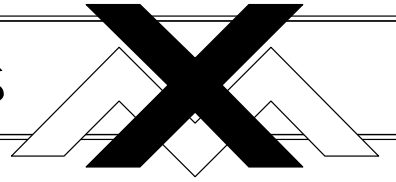


XM Controls



XM System Manual

Advanced Manufacturing Engineering Technologies

Table of Contents





1	FOREWORD	4
2	GENERAL SAFETY	5
3	BASIC COMPONENTS.....	10
3.1	XM MODULES	10
4	CONTROLLER COMPONENTS	11
4.1	EMERGENCY STOP	11
4.2	SOFT BUTTONS	12
4.3	SEQUENCE BUTTONS	12
4.4	PROGRAMMING KNOBS.....	12
4.5	FUNCTION BUTTONS.....	13
4.5.1	<i>Disable Buttons</i>	13
4.5.2	<i>Gas Buttons</i>	13
4.5.3	<i>Motion Buttons</i>	13
4.5.4	<i>Jog Buttons</i>	14
4.6	JOYSTICK CONTROLS	15
4.7	LCD DISPLAY.....	15
4.8	MODE OF OPERATION SELECT.....	16
4.8.1	<i>Weld Mode</i>	16
	Weld Mode Screen	17
4.8.1.1	17	
4.8.1.1.1	Weld Schedule File Name	17
4.8.1.1.2	Weld Graphic Display.....	17
4.8.1.1.3	Segment Status.....	17
4.8.1.1.4	Segment Sequence	17
4.8.1.1.5	System Messages	18
4.8.1.1.6	Meters	18
4.8.1.1.7	Soft Buttons	19
4.8.2	<i>Edit Mode</i>	20
4.8.2.1	Edit Mode Screen	21
4.8.2.1.1	Weld Program File Name	21
4.8.2.1.2	Weld Segment Display	21
4.8.2.1.3	Weld Program Graph Display	22
4.8.2.1.4	Module List.....	22
4.8.2.1.5	Parameter List.....	22
4.8.2.1.6	Programming Knobs (Edit Mode).....	23
4.8.2.1.7	Soft Buttons	24
4.8.2.1.7.1	Load Button	24
4.8.2.1.7.2	Save Button.....	24
4.8.2.1.7.3	Add Segment Button.....	26
4.8.2.1.7.4	Delete Segment Button	26
4.8.2.1.7.5	Set Up Button.....	26
4.8.2.1.7.5.1	<i>Set Up: Override Limits Button</i>	26
4.8.2.1.7.5.2	<i>Set Up: Data Acquisition Button (License Activated)</i>	28
4.8.2.1.7.6	Automation Button (License Activated)	29
4.8.2.1.7.6.1	<i>Left Hand Window</i>	30
4.8.2.1.7.6.2	<i>Right Hand Window</i>	30
4.8.2.1.7.6.3	<i>Automation Function Table</i>	31
4.8.3	<i>Set Up Mode</i>	34
	Set Up: Modules.....	34
4.8.3.1	34	
4.8.3.1.1	Select Module	34
4.8.3.2	More: Files	35
	Soft Buttons.....	36
4.8.3.2.1.1	36

	4.8.3.2.1.2	Programming Knobs	36
5		APPENDIX 1 (PARAMETER DEFINITIONS)	ERROR! BOOKMARK NOT DEFINED.
6		APPENDIX 2 (CREATING A WELD PROGRAM).....	ERROR! BOOKMARK NOT DEFINED.

XM System Manual

1 Foreword

Throughout this manual, these icons will highlight specific information related to each category.

<i>Icon</i>	<i>Function</i>
 Note:	Note - Highlights or reviews important information and general points of interest.
 Caution:	Caution - Highlights items, which can cause damage to the system and/or injury to operators.
 Tip:	Tip - Identifies programming suggestions and operational information for the XM.
	Safety - Identifies specific safety concerns. These items may vary depending on how the system is equipped; however, general safety practices remain constant in all situations and environments.

2 General Safety

Arc Welding Safety Precautions



ARC WELDING MAY BE HAZARDOUS.

PROTECT YOURSELF and others from possible serious injury or death!

KEEP CHILDREN AWAY at all times!

PACEMAKER WEARERS KEEP AWAY until such time as you have consulted your doctor.



Welding exposes you to certain hazards. However, welding is safe when precautions are taken. The following safety information only summarizes the more complete safety information found in the Principal Safety Standards manuals listed at the end of this section (p. 6).

Read and follow all Safety Standards!

ELECTRIC SHOCK CAN KILL

Touching live electrical parts may cause fatal shocks or severe burns. The electrode and work circuit are electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire and torch are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.



1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Use dry insulating mats or covers to insulate yourself from work and ground.
4. Disconnect input power before installing or servicing the equipment.
5. Properly install and ground any equipment according to its Owner's Manual and national, state, and local codes.
6. Turn off all equipment when not in use.
7. Ground the work piece to a good electrical (earth) ground.
8. Do not touch electrodes while you are in contact with the work (ground) circuit.
9. Use only well maintained equipment. Repair or replace damaged parts at once.
10. Keep all panels and covers securely in place.

**ARC RAYS CAN BURN EYES AND SKIN
NOISE MAY DAMAGE HEARING**

Arc rays from the welding process produce intense heat and strong ultraviolet rays that will burn eyes and skin. Noise from some processes can damage hearing.



1. Wear a welding helmet fitted with a proper shade of filter (see ANSI Z49.1 listed in the Safety Standards) to protect your face and eyes when welding or watching.
2. Wear approved safety glasses. Face shields are recommended.
3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.
5. Use approved earplugs or earmuffs if the noise level is high.

**FUMES AND GASES CAN BE HAZARDOUS
TO YOUR HEALTH**

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.



1. Keep your head out of the fumes. Do not breathe fumes.
2. If indoors, ventilate the area and/or exhaust welding fumes and gases from the arc.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheet (MSDS) and the manufacturer's instructions for metals, consumables, coatings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air, causing injury or death. Be sure the breathing air is safe.
6. Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
7. Do not weld on coated metals (such as galvanized, lead, or cadmium plated steel) unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coating and any metals containing these elements can give off toxic fumes if welded.

**FLYING SPARKS AND HOT METAL CAN
CAUSE INJURY**

Chipping and grinding cause flying metal. As welds cool, they can throw slag.



1. Wear approved face shields or safety goggles. Side shields are recommended.
2. Wear proper body protection to protect skin.

WELDING CAN CAUSE FIRE OR EXPLOSION

Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, weld spatter, hot work piece, and hot equipment can cause fires and burns. Accidental contact of electrode or welding wire to metal objects can cause sparks, overheating, or fire.



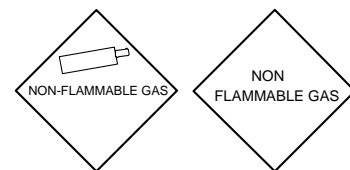
1. Protect yourself and others from flying sparks and hot metals.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within a minimum of 35 ft. (10.7m) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Welding sealed containers such as tanks or drums is very dangerous. Expanding gases within the container can cause explosions.
8. Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
9. Remove stick electrode from holder or cut off welding wire contact tip when not in use.
10. Wear oil-free protective garments such as leather gloves, heavy shirt, cuff-less trousers, high shoes, and a cap.

CYLINDERS CAN EXPLODE IF DAMAGED

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.



1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.
4. Never allow a welding electrode to touch any cylinder.
5. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
6. Turn face away from valve outlet when opening cylinder valve.
7. Keep protective cap in place over valve except when cylinders are in use or connected for use.
8. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.
9. Near the top of the tank each cylinder has a label, which identifies its contents by name, and a brief symbol, which identifies safety concerns.



It is very important to read and understand all the Material Safety Data Sheets (MSDS) for all substances you work with and around. This is your responsibility!

MOVING PARTS CAN CAUSE INJURY

Moving parts, such as fans, rotors, and belts can cut fingers and hands or catch loose clothing.



1. Keep all doors, panels, covers, and guards closed and secured in place.
2. Have only qualified people remove guards or covers for necessary maintenance and troubleshooting.
3. To prevent accidental starting during servicing, shutdown the entire system, which includes turning off the power supply.
4. Keep hands, hair, loose clothing, and tools away from moving parts.
5. Reinstall panels or guards and close doors when servicing is finished and before starting equipment.

HOT PARTS CAN CAUSE SEVERE BURNS

Avoid any contact with all *HOT* materials and substances.



1. Allow a cooling period before handling, moving, or servicing.
2. Use approved techniques, tools, and safety clothing (gloves, shields, shoes, eye protection, etc.).

STEAM AND PRESSURIZED HOT COOLANT CAN BURN FACE, EYES, AND SKIN

The coolant in the radiators and pressurized hoses is under pressure and can be very hot.

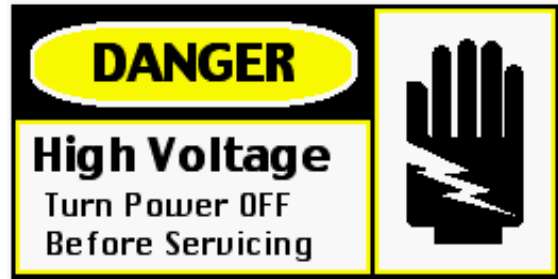


1. Wear gloves and put a rag over cap area when accessing system.
2. Allow pressure to escape before completely opening system.
3. Treat all hoses, hot or cold, with caution. Pressure can cause injury.

ELECTRICAL SHOCK CAN KILL

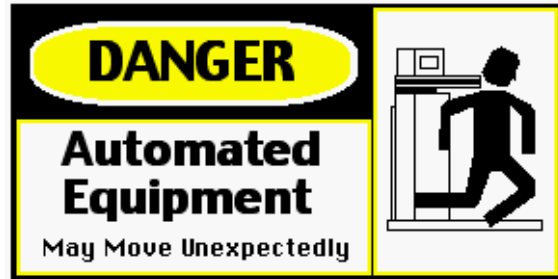
220 VOLTS

This identification label is used to call attention to immediate or imminent conditions, which if not avoided, will result in serious injury or death. Have only QUALIFIED personnel install, operate, repair, or perform any maintenance on this equipment.



