CE500 Weld Control Manual Version 1.0

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Introduction

The CE500 welding control offers reliability from simplicity. The CE500 is a compact, robust unit providing a basic welding control for resistance Spot welding machines. The membrane front panel provides a neat, water resistant finish incorporating function and data push buttons along with a three segment LED display for programming purposes.

Programming is made quick and simple, as is the operation of the control. The CE500 control is designed for panel mounting on to any spot welding machine (surface mounting available upon request).

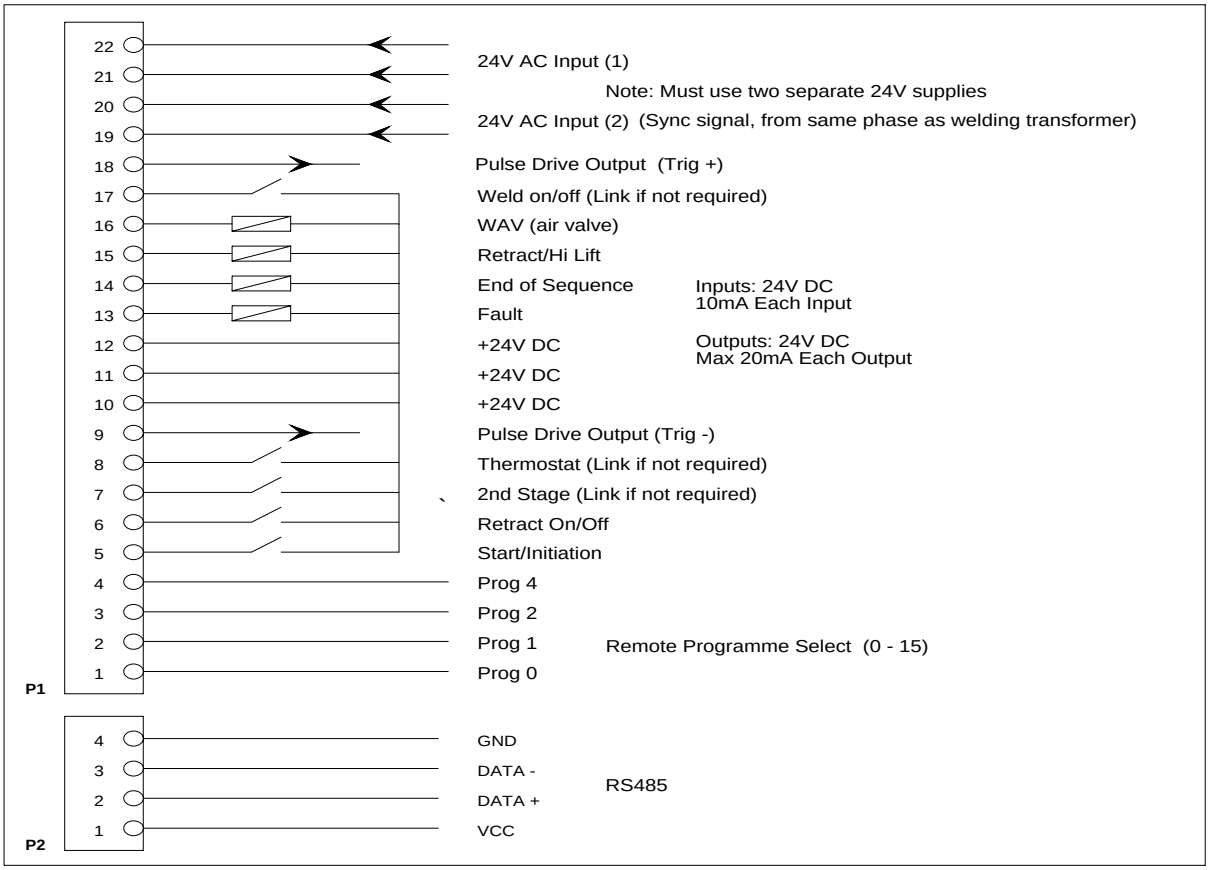
The principle features of the CE500 are:

- Operates from a 24v AC supply (Optional or customer to supply)
- 50Hz or 60 Hz operation
- 9 Inputs and 4 outputs including weld on/off
- 16 Weld programmes
- Single or Repeat operation
- Two weld intervals
- Retract/Hi Lift option
- Built-in test routines
- RS485 Interface (external programming)

Specifications

Supply voltage:	24V AC
Supply current:	< 500mA (no outputs on)
Mains frequency:	50 or 60 Hz auto sensed
Number of inputs:	9
Input requirement:	24V AC
Number of outputs:	4
Pulse drive output:	5KHz
Size:	W:160mm x H:122mm x D: 50mm
Weight:	650gms

Inputs & Outputs (customer connections)



External programme select via BCD switch (Optional).

