

**OPERATION MANUAL  
for  
9900 Controller**

Effective with Serial Number 080391

August 2016

**IMPORTANT**

Read this manual carefully before installing,  
Commissioning, or operating this product.

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- See more at: <https://www.millerwelds.com/automation-terms-of-sale#sthash.I5oRebWB.dpuf>

## NOTICE

The installation, operation and maintenance guidelines set out in this manual will enable you to maintain the equipment in peak condition and achieve maximum efficiency with your welding operation. Please read these instructions carefully to become aware of every advantage.

## CAUTION

**Only experienced personnel familiar with the operation and safe practice of welding equipment should install and/or use this equipment.**

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## 1. SAFETY PRECAUTIONS – READ BEFORE USING (SOM 2013-09)

### 1.1 Symbol Usage

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

 **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 Arc Welding 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 1-5. Read and follow all Safety Standards.

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

 During operation, keep everybody, especially children, away.



#### ELECTRIC SHOCK can kill.

the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the work piece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install, ground, and operate this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- 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 use worn, damaged, undersized, or repaired cables.

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- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal. Disconnect cable for process not in use.
- Use GFCI protection when operating auxiliary equipment in damp or wet locations.

### **SIGNIFICANT DC VOLTAGE exists in inverter welding power sources AFTER removal of input power.**

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



#### **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.



#### **FUMES AND GASES can be hazardous.**

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

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding fumes and gases. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- 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.
- 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 while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



#### **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.

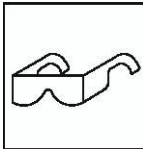


### **WELDING can cause fire or explosion.**

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- 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, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- 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.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher

### **FLYING METAL or DIRT can injure eyes.**



Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



### **BUILDUP OF GAS can injure or kill.**

- Always ventilate confined spaces or use approved air-supplied respirator.



### **ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.**

- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.



### **NOISE can damage hearing.**

- Noise from some processes or equipment can damage hearing.
- Wear approved ear protection if noise level is high.



**CYLINDERS can explode if damaged.**

Compressed 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.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve. Do not stand in front of or behind the regulator when opening the valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

## 1.3 Additional Symbols For Installation, Operation, And Maintenance



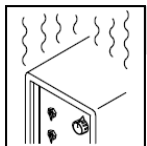
**FIRE OR EXPLOSION hazard.**

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.



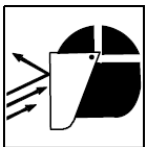
**FALLING EQUIPMENT can injure.**

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- 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.
- Keep equipment (cables and cords) away from moving vehicles when working from an aerial location.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94-110) when manually lifting heavy parts or equipment.



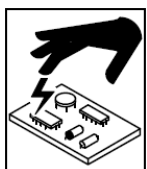
**OVERUSE can cause OVERHEATING**

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



**FLYING SPARKS can injure.**

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



**STATIC (ESD) can damage PC boards.**

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



### MOVING PARTS can injure.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.



### WELDING WIRE can injure.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.



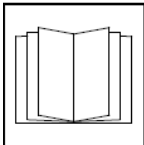
### BATTERY EXPLOSION can injure.

- Do not use welder to charge batteries or jump start vehicles unless it has a battery charging feature designed for this purpose.



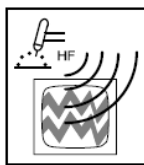
### MOVING PARTS can injure.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



### 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 maintenance and service according to the Owner's Manuals, industry standards, and national, state, and local codes.



### H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



### ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

## 1.4 California 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.*

## 1.5 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.ihc.com](http://www.global.ihc.com)).

*Safe Practices for the Preparation of Containers and Piping for Welding and Cutting*, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: [www.global.ihc.com](http://www.global.ihc.com)).

*Safe Practices for Welding and Cutting Containers that have Held Combustibles*, American Welding Society Standard AWS A6.0, from Global Engineering Documents (phone: 1-877-413-5184, website: [www.global.ihc.com](http://www.global.ihc.com)).

*National Electrical Code*, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: [www.nfpa.org](http://www.nfpa.org) and [www.sparky.org](http://www.sparky.org)).

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1, from Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151 (phone: 703-788-2700, website: [www.cganet.com](http://www.cganet.com)).

*Safety in Welding, Cutting, and Allied Processes*, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Ontario, Canada L4W 5N5 (phone: 800-463-6727, website: [www.csa-international.org](http://www.csa-international.org)).

*Safe Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, web-site: [www.ansi.org](http://www.ansi.org)).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: [www.nfpa.org](http://www.nfpa.org)).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices— phone for Region 5, Chicago, is 312-353-2220, website: [www.osha.gov](http://www.osha.gov)).

*Applications Manual for the Revised NIOSH Lifting Equation*, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333 (phone: 1-800-232-4636, website: [www.cdc.gov/NIOSH](http://www.cdc.gov/NIOSH)).

## 1.6 EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). The current from arc welding (and allied processes including spot welding, gouging, plasma arc cutting, and induction heating operations) creates an EMF field around the welding circuit. EMF fields may interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, restrict access for passers-by or conduct individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

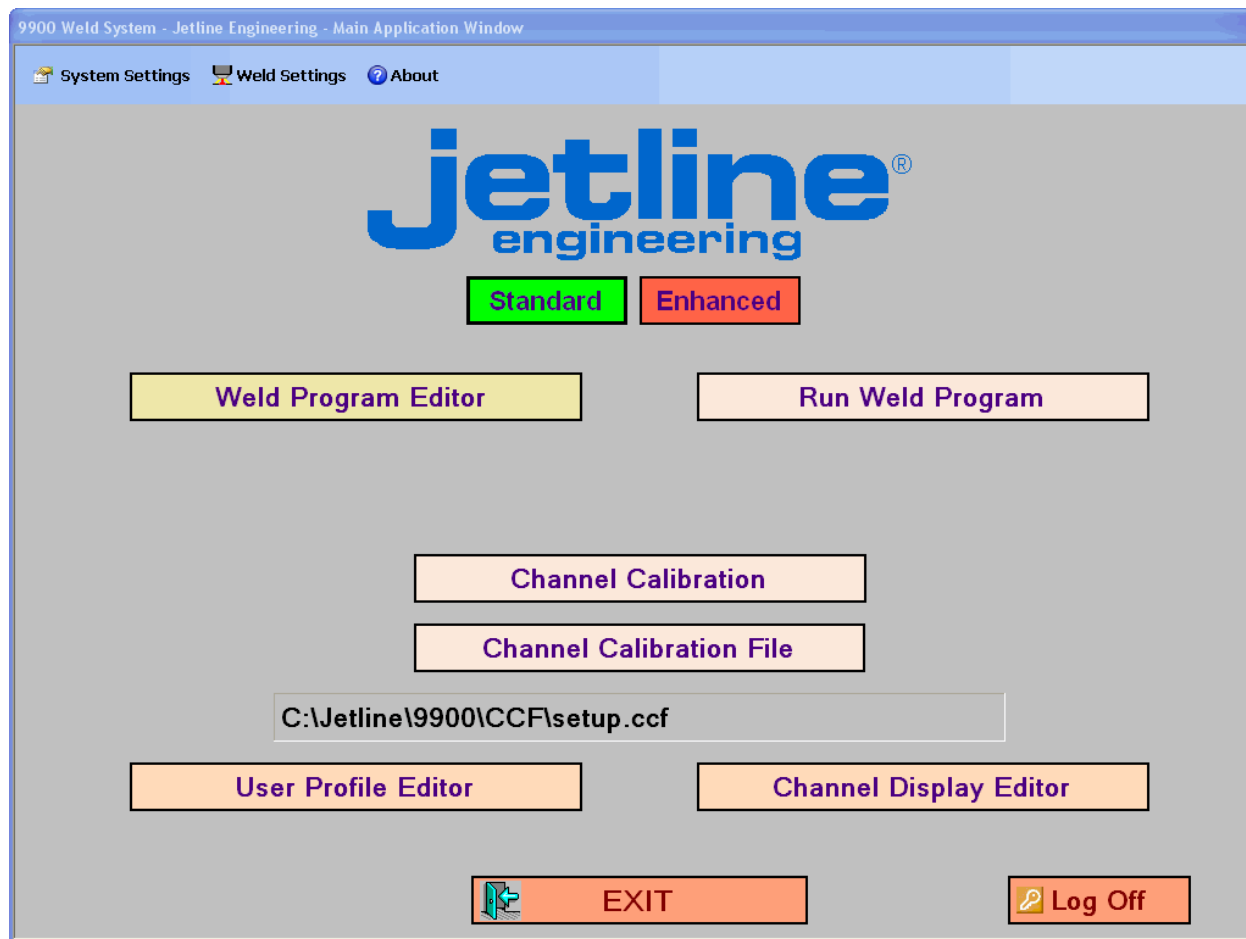
1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.

About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

## SECTION II

### USER SCREEN – STANDARD MODE



#### **Main Application Window**

Standard/Enhanced - The active mode, either Standard or Enhanced, is shown in green. The non-active mode is in red. To change the mode, select the other button.

Select Channel Calibration File – This is the configuration file that will be tied to the new weld program. (Weld programs are set up and selected in the Weld Program Editor screen.)

Run Weld Program – Press to enter the Run Screen

Weld Program Editor – Press to enter the Weld Program Editor

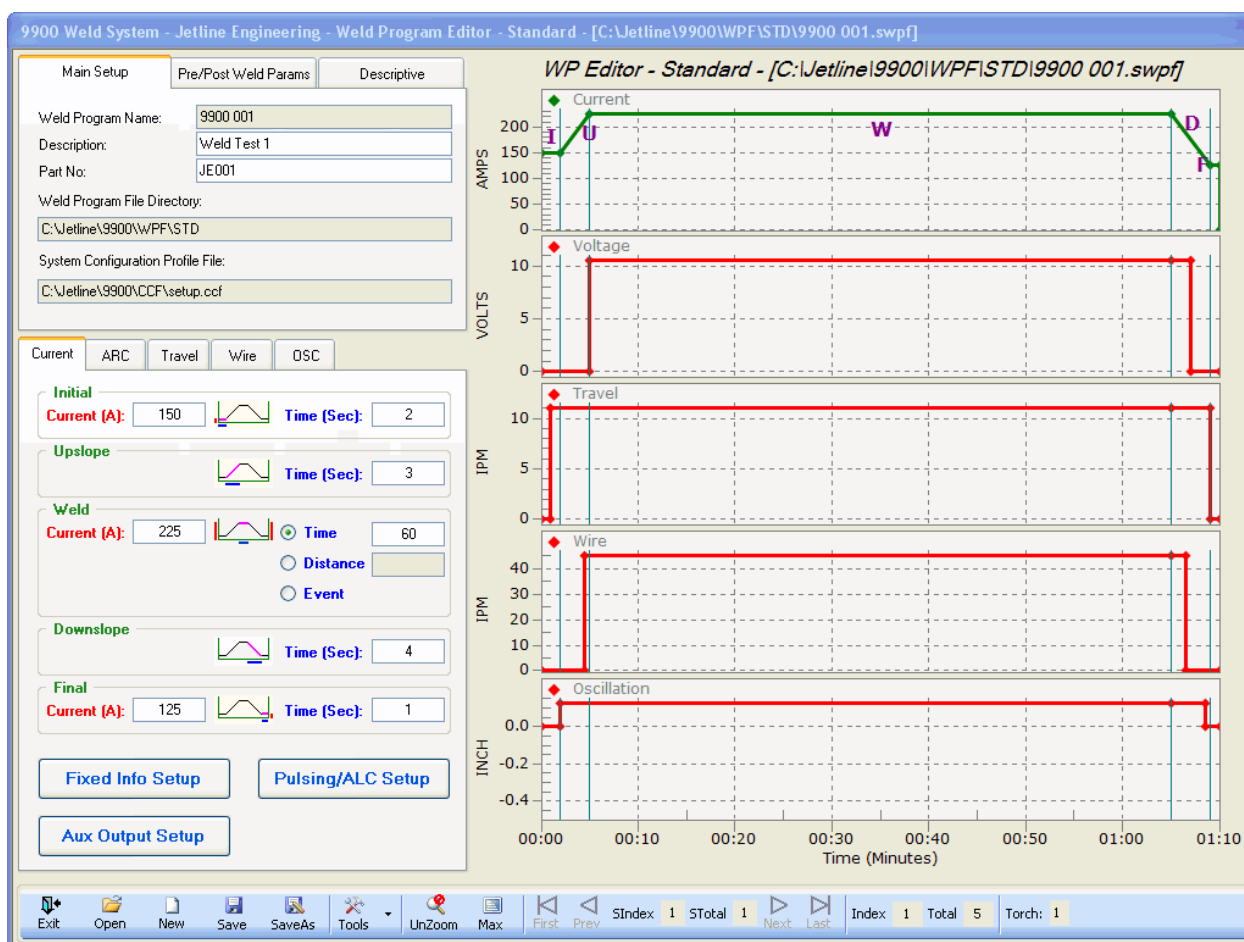
User Profile Editor – To change the rights that are given to each user

Channel Calibration – To change how the channels are displayed on the Run screen

Channel Screen Display Editor – To change how the channels are display in the run screens

Log off – To log off a user

Exit – Exit the application



## A. Weld Program Editor Screens – Standard Mode

### Main Setup Window

From the Main Application screen, press Weld Program Editor button to enter the setup windows.

Weld Program Name - Filled in by the user

Description - Filled in by the user

Part No. - Filled in by the user

Weld Program File Directory – Location on the computer where the weld program is stored

System Configuration Profile File – Location on the computer where the configuration file is stored

Graph - The graph to the right shows the weld program

### Bottom Bar

Exit – Exit the weld program editor

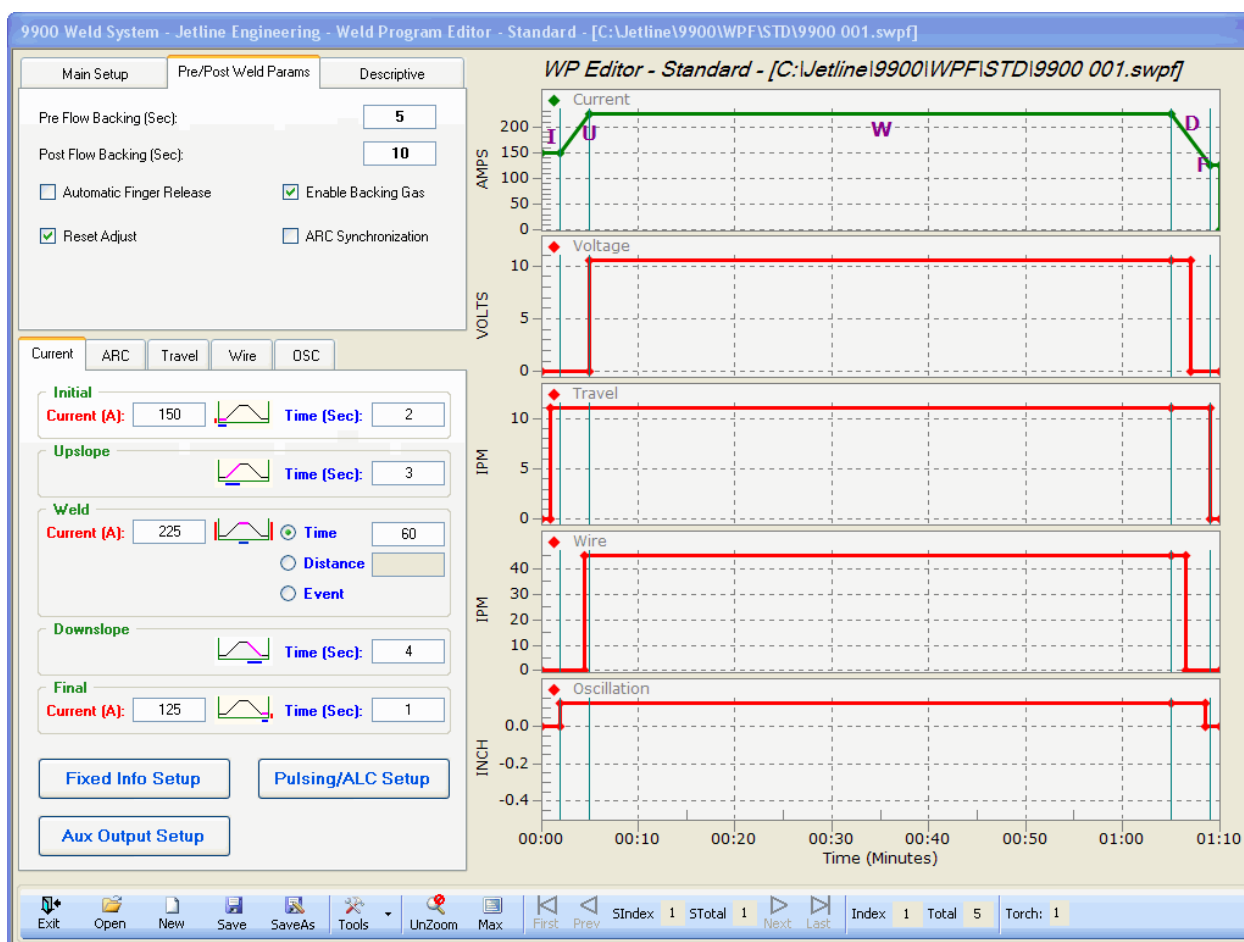
Open – Open a different weld program

New – Start a new weld program

Save – Save the changes that you have made to the weld program

SaveAs – Save the changes that you have made under a different weld program name





## Pre/Post Weld Params Window

Pre Flow Backing – Amount of time that the backing gas will flow before the arc strikes

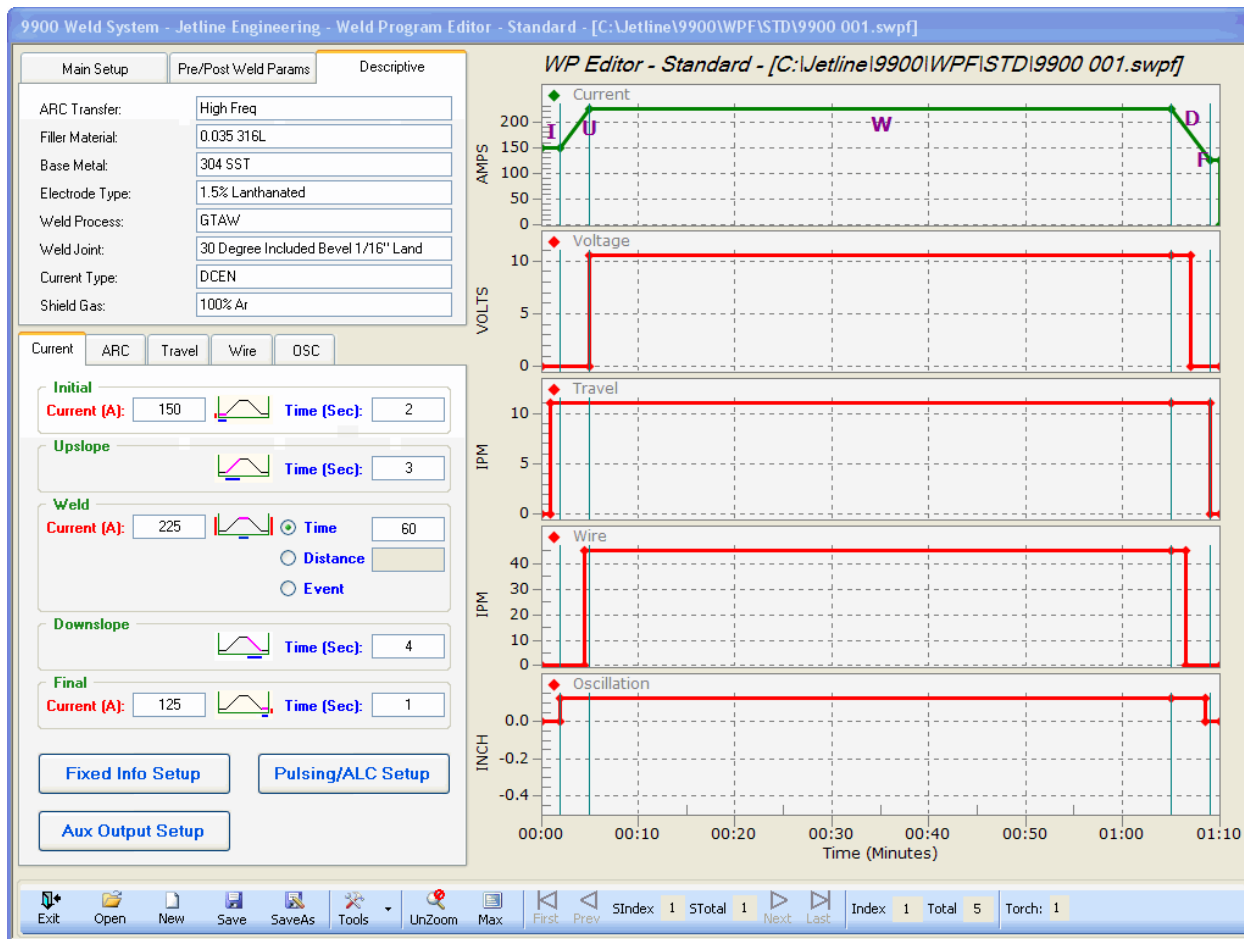
Post Flow Backing – Amount of time the backing gas is on after the arc is turned off

Automatic Finger Release – If enabled, the fingers will be released after the weld is finished

ARC Synchronization – If there is more than one torch and ARC Synchronization is enabled, all of the torches will strike at the same time

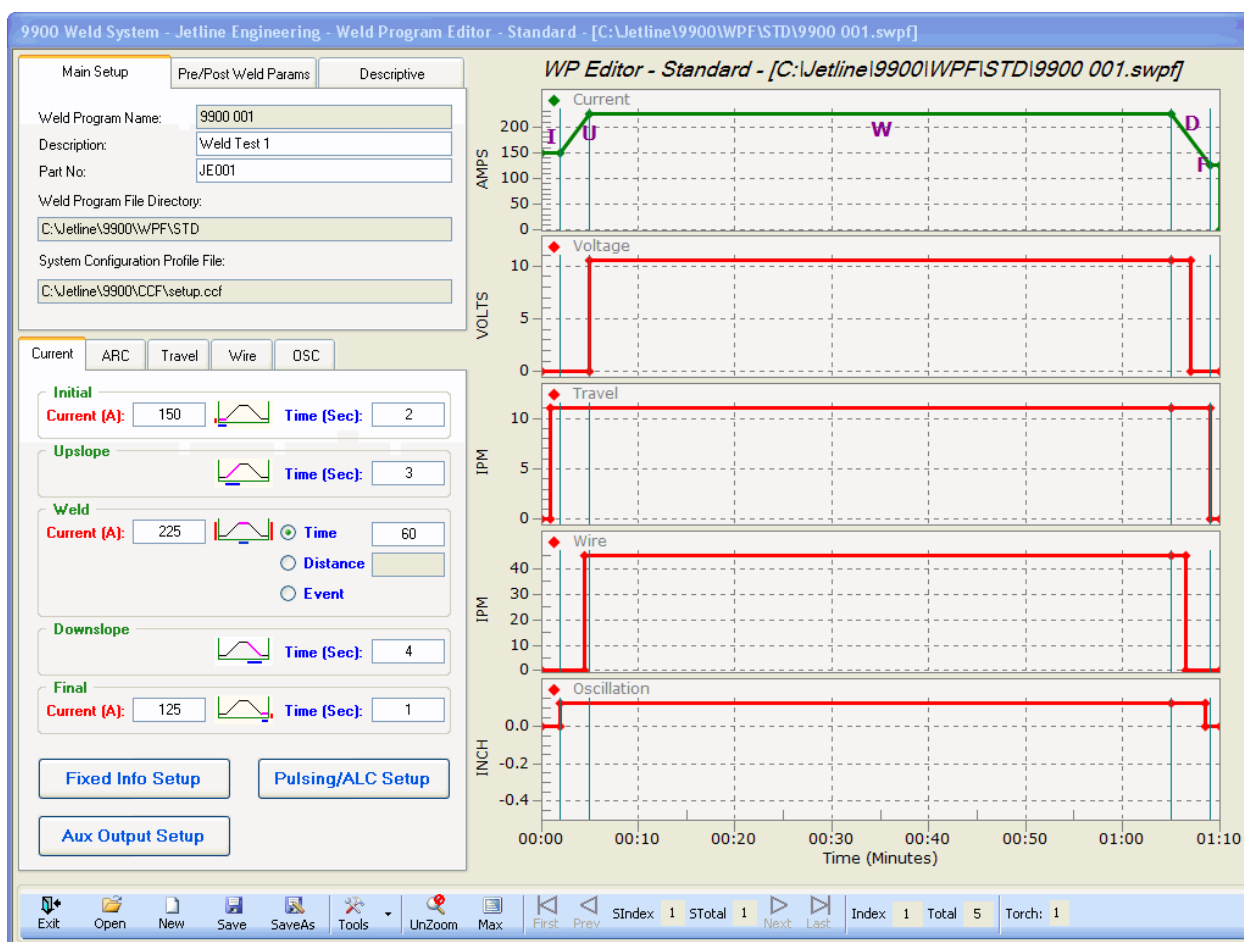
Enable Backing Gas – If enabled the backing gas solenoid will be turned on during the weld. Otherwise it will be left off.

Reset Adjust – If enabled at the end of a single pass weld the adjust percentage for each channel will be reset to 0. Otherwise on the next weld, the adjust percentage carry over.



## Descriptive Window

Descriptive – These fields can be filled in to document details of the weld process



## Channels Window - Current

### Initial

Current - The current at which the arc will strike

Time - The time the arc will remain at the Initial current level, before Upslope

### Upslope

Time - The time the current will take to slope from Initial to Weld level

### Weld

Current - Main weld current (also known as PEAK), achieved after Upslope until beginning of Downslope

Time - The time the system will remain at the Weld level (main or peak current), if enabled

Distance - The length of the Weld segment, from the end of Upslope to the beginning of Downslope, if enabled

Event - The system will remain in the Weld segment until an outside EVENT (downslope) signal is received, or Stop Button is pressed

### Downslope

Time - The time the current will take to slope from Weld level to Final level. Downslope time begins at end of Weld time or when the Weld Distance is achieved or when Stop button is pressed. All channels begin Downslope at the same time (synchronized).

**Final**

Current - The current at which the arc will slope during Downslope, from the Weld current level

Time - The time the current will remain at the Final level before extinguishing

**Jetline Engineering - 9900 - Current Fixed Information Setting Dialog**

☒ **Wait For ARC**

**Pneumatic Torch Lift**

☐ **Enable**

Start Delay (Sec):

Stop Delay (Sec):

**Torch Shield Gas**

Pre Flow (Sec):

Post Flow (Sec):

## Current Fixed Information Setting Dialog Window

Wait For ARC – If enabled, the weld program waits until an arc is detected; otherwise the Initial time starts no matter the state of the arc.

### Pneumatic Torch Lift

Start Delay – Delay after the torch is moved in and before the weld program will start

Stop Delay – Delay after the end of weld and before the torch is moved out

### Torch Shield Gas

Pre Flow – Length of time the gas is turned on before an arc is struck

Post Flow – Length of time the gas flows after the arc is turned off

**9900 Weld System - Jetline Engineering - Pulsing Setting Dialog**

**Pulsing**

☐ Initial Segment  
☐ Upslope Segment  
☒ Weld Segment  
☐ Downslope Segment  
☐ Final Segment

☒ Simple Pulsing  
Pulse Rate (PPS):    
Peak Time (%):    
Bkg Amp (%): 

☐ Pulsation  
Traverse (%):

☐ Synchronized  
Traverse (%):

☐ VP  
Frequency (Hz):  
EN Time (%):  
EP Amp (%):

☐ VP Pulsed

**VP Parameters**

Frequency (Hz):  
EN Time (%):  
EP Amp (%):

**Pulse Parameters**

Pulse Rate (PPS):  
Peak Time (%):  
Bkg Amp (%):

**ALC Segment Lockout**

☒ Initial Segment  
☒ Upslope Segment  
☐ Weld Segment  
☒ Downslope Segment  
☒ Final Segment

**Pulse Lockout**

☐ Initial Segment  
☐ Upslope Segment  
☒ Weld Segment  
☐ Downslope Segment  
☐ Final Segment

Clear

OK

Cancel

## Pulsing Setting Dialog Window

Pulsing – User selects segments in which the pulsing is active

### Simple Pulsing

Pulse Rate – Set the pulse frequency in number of pulses per second

Peak Time – Percent of the pulse that is in high current

Bkg Amp – Sets the background amperage level as a percentage of the peak level

Pulsation - Sets the background amperage level as a percentage of the peak level in pulsation

Synchronized - Sets the background amperage level as a percentage of the peak level in synchronized

### VP (AC welding)

EP Amp (%) – Sets the positive amperage level as a percentage of the peak (negative) level

Frequency (Hz) – Set the pulse frequency in Hertz

EN Time (%) – Percent of the pulse that is in negative electrode

### **VP Pulsed**

EP Amp (%) – Sets the positive amperage level as a percentage of the peak (negative) level

Frequency (Hz) – Set the pulse frequency in Hertz

EN Time (%) – Percent of the pulse that is in negative electrode

Pulse Rate – Set the pulse frequency in number of pulses per second

Peak Time – Percent of the pulse that is in high current

Bkg Amp – Sets the background amperage level as a percentage of the peak level

ALC Segment Lockout – Selected segments disable the arc length control

Pulse Lockout – The arc length control is disabled during the background current

**Jetline Engineering - 9900 - Auxiliary Devices Setup Dialog**

Auxiliary Devices:

Channel Name:

Auxiliary #:

☒ Auxiliary Device Active

Start Delay (Sec):

Stop Delay (Sec):

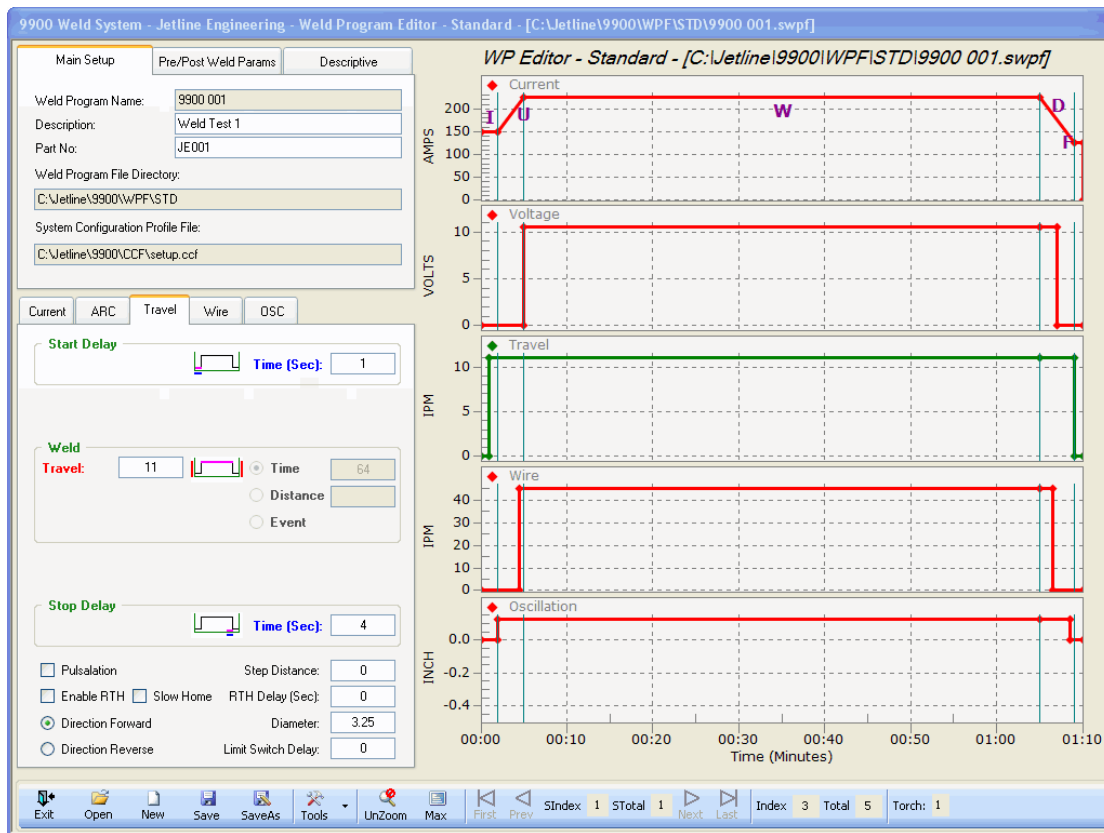
### Auxiliary Devices Setup Dialog Window

Auxiliary Devices: - Selects the auxiliary channel

Auxiliary Device Active – If enabled it will be active after the start delay and inactive after the stop delay

Start Delay – Amount of time the output is delayed from when the arc strikes

Stop Delay – Amount of time the output will remain active after the Downslope segment is initiated



## Channels Window - Travel

**Start Delay** – Length of time the start of travel is delayed from when the arc strikes

**Weld** - Travel speed setting during the weld

**Stop Delay** - Amount of time the travel will continue after the Downslope segment is initiated

**Pulsation** – Check box to enable the Pulsation Mode (used only with circumferential and oscillation)

**Step Distance** - Distance in degrees of rotation between oscillation strokes when in the Pulsation mode

**RTH (Return to Home) Delay** - Delay time starts from end of Final Current (if RTH is enabled) to return to home

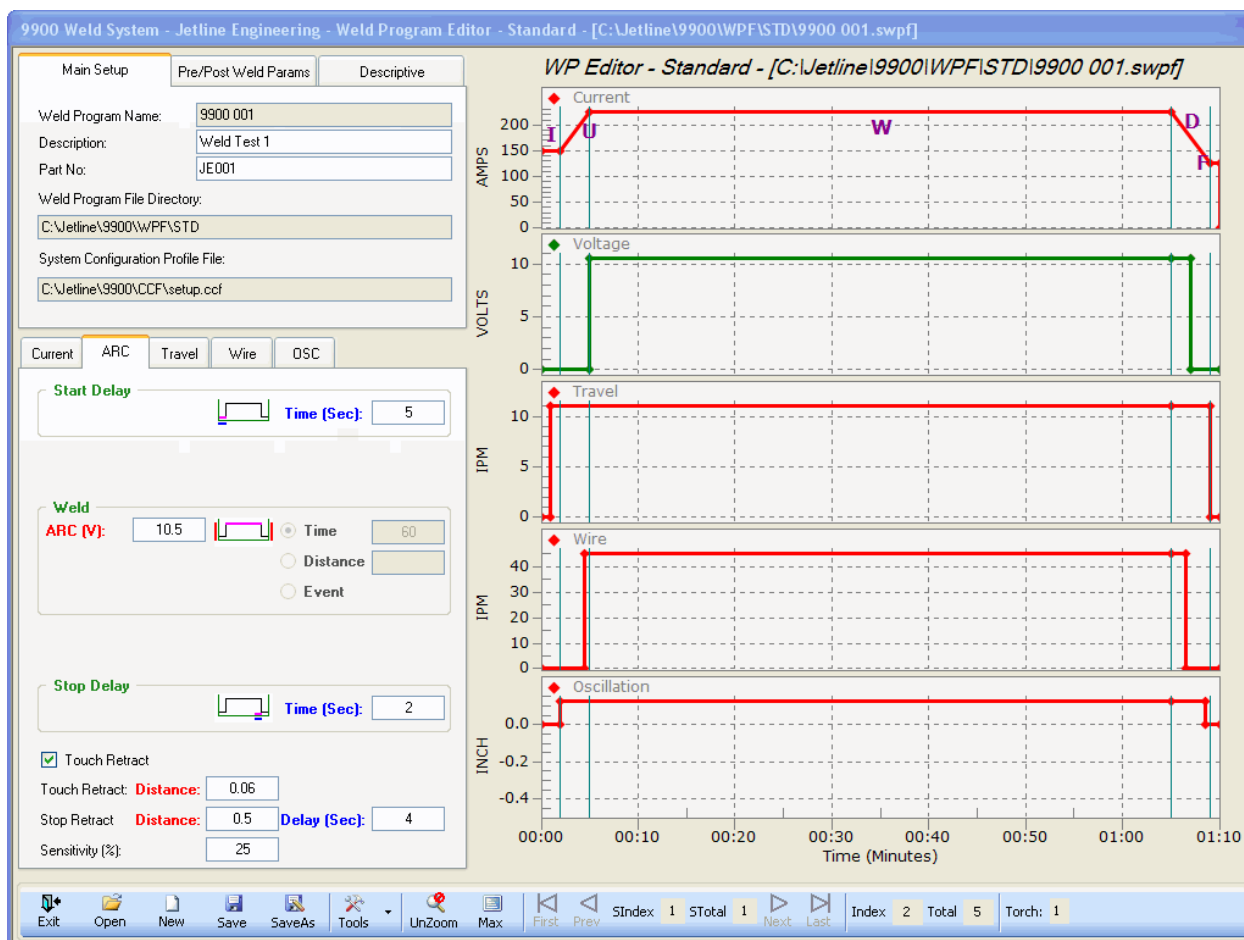
**Slow Home** – If enabled the return to home is done at the slow speed.

