–3/4 in (44 mm). This is normal, as liner will be pushed into neck when consumables are installed.

Reinstall consumables. Turn on welding power supply.

NOTICE *– Liners trimmed too long or too short can cause serious wire feeding problems. Be sure to use your liner gauge as instructed to trim the liner to the correct stick out.*

Ref. Bernard 156 207

SECTION 14 – TROUBLESHOOTING

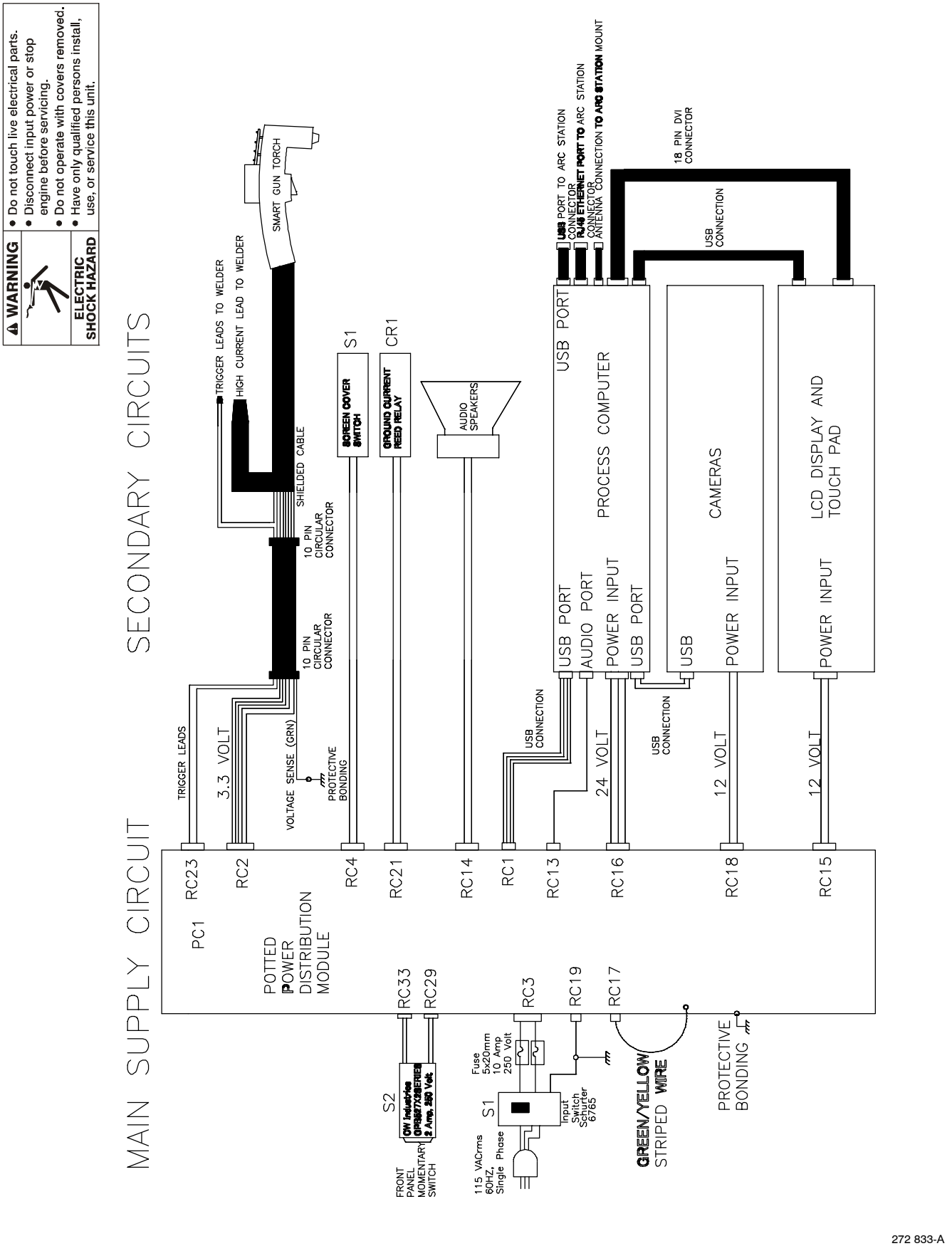
Welding-related hazards are present when using the welding training system. Read the welding power source and wire feeder Owner's Manuals and labels carefully for more information on arc welding hazards. Also read American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* from American Welding Society (www.aws.org). Operators must be trained on the proper use of this equipment before using the equipment to train others.

