DIRECTION BOOK

PROGRAM 500 IS READY SET TRANSF. TAP TO 1 SET AIR REG TO 39PST

UNITROL



SOLUTION

THE UNITROL

SOLUTION*i* Specification Chart

DESCRIPTION	RANGE
Each program is a complete RWMA Schedule including Forge Delay, Pulsation, and Special Sequences for welding galvanized steel and other coated metals.	800 Customer Set 100 RWMA Preset
Bright blue vacuum fluorescent, full alpha/numeric.	80 Characters
Keeps track of welds made.	1-65,500
Keeps track of finished parts made.	1-65,500
Stops welder when batch is completed.	1-999
Quick setup of system programs using Wizard Tutorial.	-
Automatic line voltage compensation. Maintains welder output with variations of incoming line voltage.	1% Max. Variation with +/-10% Line Voltage Change
Prevents unauthorized changes in welding schedules or setup values.	3 Security Levels
Computerized curve for welding galvanized steel. Just enter total welds and last heat % increase.	999 Welds
Displays required pressure regulator setting needed to produce requested electrode force.	0-99 psi
Single selector wire to match line voltage. Keypad entry for line frequency.	115V - 575V 50/60Hz
Assigns any weld schedule to one of two initiation inputs.	-
Single level, dual level, anti-tiedown; holding or momentary.	-
Input from external water flow switch.	-
Input for light curtain, factory programmed.	-
Exclusive UNI <i>TROL</i> operator pinch point protection safety system. Requires Soft Touch hardware kit.	-
Copy programs, install programs, modify operating system.	-
Requires closing of two hand switches within 1 second to start weld.	-
Starts weld when selected electrode force has been reached. Locks electrodes on part at end of weld if force exceeds customer-set limit to prevent cold welds.	0-99 psi
Compares RMS current to program high/low range. Locks electrodes closed if out of range.	10KA - 200KA
Accurately provides program-selected secondary current. Current values are directly entered in amps.	0-200KA +/-1% Range F.S.
Export of weld results; upload / download schedules.	RS-232 or RS-485
Automatically sets pressure regulator to provide program-selected electrode force.	0-99 psi
	DESCRIPTION Each program is a complete RWMA Schedule including Forge Delay, Pulsation, and Special Sequences for welding galvanized steel and other coated metals. Bright blue vacuum fluorescent, full alpha/numeric. Keeps track of welds made. Keeps track of finished parts made. Stops welder when batch is completed. Quick setup of system programs using Wizard Tutorial. Automatic line voltage compensation. Maintains welder output with variations of incoming line voltage. Prevents unauthorized changes in welding schedules or setup values. Computerized curve for welding galvanized steel. Just enter total welds and last heat % increase. Displays required pressure regulator setting needed to produce requested electrode force. Single selector wire to match line voltage. Keypad entry for line frequency. Assigns any weld schedule to one of two initiation inputs. Single level, dual level, anti-tiedown; holding or momentary. Input from external water flow switch. Input for light curtain, factory programmed. Exclusive UNITROL operator pinch point protection safety system. Requires closing of two hand switches within 1 second to start weld. Starts weld when selected electrode force has been reached. Locks electrodes on part a

* included with **SOLUTION***i*QC controls

** optional feature



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SOLUTIONi DIRECTION BOOK

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SOLUTION i INSTALLATION

SECTION A

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REMOTE CONSOLE controls (9180i)		



Take your time installing this new SOLUTION*i* control. Be sure that all connections are tight and that no chips get into the control

A1. UNPACK: Carefully unpack system and inspect for damage. Report any problems to the factory at once. If damage is obvious from outside of carton, photograph the damage and report to carrier immediately.

A2. LOCATION: Select location for power supply cabinet being sure that the cabinet door will clear all welder components when open. It is usually an advantage to locate this cabinet as close to eye level as possible for easy installation and servicing.

A3. MOUNTING: Select the model number group:

A3.1 FOR 9180i, 9180iD, AND 9180iL, SERIES CONTROLS:

Drill welder to match the four mounting ears mounted to the cabinet. Install cabinet.

A3.2 FOR 9180iM SERIES CONTROLS: Side mounting brackets are supplied with the system.

- a. **SIDE MOUNTING**: You can mount the control from the left or right side as desired using the two mounting brackets supplied with this control. Mount these brackets using the screws that presently hold the side panel in place per the photo at the right. Mount cabinet.
- b. **BOTTOM MOUNTING**: Alternately, by drilling holes in the four foot pads on bottom of this enclosure, you can mount the control to the top surface of the welder or to a table top.



IT IS IMPORTANT THAT NO METAL CHIPS ENTER ANY OF THE ELECTRONIC COMPONENTS IN THE CABINET! PROTECT POWER SUPPLY AND CONTACTOR DURING THE FOLLOWING DRILLING AND INSTALLATION OPERATIONS. WHEN COMPLETE, REMOVE ALL CHIPS FROM THIS CABINET BEFORE APPLYING POWER.

A4. LINE VOLTAGE CONNECTION:

A4.1 POWER CABLE HOLE: Drill or punch power cable hole either through the back, side or bottom of the cabinet. Drill or punch a second hole to handle the return cable to the welder transformer.



When doing any punching or drilling in the control cabinet, be sure to protect the control components from metal chips. After drilling or punching holes, be sure that all filings are fully removed!

A4.2 INCOMING POWER CONNECTION: See the hookup diagram in the back of this book A that matches your welding control style. Bring two line voltage wires into the control from the factory source being sure to use conduit and flexible conduit to match local electrical codes. Consult local codes for proper wire size. Wire should be sized for at least a 50% duty cycle load.

If your control has a built-in circuit breaker, connect the wires to the top terminals marked L1 and L2 on the circuit breaker.

If you control does **not** have built-in circuit breaker, connect one incoming power wire to the terminal on the SCR contactor marked **L1**.

For controls in a **hinged-door** cabinet, connect the second incoming power wire to the terminal block marked **L2**.

For controls with M in the model number (screwed-together enclosure), connect the second power wire directly to one leg of the welding transformer. Include a 16-gage wire from this junction to be brought into the welding control cabinet and connected to the small terminal block marked **L2**.



A good source for selecting the proper wire sized is the RWMA bulletin #16, charts 1.7.15 and 1.7.16 (www.rwma.org). These charts show the recommended wire sizes, fuses sizes, and disconnect switch sizes. Remember that resistance welding transformers require different sizing of these components than regular power transformers.

A5. GROUND WIRE:



Do not operate this resistance welder without a proper ground wire and connection. The ground wire must be a <u>separate</u> wire that comes into the control through the same conduit as the two power wires. Grounding cannot be from a conduit connection.

The ground wire has to be sized to handle a MINIMUM of 50% of the amperage-carrying capacity of the two main power wires coming into this control.

The ground wire must be connected to the ground stud inside this welding control. Look for the stud with the DANGER sign as shown in the photo to the right.



A6. CONNECTION OF CONTROL WIRING:

A6.1 INITIATION AND SOLENOID HOLES: Drill or punch access holes to handle the foot pedal or palm buttons, limit switches, and solenoid valves. These should be at a convenient location in the bottom or back of the cabinet. Install liquid tight or approved cable through appropriate box connectors.



When doing any punching or drilling in the control cabinet, be sure to protect the control components from metal chips. After drilling or punching holes, be sure that all filings are fully removed!

A6.2 WIRING 9180iM, 9180iL, and 9180iD series CONTROLS: Remove the

four outer screws on the control face plate. Lift the white faceplate up slightly and carefully rotate the front panel from the top to expose the wiring terminals. A bracket is provided to prevent the panel from going more than 90^o as shown in the photo to the right. Connect wires in this position. This will make wire installation easier, and be sure that the panel will be able to rotate outward in the future should service be required.



A6.3 CONNECTION FOR ALL CONTROLS: Connect foot pedal, palm buttons, or machine contacts per HOOK-UP DIAGRAM in the back of this book A.