**Diameter (Radial Only)** - Enter part diameter to program Travel speed in surface speed, IPM or CPM. Enter “0” to program in RPM.

**Limit Switch Delay** - Amount of time Downslope or Event limit switch remains inactive after arc strike. Used to rotate off of the 360 degree limit switch at the beginning of the weld without prematurely shutting down the weld.

**Direction Forward** – Check box to travel in the Forward direction during the weld

**Direction Reverse** – Check box to travel in the Reverse direction during the weld. Note: Do not use limit switches for weld length when raveling in reverse.



## Channels Window - ARC (Arc Length Control)

**Start Delay** - Amount of time the automatic arc length control (ALC) action is delayed from arc strike

**Weld** - Voltage setting during the weld. This sets the arc length (torch height) for ALC systems

**Stop Delay** - Amount of time the automatic ALC action remains active after beginning of Downslope

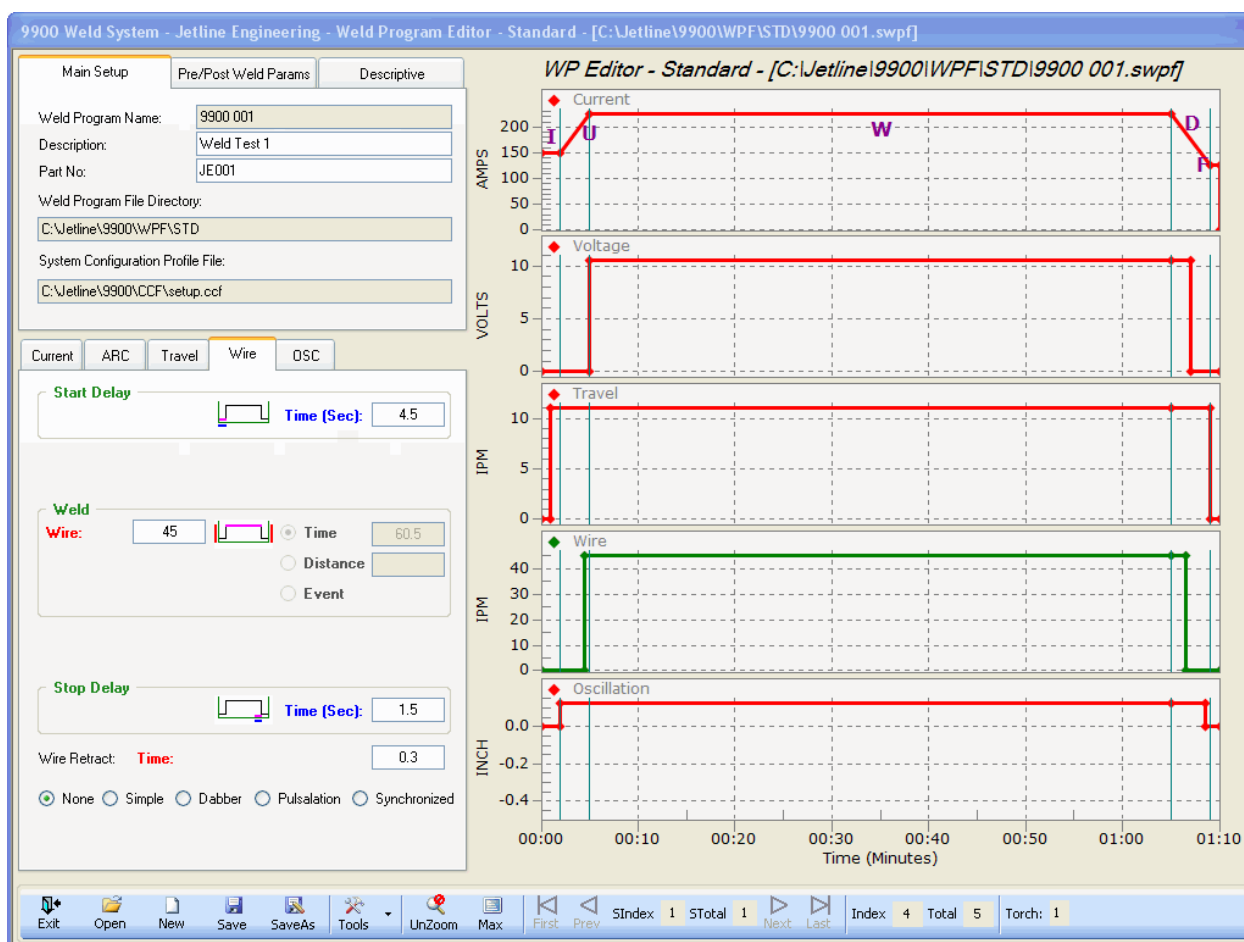
**Touch Retract** – The system does a touch retract if enabled

**Touch Retract: Distance:** - Starting arc gap distance if touch retract is enabled

**Stop Retract Distance:** - Final torch retract distance after the end of the weld

**Stop Retract Delay** - Amount of time from the end of Final Current to the beginning of the torch retract

**Sensitivity (%)** - The sensitivity or response of the automatic ALC function to a change in arc voltage or arc length during the weld. Higher value means faster response.



## Channels Window - Wire

**Start Delay** - Amount of time the start of wire feed is delayed from when the arc strikes

**Weld** - Wire feed speed setting during the weld

**Stop Delay** - Amount of time the wire feed will continue after the Downslope segment is initiated

**Wire Retract** - Amount of time the wire will retract at the end of Stop Delay

**No Pulsing** - Check this box to run wire continuously without pulsing, even if the weld current is pulsing

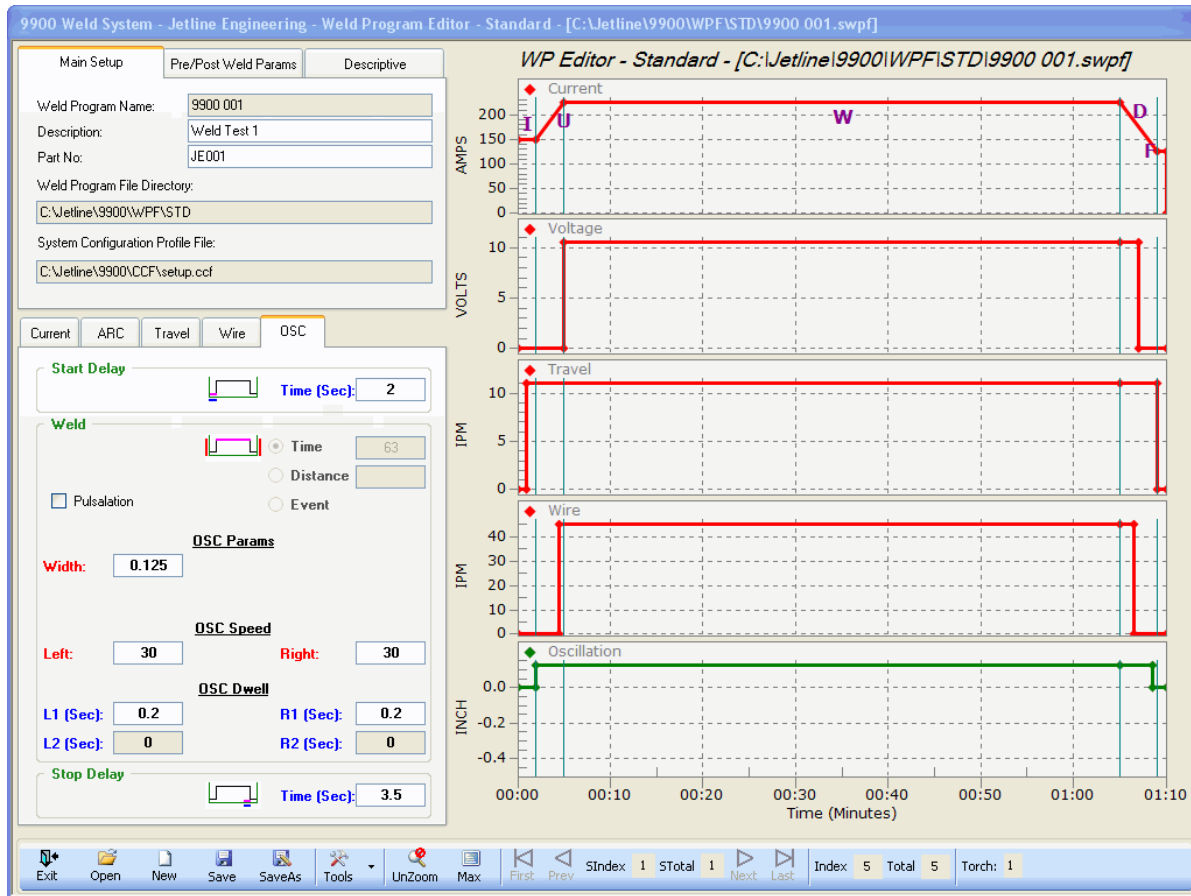
**Simple** - Check this box to pulse the wire speed synchronized with the weld current pulsing parameters and enter the background percentage for the wire

**Dabber** - Check this box to turn on the Dabber function. The value entered in the box is the distance that the wire is pulled back when the Current goes into background.

**Pulsation** - Check this box to pulse the wire speed synchronized with the oscillation parameters in the Pulsation mode and to enter the background percentage for the wire during the traverse

**Synchronized** - Check this box to pulse the wire speed synchronized with the oscillation parameters in the Synchronized mode and to enter the background percentage for the wire during the traverse

**Dabber** – How far the wire retracts when in low current state



in Simple

## Channels Window - OSC (Oscillation)

Start Delay - Amount of time the start of oscillation is delayed from arc strike

Pulsation – If enabled, pulsation is turn on.

### OSC Params

Width - The Width setting of the oscillator; total horizontal torch movement

### OSC Speed

Left: - Slide speed when moving to the left

Right: - Slide speed when moving to the right

### OSC Dwell

L1 – Amount of time the slide is stopped after moving left and before either returning to the right

oscillation, or before the positioner rotates the Step Distance in Pulsation mode

R1 – Amount of time the slide is stopped after moving right and before either returning to the left in Simple oscillation, or before the positioner rotates the Step Distance in Pulsation mode

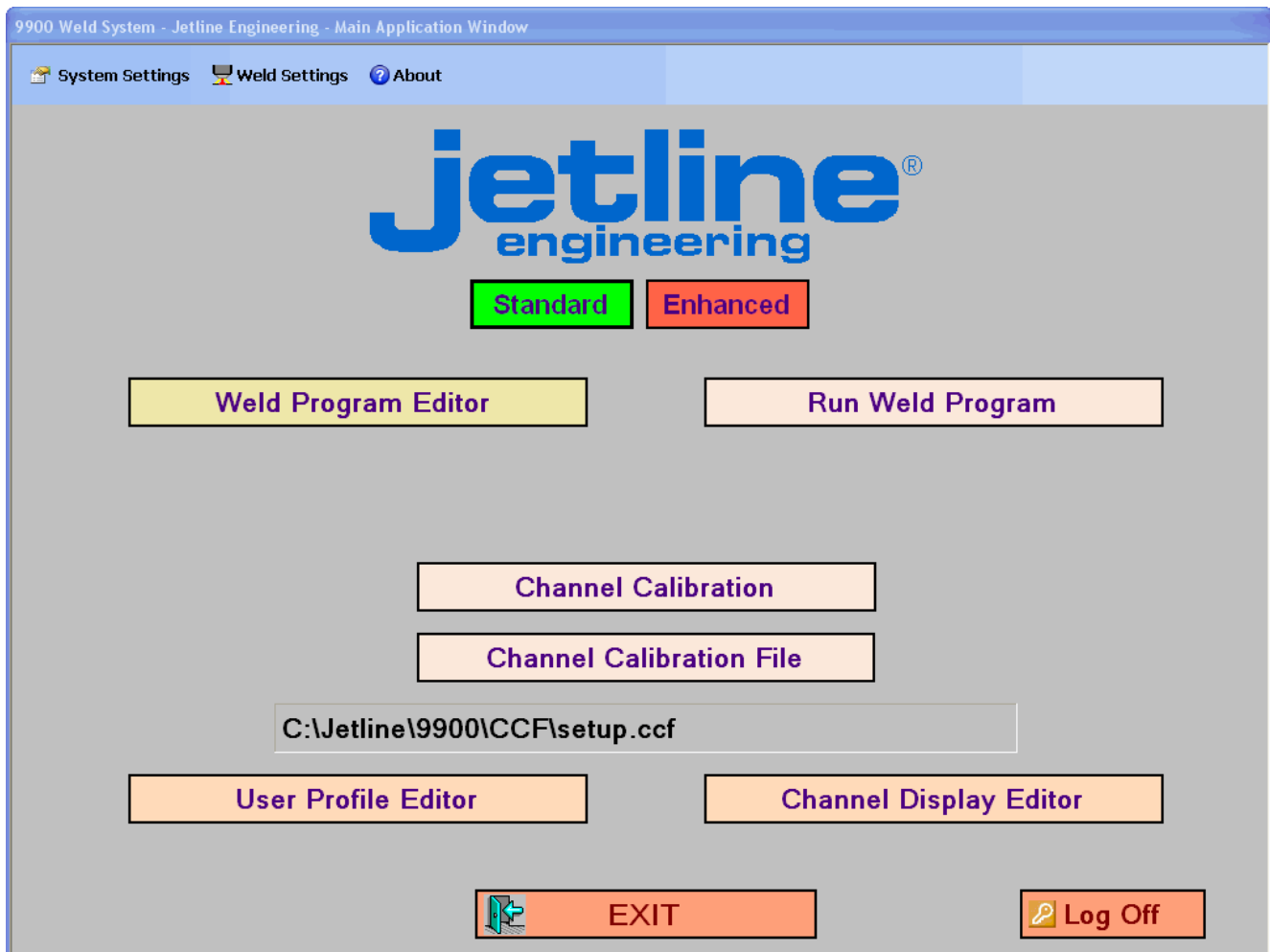
L2 – Pulsation mode only. Amount of time the slide remains stopped after the positioner rotates the Step Distance and before the slide moves back to the right

R2 - Pulsation mode only. Amount of time the slide remains stopped after the positioner rotates the Step Distance and before the slide moves back to the left

Stop Delay – Amount of time the oscillator will continue oscillating after the Downslope segment is initiate

## SECTION III

### USER SCREENS – ENHANCED MODE



#### Main Application Window

Standard/Enhanced - The active mode, either Standard or Enhanced, is shown in green. The non-active mode is in red. To change the mode, select the other button.

Channel Calibration File – This is the configuration file that will be tied to the new weld program. (Weld programs are set up and selected in the Weld Program Editor screen.)

Run Weld Program – Press to enter the Run Screen

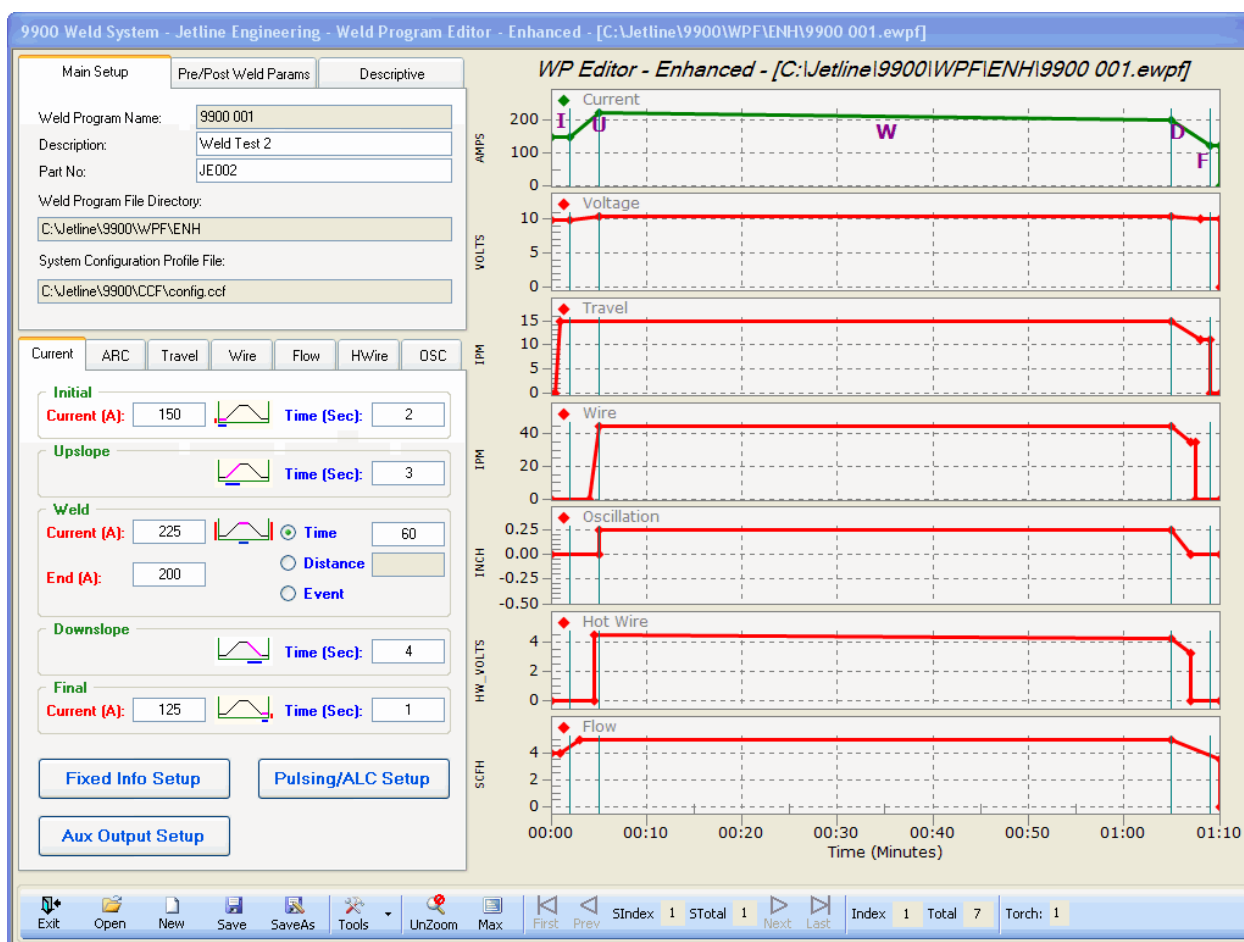
Weld Program Editor – Press to enter the Weld Program Editor

User Profile Editor – To change the rights that are given to each user

Channel Calibration – To change how the channels are displayed on the Run screen

Log off – To log off a user

Exit – Exit the application



## A. Weld Program Editor Screens — Enhanced Mode

Weld Program Name - Filled in by the user

Description - Filled in by the user

Part No. - Filled in by the user

Weld Program File Directory – Where on the computer the weld program is stored

System Configuration Profile File – Location on the computer the configuration file is stored

Graph - The graph to the right shows the weld program

### Bottom Bar

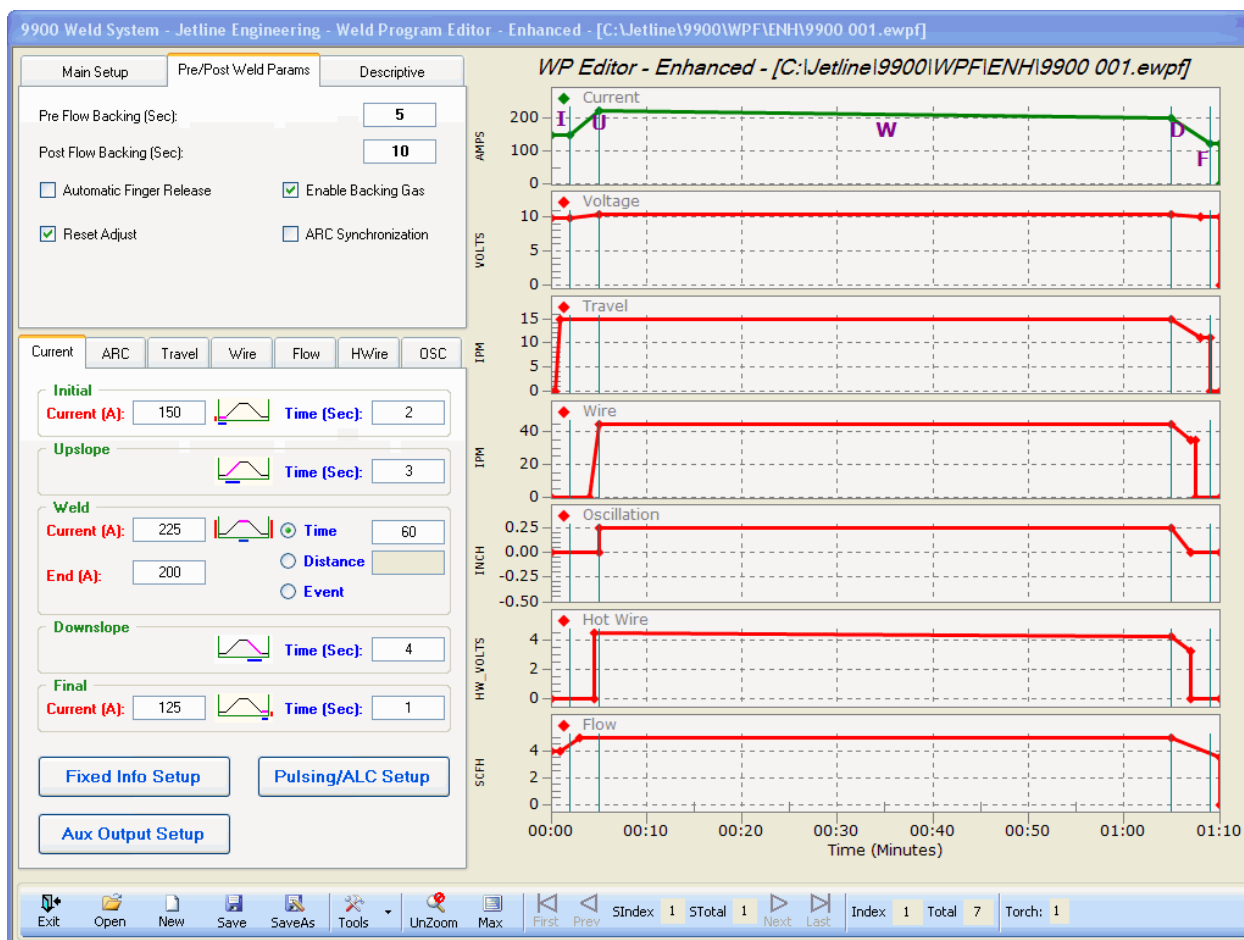
Exit – Exit the weld program editor

Open – Open a different weld program

New – Start a new weld program

Save – Save the changes that you have made to the weld program

SaveAs - Save the changes that you have made under a different weld program name



## Pre/Post Weld Params Window

**Pre Flow Backing** – Amount of time that the backing gas will flow before the arc strikes

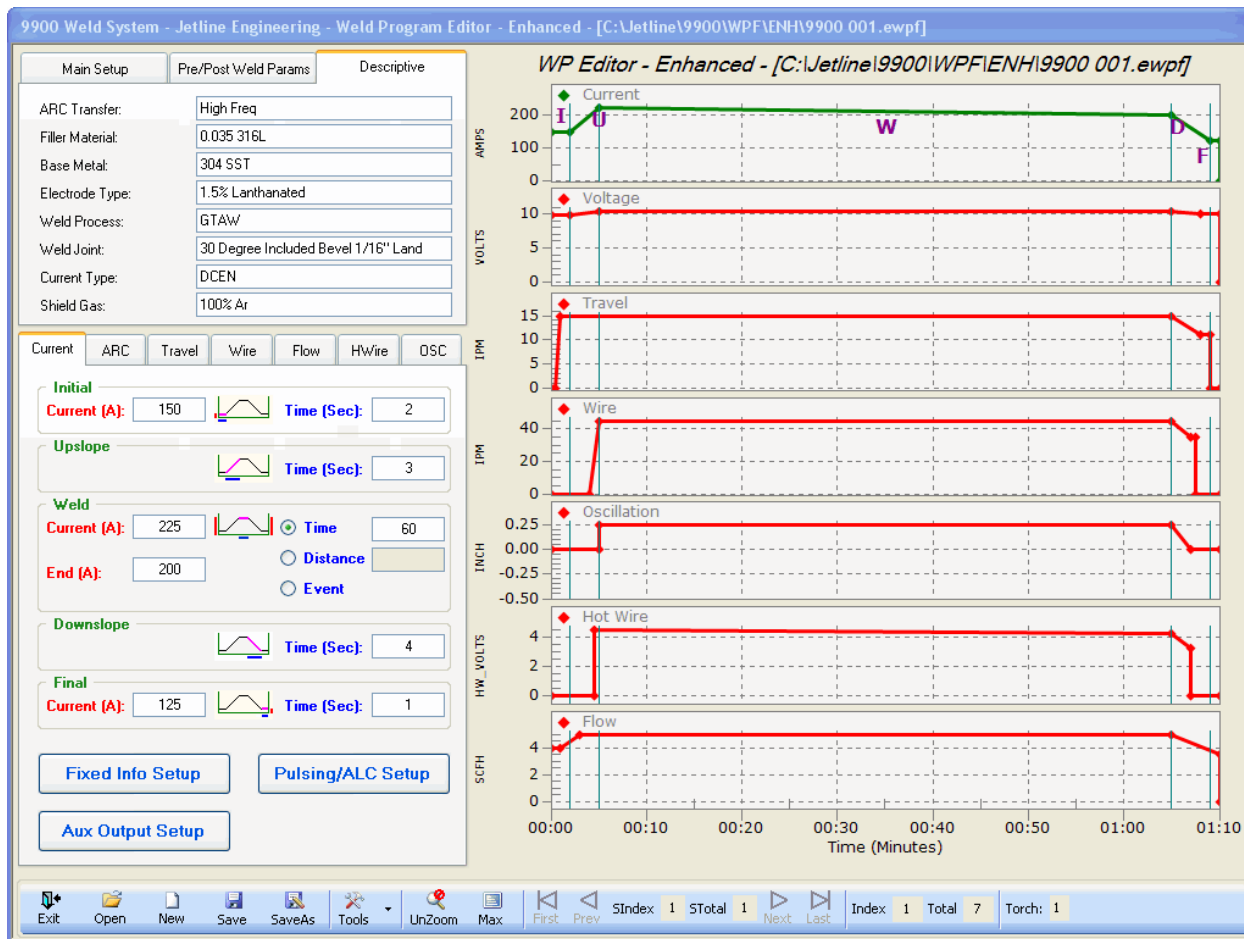
**Post Flow Backing** – Amount of time the backing gas is on after the arc is turned off

**Automatic Finger Release** – If enabled, the fingers will be released after the weld is finished

**ARC Synchronization** – If there is more than one torch and ARC Synchronization is enabled, all of the torches will strike at the same time

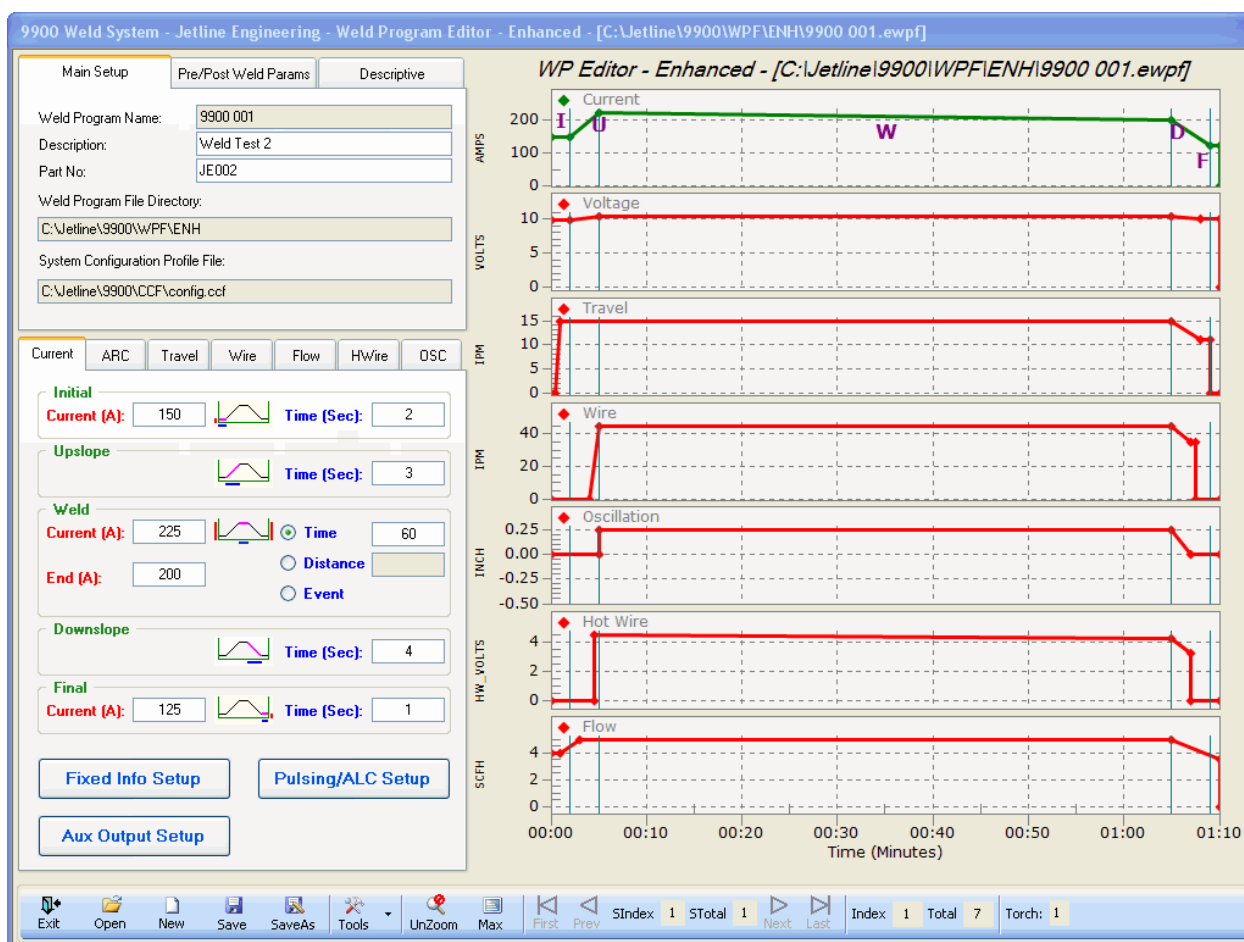
**Enable Backing Gas** – If enabled the backing gas solenoid will be turned on during the weld. Otherwise it will be left off.

**Reset Adjust** – If enabled at the end of a single pass weld the adjust percentage for each channel will be reset to 0. Otherwise on the next weld, the adjust percentage carry over.



## Descriptive Window

These fields can be filled in for documentation of the weld process.



## Channels Window - Current

### Initial

Current - The current at which the arc will strike

Time - The time the arc will remain at the Initial current level, before Upslope

### Upslope

Time - The time the current will take to slope from Initial to Weld level

### Weld

Current - Main weld current (also known as PEAK), achieved after Upslope

End - Main weld current at the end of the Weld segment

End - Main weld current (also known as PEAK), achieved before Downslope

Time - The time the system will remain at the Weld level (main or peak current), if enabled

Distance - The length of the Weld segment, from the end of Upslope to the beginning of Downslope, if enabled

Event - The system will remain in the Weld segment until an outside EVENT (downslope) signal is received, or Stop Button is pressed

### **Downslope**

Time - The time the current will take to slope from Weld level to Final level. Downslope time begins at end of Weld time or when the Weld Distance is achieved or when Stop button is pressed. All channels begin Downslope at the same time (synchronized).

