

AC INVERTER  
WELDING CONTROLLER

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IWC 4 – 5 1 0 5 2

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INSTRUCTION MANUAL

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## WARNING

### About short circuit accident

In the case the short circuit accident is caused by wear and tear of the primary cable can lead timer contactor to control damage. In this case, both the timer unit and the transistor in contactor will be damaged.

So, do not use the timer unit and contactor that had the short circuit accident and ask to repair those to manufacture.

The phenomenon happened by short circuit are following three items.

- (1) Main fuse open fault
- (2) Excessive current fault
- (3) Breaker trip

Caution) When excessive current fault is detected, check the following items.

- (a) Internal leak of the welding transformer
- (b) Secondary diode break of the welding transformer
- (c) Short circuit of the primary cable

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# 1. Outline

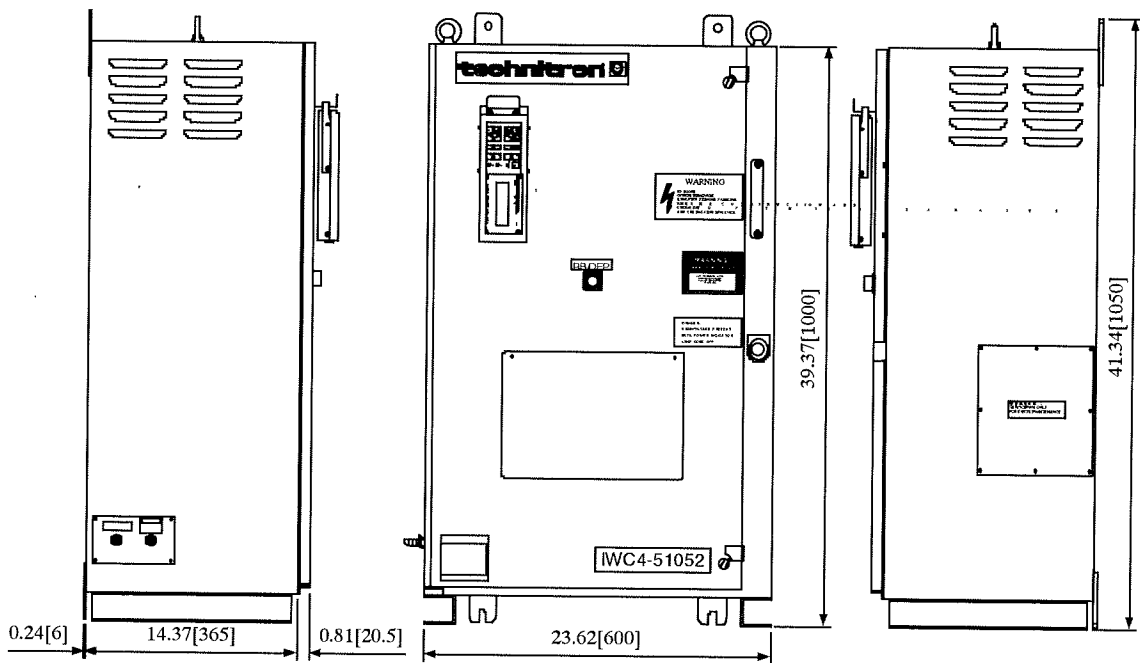
Inverter welding controller Model IWC4, is a microcomputer-controlled highly reliable timer contactor with high performance.

Being compact, this system requires less space for installation.

This controller is provided with various functions including constant current function by the direct weld current, stepper function, monitor function and fault detection function.

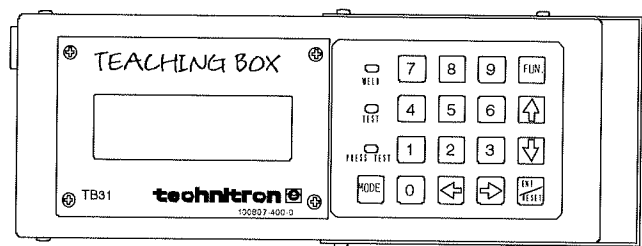
## Construction table

### a. Welding controller



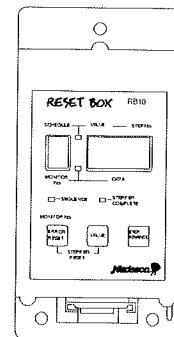
### b. Teaching box : for programming of weld items

Type : TB31-P11A



### c. Reset box : for fault reset and monitoring

Type : RB10-R20A (English version)

