



Introduction to MICROSTAR 700

Control and monitor for 50/60Hz
resistance spot welding.



For s/w version 1.00

Document revision 0



Manufacturers of advanced welding controls

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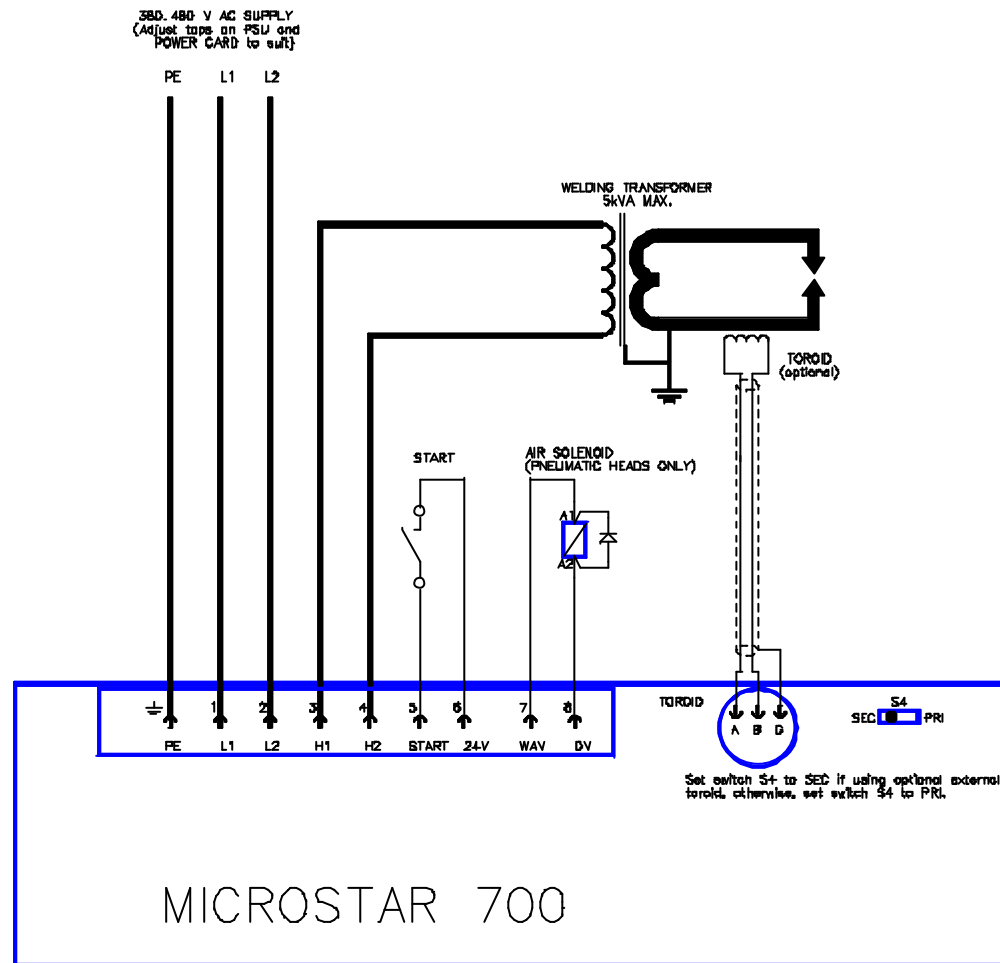
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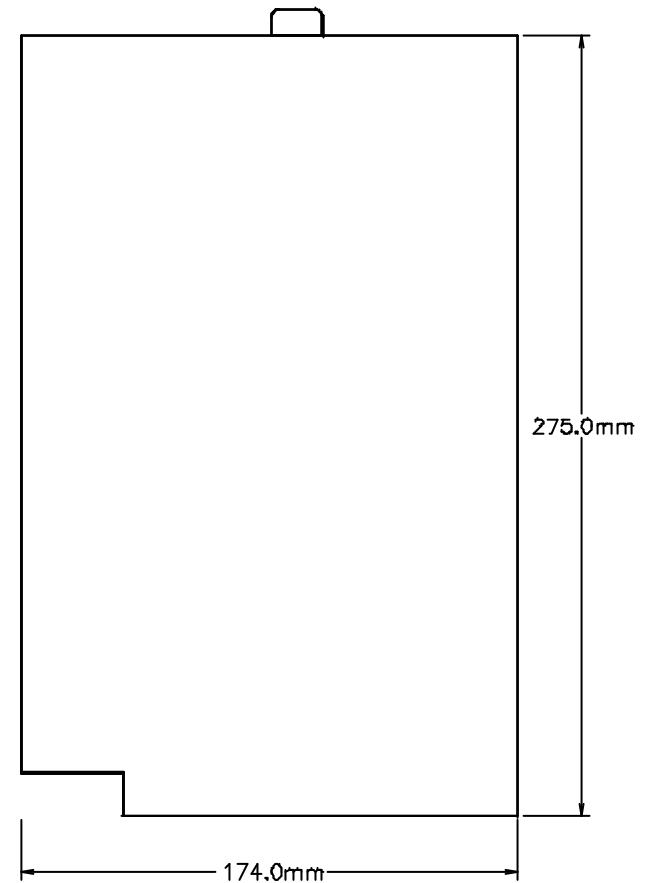
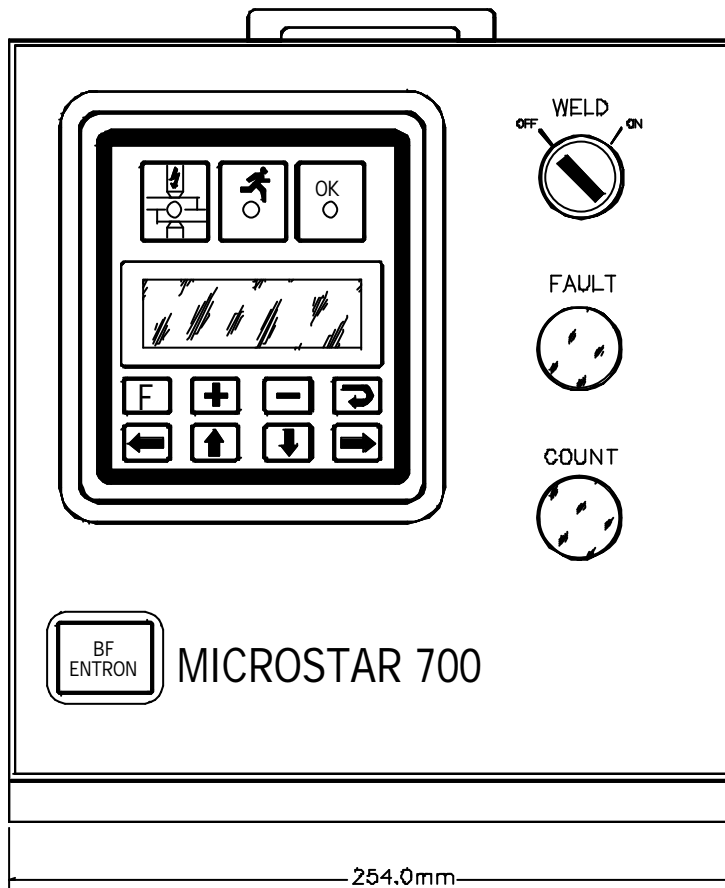
MICROSTAR 700 Functions