### **Final**

Current - The current at which the arc will slope during Downslope, from the Weld current level

Time - The time the current will remain at the Final level before extinguishing

**Jetline Engineering - 9900 - Current Fixed Information Setting Dialog**

☒ **Wait For ARC**

**Pneumatic Torch Lift**

☐ **Enable**

Start Delay (Sec):

Stop Delay (Sec):

**Torch Shield Gas**

Pre Flow (Sec):

Post Flow (Sec):

## Current Fixed Information Setting Dialog Window

Wait For ARC – If enabled, the weld program waits until an arc is detected; otherwise the Initial time starts no matter the state of the arc

### Pneumatic Torch Lift

Start Delay – Delay after the torch is moved in before the weld program will start

Stop Delay – Delay after the end of weld before the torch is moved out

### Torch Shield Gas

Pre Flow – Length of time the gas is turned on before an arc is struck

Post Flow – Length of time the gas flows after the arc is turned off

**9900 Weld System - Jetline Engineering - Pulsing Setting Dialog**

**Pulsing**

☐ Initial Segment  
☐ Upslope Segment  
☒ Weld Segment  
☐ Downslope Segment  
☐ Final Segment

☒ Simple Pulsing  
Pulse Rate (PPS):    
Peak Time (%):    
Bkg Amp (%): 

☐ Pulsation  
Traverse (%):

☐ Synchronized  
Traverse (%):

☐ VP  
Frequency (Hz):  
EN Time (%):  
EP Amp (%):

☐ VP Pulsed

**VP Parameters**

Frequency (Hz):  
EN Time (%):  
EP Amp (%):

**Pulse Parameters**

Pulse Rate (PPS):  
Peak Time (%):  
Bkg Amp (%):

**ALC Segment Lockout**

☒ Initial Segment  
☒ Upslope Segment  
☐ Weld Segment  
☒ Downslope Segment  
☒ Final Segment

**Pulse Lockout**

☐ Initial Segment  
☐ Upslope Segment  
☒ Weld Segment  
☐ Downslope Segment  
☐ Final Segment

Clear

OK

Cancel

## Pulsing Setting Dialog Window

Pulsing – User selects segments in which the pulsing is active

### Simple Pulsing

Pulse Rate – Sets the pulse frequency in number of pulses per second

Peak Time – Percent of the pulse that is in high current

Bkg Amp – Sets the background amperage level as a percentage of the peak level

Pulsation - Sets the background amperage level as a percentage of the peak level in pulsation

Synchronized - Sets the background amperage level as a percentage of the peak level in synchronized

### VP (AC welding)

EP Amp (%) – Sets the positive amperage level as a percentage of the peak (negative) level

Frequency (Hz) – Sets the pulse frequency in Hertz

EN Time (%) – Percent of the pulse that is in negative electrode

### **VP Pulsed**

EP Amp (%) – Sets the positive amperage level as a percentage of the peak (negative) level

Frequency (Hz) – Set the pulse frequency in Hertz

EN Time (%) – Percent of the pulse that is in negative electrode

Pulse Rate – Set the pulse frequency in number of pulses per second

Peak Time – Percent of the pulse that is in high current

Bkg Amp – Sets the background amperage level as a percentage of the peak level

ALC Segment Lockout – Selected segments disable the arc length control

Pulse Lockout – The arc length control is disabled during the background current

**Jetline Engineering - 9900 - Auxiliary Devices Setup Dialog**

Auxiliary Devices:

Channel Name:

Auxiliary #:

☒ Auxiliary Device Active

Start Delay (Sec):

Stop Delay (Sec):

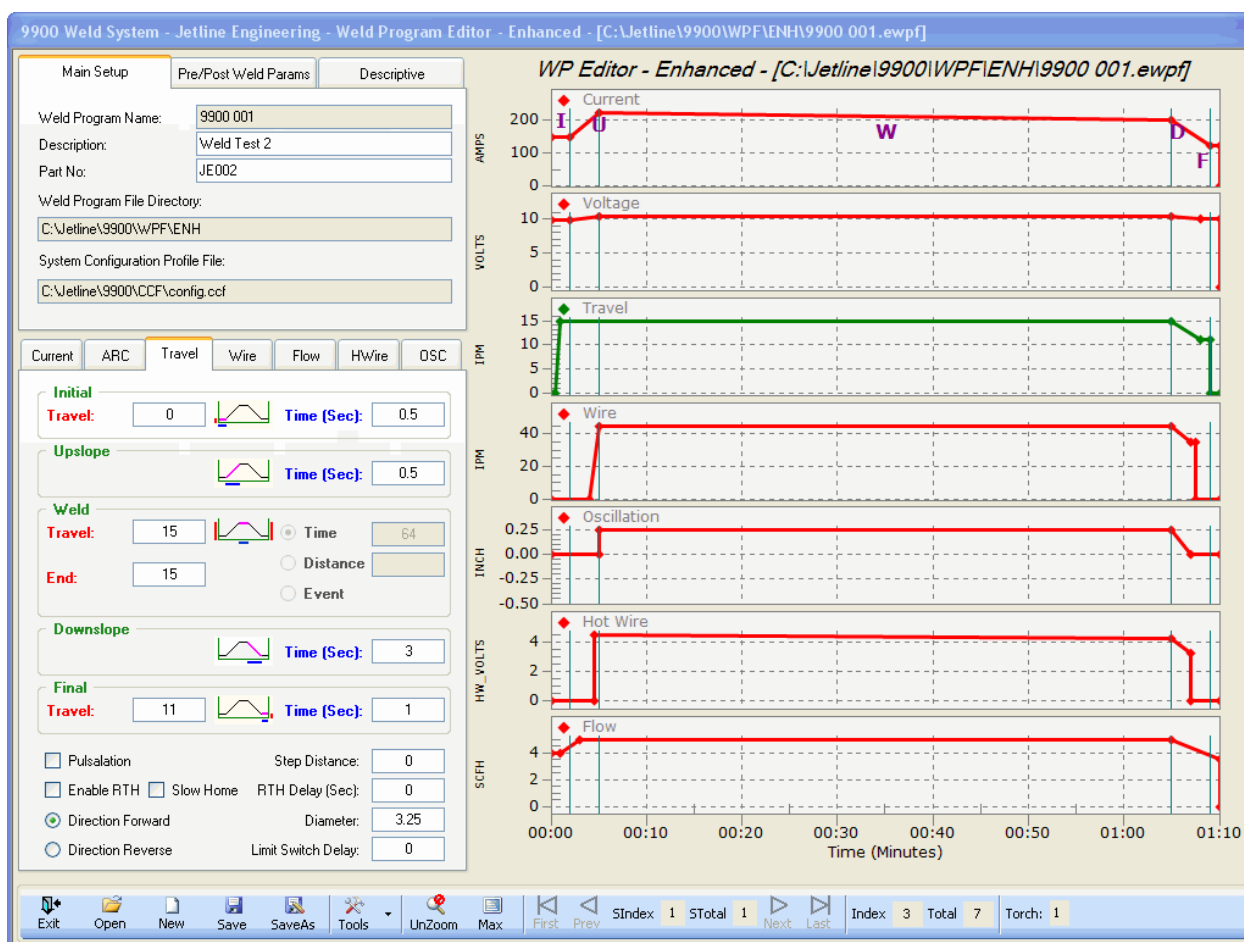
### Auxiliary Devices Setup Dialog Window

Auxiliary Devices: - Selects the auxiliary channel

Auxiliary Device Active – If enabled it will be active after the start delay and inactive after the stop delay

Start Delay – Amount of time the output is delayed from when the arc strikes

Stop Delay – Amount of time the output will remain active after the Downslope segment is initiated



## Channels Window - Travel

### Initial

Travel – The travel speed setting during Initial time

Time – The amount of time the travel speed will remain at the Initial level, before upslope

### UpSlope

Time – The amount of time the travel speed will take to slope from Initial to Weld level

### Weld

Travel – The travel speed setting at the start of the weld segment

End – The travel speed at the end of the Weld segment

### Downslope

Time – The amount of time the travel speed will take to slope from the Weld level to the Final level

### Final

Travel - The travel speed setting during Final time

Time - The amount of time the travel speed will remain at the Final level

Pulsation – Check box to enable the Pulsation Mode (used only with circumferential and oscillation)

Step Distance - Distance in degrees of rotation between oscillation strokes when in the Pulsation mode

Enable RTH (Return to Home): RTH Delay - Delay time starts from end of Final Current to return to home, if RTH is enabled

Slow Home – If enabled the return to home is done at the slow speed

Direction Forward – Check box to travel in the forward direction during the weld

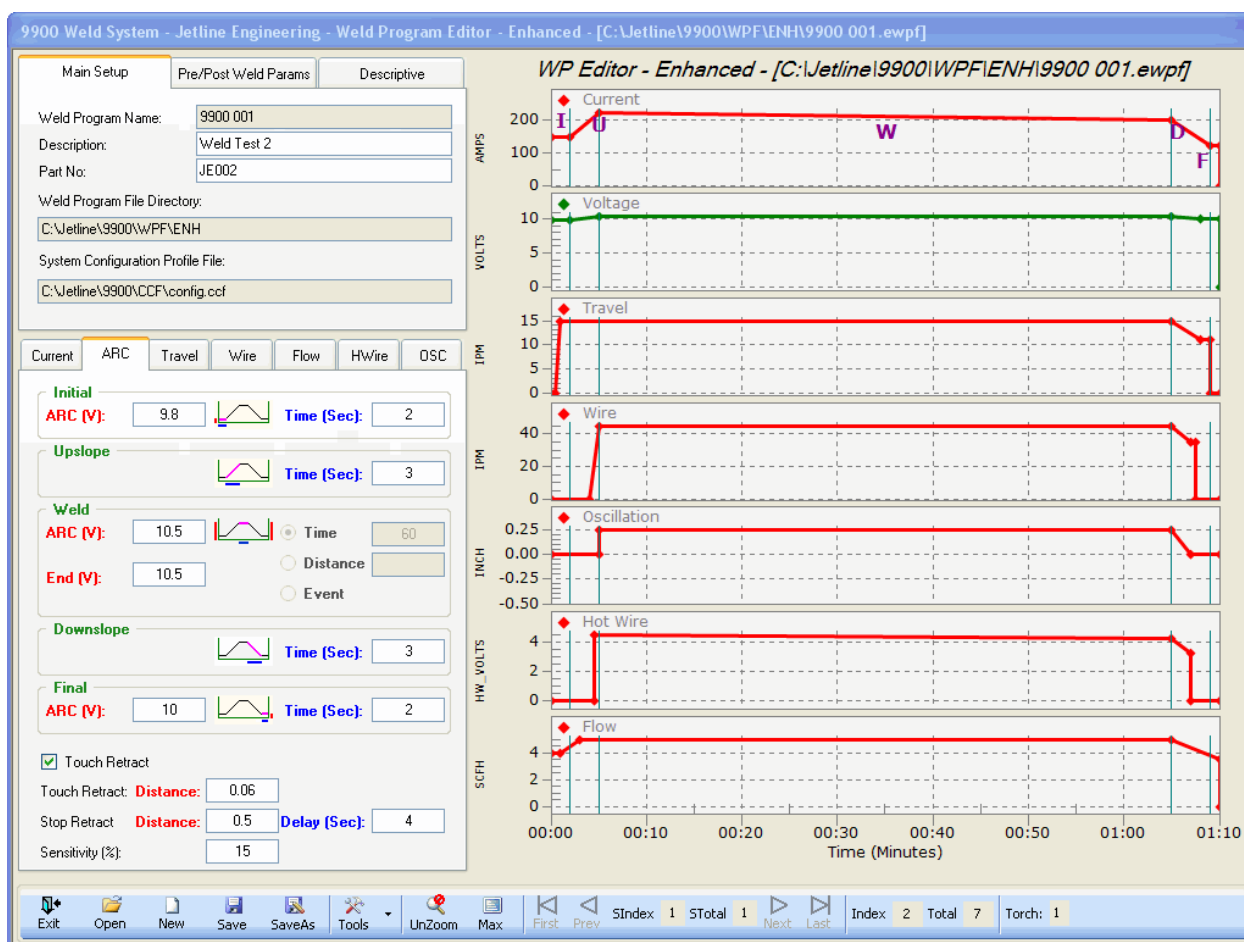
Diameter (Radial Only) - Enter part diameter to program Travel speed in surface speed, IPM or CPM. Enter "0" to program in RPM.

Direction Reverse – Check box to travel in the Reverse direction during the weld.

Limit Switch Delay - Amount of time Downslope or Event limit switch remains inactive after arc strike. Used to rotate off of the 360 degree limit switch at the beginning of the weld without prematurely shutting down the weld.

### ***WARNING***

**Do not use limit switches for weld length when traveling in reverse.**



## Channels Window - ARC (Arc Length Control)

### Initial

ARC – The ARC Voltage setting during Initial time

Time – The time ARC Voltage will remain at the Initial level, before upslope

### UpSlope

Time – The time the ARC Voltage will take to slope from Initial to Weld level

### Weld

ARC – The ARC Voltage at the start of the weld segment

End – The ARC voltage at the end of the Weld segment

### Downslope

Time – The time the ARC Voltage will take to slope from the Weld level to the Final level

### Final

ARC - The ARC Voltage setting during Final time

Time - The time the ARC Voltage will remain at the Final level

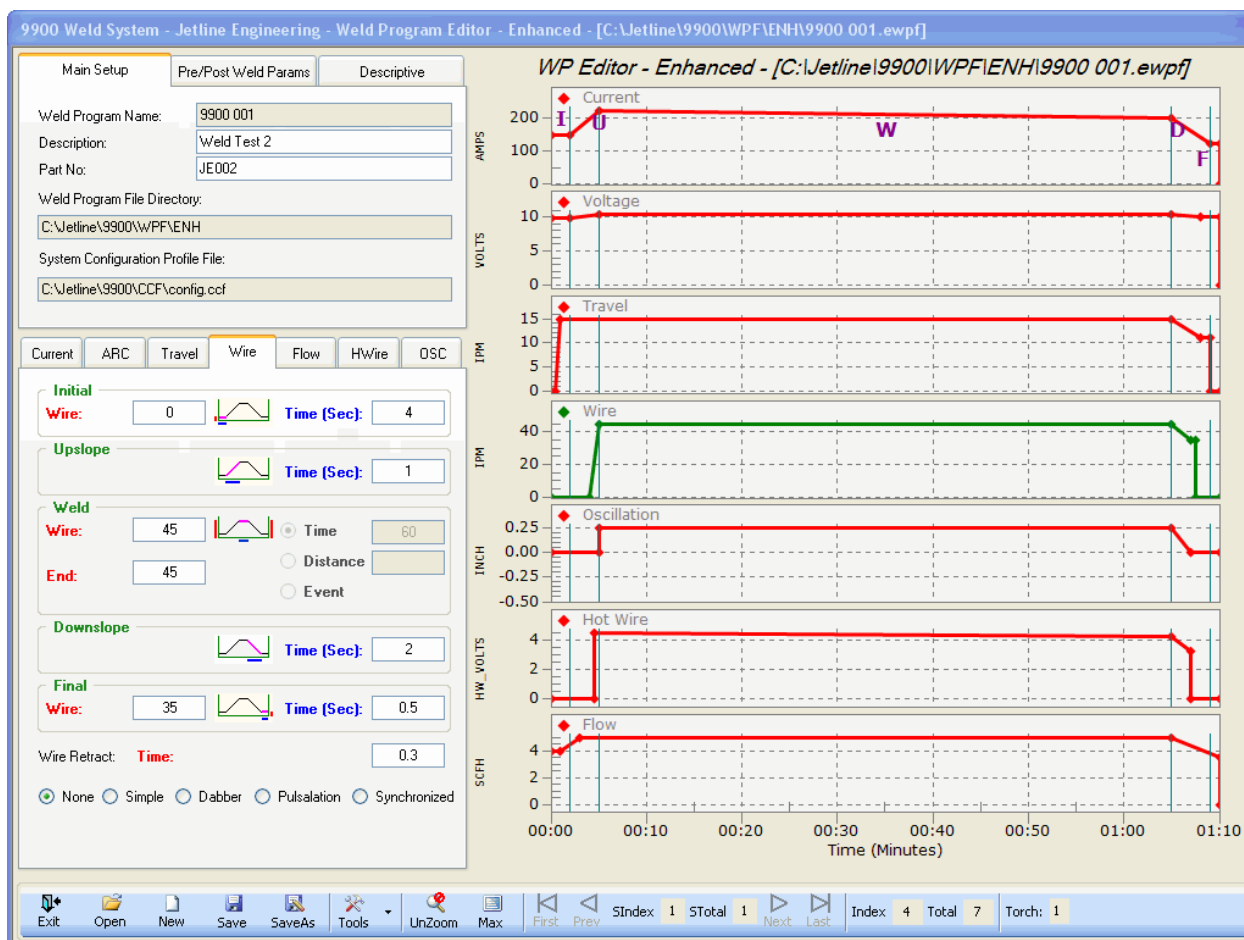
Touch Retract – Check this box to enable system touch retract

Touch Retract: Distance: – Starting arc gap distance if touch retract is enabled

Stop Retract: Distance: – Final torch retract distance after the end of the weld

Stop Retract: Delay: – Amount of time from the end of Final Current to the beginning of the torch retract

Sensitivity (%): – The sensitivity or response of the automatic ALC function to a change in arc voltage or arc length during the weld. Usually set to 20% to 40%. Higher value means faster response



## Channels Window - Wire

### Initial

Wire – The wire feed speed setting during Initial time

Time – The time the wire feed speed will remain at the Initial level, before upslope

### UpSlope

Time – The time the wire feed speed will take to slope from Initial to Weld level

### Weld

Wire – The wire feed speed at the start of the weld segment

End – The wire feed speed at the end of the Weld segment

### Downslope

Time – The time the wire feed speed will take to slope from the Weld level to the Final level

### Final

Wire – The wire feed speed setting during Final time

Time – The amount of time the wire feed speed will remain at the Final level

Wire Retract: Time: – The amount of time

No Pulsing - Check this box to run wire continuously without pulsing, even if the weld current is pulsing

Simple - Check this box to pulse the wire speed synchronized with the weld current pulsing parameters and enter the background percentage for the wire

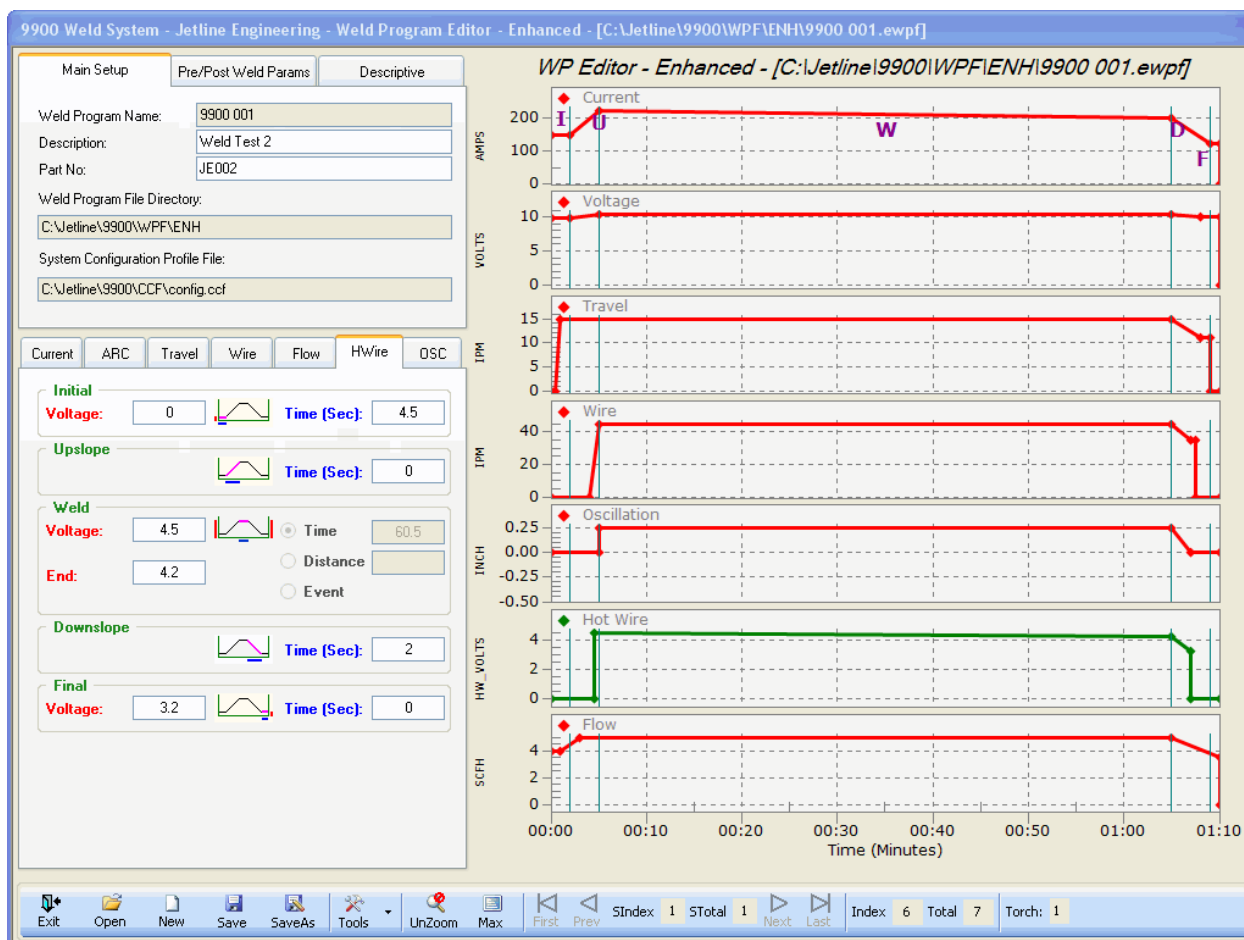
Dabber - Check this box to turn on the Dabber function. The value entered in the box is the distance that the wire is pulled back when the Current goes into background

Pulsation - Check this box to pulse the wire speed synchronized with the oscillation parameters in the

Pulsation mode and enter the background percentage for the wire during the traverse

Synchronized - Check this box to pulse the wire speed synchronized with the oscillation parameters in the Synchronized mode and enter the background percentage for the wire during the traverse

Dabber – How far the wire retracts when in low current state



## Channels Window – Hot Wire

### Initial

Voltage – The hot wire voltage setting during Initial time

Time – The time the hot wire voltage will remain at the Initial level, before upslope

UpSlope – The time the hot wire voltage will take to slope from Initial to Weld level

### Weld

Voltage – The hot wire voltage at the start of the weld segment

End – The hot wire voltage at the end of the Weld segment

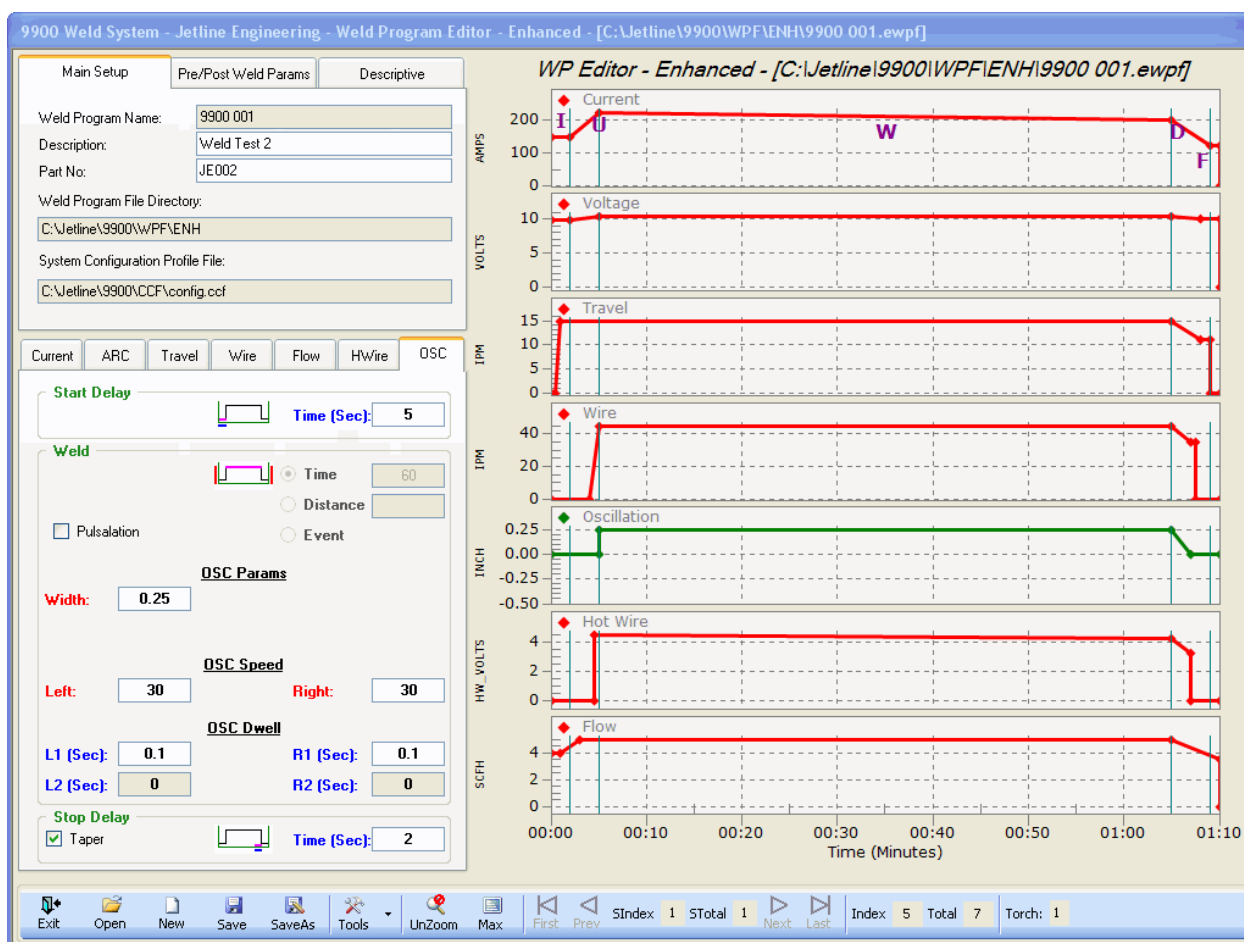
### Downslope

Time – The time the hot wire voltage will take to slope from the Weld level to the Final level

### Final

Voltage – The hot wire voltage setting during Final time

Time – The time the hot wire voltage will remain at the Final level



## Channels Window - OSC (Oscillation)

### Start Delay

Time – Amount of time the start of oscillation is delayed from arc strike

Pulsation – If enabled, pulsation is turn on

### OSC Params

Width – The Width setting of the oscillator, total horizontal torch movement

### OSC Speed

Left – Slide speed when moving to the left

Right – Slide speed when moving to the right

### OSC Dwell

L1 – Amount of time the slide is stopped after moving left and before either returning to the right in Simple oscillation, or before the positioner rotates the Step Distance in Pulsation mode

R1 – Amount of time the slide is stopped after moving right and before either returning to the left in Simple oscillation, or before the positioner rotates the Step Distance in Pulsation mode

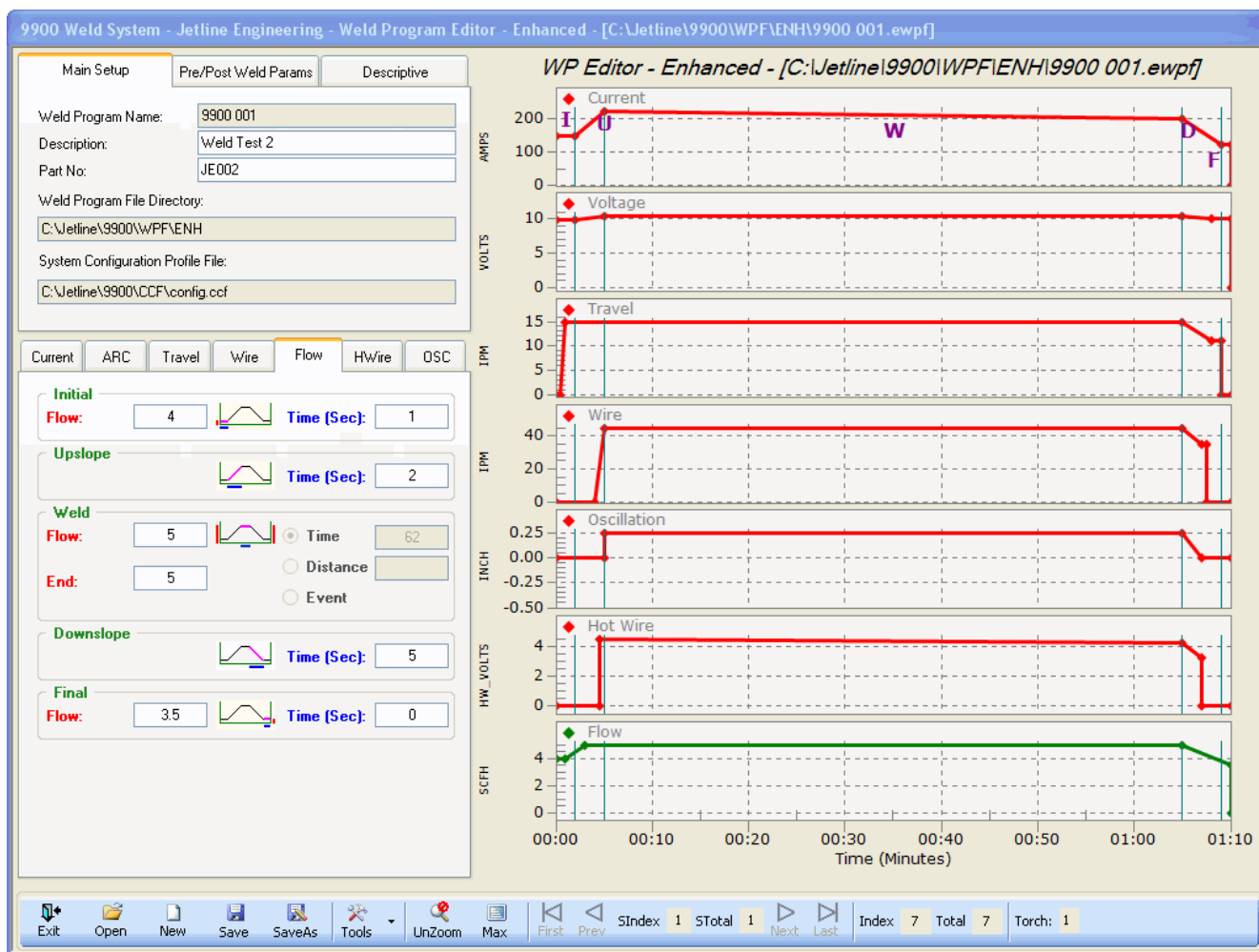
L2 – Pulsation mode only. Amount of time the slide remains stopped after the positioner rotates

the Step Distance and before the slide moves back to the right

R2 – Pulsation mode only. Amount of time the slide remains stopped after the positioner rotates the Step Distance and before the slide moves back to the left

Stop Delay Time – Amount of time the oscillator will continue oscillating after the Downslope segment is initiated

Taper – If enabled the oscillator width will taper from the start of the Downslope, until the end of the stop delay time



## Channels Window – Flow

### Initial

Flow – The gas flow setting during Initial time

Time – The time that the gas flow will remain at the Initial level, before upslope.

UpSlope – The time that the gas flow will take to slope from Initial to Weld level.

### Weld

Flow – The gas flow at the start of the Weld segment.

End – The gas flow at the end of the Weld segment.

### Downslope

Time – The time the gas flow will take to slope from the Weld level to the Final level.

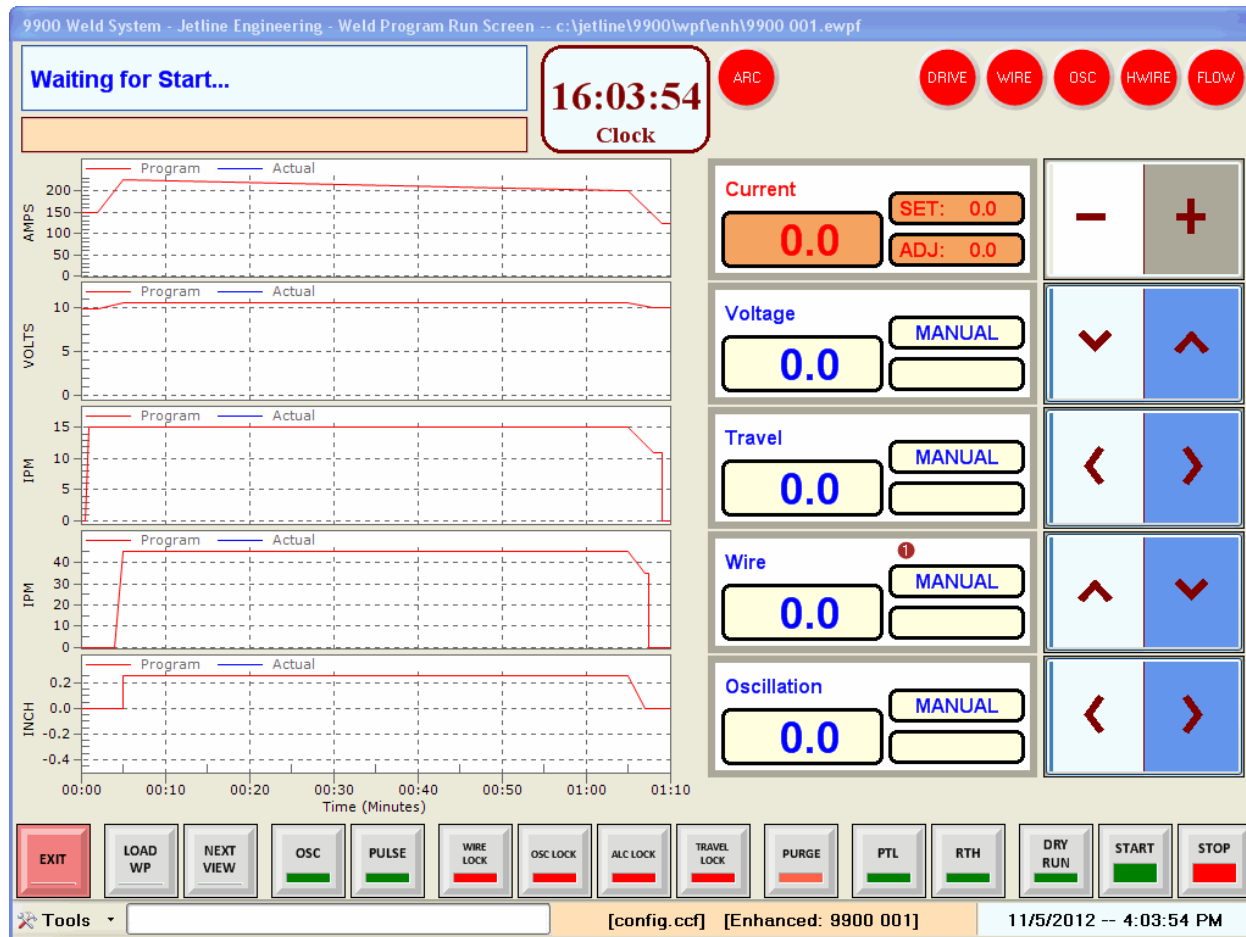
### Final

Flow – The gas flow setting during Final time.