- a. If limit switch, pressure switch, and/or transformer thermostat is used, connect per HOOK-UP DIAGRAM. If switches are PNP solid-state, check the appropriate section on the HOOK-UP DIAGRAM.
- b. If you are connecting two hand buttons for anti-tiedown initiation, there are two choices:
 - i. Both of the switches have to have two NORMALLY OPEN contacts and are wired per the HOOKUP-DIAGRAM.
 - ii. If your switches do NOT have two NORMALLY OPEN contacts, connect them to a Unitrol part #9181-56 ANTI-TIEDOWN INTERFACE. If this board was not ordered with this control it can be easily field installed for this purpose.
- c. If any of these are **not** being used, install jumpers as shown on the HOOK-UP DIAGRAM. These jumpers are normally installed at the factory.

A7. SCR CONTACTOR OVERTEMPERATURE SWITCH: This

surface thermostat switch has been factory installed. It will open if the temperature of the cooling block on the SCR contactor exceeds the switch setting. At that time the control will display:

No operation of the control is possible until this switch input has been closed.



A8. TRANSFORMER OVERTEMPERATURE SWITCH: If your

welder transformer has a thermostat that **opens** on temperature rise, remove the factory jumper and connect it to terminals #3 and #4. Before connecting, be sure that the contact is CLOSED. Some of these switches are used for turning on cooling water solenoid valves and close on temperature rise.

When this input is opened, the display will show:

TRANSFORMER OVERTEMP

WATERFLOW sw.is open

No operation of the control is possible until this switch input has been closed.

A9. LOW WATER FLOW SWITCH: If you have a WATER FLOW switch that opens a contact when water flow is low, connect this switch to terminals #13 and #14 (RT1 – RTC). Then assign **RT1** this input to operate as a **WATER FLOW SWITCH** by pressing:



No operation of the control is possible until this switch input has been closed.

A10. WATER TO SCR CONTACTOR: If your control has a WATER-COOLED SCR CONTACTOR, connect water hoses to the ¼" NPT fittings. Direction (in/out) is not important as long as this control does **not** have a built-in WATER FLOW safety switch. If it **does** have a WATER FLOW safety switch, observe the IN and OUT labels on the water ports.



SKIP

BE SURE THAT THE PIPE FITTING THAT YOU THREAD INTO THESE PORTS IS NON-METALLIC. IT CAN BE PVC OR NYLON. ANY METALLIC FITTING (GALVANIZED, BRASS, ETC.) PUT INTO THESE PORTS CAN EVENTUALLY CAUSE A HOLE IN THE WATER-COOLED JACKET THAT WILL FLOOD THE CONTROL WITH WATER AND DESTROY THE SYSTEM. WARRANTY IS VOID IF METALLIC FITTINGS ARE INSTALLED IN THESE PORTS!

If your control does NOT have a remote console as shown in the photo below, skip to A12.

A11. MOUNTING THE REMOTE CONSOLE:

A11.1 LOCATION: Select a location on the welder to mount the remote console. Ideally this should be at eye level and close enough for easy data input on the keypad.

A11.2 BRACKET: Bolt the U bracket supplied with the console to a secure surface on the welder and mount the console with the two 1/4" thumb screws supplied. Be sure that the location allows the console to swing both ways.

A11.3 PLUG IN CONSOLE: Plug the cable into the socket at the back of the remote. HAND tighten the two jack screws.



U bracket mounted to console. Notice that the top of the bracket has the threaded insert.



DO NOT TIGHTEN THESE SCREWS WITH A SCREWDRIVER OR PLIERS. EXCESS FORCE WILL BREAK THE SOCKET FASTENER AND VOID THE WARRANTY!

A11.4 ROUTE CABLE: Route this remote console cable to the power supply cabinet and push the excess cable into the large compression fitting supplied on the cabinet top. Be sure that there is enough of a loop at the console to allow full movement of the console. Tighten strain relief fitting.

A11.5 CLOSING UP: Secure all wires inside power supply cabinet and check to be sure that connections are made correctly and that no loose strands of wire are at any terminal point. If you have rotated the control out of the enclosure earlier, carefully rotate it back and secure with the original four screws.

A12. LINE VOLTAGE SELECTION: If your line voltage was known to Unitrol when this control was manufactured, it was factory connected to match that voltage.



BEFORE TURNING POWER ON, verify that this was done correctly. Check to see if the YELLOW wire on power supply terminal is connected to a terminal that most closely matches your line voltage. See photos below for your type of welding control.

Note: Controls shipped to Canada have two black wires connected to the voltage input terminals. One will be marked F2. This goes to the F2 terminal.

IF THE ACTUAL LINE VOLTAGE IS MORE THAN 20% HIGHER THAN THE TERMINAL MARKING, PERMANENT DAMAGE CAN OCCUR TO THE SYSTEM. DAMAGE CAUSED BY OVERVOLTAGE IS NOT COVERED BY WARRANTY.





For 400V – 412V line voltages, set the yellow wire on the 380V terminal.

SUPPORT: If you have any doubts when installing this control, contact UNITROL technical support 9:00 – 5:00 central time, M-F. We want to be sure that your installation goes smoothly!

By phone: 847-480-0115

By Email: support@unitrol-electronics.com

FOR CONTROLS WITH REMOTE CONSOLES, PAGE 1 OF 2.



FOR CONTROLS WITH REMOTE CONSOLES, PAGE 2 OF 2.



FOR CONTROLS WITH ALL COMPONENTS IN ONE CABINET, PAGE 1 OF 3.







FOR CONTROLS WITH ALL COMPONENTS IN ONE CABINET, PAGE 3 OF 3.



TROUBLE SHOOTING DRAWINGS

LED TROUBLE SHOOTING DRAWING, ALL IN ONE CABINET CONTROLS



TROUBLE SHOOTING DRAWINGS

LED TROUBLE SHOOTING DRAWING, CONTROLS WITH REMOTE CONSOLES



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SOLUTION FIRST TIME CONTROL SETUP

SECTION B

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HELLO, I'M YOUR NEW SOLUTION*i* INTUITIVE WELDING CONTROL

in·tui·tive (in tū'i tiv) *adj.*1. Using or based on what one feels to be true even without conscious reasoning; instinctive.
2. Easy to use and understand.

Welcome to the **SOLUTION***i* resistance welding control. The "*i*" in the name stands for **INTUITIVE.** This direction book will walk you through steps to set up the control for the first time. After that, you should be able to do most things on the control without looking at a direction book.

The display will ask questions and then tell you what to do for the next step or operation. It "thinks" like you do! It is *INTUITIVE*.

A unique



button on the keypad can be used to reach all setup programs without having to remember program locations.

FAULTS: When a fault condition occurs, the **SOLUTION***^{<i>i*} control will tell you what to do next. You don't need any codes or printed sheets to get you back into production!

Whenever you see &



pay extra attention to the idea shown.



This symbol will tell you that you should skip this section if the directions do not apply to your model control.

NEED HELP? Contact the Unitrol technical support team Monday through Friday between 9:00am and 5:00pm CT. As with all Unitrol products, we provide free technical support for the life of your **SOLUTION***i* control. **Please have your model and serial numbers ready and, if possible make your call when you are standing at the welder.**

Email support: techsupport@unitrol-electronics.com Phone support: 847-480-0115 FAX support: 847-480-0932

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Do the following steps to set up your **SOLUTION***i* control when it is first installed in your factory <u>even if it was shipped mounted on a tested</u> <u>welder</u>. Changes need to be made to match your factory's power system. This will also be a check to make sure that it was set up properly.

Let's get started

Use the **PROGRAM** button to make changes in all of the SOLUTION*i* control control's setup programs. Since this section is for SETUP purposes only, descriptions of functions will be covered later in the **USE** section of this direction book.



The display will now show:

900-Enter ALLOY and GAUGE to selec RWMA weld schedul

This program will be used during production as described in the USE section of this direction book.

B2. SETTING TIP FORCE SYSTEM



Press:

The display will show:

Maximum AIR PRESSURE VARIATION= +/-00 PSI After entering data Press YES

If the 9181-05C DIFFERENTIAL PRESSURE TRANSDUCER option is installed in this control, this number is the maximum change above or below the air pressure target that will be allowed before a fault is displayed. If you leave it at **00**, no fault will be shown.