- For use with welding transformers up to 5kVA.
- Works with spring or pneumatic head.
- Spot welding control.
- Half-cycle mode.
- Dual weld intervals plus pulsation
- Upslope and downslope.
- Constant current regulation.
- 16 programmes.
- Current monitoring (high/low/pre limits), programmable blocking.
- Weld time monitoring.
- Weld counter (programmable blocking).
- Built-in primary feedback. Optional secondary feedback via toroid.
- Toroid and CT calibration functions.
- Toroid test function.
- Large bright 4x20 display.

Users connections



Dimensions



Program parameters (x16)

Weld program

- Squeeze (0..99 cycles)
- Weld1 (0..99 cycles)
- Cool1(0..99 cycles)
- Weld2(0..99 cycles)
- Cool2(0..99 cycles)
- Pulses(0..9)
- Heat 1(0..99.9%)
- Heat 2(0..99.9%)
- Current 1 (0..60kA)
- Current 2 (0..60kA)
- Upslope (0..99 cycles)
- Downslope (0..99 cycles)
- Hold (0..99 cycles)

Monitor limits

- Monitor On/Off
- Current low limit,weld1 (0..99%)
- Current high limit,weld1 (0..99%)
- Current pre-limit,weld1 (0..99%)
- Current low limit,weld2 (0..99%)
- Current high limit,weld2 (0..99%)
- Current pre-limit,weld2 (0..99%)
- Pre-limit count (0..99)

Global parameters

Configuration

- Sequence (Spot / ½-cycle(alt/+/-))
- Frequency (50/60Hz)
- Blanking (On/Off)
- Toroid test (On/Off)
- Sensor (Toroid/CT)
- Heat range(High/Low)
- Stop/Continue on fault
- Interlock (On/Off)

Calibration

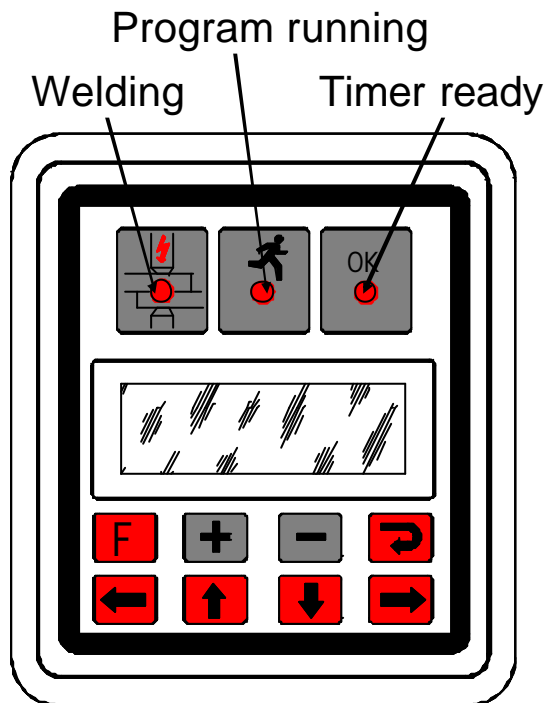
- Toroid sensitivity(100..2000 mV/kA)
- CT S/P ratio (1:1..199:1)
- CT S/P offset (-1kA..+1kA)

Counter

- Actual count (0..9999).
- Terminal count(0..9999).
- Stop at end/continue at end.