AUTOMATED AND ROBOTIC EQUIPMENT MAY MOVE UNEXPECTEDLY AND CAUSE SERIOUS INJURY OR DEATH AT ANY TIME

Observe all perimeter boundaries for all automated equipment at all times.



1. Keep all guards, doors, covers, panels, and shields securely attached at all times.
2. Stop entire system when performing any maintenance, repair, installation, or inspections.
3. Observe all Safety Lines and Limits at all times.
4. Wear appropriate safety gear when operating any function of this equipment.
5. If a malfunction occurs:
 - A. Shut down the entire system.
 - B. Contact the system manager immediately.
6. If the standard system motion becomes obstructed, DO NOT ATTEMPT to clear the obstruction yourself. Follow procedures described in #5.

Failure to follow all safety guidelines can cause serious injury or death and may damage the system.

Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3

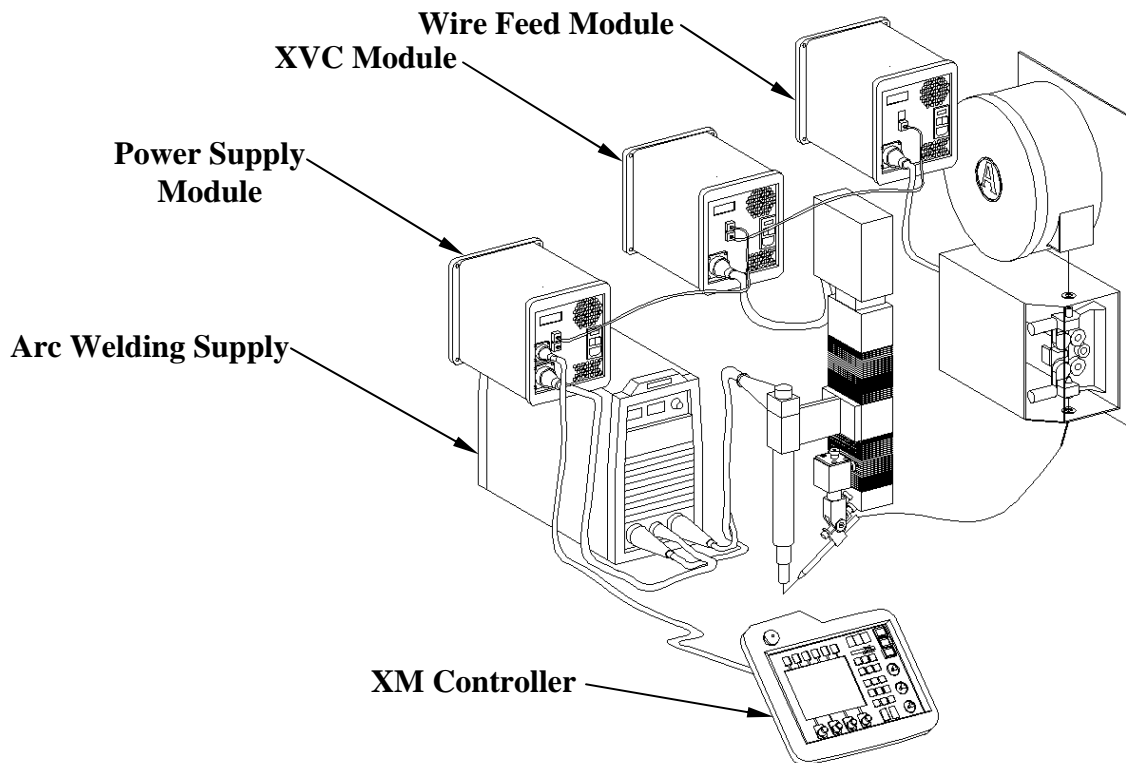
Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018

Cutting and Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch, Quincy, MA 02269

3 Basic Components

The illustration below shows a basic XM system. The modules are connected together in a manner that allows the XM Controller to identify and control each module contained within a system.

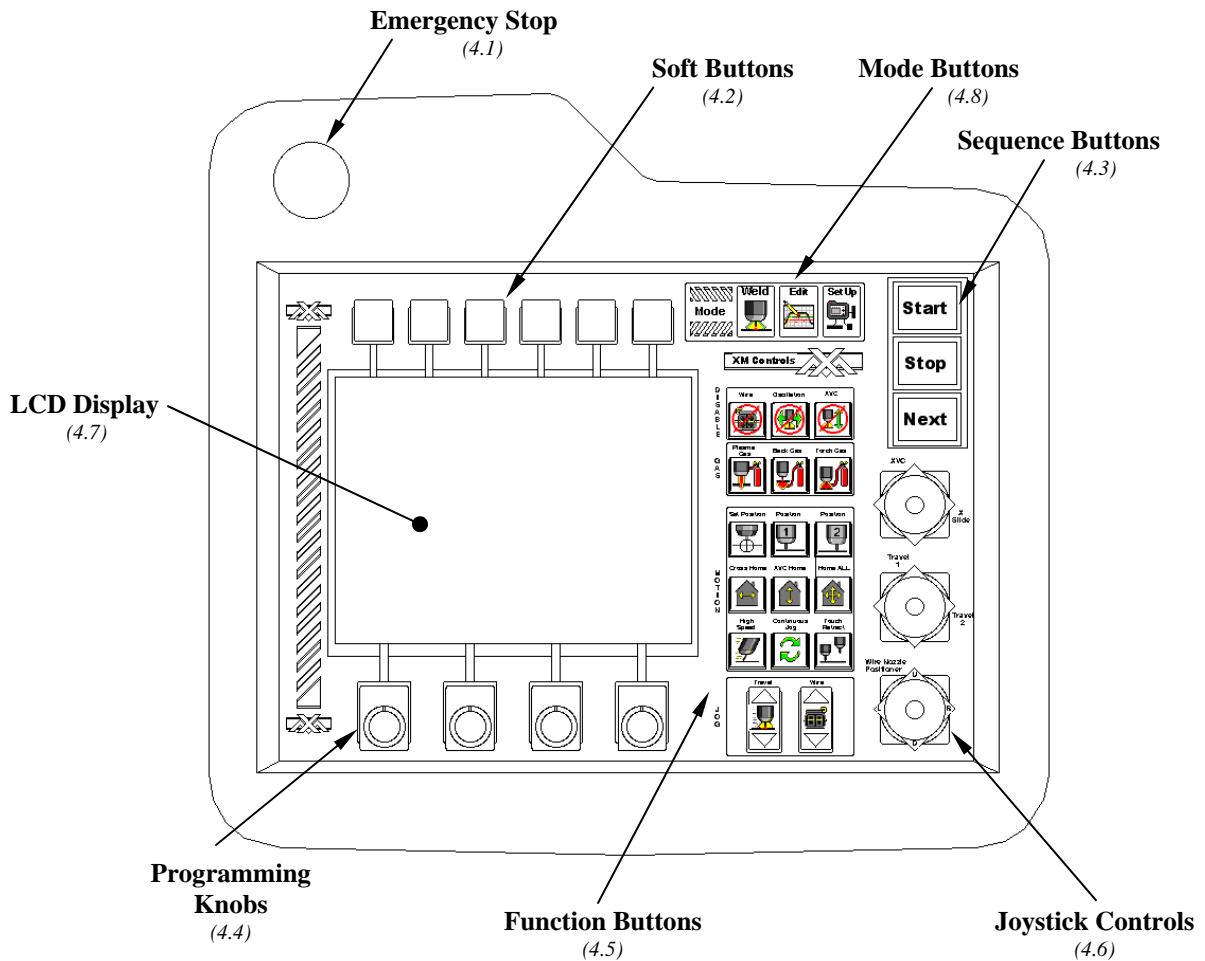
An XM system must include at least two components: an XM Controller and a Power Supply Module. With these two components installed, automated welding can proceed. With each additional module, the XM Controller immediately recognizes the module and enables the module's functions for programming. An example is the XVC Module and Wire Feed Module system illustrated below.



3.1 XM Modules

- XPS - Power - Power Supply Controller
- XVC – Automatic Voltage Controller (AVC)
- XWF - Feeder - Wire Feed Controller (2 and 4 roll versions)
- XLA - Motion - Linear Motion Controller
- XOSC – Positioning and Mechanical Oscillation Controller
- XRA - Rotary - Rotary Motion Controller
- X – AMP – Motor Drive Amplifier
- X - 200 HW – Precision Hot Wire Power Supply
- X – TR – Turning Roll

4 Controller Components



4.1 Emergency Stop

The **Emergency Stop** button immediately stops weld current output from the power supply and all servo-controlled motion. The system remains inactive until an operator pulls out the **Emergency Stop** button and pushes the CLEAR E-STOP Soft Button.



Caution:

The **Emergency Stop** button should be used to avoid damaging the system or to avoid injuries. It is not intended as a common procedure for stopping the system.

4.2 Soft Buttons

Each **Soft Button** has a corresponding label on the LCD screen. Based on the selected Mode (WELD, EDIT, OR SETUP), the function of the Soft Buttons will change.

4.3 Sequence Buttons

The **Sequence** buttons (**Start**, **Stop**, and **Next**) are used with the weld program. The **Start** button activates the current weld program. The **Stop** button terminates any running process or operation. If depressed during a weld program, the **Stop** button will either end the current weld segment and immediately go to the Down Slope segment or terminate the program if already in the Down Slope segment. The **Next** button's function depends on the weld program settings and must be depressed to advance to the next programmed event. The **Next** button illuminates when it can be used to advance a sequence in the program.