For a typical welder, press:



B4. CYLINDER AREA

Press: YES

and the display will show:



Use the following sections to identify your type of welder air cylinder and calculate the area (SQUARE INCHES) to be entered.

SINGLE PISTON AIR CYLINDER

B4.1 AREA OF SINGLE-PISTON CYLINDERS: If your welder has a single piston air cylinder, the AREA of CYLINDER can be found on the chart below. AIR CYLINDER AREA of CYLINDER **INSIDE DIAMETER** (SQUARE INCHES) (INCHES) 3.1 2

2-1/2 4.9 7.1 3 3-1/2 9.6 12.6 4 4-1/4 15.9 5 19.6 5-1/2 23.7 28.3 6 50.1 8 DIAMETER 10 78.5 12 113.5*



TYPICAL ROCKER ARM WELDER WITH A STANDARD SINGLE-PISTON AIR CYLINDER **BEHIND WELDER**

INSIDE

TYPICAL PRESS WELDER WITH A STANDARD SINGLE-PISTON AIR CYLINDER ON TOP OF WELDER

* For cylinders over 99.9 in², change the range as shown on the next page.

For non-standard diameters or metric cylinders, this value can be calculated as:

AREA of CYLINDER = .785 X INSIDE DIAMETER X INSIDE DIAMETER Example: For a 4" inside diameter cylinder:

AREA = .785 X 4" X 4" = .785 (16") = 12.56 square in.



SKIP

To estimate the INSIDE DIAMETER of a single piston cylinder, subtract 1/8" from the OUTSIDE DIAMETER of the cylinder body and round. Typical U.S. manufacturers diameters use in 1/2" increments (3", 3-1/2", 4", 4-1/2", 5", etc.).

> For welders with a CYLINDER AREA less than 99.9 square inches, skip to B5.

B4.2 CYLINDERS OVER 99.9in²



FIRST TIME CONTROL SETUP B5. IDENTIFYING TYPE OF WELDER

Identify your type of welder and follow the directions on the following pages to enter the proper number for AREA of CYLINDER.

B5.1 PRESS and PROJECTION WELDERS, SINGLE PISTON CYLINDER These welders use a **single-piston** air cylinder to directly push the electrodes closed.



TYPICAL PRESS WELDER WITH A STANDARD SINGLE-PISTON AIR CYLINDER ON TOP OF WELDER



TYPICAL PROJECTION WELDER WITH A STANDARD SINGLE-PISTON AIR CYLINDER ON TOP OF WELDER



TYPICAL PRESS WELDER WITH A STANDARD SINGLE-PISTON AIR CYLINDER ON TOP OF WELDER. THIS WELDER ALSO HAS A RETRACT FEATURE



TYPICAL PROJECTION WELDER WITH A STANDARD SINGLE-PISTON AIR CYLINDER ON TOP OF WELDER. THIS WELDER ALSO HAS A RETRACT FEATURE



TYPICAL SEAM PRESS WELDER WITH A STANDARD SINGLE-PISTON AIR CYLINDER ON TOP OF WELDER

For these types of welders, enter the **AREA of CYLINDER** as listed in the **SINGLE PISTON** table in section B4.1 into PROGRAM 979.

B5.2 MULTI-PISTON AIR CYLINDER WELDER

If your welder uses a cylinder that has two or three internal pistons (SavAir, ACP, Grossel, etc.), the effective cylinder area is usually part of the model number that is stamped on the cylinder body.

Enter this number as the **AREA of CYLINDER** in **PROGRAM 979.**

BRAND	TYPICAL MODEL NUMBER	Effective AREA of CYLINDER (square inches)	ENTER THIS NUMBER IN PROGRAM 979
SAVAIR	C-G-584-6N	5.84	5.9
ACP	AC-C-G-937	9.37	9.4
GROSSEL	2-GA-1157-1.5	11.57	11.6
MILCO/TG	TG-CG-1143-8N	11.43	11.4

If your brand cylinder is **not** shown, consult the manufacturer or distributor to find the correct **effective area** of the cylinder.

B5.3 INTENSIFIER CYLINDER WELDERS:

The cylinders on this type of welder look similar to the **MULTI-PISTON** air cylinder welders, but include a separate oil reservoir to feed hydraulic fluid into the welder cylinder.

If your welder uses an OHMA brand intensifier-type cylinder, the effective area is the **third and fourth** digit:

TYPICAL OHMA MODEL NUMBER	Effective AREA of CYLINDER (square inches)	ENTER THIS NUMBER IN PROGRAM 979
8832-RH10-12A	32	32



SECTION B, PAGE 6

MULTI-PISTON AIR CYLINDER

FIRST TIME CONTROL SETUP Enter this number as the AREA of CYLINDER in PROGRAM 979.

If you have another brand of **intensifier** cylinder, consult the manufacturer or distributor to find the correct **effective** area of the cylinder.

B5.4 ROCKER ARM WELDERS:

Rocker Arm welders take the force from the air cylinder at the rear of the welder and multiply this force by the leverage of the welder's rocker arm system.



In the picture to the right, the calculation would be:

ELECTRODE FORCE = CYLINDER AREA X AIR PRESSURE X (A/B)

The **CYLINDER AREA** is the number as listed in the **SINGLE PISTON** table at section B4.1.

EXAMPLE: The electrode force of a rocker arm welder with a 6" single-piston air cylinder (28.3 in²) where A=18", B = 24", and the air pressure is 65psi would be calculated as:

ELECTRODE FORCE = 28.3 X 65 X (18/24) = 1380 POUNDS

The SOLUTION*i* has a system to calculate the electrode force after the leverage of the welder is entered in section B9.



B5.5 TRANSGUNS AND HANGING PORTABLE GUNS:

Consult the specifications sheets or manufacturer of these types of welders to find the proper number that represents the "effective area" of the welder.



TYPICAL TRANSGUN WELDERS WELDING TRANSFORMER IS BUILT INTO THE WELDING GUN.

If the specification shows the **TIP FORCE** at a particular **AIR PRESSURE**, then the effective AREA of CYLINDER that will be entered is calculated as:

USES A HEAVY "KICKLESS" CABLE AND AN OVERHEAD WELDING TRANSFORMER.

TYPICAL HANGING PORTABLE GUN.

Effective AREA of CYLINDER = TIP FORCE / AIR PRESSURE

EXAMPLE: The chart on the welding gun specification sheet shows:

688 pounds at 80psi.

The calculation will be: effective AREA of CYLINDER = 688/80 = 8.6

Enter this number as the **AREA of CYLINDER in PROGRAM** 979.



If the specification sheet for the welding gun has values in metric, convert the numbers first to inches and psi. Then do the calculation.

B6. ENTERING THE CYLINDER AREA:

After entering the air cylinder area into the display:

Area of CYLINDER is 00.0 SQUARE INCHES After entering data Press YES The display will now show:



B7. FORGE DELAY: This is a fairly **uncommon** function on welders. But if your welder has an **extra solenoid valve** and **pressure regulator** for **BACKUP** (sometimes called **BUCKING) PRESSURE**, enter the air pressure that you will set on that pressure regulator. A typical value is 20psi.



Push

But be sure that whatever you enter into this display for **BACK-UP PRES.** will match what you **set** on the BACK-UP pressure regulator on the welder. Otherwise all of the TIP FORCE calculations will be incorrect.

If you **do not** have this FORGE DELAY system installed on your welder, leave the value at 00.

Press (YES) and the display will show:

HEAD WEIGHT = 000LB Want to chanse? PUSH The YES or NO button



If you disconnect the air coming into the welder and the electrodes do <u>not</u> close by gravity, press: NO and skip to B8.

B8. HEAD WEIGHT: If you disconnect the air coming into the welder and the electrode closes by gravity with some force between them, that force, called HEAD WEIGHT, is entered here so that your calculations will be accurate.

For example, if you need **500** pounds force for a weld and the HEAD WEIGHT is **150** pounds, you will only need **350** pounds of force out of the air cylinder to get the desired **500** pounds between the electrodes.