14-1. Troubleshooting Table

Trouble	Remedy
Monitor does not turn on. ☞ *Monitor screensaver appears after four hours of inactivity. SmartGun screensaver appears after five minutes of inactivity.*	Press Input Power switch. Place monitor On–Off switch in the On position (see Section 6-1)
	Check input power connections at AC receptacle and monitor (see Section 5-11).
	Check fuses F1 and F2, and replace fuse if open (see Section 13-3).
	Have Factory Authorized Service Agent check monitor power supply.
Monitor touchscreen does not operate.	Remove dirt and debris from touchscreen.
	Have Factory Authorized Service Agent check monitor.
Table does not calibrate.	Remove tools and debris from marker openings on weld table.
	Remove dirt and spatter from table markers and protective covers (under the table surface) with clean, damp cloth. Do not use any chemicals.
	Clean camera lens cover.
	Recalibrate table (see Section 8-7).
Workpiece does not calibrate.	Remove objects blocking camera view of joint calibration tool.
	Clean or replace joint calibration tool. If there are scratches near internal markers, rotate the tool so the scratches are not facing the camera. Replacement joint calibration tools are available for purchase (part no. 266768).
	Properly position joint calibration tool on workpiece. Tool must be held in position for at least one second on both ends of workpiece.
	Verify joint calibration tool dimensions (see Section 8-6).
Cameras do not track SmartGun or SmartStinger.	Be sure hands, tools, or debris are not blocking markers on SmartGun or SmartStinger.
	Clean camera lens cover.
System does not enter weld mode.	Press mode button on SmartGun until system enters weld mode (about two seconds).
No weld output.	Check SmartGun connections at wire feeder.
	Check connections at router box, if equipped.
	Check connections and control settings at welding power source. Also check for proper input power connections.
	Close monitor screen cover.
	Verify work clamp is properly attached.
	Verify Weld mode is enabled.
	Allow overheated SmartGun to cool. SmartGun disables welding and displays an internal error when gun internal temperature is 185°F (85°C) or above. Welding can resume when gun internal temperature drops below 176°F (80°C).
Monitor screensaver does not display after periods of inactivity.	Screensaver displays after four hours of inactivity only if the on-screen application contains no video or animations. (Video and animations prevent screensaver from displaying.)