4.4 Programming Knobs

Programming Knobs - Override weld program parameters in WELD mode. In EDIT and SETUP Mode, the knobs navigate through the screen and adjust the settings. By rotating a knob clockwise or counter-clockwise, the operator can scroll through the display to reach a desired item and then increase or decrease a value. Each knob also acts as a push button by pressing down on the knob, which allows the operator to select different parameters depending on the current Mode.

4.5 Function Buttons

4.5.1 Disable Buttons

DISABLE Buttons - Illuminate when active and stop the associated function. Pushing the illuminated button again re-enables the function and turns off the light.



From the WELD Mode, the NO WELD activation will automatically activate WIRE DISABLE and AVC DISABLE.



Wire Disable - Stops the wire feed from advancing regardless of the programmed feed rate. If wire is feeding when this button is activated, a programmed wire retract is performed.



Oscillation Disable - Suspends the programmed oscillation until the button is deactivated. The Oscillation axis will return to the center (zero) point of the programmed amplitude.



AVC Disable - Suspends AVC Control and allows the joystick to control torch height.

4.5.2 Gas Buttons

GAS Buttons - Illuminates when active and manually controls on/off functions of the gas solenoids. Gas will flow at the default rate.



Plasma Gas - Activates the plasma gas at the default flow rate. Plasma Gas will flow at this rate until the button is deactivated.

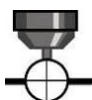


Back Gas - Activates the back gas at the default flow rate. Backing Gas will flow at this rate until the button is deactivated.

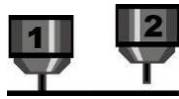


Torch Gas - Activates the torch gas at the default flow rate. Torch Gas will flow at this rate until the button is deactivated or until the end of the weld program.

4.5.3 Motion Buttons



Set Position - When this button is pressed, the POSITION 1 and POSITION 2 buttons are made ready for programming. To program, position torch where desired, press SET POSITION, and then press the POSITION 1 or POSITION 2 buttons. The current position will be saved to the corresponding button.



Position 1 and Position 2 - Moves the torch to a previously saved position (See “*Set Position*” above). All motion axis involved in torch positioning will be affected.



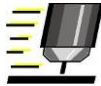
Cross Home - Moves the *Cross Slide* to the physical home switch and zeros the position readout.



XVC Home - Moves the *XVC Slide* to the physical home switch and zeros the position.



Home All - Moves all slides (or rotation devices) with *Home* capabilities to their physical home switches and zeros the position readout.



High Speed - Changes the jog speed of all motion axes that are controlled by joysticks.



Continuous Jog - Illuminates when active and is used in conjunction with the *Jog* buttons (see 4.5.4). With the CONTINUOUS JOG activated, the TRAVEL JOG or WIRE JOG buttons, once pressed, will operate continuously at the programmed rate until canceled. To cancel the CONTINUOUS JOG mode, either press the **Stop** button or deactivate the CONTINUOUS JOG button and then press the TRAVEL JOG or WIRE JOG button that was used to start the continuous jog function.



Touch Retract - Retracts the torch a specific distance from the weld piece. **Touch Retract** parameters (enable/disable and retract distance) are controlled by the weld program.

4.5.4 Jog Buttons



Travel Jog - Incrementally moves or rotates an axis in a positive or negative direction (see section 4.8.3.3 for programming).



Wire Jog - Incrementally jogs the wire feed to advance or retract the weld wire (see section 4.8.3.3 for programming).

4.6 Joystick Controls

The **Joystick Controls** are programmable (see section 4.8.3.3).

Each **Joystick** is divided into two axis of motion: a white axis and a yellow axis with corresponding labels. Each axis has programmable parameters (*Command / High Speed / Low Speed*) and can be programmed to any axis.

<i>Joystick</i>	<i>Yellow Axis</i>	<i>White Axis</i>
Top Joystick	XVC	X Slide
Middle Joystick	Travel 1	Travel 2
Bottom Joystick	Up/Down	Left/Right

4.7 LCD Display

The **LCD Display** presents the graphical interface screens required for the different Modes. The WELD, EDIT, and SETUP Modes and their program screens are described in detail in section 4.8 *Mode of Operation Select*.

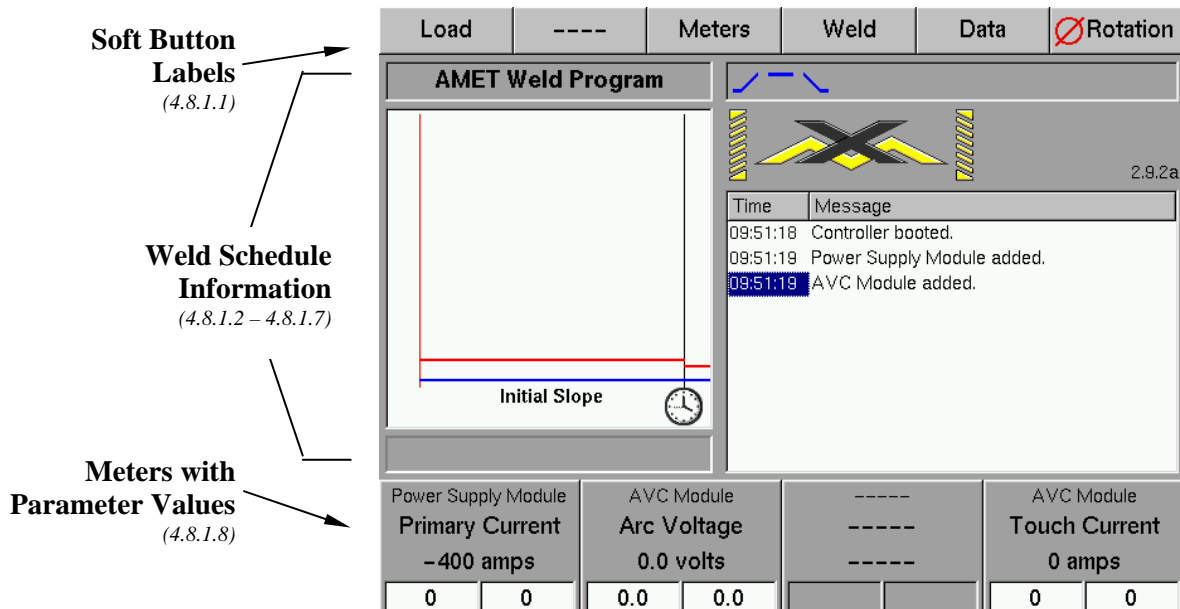
4.8 Mode Of Operation Select

4.8.1 Weld Mode



To access WELD Mode, press the WELD Mode button represented by the icon above.

The *Weld* screen is divided into three main sections. The top section contains the Soft Button labels. The center section contains weld schedule graphical information and a text message area. The bottom section displays the program *Meters*. Each *Meter* will display weld program parameter information and parameter override data.



4.8.1.1 Weld Mode Screen

The **Weld Mode Screen** consists of the following sections:

4.8.1.1.1 Weld Schedule File Name

Weld Schedule File Name - Displays the loaded weld program ready to run. In this example, the name of the current weld schedule is “AMET Weld Program.”

4.8.1.1.2 Weld Graphic Display

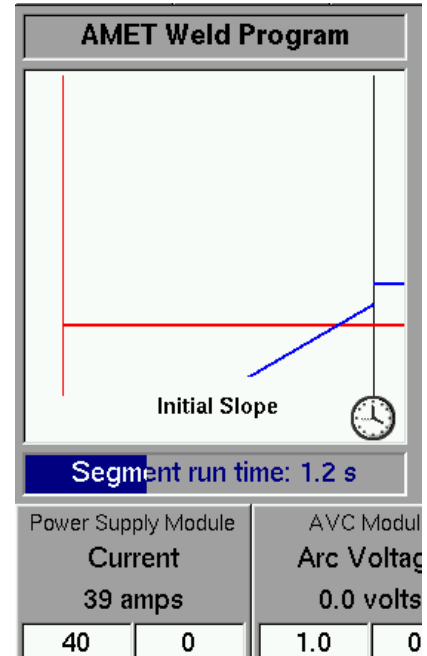
Weld Graphic Display - Displays each weld parameter for each weld program segment. While executing the weld program, the display advances as each segment completes.

4.8.1.1.3 Segment Status

Segment Status - Alphanumerically displays the segment status. It displays both the segment condition (“Segment run time”) and the segment’s current progress (“1.2 s”). The *Segment Status* subdivision also illustrates progress with a progressive task bar, which changes color as it advances.

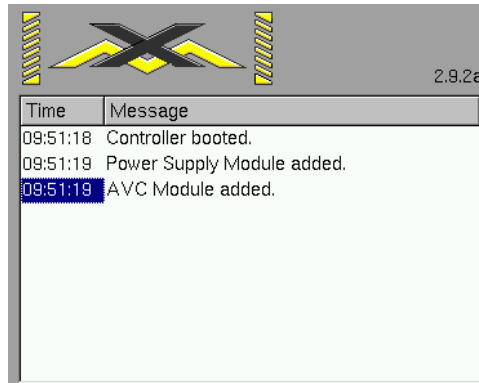
4.8.1.1.4 Segment Sequence

Segment Sequence - Indicates the segment being performed. The current segment has a highlighted red box and completed segments have a distinctive darkened background. A weld schedule must contain at least three weld segments: The Initial Slope, a Weld Segment and a Final Slope. Additional Weld Segments can be added or deleted in the EDIT mode.



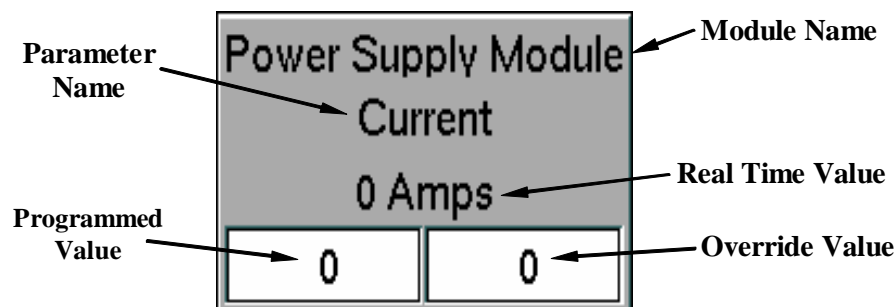
4.8.1.1.5 System Messages

System Messages – Displays error and status messages. Messages are not stored and cannot be replaced.