Prog. No	Input 1	Input 2	Input 3	Input 4
0	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1
10	0	1	0	1
11	1	1	0	1
12	0	0	1	1
13	1	0	1	1
14	0	1	1	1
15	1	1	1	1

Programming the CE500

On start-up the CE500 controller displays a firmware revision number on the 3 segments LED display for a few seconds before entering the Keyboard mode ‘Con’.

In Keyboard mode, pressing the ‘F’ key will display the current Parameter (function) i.e. 0 – d, and also display the present program in use (0 – 15).

To programme the CE500,

- Pressing the F key, this will increment the parameter, which requires to be edited.
- Pressing the ⬆ ⬇ keys will increment or decrement the value (data) of the currently displayed parameter.

When data has been edited, a welding sequence can begin. After each welding sequence the display will return to keyboard mode ‘Con’.

The table below shows the welding parameters/data and the order in which they appear in sequence.

Parameter	**Data**	
0 - Programmes	0-15	Internal or External
1 - Heat 1	0-99%	(heat setting for Weld 1)
2 - Heat 2	0-99%	(heat setting for Weld 2)
3 – Pre-Squeeze	0-99 Cycles	
4 - Squeeze	0-99 Cycles	
5 - Weld 1	0-99 Cycles	
6 - Cool	0-99 Cycles	
7 - Weld 2	0-99 Cycles	
8 - Hold	0-99 Cycles	
9 - Off	0-99 Cycles	Used only in Repeat mode
a - Upslope	0-99 Cycles	Only valid on Weld1
b - Repeat	00-off, 01-on	
c - Half Cycle	00-off, 01-0n	1 +/- Half cycle weld only
d - EOS	00-off, 01-on	
E – Ex/In Prog select	00= Internal, 01=External	Selection via Password only

Programme parameters

0 – (Programme)	Selects welding programme to be used.
1 – (Heat 1)	Controls the heat of the first weld interval.
2 – (Heat 2)	Controls the heat of the second weld interval.
3 – (Pre-squeeze)	The time (in cycles) allowed for the electrodes to close.
4 – (Squeeze)	The time (in cycles) allowed for the electrodes to build up full welding force on the component.
5 – (Weld 1)	The duration (in cycles) of the first weld interval.
6 – (Cool)	The time (in cycles) between the first and second weld intervals.
7 – (Weld 2)	The duration (in cycles) of the second weld interval.
8 – (Hold)	The time (in cycles) for which the welding force is maintained on the electrodes after welding current has ceased (forge time).
9 – (Off)	The time (in cycles) between successive weld sequences (only applicable in Repeat operation).
a – (Upslope)	A linear increase in current from initial value to the welding value, applied to weld 1
b – (Repeat)	Allows successive weld sequences (if selected).
c – (Half Cycle)	Allows only ‘1 +/- half cycle’ operation on weld1 (weld1 data must be set to 01. Data set in heat2/weld2 are ignored).
d – (EOS)	Allows for an ‘end of sequence’ signal to be given after the hold time (if selected).

Starting a Weld

When the CE500 timer has been programmed (user's welding parameters), welding can proceed. Select the programme to be used and operate the Start input. A weld sequence will begin.

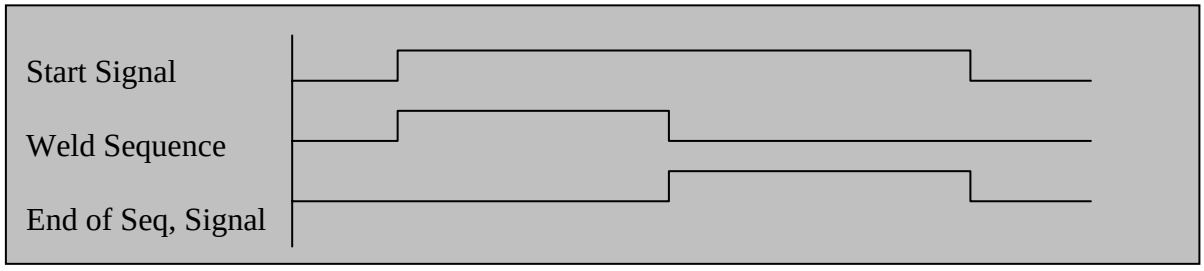
Note: The Start signal must be held on until the first weld period. If the Start signal is removed before this time, the weld sequence will be aborted.