Time – The time the gas flow will remain at the Final level.

## SECTION IV

### WELDING (RUN) SCREENS



#### A. Run Screen

##### Before Weld

Adjust (+/-) Buttons – Before the weld program is started, the button showing arrows will jog that channel. Normal jog speeds are set in the Channel Configuration Editor (Jog) as percentage of top speed. Pressing the button twice will result in Rapid jog. Not all channels can be jogged. The channels that allow the user to jog are shown in blue.

After the weld program starts, the Adjust buttons are shown in brown. At this time the +/- keys are used to adjust the weld program parameters. They can be changed up to the limit that is called out for each channel in the Channel Configuration Editor (trim limit). The speed of adjustment is also set for each channel in the Channel Configuration Editor (Step Size).

Channel Data – The large number under the name for each channel is the Actual reading for that channel. During the weld program, the upper smaller number is the Set Value for that channel

including any adjustment applied during the weld. The lower smaller number is the adjustment from the weld program as a percentage.

Channel Graph – Each channel displays the programmed values for that channel along with the actual data for the weld.

Exit – Exit the run screen. If pressed during a weld, it will cause an emergency stop (with Postflow of Torch gas).

Next View – If the system has more than 5 channels, you can view and adjust their parameters by pressing Next View.

Select WP – Select the weld program to load into the modules.

Wire (Lock/Unlock) – When this button is red, the button is disabled. When the Start button is pressed, the Wire button will turn dark green. When the Wire button is pressed, it will change to light green and the title will change to “Wire Unlock”. While in this state the wire feed will be disabled. If the Wire button is pressed again it will turn back to dark green and the title will change back to “Wire Lock”.

OSC (Lock/Unlock) - When this button is red, the button is disabled. When the start button is pressed, the OSC button will turn dark green. When the OSC button is pressed, it will change to light green and the title will change to “OSC Unlock”. While in this state the oscillator will move back to the home position and stop. If the OSC button is pressed again it will turn back to dark green, the oscillator will be allowed to run, and the title will change back to “OSC Lock”.

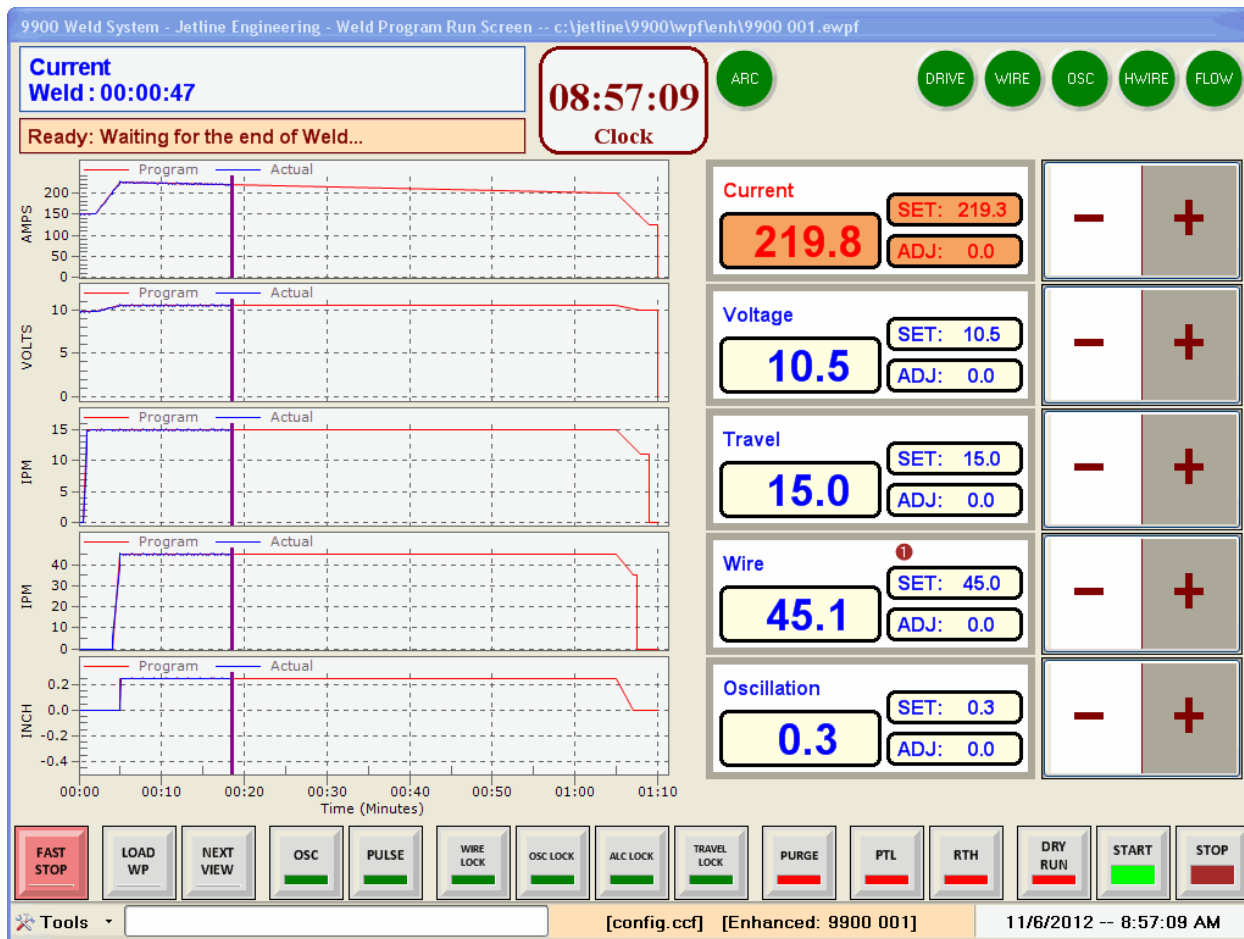
ALC (Lock/Unlock) - When this button is red, the button is disabled. When the Start button is pressed the ALC button will turn dark green. When the ALC button is pressed, it will change to light green and the title will change to “ALC Unlock”. While in this state the ALC will be disabled. During this period the torch can be moved by using the +/- buttons on the screen, or the jog switch on the slide. If the button is pressed again it will turn back to dark green and the title will change back to “ALC Lock”.

Travel (Lock/Unlock) – When this button is red, the button is disabled. When the start button is pressed, the Travel Button will turn dark green. When the Travel button is pressed, it will change to light green and the title will change to “Travel Unlock”. While in this state the travel will stop. If the Travel button is pressed again it will turn back to dark green, the travel will be allowed to run, and the title will change back to “Travel Lock”.

Purge (On/Off) - When this button is red, the button is disabled. When the button is pressed, it will change to light green and the title will change to “Purge Off”. While in this state the gas will flow for both the torch shield gas and the backing gas. If the Purge button is pressed again it will turn back to dark green and the title will change back to “Purge On”.

Start – Pressing this button will start the weld program. The light on the button will be light green while the weld program is running, dark green otherwise.

Stop – Pressing the Stop button during a weld will cause the program to go to Downslope.



## Run Screen - During Weld

The screen shown above is an example of a Run Screen during a weld.

Modify Oscillator Parameters Dialog

Segment Name:

**OSC Weld Parameters**

OSC Params

Width:

OSC Speed

Left:  Right:

OSC Dwell

L1 (Sec):  R1 (Sec):

L2 (Sec):  R2 (Sec):

Press OSC button while the weld is running

### Modify Oscillator Parameters Dialog

Segment Name – Select the segment name to display

OSC Weld Parameters – Parameters are set the same and standard or enhanced

Width - The Width setting of the oscillator, total horizontal torch movement

### **OSC Speed**

Left: - Slide speed when moving to the left

Right: - Slide speed when moving to the right

### **OSC Dwell**

L1 – Amount of time the slide is stopped after moving left and before either returning to the right in Simple oscillation, or before the positioner rotates the Step Distance in Pulsation mode

R1 – Amount of time the slide is stopped after moving right and before either returning to the left

in Simple oscillation, or before the positioner rotates the Step Distance in Pulsation mode

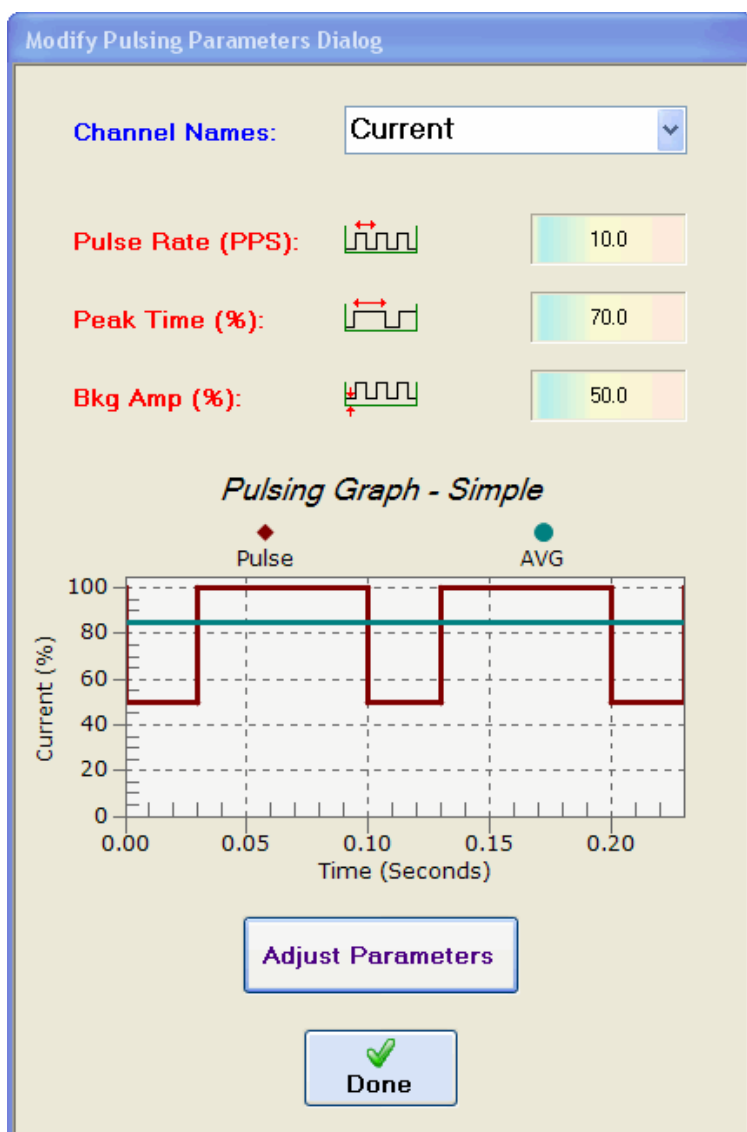
L2 – Pulsation mode only. Amount of time the slide remains stopped after the positioner rotates the Step Distance and before the slide moves back to the right

R2 - Pulsation mode only. Amount of time the slide remains stopped after the positioner rotates the Step Distance and before the slide moves back to the left

Adjust Parameters – Changes the current weld segment to the values on the screen

Start Dry Run – Run the current parameter

Done – Exit this screen



Press PULSE button

## Modifying Pulsing Parameters Dialog

Pulse Control - Parameters are set the same for standard or enhanced

### If in Simple Pulsing

Pulse Rate – Set the pulse frequency in number of pulses per second

Peak Time – Percent of the pulse that is in high current

Bkg Amp – Sets the background amperage level as a percentage of the peak level

### If in VP (AC welding)

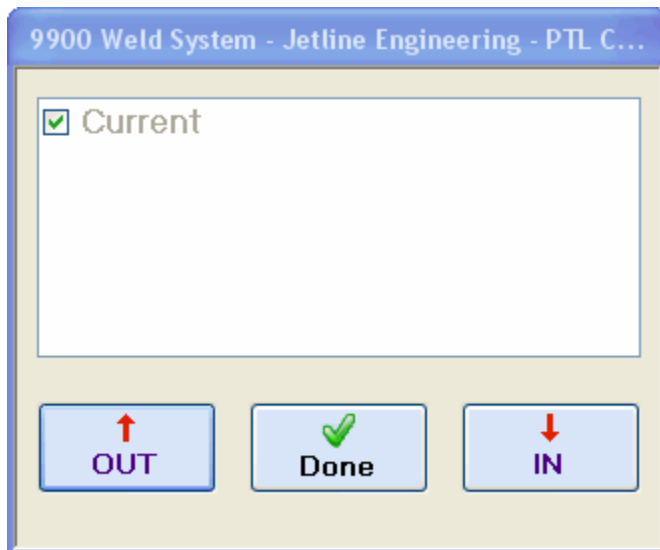
EP Amp (%) – Sets the positive amperage level as a percentage of the peak (negative) level

Frequency (Hz) – Set the pulse frequency in number of pulses per second

EN Time (%) – Percent of the pulse that is in negative electrode

Adjust Parameters – Changes the current weld segment to the values on the screen

Done – Exit this screen



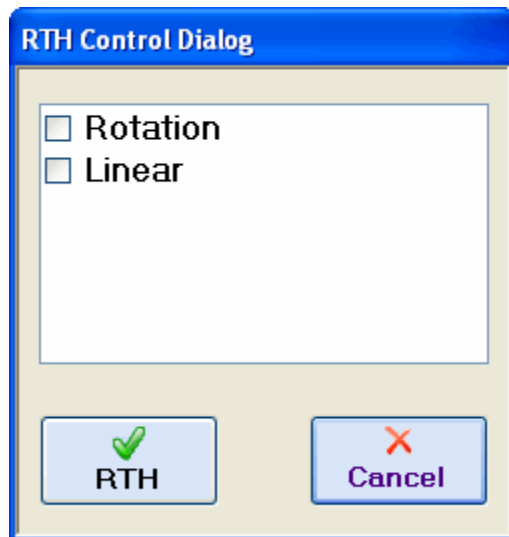
Press PTL Button

### **PTL Control Dialog**

Out – Moves the selected torches away from the work if you have PTL (Pneumatic Torch Lift)

In – Moves the selected torches towards the work if you have PTL

Done – Exit this screen



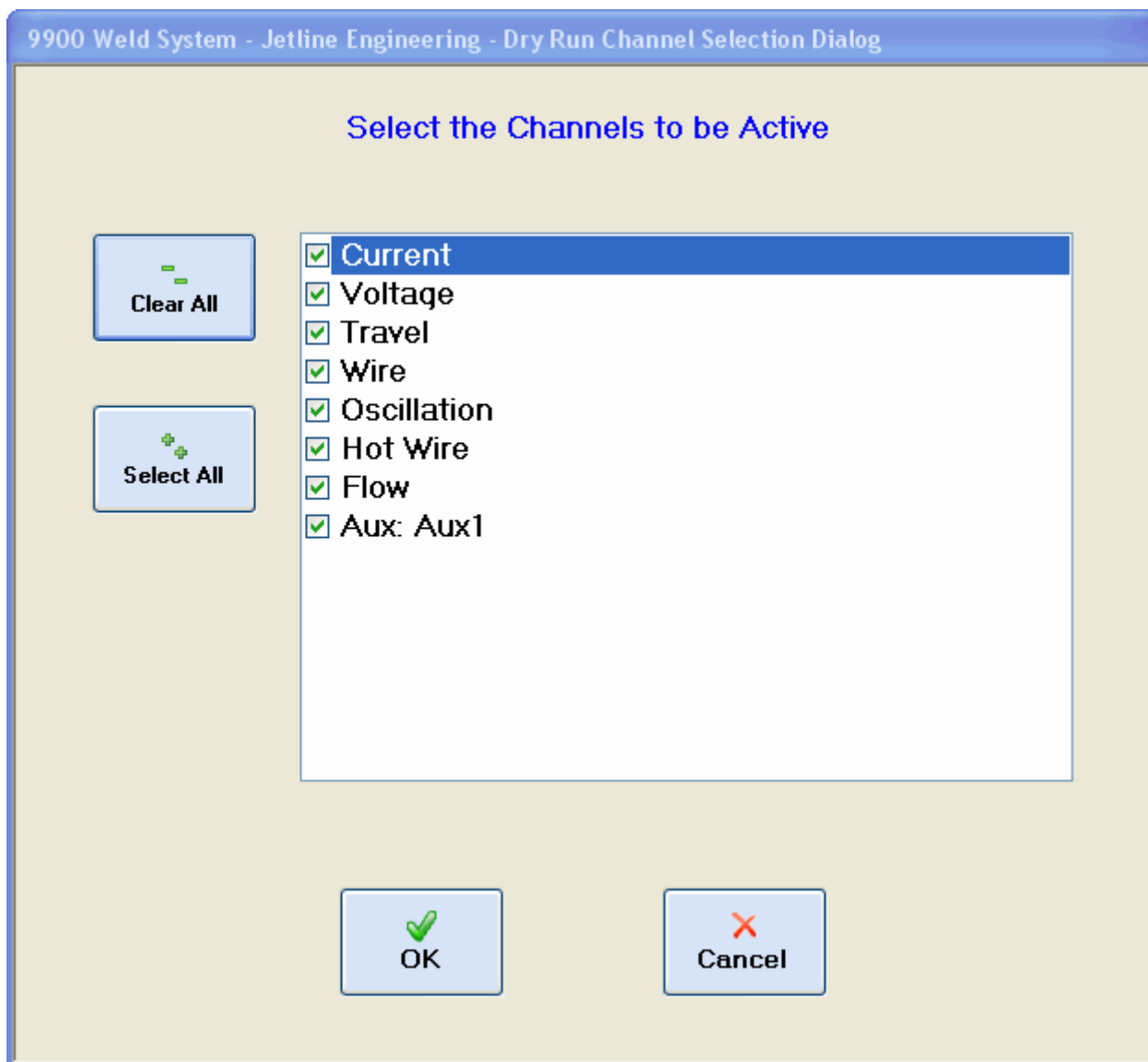
Press RTH Button

- Return to home for all of the selected channels

If there is only one travel channel, pressing the RTH button will start a return to home.

If the system has more than one travel channel, the above dialog box will be shown. The selected channels will complete a return to home when the RTH button is pressed.

Cancel - Exit this screen



Press Dry Run Button

Active Channels – Select (check) which channels are going to be active on the next run weld cycle

OK – Returns to the Run screen. Will run the channels that are selected when the Start button is pressed

Cancel – Exits without any change

9900 Weld System - Jetline Engineering - Users Editing Form

**User Information**

First Name:

Last Name:

Department:

Phone:

Email:

User Name:

Password:

Password Confirm:

**User Activities List**

- ☒ Edit Channel Calibration
- ☒ Select Channel Calibration File
- ☒ Edit Weld Program
- ☒ Run Weld Program
- ☒ Edit MultiPass Program
- ☒ Run MultiPass Program
- ☒ Edit Channel Screen Display
- ☒ System/Weld Settings
- ☒ Edit User Profile
- ☒ Adjust Pulsing
- ☒ Modify System Setting
- ☒ Modify Weld Setting
- ☐ Chinese Run Screen

Clear All      Select All (except Chinese)

Exit Save Print New Clear Delete First Prev Index 1 Total 1 Next Last

From Main Menu, press Users Profile Editor

## B. User Profile

### Users Editing Form

User Information – You can enter the data or review the data for a user.

User Activities List – This list shows what activities that the user is allowed to do.

Edit Channel Calibration – Allows that user to change the calibration numbers.

Select Channel Calibration File – Allows that user to select the calibration file that is used for a new weld program.

Edit Weld Program – Allows the selected user to change or create new weld programs.

Run Weld Program – Allows the selected user to run weld programs.

Edit MultiPass Program – Allows the selected user to change and create new multipass programs.

Run MultPass Program – Allows the selected user to run multipass programs.

Edit Channel Screen Display – Allows the selected user to change how the channels for displays on the run screen.

Edit User Profile – Allows the selected user to edit, add, or delete any of the users profiles.

Adjust Pulsing – When running a weld program with pulsing, allows the operator to change all of the pulsing parameters.

Modify System Setting – Allows the selected user to change system settings on the main screen.

Modify Weld Setting – Allows the selected user to change the weld settings on the main screen.

Chinese Run Screen – For the selected user, the run screen is in Chinese

9900 Weld System - Jetline Engineering - Channel Calibration - [C:\Jetline\9900\CCF\config.ccf]

Current ARC ATravel AWire HWire Flow Oscillation

**Profile Information**

Channel Name:  Torch Index:  IP Address:

Description:

Manufacturer:  Config. Number:

Model:  Rise Time:

☐ Pre Flow Delay in Fixed Info  
☐ Software Input Rectifier  
☐ SStop on Gas Error  
☐ SStop on Water Error  
☐ Level 2 MIG  
☒ PTL Enable

**Auxiliary Devices**

☐ Aux1   
☐ Aux2

**Range**

Units:   
Minimum Value:   
Maximum Value:

**Equivalent DC Reference Volts**

Out:  In:   
Minimum Value:    
Maximum Value:

**Misc Info**

Max Analog Pulses / Second:   
ARC Type:

**Closed Looping Parameters**

Closed Loop Sensitivity:   
I-Term:   
Closed Loop Delay:

**Indicators**

Water ☐  
Gas ☐

**Operator Speeds**

Trim Limit:   
Step Size:

Profile Editor Functions: New Duplicate Delete Clear Print Preview First Prev SubIndex 1 SubTotal 1 Next Last Index 1 Total 7

Profile File Functions: Exit Open New Save SaveAs Print Preview

## C. Configuration

### Channel Configuration Editor - Current Window

#### Profile Information

General information about the make and model of this channel

#### Range

Units – Units of measure for this channel (Amps only)

Minimum Value – Minimum program value for this channel

Maximum Value – Maximum program value for this channel

#### Auxiliary Devices

Indicates if there are auxiliary devices connected to this channel and the name(s) of the devices

#### Equivalent DC Reference Volts

Out – The analog voltage required from the 9900-10 control board to reach the range setting

In – The feedback voltage that is applied at the input of the module for this range setting

### **Misc Info**

Max Analog Pulses/Second – Maximum pulse capability for this welding power supply

ARC Type – Arc type for this channel (TIG, MIG, or Plasma)

### **Closed Looping Parameters**

Closed Loop Sensitivity – The percentage of the error between set and actual that is removed on each loop. Large numbers may result in overshoot

I-Term – Reserved

Closed Loop Delay – Amount of time after the channel is started and before the closed loop routine becomes active

### **Indicators**

Water – If enabled displays the status of the water flow switch

Gas – If enabled displays the status of the gas flow switch

### **Operator Speeds**

Trim Limit – The percentage of change that the operator is allowed to make for this channel during the welding of the part

Step Size – The percentage of change that the user makes each time the +/- keys are pressed

9900 Weld System - Jetline Engineering - Channel Calibration - [C:\Jetline\9900\CCF\config.ccf]

Current ARC **ATravel** DTravel AWire DWire HWire Flow Oscillation

**Profile Information**

Channel Name: ATravel\_1 Torch Index: 1 IP Address: 192.168.001.122

Description: Travel

Manufacturer: Config. Number: 0

Model:

**Auxiliary Devices**

☐ Aux1 ☐ Aux2

**Gain**

Input Gain: 5

**Range**

Units: IPM

Minimum Value: 1

Maximum Value: 100

**Equivalent DC Reference Volts**

Out: Minimum Value: 0.080 Maximum Value: 9.400

In: Minimum Value: 0.210 Maximum Value: 9.580

**Misc Info**

Max Analog Pulses / Second: 0

Movement Type: Radial

Encoder Type: NA

Encoder Counts / Revolution: 0

Gear Ratio (Encoder Revs/Unit): 0.0000

**Closed Looping Parameters**

Closed Loop Sensitivity: 1

Closed Loop Delay: 1

**Operator Speeds**

Trim Limit: 99 Jog: 15

Slow Home Speed: 25

Step Size: 1

Profile Editor Functions: New Duplicate Delete Clear Print Preview First Prev SubIndex 1 SubTotal 1 Next Last Index 3 Total 9

Profile File Functions: Exit Open New Save SaveAs Print Preview

## Channel Configuration Editor - ATravel Window

### Profile Information

General information about the make and model of this channel

### Range

Units – Units of measure for this channel (IPM - inches per minute, CPM - centimeters per minute, or RPM - revolutions per minute)

Minimum Value – Minimum program value for this channel

Maximum Value – Maximum program value for this channel

### Auxiliary Devices

Indicates if there are auxiliary devices connected to this channel and the name(s) of the devices

### Gain

This is the input gain for feedback. 1 if jumper is on J1, 5 if jumper is on J2, or 10 if jumper is on J3 on the 9900-10 board

### Equivalent DC Reference Volts

Out – The analog voltage required from the 9900-10 control board to reach the range setting

In – The feedback voltage that is applied at the input of the module for this range setting

### **Misc Info**

Max Analog Pulses/Second – Maximum pulse capability for this device

Movement Type – Radial (for circumferential welding positioned) or Linear (track & carriage, turning rolls)

Encoder Type – Pulse Generator, Encoder, or NA for none

Encoder Counts/Revolution – The number of ticks on the encoder

Gear Ratio – Gear ratio between encoder shaft and unit of measure (eg. 25 encoder shaft turns per inch of travel)

### **Closed Looping Parameters**

Closed Loop Sensitivity – The percentage of the error between set and actual that is removed on each loop. Large numbers may result in overshoot

Closed Loop Delay – Amount of time after the channel is started and before the closed loop routine becomes active

### **Operator Speeds**

Trim Limit – The percentage of change that the operator is allowed to make for this channel during the welding of the part

Step Size – The percentage of change that the user makes each time the +/- keys are pressed

Jog Speed – Percentage of maximum speed for the channel to move during jog

Slow Home Speed – Percentage of maximum speed for the travel channel for a slow return to home

9900 Weld System - Jetline Engineering - Channel Configuration Editor - [C:\Jetline\9900\CCF\config.ccf]

Current **ARC** ATravel DTravel AWire DWire HWire Flow Oscillation

**Profile Information**

Channel Name:  Torch Index:  IP Address:

Description:

Manufacturer:  Config. Number:

Model:

**Auxiliary Devices**

☐ Aux1

☐ Aux2

**Gain**

Input Gain:

**Range**

Units:

Minimum Value:

Maximum Value:

**Equivalent DC Reference Volts**

In:

Minimum Value:

Maximum Value:

**Misc Info**

90Hz Ratio:  ARC Distance Units:

Deadband:

ARC Type:

Lift Start: ☐ Lift Start Time:

**Closed Looping Parameters**

P-Term

I-Term

Closed Loop Delay

**Operator Speeds**

Trim Limit:

Retract:  Jog Up:

Step Size:  Jog Down:

Profile Editor Functions: New Duplicate Delete Clear Print Preview First Prev SubIndex 1 SubTotal 1 Next Last Index 2 Total 9

Profile File Functions: Exit Open New Save SaveAs Print Preview

## Channel Configuration Editor – ARC (Arc Length Control) Window

### Profile Information

General information about the make and model of this channel

### Range

Units – Units of measure for this channel (Volts only)

Minimum Value – Minimum program value for this channel

Maximum Value – Maximum program value for this channel

### Auxiliary Devices

Indicates if there are auxiliary devices connected to this channel and the name(s) of the devices

Gain –10 only

### Equivalent DC Reference Volts

In – The feedback voltage that is applied at the input of the module for this range setting

### Misc Info

Deadband – Range of voltage around the set value that the controller will not move torch

ARC Type – Arc type for this channel (TIG, MIG, or Plasma)

Arc Distance Units – Inch or Centimeters

Lift Start – If enabled the torch will do a lift start

Lift Start Time – Amount of time the torch will touch the work after current is applied before it moves up

90 Hz Ration – AC voltage ratio offset at 90 Hz

### **Closed Looping Parameters**

P- Term – P term of PID control for ARC length feedback control

I-Term - I term of PID control for ARC length feedback control

Closed Loop Delay – Amount of time after the channel is started before the closed loop routine becomes active

### **Operator Speeds**

Trim Limit – The percentage of change that the operator is allowed to make for this channel during the welding of the part

Step Size – The percentage of change that the user makes each time the +/- keys are pressed

Jog Up – Percentage of maximum speed for the channel to move during jog up

Jog Down – Percentage of maximum speed for the channel to move during jog down

Retract - Percentage of maximum speed for the channel to move during retract

9900 Weld System - Jetline Engineering - Channel Configuration Editor - [C:\Jetline\9900\CCF\config.ccf]

Current ARC ATravel DTravel **AWire** DWire HWire Flow Oscillation

**Profile Information**

Channel Name:  Torch Index:  IP Address:

Description:

Manufacturer:  Config. Number:

Model:

☐ Manual Button  
☐ Analog Input Inverted  
☐ Switch Motor Direction  
☐ Switch Jog Direction

**Auxiliary Devices**

☒ Aux1   
☐ Aux2

**Gain**

Input Gain:

**Range**

Units:    
Minimum Value:   
Maximum Value:

**Equivalent DC Reference Volts**

Out:  In:   
Minimum Value:    
Maximum Value:

**Misc Info**

Max Analog Pulses / Second:

ARC Type:

Encoder Type:   
Encoder Counts / Revolution:   
Gear Ratio (Encoder Revs/Unit):

**Closed Looping Parameters**

Closed Loop Sensitivity:   
Closed Loop Delay:

**Operator Speeds**

Trim Limit:  Jog:   
Retract:   
Step Size:

Profile Editor Functions:         SubIndex  SubTotal    Index  Total

Profile File Functions:

## Channel Configuration Editor - AWire Window

Profile Information – General information about the make and model of this channel

### Range

Units – Units of measure for this channel (IPM - inches per minute or CPM - centimeters per minute)

Minimum Value – Minimum program value for this channel

Maximum Value – Maximum program value for this channel

### Auxiliary Devices

Indicates if there are auxiliary devices connected to this channel and the name(s) of the devices

### Gain

This is the input gain for feedback. 1 if jumper on J1, 5 if jumper on J2, or 10 if jumper on J3 on the 9900-10 board

### Equivalent DC Reference Volts

Out – The analog voltage needed out of the 9900-10 control board to get the range setting

In – The feedback voltage that is applied at the input of the module for this range setting

### **Misc Info**

Max Analog Pulses/Second – Maximum pulses for this power supply

ARC Type – Arc type for this channel (TIG, MIG, or Plasma)

Encoder Type – Pulse Generator, Encoder, or NA for none

Encoder Counts/Revolution – The number of ticks on the encoder

Gear Ratio – The ratio of the gears on the encoder

### **Closed Looping Parameters**

Closed Loop Sensitivity – The percentage of the error between set and actual that is removed on each loop. Large numbers may result in overshoot

Closed Loop Delay – Amount of time after the channel is started before the closed loop routine becomes active

### **Operator Speeds**

Trim Limit – The percentage of change that the operator is allowed to make for this channel during the welding of the part

Step Size – The percentage of change that the user makes each time the +/- keys are pressed

Jog Speed – Percentage of maximum speed for the channel to move during jog

Retract – Percentage of maximum speed that the wire moves during a retract

9900 Weld System - Jetline Engineering - Channel Configuration Editor - [C:\Jetline\9900\CCF\config.ccf]

Current ARC ATravel DTravel AWire DWire **HWire** Flow Oscillation

**Profile Information**

Channel Name: HWire\_1 Torch Index: 1 IP Address: 192.168.001.125

Description: Hot Wire:

Manufacturer: Config. Number: 0

Model:

**Auxiliary Devices**

☐ Aux1 ☐ Aux2

**Gain**

Input Gain: 1

**Range**

Units: HW\_VOLTS

Minimum Value: 3

Maximum Value: 15

**Equivalent DC Reference Volts**

Out: Minimum Value: 0.23 Maximum Value: 9.54

In: Minimum Value: 0.215 Maximum Value: 9.742

**Misc Info**

Max Analog Pulses / Second: 0

**Closed Looping Parameters**

Closed Loop Sensitivity: 1

I-Term: 0

Closed Loop Delay: 1

**Operator Speeds**

Trim Limit: 99

Step Size: 1

Profile Editor Functions: New Duplicate Delete Clear Print Preview First Prev SubIndex 1 SubTotal 1 Next Last Index 6 Total 9

Profile File Functions: Exit Open New Save SaveAs Print Preview

## Channel Configuration Editor - Hot Wire Window

Profile Information – General information about the make and model of this channel

### Range

Units – Units of measure for this channel (hot wire volts)

Minimum Value – Minimum program value for this channel

Maximum Value – Maximum program value for this channel

### Auxiliary Devices

Indicates if there are auxiliary devices connected to this channel and the name(s) of the devices

### Gain

This is the input gain for feedback. 1 if jumper on J1, 5 if jumper on J2, or 10 if jumper on J3 on the 9900-10 board

### Equivalent DC Reference Volts

Out – The analog voltage needed out of the 9900-10 control board to get the range setting

In – The feedback voltage that is applied at the input of the module for this range setting

### Misc Info

Max Analog Pulses/Second – Maximum pulses for this power supply

### **Closed Looping Parameters**

Closed Loop Sensitivity – The percentage of the error between set and actual that is removed on each loop. Large numbers may result in overshoot

### **I-Term - Reserved**

Closed Loop Delay – Amount of time after the channel is started before the closed loop routine becomes active

### **Operator Speeds**

Trim Limit – The percentage of change that the operator is allowed to make for this channel during the welding of the part

Step Size – The percentage of change that the user makes each time the +/- keys are pressed

9900 Weld System - Jetline Engineering - Channel Configuration Editor - [C:\Jetline\9900\CCF\config.ccf]

Current ARC ATravel DTravel AWire DWire HWire Flow Oscillation

**Profile Information**

Channel Name: Oscillation\_1 Torch Index: 1 IP Address: 192.168.001.124

Description: Oscillation:

Manufacturer: Config. Number: 0

Model:

**Auxiliary Devices**

☐ Aux1 ☐ Aux2

**Gain**

Input Gain: 1

**Range**

Units: INCH

Minimum Value: 0

Maximum Value: 10

**Equivalent DC Reference Volts**

In: 0

Minimum Value:

Maximum Value: 5

**Misc Info**

Stepper Counts / Revolution: 1 Acceleration/Deceleration: 100

Drive Ratio (Motor Revs/Unit): 1 Maximum Speed: 120

**Closed Loop Parameters**

Closed Loop Sensitivity: 0

Closed Loop Delay: 0

**Operator Speeds**

Trim Limit: 99

Jog: 5

Step Size: 1

Profile Editor Functions: New Duplicate Delete Clear Print Preview First Prev SubIndex 1 SubTotal 1 Next Last Index 5 Total 9

Profile File Functions: Exit Open New Save SaveAs Print Preview

## Channel Configuration Editor - Oscillation Window

Profile Information – General information about the make and model of this channel

### Range

Units – Units of measure for this channel (Inch or Centimeter)

Minimum Value – Minimum program value for this channel

Maximum Value – Maximum program value for this channel

### Auxiliary Devices

Indicates if there are auxiliary devices connected to this channel and the name(s) of the devices

### Gain

Reserved

### Equivalent DC Reference Volts

In – The feedback voltage that is applied at the input of the module for this range setting

### Misc Info

Stepper Counts/Revolution – Stepper counts per revelation on the motor

Drive Ratio – The gear ratio on the stepper motor

Acceleration/Deceleration – The acceleration/deceleration speed of the stepper motor

Maximum Speed – Maximum speed of the slide

### **Closed Looping Parameters**

Closed Loop Sensitivity – The percentage of the error between set and actual that is removed on each loop. Large numbers may result in overshoot.