4.8.1.1.6 Meters

Meters - Displays four (4) parameter meters at one time. Each meter can display the following: Module name, parameter name, Real time value of the parameter and the unit of measure, Programmed parameter value, +/- Override value (operator input).



To override a parameter value, turn the associated Knob to reach the desired value. To view the next available parameter for that module, press the Knob.



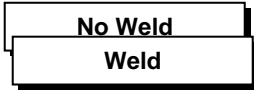
Tip:

The *Meters* Soft Button toggles the meters between the 4 primary and 4 auxiliary meters. See Section 4.8.3.2 for *Meter* assignments.

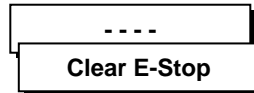
4.8.1.1.7 Soft Buttons



Load - Selects a previously created weld program from the *File Manager* screen. In this illustration, the name of the current weld schedule is "AMET Weld Program."



Weld / No Weld - In the WELD state, the weld schedule performs as programmed. In the NO WELD state, the weld schedule proceeds without weld current and disables the WIRE FEED and AVC. All other remaining weld parameters are still active.



Clear E-Stop - Only displayed when the Emergency Stop button has been activated. To clear an E-STOP condition, pull the Emergency Stop button out (non-active position) and press the CLEAR E-STOP Soft Button.



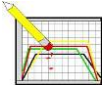
Meter - Toggles the Meters between the 4 primary and 4 auxiliary meters. See Section 4.8.1.1 6.for meter assignments.



Tip:

The two far right Soft Buttons are reserved for special applications and may not be available on your system.

4.8.2 Edit Mode



To access EDIT Mode, press the EDIT Mode button represented by the icon above.



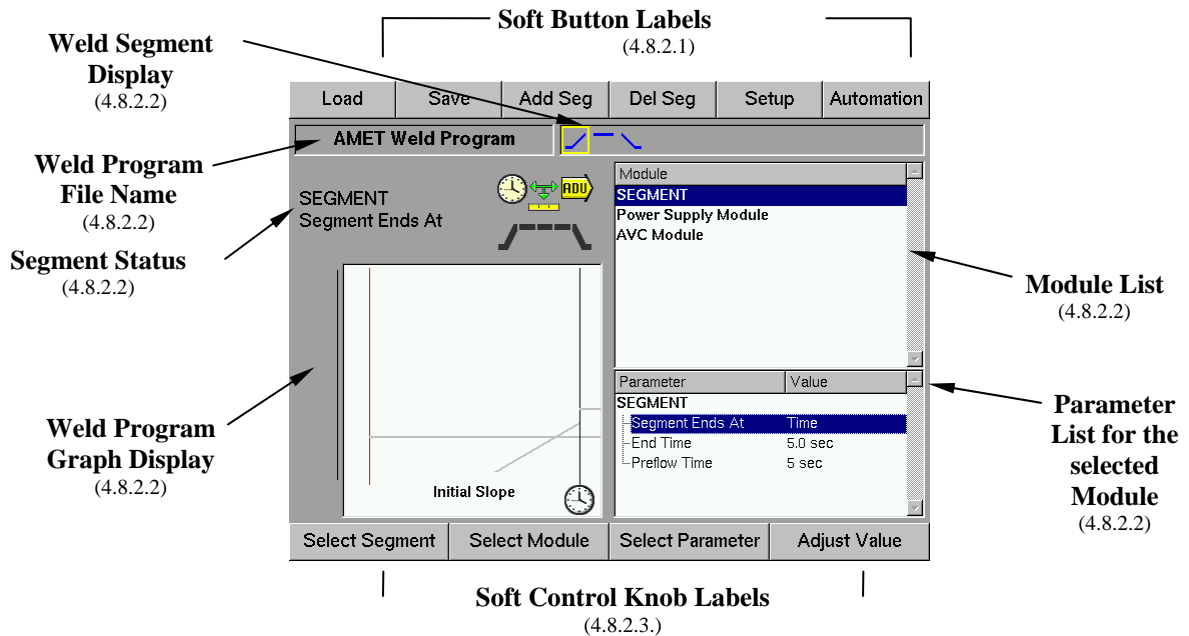
Tip:

All input or changes made from the *Edit* screen will only affect the weld program currently loaded and displayed in the *Weld Schedule File Name* location. Changes are not permanent until a file *Save* is performed.

From the *Edit* screen, an operator can create or edit weld programs (schedules), set up program OVERRIDE LIMITS, define DATA ACQUISITION parameters (license activation required), and set up pre- and post-weld AUTOMATION (license activation required).

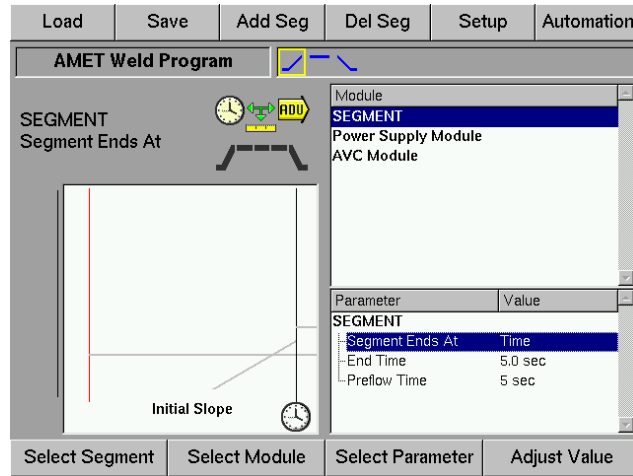
A weld schedule consists of these 5 stages: Pre-Flow, Initial Slope, Weld Segments (minimum of 1), Down Slope, and Post-Flow.

The EDIT mode defines each weld schedule segment and each module's function during the segment. The *Edit* screen is divided into information sections as shown in the following illustration.



4.8.2.1 Edit Mode Screen

The **Edit Mode Screen** contains the following:



4.8.2.1.1 Weld Program File Name

The **Weld Program File Name**. Displays the loaded weld program ready to run. In this example, the name of the current weld schedule is “AMET Weld Program.”



4.8.2.1.2 Weld Segment Display

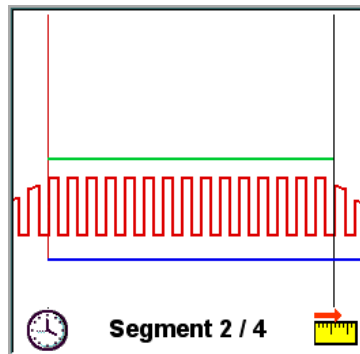
The **Weld Segment Display** subdivision graphically displays each weld segment. A yellow box highlights the created or selected segment that is currently ready for programming.



4.8.2.1.3 Weld Program Graph Display

The **Weld Program Graph Display** section displays the programmed weld parameters for each segment. The illustration below depicts what a segment program may look like. The lower section identifies the segment number followed by the total number of segments. On the left is an icon for the previous segment. On the right is an icon for active segment.


In this example, the clock icon indicates that the previous segment is *Time* based. The ruler icon with an arrow indicates the active segment is a *Position* based segment.



4.8.2.1.4 Module List

The **Module List** posts all the currently installed Modules available for programming. Navigate the *Module List* with the SELECT MODULE Knob.

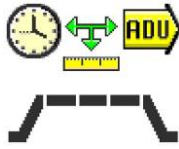
The *Module List* displays the word “SEGMENT”, which is used to program how the segment will end. The different programming options for “segment” are defined in 4.8.2.1.5.

	Tip:	Editing for the Initial Slope and Final Slope segments includes the Pre-Flow and Post-Flow timing, respectively.
---	-------------	--

4.8.2.1.5 Parameter List

The **Parameter List** will display the programmable parameters of a module selected from the *Module List*. Some parameters will have a sub-list containing the programmable elements for that parameter, a value and/or options, which can be adjusted depending on the result desired. The module specific parameter lists are listed in Appendix 1. Below is the parameter list for “Segment” options in the module list.

SEGMENT PARAMETERS



Segment Ends At - Segment termination has three options: *Time*, *Position*, *Absolute Position*, *Digital Input*, and *Advance* (pressing the **Advance** button). After defining a segment, the available parameters can be programmed for that segment.



Time Based Segments - End after a specified time in seconds.



Position Based Segments - End when a given position is reached. The position can be in inches (linear) or degrees (rotation) depending on which axis is selected for the end axis.



Tip:

Pressing the **Next** button may also terminate position segments.



Advance Based Segments - Continue indefinitely until the *Next* button is -pressed.

4.8.2.1.6 *Programming Knobs (Edit Mode)*

Soft Control Knobs scroll through lists and/or change values.

Knob

Function

Select Segment

Select Segment - navigates the segments. The *Weld Segment Display* shows a yellow box to indicate the selected segment's position within the weld schedule.

Select Module

Select Module - Navigates the module list.

Select Parameter

Select Parameter - Navigates the parameter list.

Adjust Value

Adjust Value - Changes parameter values with the speed sensitive dial.

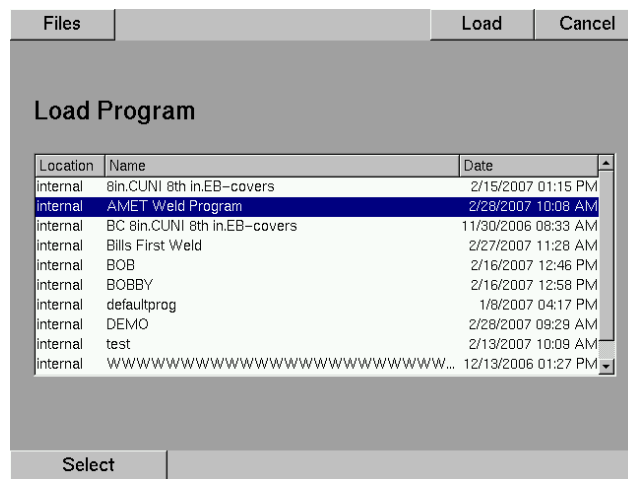
4.8.2.1.7 Soft Buttons



4.8.2.1.7.1 Load Button



Load - Displays the *Load Program* screen. This screen allows the operator to select a previously created weld program. The *Location*, *Name*, and *Date* of saved programs are listed in this window. Rotate the SELECT Knob to highlight a weld program. Then press the LOAD Button, or push the SELECT Knob.



