MEDAR

MedWeld 200
Software Guide

Program #T93340
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Revision Notes:

Revision Date	Comments
July 1995	First releast: T93340-01
August 1995	Added explanation of 000 setting for automatic NOMINAL LINE VOLTAGE setup parameter. Updated power-up displays to reflect new program number and auto nominal line voltage display.
May 1996	Updated manual to reflect changes to the software for release T93340-01-05. Reset pilot assignment on power-up Index pilot assignment on repeat Limited stepper display access Format changes to normal display and added brief display

Chapter 1: System Overview

The MedWeld 200 is a single-phase welding control based on the Z180 microprocessor. The MedWeld 200 processor provides firing signals to the SCR contactor which, in turn, provide the high-voltage, low-amperage primary weld current to the welding transformer. The weld transformer then provides low-voltage, high-amperage secondary weld current at the electrodes.

1.1 Software Features

Each MedWeld 200 control can store up to 50 independent weld schedules, 2 linear stepper profiles and a list of programmable set-up parameters (which define the operating environment).

The 50 weld schedules have a fixed sequence of functions, but programming flexibility is enhanced through features such as sequence chaining, the ability to program each weld pilot to initiate multiple weld schedules and define their order of initiation, several options to program weld current in terms of automatic voltage compensation (AVC), or current compensation (ACC), and the ability to define a weld impulse.

The control's security options allow you to prevent unauthorized users from changing programmable values. When the control is locked, any user can place the control in No Weld, change the number of off cycles (to disable or enable repeat) and reset the stepper and fault conditions. No other programmable parameters can be modified (the can only be viewed) when the control is locked.

You use the control's 2-line, 40-character LCD message display and the six programming keys to program the weld control. These are described in the following section.

1.2 User Interface Features

Status messages and programming information are provided by the MedWeld 200 display while in the "normal" display mode. This allows you to see all of the values programmed for a weld schedule as well as control status at-a-glance.

The MedWeld 200 keypad has six keys: four directional arrows, and asterisk ([*]) and a MODE key.

To change a value, you'll first use the arrow keys to move the cursor (a blinking block) to the value you want to change. The six programming keys (located below the display area) are used to:

- Select between the displays
- See or change the values programmed for each weld schedule
- Change set-up parameters (controlling basic control operation)

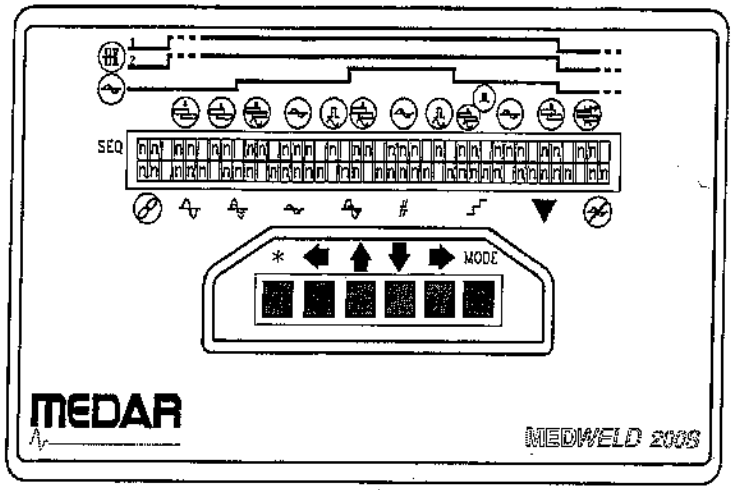
If the cursor does not stop on a value, it cannot be changed. For example, the second line of the normal display shows control status. You cannot use the arrow keys to move the cursor to these status values.

To change a value, use the [→] and [←] keys to move the cursor to the value. You can then increase the value by pressing [↑] or decrease the value by pressing [↓]. These keys can also be used to scroll through a list, or to toggle between selections such as **ON** and **OFF** .

The control uses the international welding symbols to pictorially represent the weld schedule, and to identify the control status data (on the normal display). It also graphically represents the timing sequence of the weld schedule, showing when the weld valve(s) become active and de-activate during the sequence, and when weld current is supplied to the work piece.

The MedWeld 200 face plate shown in Figure 1.1 on the following page shows both the location of the the programming keys and the international symbols. A general description of each key is shown in the table on the following page. Specific descriptions are included with each procedure throughout the manual. The international symbols are defined in Section 1.2.2.

Figure 1.1: MedWeld 200 Face Plate



1.2.1 Key Definitions

Key	Key Name	Definition
*	Asterisk	This key allows you to switch between displays within a program mode. For example, from the Normal/Programming display, this key select the Heat Select Display and Pilot Display.
↑	Up Arrow	Press this key to either increase a number, select an option, or move the cursor up through a list of options.
→	Right Arrow	Press this key to move the cursor to the right. (In the Set-Up Mode, this key is used to edit a set-up parameter value.)
←	Left Arrow	Press this key to move the cursor to the left.
↓	Down Arrow	Press this key to either decrease a number, select an option, or move the cursor down through a list of options.
MODE	Mode	Press this key to select one of the four programming modes: Normal/Programming, Fault Display*, Stepper Display and Set-up Display. *The Fault Display is available only when there are active fault or alert conditions.

1.2.2 Welding Icons

The MedWeld 200 uses icons on the face plate to represent the programmable values in the fixed weld schedule (along the top line), the weld control status information (bottom line) and timing diagram (in the upper-left corner).

Some of the icons appear more than once, to represent similar but different information. The icons are described below.

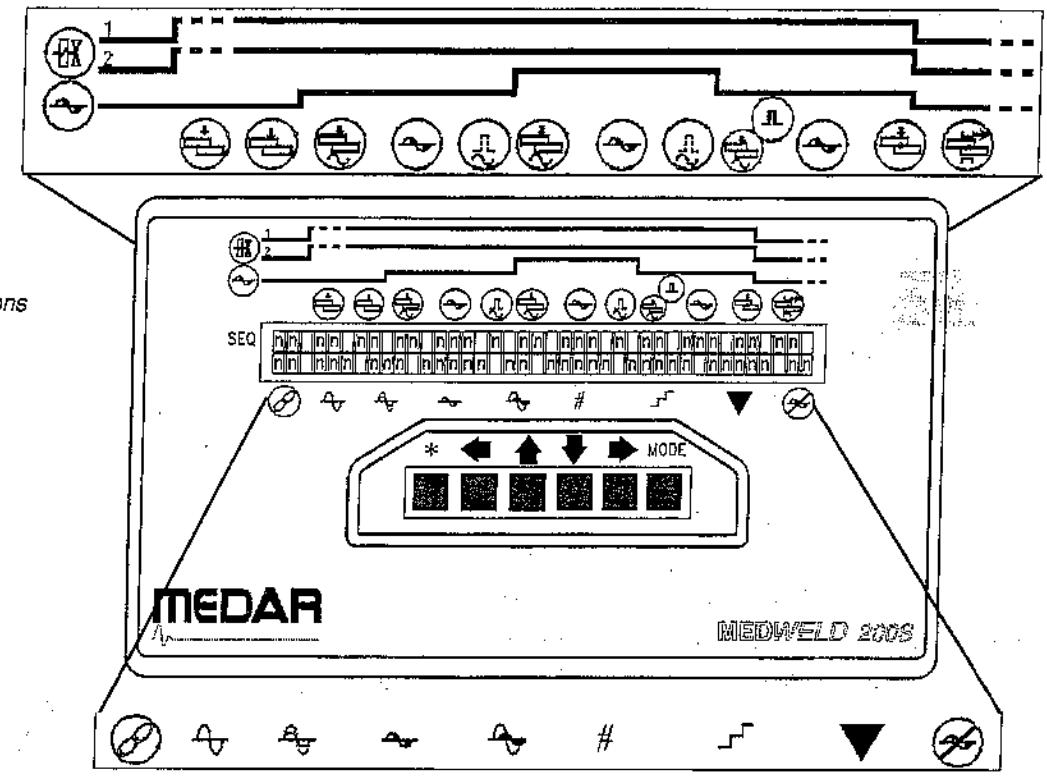
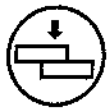


Figure 1.2: Welding Icons

Weld Schedule Icons

The functions assigned to the fixed weld schedule change based on the type of firing selected in the Heat Select Display. For example, if you select IMPULSE welding for post heat, the post heat current value is no longer displayed, and the number under the post-weld Cycle Time icon ***actually*** *represents the number of weld* ***impulses*** *(consisting of heat cycles* ***and*** *cool cycles) provided by the control. These features are described in detail in Section 2.1.2.*



Initial Squeeze: The number of cycles to wait after energizing the weld valve, to bring the tips in close to the work piece. This function is not *always* executed. (For example, if the sequence is repeating or "chained" to a previous sequence. Refer to Section 2.2.2.)

50 

Squeeze Cycle Time: The number of cycles to wait for the weld gun to fully close and build up pressure.

00 

Pre-heat Cycle Time: The number of cycles to provide pre-weld heat to the work piece.

20 

Pre-heat: The amount of current to provide during the weld cycles.

00 

Cool Cycle Time: The number of cycles to wait (for the piece to cool) between the pre-weld and weld cycles.

08 

Weld Cycle Time: The number of cycles to provide weld current to the work piece.

70 

Weld: The amount of weld current to provide during the weld cycles.

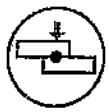
01 

Cool Cycle Time: The number of cycles to wait (to allow the piece to cool) between the weld and post-weld heat cycles.

02 

Post-heat Cycle Time: The number of cycles to supply post-weld current to the work piece (or the number of weld impulses). See Section 2.1.2.

Post-heat: The amount of current to supply during the post-weld cycles.

5 

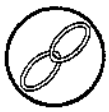
Hold Cycle Time: The number of cycles to wait before turning off the weld valves and releasing the work piece.

0 

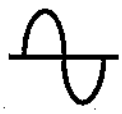
Off Cycle Time: The number of cycles where the electrodes are off the work piece before the sequence is repeated. (If this value is set to **0**, the sequence will ***not*** repeat.)

Weld Status

This section describes the symbols used to represent the status information (provided on the lower line of the display). These values are NOT programmable; they show status. (Two exceptions are the **Chaining** and **Weld/No Weld** fields, as described in Section 2.2.2 and 2.2.3.)



Chaining: This allows you to add weld functions to a sequence by "chaining" to another sequence. (This allows you to perform more complex tasks, using multiple weld functions.) The number shown in this area on the display (1-50) represents the sequence that is "chained" to the sequence you are viewing. (0 indicates the sequence is not chained.) (Refer to Section 2.2.2.)

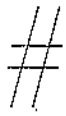


Line Voltage: This shows the present line voltage, as read from the control side of the circuit breaker. This is an RMS value that is updated once a second.

Low Line Voltage: The lowest line voltage read during any single cycle of the last weld. This is an RMS value.

Weld Current: The average secondary current of the last weld. (This value will be accurate *only* if the transformer turns ratio has been correctly programmed in the set-up parameters. Refer to Section 2.5.)

Power Factor: The power factor is calculated and updated by the weld control for each weld.



Stepper Count: This icon indicates the total weld count. This number incremented after the weld sequence is completed if the stepper is active.

Stepper Boost: This is the amount of heat being added by the weld control's linear stepper. This value is based on the boost programmed in the stepper profile and the current stepper weld count. (Refer to Section 2.4.3.)

Fault/Alert: If the weld control detects any fault or alert conditions, an error code will flash in this area. (Faults are indicated by the code **F***nn*, alert conditions are shown as **A***nn* and critical internal faults are shown as **I***nn*.) If more than one condition is detected, the display will scroll through the active conditions. To select the Fault Display (to see the condition detected by the control), press the MODE key.

Weld/No Weld: This is the other programmable field on the status line. This shows the status of the software selection. When you move the cursor to this field, you can select either condition: W (to enable weld current) or NW (to disable weld current when a sequence is initiated).

*This does NOT indicate whether weld current was **provided** during the last weld. It is a programmable software NO WELD, and merely indicates when weld current is **enabled.***

Weld Timing Sequence

This section describes the icons used in the timing chart to visually represent the action performed by the weld sequence.

The timing diagram indicates that the weld valves are pulled active before the control executes the initial squeeze function, and remain high until the off time cycles. Weld current is available during the pre-weld, weld and post-weld cycles only.

Weld Valve Cylinder: This indicates the action of the weld valves during the weld schedule.

Weld Current: This indicates when weld current is available during the weld schedule.

1.3 Installation

Use the following steps to install the control:

- Connect the input and outputs, using the I/O charts provided in Section 1.3.1 below, and wiring diagrams shipped with the control.
- Hook up the SCR cooling water. (Refer to the Cooling Water Requirements below for recommended water flow and PH.)
- Connect the incoming line voltage into the contactor cabinet at L1 and L2. The control supports operation at 600V, 480V and 240V at 60Hz, or 380V at 50Hz.
- Ensure that the enclosure is properly grounded.