### **I-Term - Reserved**

Closed Loop Delay – Amount of time after the channel is started before the closed loop routine becomes active

### **Operator Speeds**

Trim Limit – The percentage of change that the operator is allowed to make for this channel during the welding of the part

Step Size – The percentage of change that the user makes each time the +/- keys are pressed

### **Jog**

Percentage of maximum speed for the channel to move during jog

9900 Weld System - Jetline Engineering - Channel Configuration Editor - [C:\Jetline\9900\CCF\config.ccf]

Current ARC ATravel **DTravel** AWire DWire HWire Flow Oscillation

**Profile Information**

Channel Name: DTravel\_1 Torch Index: 1 IP Address: 192.168.001.127

Description: Travel: ☐ No Emergency Stop

Manufacturer:  Config. Number: 0 ☐ Analog Input Inverted

Model:  ☐ Switch Motor Direction

☐ No Travel Lock

☐ Switch Jog Direction

**Auxiliary Devices**

☐ Aux1

☐ Aux2

**Range**

Units: IPM

Minimum Value: 2.000

Maximum Value: 250.000

**Equivalent DC Reference Volts**

☐ In: 0.540

Minimum Value:

Maximum Value: 9.870

**Misc Info**

Stepper Counts / Revolution: 500 Acceleration/Deceleration: 1000 Encoder Type: NA

Drive Ratio (Motor Revs/Unit): 19.7500 Home Speed: 25 Encoder Counts / Revolution: 0

Movement Type: Linear  Home Distance: 1 Gear Ratio (Encoder Revs/Unit): 0

**Closed Looping Parameters**

Closed Loop Sensitivity: 0

I-Term: 0

Closed Loop Delay: 0

**Operator Speeds**

Trim Limit: 99 Jog: 25

Step Size: 1.0

Profile Editor Functions: New Duplicate Delete Clear Print Preview First Prev SubIndex 1 SubTotal 1 Next Last Index 8 Total 9

Profile File Functions: Exit Open New Save SaveAs Print Preview

**Channel Configuration Editor – DTravel**  
**Profile Information** – General information about the make and model of this channel.

### Range

**Units** – Units of measure for this channel (Inch or Centimeter)

**Minimum Value** – Minimum program value for this channel

**Maximum Value** – Maximum program value for this channel

### Auxiliary Devices

Indicates if there are auxiliary devices connected to the channel and the name(s) of the devices

### Equivalent DC Reference Volts

**In** – The feedback voltage that is applied at the input of the module for this range setting

### Misc Info

**Stepper Counts/Revolution** – Stepper counts per revelation on the motor.

**Drive Ratio** – The gear ratio of the stepper drive

**Movement Type** – Radial (for circumferential welding positioned) or Linear (track & carriage, turning rolls)

**Acceleration/Deceleration** – The acceleration/deceleration speed of the stepper motor.

**Home Speed** – The percentage of maximum speed of the travel when it finds home the second time

Home Distance – When find home, the travel will first move at maximum speed until it find home. It will then move back this distance before it finds home at the slower speed. On a linear system, the distance is how far in the range units that it moves back and in degrees if in radial.

Encoder Type – Pulse Generator, Encoder, or NA for none for actual travel speed

Encoder Counts/Revolution – The number ticks on the encoder

Gear Ratio – Gear Ratio between encoder shaft and the unit measure (eg. 25 encoder shaft turns per inch of travel)

### **Closed Looping Parameters**

Closed Loop Sensitivity – The percentage of the error between set and actual that is removed on each loop. Larger numbers may result in overshoot.

I-Term – Reserved

Closed Loop Delay – Amount of time after the channel is started and before the closed loop routine becomes active.

### **Operator Speed**

Trim Limit – The percentage of change that the operator is allowed to make for this channel during the welding of the parts.

Step Size – The percentage of change that the user makes each time the +/- keys are pressed.

Jog Speed – Percentage of maximum speed for the channel to move during jog.

9900 Weld System - Jetline Engineering - Channel Configuration Editor - [C:\Jetline\9900\CCF\config.ccf]

Current ARC ATravel DTravel AWire **DWire** HWire Flow Oscillation

**Profile Information**

Channel Name: DWire\_1 Torch Index: 1 IP Address: 192.168.001.128

Description: Wire:

Manufacturer: Config. Number: 0

Model:

☐ Analog Input Inverted  
☐ Switch Motor Direction  
☐ Switch Jog Direction

**Auxiliary Devices**

☐ Aux1  
☐ Aux2

**Range**

Units: IPM

Minimum Value: 4

Maximum Value: 500

**Equivalent DC Reference Volts**

In: 0.215

Minimum Value: 0.215

Maximum Value: 9.086

**Misc Info**

Stepper Counts / Revolution: 500.00 Acceleration/Deceleration: 1000 Encoder Type: NA

Drive Ratio (Motor Revs/Unit): 25.0000 Pull Back Speed: 1500.0 Encoder Counts / Revolution: 0

ARC Type: TIG Gear Ratio (Encoder Revs/Unit): 0

**Closed Looping Parameters**

Closed Loop Sensitivity: 0

Closed Loop Delay: 0

**Operator Speeds**

Trim Limit: 99 Jog: 25

Retract: 75

Step Size: 1.0

Profile Editor Functions: New Duplicate Delete Clear Print Preview First Prev SubIndex 1 SubTotal 1 Next Last Index 9 Total 9

Profile File Functions: Exit Open New Save SaveAs Print Preview

**Channel Configuration Editor – DWire**  
**Profile Information** – General information about the make and model of this channel.

### Range

**Units** – Units of measure for this channel (Inch or Centimeter)

**Minimum Value** – Minimum program value for this channel

**Maximum Value** – Maximum program value for this channel

### Auxiliary Devices

Indicates if there are auxiliary devices connected to the channel and the name(s) of the devices

### Equivalent DC Reference Volts

**In** – The feedback voltage that is applied at the input of the module for this range setting

### Misc Info

**Stepper Counts/Revolution** – Stepper counts per revelation on the motor.

**Drive Ratio** – The gear ratio of the stepper drive

**Movement Type** – Radial (for circumferential welding positioned) or Linear (track & carriage, turning rolls)

**Acceleration/Deceleration** – The acceleration/deceleration speed of the stepper motor.

**Pull Back Speed** – How fast the wire moves backwards when in dabbing

Encoder Type – Pulse Generator, Encoder, or NA for none for actual travel speed

Encoder Counts/ Revolution – The number ticks on the encoder

Gear Ratio – Gear Ratio between encoder shaft and the unit measure (eg. 25 encoder shaft turns per inch of travel)

#### **Closed Looping Parameters**

Closed Loop Sensitivity – The percentage of the error between set and actual that is removed on each loop. Larger numbers may result in overshoot.

Closed Loop Delay – Amount of time after the channel is started and before the closed loop routine becomes active.

#### **Operator Speed**

Trim Limit – The percentage of change that the operator is allowed to make for this channel during the welding of the parts.

Retract – Percentage of maximum speed that the wire moves during retract.

Step Size – The percentage of change that the user makes each time the +/- keys are pressed.

Jog Speed – Percentage of maximum speed for the channel to move during jog.

9900 Weld System - Jetline Engineering - Channel Configuration Editor - [C:\Jetline\9900\CCF\config.ccf]

Current ARC ATravel DTravel AWire DWire HWire **Flow** Oscillation

**Profile Information**

Channel Name: Flow\_1 Torch Index: 1 IP Address: 192.168.001.126

Description: Flow:

Manufacturer: Config. Number: 0

Model:

☐ Analog Input inverted  
☐ Analog Output inverted

**Auxiliary Devices**

☐ Aux1  
☐ Aux2

**Gain**

Input Gain: 1

**Range**

Units: SCFH

Minimum Value: 2

Maximum Value: 12.0

**Equivalent DC Reference Volts**

Out: Minimum Value: 0.100 Maximum Value: 9

In: Minimum Value: 1.000 Maximum Value: 9

**Misc Info**

**Closed Looping Parameters**

Closed Loop Sensitivity: 0

I-Term: 0

Closed Loop Delay: 0

**Operator Speeds**

Trim Limit: 99

Step Size: 1

Profile Editor Functions: New Duplicate Delete Clear Print Preview First Prev SubIndex 1 SubTotal 1 Next Last Index 7 Total 9

Profile File Functions: Exit Open New Save SaveAs Print Preview

**Channel Configuration Editor – Flow**  
**Profile Information** – General information about the make and model of this channel.

### **Range**

**Units** – Units of measure for this channel (SCFH, LPM, or CPM)

**Minimum Value** – Minimum program value for this channel

**Maximum Value** – Maximum program value for this channel

### **Auxiliary Devices**

Indicates if there are auxiliary devices connected to the channel and the name(s) of the devices

### **Equivalent DC Reference Volts**

**Out** – The analog voltage required from the 9900-10 control board to reach this setting

**In** – The feedback voltage that is applied at the input of the module for this range setting

### **Closed Looping Parameters**

**Closed Loop Sensitivity** – The percentage of the error between set and actual that is removed on each loop. Larger numbers may result in overshoot.

**I-Term - reserved**

Closed Loop Delay – Amount of time after the channel is started and before the closed loop routine becomes active.

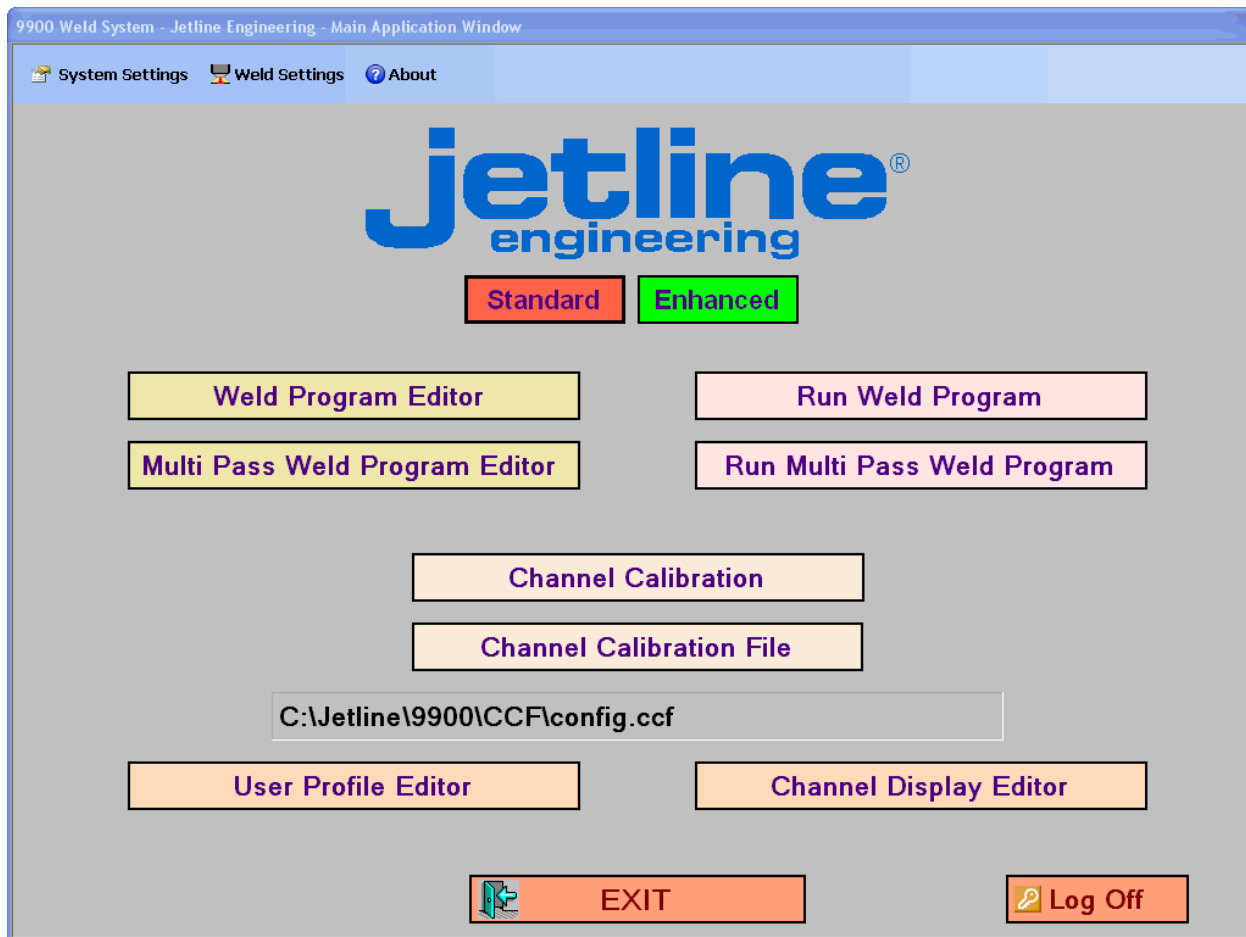
**Operator Speed**

Trim Limit – The percentage of change that the operator is allowed to make for this channel during the welding of the parts.

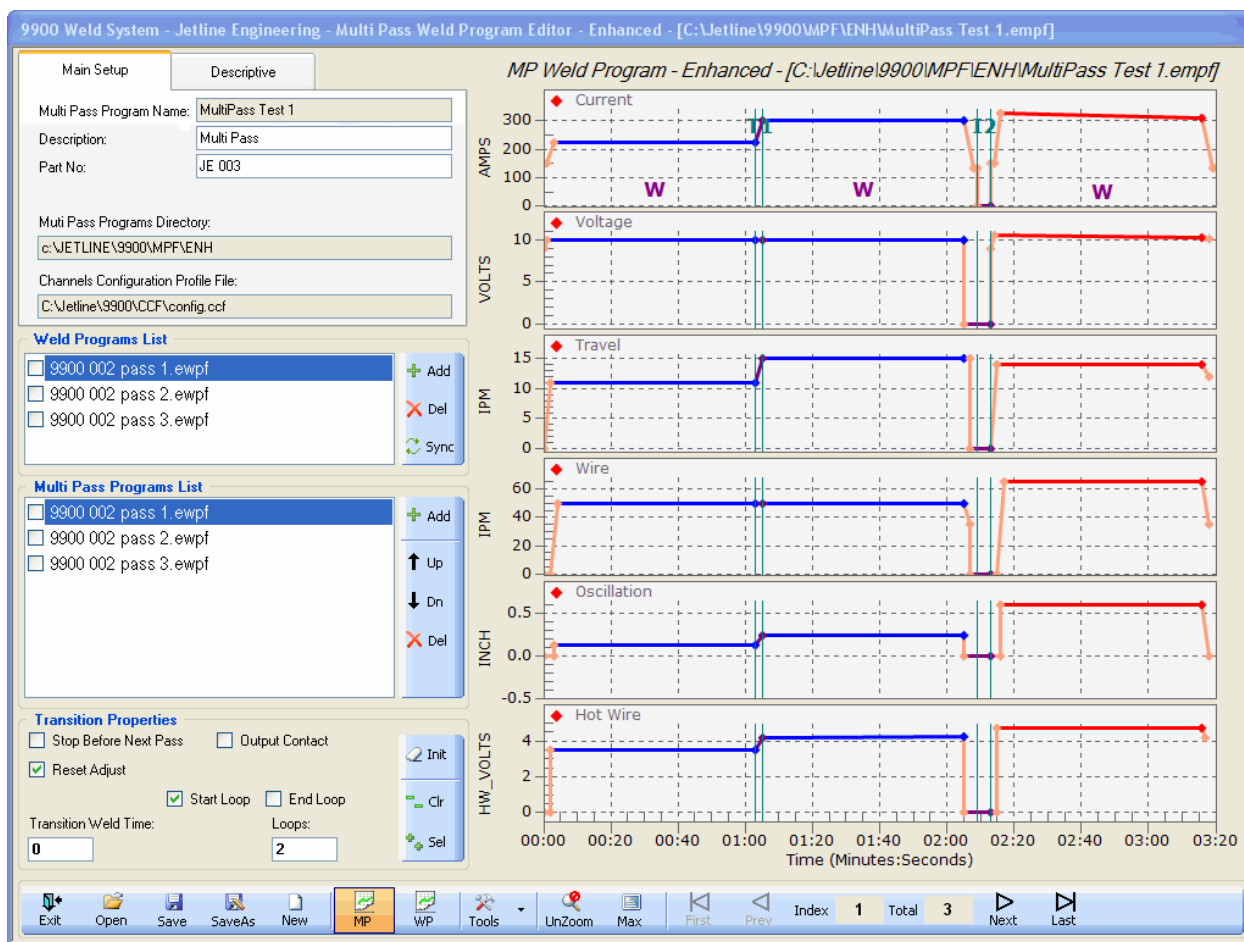
Step Size – The percentage of change that the user makes each time the +/- keys are pressed.

## SECTION V

### MULTI-PASS PROGRAM OPTION



If you have the MultiPass option enabled your main screen will show Multi-Pass Weld Program Editor and Run Multi-Pass Weld Program.



## A. Multi-Pass Weld Program Editor Screens

### Main Setup Window

From the Main Application screen, press Multi-Pass Weld Program Editor button to enter the setup windows

Weld Program Name – The file name for this weld program

Description – Filled in by the user

Part No. – Filled in by the user

Weld Program File Directory – Location on the computer where the weld program is stored

System Configuration Profile File – Location on the computer where the configuration file is stored

Graph – The graph to the right shows the multi pass weld program or any single weld program

### Bottom Bar

Exit – Exit the weld program editor

Save – Save the changes that you have made to the Multi-Pass weld program

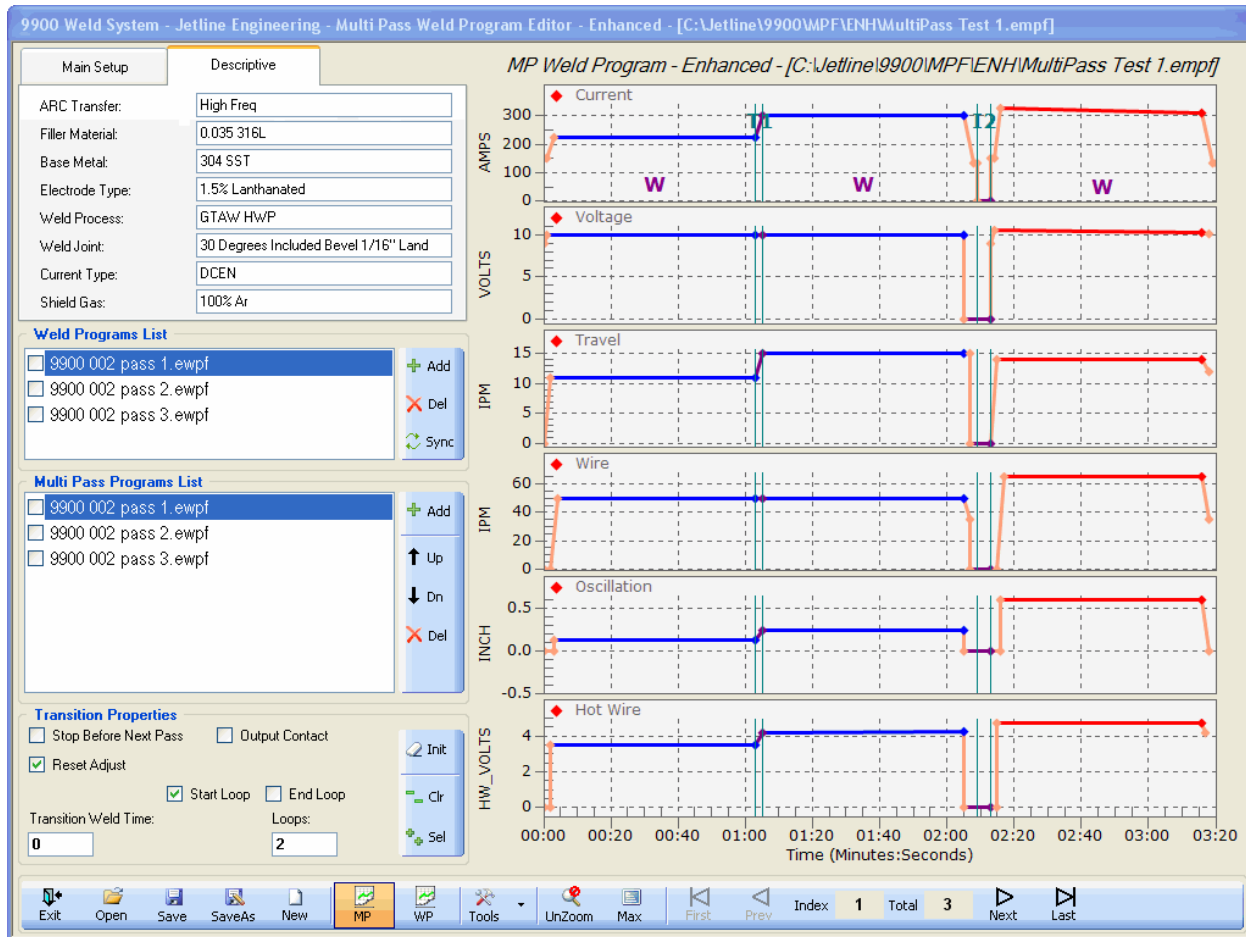
Open – Open a different weld program

SaveAs – Save the changes that you have made under a different Multi-Pass weld program name

New – Start a new Multi-Pass weld program

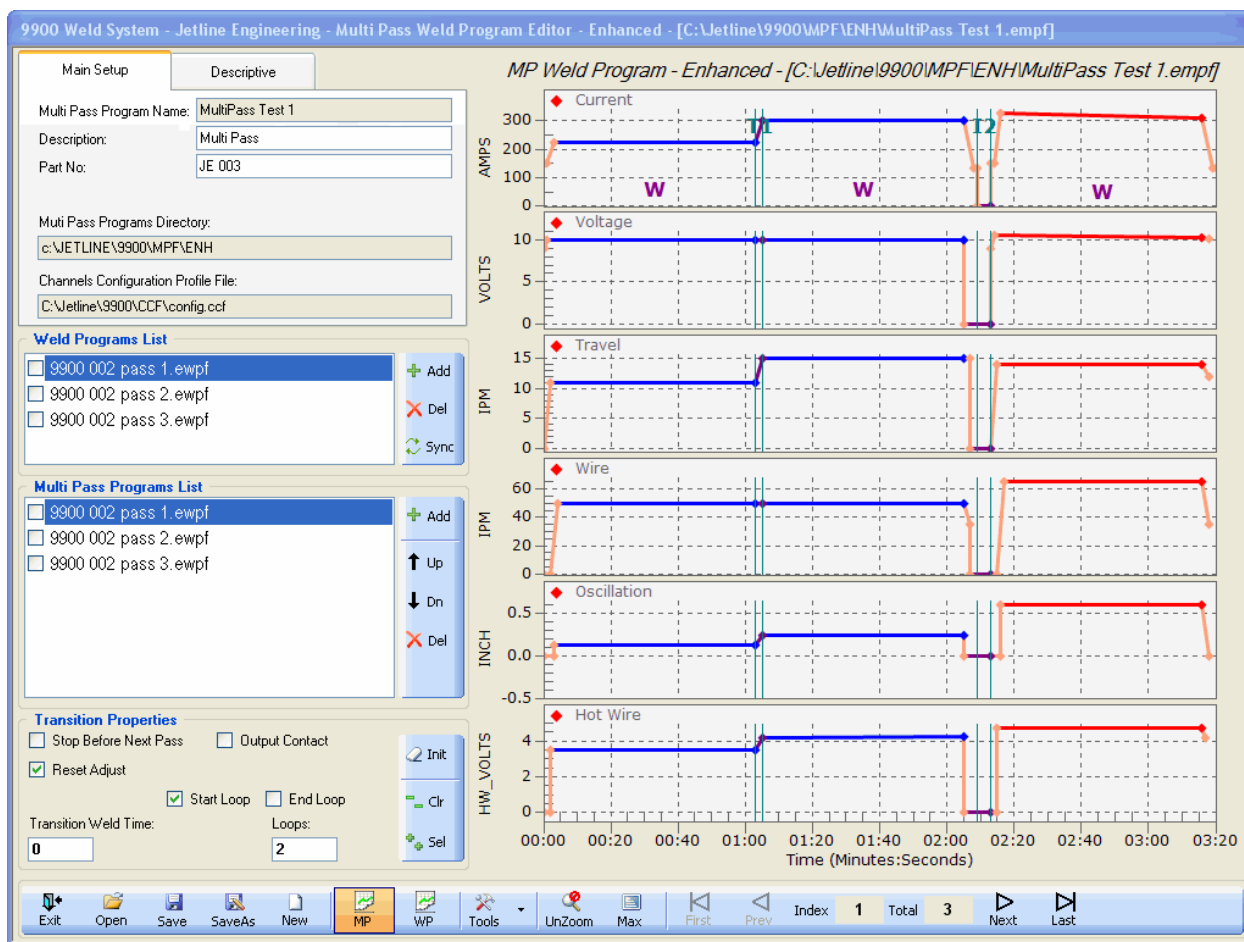
MP – In the graph shows the entire Multi-Pass program

WP – In the graph only shows that weld program that is selected in blue Multi-Pass Programs List



## Descriptive Window Fields

Descriptive – These fields can be filled in to document details of the weld process



## Weld Programs List

When you start a new Multi-Pass program, this box will show all the weld programs that can be added to the Multi-Pass program. The Add button on the side of the weld program list lets you add more program, the delete will remove programs and the Sync will only show weld program that are in the Multi-Pass programs list.

## Multi-Pass Programs List

This shows that order of weld programs that are called in the Multi-Pass program. To add a weld program to this list, click on the box that you would

like to add in the Weld Programs List, and then press Add in the Multi-Pass Programs List. You may add a weld program more than once into the Multi-Pass Program List. If the order of the weld program is not what you want you can select the weld program and then use the Up or Dn button to move it. The Del button will delete the selected weld program from the Multi-Pass Programs List.

## Transition Properties

Each weld program (except the last) need to be told how to move to the next weld program. Select each weld program and then program what takes place at the end. For the last weld program it will always end just like a single pass program.

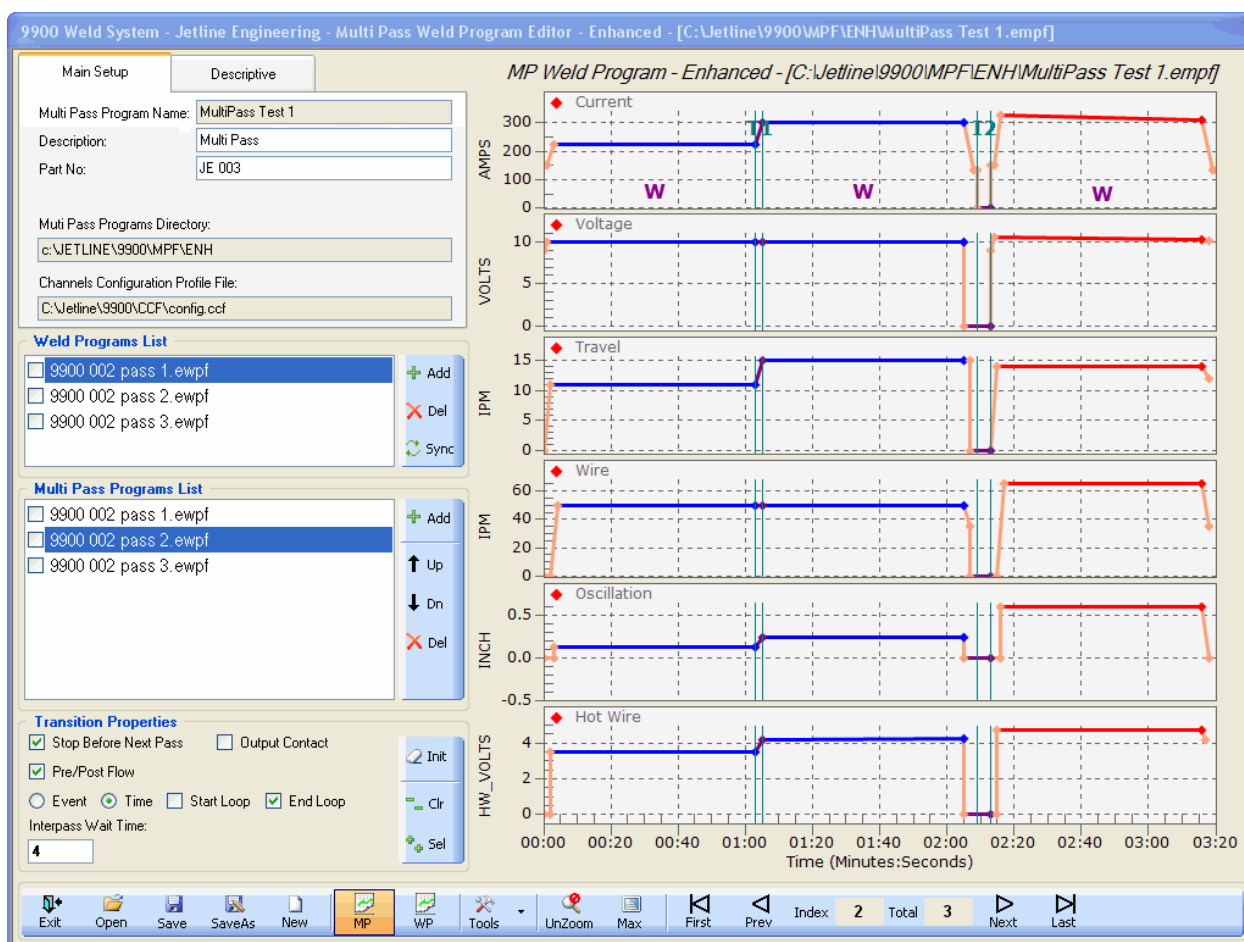
### **Stop Before Next Pass (Not Selected)**

If this button is not pressed when you come to the end of the weld segment you will transition into the weld segment of the next program without running the downslope, final, or postflow of the weld program that you are in or the preflow, initial, or upslope of the next weld program. The Transition Weld Time is how long you want to take to move between the weld parameters of the two weld programs.

Reset Adjust – If this button is selected, the adjust percentage will go back to zero when we change to the next pass, otherwise it will remain the same.

### **Output Contact**

If you any Output Contacts you can program then to be on during the transition period.



## Transition Properties

### Stop Before Next Pass (Selected)

If this button is pressed when you come to the end of the weld segment you will finish the entire weld program. To start the next weld program you can select event which at the end of the weld program will wait for the operator to press the Start button on the pendant of the Next button on the run screen. If Time is selected when the weld program is finished it will wait the required time and then automatically start the next weld program.

### Pre/Post Flow

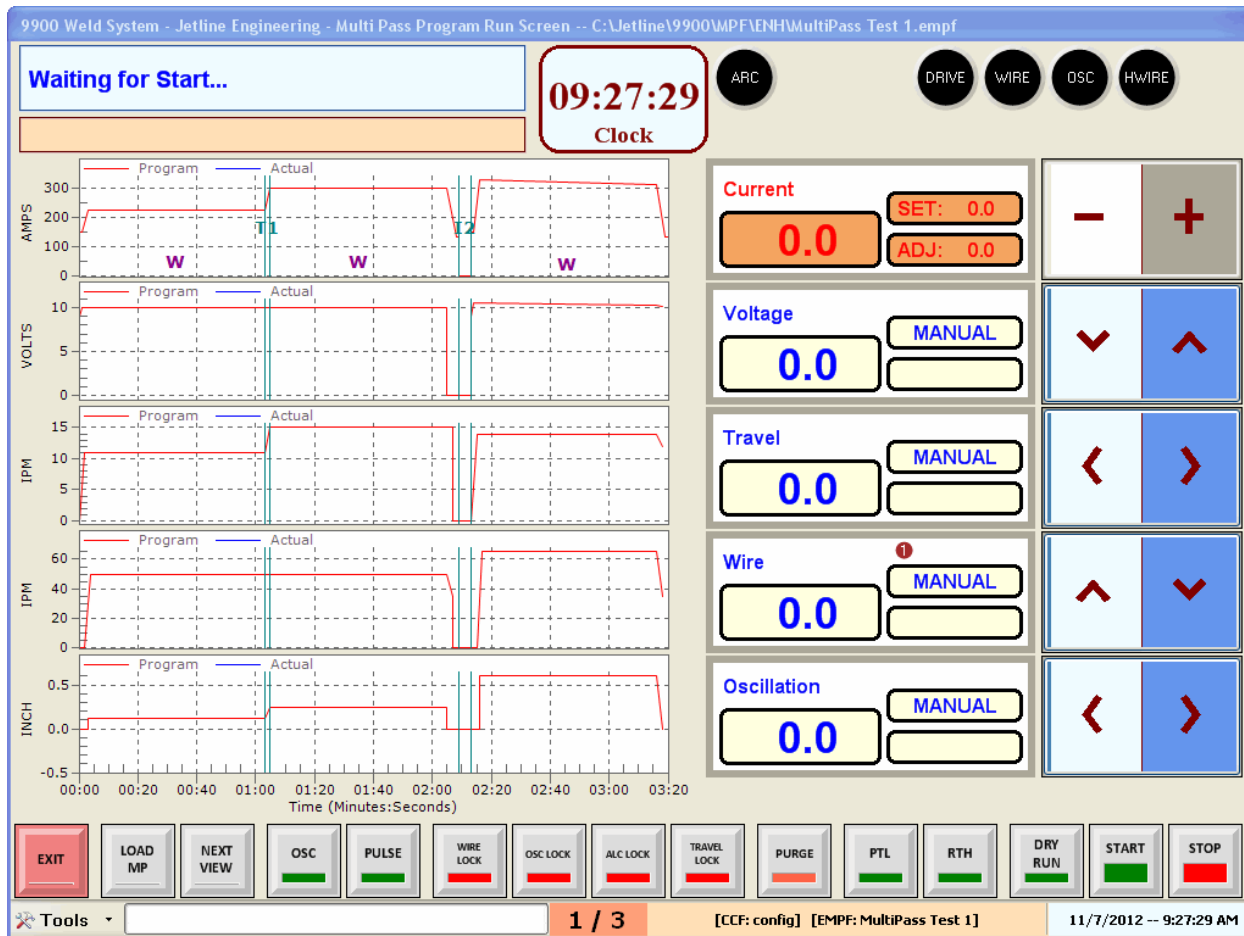
If this button is selected the pre and post flow time will be used and the gas will be turned off while we are waiting for the next pass. Otherwise the gas will remain on during the interpass, so we will not have to use the pre and post flow times.