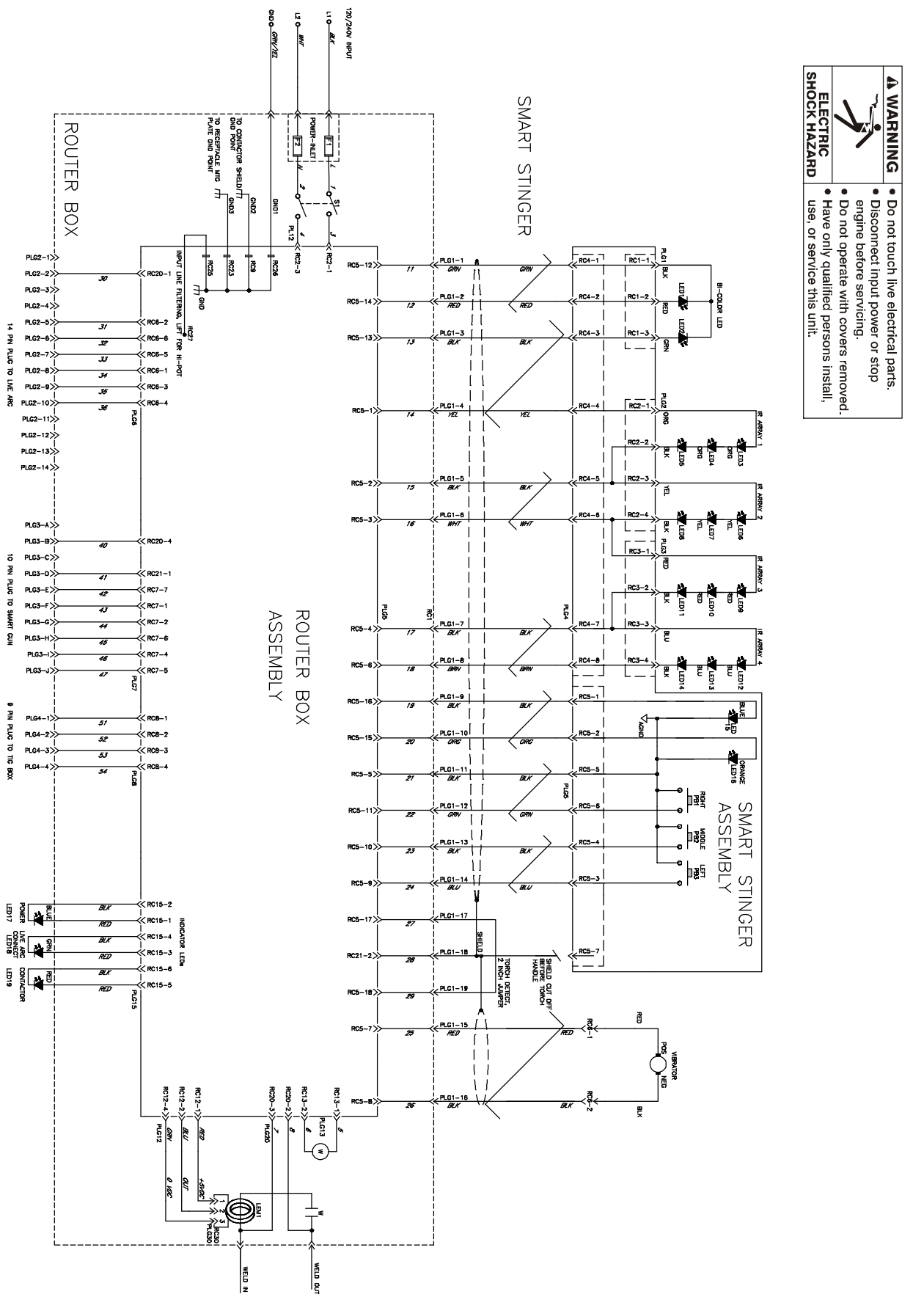
Trouble	Remedy
Cameras do not track clamp.	Ensure clamp is positioned/oriented properly.
	Ensure clamp is within specified height range for the specific joint type.
	Ensure coupon is not interfering with camera's view of clamp markers.
	Clean debris off clamp marker covers.
	Replace clamp marker covers.
	Clean/replace camera cover.
	Recalibrate clamp (see Section 8-9).
	Redo Camera-to-Arms Linkage Adjustment (see Section 8-8).
SmartGun displays "Connection not established."	High frequency interferes with SmartGun function. Do not connect LiveArc to a circuit used by equipment producing high frequency. Do not connect work cable to a common ground used by welding equipment producing high frequency.
Connection issue with SmartGun, SmartStinger, or Router Box.	Ensure all data cables are fully threaded into the connector.