Keypad and indicators

LED Indicators

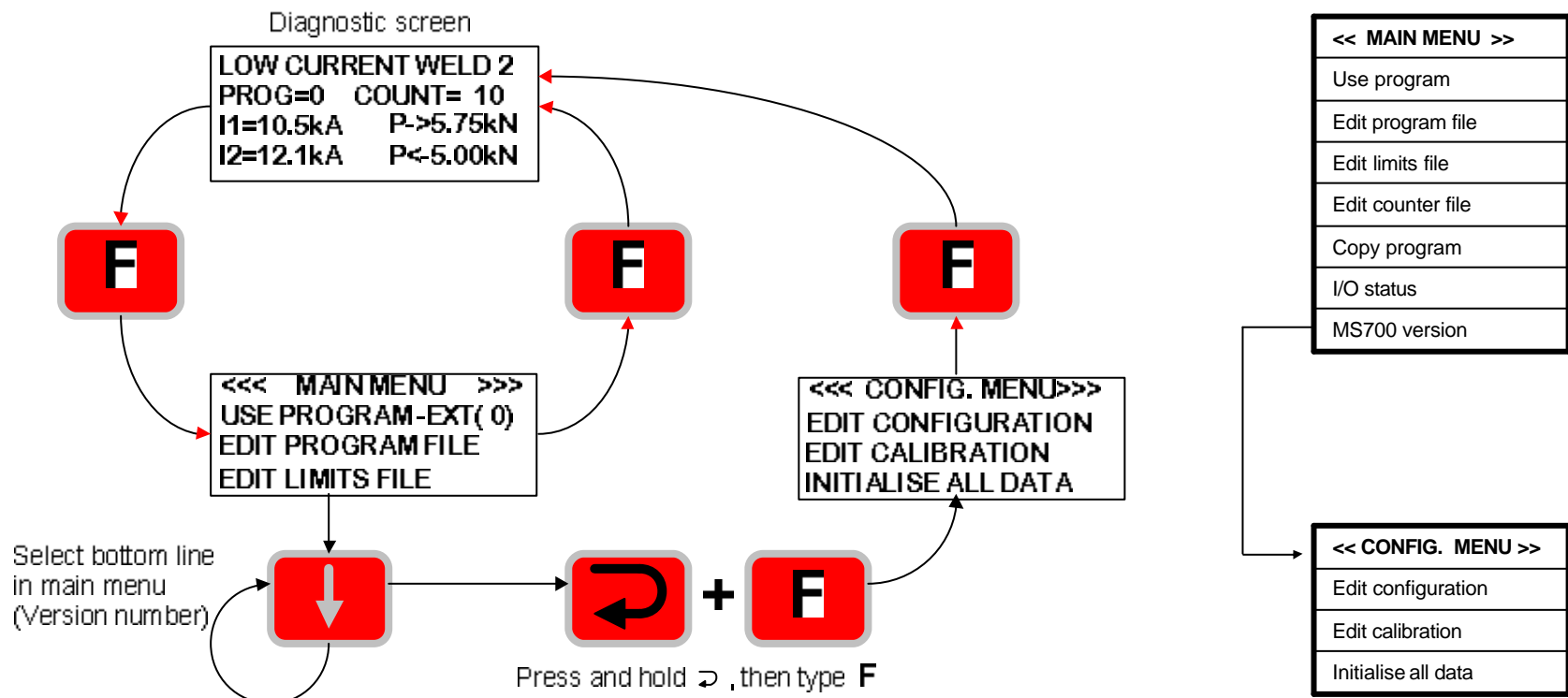


Using the keypad

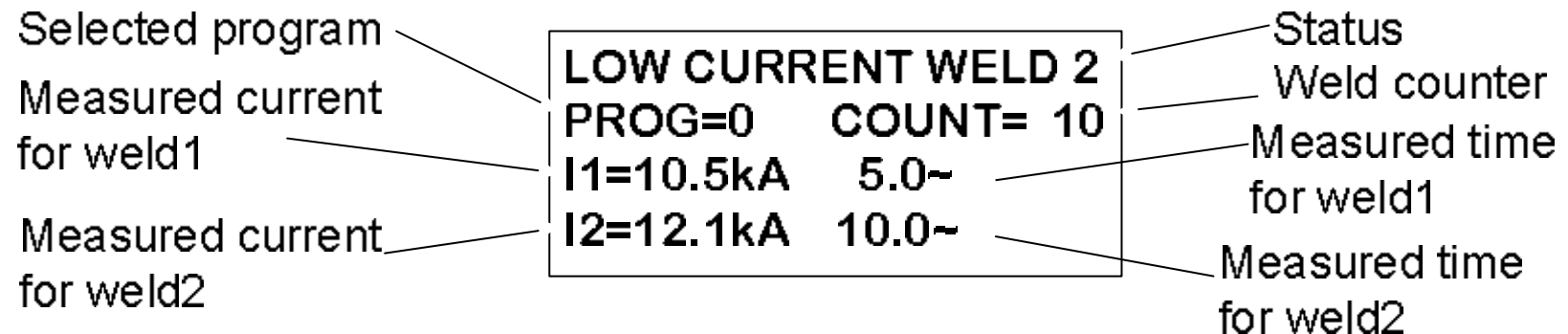
- Press the **F** (function) key to return to the previous screen, or to move between menu screens (see menus).
- The selected function or parameter will flash.
- Use the **← ↑ ↓ →** keys to select a different function or parameter. The visible window will scroll when required.
- Press the **→** key to access the selected function.
- Press the **+** or **-** keys to alter the selected parameter. Press **+** and **-** together to set a parameter to 0 or its minimum value.
- On some screens, certain keys can have a special function. These are noted on the page describing that screen.

Menus

The various functions of the timer are arranged into a set of menus and screens. The diagrams below shows how these are organized and accessed:



Diagnostic display




Note that some elements may not be visible, if that feature is not being used.

Status: diagnostic error messages. If more than one exists, these are flashed sequentially.

Selected program: this is the program no. that is presently selected.

Measured current: the RMS current measured during the last weld.