4.8.2.1.7.2 Save Button



Save - Displays the *Save Program* screen, enabling the user to save an existing program or create an alphanumeric name for the newly created program. Below are the steps to save a weld program, “AMET Weld Program.”

Step 1: Open the *Save* screen by pushing the SAVE Button.

Step 2: Press the CANCEL Button to exit without saving.

Step 3: Either create a new file or overwrite an existing file. To create a new file, highlight the *<new file>* option with the SELECT Knob. To overwrite an existing file, select a previously saved program with the SELECT Knob and press the SAVE Button.

Step 4: Rename the file with the following Knobs:

Delete Char

Deletes a character. Rotating the knob left or right will delete characters.


Insert Char

Inserts a character. Scrolls cursor left or right in the Name Window.


Select Char

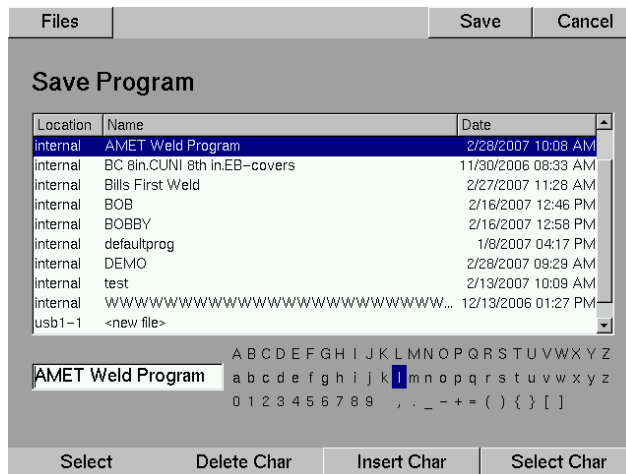
Selects a character. Scrolls the cursor through the alphanumeric character list. Depress the knob to select.

Step 5: Once the new file is properly named, press the SAVE button.

 **Tip:** Renaming a previously saved program with a different name will create a new file.

Step 6: Press the FILES Button to enter the *Manage Files* Screen. In the *Manage Files* screen, the operator can move, copy, and delete files on the internal or USB memory.

 **Tip:** When editing a weld program with the XM Controller, changes are automatically saved to the controller upon exiting EDIT Mode. You do not have to push the SAVE Button to activate changes. However, it is recommended you save a created program to verify a proper save function has been completed.



4.8.2.1.7.3 Add Segment Button



Add Segment - Inserts a new segment before the active (selected) segment. With the SELECT SEGMENT Knob, place the yellow highlight box over the *Segment* icon or *Final Slope* icon. Press the ADD SEG button to add.

4.8.2.1.7.4 Delete Segment Button



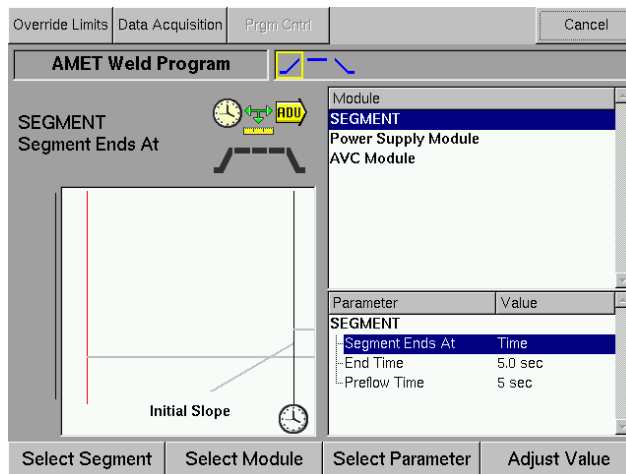
Delete Segment - Deletes the highlighted segment.

4.8.2.1.7.5 Set Up Button



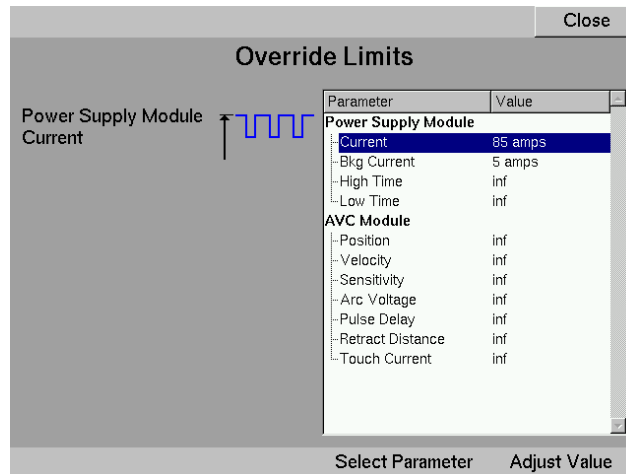
Set Up - Displays a sub-menu screen. This screen displays OVERRIDE LIMITS and DATA ACQUISITION Soft Buttons. Weld program editing can be done from this screen also.

4.8.2.1.7.5.1 Set Up: Override Limits Button



Override Limits

Override Limits - Displays the *Override Limits* screen. This screen allows the programmer to set limits for each selected module parameter. In the illustration, the “Power Supply Module” has been selected. The display parameter list contains all override parameters for that module and their values.



Note:

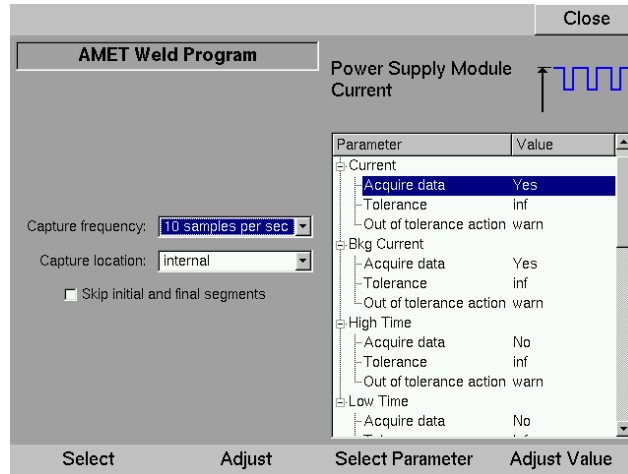
Each parameter value is set to the default “inf” or infinite. This means no *Override Limit* is set and the operator has the full range of override capabilities for that weld schedule.

The SELECT PARAMETER Knob scrolls through the parameter list. The ADJUST VALUE Knob defines the parameter limit. When finished, press the CLOSE Soft Button to return to the *Set Up* Screen. The values are automatically saved.

4.8.2.1.7.5.2 Set Up: Data Acquisition Button (License Activated)

Data Acquisition

Data Acquisition - A License Activated option. This screen allows the programmer to set data collection criteria for each module parameter. During the weld schedule, data is gathered and saved to the controller memory.



Data Acquisition Options

Description

- Capture Frequency** Determines how often data is acquired and saved to memory.
- Capture Location** Determines where the acquired data is saved. Can be saved to Internal or USB.
- Skip Initial and Final Segments** Check the box to skip data acquisition for the initial and final segments.

Data Acquisition Parameters

Description

Acquire Data

Determines whether the memory captures data for that parameter.

Tolerance

Sets the minimum and maximum values for the selected parameter that gives a plus-or-minus tolerance for the established setting.

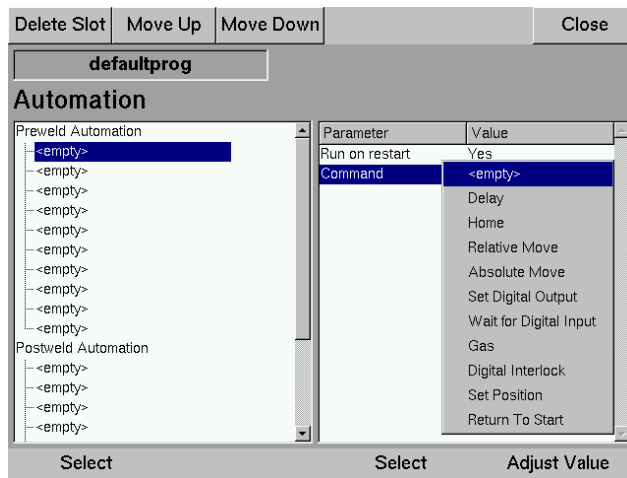
Out of tolerance action

When the acquired data exceeds the tolerance level, this option tells the weld program to stop the module or warn the user.

4.8.2.1.7.6 Automation Button (License Activated)





Automation

Automation - A License Activated option. This screen allows the programmer to create automated sequences of Pre-weld and Post-weld events.



4.8.2.1.7.6.1 Left Hand Window

The left-hand window shows the sequence of Preweld and Postweld automation events. The system will adhere to this list of directions before and after a weld. Select a slot with the furthestmost left SELECT Knob. You can delete or move a slot position with the following Soft Buttons:

<i>Soft Buttons</i>	<i>Function</i>
	Delete Slot – Deletes the selected automation command in the sequence.
	Move Up – Moves the selected automation command down one spot in the sequence.
	Move down - Moves the selected automation command down one spot in the sequence.
	Close – Returns to Edit Mode.

4.8.2.1.7.6.2 Right Hand Window

The right-hand window shows the available commands with respective parameters. To select a command to place in the Automation sequence, rotate or push the ADJUST VALUE Knob.