Second Stage

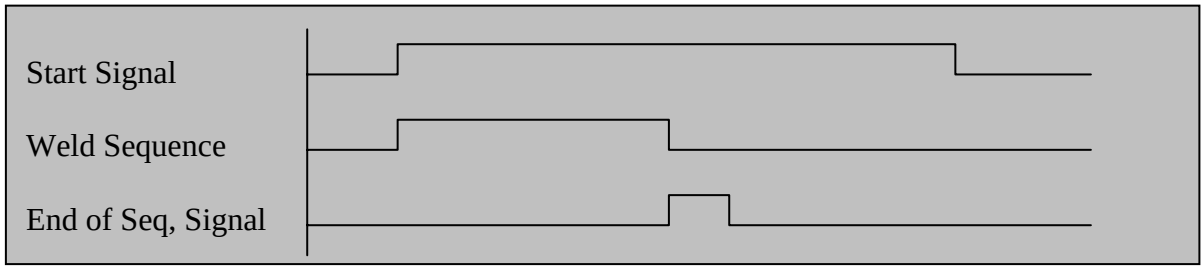
Some welding operations may require a Second Stage function. When the weld sequence has reached the end of the squeeze time, if this input is made, the sequence will continue, otherwise it will wait until a signal is received. If this function is not required a link must fitted (see input/output connection diagram).

End of Sequence Output (EOS)

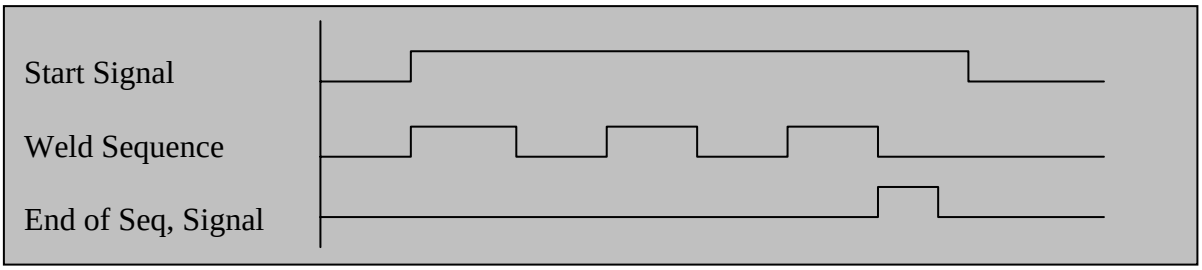
In Single Spot operation, at the end of the weld sequence the End of Sequence output switches on. If the Start signal is still present, the End of Sequence signal remains on until the Start signal is removed.



In Single Spot operation, at the end of the weld sequence the End of Sequence output switches on. If the Start signal is absent, the End of Sequence signal switches on for a fixed time of 50 cycles.



In Repeat Spot operation, the End of Sequence output switches on for a fixed time period of 50 cycles after the Hold time has been completed.



Other Functions

A password (No) is required to enter Protected parameters functions. These functions allow for data to be entered for special timing operations to suit various machine operations.

Protected parameters. (only accessible by Clifford Engineer)

- Count (processor cycles per percent heat)
- Lead percentage (lowers 100% heat to compensate for inductance)
- Neg Pulse Delay (adjusts neg half cycle delay to compensate for zero crossing lag)
- No..of firing pulses per cycle (50 or 60Hz)
- Firing pulse width (processor cycles +/1 2uS)
- Firing pulse period
- Controller Address

Diagnostics

Error code display reading:

2 nd; (No 2nd stage signal present).
E55; Thermostat malfunction (red LED on)
(Press F key to reset)

Sequence timing chart.