Notes



272 833-A

Figure 15-1. Circuit Diagram



276650-B

Figure 15-2. Circuit Diagram For Unit With Optional SMAW Module

Notes

☞ *Hardware is common and not available unless listed.*

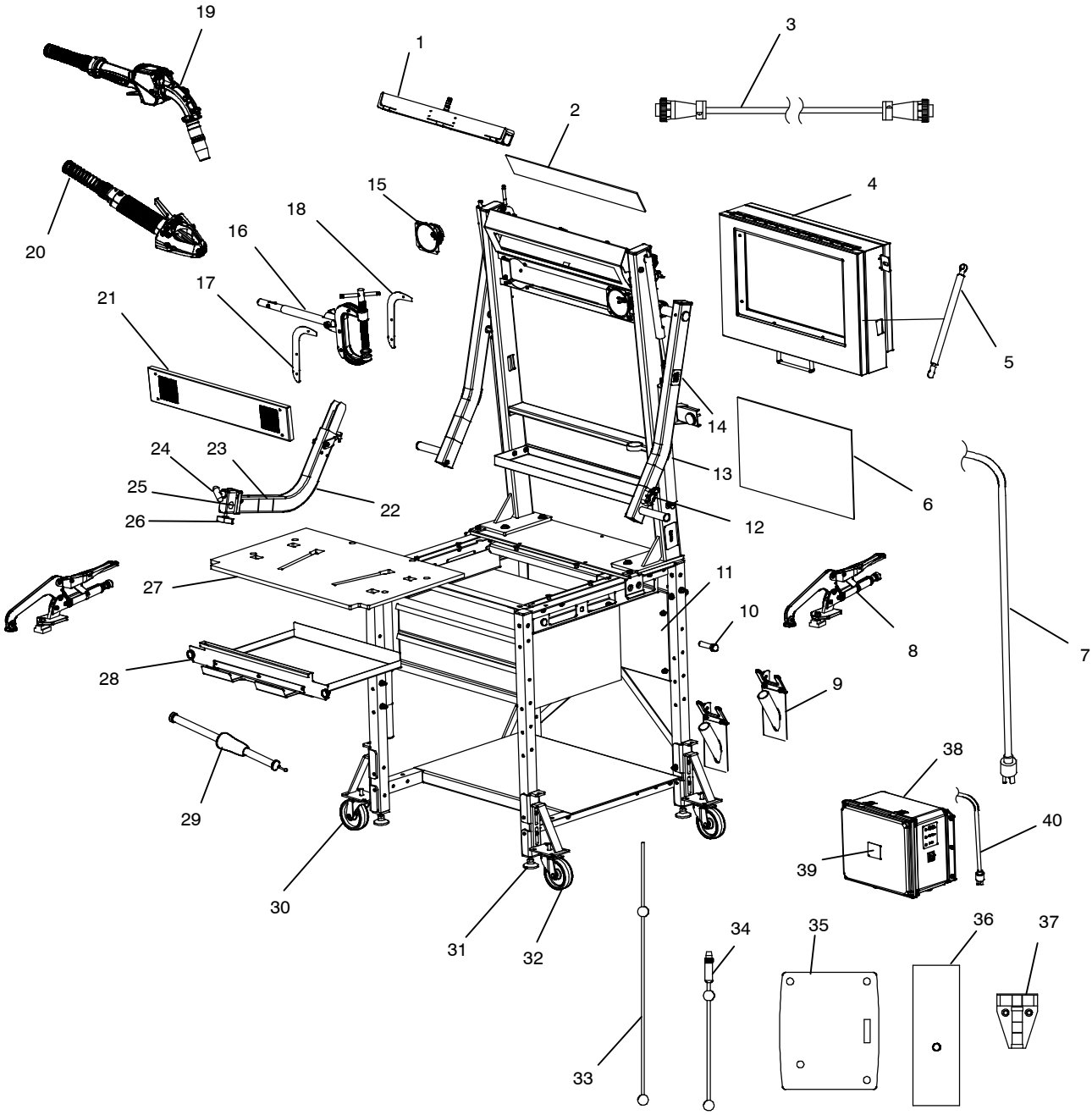


Figure 16-1. Weld Table And Monitor Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 16-1. Weld Table And Monitor Assembly