HEAD WEIGHT can be measured by using a digital hand-held electrode force measuring device. However if this is not available or your hand-held unit does not have any accuracy in the low range, you can use a digital UPS scale. **Put a 14** gage or thicker sheet of steel on top and bottom of the scale to prevent the electrodes from denting the soft steel panels of a typical scale.

If the welder has a TIP DRESS valve that removes all air from the bottom of the air cylinder, turn on this valve.



If you are installing a control with SOFT TOUCH, you cannot use the SOFT TOUCH **TIP DRESS** switch to close the electrodes for this test. In this case you have to remove all of the air from the welder to measure the HEAD WEIGHT.

If the welder does NOT have a TIP DRESS valve, remove the incoming air pressure going to the welder to allow the electrode to close under gravity.

Enter the measured HEAD WEIGHT value (if any) and press:



B9. SELECTING THE TYPE OF WELDER

The display will show one of the two displays:



B9.1 PRESS WELDER: If you told the SOLUTION*i* that your welder was a **PRESS or PROJECTION WELDER**, the display will show:



Where ##.# is the number you entered as the **AREA of CYLINDER**. This means that the TIP FORCE between electrodes will be calculated as the air pressure times this number. It will then exit out to the next setup program.

EXAMPLE: If the display showed:



and the air pressure regulator is set for 60psi, then the force between electrodes would be:

TIP FORCE = 12.6 X 60 = 756 POUNDS

B9.2 ROCKER ARM WELDER SETUP: If you told the SOLUTION*i* that your welder was a **ROCKER ARM WELDER**, the display will show:



Enter **DIMENSION A** in the photo to the right. This is the dimension from the center of the pivot pin that connects the air cylinder rod to the back of the rocker arm to the center of the rocker arm pin.

Be sure that the number matches including the decimal.



TYPICAL ROCKER ARM WELDER

Press

and the display will show:



Enter **DIMENSION B** in the photo. This is the dimension from the center of the rocker arm pin to the centerline of the electrode holder.



Where the SOLUTIONi calculated: ##.# = AREA of CYLINDER X (A/B).

EXAMPLE: Dimension A = 24", and dimension B = 18", and the area of the air cylinder is **19.6in**². These numbers would be entered as:



If the air pressure = 50psi, then: **TIP FORCE = 26.1 X 50 = 1,350 POUNDS.** It will then exit out to the next setup program.

B10. SETTING UP Automatic Voltage Compensation

(AVC). This function will maintain the RMS voltage going into the welder transformer within a +/- 1% window for a line voltage variation of +/- 10%.


Read the line voltage with a voltmeter inside the welding control and **enter** the value on this line.



where ### is the value you just entered.

Then press

After a few seconds, the display will now show:



This confirms that the baseline for the Automatic Voltage Compensation system has been set.

B10.1 TURNING OFF AVC: If the control is not holding steady welding current, the **AVC** function can be turned **OFF** to see if this system is causing the problem. To do this, press:



B11. INITIATION MODES: The display now shows:

990-CHOOSE MODE Of INITIATION: MOMENTARY or HOLDING SELECT=YES, SKIP=NO

Press (Y

and the display will show:

HOLDING INITIATION Want to chanse? Push The YES or NO button



Be sure that you set this INITIATION MODE properly as shown on the next page to prevent injury to the welder operator.

B11.1 HOLDING INITIATION: When the control is in this mode, if the foot or hand initiation switch is opened **before** the start of the first heat cycle, the electrodes will open and the sequence will stop.

This is the <u>safest</u> mode and should be used if you do **not** have the Unitrol **SOFT TOUCH** safety system installed on this welder, or if you have a light curtain properly installed to protect the operator from pinch point injury during a weld sequence.

Even if you have the Unitrol **SOFT TOUCH** system installed or have a properly installed light curtain system, leaving the control in the **HOLDING INITIATION** mode will allow the operator to open the electrodes before the start of the weld if the position of the electrode is not correct.

B11.2 MOMENTARY INITIATION: When the control is in this mode, once the foot or hand initiation switch has been pushed, the sequence will continue to completion even if the initiation switch has been opened.

This is the <u>LEAST SAFE</u> mode and should **only** be used if you have the Unitrol **SOFT TOUCH** safety system installed on this welder, or you have a light curtain properly installed to protect the operator from pinch point injury during a weld sequence.

Press

SINGLE

to exit out of this program.

B12. SETTING WELDER TRANSFORMER STYLE:

Your SOLUTION*i* control can operate two types of welding transformers.



Most package transformers are **WOUND CORE** style. These are transformers with metal casings on the outside of the transformer.

Other transformers do not have metal casings on the outside and are usually **STACKED CORE** transformers.

Check with the welder manufacturer to identify your transformer style. If you cannot get this information, leave the control in **WOUND CORE.**

Press (NO) and the program will exit out.

If you have identified the welding transformer as a STACKED CORE style, press

YES

to make the change.



If this control does **not** have the letters **QC** in the model number, skip the rest of the FIRST TIME CONTROL SETUP.



If your control has a primary Current Transformer (CT) installed inside the cabinet as in the photo to the right, skip to B14.



SKIP If the KVA of your welder was known when the control was built at Unitrol, the CURRENT MONITORING settings were made to this control prior to shipment from Unitrol. This will be shown on the serial number page of at the front of this direction book. If the calibration and setting for SECONDARY CURRENT is shown on that page, skip to B14.

B13. SETTING SECONDARY CURRENT MONITORING SYSTEM



Press (NO) if your control has a SECONDARY CURRENT

COIL as shown in the photo to the right.

The display will show:

SECONDARY CUR SYSTEM 100KA MAX CURRENT =1 Want to change? Push the YES or NO button



This program selects the maximum secondary current that will be read by this pickup coil. If you do not know the maximum secondary current for your welder, use the following chart to make this selection:

WELDER KVA	MAX. CURRENT	RANGE NUMBER	
UP TO 20	10KA	4	
25 TO 75	25KA	3	
80 TO 150	50KA	2	
OVER 150	100KA	1	

If the maximum current number is shown on the display, press to exit out of this program.

If the maximum current number on the display is NOT correct, press

The display will show:



Press the numbered button on the keypad that matches the desired range. The display will now briefly show the selected MAXIMUM CURRENT RANGE and then exit to:



B13.1 SETTING CURRENT RANGE SWITCH

After setting the control's electronic system for current range, a DIPswitch has to be set mechanically to match this range.

For model 9180iQC (REMOTE CONSOLE)

1. Remove the blue back plate on the remote console.

2. Locate the 4-position DIPswitch as shown in the photo.

3. Pull the switch finger that matches the desired MAXIMUM CURRENT RANGE (chart on



page A16) to the left (ON) as shown in the photo. In this photo, the #3 (25KA) switch is selected.

4. Push the other three fingers to the right (off).

5. Install the back plate and mounting angles per the photo to the right.



For models 9180iLQC- and 9180iDQC- (all in one cabinet)



- 1. Remove the outer four screws that hold the white faceplate of the control to the cabinet or door.
- 2. Lift the plate up slightly and rotate out a few inches at the top as shown in the photo above.
- 3. Look down between the two circuit boards and locate the 4-position DIPswitch at the top between the front of the circuit board and the inside of the white metal faceplate.
- 4. Push the switch finger that matches the desired MAXIMUM CURRENT RANGE (chart on page B18) away from the white metal faceplate. In the photo the #2 (50KA) switch is selected.
- 5. Pull the other three fingers towards the white metal faceplate.

B14. HEAT SETTING MODES:

SKIP

Setting welding heat on your SOLUTION*i* control can be done in two different ways:

B14.1 UNDERSTANDING CONSTANT VOLTAGE MODE:

In this mode the welding heat will be set in **% of the maximum available power** for the welding transformer and welder. In this case, the first display for a welding schedule display will look like:



This **CONSTANT VOLTAGE** mode should be used for PROJECTION WELDING (weld nuts, parts with projections). It can also be used for all welding sequences.