1.3.1 Cooling Water Requirements

Warranty (For ALL Thyristor Modules)

Free replacement or 100% (one hundred percent) credit is given, if any SCR module fails within the first twelve months of the date of receipt, due to an agreed manufacturing defect.

Water Quality

The cooling water must have the following qualities:

- PH between 7.0 and 9.0
- Maximum chloride content 20 P.P.M.

- Maximum nitrate content 10 P.P.M.
- Maximum sulfate content 100 P.P.M.
- Maximum solids content 250 P.P.M.
- Maximum calcium carbonate content 250 P.P.M.
- Resistivity greater than 2000 ohms/cm at 25 C.
- The hose used must not be less than 18 inches long across the power voltages.

Water Flow

Caution: *Power should be removed from the SCR if the cooling water is not flowing and the resistivity of the water is less than 5000 ohms/cm. If the circulation is stopped when the power is still on, current through the water in the hose will heat the water, causing steam which will separate the water in bubble forms. The current will arc across these voids, which will destroy the hose. Usually the hose will rupture when the cooling water is again put into a circulating mode. This results as pressure is being developed across it. The use of water savers are not recommended for the above reasons.*

If magnetic contactors remove the power from the SCR module, hose destruction is eliminated (there is no current to cause the damage).

Where cooling manifolds are used rather than hose, the same destructive action can take place, destroying the cement holding the manifold together, and resulting in serious water leaks.

Hoses

If a cooling hose must be replaced at any time, a certified non-electrically conductive type of hose no larger than 3/8 of 1 inch I.D must be used. This hose must not be shorter than 18 inches in length.

Electrical Characteristics

At no time should the thyristor module exceed its rated or specified electrical characteristics for current or voltage. If these specifications are exceeded, the effect of these transients upon the thyristors is to cause tracking across the surfaces of the silicon slice or to cause excessive localized leakage currents. This will result in hot spot temperatures at the reversed PN junction.

There are three main sources of voltage transients:

- The main supply.
- Contactors between the main supply and the equipment.
- The semiconductors in the equipment, which are likely to generate transients during switching or communication.

1.3.2 Connecting Inputs and Outputs

The MedWeld 200 provides five 24VDC unregulated inputs and five dry contact 120V outputs with AC provided, as wired at the factory. The inputs and outputs are located on the control's I/O board.

Two 1-amp picofuses are located above the 24V connector on the programming/display board. These fuses control power to the control processor and the inputs. The fusing for the outputs is at 1FU inside the control cabinet.

The following charts show you the location of the inputs and outputs at the I/O board connector.

Important! *To avoid possible noise interference, maintain a minimum distance between the I/O wires and the high voltage wires of 15 cm (6 inches).*

Inputs

	I/O Board Jumper Connector	Inputs
Pilot #1	J2 Pin #1	IN0
Pilot #2	J2 Pin #2	IN1
Second Stage / Palm Switch	J2 Pin #3	IN2
Retract Pilot	J2 Pin #4	IN3
System Cooling / No Weld	J2 Pin #5	IN4
Common	J2 Pin #6 J2 Pin #7 J2 Pin #8	COM1 COM2 COM3

Outputs

	I/O Board Jumper Connector	Outputs
Weld Valve #1	J1 Pin #1 J1 Pin #2	OUT0 OUT0C
Weld Valve #2	J1 Pin #3 J1 Pin #4	OUT1 OUT1C
End Of Hold	J1 Pin #5 J1 Pin #6	OUT2 OUT2C
Fault/Alert Output	J1 Pin #7 J1 Pin #8	OUT3 OUT3C
Retract #1 Output	J1 Pin #9 J1 Pin #10	OUT4 OUT4C

1.3.3 Powering Up the Control

When you apply power to the MedWeld 200 it resets outputs to their "normal" states and checks memory integrity. Next it briefly shows the program number, version, and revision level on the display:

```
T93340-01-06  xper 2.6
```

After a few seconds, the display changes to briefly show the current settings of the two retract set-up parameters:

```
25 RETRACT MODE (LATCHED)
26 RETRACT CYLINDER (AIR NORMAL)
```

This display tells you how the control will react to an active retract pilot input.

You'll see a third display briefly at power-up *only* if the setup parameters select automatic nominal line voltage (NOMINAL LINE VOLTAGE is set to zero). This display is similar to the one shown below:

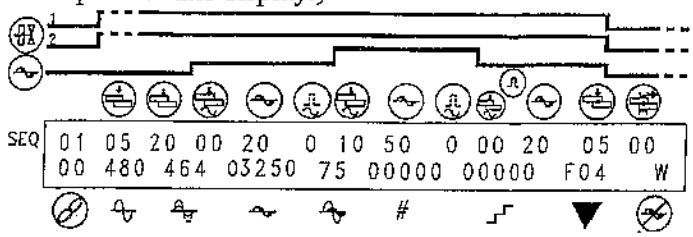
```
V(average) = 452V   V(nominal) = 468V
```

This indicates the nominal voltage that the control selected, based on the average voltage detected on the weld bus: V(average) is the average voltage detected and V(nominal) is the nominal line voltage selected by the control.

For a description of this parameter, see "(30) NOMINAL BUS VOLTAGE" in Chapter 5.

At the end of the power-up cycle, the Normal/Programming mode display appears showing the weld schedule and control status. (See Chapter 2 for a complete description of this display.)

Figure 1.3: Normal/Programming Display



The weld pilot assignment is also reset to sequence #01 by the control (as described in Section 2.1.3). At this point you can program weld sequences or provide a weld pilot input to initiate a weld sequence. (Refer to this procedure in Section 2.7.)

1.3.4 Security Control

As described in Section 1.1, the MedWeld 200 control provides a security feature to lock the control (using a 6-key access code). When shipped from the factory, the control is *unlocked.*

However, you can lock the control to prevent unauthorized users from making programming changes, using the steps described in Section 2.6.2.

Your 6-key access code is provided in the Appendix Section. (For security purposes, this section can be removed from this manual to control access to the security code.)

Chapter 2: Display Modes

The MedWeld 200 control has four display modes. Each mode has one or more options when you press [*]:

- Normal / Programming Mode
  - [*] Heat Select
  - [*] Pilot Assignment
- Fault Display Mode *(if a fault or alert condition exists)*
  - [*] Reset faults
- Stepper Status Mode
  - [*] Stepper Reset / Tip Dress Display *(only if the stepper is active)*
  - [*] Stepper Profile Display *(only if the stepper is active)*
- Set-up Mode
  - [*] Security / Reload Display

As shown in the illustration on the following page, you'll use the MODE key to select from the main displays. (Each time you press MODE the display changes.)

From each display mode, press [*] to see the options available from that display. For example, from the Normal / Programming mode, press [*] once to select the type of weld heat to use for the selected sequence (Heat Select). Press [*] again to assign weld sequences to the weld pilots (Pilot Assignment). Pressing [*] a third time returns you to the Normal / Programming mode.

You can also press MODE at any time to move to the Fault mode (if any fault or alert conditions were detected), the Stepper Status mode, the Setup mode or back to the Normal/Programming Display.

The options available to you are also based on whether the control is locked or unlocked: when the control is *locked* you cannot access the stepper display, heat display or the setup display. These options are also bypassed when you've selected the Brief Display (as described in Section 2.6.3.) Each mode and option is described in the sections that follow.

Power-Up Displays

```
T93340-06  xper 2.6
```

```
25 RETRACT MODE: (LATCHED)
26 RETRACT CYLINDER (AIR NORMAL)
```

```
V(average) = 452V    V(nominal) = 468V
```

Normal/Programming Display

```
01 05 20 00 20  0 10 50  0 00 20  05 00
02 480 464 03250 75 00000 00000 F10    W
```

*

Heat Select Display

```
SEQ   PRE-HEAT      WELD      POST-HEAT
 01   ( AVC  )    ( ACC  )   (IMPULSE)
```

*

Pilot Assignment Display

```
PILOT  1 *01  00  00  00  00  00  00  00
          00  00  00  00  00  00  00  00
```

*

MODE

Fault Display (Only if faults or alerts are detected)

```
F10  NO ZERO CROSSING SYNC:
A02  END OF STEPPER:
```

*

(Resets faults and alerts and returns to Normal/Programming Display)

MODE

Stepper Status Mode

```
STR=01    STP=01    TWC=00000    SWC=0000
BST(%I)=00    BST(ACC)=00.0    STATUS=OFF
```

*

Stepper/Tip Dress Reset *(only if stepper is ON)*

```
   RESET STEPPER          TIP DRESS
STR.01( ) STR.02( )  STR.01( ) STR.02( )
```

*

Stepper Profile *(only If stepper is ON)*

```
STR=01 STP=01  BST %I =00  BST ACC =00.1
STP CNT=0060   CURR: LO=00200  HI=10000
```

*

MODE

Set-up Mode

```
01  STEPPER APPROACHING MAX:      (ALERT)
```

*

Security/Reload Display

```
   SECURITY     BRIEF DISPLAY     RELOAD
    ( )            ( )             ( )
```

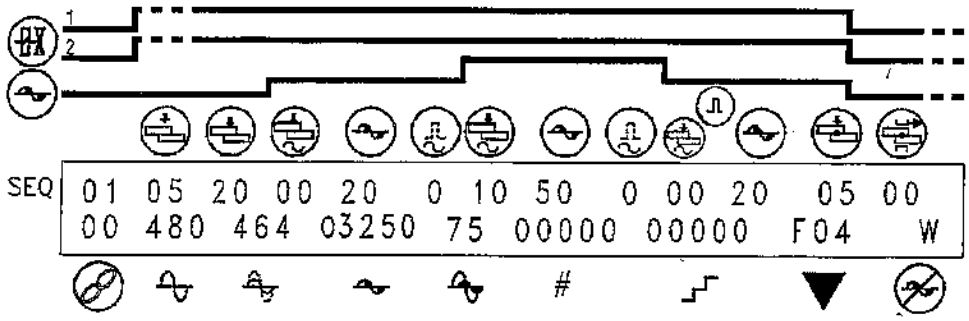
MODE

(Returns to Normal/Programming Display)

2.1 Normal / Programming Mode

You'll see the Normal / Programming mode (shown in Figure 2.1 below) after the initialization messages on power-up. This display is used to program weld sequences and view the status of the last weld.

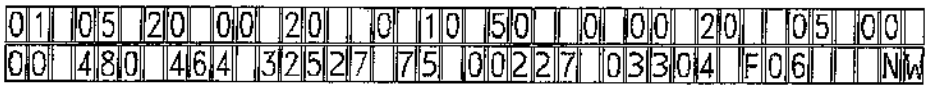
Figure 2.1:Normal/Programming Display



- The upper line is the weld sequence. You can change the values on this line.
- The lower line is the weld data collected the last time this weld sequence was initiated. (You can change only the chaining and weld/no weld status.)

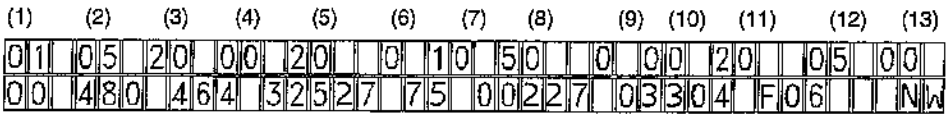
2.1.1 The Weld Sequence

The weld sequence information is displayed in the top line of the screen.



You can program values on the Weld Sequence information line using the arrow keys. (Use the [→] and [←] to move the flashing cursor to the field you want to change. When the item is selected, the [↑] and [↓] keys increase or decrease the value displayed.)

The following table gives you a description of each number in the Weld Sequence information line. Numbers 1-13 in the diagram correspond to numbers 1 through 13 in the # column of the following table.



#	Function	Description
1	SEQUENCE NUMBER	This field has two functions: (1) Selects a sequence to edit. (2) Displays the sequence number that was last initiated. *Note:* *The next sequence initiated is not determined by the sequence displayed in this field. Refer to Section 2.1.3: for instructions on selecting the sequences initiated by the control when the weld pilot(s) become active.*
2	INITIAL SQUEEZE	This is the cycle time for initial gun closure. It is not repeated when the control is in REPEAT mode, or for the second sequence in a chain of sequence, unless the DUAL cylinder mode is selected in the set-up parameters.†
3	SQUEEZE	This is the cycle time for the gun to fully close and build up pressure.†
4	PRE-HEAT Time	This is the cycle time for the pre-heat pulse.†
5	PRE-HEAT Current	This is the amount of energy for the pre-heat pulse. •†
6	COOL	This is the number of delay cycles between the pre-weld and weld functions.†
7	WELD Time	This is the cycle time for the weld pulse.
8	WELD Current	This is the amount of energy for the weld pulse.
9	COOL	This is the number of delay cycles between the weld and post-weld functions.
10	POST-HEAT Time	This is the cycle time for the post-heat pulse.•
11	POST-HEAT Current	This is the amount of energy for the post-heat pulse.•
12	HOLD	This is the number of cycles of hold time after the weld pulse.§
13	OFF	This represents the number of cycles during which the electrodes are off the work before the sequence is repeated.§ *Note:* *If the off time is programmed to anything other than zero, the control is in repeat mode, and will repeat the schedule starting with the squeeze function. If off time is zero, the control will not repeat the sequence.*

• *The function assigned to these fields may change, based on the firing mode selected (in the Heat Select Display, described in Section 2.1.2).*

§ *If this sequence will chain to another sequence (as described in Section 2.2.2), these functions are NOT executed until the control reaches the last sequence in the chain.*

† *If this sequence was chained to another (the chain started with a different sequence) these functions are NOT executed. They are only performed during the sequence at the top of the chain.*

2.1.2 Heat Select Display

When you press the [*] key from the Normal / Programming mode, you'll see the following display, used to select the type of firing heat to provide to each weld function of the selected sequence.