1		266968	Camera, LiveArc Motion Tracking	1
2		266672	Cover, LiveArc Camera Window	1
3		272914	Cable Assy, LiveArc SmartGun Communication	1
4		+267018	Enclosure, Display/Computer	1
		267995	Switch, Input Power	1
		267993	Switch, Monitor, On-Off	1
		*268098	Fuse, Input Power Receptacle, 5 x 20 mm, 10 A, 250 VAC Slo-Blo	2
5		267144	Strut, Display Door	2
6		266684	Cover, LiveArc Monitor Display Window	1
7		267504	Power Cord, LiveArc No 16/3 15ft	1
		021469	Label, Electric Shock	1
8		257285	Clamp, LiveArc Table	2
9		274786	Assembly, Holster Stinger W/Overmold	2
10		266772	Marker, Table	4
11		+♦274064	Bracket, Contactor Box	1
		♦275900	Label, Router Box Connectors	1
12		267990	Assembly, Mechlock Release	1
13		266694	Strut, Gas (w/Covers)	2
14		261084	Label, Caution, Pinch Point	2
15		266676	Speaker	2
16		266786	Clamp Assy, LiveArc Welding Positioning Arm (Includes)	1
17		270106	.. Protective Cover, Clamp Left	1
18		270105	.. Protective Cover, Clamp Right	1
		277826	Kit, LiveArc SmartGun Replacement (See Figure 16-3)	1
19		273241	Torch, LiveArc SmartGun 60 Degree Gooseneck (See Figure 16-3)	1
		264431	Enclosure, Pod Lens (Covers)	1
		277824	Kit, LiveArc SmartStinger Replacement (See Figure 16-2)	1
20		♦275089	Assembly, LiveArc SmartStinger Complete (See Figure 16-2)	1
		*♦275910	Cable Assy, 15 Ft Dinse Male To Female 50 Series	1
21		266675	Cover, Speaker	1
22		+268933	Arm, Extension	1
23		267430	Label, Caution Moving Parts	2
24		271184	Knob, T 2.000 Bar W/.375 Stud 1.5 Barrel	1
25		270421	Assembly, Out Of Position Pivot	1
26		271183	Knob, T 3.000 Bar W/.312-18 Stud 1.000 Lg	1
27		266700	Table Top, LiveArc Reversible Panel	1
28		275363	Assembly, Cal Tool & Dust Tray	1
29		266768	Tool, LiveArc Weld Joint Calibration (Includes)	1
		269988	.. Assembly, LiveArc Plastic Tube With Grip, Joint Cal Tool	1
30		250259	Caster, Sta 3.00 In.	2
31		244965	Foot, Mtg Arcstation	4
32		250258	Caster, Swvl 3.00 In.	2
33		♦274827	Tool, Livearc Stinger Calibration Tool	1
34		267571	Tool, LiveArc SmartGun Calibration Tool	1
35		271475	Tool, LiveArc Table Calibration	1
36		270711	Bracket, Out Of Position Calibration Block	1
37		270959	Tool, LiveArc 2 Way Level	1
38		+♦275484	Assembly, Router Box (Includes)	1
		*277732	Kit, Service Contactor Replacement	1
		274295	.. Circuit Card Assy, Router Box	1
		275653	.. Assembly, Contactor	1
		275892	.. Fused Power Inlet Module, 10a 250vac	1
		275893	.. Fuse Drawer, Power Inlet Module 2 Pole X–Safe	1
		*268098	.. Fuse, Mintr Cer 10. Amp 250 Volt T–Lag	2
		177396	.. Switch, Rocker Dpst 15a 250vac Off–None–On	1
		267504	.. Power Cord, Livearc No 16/3 15ft	1
39		♦272813	Label, Warning High Voltage	1
40		♦275795	Cable Assy, Livearc To Router Box Communication	1

* Recommended Spare Parts.