Weld counter: the present value in the counter (updates after each weld)

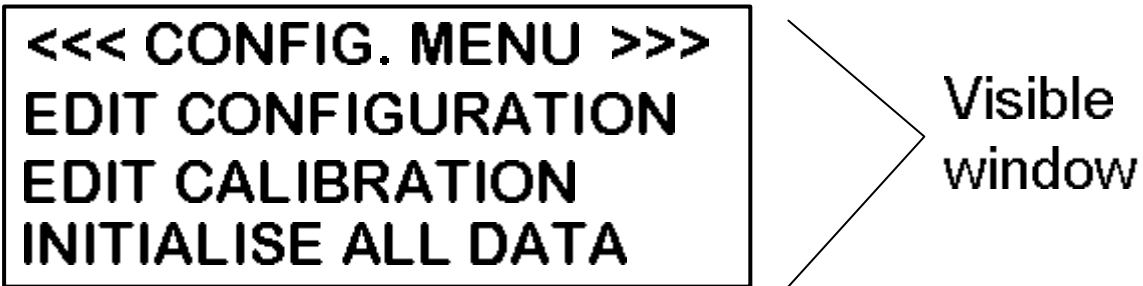
- Press the **F** key to move to the Main menu screen.
- Press  to reset faults (same action as external input).

Status messages

The description (abbreviated) appears on the top line of the diagnostic screen.

Description	Advice
No errors	
Configuration error	Edit the configuration file
No synchronising signal	Check 27V AC sync. signal source / Check frequency in configuration file
Counter end	Reset counter
Data error	Edit program
Weld off	Close Weld-on switch
No current (weld 1)	Check secondary circuit / check toroid connection
No current (weld 2)	Check secondary circuit / check toroid connection
Low current (weld 1)	Check secondary circuit or adjust parameters
Low current (weld 2)	Check secondary circuit or adjust parameters
Pre-alarm (weld 1)	Check secondary circuit or adjust parameters
Pre-alarm (weld 2)	Check secondary circuit or adjust parameters
High current (weld 1)	Check secondary circuit or adjust parameters
High current (weld 2)	Check secondary circuit or adjust parameters
Low time (weld 1)	Check secondary circuit, parts fit, start signal
Low time (weld 2)	Check secondary circuit, parts fit, start signal
Toroid overrange	Reduce current, or use an external signal attenuator
Toroid short circuit	Inspect toroid connection
Toroid open circuit	Inspect toroid connection

Configuration menu



- Press the **F** key to return to the diagnostic screen.

Note: To access the Configuration menu, select the 'version' line on the main menu (last line), hold down the  key, then press the **F** key.

Edit configuration

<<<CONFIGURATION>>>
TYPE: SPOT
FREQUENCY 50Hz
BLANKING Off

Visible
window

TOROID TEST On
SENSOR TOROID
HEAT RANGE HIGH
STOP ON FAULT
INTERLOCK On

- Type: **Spot / ½-cycle alternating / ½-cycle positive/ ½-cycle negative.**
- Frequency:**50 Hz / 60Hz** : Set to the frequency of your mains supply.
- Blanking (**On/Off**): When set to **On**, the first 2 cycles of weld current will be excluded from the measurement and limit testing process.
- Toroid test (**On/Off**): When set to **On**, the resistance of the optional external toroid is tested while the timer is idle. The resistance must lie between 10 and 100 Ohms. Values outside this range will prevent the timer from starting.

..edit configuration

- **Sensor: Toroid / CT** : Select the type of feedback sensor which you are using. An external toroid may be used for sensing on the secondary, or the built-in CT is used for sensing on the primary. Be sure to set switch S4 (on the back panel) appropriately.
- **Heat range (High/Low)**: High corresponds to a control range of 30-130'. Low corresponds to a control range of 50-150'. Select the LOW range for machines with a poor power factor, or when exceptionally low currents are required.
- **Stop on fault (Stop/Continue)** : If **Stop** is selected, then when a weld fault is detected, no further welds are permitted until a fault reset is given. If **Continue** is selected, then further welds will be permitted, regardless of the status of the previous weld.
- **Interlock (On/Off)**: If Interlock is **ON**, when a weld sequence has progressed beyond the Squeeze time, the sequence continues to completion, regardless of the state of the Start signal. If Interlock is **OFF**, the weld sequence is terminated if the Start signal is removed before the sequence has completed.

Edit calibration

```
<<< CALIBRATION >>>  
TOROID: 150 mV/kA  
S/P RATIO 50:1  
S/P OFFSET 0 A
```



Visible
window

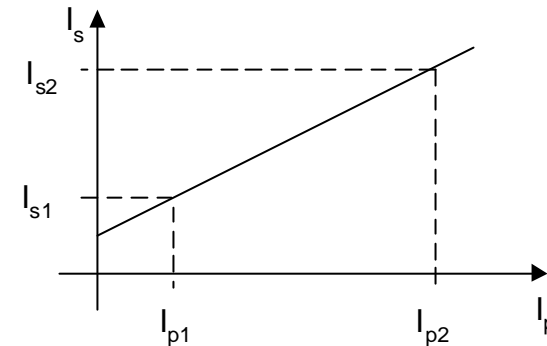
- **Toroid**: sensitivity of the measuring coil (toroid), expressed in mV/kA.
- **S/P ratio & Offset**: See next page for details.

...calibration

•If the sensor (CT) is measuring the primary current, the timer can display secondary values. It does this by calculation based on the **Secondary to Primary ratio (S/P ratio)** and offset (**S/P offset**) parameters.

•To determine the correct values, do the following:

- Set the S/P ratio to 1:1 in the calibration.
- Set the S/P offset to 0 in the calibration.
- Do a short circuit weld at a low heat in PHA mode, and measure the secondary current (I_{s1}) with a meter. Note the corresponding value (I_{p1}) on the timer status screen.
- Do a short circuit weld at a high heat in PHA mode, and measure the secondary current (I_{s2}) with a meter. Note the corresponding value (I_{p2}) on the timer status screen.
- Calculate and enter S/P ratio = $(I_{s2} - I_{s1}) / (I_{p2} - I_{p1})$
- Calculate and enter S/P offset = $I_{s2} - (I_{p2} \times \text{S/P ratio})$



.....calibration

- If you do not have a suitable meter, or you do not wish to do the calculations, you can still use primary feedback by doing the following:
 1. Set the S/P ratio = **transformer turns ratio** in the calibration.
 2. Set the S/P offset to 0 in the calibration.
- If you do not know the **transformer turns ratio**, then use a value of 50:1 as many welding transformers will be approximately this figure.
- The current readings on the timer will be shown in kA, and the timer will regulate (in CCR mode) to these figures, but they will not tie-up with a meter (i.e. the numbers are not absolute, but in 'scaled' Amps).