If the control is locked, you cannot change the heat display settings, and this display will not be available when you press [*]. This display is also bypassed when you select the Brief Display from the Security/Reload menu.

You define the pre-heat, weld and post-heat firing types individually, as you can see from the Heat Select display shown below.

```
SEQ    PRE-HEAT      WELD        POST-HEAT
 01   (  AVC  )    (  ACC  )    (IMPULSE)
```

In the example shown above, the firing heat for the pre-heat cycles is AVC (Automatic Voltage Compensation), the weld cycles will use Automatic Current Compensation (ACC), and the post-weld cycles are specified as impulses (so the control will pulsation weld -- repeat the weld heat and cool cycles for the number of impulses programmed in the post-weld cycles field).

When you enter the display, the cursor is located on the sequence number. Use the [↑] and [↓] arrow keys to select the weld sequence you want to program.

When you see the correct sequence, you'll use the [→] and [←] keys to move the cursor to the pre-heat, weld or post-heat fields, then the [↑] and [↓] keys to scroll through the list of options available for that function.

When you've selected the correct options for a sequence, you can move the cursor back to the sequence number (to select another sequence) or move another display (with the MODE or [*] keys).

*Changes to the weld types do not take effect until you exit the Heat Select Display, by pressing either [*] or the MODE key. These changes **will** impact the data in the selected weld sequence. Make certain you return to the Normal/Programming display to verify the weld data **before** attempting to initiate a weld with that sequence.*

Each function (pre-heat, weld and post-heat) has a different list of heat options. Each is described in the sections that follow.

Pre-heat Options

When you move the cursor to the PREHEAT field, you can use the [↑] and [↓] keys to scroll through the three pre-weld options: Slope, ACC and AVC.

Slope When you select this option, you're telling the control that during the pre-weld function, the heat should *ramp* from the amount specified in the pre-heat function to the amount of weld heat over the number of pre-heat cycles.

For example, if you set the pre-heat to 30, the pre-heat cycles to 50, and the weld heat to 65, the control will ramp the weld heat from 30% to 65% heat over the 50 pre-heat cycles. This does ***not*** impact the weld function.

Note: *The **Slope** pre-heat option can be selected only if the AVC option has been selected for the weld function, as described in the following section, "**Weld Options.**"*

AVC This specifies that the control use Automatic Voltage Compensation (AVC) to provide consistent weld heat despite changes in the primary line voltage. When you program using AVC, you'll program firing heat as *a percentage of the maximum available* current.

The control monitors the primary voltage, using a programmed nominal line voltage to determine when to compensate for voltage swings on the weld bus. (This method cannot compensate for changes in the welder secondary circuit.)

For example, if you enter 30 for the pre-heat function, the MedWeld 200 will provide 30% of the maximum available current to the weld.

ACC This option selects the Automatic Current Compensation (ACC) firing method, where heat is programmed by specifying the amount of secondary current desired.

The control monitors the secondary current during each cycle (rather than the primary voltage), and compensates for any variations during the next cycle of the weld. This method allows the control to provide a constant level of secondary current to the work piece.

Whenever you change firing modes, the appropriate function in the weld schedule is reset to the minimum heat: 20% for AVC, or 0 amps for ACC. Make certain that you return to the Normal / Programming mode to verify the heat values after you exit the Heat Select display.

Weld Options

There are four heat options available for the weld function: AVC, ACC, AVC Seam and ACC Seam:

AVC Automatic Voltage Compensation, as described above. Program a percent of maximum available current.

ACC Automatic Current Compensation, as described above. Program the desired secondary current to provide to the work piece.

ACC Seam
AVC Seam These two options allow you to select seam welding, using either AVC or ACC firing modes. For this option, the control repeats the weld function *until the initiate (the appropriate weld pilot input) is removed*. For example, if you programmed 5 weld cycles, the control welds to the next multiple of 5 cycles after the initiate is removed

Post-heat Options

When you move the cursor to the POST-HEAT field, you can use the [↑] and [↓] keys to scroll through the four options: Slope, ACC, AVC and Impulse.

Remember that the option you select may change the values programmed for the selected weld schedule: AVC resets the heat to the minimum of 20%, ACC resets the heat to 0 amps, and Impulse removes the post-heat cycles value and selects impulse welding. Make certain you return to the Normal / Programming mode to view the weld schedule after making ***any*** *changes in the Heat Select display.*

Slope When you select this option, you're telling the control to *ramp* from the amount specified in the weld function to the amount of post-heat energy over the number of post-heat cycles.

For example, if the weld function provides heat at 60% of maximum and the post-heat is set to 30 and the post-heat cycles to 20, the control will post slope the heat from the weld current (60%) down to 30% over 20 cycles. This does not impact the weld function.

ACC Automatic Current Compensation, as described above. Program as secondary current.

AVC Automatic Voltage Compensation, as described above. Program heat as a percentage of maximum available current.

Impulse This option does not truly provide post-weld heat. It allows you to tell the control to use pulsation for the ***weld function.***

Pulsation allows you to specify the number of *impulses* the control will perform. (An impulse is the combination of weld cycles *and* cool cycles.)

When you select Impulse mode for the post-heat, you're telling the control that the heat and cool cycles programmed for the weld function constitute one impulse. The number of impulses programmed is the number of times that the heat and cool cycles of the weld function will be repeated.

For example, if the weld heat is 50% for 5 cycles, the cool cycles are set to 2, and the post-heat cycle time is set to 10, the control will provide 10 impulses (each impulse consisting of 5 cycles of 50% heat followed by 2 cool cycles).

When you have set the heat options for the selected sequence, press [*] to move to the Pilot Assignment display. (You could also press MODE to change from the Normal / Programming mode to the Fault or Stepper Status Mode.)

The changes you made to the firing modes do not take effect until you leave the Heat Select Display. Make certain you verify the weld schedules *before* attempting to initiate a weld sequence *if* the firing mode has been changed.

2.1.3 Pilot Assignment Display

The Pilot Assignment display is used to tell the MedWeld 200 which weld sequence to initiate when it receives a weld pilot input. You can specify a list of up to 16 sequences to initiate in order for weld pilot #1 and weld pilot #2.

When you press the [*] key from the Heat Select display, you'll see the display shown in Figure 2.3, which is used to assign sequences to a weld pilot.

```
PILOT  1 *01  02  03  04  05  06  07  08
         00  00  00  00  00  00  00  00
```

98.9

105.5

The cursor is located on the weld pilot number selected: 1 or 2. Use the [↑] and [↓] keys to select the pilot you want to see. Now use the [→] key to move the cursor to the first field on the assignment list. (This is the sequence that will be initiated the *first time* the MedWeld 200 receives the weld pilot input selected.) The second field shows the weld sequence that will be initiated the *second* time the control receives the input.

The control moves through the assignment list, initiating the appropriate sequence each time it receives an initiate input, until it encounters a field containing a zero. (When it reaches zero, it returns to the sequence in the first field on the assignment list.)

In the example above, the control will execute sequences 01 through 08 in the order shown, then return to sequence 01.

At power-up...

At power-up or when power to the control is cycled, the control *resets* the pilot assignment to the **first** sequence number in the pilot assignment list.

To disable the assignment list (always initiate the same sequence) set the first value to the sequence number desired, and the second number in the assignment list to zero.

The asterisk (*) on the display indicates the next sequence that will be initiated when the appropriate pilot becomes active.

To program the pilot assignment...

To program the assignment list, position the cursor on the appropriate field, and use the [↑] and [↓] keys to select the sequence number desired (1-50). Then use the [→] key to move to the next field on the list. You can tell the control to initiate a list of up to 16 sequences for each pilot with this display.

To select a specific sequence...

To force the control to initiate a particular sequence, position the cursor on that sequence assignment and push the [*] key. The asterisk (*) on the display will appear next to that sequence number, indicating that that sequence will be used the next time a weld is initiated.

When you have finished...

When you have finished assigning sequences, use [→] or [←] to move the cursor to the weld pilot number, then press [*] to return to the Normal/Programming display.

You can also press MODE to change to the Fault mode (if there are active fault or alert conditions) or Stepper Status mode.

2.2 Getting Started: Programming Weld Data

Select A Weld Sequence

Select a weld sequence by following the steps below.

```
(1)  (2)  (3)  (4)  (5)  (6)  (7)  (8)  (9) (10) (11)  (12) (13)
01   05   20   00   20   0    10   50   0   00   20   05   00
00   480  464  3252 7    75   0022 7    0330 4    F06  |    NW
```

1. If the cursor is not on **(1)** in the diagram above, use [→] or [←] to move it there.
2. Press [↑] or [↓] to select the sequence you wish to view or edit.

Programming Initial Squeeze Cycle Time

Program the Initial Squeeze cycle time by following the steps below.

```
(1)  (2)  (3)  (4)  (5)  (6)  (7)  (8)  (9) (10) (11)  (12) (13)
01   05   20   00   20   0    10   50   0   00   20   05   00
00   480  464  3252 7    75   0022 7    0330 4    F06  |    NW
```

1. If the cursor is not on **(2)** in the diagram above, use [→] or [←] to move it there.
2. Press [↑] to increase, or [↓] to decrease the number.

You cannot change any programmed setting when the control is in locked mode. Refer to the Appendix Section for a discussion of how to lock or unlock the control.

Programming Squeeze Cycle Time

Program the Squeeze cycle time by following the steps below.

```
(1)  (2)  (3)  (4)  (5)  (6)  (7)  (8)  (9) (10) (11)  (12) (13)
01   05   20   00   20   0    10   50   0   00   20   05   00
00   480  464  3252 7    75   0022 7    0330 4    F06  |    NW
```

1. If the cursor is not on **(3)** in the diagram above, use [→] or [←] to move it there.
2. Press [↑] to increase, or [↓] to decrease the number.

Programming PRE-HEAT Cycle Time

Program the PRE-HEAT Pulse cycle time by following the steps below.

```
(1)  (2)  (3)  (4)  (5)  (6)  (7)  (8)  (9)  (10) (11)  (12) (13)
01   05   20   00   20   0    10   50   0    00   20   05   00
00   480  464  325227 75   002227 033040 F06  NW
```

1. If the cursor is not on (**4**) in the diagram above, use [→] or [←] to move it there.
2. Press [↑] to increase, or [↓] to decrease the number.

Programming the PRE-HEAT Current

Set the PRE-HEAT current by following the steps below.

```
(1)  (2)  (3)  (4)  (5)  (6)  (7)  (8)  (9)  (10) (11)  (12) (13)
01   05   20   00   20   0    10   50   0    00   20   05   00
00   480  464  325227 75   002227 033040 F06  NW
```

1. If the cursor is not on (**5**) in the diagram above, use [→] or [←] to move it there.
2. Press [↑] to increase, or [↓] to decrease the number.

Remember that the firing mode (selected in the Heat Select display) will impact how current is programmed: with AVC, you program weld heat as a percentage of maximum available primary voltage; with ACC, you select a secondary current value (in amps). Any changes made in the Heat Select display will reset the current values to their minimum values: 20% for AVC; 00000 amps for ACC. Refer to Section 2.1.2.

Programming COOL Cycle Time

The weld control has two cool cycles which you can program (#6 and #9). Program the COOL cycle time by following the steps below.

```
(1)  (2)  (3)  (4)  (5)  (6)  (7)  (8)  (9)  (10) (11)  (12) (13)
01   05   20   00   20   0    10   50   0    00   20   05   00
00   480  464  325227 75   002227 033040 F06  NW
```

1. If the cursor is not on (**6**) or (**9**) in the diagram above, use [→] or [←] to move it there.
2. Press [↑] to increase, or [↓] to decrease the number.

Programming WELD Cycle Time

Program the WELD Cycle time by following the steps below.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
01	05	20	00	20	0	10	50	0	00	20	05	00
00	480	464	3252	27	75	0022	27	0330	4	F06		NW

1. If the cursor is not on (7) in the diagram above, use → or ← to move it there.
2. Press ↑ to increase, or ↓ to decrease the number.

Remember that the firing mode impacts this value. If you select either AVC or ACC Seam welding, the control will repeat the weld function as long as the weld pilot is active. When the pilot is removed, the control will go on to the next function in the sequence.