### Loop settings

With or without Stop Before Next Pass selected, you can loop through a single pass or multiple passes. The first pass of the loop you select Start Loop. In this transition field you also select the number of loops (note: if you enter 0 loops, you will continue to run this loop until you hit the LSkip button in the run screen). The last pass is when you select End Loop. You can't have embedded

loops. If you have a Start Loop and End Loop without any embedded loops, the Start and End

Loop will be black, but if they do not match up they will be red.



## Running Multi-Pass Programs

Running Multi-Pass Programs is just like a single pass program but for a couple added features

weld program to show you which pass you are currently on. The 3 tells you how many passes are in this program.

If for any reason you need to start the Multi-Pass program at another pass, press the fraction on the bottom middle of the screen. The 1 is this example shows that you are ready to start with pass 1. This number will also change when you are running the

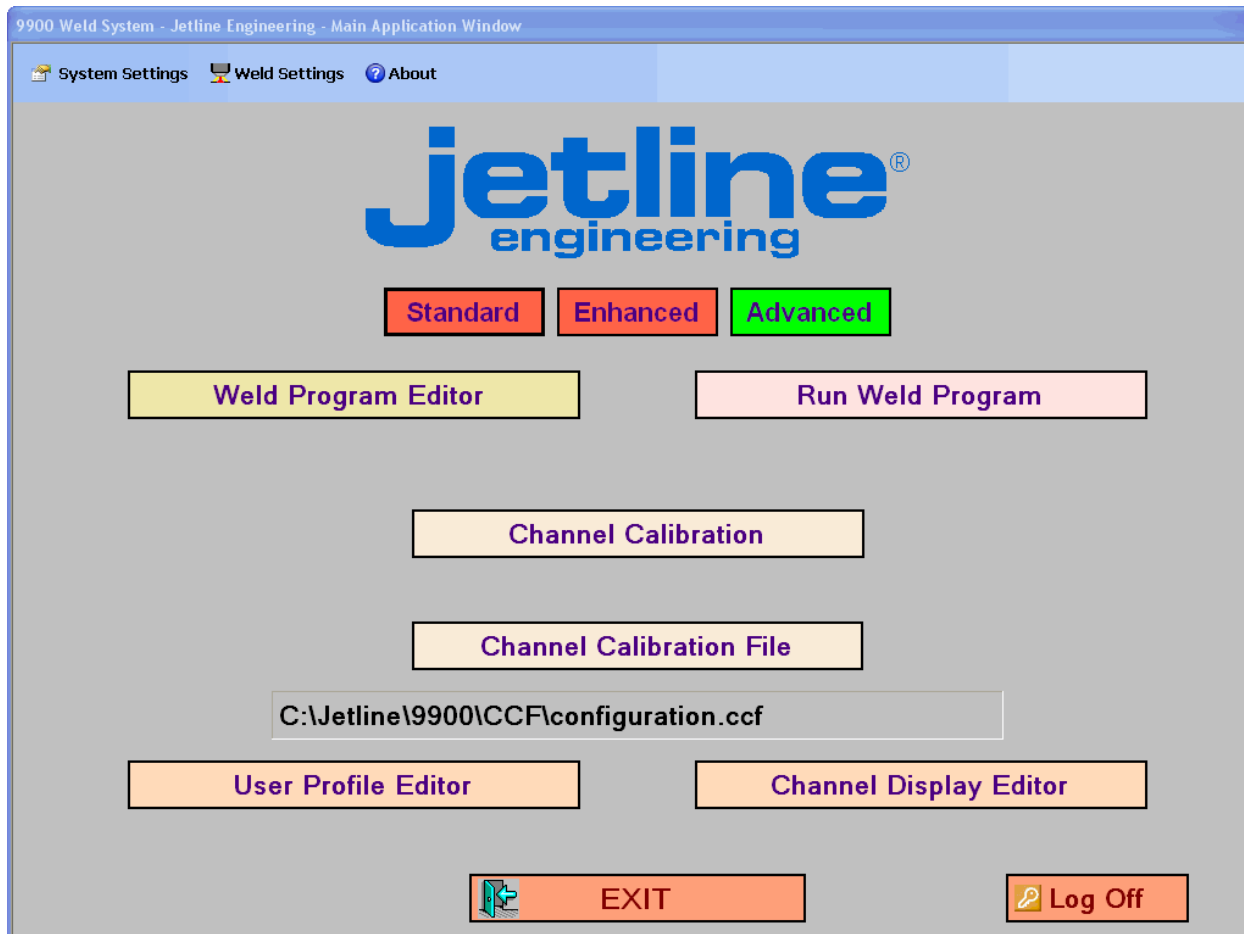
When you are in the weld segment you may press the Start button on the pendant or the Skip button (the Start Button will change to Skip) to move to the end of the weld segment that you currently in.

When you are in Interpass wait, you may press the Start button on the pendant or the Next button (the Start Button will change to Next) to start the next weld program.

Note: When you end a weld program and move to the next weld program all the Adjust percentages will be reset to zero.

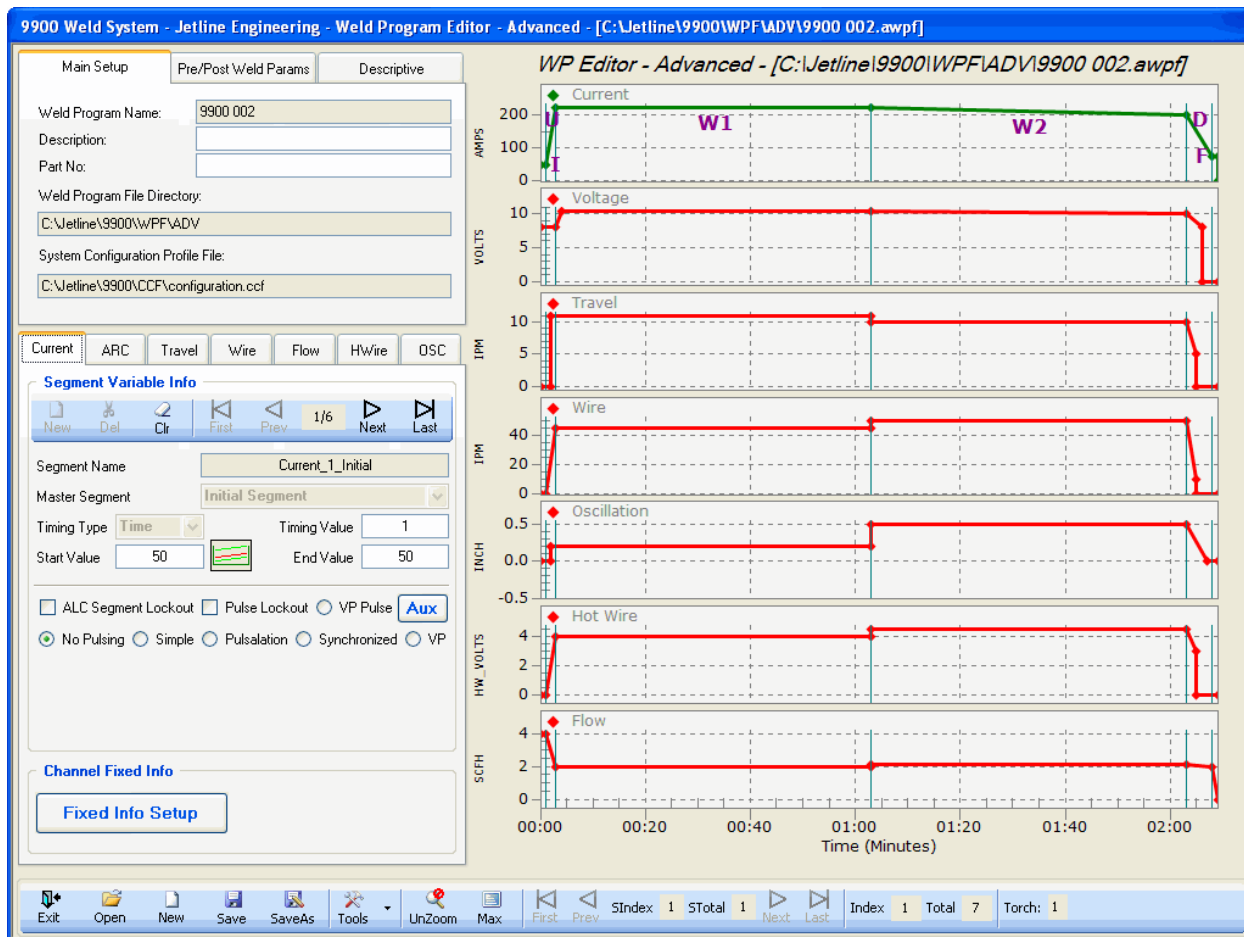
## SECTION VI

### ADVANCED MODE



Main Application Window – Advanced Mode

Enter Advanced mode by pressing the Advanced box. The Advanced box will be green when in the advanced mode.



## A. Weld Program Editor Screens – Advance Mode

### Main Setup Window

From the Main Application screen, press Weld Program Editor button to enter the setup windows

Weld Program Name – Filled in by the user

Description – Filled in by the user

Part No. – Filled in by the user

Weld Program File Directory – Location on the computer where the weld program is stored

System Configuration Profile File – Location on the computer where the configuration file is stored

Graph – The graph to the right shows the weld program

### Bottom Bar

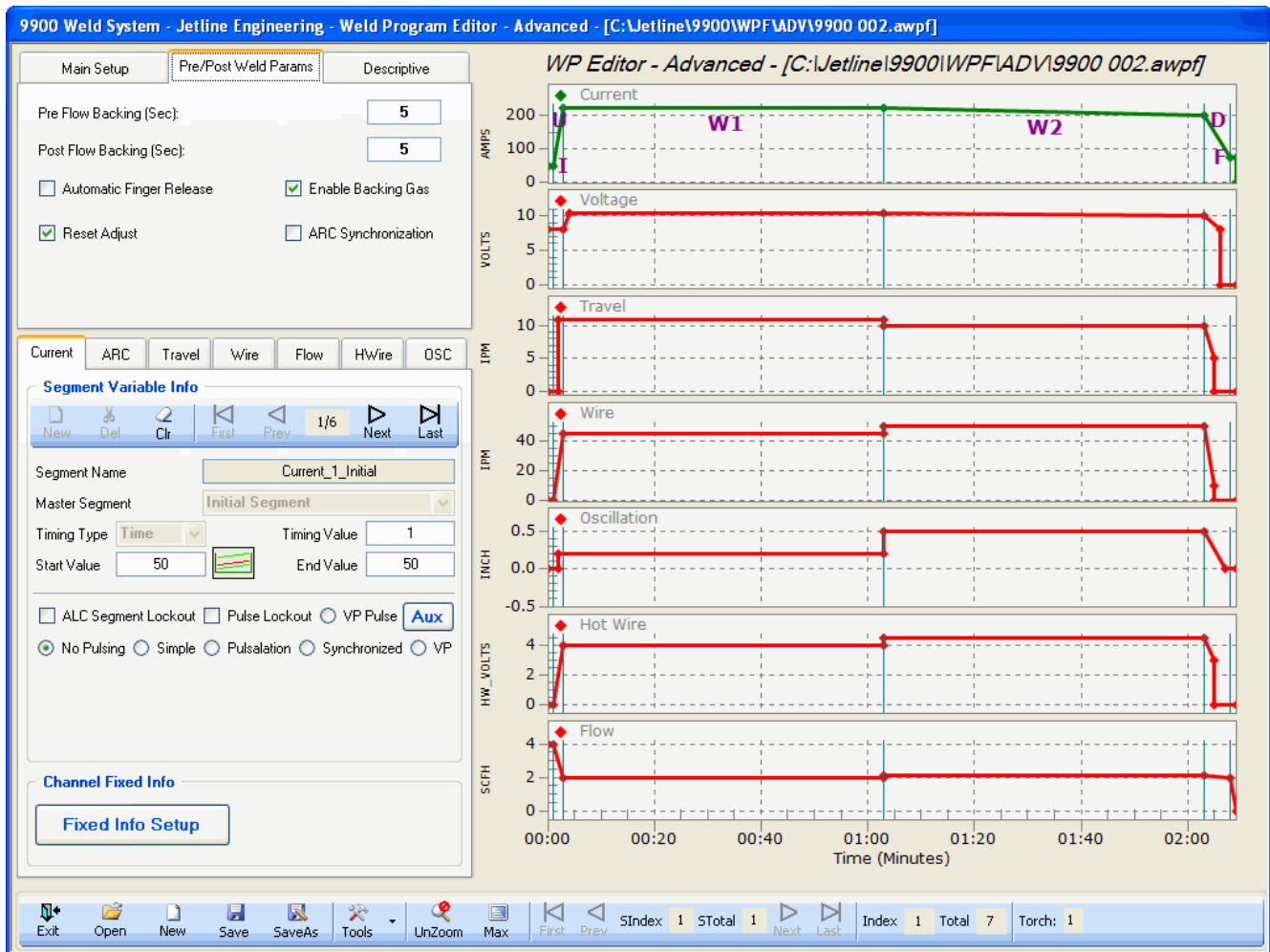
Exit – Exit the weld program editor

Open – Open a different weld program

New – Start a new weld program

SaveAs – Save the changes that you have made under a different weld program name

Save – Save the changes that you have made to the weld program



## Pre/Post Weld Params Window

Pre Flow Backing – Amount of time that the backing gas will flow before the arc strikes

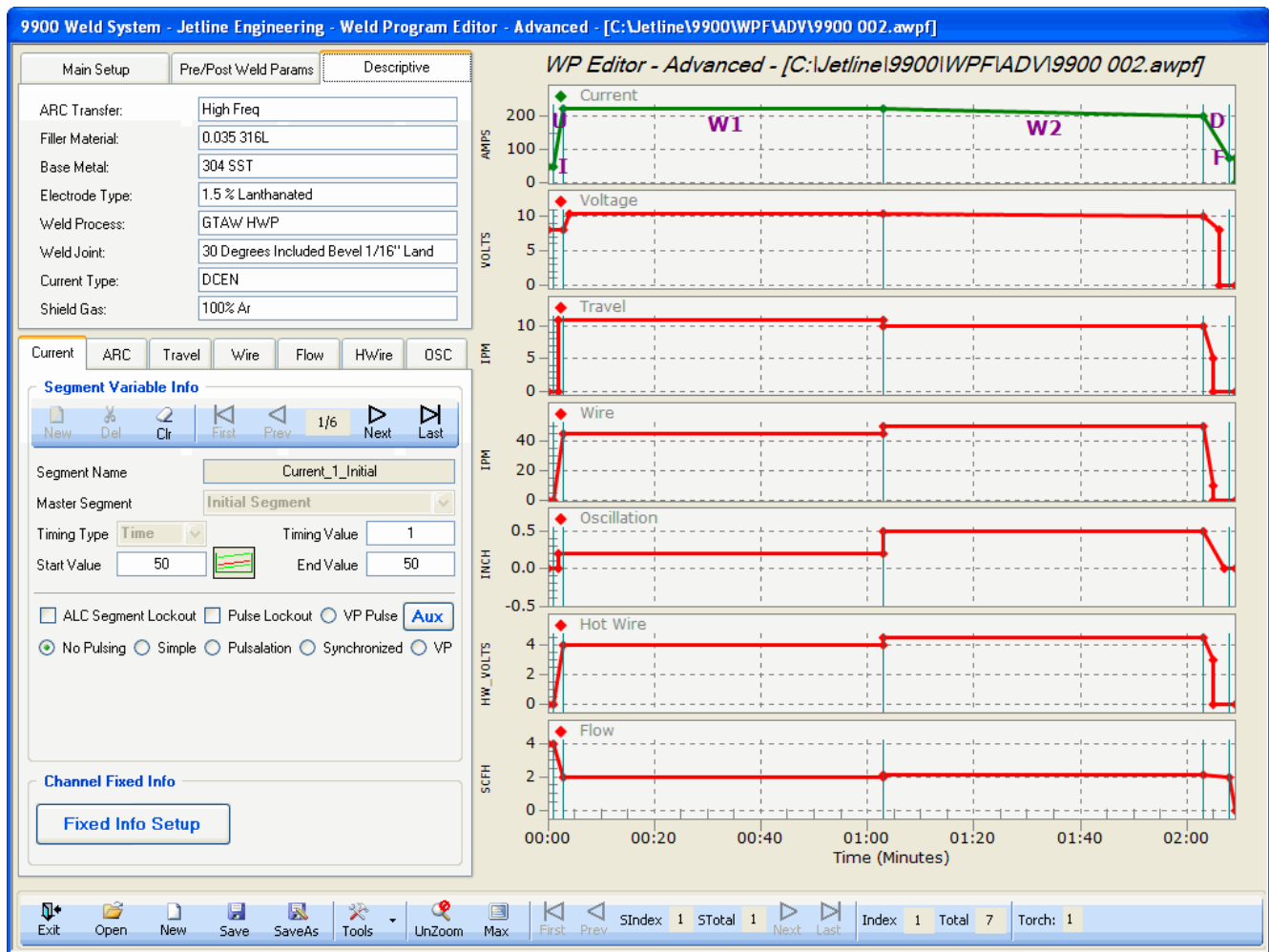
Post Flow Backing – Amount of time that the backing gas is on after the arc is turned off

Automatic Finger Release – If enabled, the fingers will be released after the weld is finished

ARC Synchronization – If there is more than one torch and ARC Synchronization is enabled, all the torches will strike at the same time

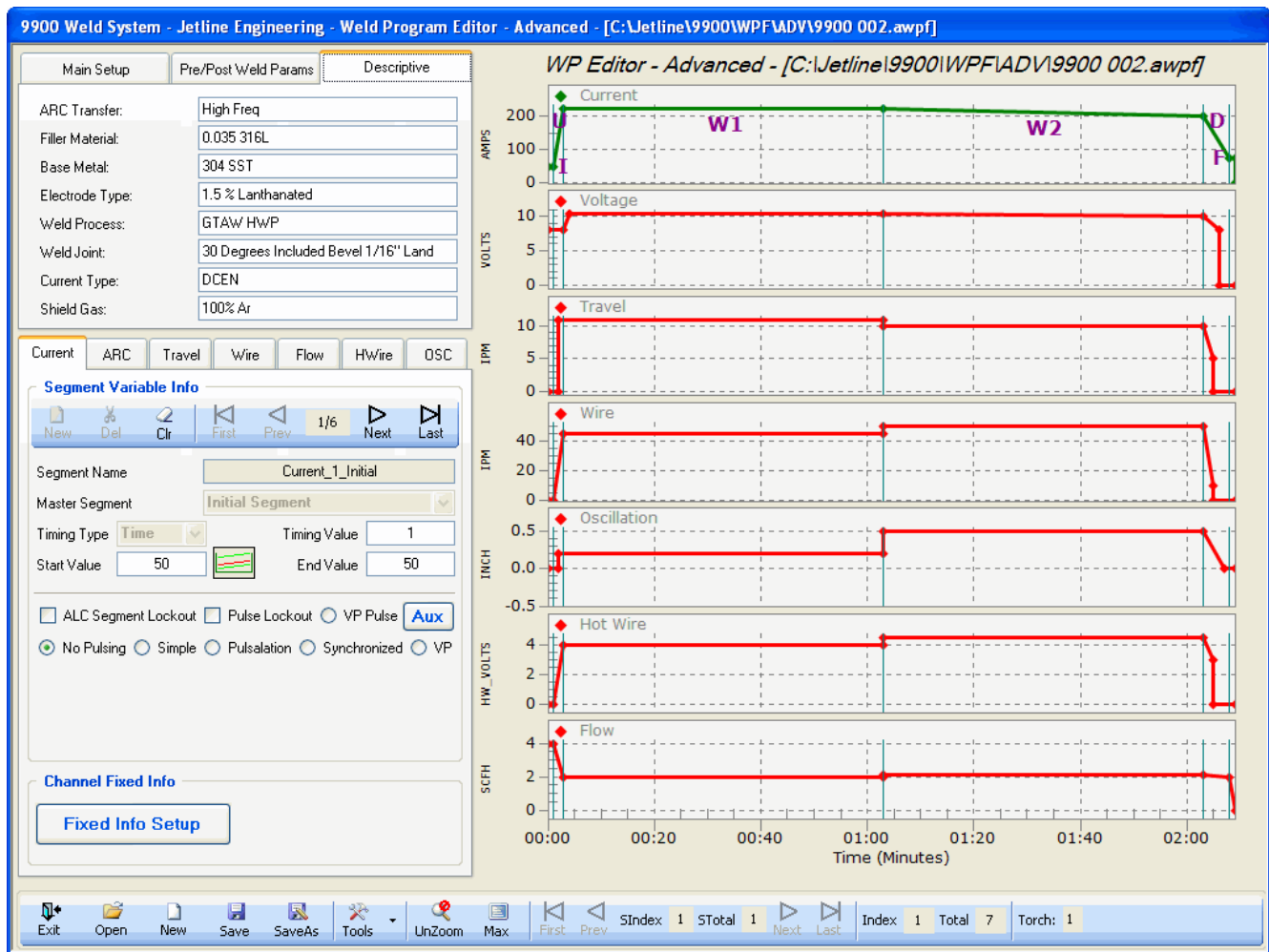
Enable Backing Gas –

Reset Adjust -



## Descriptive Window

Descriptive – These fields can be filled in to document details of the weld process



## Segment Variable Info

New – Add a new weld segment

Last – Go to the last segment

Del – Delete the current weld segment

Segment Name – Which segment is currently displayed

Clr – Reset all the variables for this segment

First – Go to the first segment (Initial)

## Timing Type/Timing Value

Prev – Go to the previous segment

Time – The time the system will remain in this segment

Next – Go to the next segment

Distance – The length of this weld segment

Event – The system will remain in the segment until an outside EVENT (downslope) signal is received or Stop Button is pressed

Start Value – The main weld current (also known as PEAK) at the start of this segment

End Value – The main weld current (also known as PEAK) at the end of this segment

ALC Segment Lockout – Selects if the arc length control is disabled for this segment

Pulse Lockout – The arc length control is disabled during the background current for this segment

No Pulsing – No Current pulsing for this segment

### **Simple**

Pulse Rate – Set the pulse frequency in number of pulses per second

Peak Time – Percent of the pulse that is in the high current

Bkg Amp – Sets the background amperage level as a percentage of the peak level

Pulsation – Sets the background amperage level as a percentage of the peak level in synchronized

Synchronized – Sets the background amperage level as a percentage of the peak level in synchronized

### **VP (AC welding)**

EP Amp (%) – Sets the positive amperage level as a percentage of the peak (negative) level

Frequency (Hz) – Set the pulse frequency in Hertz

EN Time (%) – Percent of the pulse that is in the negative electrode

### **VP Pulsed**

EP Amp (%) – Sets the positive amperage level as a percentage of the peak (negative) level

Frequency (Hz) – Set the pulse frequency in Hertz

EN Time (%) – Percent of the pulse that is in negative electrode

Pulse Rate – Set the pulse frequency in number of pulses per second

Peak Time – Percent of the pulse that is in high current

Bkg Amp – Sets the background amperage level as a percentage of the peak level



9900 Weld System - Jetline Engineering - Current Fixed Informatio...

☒ **Wait For ARC**

**Pneumatic Torch Lift**

☐ **Enable**

Start Delay (Sec):

Stop Delay (Sec):

**Torch Shield Gas**

Pre Flow (Sec):

Post Flow (Sec):

 **Clear**  **OK**  **Cancel**

### Current Fixed Information Setting Dialog Window

Wait For ARC – If enabled, the weld program waits until an arc is detected; otherwise the Initial time starts no matter the state of the arc.

#### Pneumatic Torch Lift

Start Delay – Delay after the torch is moved in and before the weld program will start

Stop Delay – Delay after the end of weld and before the torch is moved out

#### Torch Shield Gas

Pre Flow – Length of time the gas is turned on before an arc is struck

Post Flow – Length of time the gas flows after the arc is turned off

9900 Weld System - Jetline Engineering - Auxiliary Devices Setu...

Auxiliary Devices: Aux1

Channel Name: AWire\_1

Auxiliary #: 1

☐ Auxiliary Device Active

Start Delay (Sec): 0.00

Stop Delay (Sec): 0.00

OK Cancel

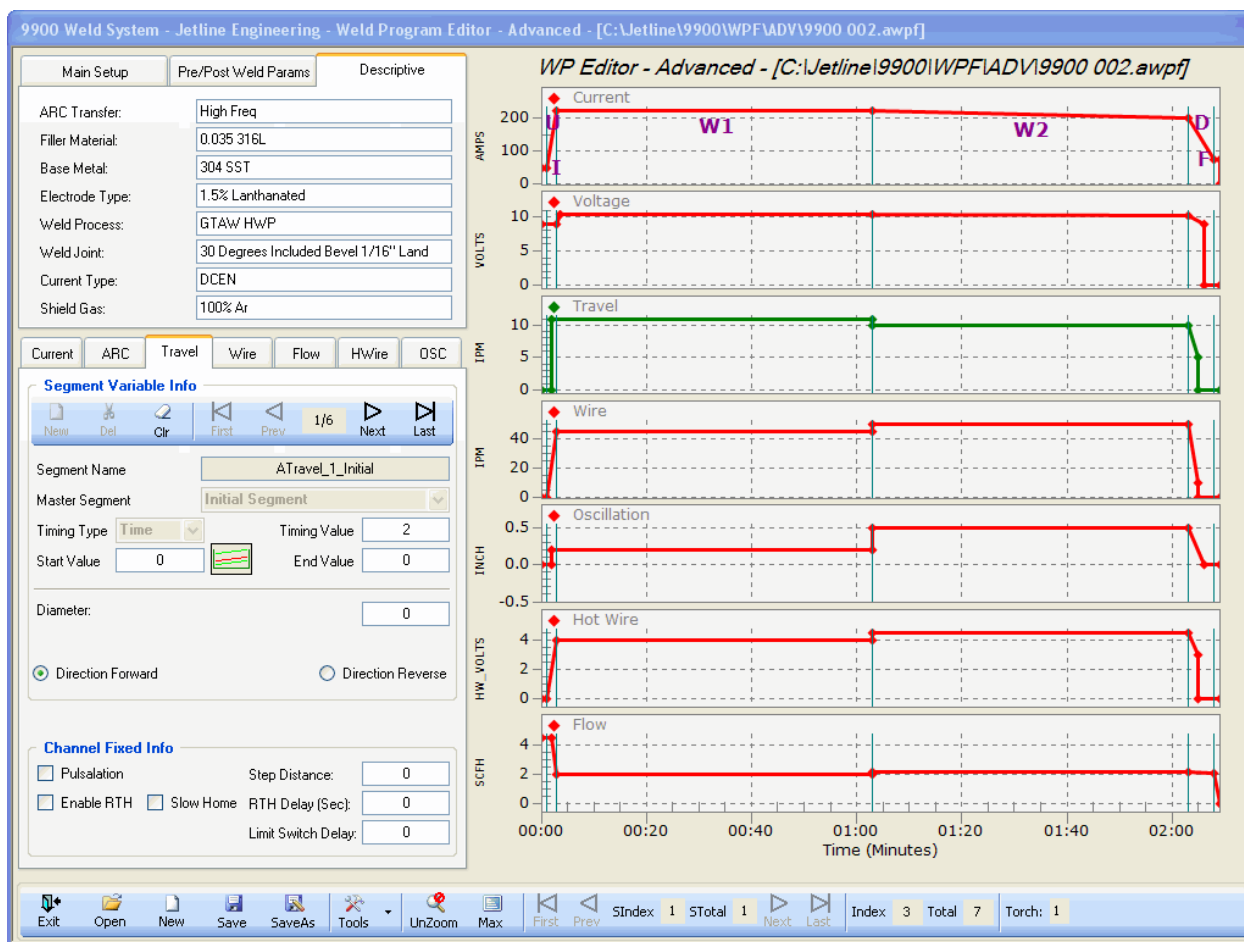
### Auxiliary Devices Setup Dialog Window

Auxiliary Devices: - Selects the auxiliary channel

Start Delay – Amount of time the output is delayed from when the arc strikes

Auxiliary Device Active – If enabled it will be active after the start delay and inactive after the stop delay

Stop Delay – Amount of time the output will remain active after the Downslope segment is initiated



## Segment Variable Info - ATravel

Clr – Reset all the variables for this segment

Segment Name – Which segment is currently displayed

First – Go to the first segment (Initial)

### Timing Type/Timing Value

Prev – Go to the previous segment

Time – The time the system will remain in this segment

Next – Go to the next segment

Last – Go to the last segment

Start Value – The speed of the travel at the start of this segment

End Value – The speed of the travel at the end of this segment

Diameter (Radial Only) – Enter the part diameter for this segment to program Travel speed in surface, IPM or CPM. Enter “0” to program in RPM

Direction Forward – Check box to travel in the forward direction in this segment

Direction Reverse – Check box to travel in the Reverse direction in this segment

### **Channel Fixed Info**

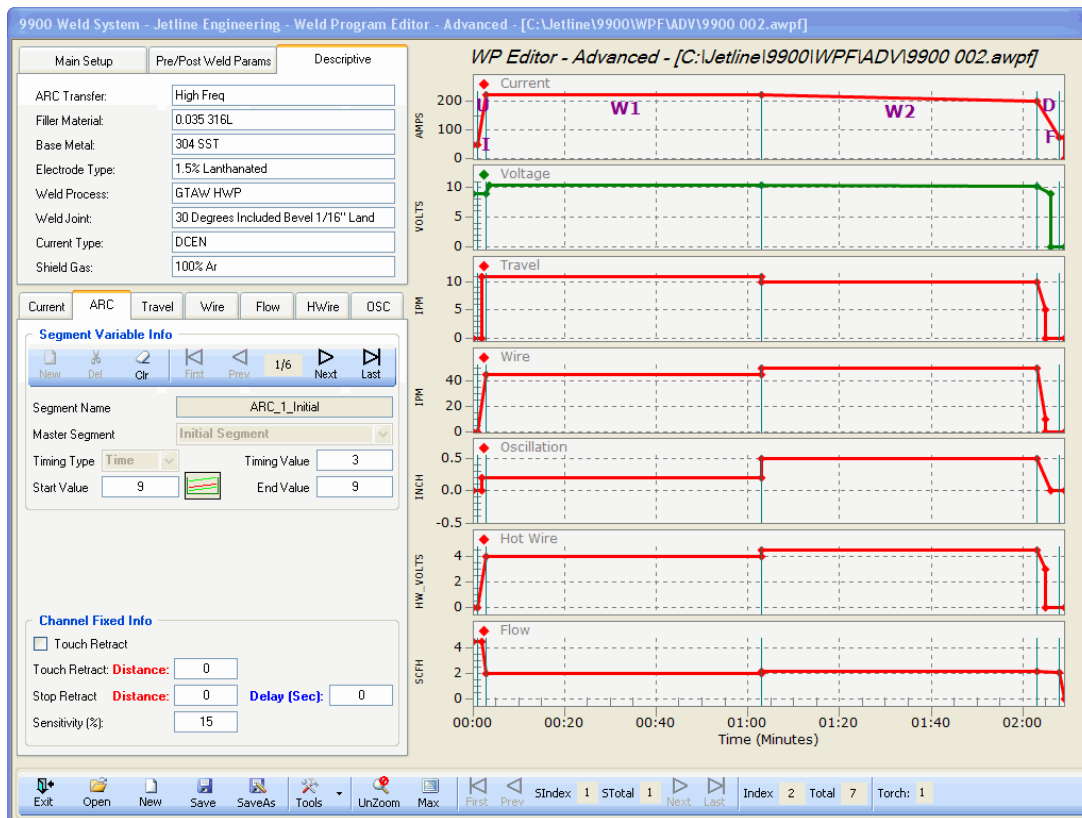
Pulsation – Check box to enable Pulsation Mode (used only with circumferential and oscillation)

Step Distance – Distance in degrees of rotation between oscillation strokes when in the Pulsation mode

Slow Home – If this box is checked the travel channel goes to home at slow speed.