If you require precise and absolute settings then you must either:

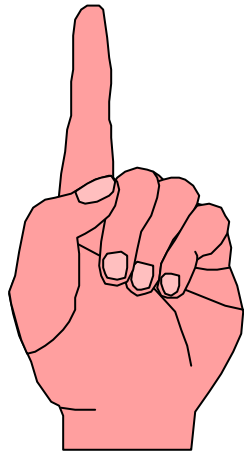
- Do the procedure and calculations (see previous page)

OR

- Use secondary feedback from a toroid, and set the sensitivity correctly.

Initialise all data

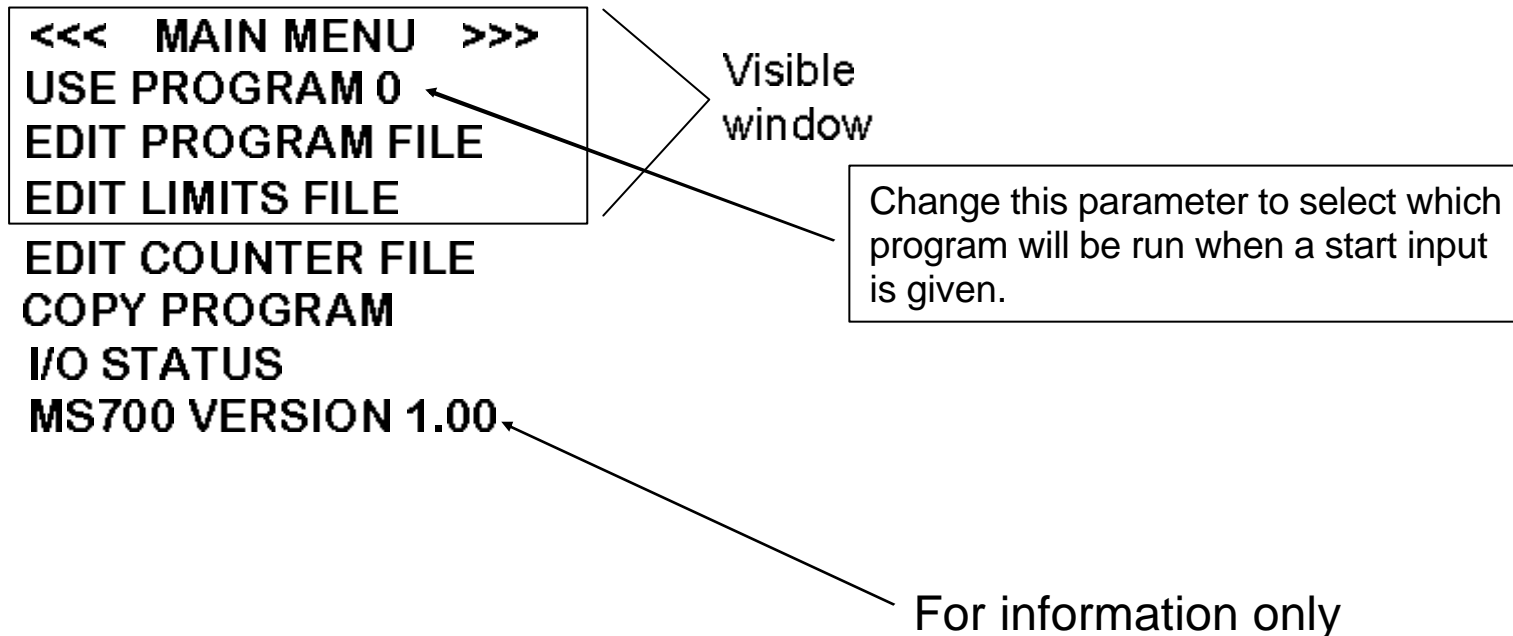
The **Initialise** function provides a convenient means of setting all of the data in the timer to a known initial state. This can be useful when first setting up a system.




Caution: When you use the **Initialise** function, you will lose all previously stored data in the timer.

After an **initialise** operation, you should edit the configuration and calibration files to suit your installation. You will then need to set-up any welding programmes etc. which you wish to use.

Main menu



- Press the **F** key to return to the diagnostic screen.

Note: To access the **Configuration menu**, select the 'version' line on the main menu (last line), hold down the  key, then press the **F** key.

Edit program

```
<<< PROGRAM 0 >>>  
I1=7.50kA 25.0% PHA  
I2=10.0kA 50.0% CCR  
SQZ= 10
```

```
W1 = 0   C1 = 0  
W2 = 10  C2 = 0  
Pulses(W2-C2) = 1  
UPSLOPE = 0  
DOWNSLOPE = 0  
HOLD = 10
```

Visible
window

PHA=Phase angle mode. The current and heat parameters are independently adjustable. No current regulation takes place.

CCR=Constant current regulation mode. The current parameter is adjustable, but the heat is automatically determined by the timer, as it regulates the current to the set level.

...edit program($\frac{1}{2}$ -cycle)

```
<<< PROGRAM 0 >>>  
I2=10.0kA  50.0%  
SQZ= 10    W2 =  $\frac{1}{2}$   
HLD= 10
```

$\frac{1}{2}$ -cycle welding: Only the Weld2 interval is used. Weld time may be set to 0 or to one $\frac{1}{2}$ -cycle only. Constant current regulation (CCR) is not available. Adjust the %heat parameter to change the current, and adjust I2 to set the monitoring level, if required.