Programming the WELD Current

Set the WELD current by following the steps below.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
01	05	20	00	20	0	10	50	0	00	20	05	00
00	480	464	3252	27	75	0022	27	0330	4	F06		NW

1. If the cursor is not on (8) in the diagram above, use → or ← to move it there.
2. Press ↑ to increase, or ↓ to decrease the number.

Remember that weld heat is determined by the firing mode selected in the Heat Select display. If you made any changes to the settings, the current is reset to its minimum acceptable value: 20% for AVC, 00000 amps for ACC.

Programming POST-HEAT Cycle Time

Program the POST-HEAT cycle time by following the steps below.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
01	05	20	00	20	0	10	50	0	00	20	05	00
00	480	464	325	27	75	0022	7	0330	4	F06		NW

1. If the cursor is not on **(10)** in the diagram above, use → or ← to move it there.
2. Press ↑ to increase, or ↓ to decrease the number.

If the post-weld function is used to define weld impulses, you'll use the steps above to enter the number of times the control will repeat the weld impulse (heat cycles and cool cycles) programmed by the WELD and COOL functions.

*If you selected Impulse for the post-heat firing mode in the Heat Select Display, this value does not represent the post-heat cycle time. It is the number of weld **impulses** to provide. (A weld impulse consists of the weld cycles combined with the cool cycles, as described in Section 2.1.2.)*

Programming POST-HEAT Current

Program the POST-HEAT current by following the steps below.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
01	05	20	00	20	0	10	50	0	00	20	05	00
00	480	464	325	27	75	0022	7	0330	4	F06		NW

1. If the cursor is not on **(11)** in the diagram above, use → or ← to move it there.
2. Press to increase, or ↓ to decrease the number.

*If you selected **Impulse** for the post-heat firing mode, this value is not displayed, and is not programmable. Refer to Section 2.1.2.*

Programming HOLD Cycle Time

Program the HOLD Cycle time by following the steps below.

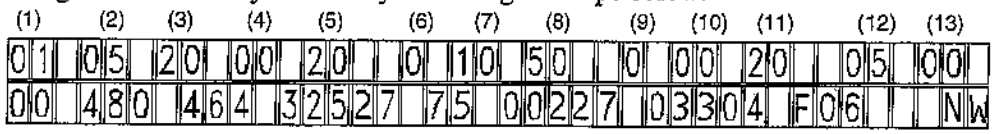
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
01	05	20	00	20	0	10	50	0	00	20	05	00
00	480	464	325	27	75	0022	7	0330	4	F06		NW

1. If the cursor is not on **(12)** in the diagram above, use → or ← to move it there.
2. Press ↑ to increase, or ↓ to decrease the number.

*If the weld sequence is "chained" to another sequence, this function is not executed. (Only the Hold and Off cycles in the **last** sequence in the chain are performed.)*

Programming OFF Cycle Time

Program the OFF Cycle time by following the steps below.



1. If the cursor is not on **(13)** in the diagram above, use [→] or [←] to move it there.
2. Press [↑] to increase, or [↓] to decrease the number.

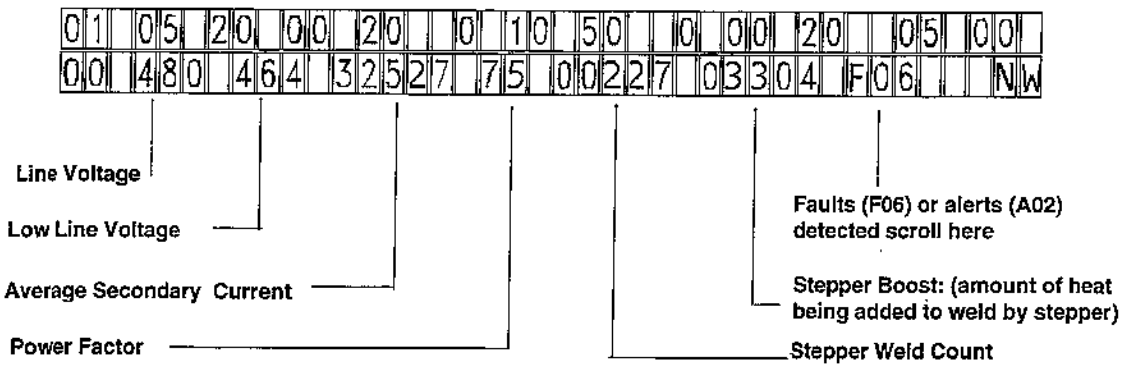
*If this weld sequence chains to another sequence, this function is not executed unless this is the **last** sequence in the chain.*

*Repeat will start at the **squeeze function** of the first sequence in the chain, unless the cylinder type (selected in the set-up parameters) is set to DUAL. In this case, the control will repeat at the **start** of the first sequence in the chain.*

During OFF time, the end of hold output is activated for the number of cycles of OFF time.

2.2.1 About the Weld Status Data

The bottom row of the screen represents the weld status data collected by the control the last time the selected sequence was initiated. The status information is NOT programmable; it merely shows the data collected.

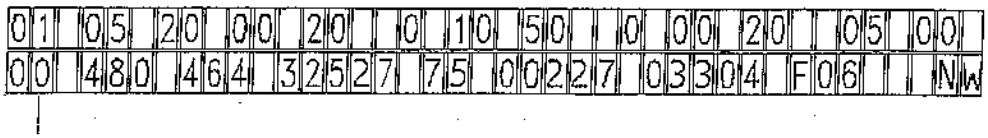


This display is updated after each weld. You cannot move the cursor to these fields. However, you can change the *first* and *last* field on this line, to select the weld/no weld status and to tell the control to chain to another weld sequence, as described in the following section.

2.2.2 Chaining Sequences

The first field on the lower line of the display allows you to tell the control to "chain" the currently selected sequence to another weld sequence, to allow you to add additional weld functions to a weld sequence.

The "chain" command field, highlighted in the figure below, is normally set to zero. However, if not set to 0, it contains the number of the weld sequence that is "chained to" after the post-heat function in the current sequence.



"Chain to" sequence number

Chaining is designed to provide additional flexibility and welding power within a weld sequence. It allows you to add to the control's fixed weld schedule (pre-heat, weld, heat) and perform welding at multiple currents, or to perform more complex operations.

When the MedWeld 200 starts a chain sequence, it executes each function in the first sequence of the chain -- ***until*** it completes the post-heat function. Then, rather than go on to the hold cycles and off cycle time, it jumps immediately to the weld sequence that it is "chained" to, and executes the weld function in the new sequence.

The control does **NOT** *execute the new weld sequence's initialization functions: initial squeeze, squeeze, and pre-weld. It skips down to the weld function and post-weld functions, and then checks whether it is chained to a third sequence.*

If NOT, it executes the hold and off cycle functions. However, if it IS chained to another weld sequence, it again skips the hold and off cycles and jumps to the weld function in the new sequence.

Theoretically, the MedWeld 200 can execute all 50 sequences as part of a chain. (The last sequence in any chain is the sequence where the chaining field is programmed to zero.) However, in reality, few applications require such complexity. Under normal operating conditions, a chain will consist of only two or three sequences.

It is also possible to tell the control to repeat a weld sequence chain, by setting the off cycles in the last sequence of the chain to a value other than zero. During the off cycles, the control processes any weld faults and then activates the End of Hold output (if no faults were detected). This allows the control to stop any automated processes when a fault occurs, ***before*** the End of Hold output can signal the controller to initiate another weld.

Again, chaining is not a typical application.

A sequence can only be used once within a chain. If used more than once, the control generates a Chained Sequence Error Fault.

2.2.3 Selecting Weld/No Weld Mode

The only other programmable field on the lower line of the display is the Weld/No Weld field.

```
01 05 20 00 20 0 10 50 0 00 20 05 00
00 480 464 325 27 75 0022 7 0330 4 F06 NW
```

W = weld
NW= no weld

This field not only shows the currently selected status, but also allows you to change the currently selected mode:

- In Weld mode firing pulses are enabled to the welding transformer primary.
- In No Weld, the control cycles, but weld current is NOT provided to the work piece.

*This indicator only shows whether weld current is **enabled.** It does NOT indicate whether weld current was **provided** during the last weld.*

If the control is in no weld, (either because it was disabled on the Normal/Programming display or because the System Cooling/No Weld input becomes inactive), the control will cycle in no weld but show the System Cooling/No Weld fault in the fault display area (F13). Refer to Chapter 5 for a more detailed description of this fault condition.

To change to currently selected mode, take the following actions from the Normal/Programming mode display:

Press:	To:
[→] or [←]	move the cursor to the Weld/No Weld position on the Normal Display screen.
[↑] or [↓]	Use the [↑] to select WELD or the [↓] to select NW. "W" =WELD; "NW"=NO WELD

You can now press MODE to select the Fault or Stepper Status modes, or use the [*] to continue programming tasks.

2.3 Fault/Alert Display Mode

The Fault/Alert Display mode provides a description of which fault or alert condition(s) were detected during the last weld sequence initiated, and allows you to reset those fault conditions.

When the weld control detects a condition you defined as either a fault or an alert in the set-up parameters, it flashes one or more error codes in the lower right corner of the Normal/Programming mode display. (If the control detected more than one fault condition, the codes will scroll across the lower right corner of the screen.)

To enter the Fault Display mode, press the MODE key from the Normal/Programming display.

This mode is available ONLY if there are active fault or alert conditions. (In the Normal/Programming display, you'll see data in the fault or alert field. If there are no active faults or alerts, you'll go to the Stepper Status mode when you press MODE.)

2.3.1 Fault Descriptions

To see a description of the fault and/or alert conditions, press MODE, and you'll see a display similar to the one shown below.

```
F04  LOW CURRENT LIMIT
A07  LINE VOLTAGE LIMIT
```

The control displays the fault or alert code number(s) followed by a description for each active fault or alert condition. (Refer to the Appendix for a complete list of fault/alerts and their corresponding code numbers.)

Fault conditions are represented by an F (F04), and the letter A represents conditions you defined as an alert (A07). There are also three *internal* fault conditions, (such as a memory error) which are indicated by the letter I (I02).

At this point, you can:

Press:	To:
[↑] or [↓]	Displays additional Fault or Alert messages (if more than two are active).
MODE	Moves to the Stepper Status mode
[*]	Reset the fault and alert conditions, and returns to the Normal/Programming display.

*How the control reacts to a **fault** condition depends on the Initiation On Fault set-up parameter.*

*If a fault is detected **and** the Initiation On Fault set-up parameter is set to INHIBIT, the control will not initiate another sequence until the fault has been reset.*

If the Initiation On Fault set-up parameter is set to ALLOW, the control ignores the fault and initiates the sequence.

*Initiation is never inhibited by an active **alert** condition.*

2.3.2 Resetting the Faults

You reset the control fault and alert conditions using the keypad. Press [*] from the fault display, and the control returns to the Normal/Programming display with the fault conditions cleared. (The fault display area on the Normal display is now blank.)

The control will now accept a weld initiate.

2.4 Stepper Status Mode

As previously described, if the control is unlocked and the Brief Display is NOT selected, you'll see the Stepper mode when you press the MODE key. (If there are no fault conditions, press MODE *once* from the Normal/Programming mode. If there are active fault or alert conditions, press MODE *twice*.)

The Stepper display is shown below:

```
STR=01    STP=01    TWC=0000    SWC=0000
BST(%I)=00  BST(ACC)=00000  STATUS=ON
```

You'll use this mode to:

- See the status of the steppers, including the current weld count and amount of "boost" being provided to each weld
- Turn the steppers on or off
- If the stepper status is ON:
  - Reset the steppers or perform a tip dress reset (press [*][*])
  - Program the stepper profiles (press [*])

2.4.1 About the Linear Steppers

The MedWeld 200 control provides two independent linear steppers to assure consistent heat to each weld, despite mushrooming and alloying of the electrode tips.

The stepper tracks the number of welds initiated by each weld pilot input, and gradually increases the heat supplied to the weld at several programmable set points. (Stepper #1 is assigned to weld pilot input #1; stepper #2 is assigned to weld pilot input #2.)

Heat is added to the weld in several "steps," each of which supplies additional weld current in a linear fashion over a programmed number of welds. When the stepper reaches the last programmed set point (the last weld in the last step), the electrodes must be dressed (tip dress reset) or replaced and the stepper reset.

The weld operator programs the stepper based on experience with the weld process and resulting electrode deterioration. The optimum stepper settings are the result of trial and error.

For example, if a step is programmed to add 3% heat after 100 welds, it will actually add current in the following way:

- 1% after 33 welds
- 2% after 66 welds
- 3% by the 100th weld.

This 3% increase is added to the current value already programmed into the control. (The is the amount of stepper "boost," or the amount of heat being added to the weld function by the stepper.) The stepper status display shows the boost (BST) in two ways: as a percent of maximum available primary current (for AVC welding) and in amps of secondary current (for ACC welding).