♦ OPTIONAL

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*

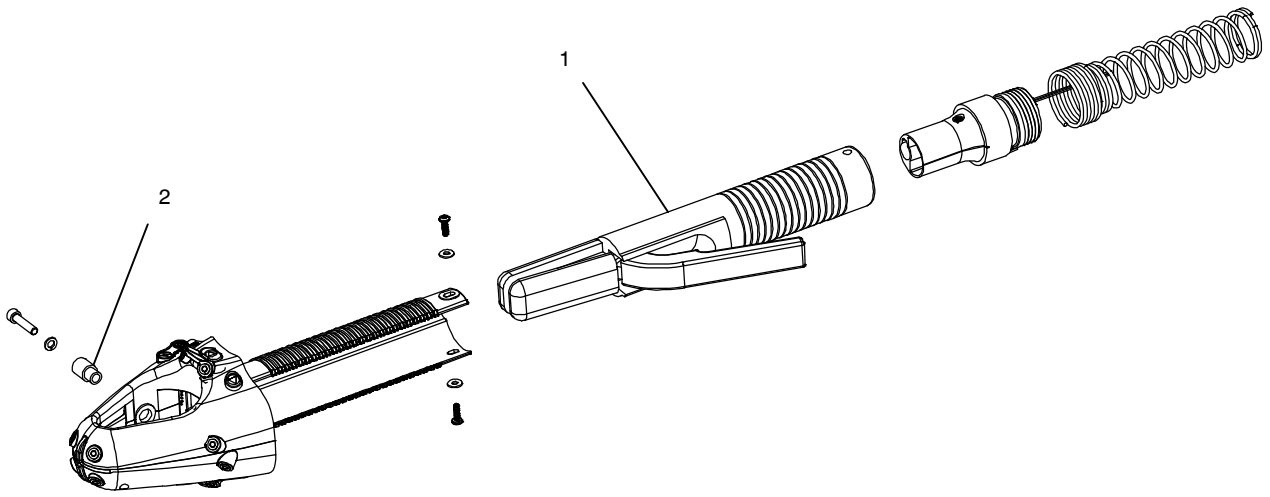
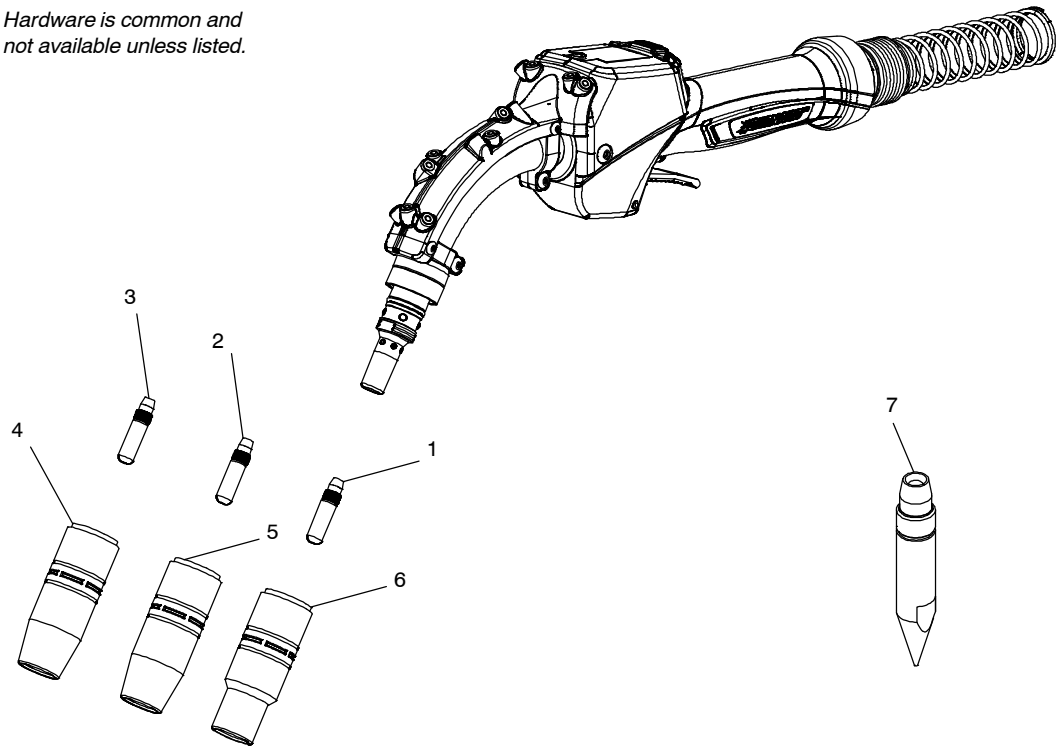


Figure 16-2. Optional SmartStinger Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 16-2. Optional SmartStinger Assembly (Figure 16-1 Item 20)	
. . . . .		*277735	. . Kit, Electrode Stinger Replacement	1
. . .	1	274792	. . Holder, Electrode Stinger w/Holes	1
. . .	2	274791	. . Insulator, SmartStinger Enclosure	1
. . . . .		WC-4-10	. . Cover, Cable 10ft (3.0m)	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*



268 609-B

Figure 16-3. SmartGun Consumables

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 16-3. SmartGun Consumables (Figure 16-1 Item 19)	
1		403–20–35–05	Contact Tip, .035 Heavy Duty (5 Pack)	1
2		403–20–45–05	Contact Tip, .045 Heavy Duty (5 Pack)	1
3		403–20–52–05	Contact Tip, .052 Heavy Duty (5 Pack)	1
4		401–06–62–02	Nozzle, 5/8 In. Bore, 1/8 In. Contact Tip Setback, Hvy Duty (2 Pack)	1
5		401–87–62–02	Nozzle, 5/8 In. Bore, 1/8 In. Contact Tip Extension, Hvy Duty (2 Pack)	1
6		401–48–62–02	Nozzle, 5/8 In. Bore Flush (2 Pack)	1
7		403–20–05–01	Teach Tip, LiveArc	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

The consumables on this page are included with every LiveArc system. They are available from Miller parts.