Enable RTH (Return to Home) – RTH delay – Delay time starts form end of Final Current to return to home, if RTH is enabled

Limit Switch Delay – Amount of time Downslope or Event limit switch remains inactive after arc strike. Used to rotate off of the 360 degree limit switch at the beginning of the weld without prematurely shutting down the weld



## Segment Variable Info – ARC

Clr – Reset all variables for this segment

First – Go to the first segment (Initial)

Prev – Go to the previous segment

Next – Go to the next segment

Last – Go to the last segment

Segment Name – Segment currently displayed

## Timing Type and Timing Value

Time – The time the system will remain in this segment

Start Value – The ARC Voltage at the start of this segment

End Value – The ARC Voltage at the end of this segment

## Channel Fixed Info

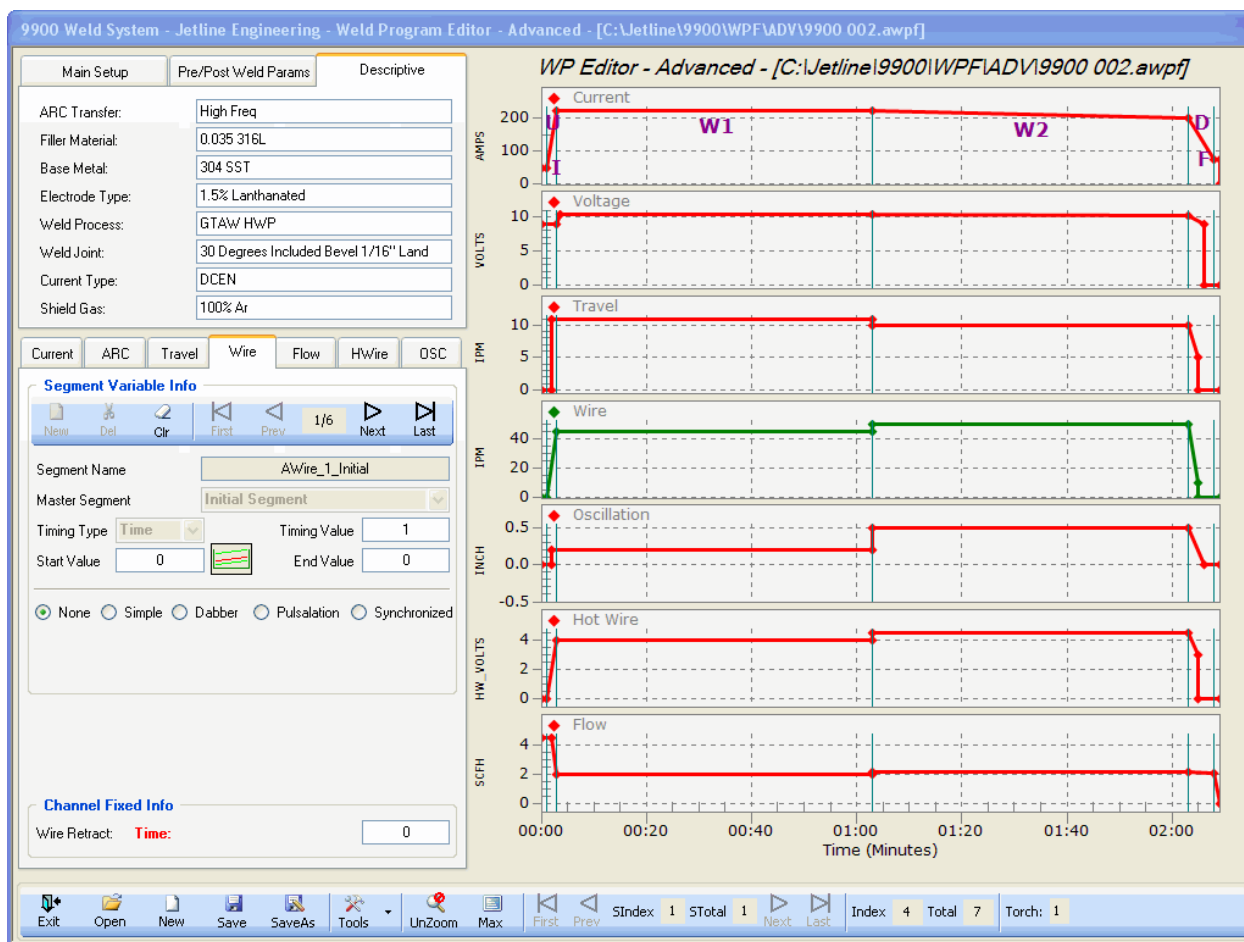
Touch Retract – Check this box to enable system touch retract

Touch Retract: Distance – Starting arc gap distance if touch retract is enabled

Stop Retract: Distance – Final torch retract distance after the end of the weld

Stop Retract: Delay – Amount of time from the end of Final Current to the beginning of the torch retract





## Segment Variable Info - AWire

Clr – Reset all the variables for this segment

Segment Name – Which segment is currently displayed

First – Go to the first segment (Initial)

### Timing Type and Timing Value

Prev – Go to the previous segment

Time – The time the system will remain in this segment

Next – Go to the next segment

Last – Go to the last segment

Start Value – The wire speed at the start of this segment

End Value – The wire speed at the end of this segment

None – Check this box to run wire continuously without pulsing in this segment, even if the weld current is pulsing

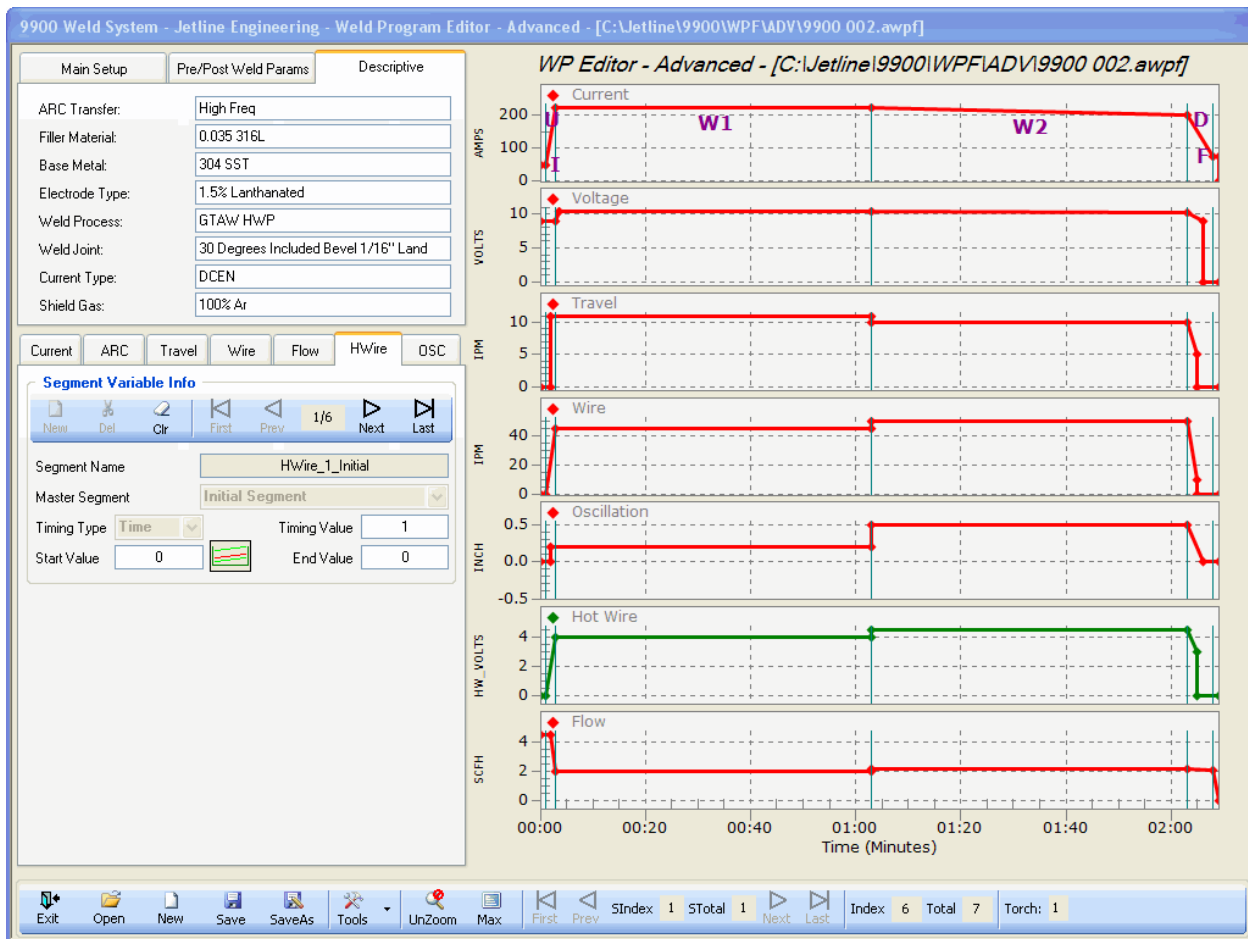
Simple – Check this box to pulse the wire speed synchronized with the weld current pulsing parameters and enter the background percentage for the wire

Dabber - This box to turn on the Dabber function. The value entered in the box is the

distance that the wire is pulled back when the Current goes into background

Pulsation – Check this box to pulse the wire speed synchronized with the oscillation parameters in the Pulsation mode and enter the background percentage for the wire during the traverse

Synchronized – Check this box to pulse the wire speed synchronized with the oscillation parameters in the Synchronized mode and enter the background percentage for the wire during the traverse



## Segment Variable Info - HWire

Clr – Reset all the variables for this segment

Segment Name – Which segment is currently displayed

First – Go to the first segment (Initial)

Timing Type/Timing Value

Time – The time the system will remain in this segment

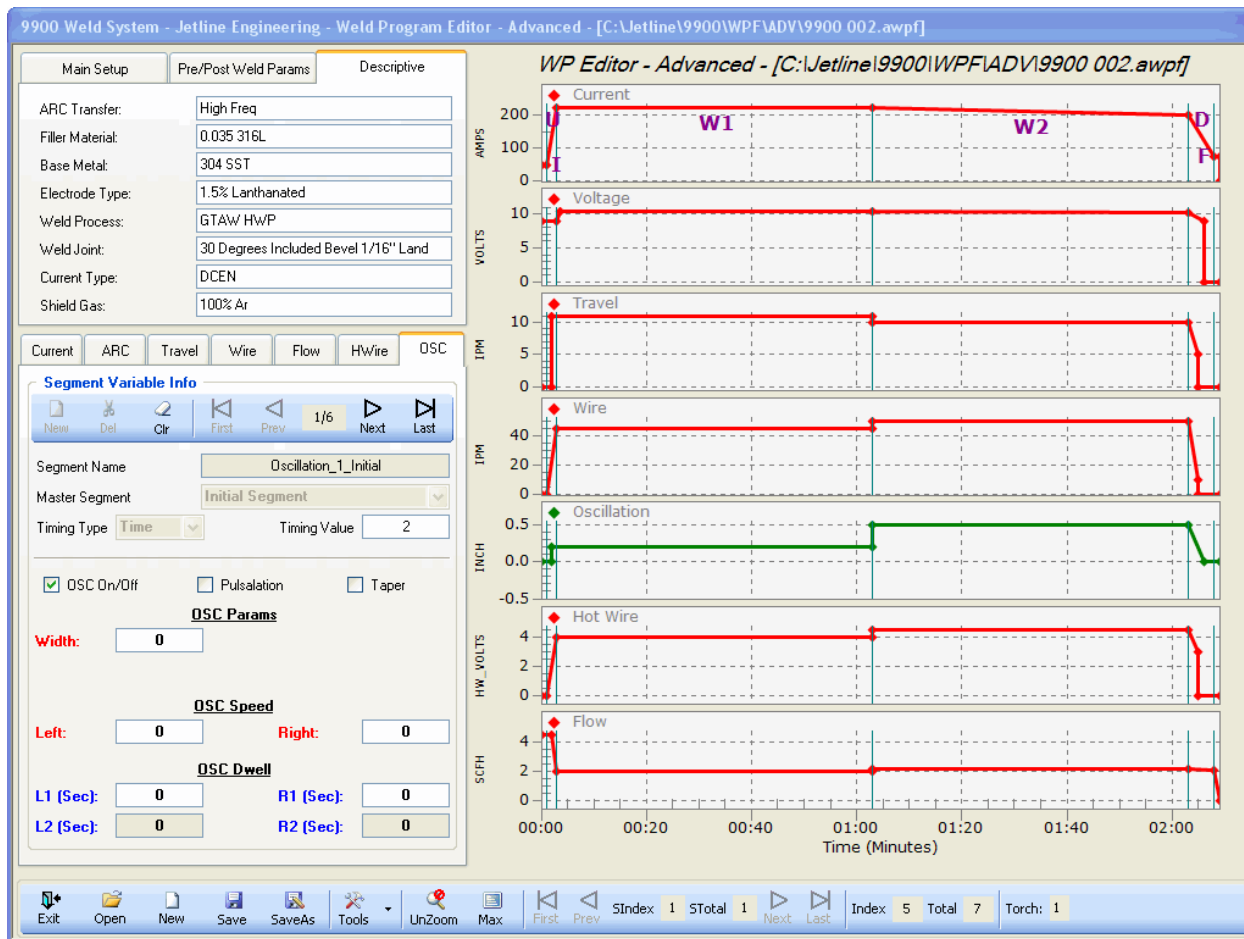
Prev – Go to the previous segment

Start Value – The hot wire voltage at the start of this segment

Next – Go to the next segment

End Value – The hot wire Voltage at the end of this segment

Last – Go to the last segment



## Segment Variable Info - Oscillation

Clr – Reset all the variables for this segment

Segment Name – Which segment is currently displayed

First – Go to the first segment (Initial)

### Timing Type/Timing Value

Prev – Go to the previous segment

Time – The time the system will remain in this segment

Next – Go to the next segment

Last – Go to the last segment

OSC On/Off – Check this box to turn on the Oscillator for this segment

Pulsation On/Off – Check this box if Oscillator is in pulsation for this segment

Taper On/Off – Check this box to taper the Oscillator width to 0 at the end of this segment

### **OSC Params**

Width – The Width setting of the oscillator, total horizontal torch movement

Center – The position of the slide that is the center of the oscillation stroke (set to 0 for relative positioning systems)

### **OSC Speed**

Left – Slide speed when moving to the left

Right – Slide speed when moving to the right

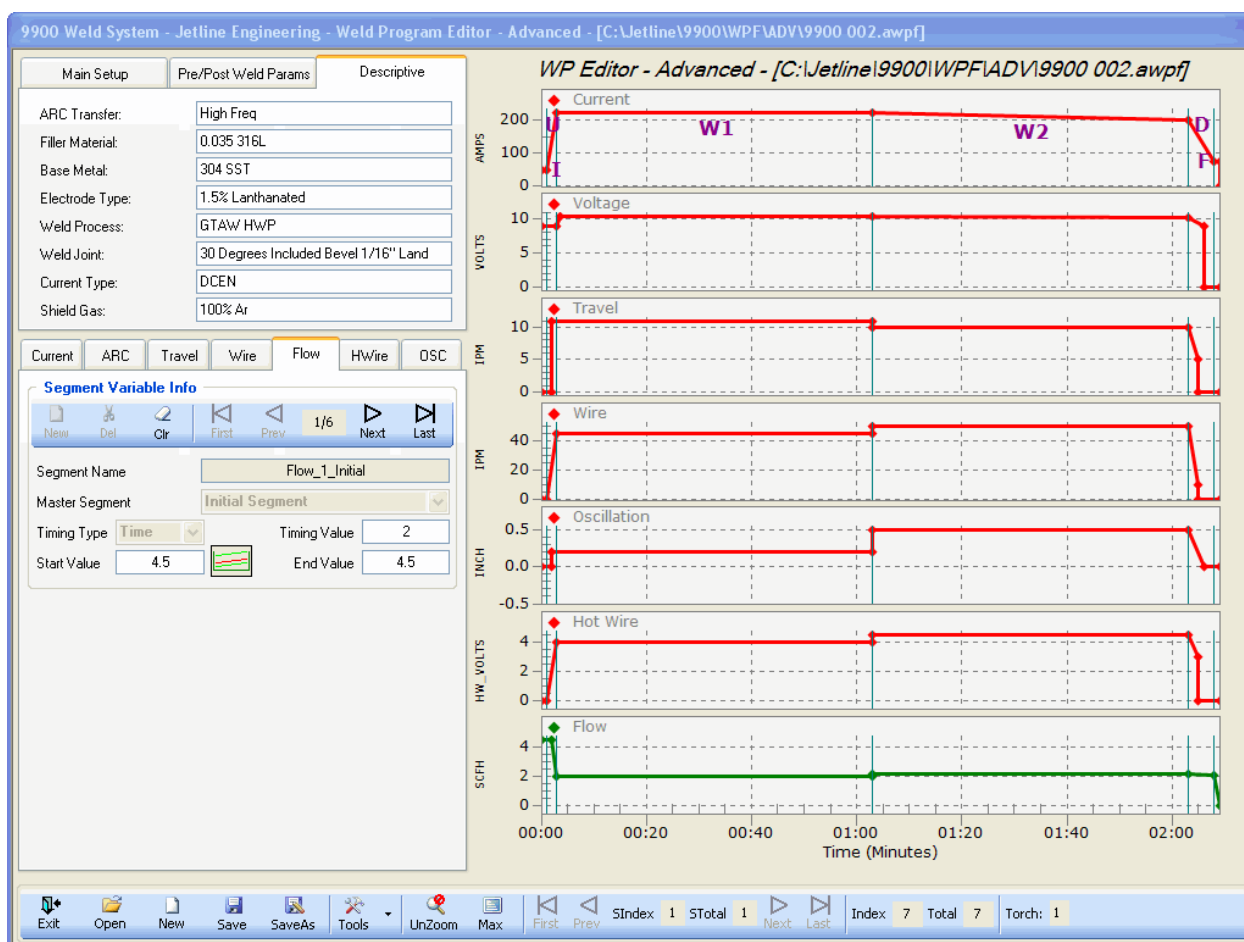
OSC Dwell

L1 – Amount of time the slide is stopped after moving left and before either returning to the right in Simple oscillation, or before the positioned rotated the Step Distance in Pulsation mode

R1 – Amount of time the slide is stopped after moving right and before either returning to the left in Simple oscillation, or before the positioned rotated the Step Distance in Pulsation mode

L2 – Pulsation mode only. Amount of time the slide remains stopped after the positioned rotates the Step Distance and before the slide moves back to the right

R2 – Pulsation mode only. Amount of time the slide remains stopped after the positioned rotates the Step Distance and before the slide moves back to the left



## Segment Variable Info - Flow

Clr – Reset all the variables for this segment

First – Go to the first segment (Initial)

Prev – Go to the previous segment

Next – Go to the next segment

Last – Go to the last segment

Segment Name – Which segment is currently displayed

### Timing Type/Timing Value

Time – The time the system will remain in this segment

Start Value – The hot wire voltage at the start of this segment

segment

## SECTION VII

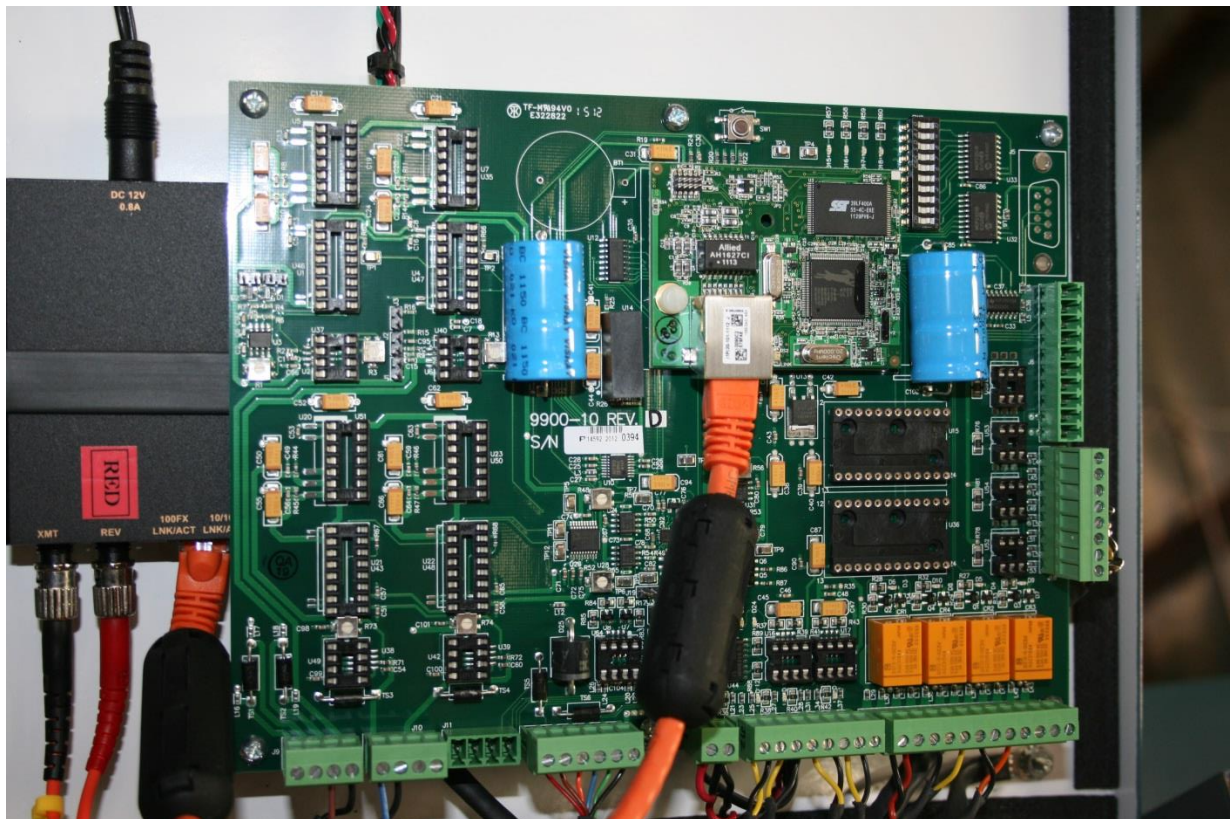
### REPROGRAMMING BOARDS

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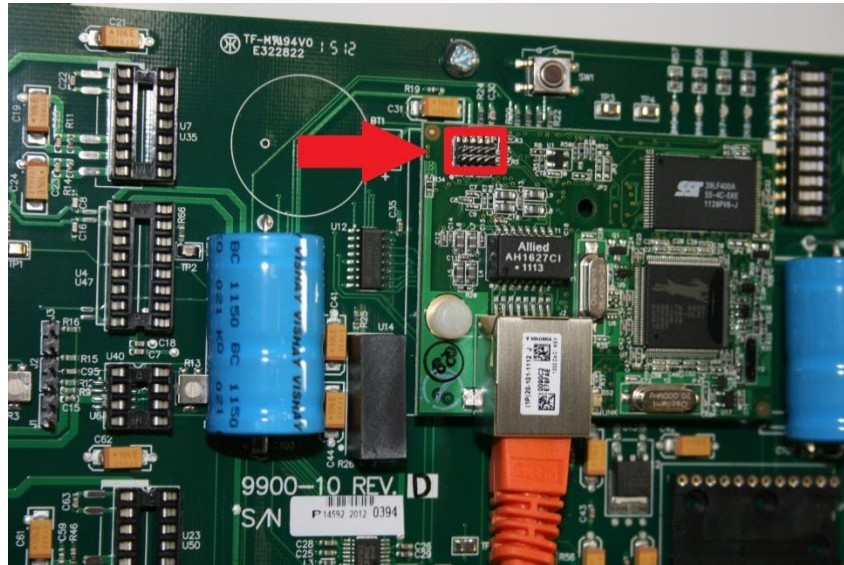
Follow the steps below to reprogram Miller Welding Automation Engineering 9900 Module Boards:

The same procedure is used for all Miller Welding Automation Engineering 9900 Module Boards.

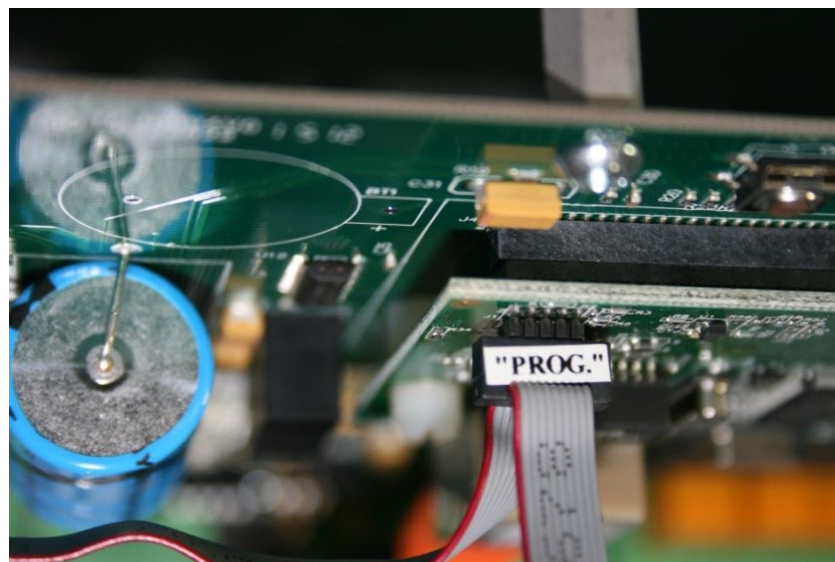
1. Copy the supplied 9900 Module Code file into the C:\Miller Welding Automation\9900\System Files\Module Code location in the 9900 computer. An example of the module code file name is: Versionxxxx.bin where xxxx is a four digit number.
2. Plug the programming cable into a USB slot on the back of 9900 computer.
3. On the outside of the module box to be reprogrammed, turn the power switch to OFF.
4. Open the module and locate the circuit board assembly on the inside of the door. A picture of the inside of a module door is below.



5. Locate the smaller circuit board with an Ethernet cable connected to it mounted to the larger circuit board. This is called the Rabbit board, and it is the board that must be connected to in order to reprogram the module.
  - a. The programming pins are indicated in the picture below.



6. Attach the programming cable to the Rabbit board as shown below. Be sure that the RED line on the cable is orientated to the closest corner of the Rabbit board.



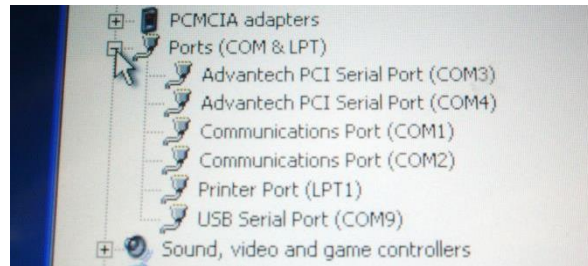
7. On the outside of the module box to be reprogrammed, turn the power switch to ON.

8. Returning to the 9900 computer, navigate to the C:\Rabbit Loader location and launch the RFU application. The RFU application can be found by following the steps below.
  - a. Touch the START menu in the bottom left corner of the desktop screen.
  - b. Double touch: My Computer
  - c. Double touch: Local Disk (C:)
  - d. Double touch: Rabbit Loader
  - e. Double touch: RFU
9. The first time a module is reprogrammed with new code(a Flash Image), the new Flash Image must be selected. This is the Module Code that was copied into C:\Miller Welding Automation\9900\System Files\Module Code during Step 2. above. The new flash image is selected by following the directions below.
  - a. Touch FILE at the top left of the Rabbit Field Utility(RFU) window.
  - b. Touch: Load Flash Image
  - c. Touch: the Versionxxxx.bin file copied into C:\Miller Welding Automation\9900\System Files\Module Code during Step 2. above.
  - d. Touch: Open
- 9.1 After loading the new flash image the first time, it can be selected from the list of available code versions displayed when FILE is touched on the main RFU screen.
10. Selecting Open will prompt the RFU application to attempt to establish communication with the 9900 Module. If communication is established, the new module code will be loaded into the Rabbit board. If there is a problem with communication, please see Step A-1 at the end of these instructions.
  - a. Wait for the programming status bar to close.
11. On the outside of the reprogrammed module, turn the power switch to OFF.
12. Carefully remove the programming cable from the Rabbit board.
13. Other modules can be reprogrammed through the same procedure at this time if necessary.

A-1. The following instructions detail how to reconfigure the communication settings for the RFU (Rabbit Flash Utility) in the case of a communication error during the initial reprogramming attempt.

- a. Navigate to the Windows Device Manager.
  - i. Touch: Start at the bottom left corner of the desktop screen.
  - ii. Touch: Control Panel
  - iii. Double touch: System
  - iv. Touch: Hardware
  - v. Touch: Device Manager
  - vi. Touch: Ports (COM & LPT)
  - vii. Locate & Note: USB Serial Port (COMx), where x= a number.

For Example, the USB Serial Port is COM9 in the Image below.



- b. In the main screen of the RFU application, touch: Setup.
- c. Locate the Serial Port dropdown menu and select the COMx port identified in Step A-1 a. vii above.
- d. Verify that Use Serial Connection is selected. Select it if it is not.
- e. Touch: OK
- f. Return to Step 9 above.

## SECTION VIII

### CALIBRATION

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#### A. Touch up Calibration

Before you make any changes, it is recommended that you make a copy of the configuration file. To do this, go into the Channels Configuration Editor and press the “Save As” button on the bottom of the screen. Change the name by adding today’s date so you can quickly tell when it was copied. After making a copy, open the old file so that all the changes will be made in the original file. If you need to bring back the old file, just open the saved file and use “Save As” and change its name back to the original file.

For all channels except ARC, the Closed Loop Sensitivity must be changed to 0. Write down the current number so it can be restored when you are finished.

#### B. Definitions

Range Minimum Value: No value for this channel can be entered in below this value in the weld program. This value should not be change during a touch up calibration.

Range Maximum Value: No value for this channel can be entered in above this value in the weld program. This value should not be change during a touch up calibration.

Out Minimum Value: The analog voltage that is put out by the 9900-10 board so that the channel operates at the minimum value.

Out Maximum Value: The analog voltage that is put out by the 9900-10 board to have that channel operates at the maximum value.

In Minimum Value: The input voltage that comes into that module for that channel to be operating at the minimum value.

In Maximum Value: The input voltage that comes into that module for that channel to be operating at the maximum value.

#### TEST PROGRAM

It is best to perform the calibrate program in standard mode. Write a test program that will run each channel. When you are ready to calibrate a channel, use Dry Run and turn off every channel except the one that you are testing. For your test program, be sure that ALC is locked out in every segment. Also be sure to turn off Wait for Arc and Touch Retract, and do not have any pulsing in your program for calibration.

To do a complete calibration, you will need to run each channel in the low half of its range and in the upper half of the range. For travel and wire, the time is important. After each test, measure or watch what the actual distance or reading was.

Go into the Channel Configuration Editor and select the channel that you are working with. First you will need to press the blue button.

9900 Weld System - Jetline Engineering - Channel Calibration - [C:\Jetline\9900\CCF\config.ccf]

Current ARC ATravel DTravel AWire DWire HWire Flow Oscillation

**Profile Information**

Channel Name:  Torch Index:  IP Address:

Description:

Manufacturer:  Config. Number:

Model:  Rise Time:

☐ Pre Flow Delay in Fixed Info  
☐ Software Input Rectifier  
☐ SStop on Gas Error  
☐ SStop on Water Error  
☐ Level 2 MIG  
☒ PTL Enable

**Auxiliary Devices**

☐ Aux1   
☐ Aux2

**Range**

Units:   
Minimum Value:   
Maximum Value:

**Equivalent DC Reference Volts**

 Out:  In:   
Minimum Value:    
Maximum Value:

**Misc Info**

Max Analog Pulses / Second:   
ARC Type:

**Closed Looping Parameters**

Closed Loop Sensitivity:   
I-Term:   
Closed Loop Delay:

**Indicators**

Water ☐  
Gas ☐

**Operator Speeds**

Trim Limit:   
Step Size:

Profile Editor Functions: SubIndex:  SubTotal:  Index:  Total:

Profile File Functions:

After you press the Blue button, the calibration boxes will open up

9900 Weld System - Jetline Engineering - Channel Calibration - [C:\Jetline\9900\CCF\config.ccf]

Current ARC ATravel DTravel AWire DWire HWire Flow Oscillation

**Profile Information**

Channel Name:  Torch Index:  IP Address:

Description:

Manufacturer:  Config. Number:

Model:  Rise Time:

☐ Pre Flow Delay in Fixed Info  
☐ Software Input Rectifier  
☐ SStop on Gas Error  
☐ SStop on Water Error  
☐ Level 2 MIG  
☒ PTL Enable

**Auxiliary Devices**

☐ Aux1   
☐ Aux2

**Range**

Units:    
Minimum Value:   
Maximum Value:

**Equivalent DC Reference Volts**

Actual:  Out:   
 Read:  Minimum Value:  In:   
 Program:  Diameter:  Maximum Value:   
 Time:

**Misc Info**

Max Analog Pulses / Second:   
ARC Type:

**Closed Looping Parameters**

Closed Loop Sensitivity:   
I-Term:   
Closed Loop Delay:

**Indicators**

Water ☐  
Gas ☐

**Operator Speeds**

Trim Limit:   
Step Size:

Profile Editor Functions:         SubIndex  SubTotal    Index  Total

Profile File Functions:

For each channel, the Program, Read, Diameter and Time boxes will be filled in with what was just run. You need to enter in the actual value that you measured. For travel it is the distance that the module moved; for wire it is how much wire came out; for the other channels it is the value that was measured.

keep what you have just done. You can now run the calibration in the other half of the range.

After you enter in the actual value, press that green button once. When you press the green button you will see the In and Out numbers change. If you have made a mistake or would like to go back, press the Red button. After the changes you will need to press the Save button to

## **C. Calibration Tips**

### **Calibration of Current Channel**

Make sure that you have a part that can handle the current without burning through. Make sure that you run the current for about 8 seconds after the program has gotten to the weld segment. You can use the meter on the power supply to determine the actual reading.

### **Calibration of Arc Channel**

You will need to supply a voltage between the work and the tungsten. In the program, enter the value of the voltage that is between the work and the tungsten. Run the program for at least 8 seconds in the weld program. Since you know the actual value, enter that number in the box and then press the green button.

### **Calibration of Travel and Wire**

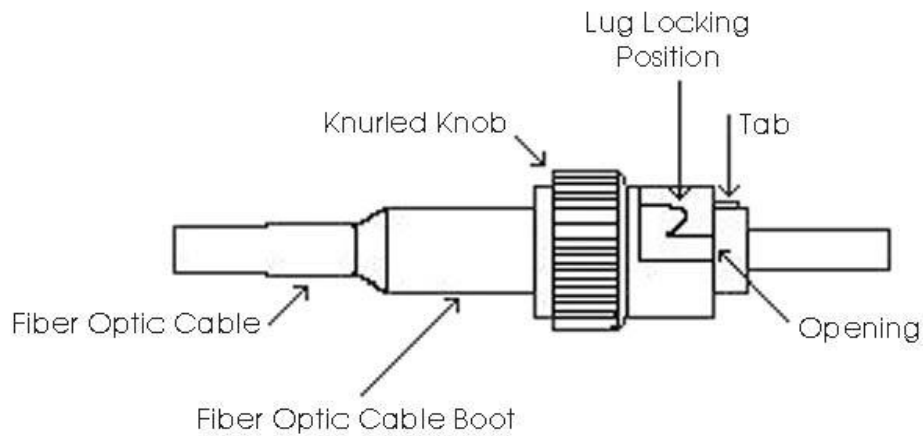
Always do the calibration of the travel in the forward direction. For these channels you will have to run the weld program to completion. For the faster speeds you only need the weld time to be from 15 – 30 seconds. For the slower speeds you can go for a couple of minutes. If the delay start for the travel and wire match the amount of time that the current is in initial and upslope, and you have no stop delay, that is the time that each channel will be active. It makes it easier when measuring to know if the channel has moved the correct distance.