As the amount of stepper boost increases (in the latter steps of the profile), you must expand the window of acceptable secondary current to avoid generating High and Low Current Limit Faults. The Stepper Profile display allows you to program new current limit values for each step, so as the total heat (the base heat from the weld function *plus* the heat added by the stepper) increases, the high and low current limits also increase. (Refer to the Stepper Profile display in Section 2.4.4.)

2.4.2 Viewing Stepper's Status

The Stepper Status display (shown below) shows the following values:

```
STR=01    STP=01    TWC=00000    SWC=0000
BST(%I)=00    BST(ACC)=00000  STATUS=ON
```

Abbreviation	Definition
STR	STR (stepper) - The selected stepper. The MedWeld 200 control has 2 steppers, each containing 5 steps.
STP	STP (step) - The step (1-5) being implemented by the stepper for each weld. You can move the cursor to this field to advance the stepper to the next (or previous) step.
TWC	TWC (total weld count) - The number of welds executed by the selected stepper since the stepper was reset.
SWC	SWC (stepper weld count) - The number of weld executed during the current step.
BST(%I)	(Stpper boost %I) - The percentage of maximum available current that the stepper is adding to the weld function.
BST(ACC)	(Stepper boost ACC) - The amount of secondary current that the stepper is adding to the weld function.
STATUS	STATUS - Shows whether the stepper is **on** or **off**.

You can change the programmable settings by moving the cursor to the stepper status value and using the [↑] and [↓] keys to increase or decrease the setting, or to change the option selected. For example, you can turn the selected stepper on or off by pressing the [↑] or [↓] key to toggle the value.

If either stepper is ON, you can now press [*] to see the stepper programming displays:

- To reset the stepper or perform a tip dress reset, press [*] to move to the Stepper Reset Display.
- To see the stepper profile (the amount of stepper boost programmed for each step), press [*] *twice*, to select the Stepper Profile Display.

If both steppers are OFF, the stepper programming displays are disabled. You cannot see the stepper profile or stepper reset displays unless the stepper status is ON.

To move to a different mode, press the MODE key, and you'll see the Set-up display, described in Section 2.5.

If you selected the Brief Display from the Security/Reload display, none of the stepper displays are available. (Refer to Section 2.6.2.)

2.4.3 Stepper Reset/Tip Dress Display

When the control completes the last weld in the last step (or when the electrodes are replaced or the tips filed), you must reset the stepper, to continue to provide the desired heat to each weld.

If the stepper status is ON, you can see the stepper reset display when you press [*].

```
   RESET STEPPER          TIP DRESS
STR.01( ) STR.02( )  STR.01( ) STR.02( )
```

This display allows you to either reset the stepper (to step 1, weld count 0), or to perform tip dress reset (to set the stepper back to step 2). To use this display, press [→] to move the cursor to the correct stepper, as described below.

*You can also choose to program the stepper profile by pressing * from this display. This display is described in Section 2.4.4.*

Reset Stepper

When the electrodes are *replaced*, use the RESET STEPPER option to tell the stepper profile to go back to step 1, weld count 00000. Use [→] to move the cursor to either (STR.01) or (STR.02) under RESET STEPPER.

Once the cursor is in place, press [↑] or [↓] to reset the stepper. (You will see a message telling you the steppers have been reset, and you return to the Normal/Programming display.)

Tip Dress

When the electrodes are merely *dressed* (rather than replaced), electrode performance improves, but not as much as when the electrodes are replaced. When you perform tip dress, the stepper profile returns to step 2 of the profile.

To tip dress reset stepper #1 (assigned to weld pilot #1), move the cursor to STR.01 (under TIP DRESS). To tip dress stepper #2, move the cursor to STR.02.

Once the cursor is in place, press [↑] or [↓] to reset the stepper. (You will see a message telling you the steppers have been reset, and you return to the Normal/Programming display.)

2.4.4 Stepper Profile Display

If you press [*] from the Stepper Reset display (to program the stepper profile), you'll see the Stepper Profile display shown below:

```
STR=01 STP=01 BST(%I)=03  BST(ACC)=0100
STP CNT=0060   CURR:  LO=00200 HI=10000
```

The MedWeld 200 provides two steppers, and each stepper provides five steps. (Stepper #1 control the weld sequence initiated by pilot #1; stepper #2 controls pilot #2.)

The following table described the information in this display:

Abbreviation	Definition
STR	STR - The currently selected stepper (#1 or #2) Select the stepper you want to edit using the [↑] or [↓] arrow keys. Stepper 1 controls sequences initiated by Weld Pilot #1 and Stepper 2 controls sequences initiated by Weld Pilot #2. (STR=stepper)
STP	STP - tells you which step (1-5) you are editing. Select the step (1-5) you want to edit using the [↑] or [↓] arrow keys. (STP= step)
BST(%I)	(Stepper boost %I) - The amount of "boost" to add during the current step when the control will perform AVC welding. (% maximum primary current)
BST(ACC)	(Stepper boost ACC) - The amount of "boost" to add during the current step when the control will perform ACC welding (secondary current in amps)
STP CNT	STP CNT - The number of welds in the currently selected step. This tells the control the number of wheld in this step over which to linearly increase the amount of boost programmed in the BST(%I) and/or BST(ACC) fields. Change the number of welds in this step using the [↑] or [↓] arrow keys. (STP CNT=stepper count)
CURR LO	This field sets a new Low Secondary Current Limit (to override the value programmed in the set-up parameter). This can prevent the control from generating Low Current Limit fault conditions when the stepper boost is reduced by resetting or tip dressing the stepper. This new limit applies only to this step of the *selected* stepper. (CURR LO=low current limit)
CURR HI	This sets a new High Secondary Current Limit (to prevent unnecessary High Current Limit fault conditions generated by increases in weld current caused by increasing the stepper boost). (CURR HI=high current limit)

Programming the Stepper Profile

You can program new values for each of the five steps in the stepper profile from the Stepper Profile display:

1. With the cursor underneath STP (step), press [↑] or [↓] to select the STR (stepper) number 1 or 2.
2. With the cursor under STP, press [↑] or [↓] to select the step you want to edit. (The stepper has five steps.)
3. Press [→] to move the cursor to the boost value (BST %I programs the boost as a percent of primary voltage, for AVC; BST ACC, program the secondary current as k amps) This is the amount of heat to add to the selected step, based on the weld count.
4. Press [↑] or [↓] to increase or decrease the boost.
5. Press [→] to move the cursor to the weld count STP CNT. Now press the [↑] or [↓] key to select the weld count for this step of the stepper. (This is the number of welds over which to linearly increase the weld heat by the boost value.)
6. Press [→] to move the cursor to low current value (CURR: LO=00000). This option enables you to program a new low current limit value for each step.
7. Press [↑] or [↓] to increase or decrease the LO CURR limit.
8. Press [→] to move the cursor to high current limit (HI=00000). This option enables you to program a new high current limit value for each step.
9. Press [↑] or [↓] to increase or decrease the HI CURR limit.

The current limits you set in the stepper profile override the limits in the set-up parameters when the stepper is turned on.

2.5 Set-up Mode

The Set-Up mode allows you to define the operating environment for the MedWeld 200 control. To select this mode, press the MODE key from the Stepper Status display, and you'll see the display shown below.

```
01 STEPPER APPROACHING MAX:      (ALERT)
02 END OF STEPPER:               (ALERT)
```

*The display shown above shows the first set-up parameter in the list, which is what you will see the **first time** you enter the Set-up modeafter turning off the control. Otherwise, the control returns to the point in the list of set-up parameters where you left off (the last time you used the set-up mode).*

Note: *If the control is locked or the Brief Display is selected (from the Security/Reload options), this display is NOT enabled. (It will not be displayed, because you cannot program these parameters.)*

2.5.1 Set-up Parameters

The MedWeld 200 provides 35 set-up parameters, which are used to define the severity of control error conditions, and identify the hardware environment (such as retract type and the transformer type) to the control.

These are listed in the following table along with the options available for each parameter and the weld control's default (factory) setting.

Each parameter and error condition is defined in Chapter 5.

Parameter	Options	Default
01 STEPPER APPROACHING MAX:	FAULT/ALERT	**ALERT**
02 END OF STEPPER:	FAULT/ALERT	**ALERT**
03 HIGH CURRENT LIMIT:	FAULT/ALERT	**FAULT**
04 LOW CURRENT LIMIT:	FAULT/ALERT	**FAULT**
05 HALF CYCLE:	FAULT/ALERT	**FAULT***
06 VOLTAGE COMPENSATION:	FAULT/ALERT	**ALERT**
07 LINE VOLTAGE:	FAULT/ALERT	**ALERT**
08 REWELD:	FAULT/ALERT	**FAULT**
09 CURRENT COMPENSATION:	FAULT/ALERT	**ALERT**
10 NO ZERO CROSSING SYNC:	FAULT	**FAULT***
11 LOW BATTERY:	FAULT/ALERT	**ALERT**
12 WELD PILOT:	FAULT/ALERT	**ALERT**
13 SYSTEM COOLING/NO WELD:	FAULT/ALERT	**FAULT**
14 STAGE 2/PALM SWITCH:	FAULT/ALERT	**ALERT**
15 CHAINED SEQUENCE:	FAULT/ALERT	**FAULT**
16 RETRACT PILOT:	FAULT/ALERT	**FAULT**
17 BEAT MODE:	FAULT/ALERT	**FAULT**
18 HEAT CYCLE LIMIT	FAULT	**FAULT***
19 INITIATION ON FAULT:	ALLOW / INHIBIT	**INHIBIT**

20 INITIATION TYPE:	BEAT / NON BEAT	**NON BEAT**
21 INDEX PILOT ASSIGN ON REPEAT:	YES/NO	**NO**
22 SECOND STAGE INPUT:	2 STAGE/ PALM SWITCH	**2 STAGE**
23 PRESSURE CYLINDER TYPE:	SINGLE / DUAL	**SINGLE**
24 TRANSFORMER:	AC WOUND / AC STACKED CORE DC WOUND /DC STACKED CORE	**AC WOUND**
25 CURRENT LIMIT MODE:	PEAK/AVERAGE	**AVERAGE**
26 RETRACT MODE:	LATCHED / UNLATCHED / NONE	**NONE**
27 RETRACT CYLINDER:	AIR-NORMAL / AIR-INVERTED	**AIR-NORMAL**
28 REWELD:	DISABLED / ENABLED	**DISABLED**
29 HEAT CYCLE LIMIT (0=SEAM)	00-99	**00**
30 TRANSFORMER TURNS RATIO 1:	000.1-999.9	**001.0**
31 NOMINAL LINE VOLTAGE:	000-650	**000 VOLTS†**
32 WAIT FOR LINE VOLTAGE	000-650	**000 VOLTS**
33 LINE VOLTAGE WAIT TIME (CYC):	000-999	**000 CYC**
34 HIGH CURRENT LIMIT (AMPS):	00001-99999	**10000 AMPS**
35 LOW CURRENT LIMIT (AMPS):	00001-99999	**01000 AMPS**

* These parameters are permanently set as FAULTS and cannot be changed.

† When set to 000, the control automatically calculates the nominal line voltage at power-up.

2.5.2 Moving Through the Set-up Parameters

The control displays each parameters in the order shown in the table above. the parameter number is also displayed, to indicate where you are located in the list.

You can move through the list by pressing [↑] or [↓]. When you reach the last parameter in the list (#35), the display wraps around to the first parameter in the list.

2.5.3 Changing a Set-up Parameter

When you want to change the setting of one or more parameters, you can do so by following these steps:

1. Press [↑] and [↓] to move through the parameter list until you see the parameter you want to change.
2. When the correct parameter is displayed, press [→]. The cursor moves to highlight the current setting for the selected parameter.
3. Press [↑] or [↓] to either scroll the list of options (such as Fault/Alert or Peak/Average) or to increase and decrease a numerical value.
4. When the correct setting is displayed, press [→] or [←] to move the cursor back to the beginning of the line.

You can now either select another parameter by pressing [↑] or [↓] and repeating the steps above, or go to a different display mode by pressing MODE.

☞ *Refer to **Chapter 5: Set-up Parameters and Fault Descriptions** for a complete description of each set-up parameter and fault condition.*

You can also press [*] to select the Security/Reload display, which allows you to either lock or unlock the control, select the Brief Display mode, or to reset all of the control's programmable settings to their default values. These options are described in the following section.

2.6 Security/Reload Display

When you press [*] from the Set-up mode, you'll see the display shown below.

```
SECURITY    BRIEF DISPLAY    RELOAD
  ( )           ( )            ( )
```

Each of these options is described in the following sections.

2.6.1 Security

When you move the cursor to select Security, the control will prompt you to enter a 6-key access code. When you successfully enter the correct sequence of keys, the control will either lock (if currently unlocked), or unlock (if the control was locked).

The control is unlocked when shipped from the factory, but can be locked to prevent unauthorized users from making program changes. For information regarding your access code, refer to the Appendix Section.