Select the desired command by rotating the ADJUST VALUE Knob. Select a programmable parameter with the SELECT Knob and program the parameter with the ADJUST VALUE Knob.

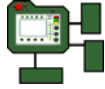
4.8.2.1.7.6.3 Automation Function Table


<i>Automation Option</i>	<i>Sub Options</i>	<i>Function</i>
Delay	Allow Advance	If “Yes” is selected this allows the operator to press the “Next” button and it will skip over this step in the Automation Sequence.
	Wait for Operator	Waits for the Operator to press the “Next” button.
	Time	Delays for a specific amount of time.
Home	Allow Advance	If selected this allows the operator to press the “Next” button and it will skip over this step in the Automation Sequence.
	Module Select	If “Yes” is selected next to a specific module then that axis will home when this step is run in the Automation Sequence.
Relative Move	Allow Advance	If selected this allows the operator to press the “Next” button and it will skip over this step in the Automation Sequence.
	Time for Move	Sets the time that is allotted for the Relative Move in the Automation Sequence. The system will automatically set the acceleration and velocity for each axis depending on the amount of time that is set and the distance that a specific axis must travel during the Relative Move step in the Automation Sequence.
	Set Axis Lengths	Sets the length that a specific axis will travel during this Relative Move step in the Automation Sequence. A Relative move is a distance from the axis current location.
Absolute Move	Allow Advance	If selected this allows the operator to press the “Next” button and it will skip over this step in the Automation Sequence.
	Time for Move	Sets the time that is allotted for the Absolute Move in the Automation Sequence. The system will automatically set the acceleration and velocity for each axis depending on the amount of time that is set and the distance that a specific axis must travel during the Absolute Move step in the Automation Sequence.
	Module Position/Enable Select	If “Enabled” is set to “No” then that specific axis will not move during this step of the Automation Sequence. If the “Enabled” is set to “Yes” then the axis will perform an Absolute Move (from zero position) based on the “Position” value that is set.
Set Digital Output	Digital Selection	Allows the operator to select a specific Digital Output to perform a function on and then select one of the following functions: “Ignore” performs no action with a specific Digital Output. “Set” turns on a specific Digital Output. “Clear” turns off a specific Digital Output.
Wait for Digital Input	Allow Advance	If selected this allows the operator to press the “Next” button and it will skip over this step in the Automation Sequence.
	Digital Selection	Allows the operator to select a specific Digital Input to and then select one of the following functions for that Digital Input: “Ignore” performs no action with a specific Digital Input. “Set” waits for the Digital Input to be set. “Clear” waits for the Digital Input to be cleared.
Gas	Gas Selection	Allows the Operator to select a specific Gas Output and

<i>Automation Option</i>	<i>Sub Options</i>	<i>Function</i>
		then perform one of the following functions: "Ignore" performs no action with a specific Gas Output. "Set" turns on a specific Gas Output. "Clear" turns off a specific Gas Output.
Touch Retract	Allow Advance	If selected this allows the operator to press the "Next" button and it will skip over this step in the Automation Sequence.
	Module Selection	If set to "No" then no Touch Retract function is performed on that specific module. If set to "Yes" then a Touch Retract is performed on that specific module.
Torch Probe	Probe Module	Allows the Operator to select the AVC Module that will be used to sense the voltage for the "Torch Probe"
	Axis 1	Allows the operator to select which axis will move in order to perform the "Touch Retract".
	Velocity 1	Sets the speed which the selected "Axis" will move at in order to perform the "Touch Retract".
	Axis 2	Allows the operator to select which axis will move in order to perform the "Touch Retract".
	Velocity 2	Sets the speed which the selected "Axis" will move at in order to perform the "Touch Retract".
Digital Interlock	Mode	If set to "Check" the Digital Interlock function will only look for Input 1 and 2 to be satisfied momentarily. If set to "Continuous" the Digital Interlock function will be active throughout the entire weld program and will require both Input 1 and 2 to be satisfied throughout this period. If set to "Disable" it will ignore the Digital Interlock function.
	Input 1	Sets the first digital input to monitor for the Digital Interlock function.
	Input 2	Sets the second digital input to monitor for the Digital Interlock function.
Call PLC Function	Allow Advance	If selected this allows the operator to press the "Next" button and it will skip over this step in the Automation Sequence.
	Function	Allow the operator to select a PLC Program that will begin to run at this point in the automation sequence. This is a license activated option and the PLC program is a factory created program that is system specific.
Find Edge	Module	Allows the operator to select the SeamTracker module.
	Scan Axis	Sets the axis that will move in order to perform the scan.
	Velocity	Sets the velocity that the scan axis will move during the scan.
	Span	Sets the distance that the scan axis will move to find and edge. If the edge is not found during this span then a fault will occur.
	Threshold	Sets the voltage threshold that dictates the voltage variance that is required to sense and edge.
Find Center	Module	Allows the operator to select the SeamTracker module.
	Velocity	Sets the velocity that the SeamTracker module will move during the scan.
	Span	Sets the distance that the scan axis will move to find and edge. If the edge is not found during this span then a fault

<i>Automation Option</i>	<i>Sub Options</i>	<i>Function</i>
		will occur.
	Threshold	Sets the voltage threshold that dictates the voltage variance that is required to sense the center of a seam.
Set Position	Enabled	If set to "No" no position will be set for a specific axis. If set to "Yes" then the position meter will be set to the value that is input into the "Position" parameter.
	Position	This value will be placed into the position meter for a specific axis as long as the "Enabled" parameter is set to "Yes".
Return To Start	Enable	Enables a specific module and once the program is complete this function will return the selected axis to their weld start position.
Torch Probe Center	Probe Module	Allows the Operator to select the AVC Module that will be used to sense the voltage for the "Torch Probe"
	Axis	Allows the operator to select which axis will move in order to perform the "Touch Retract". This function will probe in two directions and then find the center of the seam based on these probes.
	Velocity	Sets the speed which the selected "Axis" will move at in order to perform the "Touch Retract".

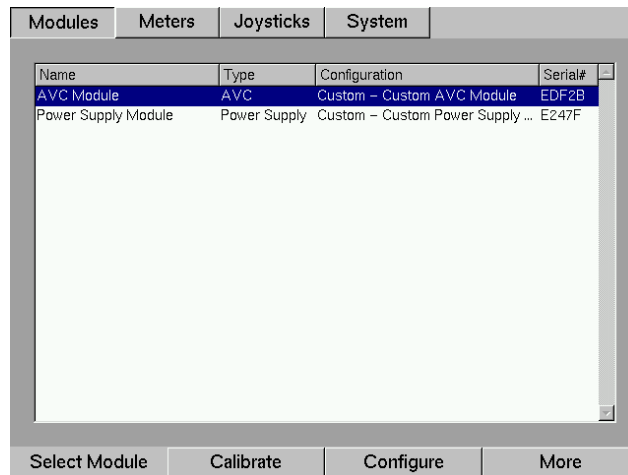
4.8.3 Set Up Mode



 **Note:** SETUP Mode is viewed as a maintenance procedure. Therefore, detailed information is located in the XM System Maintenance Manual.

To access SETUP Mode, press the SETUP button represented by the icon above.

SETUP Mode displays four system *Set Up* options: MODULES, METERS, JOYSTICKS, and SYSTEM. Press a Soft Button to access one of the four screens with its available Knob functions.



4.8.3.1 Set Up: Modules

The **Modules** screen has four sub-functions: SELECT MODULE, CALIBRATE, CONFIGURE, and MORE. The CALIBRATE and CONFIGURE Knobs will not function until a module is selected in the scrolling pane.

4.8.3.1.1 Select Module

The SELECT MODULE Knob selects a module from the available modules list. Rotate the Knob to scroll up or down. The selected module is highlighted.

4.8.3.2 More: Files







Selecting the FILES option will access the *Manage Files* screen. This allows an operator to locate and select a single file, multiple files, or all files stored on the XM Controller. Files can then be uploaded to or downloaded from an external source thru a USB connection located under the cover on the right side of the XM Controller.

Show All	Rename	Delete	Move	Copy	Close																																	
Manage Files																																						
internal:																																						
<table border="1"><thead><tr><th>Name</th><th>Type</th><th>Date</th></tr></thead><tbody><tr><td>8in.CUNI 8th in.EB-cov...</td><td>Program</td><td>2/15/2007 01:15 PM</td></tr><tr><td>AMET Weld Program</td><td>Program</td><td>2/28/2007 10:17 AM</td></tr><tr><td>BC 8in.CUNI 8th in.EB-...</td><td>Program</td><td>11/30/2006 08:33 AM</td></tr><tr><td>Bills First Weld</td><td>Program</td><td>2/27/2007 11:28 AM</td></tr><tr><td>BOB</td><td>Program</td><td>2/16/2007 12:46 PM</td></tr><tr><td>BOBBY</td><td>Program</td><td>2/16/2007 12:58 PM</td></tr><tr><td>defaultprog</td><td>Program</td><td>1/8/2007 04:17 PM</td></tr><tr><td>DEMO</td><td>Program</td><td>2/28/2007 09:29 AM</td></tr><tr><td>test</td><td>Program</td><td>2/13/2007 10:09 AM</td></tr><tr><td>XXXXXXXXXXXXXX...</td><td>Program</td><td>12/13/2006 01:27 PM</td></tr></tbody></table>						Name	Type	Date	8in.CUNI 8th in.EB-cov...	Program	2/15/2007 01:15 PM	AMET Weld Program	Program	2/28/2007 10:17 AM	BC 8in.CUNI 8th in.EB-...	Program	11/30/2006 08:33 AM	Bills First Weld	Program	2/27/2007 11:28 AM	BOB	Program	2/16/2007 12:46 PM	BOBBY	Program	2/16/2007 12:58 PM	defaultprog	Program	1/8/2007 04:17 PM	DEMO	Program	2/28/2007 09:29 AM	test	Program	2/13/2007 10:09 AM	XXXXXXXXXXXXXX...	Program	12/13/2006 01:27 PM
Name	Type	Date																																				
8in.CUNI 8th in.EB-cov...	Program	2/15/2007 01:15 PM																																				
AMET Weld Program	Program	2/28/2007 10:17 AM																																				
BC 8in.CUNI 8th in.EB-...	Program	11/30/2006 08:33 AM																																				
Bills First Weld	Program	2/27/2007 11:28 AM																																				
BOB	Program	2/16/2007 12:46 PM																																				
BOBBY	Program	2/16/2007 12:58 PM																																				
defaultprog	Program	1/8/2007 04:17 PM																																				
DEMO	Program	2/28/2007 09:29 AM																																				
test	Program	2/13/2007 10:09 AM																																				
XXXXXXXXXXXXXX...	Program	12/13/2006 01:27 PM																																				
			Source: internal	10 MB free																																		
			Destination: usb1-1	7.7 MB free																																		
Select File	Select All	Select Source	Select Dest																																			



AMET strongly recommends a periodic backup (copy) of all files to an external source. This should be done by those individuals with the proper qualifications and training.