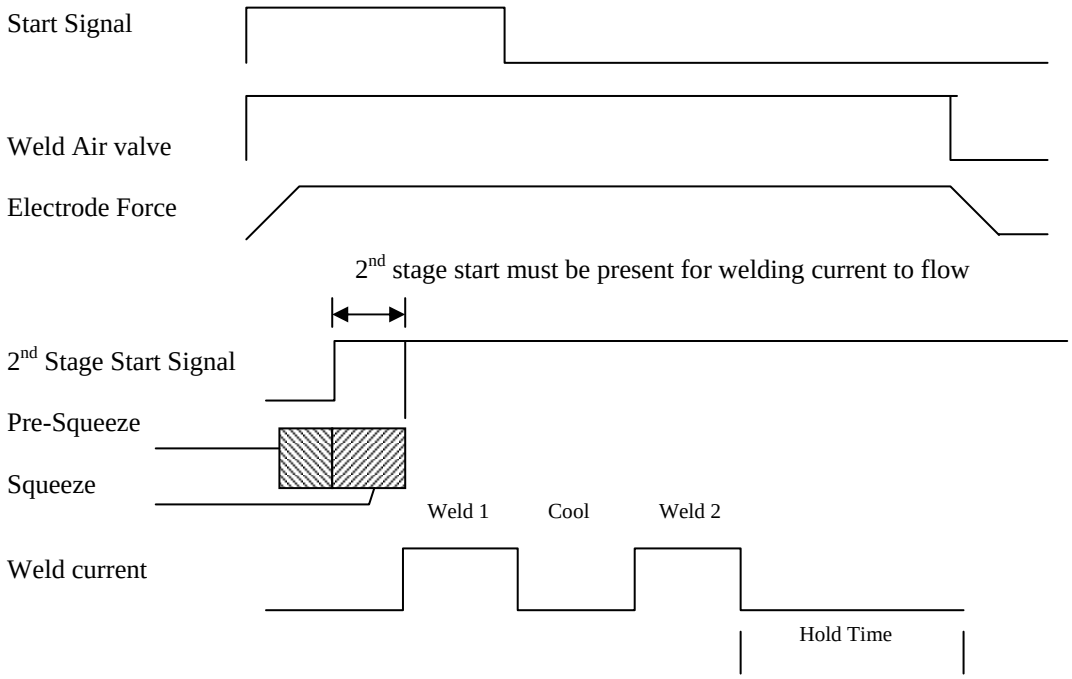


Figure 1-0 Timing of the Pre-Squeeze, Squeeze, and 2nd stage start signals.

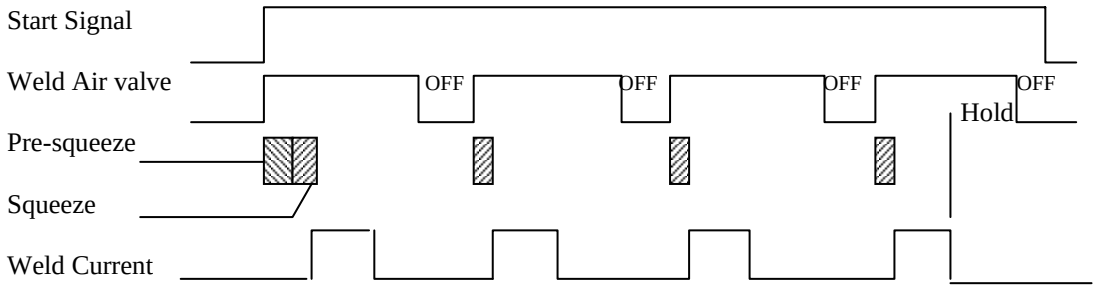


Figure 1-2. Repeat sequence operation.

Glossary of Basic Resistance Welding Terms

Heat 1	% Heat set for weld 1 (weld 1 is sometimes referred to as “preheat)
Heat 2	% Heat set for weld 2. Weld interval 2 is usually programmed to provide the actual weld, unlike weld 1- preheat, and weld 2- post heat.
Presqueeze	The time allowed for the welding electrodes to close onto the components to be welded.
Squeeze	The time interval in a weld sequence for the electrodes to exert full welding force on the work piece.
Weld 1	A weld pulse intended to burn through surface coatings in preparation for the next weld pulse. Sometimes called Pre Heat
Weld 2	The weld pulse that welds the components together.
Cool	A time interval, in a weld sequence, between weld 1 & weld 2
Hold	The time period following the last weld pulse, prior to the electrodes opening. This allows the molten material to solidify.
Off	In a repeated weld sequence, this is the electrode opening time between sequences.
EOS	A signal given at the end of a weld sequence for use in other applications such as linking other weld timers.
WAV (air valve)	Air valve which controls the weld force to the electrodes
Retract (air valve)	For use on a machine where the electrodes can be opened and closed in two stages.
Thermostat	A switch device that operates at a certain temperature to protect certain parts of a machine
Second Stage	A signal required allowing the weld sequence to proceed from the end of the squeeze time to the beginning of the weld interval. If this signal is required, and is absent, the sequence is halted at the end of the squeeze until signal is given. This input may be used to check electrode force has reached the correct value, or to make the sequence wait until another machine has completed its weld.
Start Signal	The signal that starts the welding sequence.
RS485	Serial communication system.
Weld Transformer	Electrical component for converting mains voltage input to low voltage, welding current output.

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