2.6.2 Brief Display

The Brief Display option allows you to tell the control that certain menus and options are no longer required: you have finished programming the control and you require only the Normal Display, Pilot Assignment Display, and the Fault Display.

All other programming displays are bypassed by the control: when you press the MODE key from the Normal display, you'll change to the Fault Display ONLY if there are active fault conditions.

(If there are no active fault conditions, the only other display available is the Pilot Assignment, by pressing [*].)

However, if a stepper has reached the last weld allowed in the stepper profile, you can access the Stepper Reset Tip Dress display (described in Section 2.4.3). This will allow you to reset the stepper or perform a tip dress reset.

To select the Brief Display from the Security/Reload display, move the cursor to Brief Display (using [→]) and the press [↑] or [↓] to turn the Brief Display on or off. The display shows a message indicating the current status of the Brief Display (on or off), and returns to the Normal display mode.

(The status toggles: if the display is turned OFF when you select this option, the display will turn ON. If it is already ON, selecting this option will turn it OFF.)

Note: *If the Brief Display is selected, the Setup display (which is used to select the Security/Reload display) is not available. To return to this display and turn off the Brief Display, press and **hold** the MODE key until you see the Security/Reload display.*

2.6.3 Reload (the default settings)

When the MedWeld 200 is shipped from the factory, settings for the stepper profiles, stepper parameters, and set-up parameters are stored in the control's memory. These settings are called "defaults" and are listed in the Appendix. The default values are used by the control unless you change them.

The Reload option allows you to reset every programmable value to a known state.

*You can reload the settings only if the control is **unlocked**.*

To reset the defaults:

1. Select the **RELOAD** option by pressing [→] to move the cursor.
2. Press either [↑] or [↓] to reload the control from EPROM. (You will see a message telling you that the weld control's defaults have been successively reloaded, as shown below.) You automatically return to the Normal Display mode.

This option reloads ALL default settings. Make certain you return to the Normal/Programming mode to view all of the programmable settings before attempting to initiate a weld sequence.

2.7 Initiating a Weld Sequence

The MedWeld 200 uses the two Weld Pilot inputs and the pilot assignment list (in the Pilot Assignment display) to determine which sequence to initiate when you provide a weld pilot input. (The Pilot Assignment display, described in Section 2.1.3, tells the control which sequence to initiate when it receives each pilot input.)

When a Weld Pilot Input (either #1 or #2) becomes active, the weld control will look at the appropriate pilot assignment list and initiates the sequence indicated by an asterisk. When the control completes the selected sequence, it updates the weld status data (on the Normal/Programming display), and the asterisk on the Pilot Assignment Display moves to he next programmed sequence.

The following describes the steps required to set up a weld sequence:

1. Select the sequence you want to edit from the Normal/Programming mode.
2. Press [*] to define the firing heat for the pre-heat, weld, and post-heat cycles (in the Heat Select display)
3. Press [*] to assign the sequence to a weld pilot (and, indirectly, the stepper to control the sequence).
4. Program the linear stepper assigned to the weld sequence. If the stepper is not used, turn the stepper to OFF. (Press MODE until you enter the Stepper Status mode.)
5. Return to the Normal/Programming mode to verify all of the values programmed.
6. If you have finished programming the control settings, go to the Security/Reload display and select the Brief Display option.

   [*] (This will prevent the control from displaying menus and options that are no longer required. It also effectively locks out access to programming displays by unauthorized users.)

When you have performed all of these steps, you are ready to provide a weld initiate.

Note: *At power-up (or when power to the control is cycled), the pilot assignment is always reset to the first sequence in the pilot assignment list.*

Chapter 3:
Function Code Descriptions

When the MedWeld 200 initiates a weld, it executes a series of commands (called functions) in a specific order called a weld schedule.

3.1 Weld Schedule Function List

When the control is shipped from the factory, a default weld schedule is programmed into the control's memory. The following list shows the weld schedule contained in all 50 sequences until and unless you program a new value.

Not all of the functions in the weld schedule are programmable. Those that can be programmed (and are shown in the weld schedule icons) are indicated below. The non-programmable weld functions are shown in the schedule below to help you understand control operation.

—START OF SEQUENCE—
VERIFY VALVE #1 OUT OF RETRACT
TURN ON WELD VALVE FOR PRE-SQUEEZE
INITIAL SQUEEZE 05 CYCLES (programmable)
TURN ON WELD VALVE FOR SQUEEZE
SQUEEZE 20 CYCLES (programmable)
WAIT FOR SECOND STAGE
PRE-HEAT 00 CYCLES 20 %I (programmable)
COOL 0 CYCLES (programmable)
WELD 10 CYCLES 50 %I (programmable)
COOL 0 CYCLES (programmable)
POST-HEAT 00 CYCLES 20 %I (programmable)
CHAIN TO SEQUENCE 00 (programmable)
PROCESS WELD FAULTS
REWELD IF LOW CURRENT LIMIT FAULT
HOLD 05 CYCLES (programmable)
TURN OFF WELD VALVE
OFF 00 CYCLES (programmable)
WAIT UNTIL NO INITIATE
—END OF SEQUENCE —

3.2 Programmable Weld Function Definitions

Each programmable function in the weld schedule is described in the following sections. The functions are separated into groups according to the action they perform.

3.2.1 Delay Functions

INITIAL SQUEEZE nn CYCLES
SQUEEZE nn CYCLES
COOL nn CYCLES
HOLD nn CYCLES

All of the delay functions cause the weld control to wait for a specified number of cycles. During these functions, weld current does not flow and the status of the I/O does not change.

OFF nn CYCLES

This is also a delay function, but it is also used tell the control when to repeat the weld sequence.

- *If the **OFF CYCLES*** function is set to zero, the weld control is NOT in repeat mode (the sequence is completed and the End of Hold output is activated).
- If you program a value other than zero, the control will repeat the weld schedule, starting with the SQUEEZE function, until the initiate is removed (unless the control is in dual mode).

The INDEX PILOT ASSIGN ON REPEAT setup parameter (described in Section 5.1) also uses the OFF TIME function.

- If this parameter is set to YES, the control will check the OFF TIME cycles, and index the pilot assignment if the function is set to a value other than zero. (At the end of one sequence, the control will initiate the next sequence in the pilot assignment list if the OFF TIME cycle is not zero.) This continues until the control executes a sequence where the off time is set to zero.
- If the parameter is set to NO, the control operates in standard repeat mode, where the control repeats the weld schedule until the initiate is removed. (When the initiate is removed, the control will index the pilot assignment to the next sequence in the list, as described in Section 2.1.3.)

3.2.2 Weld Functions

The pre-heat, weld and post-heat functions provide a programmed amount of energy for a programmed amount of time.

The Heat Select Display allows you to tell the control how to compensate for changes in the welding environment (using Automatic Voltage Compensation or Automatic Current Compensation), when to ramp current (using slope), to specify seam welding, or impulse welding. Some of these options also change how these functions are programmed.

☞ *Refer to Section 2.1.2 for more information on the Heat Select Display options.*

3.2.3 Special Functions

CHAIN TO SEQUENCE nn

The sequence number programmed in this function represents the next group of weld and post-weld functions to be executed by the control (without initiating a new sequence). This allows you to perform more complex welding tasks within one sequence.

☞ *Refer to Section 2.2.2 for more information on chaining.*

3.3 Non-Programmable Weld Function Definitions

Each non-programmable function in the weld schedule is described below.

VERIFY VALVE #1 OUT OF RETRACT

When this function is executed the control checks the state of the Retract Output to verify that valve #1 is out of retract (based on the status of the two retract setup parameters).

- If the RETRACT CYLINDER setup parameter is set to AIR NORMAL, the control is out of retract when the retract output is OFF.
- If set to AIR INVERTED, the control is out of retract when the retract output is ON.

TURN ON WELD VALVE FOR PRE-SQUEEZE

The action performed by this function depends on the PRESSURE CYLINDER TYPE set-up parameter:

- If set to SINGLE cylinder, the control activates the Weld Valve output associated with the Pilot Input that initiated the sequence. (Pilot #1 will activate weld valve #1.)
- For DUAL cylinder, the control activates Weld Valve 1. (When the SQUEEZE function is executed, Weld Valve 2 is activated.)

TURN ON WELD VALVE FOR SQUEEZE

The action performed by this function depends on the PRESSURE CYLINDER TYPE setup parameter.

- If set to SINGLE, the control re-asserts the Weld Valve associated with the Pilot Input that initiated the sequence.
- If set to DUAL, the control activates Weld Valve 2. (Weld valve #1 was activated during the pre-squeeze function.)

WAIT FOR SECOND STAGE

This function is only used if the SECOND STAGE INPUT set-up parameter is set to 2-STAGE (rather than PALM SWITCH).

When this function is executed the control pauses in the weld sequence and waits for the Second Stage/Palm Switch Input to become active. If the weld initiate becomes inactive while the control is waiting for this input, the sequence is aborted and the control generates a Second Stag/Palm Switch fault.

PROCESS WELD FAULTS

This function provides a one-cycle delay in the weld sequence to allow the control to process any fault conditions that may have been generated so far in the sequence.

REWELD IF LOW CURRENT LIMIT FAULT

If the REWELD setup parameter is set to ENABLED, this function tells the control to restart the weld sequence if it detects insufficient current was provided to assure a good weld. (The control detected a Low Current Limit fault condition.)

In a chained sequence, the control rewelds by starting over at the *top* of the chain-- at the first sequence in the chain -- rather than just repeating the weld function that generated the Low Current Limit fault.

TURN OFF WELD VALVE

When this function is executed the control de-activates any active weld valve(s).

WAIT UNTIL NO INITIATE

This function causes the control to pause in the weld sequence until the Pilot Input is de-activated. During this pause, the I/O status is not changed.

Chapter 4:
I/O Definitions

This chapter defines the inputs and outputs provided by the MedWeld 200.

4.1 Input Definitions

Pilot 1 Input

This input is assigned to the Weld Valve 1 Output. When this input becomes active, the control initiates the sequence assigned to weld pilot 1.

Pilot 2 Input

This input is assigned to the Weld Valve 2 Output. When this input becomes active, the control initiates the sequence assigned to weld pilot 2.

Note: *An exception to this is when the DUAL cylinder type is selected in the set-up parameters. In this case, both valve outputs are activated by a weld sequence: valve #1 during the turn on valve for pre-squeeze function, and valve #2 during the turn on valve for squeeze function. Refer to the Set-Up parameter descriptions in Chapter 5.*

☞ *The sequence(s) assigned to a weld pilot are determined using the Pilot Assignment Display, described in* ***Section 2.1.3.***

Second Stage/Palm Switch Input

The function of this input is determined by the SECOND STAGE INPUT set-up parameter.

- If set to SECOND STAGE, this input must be active when the weld control executes the Wait For Second Stage Function. (The control will wait for this input to become active, and generates a Second Stage/Palm Switch fault if the initiate is removed while it is waiting.) This allows you to tell the control to wait for a second condition to become true before continuing with a weld sequence.

- If the parameter is set to PALM SWITCH, this input must become active within 3 cycles of the weld pilot input to initiate a sequence. Both the weld pilot and the palm switch must be maintained until the pre-weld, or the sequence will abort and the control will generate a Second Stage/Palm Switch fault.

System Cooling/No Weld

This input indicates when the control is capable of providing weld current. (A weld/no weld hardware switch can be wired in series with the thermostat switch on the SCR contactor, used to indicate that cooling water is being provided to the SCRs.)

If this input is not active when the weld control receives a weld initiate, the control cycles in no weld and generates a System Cooling/No Weld Fault.

Retract Input

This input changes the state of the Retract Output. How the Retract Valve output reacts to this input depends on the RETRACT MODE set-up parameter, as well as the RETRACT CYLINDER set-up parameter.

- When set to UNLATCHED, the Retract Valve output follows the state of the retract input (the valve output is active while the input is active).

- When you set LATCHED retract mode, the retract input changes the state of the retract valve output. (The first pulse from the input activates the valve output, the second pulse from the input de-activates the output.)

- When you select NONE, the control ignores the retract input.

The RETRACT CYLINDER parameter defines the retract cylinder as either AIR-NORMAL or AIR-INVERTED.

- AIR-NORMAL indicates that the retract output is turn **OFF** to close the gun.

- AIR-INVERTED indicates that the retract output is turned **ON** to close the gun.

Important! *For safety reasons the MedWeld 200 ignores any changes made to the retract set-up parameters until you reset the control (by cycling power). The control also displays the currently selected status of the retract set-up parameters on power up.*

4.2 Output Definitions

Weld Valve #1

The Pilot 1 Input is assigned to this output.

Weld Valve #2

The Pilot 2 Input is assigned to this output.

In DUAL mode (the Pressure Cylinder Type set-up parameter has DUAL selected), both valve outputs are activated by the weld sequence. (Valve #1 is activated during the Turn on Weld Valve for Pre-Squeeze function, and valve #2 activated during the Turn on Weld Valve for Squeeze function.) Refer to the description of this set-up parameter in Chapter 5.