If the timer is configured for $\frac{1}{2}$ -cycle welding, then the program screen changes as shown above, in order to present only the relevant parameters.

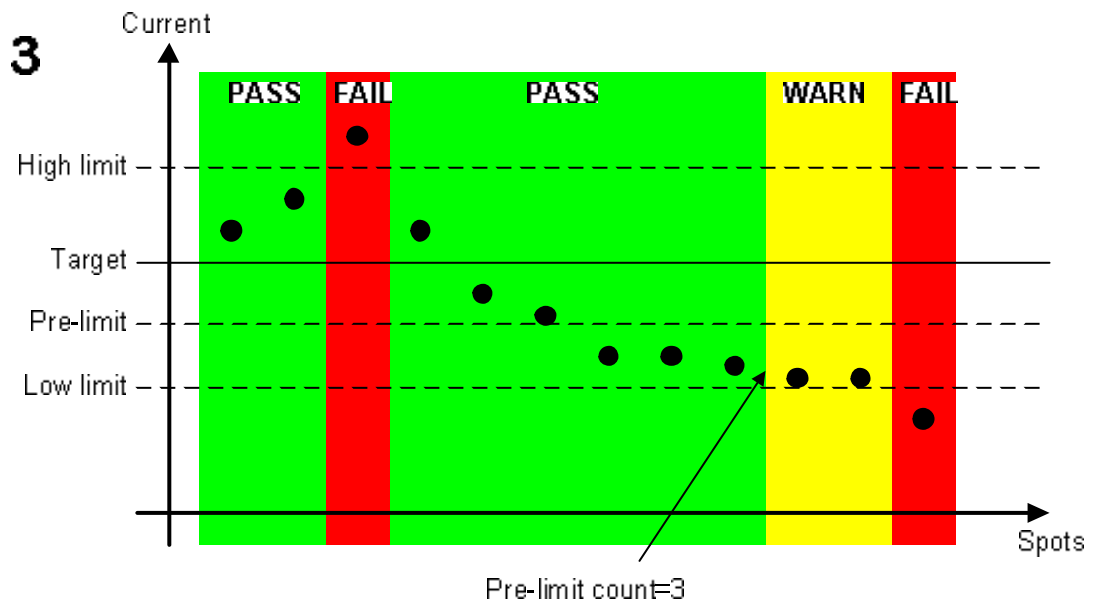
Edit limits

```
<<< LIMITS PROG 0 >>>  
MONITOR On  
LOW1=15% HIGH1=10%  
PRE-LIMIT1= 5%  
LOW2=10% HIGH2= 8%  
PRE-LIMIT2= 5%  
PRE-LIMIT COUNT = 3
```

Visible window

When **MONITOR** is On, both current and weld time will be monitored.

The **PRE-LIMIT COUNT** is the number of successive welds which must fail the pre-limit level, before a warning message is produced.



Edit counter

```
<<<  COUNTER  >>>  
COUNT NOW = 431  
COUNT UP TO  500  
STOP AT END
```

Count now is incremented after every weld. When **count up to** is reached, the counter output is activated.

Set **count up to** = 0 to disable the counter.

If **stop at end** is selected, then no further welding may take place until a counter reset is given.


If **continue at end** is selected, then further welding can take place as normal, but the counter output will remain on.

Count now is reset to zero by activating the counter reset input.

Copy program

```
<<< COPY PROGRAM >>>  
FROM: 0  
TO: 1  
GO
```

Copy a program (and associated limit and event files) to any other program, or to all other programmes.

- The **TO** parameter can be set to **ALL** if required (i.e. copy 1 program to all others).
- Select the last line (**GO**), then press the  key to execute the copy function. This line will briefly show **COPY DONE**, when the function is complete.

I/O Status

```
<<< I/O STATUS >>>
I01:START      Off
I02:WELD ON    On
I03:RES.FAULT  Off
I04:RES.COUNT  Off
```

....

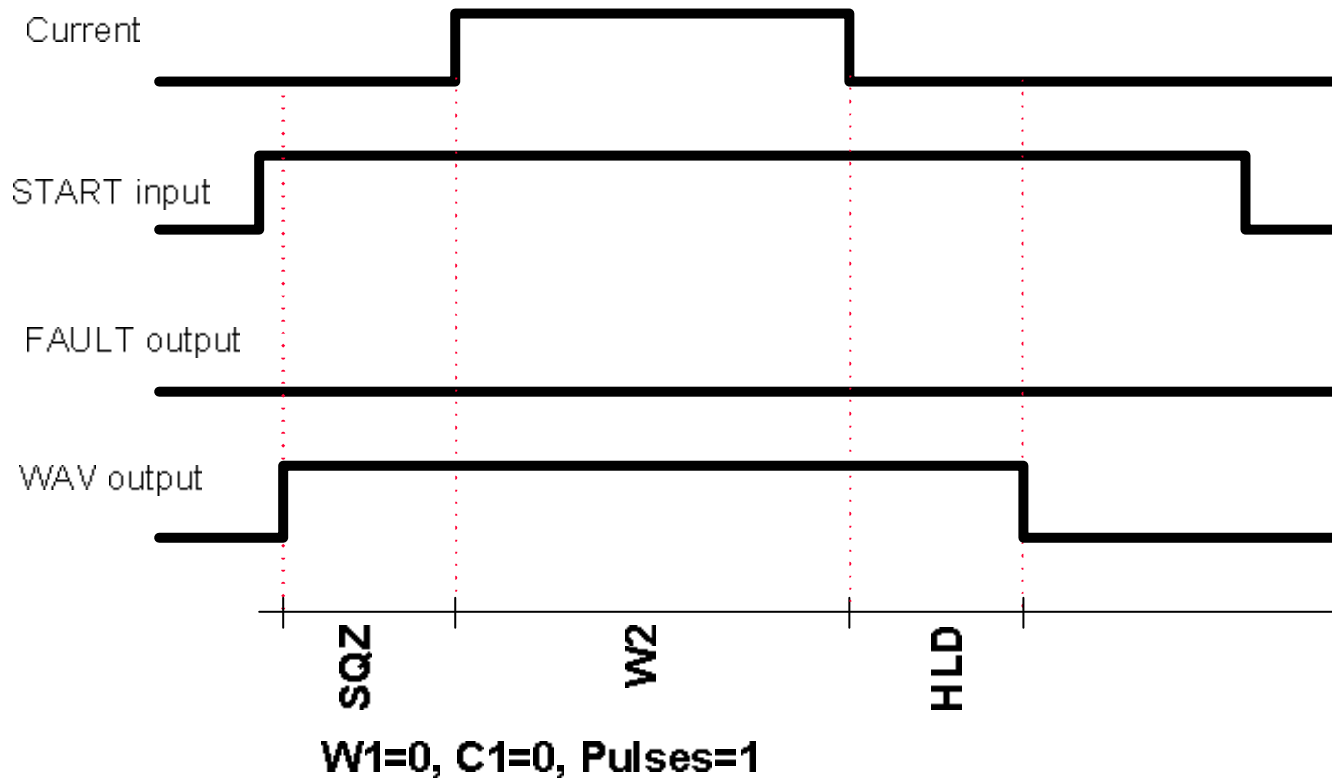
....