 If you want to use only heat settings in percent (%) and not use the CONSTANT CURRENT feature of this control, exit out of this FIRST TIME CONTROL SETUP section. You can always come back at a later date to do this procedure.

B14.2 UNDERSTANDING CONSTANT CURRENT MODE:

In this mode, the welding heat will be set in AMPS. This is useful if you are going to use standard resistance welding charts, or are going to use the built-in RWMA welding schedules. The CONSTANT CURRENT welding schedule display will look like:



You can switch back and forth between these two modes with just a few keystrokes.

Before using this control in the **CONSTANT CURRENT** mode, you need to follow a one-time set-up procedure to "teach" the SOLUTION*i* control the welding current created by different percentage heat settings on your particular welder.

B14.3 DOING THE LEARN CURVE:

1. Press:



6. Measure the incoming line voltage inside the welding control cabinet and enter

that number here. Then press

7. The display will now show:

Set TRANSF.TAP to #1 Place metal between ELECTRODES and then close INITIATION SW.

- 8. As directed
 - a. Place two pieces of metal that represent the **middle thickness** combination that you will be welding on this welder
 - b. Put the metal **approximately** ½ **way into the throat of the welder**. This will "teach" the control results of the **average** welding conditions and get the control to the requested welding current quickly and accurately.



Since this LEARN CURVE will be used for a long time, try to use the correct metal combination and location as shown above. A little extra time now will pay off in the coming years!

9. Close the initiation foot switch or hand switches and KEEP THEM CLOSED. The electrodes will close on the metal and the display will show:



The SOLUTION*i* control will make a series of pulses, open the electrodes, and then display.

Open INIT. SWITCH

Open the footswitch or hand switches.

If you told the control that there were more than 1 TRANSFORMER TAP SWITCHES, the display will show:



- 10. Move the metal to another spot a few inches away from the first location.
- 11. Close the initiation foot switch or hand switches and KEEP THEM CLOSED. The electrodes will close on the metal and the display will show:



The SOLUTION*i* control will make a series of pulses and then display:



12. This sequence will continue until the control has done a LEARN CURVE for all TAP SWITCHES.





Welding in **CONSTANT VOLTAGE** mode is recommended for all projection welding (weld nuts, sheets with projections, etc.)

SOLUTION i PERSONALIZATION

SECTION C

FUNCTION	SECTION	DIRECT ACCESS NUMBER*	PAGE NUMBER
Setting COUNTING SYSTEM	C1	991	1
Setting BATCH COUNTER	C1.1	991	1
Using BATCH COUNTER	C1.2	991	2
SECURITY SYSTEM	C2	-	3
SECURITY LEVELS table	C2.1	-	3
Setting SECURITY LEVEL	C2.2	987/96	4
BYPASS KEYLOCK SECURITY CODE	C2.3	987/99	4
Viewing weld schedules with key in LOCK position	C2.4	987/99	5
Heat change ON THE FLY	C3	987/78	6
EHR/FAULT RELAY assignment	C4	-	7
EHR relay operation	C4.1	-	7
FAULT relay operation	C4.2	-	8
FAULT RESET mode	C5	982	8
KEYPAD & INITIATE fault reset mode	C5.1	-	9
KEYPAD & KEYLOCK fault reset mode	C5.2	-	9
FAULT RELAY mode	C6	985	9
CLOSE on FAULT	C6.1	985	10
CLOSE on ACCEPTED WELD	C6.2	985	10
EHR and Fault RELAY CLOSING TIME	C7	987/21	10
Setting CURRENT BLANK cycles	C8	983	11
Setting mode for CURRENT MONITOR	C9	984	11
DISPLAY ONLY	C9.1	984	12
COMPARE TO LIMITS	C9.2	984	12
Configure SVO OUTPUT	C10	987/80	13
FORGE DELAY	C10.1	987/80	13
INTENSIFIER DELAY	C10.2	987/80	14
CLAMP DELAY	C10.3	987/80	15
Turn on with LEVEL 2	C10.4	987/80	16
FULL or HALF CYCLE count	C11	993	16

*If the number shown has a / (example: 987/96), press:



Your SOLUTION*i* control can be personalized to use functions to best match your needs.

C1. SETTING COUNTING SYSTEM: The SOLUTION*i* control has several counting functions built into the system. They include WELD COUNTER, PARTS COUNTER, and BATCH COUNTER.



If you are making more than 1 weld per part and want to count FINISHED parts,

enter the number of WELDS on each PART and then press (YES)

If you want to only count **WELDS**, leave 000 and press

C1.1 SETTING BATCH COUNTER: The display will now show:

BATCH	COUNT	'ER is	OFF
Want t	o cha	nse?	Push
the YE	S or	NO bu	Itton

If you want to have the control stop operation when a predetermined number of

finished parts has been completed, press

The display will now show:

PARTS PER BATCH =000 After entering data Press YES

Enter the number of parts that will be in a BATCH and press (YES). The display will exit out of this set up program.

C1.2 USING BATCH COUNTER: If you entered a number for the **BATCH COUNTER** and start to weld, the welder will continue to operate and after each weld will display:

PROGRAM 055 IN USE 00,437 LEFT IN BATCH 00,063 PARTS MADE

This indicated that there are 437 more parts to make before the control will stop.

After the last weld is made for the last part in the batch, the display will show:

```
BATCH is completed.
PRESS "YES"
to start a new BATCH
```

The welder will not operate until you push (YES). This will now reset the **BATCH COUNTER.**

C2. SETTING SECURITY SYSTEM: Your SOLUTION*i* control has a built-in security system to prevent unauthorized changes to welding or setup programs. The control will be either LOCKED or OPEN depending on the key position.



C2.1 SECURITY LEVELS: With the key in the LOCK position, the following operations will be allowed (YES) or blocked (NO):

FUNCTION	STANDARD	FULL MANAL	FULL AUTO
Review WELDING PROGRAM DATA	YES	NO	NO
Change WELDING PROGRAM DATA	NO	NO	NO
Select NEW WELDING PROGRAM	YES	NO	NO
Change welding mode SINGLE, NO WELD, or REPEAT	YES	YES	NO
Link PROGRAMS TO INITIATION-A AND INITIATION-B in PROGRAM 995	YES	NO	NO
CHANGE REPEAT OFF TIME in WELDING PROGRAMS	YES	YES	NO
Reset PARTS OR BATCH COUNTERS in PROGRAM 991	YES	NO	NO
Measure TIP FORCE in PROGRAM 996	YES	NO	NO
Turn TRANSDUCER ON/OFF in PROGRAM 996	NO	NO	NO
Set WELD CYLINDER AREA in PROGRAM 997	NO	NO	NO
Select or change any of the SETUP PROGRAMS	NO	NO	NO

C2.2 SETTING SECURITY LEVEL: Turn the key to **OPEN** and press:



C2.3 BYPASS KEYLOCK SECURITY CODE: You can enter a

three-digit number that can be used in place of opening the keylock. To select a security code, press:



If the keylock is in the **LOCK** position and you try to make a change not permitted by the security level chosen, you can enter this code and then make changes. Once you push **SINGLE, NO WELD**, or **REPEAT** to exit out, you will have to go through the same procedure if you want to get back into a locked program.

C2.4 VIEWING WELDING SCHEDULES WITH KEY IN LOCK

POSITION: If the key is in the **LOCK** position, the control is the STANDARD KEYBOARD LOCK mode, and you try to enter a welding program, the display will show:

Keyboard is locked

Keyboard is locked Bypass keylock-enter Security code = ___ Then press YES

Enter the security code and press (YES). You will be able to view and change anything in the **PROGRAM**.

If you do **not** know the security code, just press YES

. The display will show:

WRONG NUMBER ENTERED

and then go to the opening screen of the last **WELD PROGRAM.** If you try to change any line **other** than **REPEAT OFF TIME**, the control will show this display while flashing the word **LOCK** along the right edge and then exit out:



C3. HEAT CHANGE "ON THE FLY"

Your SOLUTION*i* control can be used to increase or decrease in **WELD HEAT%** using two buttons on the keypad without going into the welding program and even if the keypad is locked.

6

Q

.....