End Of Hold

This output turns on after control completes the number of HOLD CYCLES programmed. The output remains active for the number of OFF CYCLES programmed. (For example: if the OFF CYCLES are set to 08 cycles, this output is held active for 8 cycles.)

If the OFF CYCLES are disabled (programmed for 0 cycles), this output remains on for a default value of five cycles before it is turned off.

Fault/Alert Output

This output has two different states (FAULT/ALERT). The fault output is active high when there are no fault conditions detected.

- If the control detects certain error conditions, this output becomes inactive until the fault is reset. (To reset fault or alert conditions, press the [*] key from the Fault Display, as described in Section 2.3.)
- If the control detects a condition defined as an alert, this output will toggle on and off. When the control receives a new weld initiate, it resets this output.

The INITIATION ON FAULT set-up parameter determines whether you can initiate a new weld sequence when a fault condition has been detected (and the fault/alert output is active). Refer to the description of

this set-up parameter is Chapter 5.

Retract Output

This output is activated or de-activated by the control in response to the Retract Input. The action of the output is based on how retract is defined in the RETRACT MODE setup parameter.

- When set to UNLATCHED, the Retract Valve output follows the state of the retract input (the valve output is active while the input is active).
- When you set LATCHED retract mode, the retract input changes the state of the retract valve output. (The first pulse from the input activates the valve output, the second pulse from the input de-activates the output.)
- When you select NONE, the control ignores the retract input.

This output is also controlled by the RETRACT CYLINDER set-up parameter.

- When set to AIR-NORMAL, the retract output is *activated* to indicate that the control is in retract.
- When set to AIR-INVERTED, the retract output becomes *inactive* to indicate that the control is in retract.

Important! *For safety reasons the MedWeld 200 ignores any changes made to the retract set-up parameters until you reset the control (by cycling power). The control also displays the currently selected status of the retract set-up parameters on power up.*

Chapter 5: Definitions

The MedWeld 200 provides a number of programmable settings (called set-up parameters) to customize the control to meet your requirements. These parameters either define the hardware environment (such as the type of retract, pressure cylinder, or transformer used) or tell the control how to react when it detects certain error conditions.

- If you define a condition as a FAULT, the control activates the Fault/Alert output when that condition is detected. (The set-up parameter Initiation On Fault lets you tell the control to either INHIBIT or ALLOW the operator to initiate a new sequence when this output is active.)
- When an error conditions is defined as an ALERT, the control flashes the Fault/Alert output when it detects that condition. Alert conditions do not inhibit initiation.

Other parameters also define the hardware and describe nominal range limits on weld current. As described in Section 2.5, you use the Set-Up Mode to see or change any of the parameters.

5.1 Set-up Parameters

(01) STEPPER APPROACHING MAXIMUM: (FAULT/ALERT)

This defines the severity of the condition when a stepper (#1 or #2) reaches step #5 of the profile. This condition is provided as a warning that electrode maintenance will soon be required.

(02) END OF STEPPER: (FAULT/ALERT)

This condition is generated when the stepper has completed the last weld in step #5. The electrodes must now be dressed or replaced, and the stepper reset to clear this condition.

(03) HIGH CURRENT: (FAULT/ALERT)
(04) LOW CURRENT: (FAULT/ALERT)

These two conditions are generated when the control detects that the current provided to a weld exceeded the range you defined.

The range of acceptable current can be defined in two places by the control. It is defined by the High and Low Current Limit set-up parameters (#33 and #34). The Stepper Profile Display also allows you to define new secondary current limits to override the set-up parameters, to prevent this fault condition from being generated by the action of stepper boost adding current to the weld function.

These conditions indicate that the current provided to the work piece may have been unacceptable.

(05) HALF CYCLE: (FAULT/ALERT)

This condition is generated if the MedWeld 200 detects conduction on one half-cycle, followed by a half-cycle with no conduction, indicating a possible firing fault.

(06) VOLTAGE COMPENSATION: (FAULT/ALERT)

This condition indicates that the control was unable to compensate for a large swing in line voltage. This fault is generated when the weld function uses AVC (Automatic Voltage Compensation) firing mode, as defined in the Heat Select display described in Section 2.1.2.

(07) LINE VOLTAGE: (FAULT/ALERT)

This condition is generated to indicate that the weld control did not provide minimum voltage required to perform a weld. (The minimum voltage is programmed by two set-up parameters: #31 (WAIT FOR LINE VOLTAGE:) and #32 (LINE VOLTAGE WAIT TIME:).

For example, if parameter #31 is set to 480 volts, and parameter #32 is set to 050 cycles, the fault indicates that the control waited for 50 cycles for the line voltage to reach at least 480 volts. When the control did not reach the line voltage programmed, the control completes the weld sequence and generates this condition.

(08) REWELD: (FAULT/ALERT)

The control generates this condition if the control detected a low current limit fault and rewelded, but then detected low current while rewelding. This fault condition is provided to prevent the control from entering an endless loop, continuously rewelding when sufficient secondary current is not available.

(09) CURRENT COMPENSATION: (FAULT/ALERT)

This condition is generated if the control detects that it did not provided the desired amount of secondary current to a weld function. (This fault is comparable to the Voltage Compensation Limit condition, but is generated when the ACC firing mode is selected in the Heat Select display).

(10) NO ZERO CROSSING SYNC: [FAULT]

This condition indicates that the control was unable to synchronize its voltage zero crossing signal with the incoming line voltage. This can also occur if no line voltage is present. The control cannot execute a weld sequence when this condition is present. This parameter is not programmable; it is always considered a fault condition.

(11) LOW BATTERY: (FAULT/ALERT)

If the battery maintaining the integrity of random access (RAM) memory drops below a certain voltage, the control generates this condition.

(12) WELD PILOT: (FAULT/ALERT)

This error condition can be caused by three factors:

- Both Weld Pilot Inputs are active at the same time.
- If you reset the faults while the Weld Pilot input is still active.
- If the initiate is removed while the control is waiting for the 2nd Stage Input to become active.

(13) SYSTEM COOLING/NO WELD: (FAULT/ALERT)

This condition indicates that weld current could not be provided during the weld functions of the previous sequence:

- If the System Cooling/No Weld input is not active when the control attempts to initiate a weld sequence, this condition is generated and the control completes the sequence in No Weld.
- It can be caused by the system cooling thermostat on the control SCRs opening (due to excessive heat). This indicates the cooling water is not present or not sufficient.
- The control also supports an operator hard-wired no weld switch, wired in series with the SCR thermostat. (Opening the no-weld switch can also cause this condition.)
- This fault is also generated if the operator has selected NW (no weld) from the Normal/Programming display.

(14) STAGE 2 /PALM SWITCH: (FAULT/ALERT)

This condition is generated if the control receives only one of two inputs required to initiate a weld (if the SECOND STAGE INPUT set-up parameter is set to PALM SWITCH), or if there was a delay of more than 3 cycles between the two inputs.

(For safety reasons, the control requires that there is no more than a 3-cycle delay between the two initiate inputs (Second Stage/Palm Switch and the weld pilot) becoming active.

Both inputs must be maintained (remain active) until the control has begun executing the preheat function. If the inputs were not activated within 3 cycles of each other, ***or*** either input dropped out before the preheat function is started, the control aborts the weld sequence and generates this fault condition.

(15) CHAINED SEQUENCE: (FAULT/ALERT)

As described in Section 2.2.2, the MedWeld 200 allows you to "chain" weld sequences, to perform multiple weld functions. This fault is generated if the same sequence appears more than once in a chain.

(16) RETRACT PILOT: (FAULT/ALERT)

This fault is generated if a weld initiate input becomes active while the control is in a retracted state (the retract output is active).

The state of the retract output is controlled by the Retract Mode and Retract Cylinder set-up parameters, (#25 and #26), which are displayed at power-up These parameters are described in detail later in this section.

(17) BEAT MODE: (FAULT/ALERT)

If the Initiation set-up parameter selects the BEAT type of initiation, the control expects that the weld pilot input will remain active at least until the pre-heat function is executed.

This fault is generated only if BEAT mode is selected, *and* the weld pilot drops out early (before the Pre-weld Function has been executed). In this case, the control aborts the sequence.

If the NON-BEAT initiation type is selected, the control does not require that the weld pilot input remain active. (This fault cannot be generated if NON-BEAT is selected.)

(18) HEAT CYCLE LIMIT: [FAULT]

This fault is generated when the control detects that the number of consecutive weld cycles where conduction occurred exceeded the limit programmed in the Heat Cycle Limit set-up parameter. When this condition is detected, the control also times out the weld sequence in No Weld.

Seam welding frequently requires long periods of conduction. For seam welding, this parameter can be set to zero to disable the cycle limit.

(19) INITIATION ON FAULT: (INHIBIT/ALLOW)

This parameter tells the control how to react if there are any active fault conditions when a weld initiate is received:

- INHIBIT tells the control to ignore the initiate until the faults have been reset.
- ALLOW tells the control to reset any active fault conditions when an initiated is received, and to initiate the sequence.

(20) INITIATION TYPE: (BEAT/NON BEAT)

This parameter lets you tell the control how to react if the weld initiate drops out during the weld sequence.

- When BEAT is selected, the weld pilot input must be held active until the the control has executed the Pre-heat function. (If the input is de-activated before the Pre-heat Function is executed, the control generates a Beat Mode Fault and aborts the sequence.)
- When NON BEAT is selected, the control does not require that the initiate input remain active.

(21) INDEX PILOT ASSIGN ON REPEAT: (YES/NO)

This parameter tells the control how to react when it is in repeat mode: to repeat on the current weld sequence or index to the next sequence in the pilot assignment list.

- When set to NO, the control is in standard repeat mode. If the OFF TIME function in the weld sequence is set to a value other than zero, the control repeats the sequence until the pilot is removed. (When the pilot next becomes active, the control initiates the next sequence in the assignment list.)
- If set to YES, the control uses the pilot assignment list with repeat mode. If the OFF TIME in the sequence initiated is set to a value other than zero, the control will execute the *next* sequence in the assignment list. It continues down the assignment list until it encounters a sequence with the OFF TIME function set to zero ***or*** until the pilot is removed or until it reaches the end of the pilot assignment list. At that point, the pilot input must be removed and re-activated to continue welding.

Note: *The pilot assignment is reset whenever power to the control is removed. (The pilot assignment is reset to the first sequence in the assignment list.)*

(22) SECOND STAGE INPUT: (STAGE 2/PALM-SWITCH)

This set-up parameter defines the action of the Stage 2/Palm-Switch Input:

- When this parameter is set to PALM-SWITCH, the control expects that both the pilot and the second stage input will become active at approximately the same time. If the weld pilot does not become active within 3 cycles of the palm-switch input, the sequence is aborted. Both inputs must be held active until the control executes the pre-heat function. If either condition is not met, the control aborts the sequence and generates a fault condition (#14).
- When set to SECOND STAGE, the control expects the Stage 2 input to become active during the weld sequence, and will wait for this input (during the Wait For Second Stage function). If the weld pilot input become inactive while the control is waiting for this input, the control generates a Second Stage/Palm Switch fault (#12).

(23) PRESSURE CYLINDER TYPE: (SINGLE/DUAL)

This set-up parameter defines the type pressure cylinder:

- If a SINGLE cylinder is being used, the control activates the weld valve twice in the weld sequence: during the function Turn On Weld Valve For Pre-squeeze, and the output is re-asserted by the second function controlling the output: Turn On Weld Valve For Squeeze. The control activates the weld valve output associated with the active pilot input. (Valve #1 for weld pilot #1, valve #2 for weld pilot #2.)
- If a DUAL cylinder is being used, the control activates weld valve #1 during the function Turn On Weld Valve for Pre-squeeze. When the control executes the function Turn On Weld Valve For Squeeze, valve #2 is activated (for Intensification).

(24) TRANSFORMER: (AC WOUND/AC STACKED CORE/DC WOUND/DC STACKED CORE)

This parameter has tells the control the type of transformer:

- If you select AC STACKED or DC STACKED, the first half-cycle of each pulse is fired completely as required by the weld schedule. When you select AC WOUND or DC WOUND, the control uses delayed firing to prevent damage to wound core transformers.

- The selection between AC and DC also impacts how the control performs voltage or current compensation. AC calculations are based on the actual current read. For DC transformers, the control uses a special algorithm to approximate the current.

Caution!

These options are provided for maximum flexibility between applications. Make sure you check the set-up parameter settings to assure the transformer type matches your configuration before attempting to initiate a weld sequence, to prevent possible damage to equipment.

(25) CURRENT LIMIT MODE: (PEAK/AVERAGE)

This parameter tells the control the method to use during current limit processing.

- If this parameter is set to PEAK, this fault is generated if the High or Low Current Limit (programmed in the set-up parameters or Stepper Display) is exceeded during any *one* cycle of a weld sequence.
- If set to AVERAGE, the control adds the current read during each cycle and divides by the total number of cycles to determine average current.