See Section 13-4 for instructions on removing and replacing SmartGun consumables. See Section 13-5 for instructions on removing and replacing the SmartGun liner.

Table 16-1 through Table 16-4 list all consumables compatible with the SmartGun. These parts are available from Bernard/Tregaskiss at 1-855−MIGWELD (1-855-644-9353).

*Parts included with every LiveArc system.

Table 16-1. Quick Load Liners

Wire Size	Liner Part Number
0.023 in.	415−23−15Q
0.030 in.	415−30−15Q
0.035 − 0.045 in.	415−35−15Q*
0.045 − 1/16 in.	415−116−15Q
1/16 − 5/64 in.	415−564−15Q

Table 16-2. Tough Lock Contact Tips

Wire Size	Standard Duty	Heavy Duty	Heavy Duty Tapered	Extended Life Heavy Duty	Extra Heavy Duty	Qty
0.023 in. (0.6 mm)	403−14−23	N/A	N/A	N/A	N/A	100
0.030 in. (0.8 mm)	403−14−30	403−20−30	403−21−30	403−27−30	N/A	100
0.035 in. (0.9 mm)	403−14−35	403−20−35*	403−21−35	403−27−35	N/A	100
0.040 in. (1.0 mm)	403−14−1.0	403−20−1.0	403−21−1.0	403−27−1.0	603−20−1.0	100
0.045 in. (1.2 mm)	403−14−45	403−20−45*	403−21−45	403−27−45	603−20−45	100
3/64 in. (1.2 mm)	N/A	403−20−364	N/A	403−27−364	603−20−364	100
0.052 in. (1.3 mm)	N/A	403−20−52*	N/A	N/A	603−20−52	100
0.055 in. (1.4 mm)	N/A	403−20−1.4	N/A	N/A	603−20−1.4	100
1/16 in. (1.6 mm)	N/A	403−20−116	N/A	403−27−116	603−20−116	100
0.070 in. (1.8 mm)	N/A	403−20−1.8	N/A	N/A	N/A	100
0.078 in. (2.0 mm)	N/A	403−20−78	N/A	N/A	N/A	100
5/64 in. (2.0 mm)	N/A	403−20−564	N/A	N/A	603−20−564	100
For quantities of 25: Add “−25” to the end of the part number. Example: 25 Heavy Duty Contact Tips for 0.030 in. wire size is Part No. 403−20−30−25.						

*Parts included with every LiveArc system.