To use this feature and set + and - limits:







If your control does NOT have the letters QC in the model number, skip to C7.

C4. EHR/FAULT RELAY ASSIGNMENT.

The control has a relay that can be **jumper selected** to be used in one of two ways:

C4.1 EHR – End Of Hold OPERATION. When the **J3 jumper** is in the **EHR** position, the relay will close at the **end of every weld**.





button is pushed, the EHR relay will NOT close.

EXCEPTION: If an external **NO WELD** switch is connected to terminal **NW1** and this switch is **OPEN**, the **EHR** relay will **still** close at the end of a sequence.

C4.2 FAULT RELAY OPERATION. When the **J3 jumper** is in the **FAULT** position, the relay will close when any fault shown in **C5** occurs.



C5. FAULT RESET MODE:

The SOLUTION*i* control can respond to three types of faults:

- 1. WELDING CURRENT out of customer-set window
- 2. ELECTRODE FORCE out of customer-set variation window
- 3. LINE VOLTAGE out of +/-10% variation from baseline

Faults in any of these three categories can close a FAULT relay for a selectable time and can also stop the welding sequence if so desired. You can also set the SOLUTION*i* control to close on a successful weld.

The faults will also be shown on the display. To set the desired **FAULT RESET MODE**, Press:



C5.1 KEYPAD & INITIATE: If you push

h 🕇 1

every time one of the

three faults is detected, the electrodes will stay closed.

To release and reset the fault do **one** of the following even if the **KEYPAD** is **CLOSED**:

- 1. Release and then close the **FOOT SWITCH** or **HAND SWITCHES**.
- 2. Push any button on the keypad.

C5.2 KEYPAD & KEYLOCK: This mode is useful for critical parts welding when you want to require a supervisor to reset a fault.

If you push



every time one of the three faults is detected, the

electrodes will stay closed.

To release and reset the fault do one of the following:

- 1. If the **KEYLOCK** is in the **OPEN** position, press
- 2. If the **KEYLOCK** is in the **LOCK** position, turn the **KEYLOCK** to **OPEN** and



S YES

C6 FAULT RELAY MODE: The **FAULT RELAY** can be used in two modes:

- 1. CLOSE FOR REJECTED WELD. In this mode, the relay will close after a weld with any of the faults in C4.
- 2. CLOSE FOR ACCEPTED WELD. In this mode, the relay will close after a weld has been completed with NONE of the faults in C4.

To select the desired mode, push:



C6.1: CLOSE ON FAULT. The

relay will close when an out-of-range weld has just been completed.

FAULT RELAY CLOSES FOR REJECTED WELD Want to chanse? Push the YES or NO button



to keep the control in this mode.

If you want to change the mode, press



C6.2: CLOSE ON ACCEPTED WELD.

The display will show: The relay will close when all values being monitored are within the proper range.

FAULT RELAY CLOSES FOR ACCEPTED WELD

C7 EHR and FAULT RELAY CLOSING TIME: The EHR/FAULT

closing time can be adjusted to keep it closed long enough to allow a PLC or other control system to recognize the closure.

To adjust this time, press:



Enter the desired time (in cycles–1/60th second) for the relay to remain closed.

NOTE: If the initiation is closed during this RELAY ON TIME, the relay will immediately open and the next weld will start.

C8. SETTING CURRENT BLANK CYCLES: When measuring

welding current it is usually helpful to not read the first few cycles in the weld. These first few cycles will be used to establish good contact at the weld zone, and not monitoring this initial time will help make the current readings more consistent. If you are using 5 cycles or less of **WELD TIME**, leave this number at 00. Otherwise:



If you are using more than 5 WELD TIME cycles, enter 1 or 2. Then press YES



If you put a number in **CUR. BLANK CYCLES** that is **equal or higher** than the **WELD TIME**, the control will show 00,000A for every weld.

C9. SETTING MODE FOR CURRENT MONITOR: The

SOLUTION*i* control can use the **CURRENT MONITORING** system in three ways:

- 1. Just display the **WELDING CURRENT** at the end of each weld.
- 2. Display the **WELDING CURRENT** at the end of a weld and compare it to program limits.
- 3. Do not display **WELDING CURRENT** and do not compare it to program limits.

To select the desired mode, press:



C9.1: DISPLAY ONLY: If you push 1 the average RMS welding current will be displayed after each weld, but the control will not compare it to anything and will not indicate if an out-of-range weld has been made.

C9.2: COMPARE TO LIMITS: If you

push 2, the average RMS welding current will be displayed after each weld, and the control will compare it to the HIGH CURRENT LIMIT



and LOW CURRENT LIMIT in the welding program:

If the measured average RMS welding current in a weld goes above the HI CUR **LIMIT,** the display will show:

HIGH CURRENT: The on the right indicates current read was higher than the **HI CUR LIM.** Line in the welding program.



If the control was set in C5 for AUTOMATIC fault reset, the control will reset without any other action.

If the control was set in **C5** for **KEYPAD & INITIATION** or **KEYPAD & KEYLOCK**, the display will remain and the electrodes will stay closed until the system is reset per **C5**.

LOW CURRENT: If the measured average RMS welding current in a weld goes **below** the **LO CUR LIM.** the display will show ▼ at the end of the display line and follow the same reset procedure as shown above.

SKIP If your control includes SOFT TOUCH, skip to C11.

C10. CONFIGURE SV0 OUTPUT: The voltage output terminal **SV0** can be assigned to operate in several ways. To select how you want this output to operate, press:



The display will show:

SVO	FUNCTION	IS:
NOT ASS	SIGNED	= 1
Want to	o chanse?	' Push
the YES	3 or NO b	utton



and the display shows:



C10.1 FORGE DELAY: This function is useful when welding alloys that tend to crack when the nugget is cooled.



Your welding machine has to have a **FORGE DELAY** valve system to use this function. This includes a 3-way **FORGE SOLENOID VALVE** to quickly exhaust air from the bottom (return) port of the air cylinder when the **FORGE VALVE** is turned on. If it does not have this valve, skip to **C10.2**.

To select FORGE DELAY, press

and then exit out.

2

The display will show:

SVO FUNCTION IS: Forge Delay

If you have selected FORGE DELAY, a new line will appear in all welding programs:

```
FORGE DELAY 00CY
```

In this mode, the **SV0 output** turns **ON** at a timing that starts at the beginning of **WELD TIME**. If there are using **PULSATION** in the welding program, the timing starts at the **start** of the last **IMPULSE**.

SVO FUNCTION IS: FORGE DELAY =2

If you are in this mode, a new line will appear in all welding programs:

FORGE DELAY 00CY←

FORGE DELAY time starts at the beginning of the WELD TIME. If your welding program uses PULSATION, this FORGE DELAY TIME starts at the beginning of the last WELD IMPULSE.

C10.2 INTENSIFIER DELAY: This function is used for welders that have **intensifier cylinders.** The most common brand of these is OHMA.

If your welder has the **SOFT TOUCH** option installed, this function will be handled by **SOFT TOUCH.** This mode should be left in **SOFT TOUCH = 6 mode.**

If you push



the display will show:

SVO FUNCTION IS: INTENSIF. DELAY =3

and exit out.

SECTION C, PAGE 14

and exit out.

If you are in this mode, a new line will appear in all welding programs:



In this mode, the solenoid valve connected to **SV1** turns on first to bring the electrodes closed under low advance fluid force. After the **INTENSIF. DELAY** time, the solenoid valve connected to **SV0** turns on to put full welding force on the electrodes.



Push

and the display will show the rest of the choices:



C10.3 CLAMP DELAY: Press 4 and the display will show:

CLAMP (SV1)	ON.	Then
SVØ ON A	after	- DEI	_AY
Want to	char	nge?	Push
the YES	or 1	ЧO Бі	utton

Push No to use this mode. This is useful for operations that need to clamp a part first before bringing the welding electrode down.

YES and the display will show:



In this mode, the **CLAMP** wired to **SV1** turns on at the same time that the weld head **SVO** is turned **ON**. At the end of the sequence, **SV0** turns **OFF** and then after the **CLAMP DELAY** in the welding program the **CLAMP** releases. This can be used to keep parts in place for cooling, or can be used to operate a water solenoid valve that floods the part during an operation and stays on for a selected time afterwards.