### **Calibration of Hot Wire**

Read the hot wire voltage using an AC meter between the torch and the work.

## SECTION IX

### FIBER OPTIC CABLE CONNECTION



#### **Fiber Optic Cable Connector**

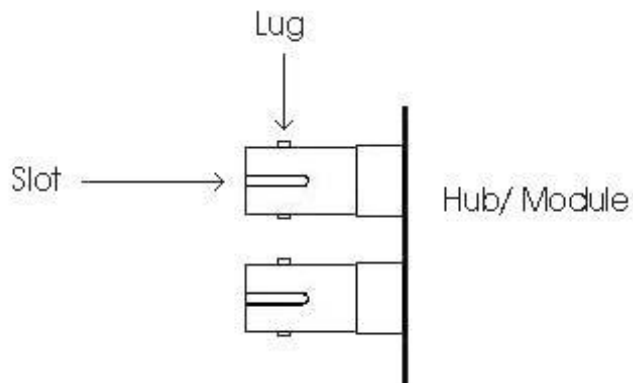
To replace the fiber optic cable, follow these steps:

Turn the Fiber Optic cable boot so the tab engages the slot on the mating connector that is on the hub or module. Push in gently until it stops.

Turn the Knurled Knob until the opening lines up with the lug.

Push and then turn the Knurled Knob clockwise so the Knob is locked in place. (Lugs go into opening on the knob.)

Do the same for the other fiber optic cables.



## Connector on Hub or Module

## **Section X**

### **Electrical Drawings**

#### **Physical Layout of Modules**

9900-HUB-1 9900 Module/HMI Interconnection Hub

9900-CGSM-1 9900 Current and Gas Control Module

9900-MCMA-1 9900 Motor Control Module

9900-MCMA-3 9900 Motor Control Module

9900-AV-1 9900 Arc Length Control Module

9900-HWP-1 9900 Hot Wire Process Module

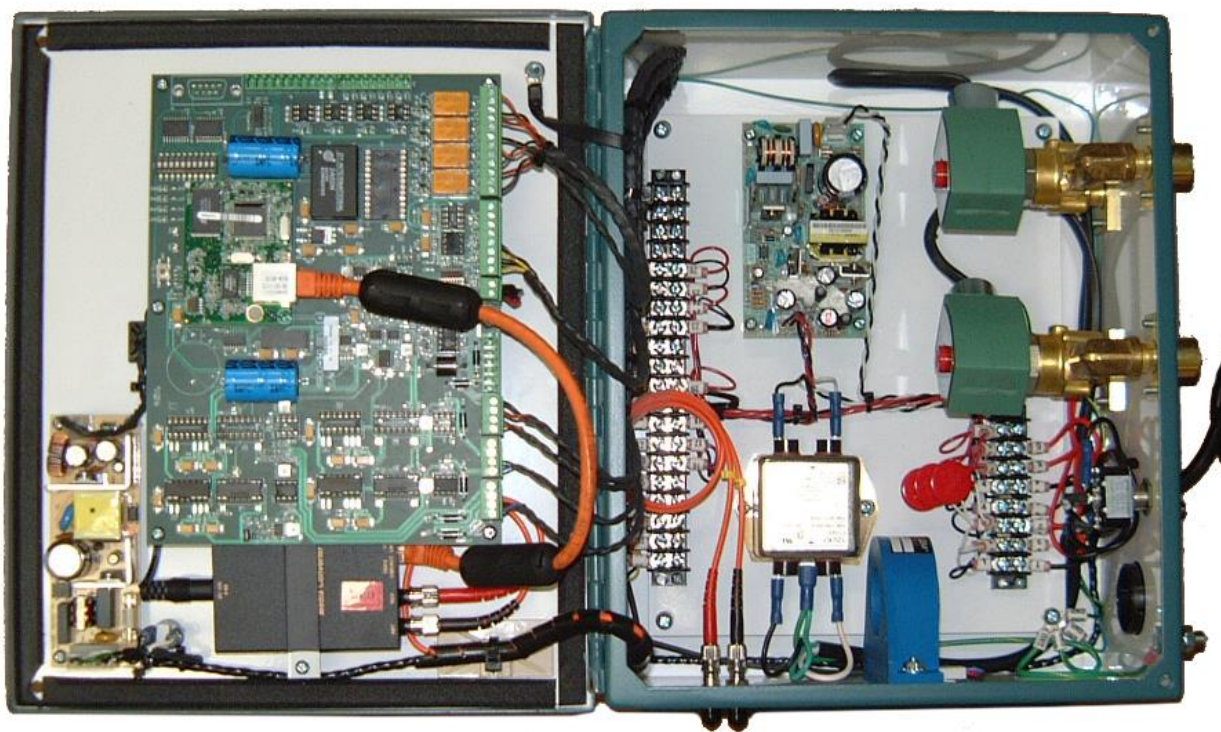
9900-OSC-1 9900 Magnetic Oscillator Control Module

9900-OSC-1 9900 Mechanical Oscillator Control Module

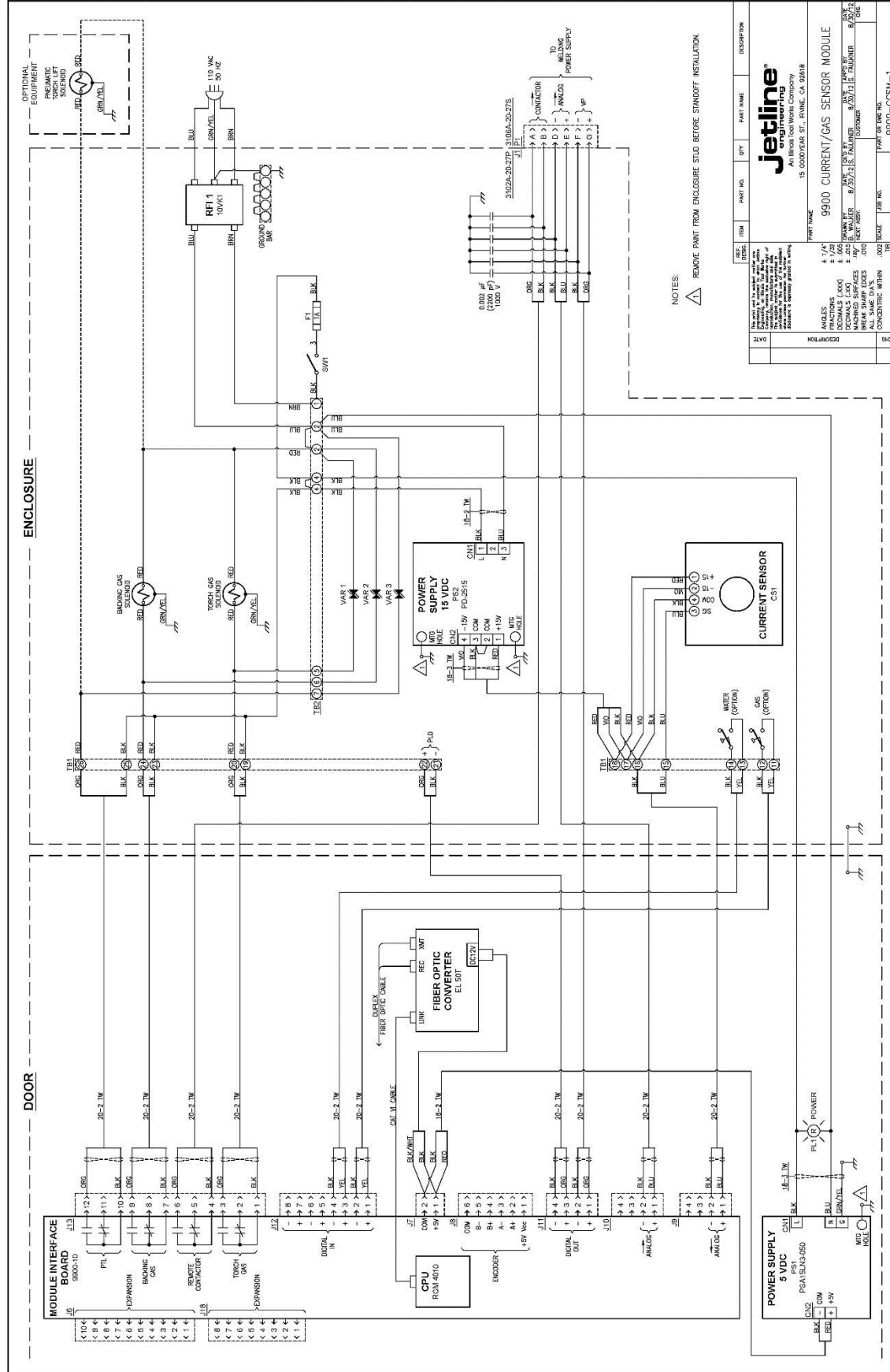




**9900-CGSM-1 CURRENT & GAS CONTROL MODULE, EXTERIOR**



**9900-CGSM-1 CURRENT & GAS CONTROL MODULE, INTERIOR**



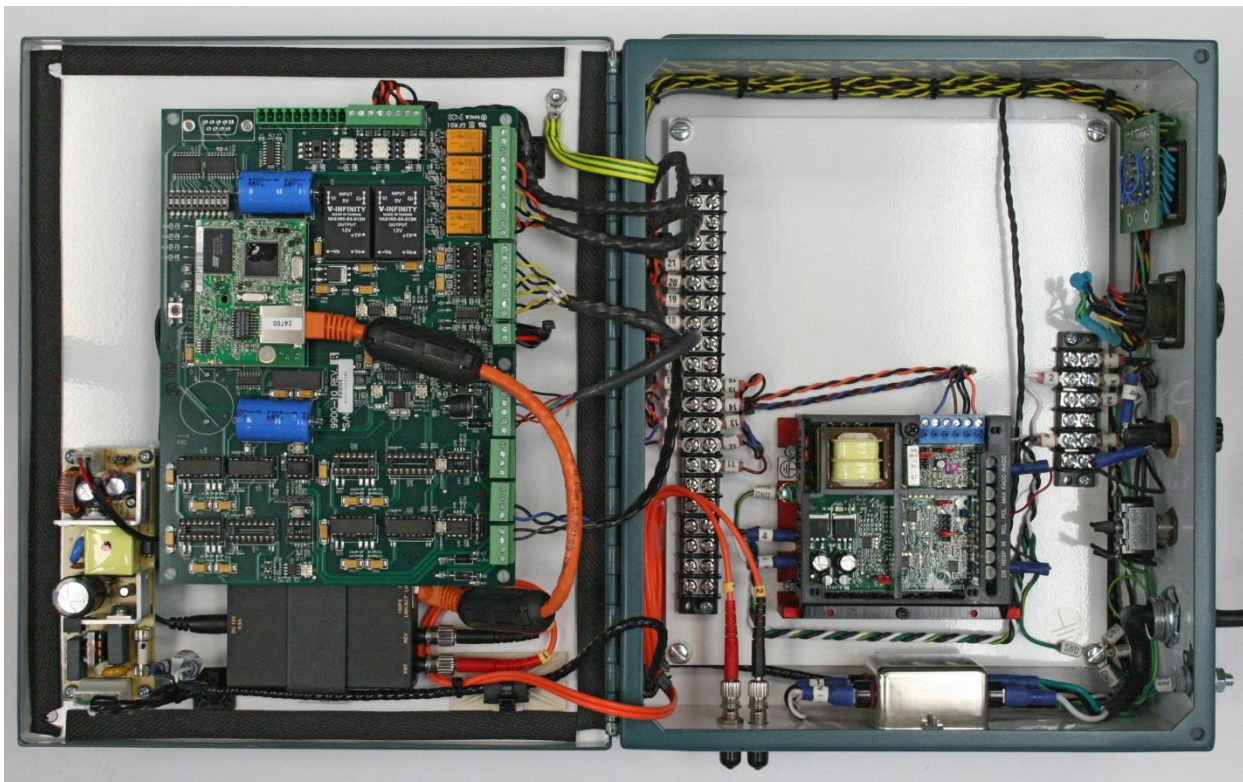
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9900-MCMA-1 MOTOR CONTROL MODULE, EXTERIOR

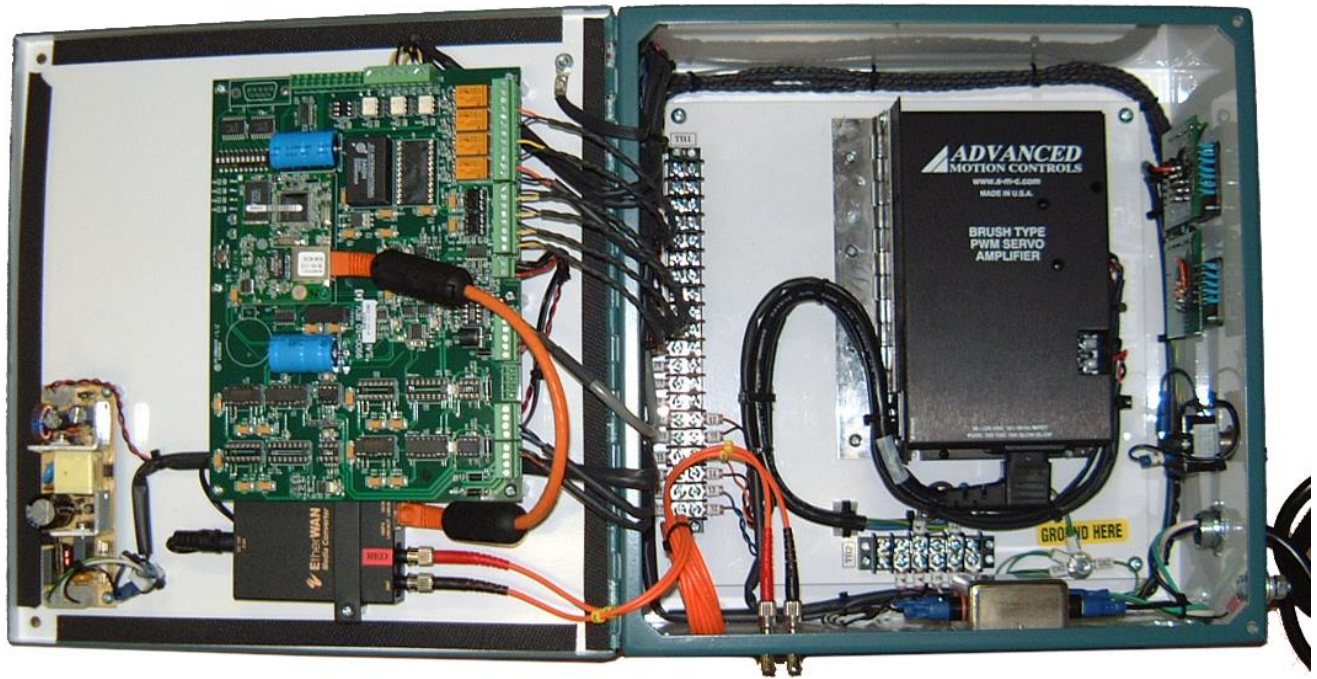


**9900-MCMA-1 MOTOR CONTROL MODULE, INTERIOR**

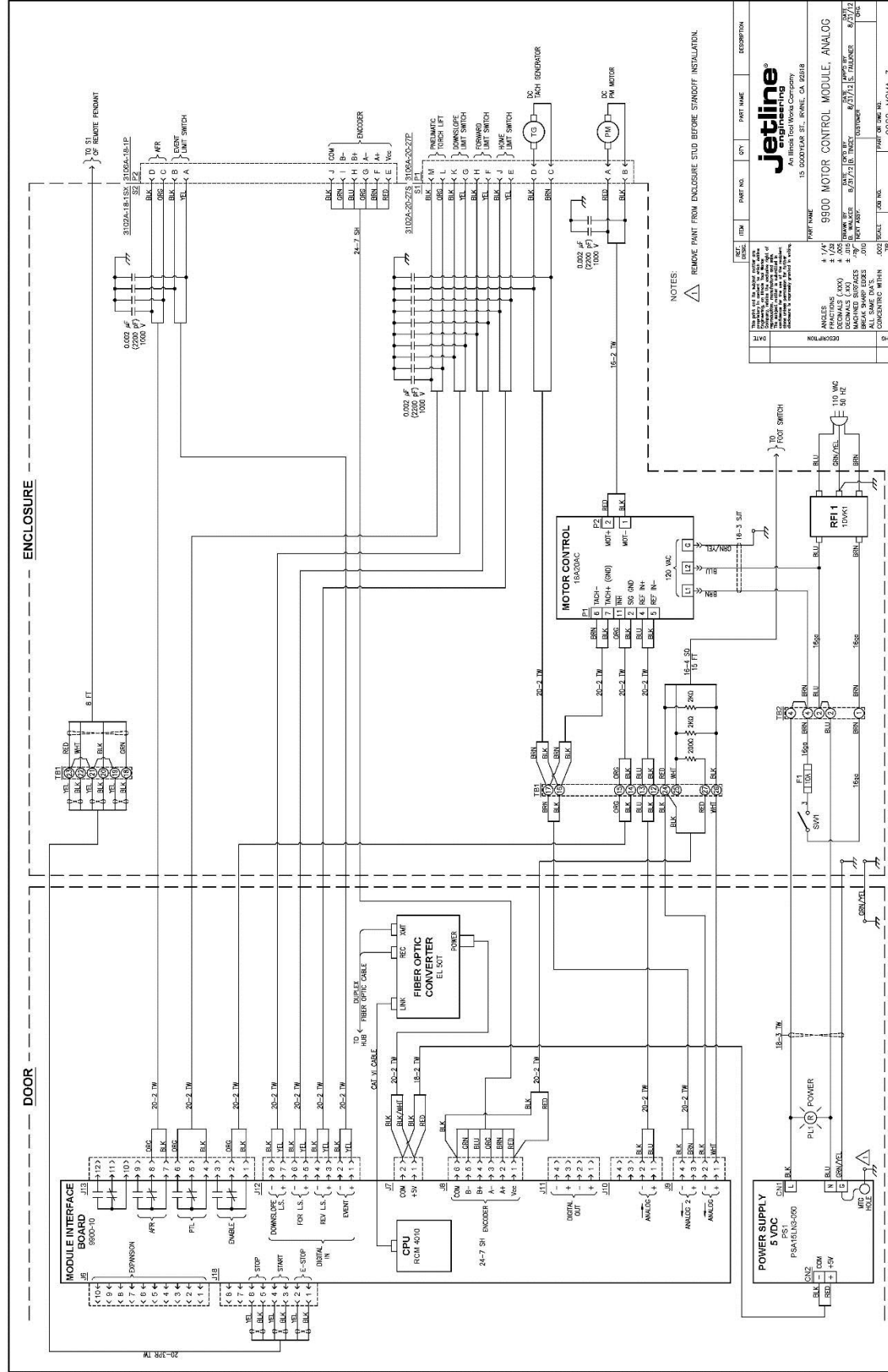




**9900-MCMA-3 MOTOR CONTROL MODULE, EXTERIOR**

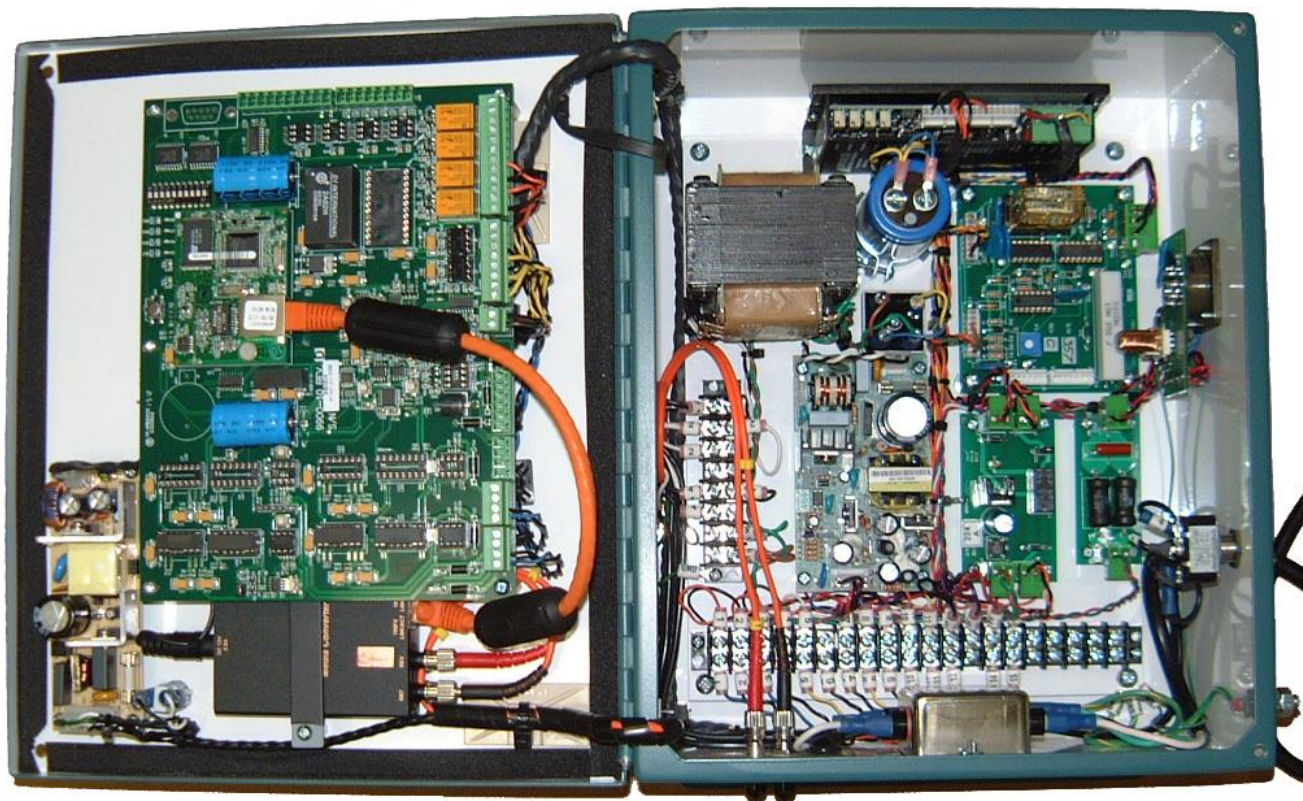


9900-MCMA-3 MOTOR CONTROL MODULE, INTERIOR

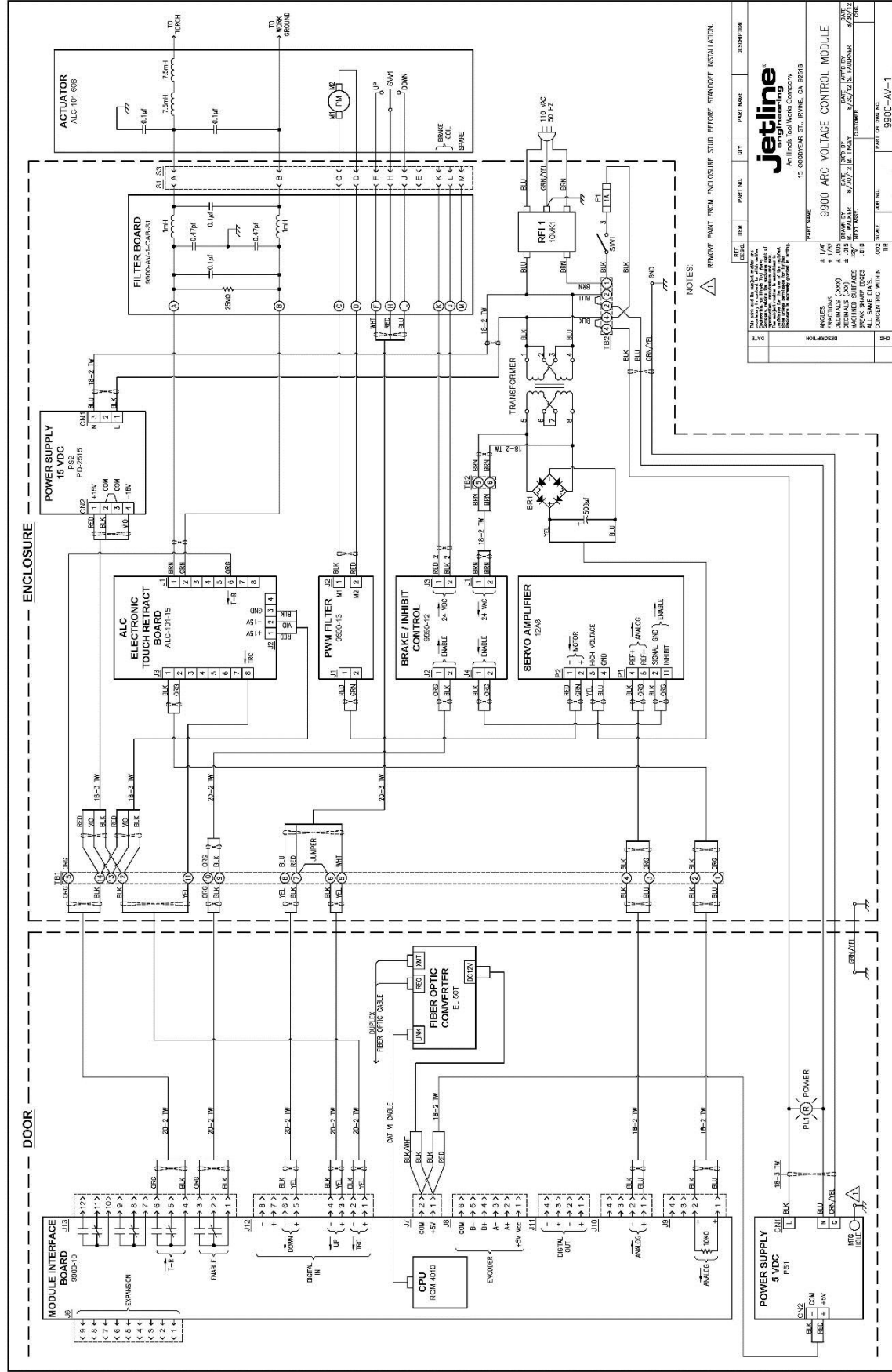
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9900-AV-1 ARC VOLTAGE CONTROL MODULE, EXTERIOR



**9900-AV-1 ARC VOLTAGE CONTROL MODULE, INTERIOR**



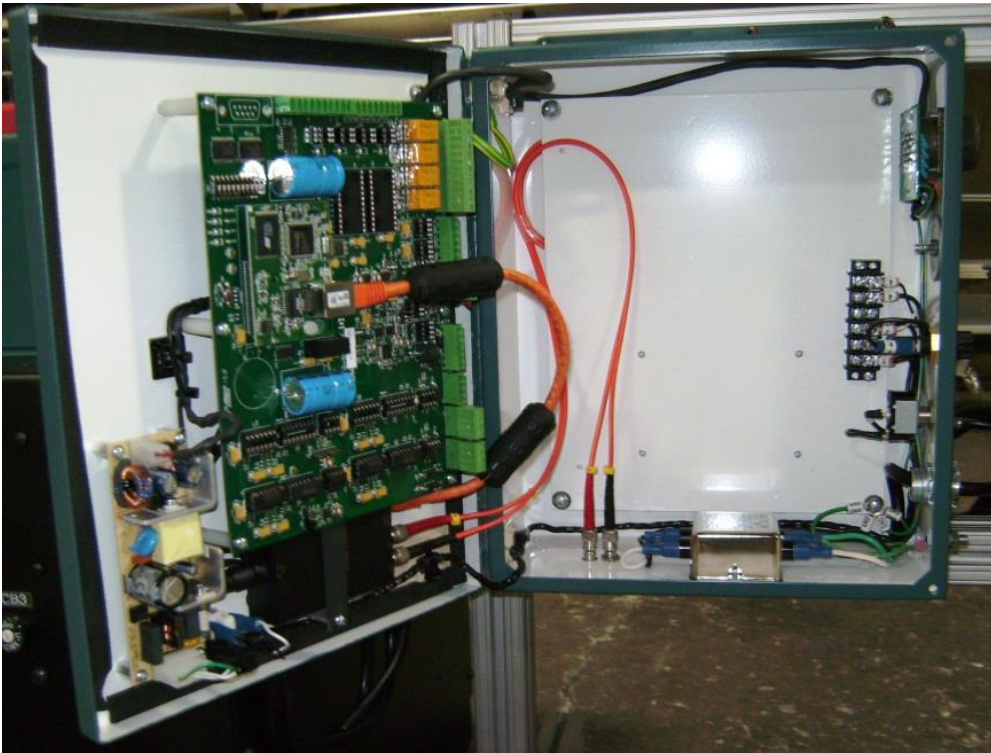
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| REV | DATE    | ITEM | QTY | PART NAME | DESCRIPTION |
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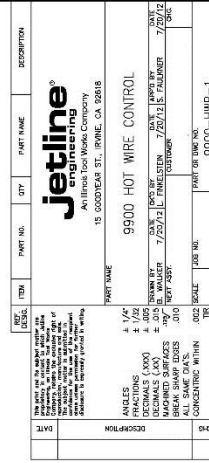
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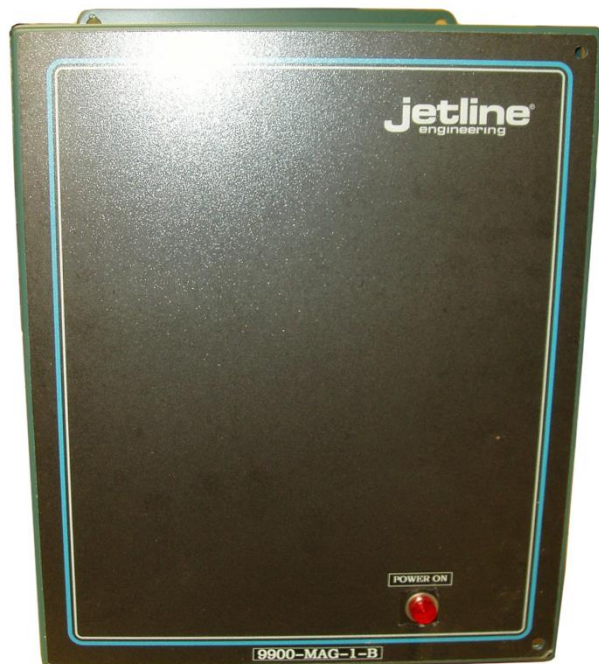


**9900-HWP-1 HOT WIRE PROCESS CONTROL MODULE, EXTERIOR**

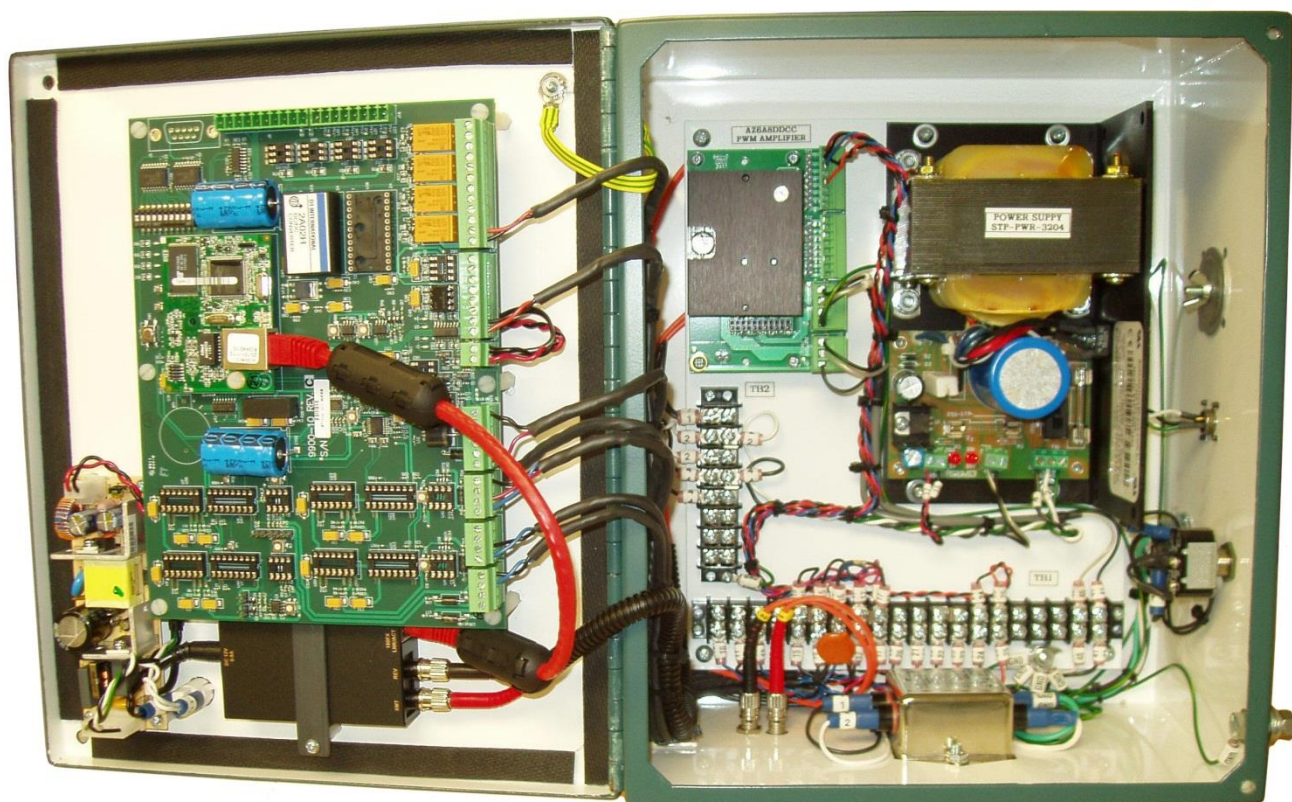


**9900-HWP-1 HOT WIRE PROCESS CONTROL MODULE, INTERIOR**





9900-OSC-1 MAGNETIC ARC OSCILLATOR CONTROL MODULE, EXTERIOR



**9900-OSC-1 MAGNETIC ARC OSCILLATOR CONTROL MODULE, INTERIOR**