Table 16-3. Nozzles

Part No.	Nozzle Type	Bore	Type**	Material	O.D.	Length	Tip Placement	Qty
401–6–50	Heavy Duty	1/2 in.	C	Copper	1.062 in.	2.88 in.	1/8 in. Recess	10
401–48–62*	Heavy Duty	5/8 in.	A	Copper	1.062 in.	2.76 in.	Flush	10
401–5–62	Heavy Duty	5/8 in.	C	Copper	1.062 in.	3.00 in.	1/4 in. Recess	10
401–6–62*	Heavy Duty	5/8 in.	C	Copper	1.062 in.	2.88 in.	1/8 in. Recess	10
401–71–62	Heavy Duty	5/8 in.	C	Brass	1.106 in.	2.88 in.	1/8 in. Recess	10
401–7–62	Heavy Duty	5/8 in.	C	Brass	1.106 in.	3.00 in.	1/4 in. Recess	10
401–81–62	Heavy Duty	5/8 in.	C	Copper	1.062 in.	2.63 in.	1/8 in. Stick–Out	10
401–87–62*	Heavy Duty	5/8 in.	C	Brass	1.062 in.	2.63 in.	1/8 in. Stick–Out	10
401–5–75	Heavy Duty	3/4 in.	C	Copper	1.062 in.	3.00 in.	1/4 in. Recess	10
401–6–75	Heavy Duty	3/4 in.	C	Copper	1.062 in.	2.88 in.	1/8 in. Recess	10
401–7–75	Heavy Duty	3/4 in.	C	Brass	1.106 in.	2.88 in.	1/8 in. Recess	10
401–42–50	Standard Duty	1/2 in.	A	Brass	0.938 in.	2.88 in.	1/8 in. Recess	10
401–4–50	Standard Duty	1/2 in.	C	Copper	0.938 in.	2.88 in.	1/8 in. Recess	10
401–44–50	Standard Duty	1/2 in.	A	Brass	0.938 in.	2.50 in.	1/4 in. Stick–Out	10
401–48–50	Standard Duty	1/2 in.	A	Brass	0.938 in.	2.63 in.	1/8 in. Stick–Out	10
401–4–38	Standard Duty	3/8 in.	B	Copper	0.938 in.	2.74 in.	Flush	10
401–40–38	Standard Duty	3/8 in.	B	Brass	0.980 in.	2.81 in.	1/16 in. Recess	10
401–4–62	Standard Duty	5/8 in.	C	Copper	0.938 in.	2.88 in.	1/8 in. Recess	10
401–8–62	Standard Duty	5/8 in.	C	Copper	0.938 in.	2.63 in.	1/8 in. Stick–Out	10
401–9–62	Standard Duty	5/8 in.	C	Copper	0.938 in.	2.51 in.	1/4 in. Stick–Out	10
401–4–75	Standard Duty	3/4 in.	D	Copper	0.938 in.	2.88 in.	1/8 in. Recess	10
**Nozzle types are: A–Bottleneck, B–Long Taper, C–Short Taper, D–Straight.								

Table 16-4. Other SmartGun Consumables

Description	Part No.	Type	Qty
Retaining Head	404–26–25*	Heavy Duty	25
Retaining Head	404–18–25	Standard Duty	25
Neck Insulator	402–11*		

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Notes

Notes

Notes

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1. 5 Years Parts — 3 Years Labor
   * Original Main Power Rectifiers Only to Include SCRs, Diodes, and Discrete Rectifier Modules
2. 3 Years — Parts and Labor
   * Auto-Darkening Helmet Lenses (Except Classic Series) (No Labor)
   * Engine Driven Welder/Generators **(NOTE: Engines are Warranted Separately by the Engine Manufacturer.)**
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   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Transformer/Rectifier Power Sources
3. 2 Years — Parts and Labor
   * Auto-Darkening Helmet Lenses – Classic Series Only (No Labor)
   * Fume Extractors – Capture 5, Filtair 400 and Industrial Collector Series
4. 1 Year — Parts and Labor Unless Specified
   * Automatic Motion Devices
   * CoolBelt and CoolBand Blower Unit (No Labor)
   * Desiccant Air Dryer System
   * External Monitoring Equipment and Sensors
   * Field Options **(NOTE: Field options are covered for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)**
   * RFCS Foot Controls (Except RFCS-RJ45)
   * Fume Extractors – Filtair 130, MWX and SWX Series
   * HF Units
   * ICE/XT Plasma Cutting Torches (No Labor)
   * Induction Heating Power Sources, Coolers **(NOTE: Digital Recorders are Warranted Separately by the Manufacturer.)**
   * LiveArc Welding Performance Management System
   * Load Banks
   * Motor-Driven Guns (except Spoolmate Spoolguns)
   * PAPR Blower Unit (No Labor)
   * Positioners and Controllers
   * Racks
   * Running Gear/Trailers
   * Spot Welders
   * Subarc Wire Drive Assemblies
   * Water Coolant Systems
   * TIG Torches (No Labor)
   * Wireless Remote Foot/Hand Controls and Receivers
   * Work Stations/Weld Tables (No Labor)
5. 6 Months — Parts
   * Batteries
   * Bernard Guns (No Labor)
   * Tregaskiss Guns (No Labor)
6. 90 Days — Parts
   * Accessory (Kits)
   * Canvas Covers
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * M-Guns
   * MIG Guns and Subarc (SAW) Torches
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   * Roughneck Guns
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Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
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