etc.

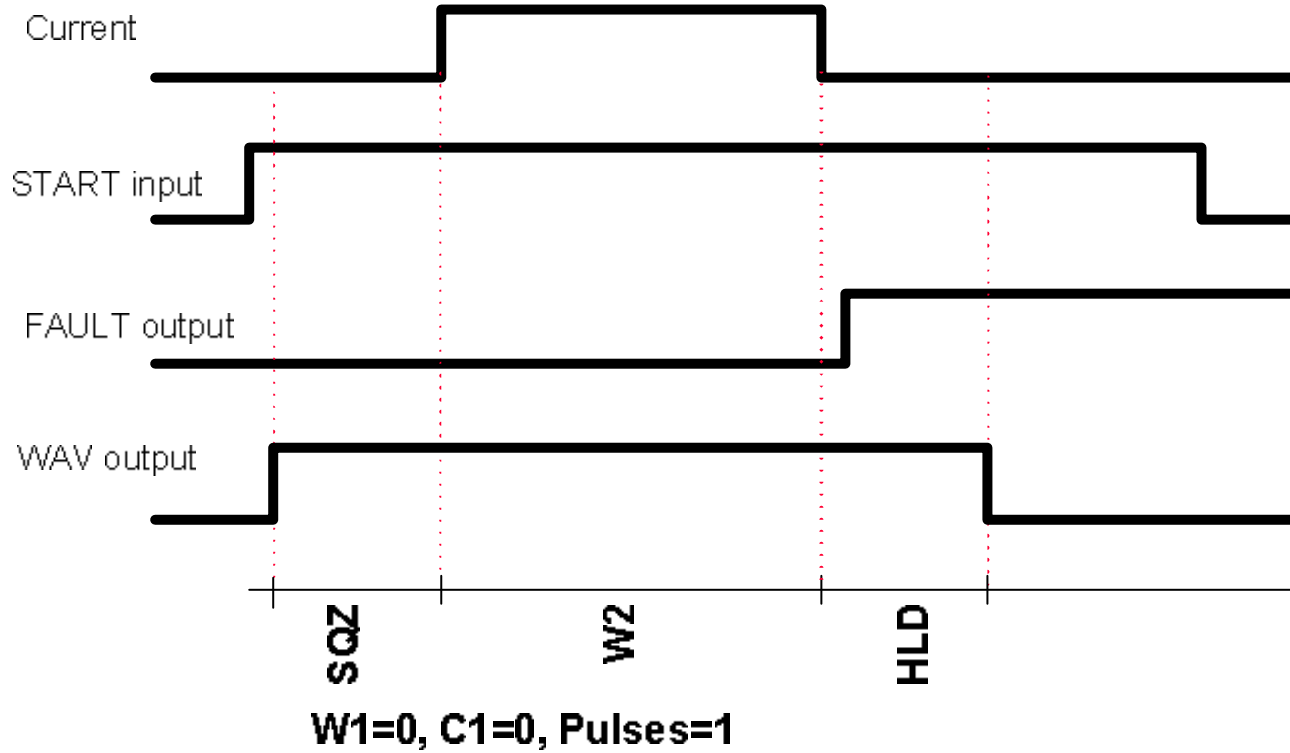
Visible
window

This screen can be used to observe the status of all the discrete inputs and outputs.