If you use any of the CLAMP functions above, the J2 jumper on the power supply **must** be set to the **ON** position as in this photo.



If you are using any of the **CLAMP DELAY** functions, **DO NOT OPERATE THE WELDER IF THIS JUMPER IS NOT IN THE "ON" POSITION**.

C10.4 TURN ON WITH LEVEL 2: Press 5 and the display will show:

SVO FUNCTION IS: TURN ON W/LEVEL 2=5

In this mode, the SV0 output will turn ON only after the second level of the **FOOT SWITCH** is closed.



This can be used to clamp a part when the first level of the **FOOT SWITCH** is closed. Then if the part looks to be in the correct positon, closing of the second level of the **FOOT SWITCH** will close the welding electrode. This is often used for critical assemblies or for resistance brazing operations.

C11 FULL or HALF CYCLE COUNT: Normal resistance welding uses full **line cycle** weld timing. But if you are welding very thin material and need to have ½ cycle of **WELD TIME**, or are doing a very sensitive weld that needs timing in ½ cycles, change the SOLUTION*i* control as follows:

Press







SECTION D

FUNCTION	SECTION	DIRECT ACCESS NUMBER*	PAGE NUMBER
Entering WELD PROGRAM	D1	-	1
CREATE PROGRAM	D1.1	-	1
VIEWING or MODIFYING PROGRAM	D1.2	-	1
Entering a NEW WELD PROGRAM	D1.3	-	2
WELDING SEQUENCES	D2	-	3
BASIC WELDING SEQUENCE	D2.1	-	3
SINGLE, NO WELD, REPEAT buttons	D2.2	-	4
Weld SEQUENCE with REPEAT	D2.3	-	5
Full RWMA WELD SEQUENCE	D2.4	-	6
START WELDING	D3	-	8
Changing HEAT% ON THE FLY	D4	978	9
Using PRESSURE TRANSDUCER	D5	996	10
Setting effective CYLINDER AREA	D5.1	996	10
TURNING ON the transducer	D5.2	996	10
Checking TIP FORCE	D5.3	996	11
Checking AIR PRESSURE	D5.4	996	11
Using PRESSURE TRANSDUCER	D5	996	10
Setting effective CYLINDER AREA	D5.1	996	10
TURNING ON the PRESSURE TRANSDUCER	D5.2	996	10
Checking TIP FORCE	D5.3	996	11
Checking AIR PRESSURE	D5.4	996	11
Using PRESSURE TRANSDUCER	D5.5	996	12
RWMA WELDING SCHEDULES	D6	-	14
Selecting an RWMA SCHEDULE	D6.1	900	14
Using selected RWMA SCHEDULE	D6.2	900	15
Trimming an RWMA SCHEDULE	D6.2	-	16
TAP FAULT function	D6.3	997/72	16
Turning off TAP FAULT function	D6.4	997/72	17
ELECTRONIC PRESSURE option 9181-16	D7	-	18
Electronic Pressure Regulator EQUIPMENT	D7.1	-	18
Electronic Pressure Regulator OPERATION	D7.2	-	18

D1: ENTERING A WELDING PROGRAM:

D1.1 CREATE PROGRAM: To create a new **WELDING PROGRAM** or modify an existing one, turn the **KEYLOCK** to the **OPEN** position and press:



where ### is from 001 to 799.



The display will show:



D1.2 VIEWING OR MODIFYING AN EXISTING WELDING PROGRAM:

If **PROGRAM ### IS READY** is shown, some data is already in this PROGRAM

number. Press



if you want to check this PROGRAM or make changes.

Press **PROGRAM** and another number if you want to find an EMPTY program.

D1.3 ENTERING A NEW WELDING PROGRAM:

If **PROGRAM ### is empty** is shown, there is no data in this program. Press



and the display will show the first four lines of the welding program:

SQUEEZE TIME 00CY← WELD TIME 00 CY WELD HEAT 00% MOD.WELD HEAT 00%

The < on the right edge shows the line that can be changed.

On the display above, the arrow is pointing to the **SQUEEZE TIME**. To enter a value for **SQUEEZE TIME** in this program, just push the desired keypad numbers until the display shows the proper value.



D2. WELDING SEQUENCES

D2.1 BASIC WELDING SEQUENCE: The diagram below shows the welding sequence used for most applications. Lines in the welding schedules are RWMA welding functions. **MOD.WELD HEAT** will be explained later.



A common error is to enter some value in every line of the **WELDING PROGRAM**. For the majority of welding, you only need the **BASIC WELDING SEQUENCE** above to make great welds.

D2.2 SINGLE, NO WELD, and RUN/REPEAT BUTTONS



When the foot pedal is closed, the control will do **one** weld sequence and open the electrodes. It will not repeat another weld sequence even if the foot pedal remains closed.

When the foot pedal is closed, the control mechanically go through **one** sequence without passing any welding heat. It will not repeat another sequence even if the foot pedal remains closed.

When the foot pedal is closed, the control will mechanically go through **one** sequence without passing any welding heat. It will **repeat** this sequence if the foot pedal remains closed with **REPEAT OFF TIME** (as set in the welding program being used) between the opening of the electrodes and the next closing.



When the foot pedal is closed, the control will go through **one** weld sequence and open the electrodes. It will repeat this sequence if the foot pedal remains closed with **REPEAT OFF TIME** (as set in the welding program being used) between the opening of the electrodes and the next closing.
Before pushing the foot switch to start a weld, be sure that the colored lights are on to represent the way you want to operate the welder.

D2.3 WELD SEQUENCE WITH REPEAT:



D2.4: If you are **NOT** using the **DIFFERENTIAL PRESSURE TRANSDUCER**,

set **INITIAL SQUEEZE TIME** long enough to allow the electrodes to close and get to full weld pressure before starting heat. Then set the **SQUEEZE TIME** to the time it takes to close and get the electrodes to full force between the repeat sequences.

If you set **INITIAL SQUEEZE = 00**, the control will use **SQUEEZE TIME** for all delays.

D2.5: FULL RWMA WELD SEQUENCE



Enter the desired values in each line for the additional RWMA welding function using the sequence above as a guide.



First heat sequence.

Non-heat time after the end of PREHEAT



The sequence **PREHEAT**, **COOL AFTER PREHEAT**, **WELD** works amazingly well for welding **GALVANIZED STEEL**. See schedules in the back of this direction book for the **GALVANIZED STEEL** sequence.

NUMBER OF PULSES 00← PULSATION COOL 00CY

Number of times the WELD TIME will repeat with PULSATION COOL cycles between the WELD pulses. The example in section D2.4 3 PULSES of 2 WELD CYCLES each.

PULSATION is handy to use when welding thick metal (.120" or thicker). Divide the number of weld cycles found on a welding chart for this thickness by 5 and Set **PULSATION COOL = 3**.

PULSATION can also be useful for welding very near the edge of a sheet. If set properly it will minimize metal expulsion from the edge.



QUENCH & TEMPER sequence is useful for welding spring steel or other higher-carbon metals. The **QUENCH TIME** lets the nugget area cool down, and the **TEMPER TIME** reheats the nugget to a lower temperature to increase ductility of the weld nugget and area around the weld nugget.

SOLUTIONi IN PRODUCTION

TRANSFORMER TAP **#** 3←



TYPICAL TAP SWITCH Enter the position of the welder transformer **TAP SWITCH**. If your welder does not have this switch, enter **1**.

This line will remind the setup person that the transformer **TAP SWITCH** should be set to this number to match conditions when this welding program was originally set up and approved.

If your control has **QC** in the model number, this line will also be used to select the proper **LEARN TABLE** when operating the control in **CONSTANT CURRENT** mode.



Enter the desired force between electrodes. See **SETTING TIP FORCE CALCULATOR SYSTEM** in section B2 for information on this function.

If your control has **QC** in the model number, it will wait for this selected TIP FORCE to be reached before starting the first weld heat sequence.