If the average current falls outside of the range defined by the High and Low Current Limit set-up parameters (or the stepper profile current limits), the control generates a High or Low Current Limit fault.

(26) RETRACT MODE: (LATCHED/UNLATCHED/NONE)

This parameter tells the control how to react when it receives the Retract input:

- UNLATCHED tells the control to let the Retract Output follow the state of the Retract Input.
- LATCHED tells the control to change the state of the Retract Output whenever it receives a brief pulse from the Retract input.
- If this set-up parameter is set to NONE, retract is disabled.

Caution!

For safety reasons, the MedWeld 200 ignores any changes made to this parameter until you reset the control by cycling power. To assure operator safety, the control always displays the currently selected status of this set-up parameter at power-up.

Also, if the Retract Mode set-up parameter is changed to either Latched or Unlatched, it is necessary to toggle the state of the Retract Pilot input (to activate the retract valve output) before initiating the next weld sequence.

(27) RETRACT CYLINDER: (AIR-NORMAL/AIR-INVERTED)

This set-up parameter defines the gun cylinder. This parameter, along with the Retract Mode parameter (#25, above) define operation of the weld guns.

- AIR NORMAL should be selected when you are using an air only cylinder ***and*** when the Retract Output is turned **off** to close the gun. (OFF=out of retract)
- AIR INVERTED should be selected when you are using an air only cylinder ***and*** when the Retract Output is turned on to close the gun. (ON=out of retract)

Caution!

For safety reasons, the MedWeld 200 ignores any changes made to this parameter until you reset the control by cycling power.

To assure operator safety, the control always displays the currently selected status of this set-up parameter at power-up.

(28) REWELD: (ALLOW/INHIBIT)

This set-up parameter tells the control how to react when the control detects that there was insufficient secondary current provided to the previous weld.

- ALLOW tells the control to allow automatic rewelding.
- INHIBIT prevents the control from rewelding, despite insufficient current. The control merely indicates the low current fault condition.

(29) HEAT CYCLE LIMIT (0=SEAM):

This set-up parameter defines the maximum number of consecutive cycles of heat conduction. (This counter is reset after nine consecutive cycles without conduction.)

Seam welding applications frequently require more than 99 cycles of conduction. For seam welding applications, this parameter can be disabled by setting the value to zero.

(30) TRANSFORMER TURNS RATIO: 1: (000.1-999.9)

This parameter tells the control the turns ratio of the welding transformer used, to allow the control to determine secondary current during a weld. (The primary current is multiplied by the turns ratio to determine secondary current.)

(31) NOMINAL LINE VOLTAGE: (000-650)

This parameter determines the nominal line voltage required for AVC weld heat control. (See Chapter 2 for an explanation of AVC.) You can either enter a nominal line voltage directly or use the nominal line voltage that the control calculates automatically every time you power-up.

If you want to enter a nominal line voltage directly, simply enter a value in the range of 001 to 650 (i.e., 1 to 650 VAC) for NOMINAL LINE VOLTAGE. This value becomes the nominal line voltage. It only changes if you change it explicitly or reload defaults.

If you want to use the nominal line voltage that was automatically calculated by the control at power-up, enter 000 for the NOMINAL LINE VOLTAGE. (Note that "000" does not mean 0 volts...) When this parameter is set to 000, the control recalculates the nominal voltage every time you power-up. It does so as follows:

At power-up, the bus voltage is averaged over 15 cycles. The nominal voltage is set to one of the five values in the right column of the table below. The setting depends on the range (left column) the average voltage falls within.

Range	Automatic Nominal Line Voltage Setting (VAC)
000–140	117 (120V bus)
141–264	215 (220V bus)
265–420	371 (380V bus)
421–520	468 (480V bus)
521–999	575 (600V bus)

If you want to check the calculated nominal line voltage setting, cycle power and watch the display as the control powers up. If NOMINAL LINE VOLTAGE is set to 000, then the third of three initial displays shows the average voltage and the calculated nominal line voltage.

The example display below shows a calculated average line voltage of 455V and nominal line voltage of 468V.

V(average) = 452	V(nominal) = 468V

This display only appears on power-up if NOMINAL LINE VOLTAGE is set to 000.

(32) WAIT FOR LINE VOLTAGE: (000-650)

This set-up parameter sets the minimum line voltage value that the control must obtain before being allowed to continue with the weld sequence.

This set-up parameter works with set-up parameter #33.

(33) LINE VOLTAGE WAIT TIME (CYC): (000-999)

This set-up parameter sets the maximum number of cycles that the control can delay the weld sequence to allow the voltage to rise above the programmed minimum value. (This set-up parameter works with set-up parameter #32.)

After the number of cycles programmed, the control generates a line voltage limit fault and continues with the weld sequence.

(34) HIGH CURRENT LIMIT (AMPS): (00001-99999)
(35) LOW CURRENT LIMIT (AMPS): (00001-99999)

These two set-up parameters tell the control the range of acceptable secondary current. If the secondary current exceeds the High Current Limit set-up parameter or falls below the Low Current Limit set-up parameter the appropriate current limit fault will be generated.

5.2 Internal Faults

There are three internal fault conditions which can be displayed:

(01) SHORTED CONTACTOR

The control detected that the contactor was on (closed) when it should not be closed, supplying high voltage to the control. The control also activates the Fault/Alert Output.

(02) EPROM ERROR

The control processor detected a failure in the EPROMs which contain the control's operating program. In this event, contact Medar for service assistance. (The processor board must be replaced.)

(03) RAM DATA ERROR

The processor detected an error in the contents of RAM memory (used to store the programmable settings). When this condition is generated, you must reload the default settings (stored in the EPROMs). To reload the default settings, press the MODE key until you see the Set-Up Mode display, then press [*] to see the Security/Reload display. Follow the procedures described in Section 2.6.1 to reload the default settings.

If you have made any changes to the default settings, remember that the control will return to the settings contained when shipped from the factory. ***Make certain that you check the appropriate set-up parameters and other programmable settings after reloading the defaults.***

Appendix: System Defaults

This appendix lists the set-up parameter defaults, the manual stepper defaults, and the current limit stepper defaults, the default weld schedule and a fault code listing.

Set-up Parameter Defaults

Parameter	Options	Default
01 STEPPER APPROACHING MAX:	FAULT/ALERT	**ALERT**
02 END OF STEPPER:	FAULT/ALERT	**ALERT**
03 HIGH CURRENT:	FAULT/ALERT	**FAULT**
04 LOW CURRENT:	FAULT/ALERT	**FAULT**
05 HALF CYCLE:	FAULT/ALERT	**FAULT**
06 VOLTAGE COMPENSATION :	FAULT/ALERT	**ALERT**
07 LINE VOLTAGE:	FAULT/ALERT	**ALERT**
08 REWELD:	FAULT/ALERT	**FAULT**
09 CURRENT COMPENSATION:	FAULT/ALERT	**ALERT**
10 NO ZERO CROSSING SYNC:	FAULT	**FAULT***
11 LOW BATTERY:	FAULT/ALERT	**ALERT**
12 WELD PILOT:	FAULT/ALERT	**ALERT**
13 SYSTEM COOLING/NO WELD:	FAULT/ALERT	**FAULT**
14 STAGE 2/PALM SWITCH:	FAULT/ALERT	**ALERT**
15 CHAINED SEQUENCE:	FAULT/ALERT	**FAULT**
16 RETRACT PILOT:	FAULT/ALERT	**FAULT**
17 BEAT MODE:	FAULT/ALERT	**FAULT**
18 HEAT CYCLE LIMIT:	FAULT	**FAULT***
19 INITIATION ON FAULT:	ALLOW/INHIBIT	**INHIBIT**
20 INITIATION TYPE:	BEAT/NON BEAT	**NON BEAT**
21 INDEX PILOT ASSIGN ON REPEAT:	YES/NO	**NO**
22 SECOND STAGE INPUT:	2 STAGE/PALM SWITCH	**2 STAGE**
23 PRESSURE CYLINDER TYPE:	SINGLE/DUAL	**SINGLE**
24 TRANSFORMER TYPE:	AC WOUND/AC STACKED CORE DC WOUND/DC STACKED CORE	**AC WOUND**
25 CURRENT LIMIT MODE:	PEAK/AVERAGE	**AVERAGE**

26 RETRACT MODE:	LATCHED/UNLATCHED/NONE	NONE
27 RETRACT CYLINDER:	AIR-NORMAL/AIR-INVERTED	AIR-NORMAL
28 REWELD:	ENABLED/DISABLED	DISABLED
29 HEAT CYCLE LIMIT (0=SEAM)	00-99	0
30 TRANSFORMER TURNS RATIO 10:	0000.1-999.9	001.0
31 NOMINAL LINE VOLTAGE:	100-650	000 †
32 WAIT FOR LINE VOLTAGE:	000-650	000 ‡
33 LINE VOLTAGE WAIT TIME (CYC):	000-0999	000 ‡
34 HIGH CURRENT LIMIT (AMPS):	00001-99999	10000 AMPS
35 LOW CURRENT LIMIT (AMPS):	00001-99999	01000 AMPS

* These parameters are set as FAULTS and cannot be changed.

† When set to 000, the control automatically calculates the nominal line voltage at power-up.

‡ These two set-up parameters work together: parameter #32 indicates the *amount* of voltage to wait for and #33 indicates *how long* to wait for line voltage.

Default Weld Schedule

—START OF SEQUENCE—
VERIFY VALVE #1 OUT OF RETRACT
TURN ON WELD VALVE FOR PRE-SQUEEZE
INITIAL SQUEEZE 05 CYCLES (programmable)
TURN ON WELD VALVE FOR SQUEEZE
SQUEEZE 20 CYCLES (programmable)
WAIT FOR SECOND STAGE
PREHEAT 00 CYCLES 20 %I (programmable)
COOL 0 CYCLES (programmable)
WELD 10 CYCLES 50 %I (programmable)
COOL 0 CYCLES (programmable)
POSTHEAT 00 CYCLES 20 %I (programmable)
CHAIN TO SEQUENCE 00 (programmable)
PROCESS WELD FAULTS
REWELD IF LOW CURRENT LIMIT FAULT
HOLD 05 CYCLES (programmable)
TURN OFF WELD VALVE
OFF 00 CYCLES (programmable)
WAIT UNTIL NO INITIATE
—END OF SEQUENCE —

Stepper Defaults (Linear)

Step 1: 3% heat or 0100 amps in 0060 welds
Step 2: 3% heat or 0100 amps in 0180 welds
Step 3: 3% heat or 0100 amps in 0300 welds
Step 4: 3% heat or 0100 amps in 0600 welds
Step 5: 3% heat or 0100 amps in 0800 welds

Stepper Current Limits Defaults

Step	Current	Limit
1	Low Current Limit	200 amps
	High Current Limit	10000 amps
2	Low Current Limit	200 amps
	High Current Limit	10000 amps
3	Low Current Limit	200 amps
	High Current Limit	10000 amps
4	Low Current Limit	200 amps
	High Current Limit	10000 amps
5	Low Current Limit	200 amps
	High Current Limit	10000 amps

Fault Code Listing

The codes below are the codes the control displays in the lower right corner of the Normal Display screen when a fault occurs.

Fault Code	Definition
01	STEPPER APPROACHING MAX:
02	END OF STEPPER:
03	HIGH CURRENT LIMIT:
04	LOW CURRENT LIMIT:
05	HALF CYCLE:
06	VOLTAGE COMPENSATION LIMIT:
07	INSUFFICIENT LINE VOLTAGE:
08	REWELDED
09	CURRENT COMPENSATION LIMIT:
10	NO ZERO CROSSING SYNC:
11	LOW BATTERY:
12	WELD PILOT
13	SYSTEM COOLING/NO WELD:
14	STAGE 2/PALM SWITCH:
15	CHAINED SEQUENCE ERROR:
16	RETRACT PILOT
17	BEAT MODE
18	HEAT CYCLE LIMIT
INTERNAL FAULT CONDITIONS	
I01	SHORTED SCR
I02	EPROM ERROR
I03	RAM ERROR

Security Access Code

As described in Section 1.3.3, the MedWeld 200 is unlocked when shipped from the factory, but can be locked to prevent unauthorized programming changes.

To lock (or unlock) the control, use the Reload/Security display options. (To reach this display, press MODE until you see the Set-up display, then press the [*] key to select the Security/Reload display.)

From this display, use the [→] or [←] key to move the cursor to the Security option, then press [↑] or [↓] to select Security.

The control now prompts you to enter the 6-key access code. Your access code is shown below:

[*] [MODE] [←][→][↑][↓]

When the press this sequence of keys, the control is immediately locked (if it was previously unlocked) or unlocked (if it was locked when you entered the access code).

NOTE!

For security purposes, this page should be removed from the manual and stored in a secure place. If you wish to change your access code, contact your Medar Sales or Service representative for assistance.