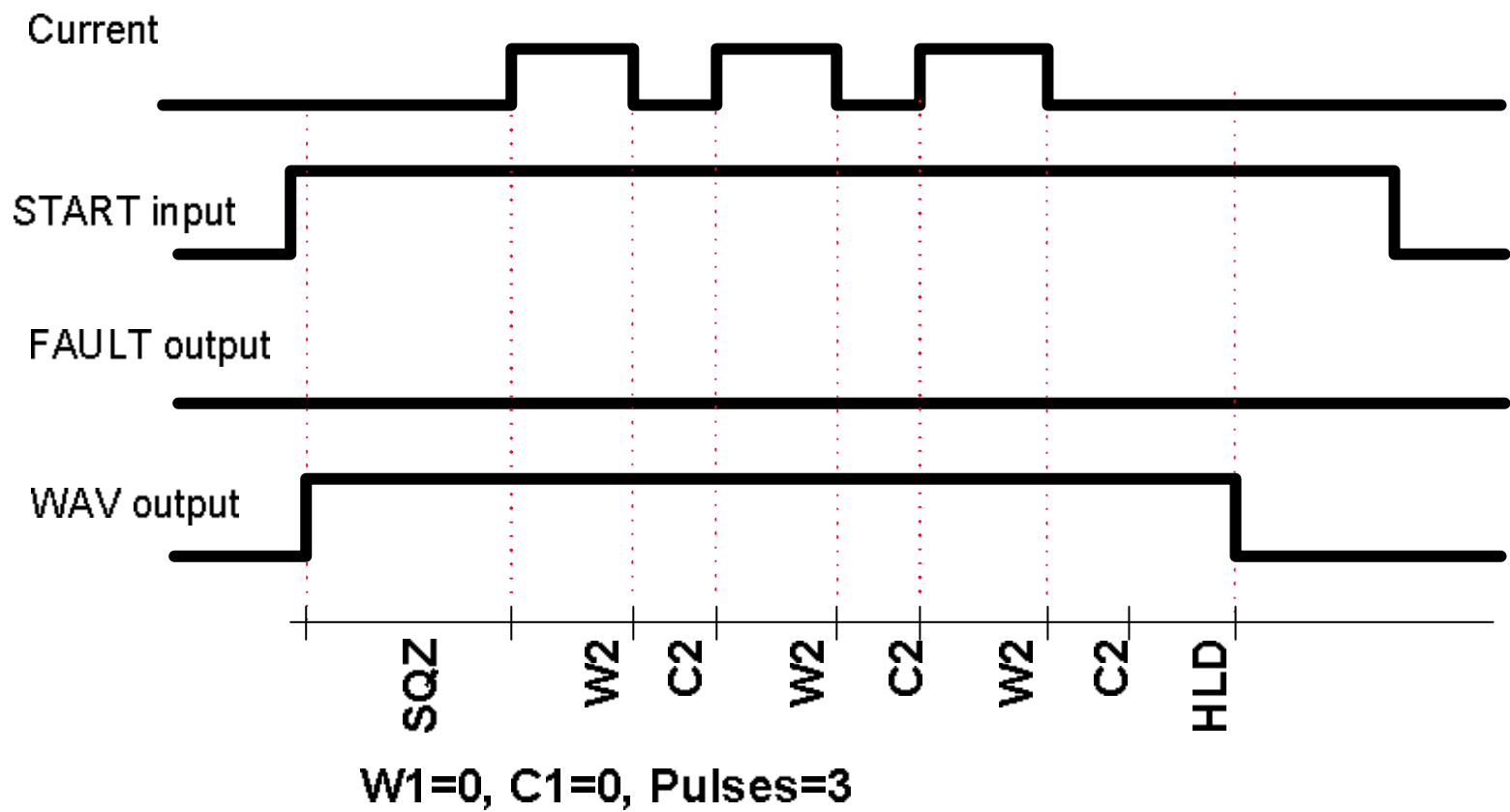
Operation: basic spot weld – no weld faults



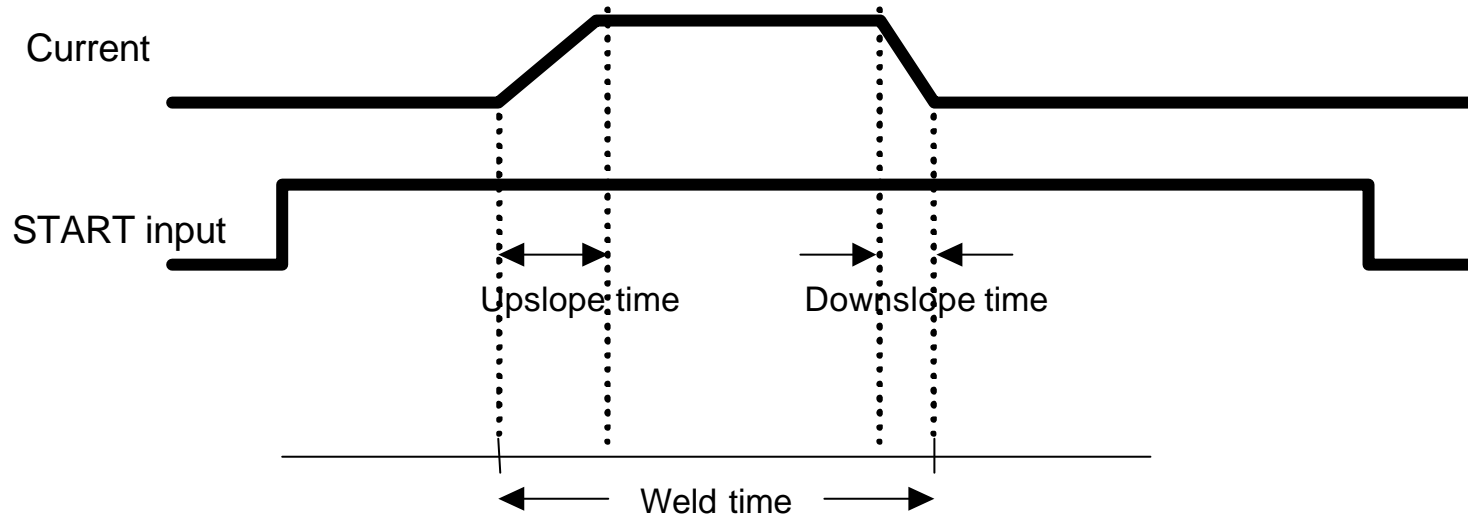
Operation: basic spot weld – weld fault



Operation: pulsation spot weld



Operation: upslope and downslope



The upslope and downslope times are part of the overall weld time – they **do not** add to the weld time.