D3: START WELDING: After entering numbers on lines in this program,

press:

STEP an

and the display will show:

PROGRAM 005 IS READY Set TRANSF. TAP TO 3 Set PRES. REG. 35psi

Set the **TRANSFORMER TAP SWITCH** to the #3 position. Set the **AIR PRESSURE REGULATOR** to 35psi.

D4: CHANGING HEAT% ON THE FLY: If you entered values for the **MODIFIED HEAT LIMITS** (see C3), you can **increase** or **decrease** the **WELDING HEAT%** "on the fly" without going into the welding program. This can be done even if the keypad is in the LOCK position.

Each time you press



the WELD HEAT% will increase 1%. You can do

this up until you have reached the limit set in section C3 (PROGRAM 978).

Each time you press



the WELD HEAT% will decrease 1%. You can

do this up until you have reached the limit set in section C3 (PROGRAM 978).

If you have pushed these buttons to trim the **WELD HEAT%**, the original **WELD HEAT%** that was set in this welding program will **not** be changed. But the next line will show the current value of **WELD HEAT%** being used:



This confirms that the WELD HEAT% you are now using (**MOD.WELD HEAT**) is 87%. But the original WELD HEAT% is still 80%. In this way you will not lose the original setting, but can trim it to match changes in material.

This **MOD.WELD HEAT%** will remain the value being used until either:

- 1. The **WELD HEAT%** value is changed. The **MOD.WELD HEAT%** will change to the new **WELD HEAT%**.
- 2. You press STEP when the \leftarrow is on the **MOD.WELD HEAT** line. This will

change the MOD.WELD HEAT% it to match the original WELD HEAT % value.

D5. USING THE DIFFERENTIAL PRESSURE TRANSDUCER:

The SOLUTION*i* control, when ordered with the QC package, will wait until the ELECTRODE FORCE has reached the program selected value before welding.



Use of this **DIFFERENTIAL PRESSURE TRANSDUCER** will eliminate the need for having any **SQUEEZE TIME** in a weld program. This will make the welding sequence as fast as possible while producing high quality welds.

The transducer, if used properly, will eliminate metal expulsion (flash), minimize surface indentation at the weld zone, and extend electrode life.

D5.1 SETTING EFFECTIVE CYLINDER AREA: Before you turn the transducer on be sure that the effective air cylinder area was entered into PROGRAM 979 as directed in sections **B2 through B9.**

D5.2 TURNING THE TRANSDUCER ON: Press:



The display will show:

Press

Press

NO



if the **TRANSDUCER** is OFF is shown.

if TRANSDUCER is OFF is shown.

D5.3 CHECKING TIP FORCE: The display will show:

Check TIP FORCE? PRESS the YES or NO button

Press YES and the display will show:

Check TIP FORCE? Push foot switch or Hand buttons

Close the foot switch or hand buttons and the electrodes will close. They will stay closed but will not pass any current.

The display will show:

TIP FORCE = **###**LB When finished press STEP

The number displayed represents the calculated TIP FORCE.







and the display will show:

Check AIR PRESSURE? Push foot switch or Hand buttons

Close the foot switch or hand buttons and the electrodes will close. They will stay closed but will not pass any current.

The display will show:



The number displayed represents the differential air pressure as measured by the transducer.





and the SOLUTION*i* control will reset and be ready to weld.



If your control does NOT have the letters QC in the model number, skip to the next section.

5.5 USING THE PRESSURE TRANSDUCER IN PRODUCTION:

1. Each weld program has a line:



Enter the desired TIP FORCE for the material being welded.

2. Press



3. If you entered the correct information about cylinder area in section B of these directions, the SOLUTION*i* control will display:



- 4. Set the welding pressure regulator to the value displayed (35psi in this example). If you have the 9181-16 Electronic Pressure Regulator option, this pressure will be automatically set.
- 5. Before starting production, be sure that this transducer function is turned on. To do this, press:



The display will show:



7. When you push the foot switch or hand buttons to make a weld, the SOLUTION*i* control will close the electrodes and wait for the air psi, as shown in step 3 above, to be reached. While this is happening, the display will scroll across the bottom:

8. Once the air pressure has been reached, the control will go through the weld sequence. If the air pressure is NOT reached, this display will continue to be shown until you release the foot or hand switch.

D6. RWMA WELDING SCHEDULES: Your SOLUTION*i* control is factory programmed with welding schedules for various alloys and metal thicknesses.



The **RWMA** welding schedules are **good starting points**. They assume that the proper electrode face shape is being used. These schedules should get you very close to the desired results.

As shown below, you can trim these schedules to get the optimized weld to match your particular test requirements.

D6.1 SELECTING AN RWMA SCHEDULE:

MASTER MASTER SETUP SETUP 1. Press: ROGRAM PROGRAM ALLOY 900-Enter And GAUGE to select The display will show: RWMA weld schedule SELECT=YES, SKIP=NO and the display will show: 2. Press YES CHOOSE MATERIAL LOW CARBON ST Want to chanse? Push YES the or NO button If you want to weld LOW CARBON STEEL (CRS), press NO

The display will show:

Thinnest metal =00GA After entering data Press

- 3. Enter the thinnest gauge of the parts being welded. Then press
- 4. For example, if you are welding 16 gauge CR to another sheet of CR that is the same or thicker, enter 16 gauge and the display will show:



Notice that this preset RWMA schedule is program 805. The next time you want to weld this same material you could just go to PROGRAM 805 directly. This number can also be put on a production sheet. This eliminates the need to go through the questions again.

5. If you want to weld this material, press



The display will show:

CRS , 16GA-READY 805:



This Transformer TAP SWITCH position can be changed later if it is not correct for the range of current needed for this part.

Set the pressure regulator to the PSI shown on the display and make a sample weld.

D6.2. TRIMMING THE RWMA SCHEDULE. If the results are not exactly what you need to pass your quality tests, you can trim the welding

program by pushing



The display will show:

SQUEEZE TIME 30CY← WELD TIME 14 CY WELD CUR. 11,600A MOD.WELDCUR 11,600A

Press



to see the rest of the RWMA welding schedule.

It is recommended that you only adjust the welding current line. Leave the other values per the RWMA schedule. This should produce the best welds.

The trim changes in this RWMA welding program will stay in this program for future use.

IF YOUR SOLUTION*i* CONTROL DOES NOT HAVE QC IN THE MODEL NUMBER, YOU HAVE TO BE IN CONSTANT VOLTAGE MODE (PROGRAM 997, ENTER, 11). In this case the display will show 00% for the WELD HEAT. To make a starting weld, set WELD HEAT to 50%, make a test weld, and start increasing the WELD HEAT% until you reach the desired weld quality.

D6.3 TAP FAULT FUNCTION: If the welding current in this program requires that the **WELD HEAT** be set **ABOVE 90%** or **BELOW 60%**, the display will show:

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ATTN:

TRANSF.

TURN

WELD

TAP.

Too LOW

TAP SW.

CURRENT

LOWER

POSITION

for



If you have a **TAP SWITCH** on your welding transformer, to up or down one number and try again. Repeat until the control does not show this phrase.

If you do **NOT** have a transformer **TAP SWITCH** on your welder, you can ignore this recommendation.



TYPICAL TAP SWITCH

D6.4 TURNING OFF TAP FAULT FUNCTION: If you do not want

this TAP SWITCH warning system, press:



7. ELECTRONIC PRESSURE REGULATOR OPTION 9181-16

This **option** sets an electronic pressure regulator to provide the requested air pressure in response to the TIP FORCE line in a program. If this option was ordered with your control the system is factory set to operate.

7.1 EQUIPMENT: An electronic pressure regulator has been provided with your control. This unit is installed on your air system in full replacement of the existing mechanical **WELDING PRESSURE REGULATOR.** It should be located **AFTER** the filter and before the oiler.

7.2 OPERATION: Each welding program has a line:



At this time the **ELECTRONIC PRESSURE REGULATOR** will change to this value and the display on the regulator will confirm the pressure.

Note that the pressure might be as much as 1psi higher than the requested value.

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