4.8.3.2.1.1 Soft Buttons

<i>Soft Buttons</i>	<i>Function</i>
	Show All - Displays all files stored on XM Controller.
	Rename - Displays a screen to <i>Rename</i> a selected file.
	Delete - Permanently deletes the currently selected file.
	Move - Moves or transfers a file from one file location to another
	Copy - Copies the currently selected file to another destination.
	Close - Returns to the main <i>Set Up</i> screen.

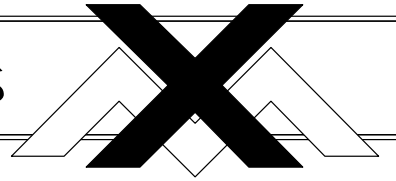
**Tip:**

The COPY/MOVE button will only function when the system detects an external storage device attached to the Controller, as defined in the *Source* and *Destination* fields.

4.8.3.2.1.2 Programming Knobs

<i>Knobs</i>	<i>Function</i>
	Select Files - Scrolls through the file list. Press the Knob to select a file.
	Select All - Selects all the files in the list.
	Source - Displays “internal” unless an external device is attached to usb-1 port.
	Destination - When an external device is attached, toggles between “internal” or “usb-1”.

XM Controls



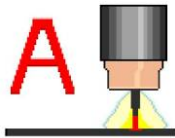
Appendix 1

Parameter Definitions

Advanced Manufacturing Engineering Technologies

Power Supply Module

Parameters

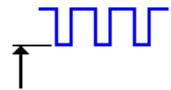


Mode:

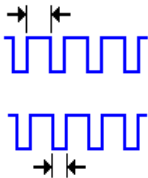
- **Independent** - Allows the power supply settings to operate without input from other modules. Pulsation is specified in terms of *Background Current*, *High Time*, and *Low Time*.
- **Sync to Oscillation** - Synchronizes the power supply with the oscillation settings.
- **No Pulse** - Disables the pulsation settings for that segment and outputs straight current.



Current - Has two programmable elements *Initial* and *Final*.
Note: Operator terminated segments cannot be sloped.



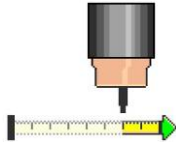
Background Current - Has two programmable elements: *Initial* and *Final*.



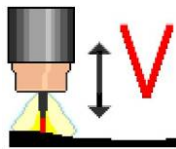
High Time and **Low Time** - Programmed in seconds.

XVC Module

Parameters

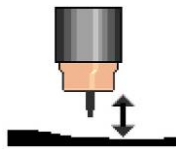


Start Delay - Sets the time (in seconds) from the beginning of the segment until the automatic voltage control begins.

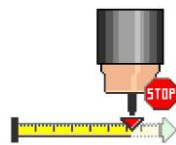


Mode:

- **Continuous AVC** - AVC is always active.
- **Primary Only AVC** - AVC is active on high current pulse only.
- **Background Only AVC** - AVC is active on low current pulse only.
- **Disabled** - AVC is disabled for the segment.



Sensitivity - Controls how the AVC responds to a change in voltage. It can be set from +95 to -95. The number is dimensionless and is typically determined at the factory.

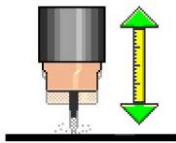


Early Stop - Sets when the AVC turns off (in seconds) before the segment ends.

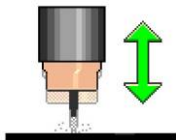
XVC Module-Touch Retract

Parameters

Note: These parameters are only available in the upslope segment.



Distance - Sets the retract distance measured from the tip of the electrode to the contact point on the work piece.



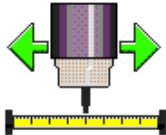
Touch Retract - Touches the work piece and retracts the specified distance to allow HF starts.

Touch Start - Touches the work piece, starts the arc, then retracts the specified distance to start the weld.

Touch Current - Sets the current level during a *Touch Start* operation.

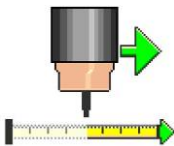
Linear Axis Module

Parameters

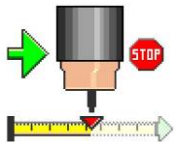


Linear Travel - Programs the linear motion.

Velocity - Sets the velocity for a linear travel move in inches per minute.



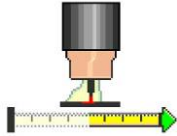
Start Delay - Sets the time (in seconds) from the beginning of the segment until the programmed linear motion begins.



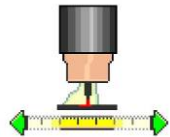
Early Stop - Sets when the linear motion stops (in seconds) before the segment ends.

Oscillation Module

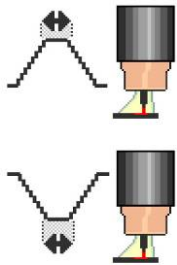
Parameters



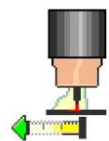
Start Delay - Sets the time (in seconds) from the beginning of the segment until the programmed *Oscillation* will begin.



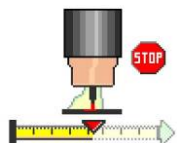
Amplitude - Defines the overall oscillation width (in inches) for the weld segment.



In Dwell and Out Dwell - Sets the time (in seconds) spent on either extreme side of the oscillation.



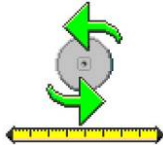
Slew Time - Sets the time (in seconds) to travel from in dwell to out dwell.



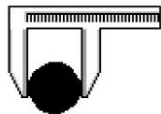
Early Stop - Sets when the oscillation stops (in seconds) before the segment ends.

Rotation Module

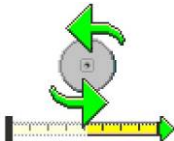
Parameters



Mode - Measures speed in either “rpm” or “ipm.” If “ipm” is selected, *Part Diameter* will show in the parameter list. In either mode, *Initial* value and *Final* value are programmable.

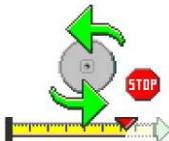


Part Diameter - Specifies the Outside Diameter (OD) of the part. It programs in inches per minute and is only available if the rotation mode is set to in/min in the up slope segment.



Start Delay - Sets the time (in seconds) from the beginning of the segment until the programmed rotation begins.

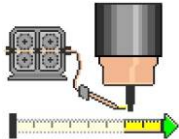
Velocity – Sets the speed at which the rotations will travel.



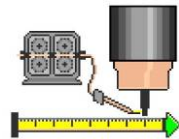
Early Stop - Sets when the rotary motion stops before the segment ends.

Wire Feed Module

Parameters

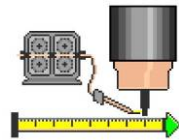


Start Delay - Sets the time (in seconds) from the beginning of the segment until the programmed *Wire Feed* begins.

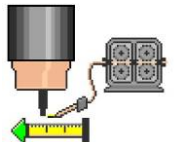


Mode:

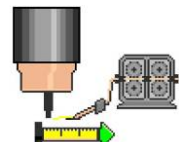
- **Continuous** - Feeds the wire at a continuous rate.
- **Sync to Current** - Synchronizes the wire feed rate to the power supply current.



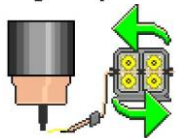
Feed Rate - Has two programmable elements: *Initial* and *Final*. Each is programmed in inches per minute (ipm).



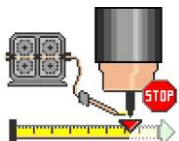
Low Rate - Has two programmable elements: *Initial* and *Final*. Each is programmed in inches per minute (ipm).



Retract Distance - Retracts the wire (in inches) after a weld completes.



Retract Speed - Determines the retraction speed (in inches per minute).



Early Stop - Sets when the wire feed will stop before the segment ends.

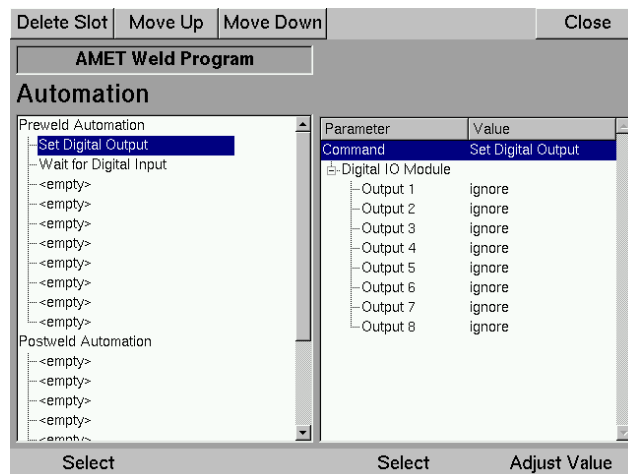
Digital IO Module

Parameters

Settings for the Digital IO Module will appear in Automation. Open the Automation Screen and place *Set Digital Output* or *Wait for Digital Input* in the Preweld and Postweld sequences.

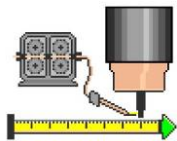
Set Digital Outputs (1 – 8) Wait for Digital Input (1 – 8)

Parameter	Description
Ignore	Ignores digital input/output.
Set	Turns digital input/output on.
Clear	Turns digital input/output off.
Allow Advance	Turn this option to on in order to enable the Next button, which will skip over this specific step in the automation if needed.



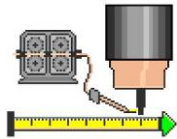
Hotwire Module

Parameters



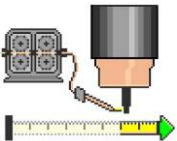
Mode:

- **Enabled** – Enables contactor for output
- **Disabled** – Disables the hotwire contactor.



Voltage:

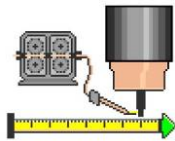
- **Initial Value** – Sets the starting voltage amount.
- **Final Value** – Sets the end voltage amount.



Stop Delay - Sets the time (in seconds) from the beginning of the segment until the programmed *Wire Feed* begins.

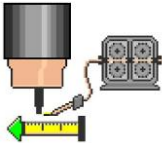
Hotwire Wire Feeder Module

Parameters



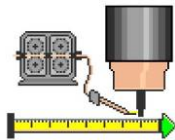
Mode:

- **Enabled** – Enables contactors for output
- **Disabled** – Disables the hotwire contactors.



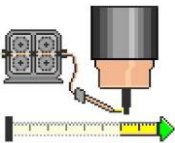
Feed Rate:

- **Initial Value** – Sets the rate (in/min) at which the wire will feed.
- **Final Value** – Sets the rate (in/min) at which the wire will feed.



Voltage:

- **Initial Value** – Sets the starting voltage amount.
- **Final Value** – Sets the end voltage amount.



Stop Delay - Sets the time (in seconds) from the beginning of the segment until the programmed *Wire Feed* begins.

Lincoln Power Supply

Parameters



Mode:

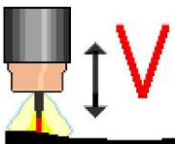
Disabled, CC 60Hz Sine, CC 50Hz Sine, CV DC-, CV DC+, CV Square Wave, CC DC-, CC DC+, CC Square Wave. These modes are configured in the configuration file for the Power Supply Module and are pre-programmed in the Lincoln Power Supply. When you select one of these modes the XM Controller is telling the Lincoln Power Supply which mode to run in.



Wire Runin: sets the Wire Runin in inches per minute. This value is usually lower than the actual welding wire travel speed.



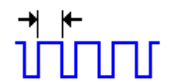
Current: sets the current in amps and is used by the Lincoln Power Supply, along with the Arc Voltage setting, to determine the speed of the wire feeder during welding.



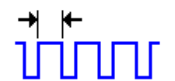
Arc Voltage: sets the arc voltage in volts and is used by the Lincoln Power Supply, along with the Current setting, to determine the speed of the wire feeder during welding.



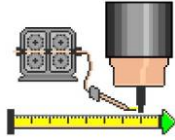
DC Offset: sets the DC offset and is only used during AC welding.



Frequency: sets the frequency in hertz and is only used during AC welding.



Wave Balance: sets the wave balance in percentage and is only used during AC welding. Example: 80% straight, 20% reverse.



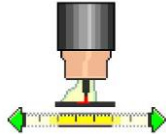
Burnback time: sets the burnback time in seconds. The burnback time is the amount of time that the wire stops feeding before the end of the weld. During the time that the wire is not feeding the current is still flowing from the Lincoln Power Supply therefore burning back the wire.

Phase: only used with multiple Lincoln Power Supplies during AC welding. This function allows you to offset the phases of the AC signals by changing the offset in degrees.

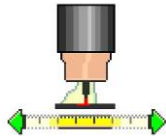
Initiate Delay: only used with multiple Lincoln Power Supplies. This function allows the operator to set a delay between the time when the first Lincoln Power Supply initiates the arc and the time when the second Lincoln Power Supply initiates the arc.

Meta Vision System

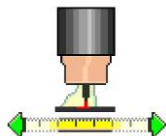
Parameters



Weld Type:
Circumferential
Longitudinal



Groove Type:
V
U



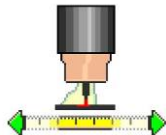
Part Thickness: (Currently Not Used)

Mode:

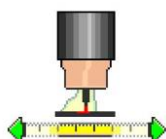
Disabled – disables the Meta Vision System Tracking.

Manual – not used.

Tracking – this mode uses the Meta System to track the joint by the use of the XM System axis.



Adaptive – this mode uses the Meta System to track the joint by the use of the XM System axis and additionally the Meta System commands changes to the velocity of the travel axis, based on the previous pass data, to adapt the amount of weld being applied to certain areas of the joint. The override value shows up in the travel axis override meter but cannot be changed manually during welding.



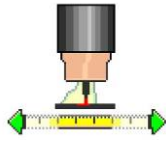
Layer Type:

Root – Used for running a root pass.

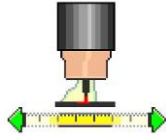
Single – Used for running a single pass.

Tandem – Not Currently Used.

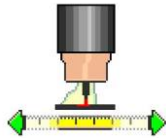
Cap – Used for running a cap pass.



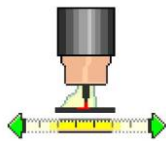
Groove Position: sets the groove position as a percentage. This is only used when running a *Single* layer type.



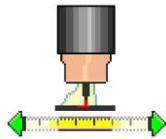
Layers: sets the number of layers that will be welded in a segment. If this value is set to *Automatic* then the Meta System determines when the layer is complete based on depth of the weld.



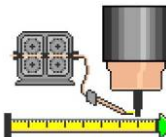
Passes: sets the number of passes per layer during a segment. If this value is set to *Automatic* then the Meta System determines when a pass is complete based on the width of the weld.



Horizontal Offset: sets the horizontal offset in inches. This offset is a distance from the tracking position of the Meta System in the horizontal axis.



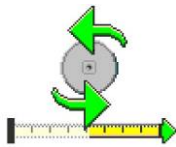
Vertical Offset: sets the vertical offset in inches. This offset is a distance from the tracking position of the Meta System in the vertical axis.



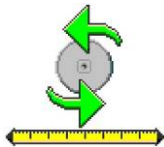
Sidewall Offset: sets the sidewall offset in inches. This offset is the distance from the sidewall of the groove toward the center of the groove.

Turning Rolls

Parameters



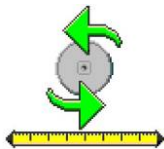
Start Delay - Sets the time (in seconds) from the beginning of the segment until the programmed rotation begins. If this value is set to *Initiate* the Turning Rolls will start when the Power Supply Initiates the arc



Mode:

Internal encoder - used for a motor mounted encoder.

External encoder – used for an encoder that is not connected directly to the motor. This encoder is usually riding on the part to give actual travel distance and speed.

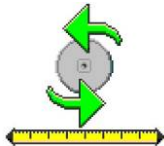


Weld Mode:

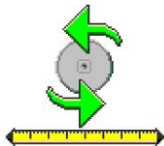
Od – used if welding on the outside diameter of the part.

Id – used if welding on the inside diameter of the part.

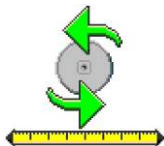
Depending on which *Weld Mode* is selected the direction of the rotation will change.



Part Diameter: Specifies the Outside Diameter (OD) of the part. It programs in inches per minute and is only available if the rotation mode is set to in/min in the up slope segment.



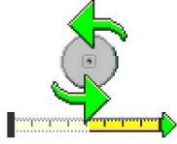
Effective Diameter: sets the effective diameter in inches. The effective diameter is the actual welding surface of the part.



Velocity:

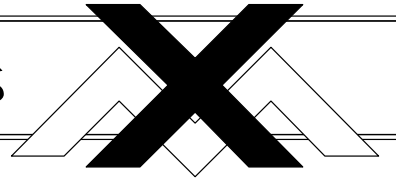
Initial value: sets the initial value in inches per minute.

Final value: sets the final value in inches per minute.



Early Stop - Sets when the rotary motion stops before the segment ends.

XM Controls



Appendix 2

Creating a Weld Program

Advanced Manufacturing Engineering Technologies

Creating a Weld Program

Steps

1. Enter “Edit Mode” on the XM Controller.
2. Select the “defaultprog” weld program.
3. Highlight the upslope segment of the weld program.
4. Set the “Segment” parameters according to your needs. See section 4.8.2.1.5 for “Segment” parameters and functions.
5. Select the “Power Supply” module and adjust the parameters according to your programming needs. See Appendix 1 for programming options.
6. Select the remaining modules and adjust the associated parameters according to your programming needs. See Appendix 1 for programming options.
7. Highlight the next segment in the weld program and repeat steps 5 and 6. Repeat this step until all weld program segment parameters are set according to your programming needs.
8. Press the “Automation” button and add any automation sequences that are required for your welding process. “Automation” is a license activated option that may not be included with your system but is not necessary to run a weld program. See section 4.8.2.1.7.6 for details on programming the Automation sequence and associated functions.
9. Press the “Setup” button and set the values for “Override Limits”. See section 4.8.2.1.7.5.1 for details on Override Limit programming.
10. Press the “Setup” button and set the values for the “Data Acquisition” feature. “Data Acquisition is a license activated option that may not be included with your system but is not necessary to run a weld program. See section 4.8.2.1.7.5.2 for details on Data Acquisition programming.
11. Press the “Save” button to save the modified weld program. You will have the option to change the name of the weld program from “defaultprog” to any alphanumeric name that you desire. See section 4.8.2.1.7.2 for specific details on how to save a weld program.