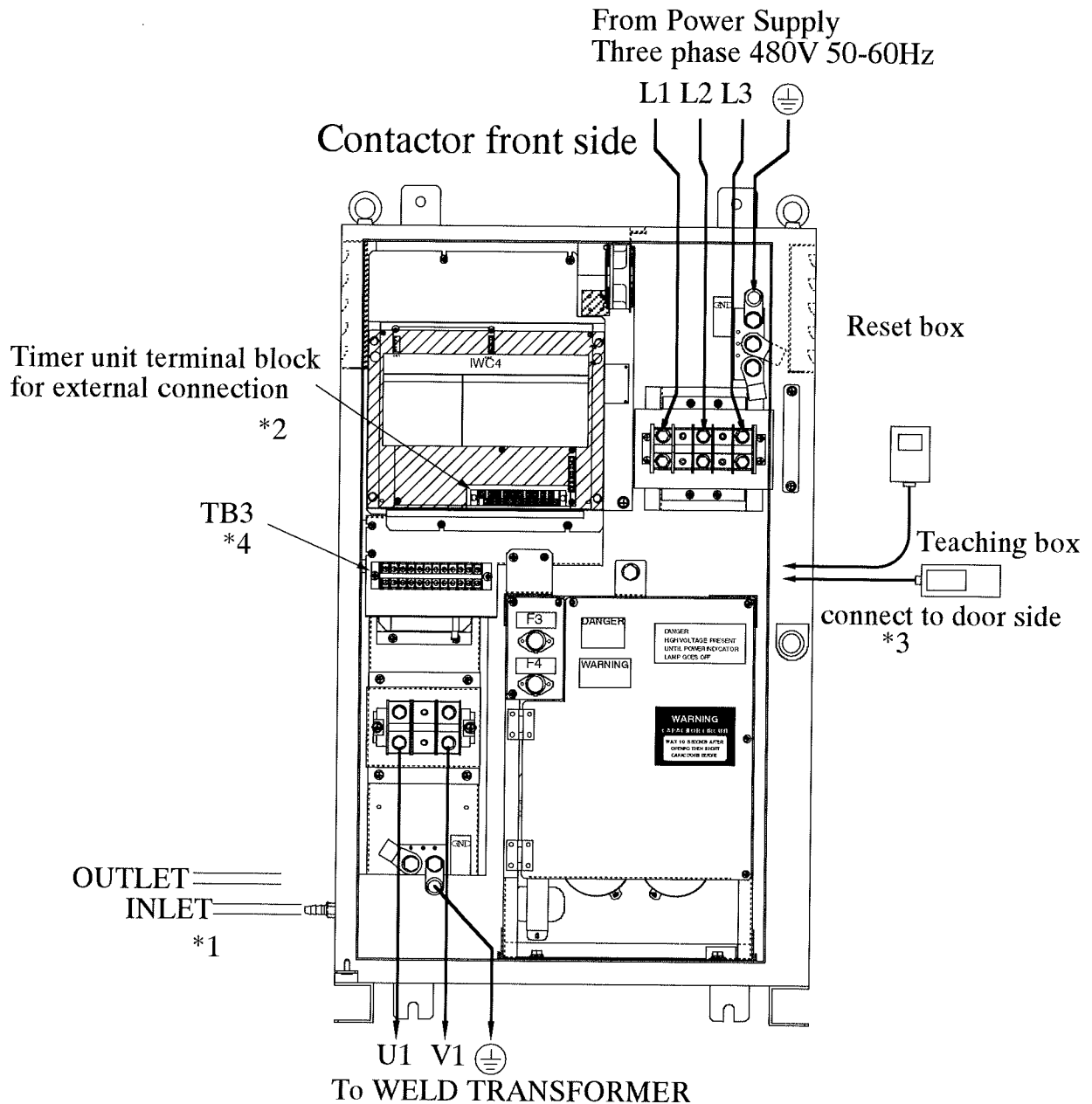


### d. Reset cable : for connection the teaching box or the reset box

Refer to the other instruction manual about the teaching box and the reset box.

## 2. Installation

Provide the connection to the cooling water piping, the grounding wiring and the welding power supply cable wiring as follows :



\*1 : Connect the cooling water pipe to INLET/OUTLET port on the left side.

\*2 : The timer unit terminal block for external connection is connector type.

The terminal can be attached and detached without rearranging the wiring.

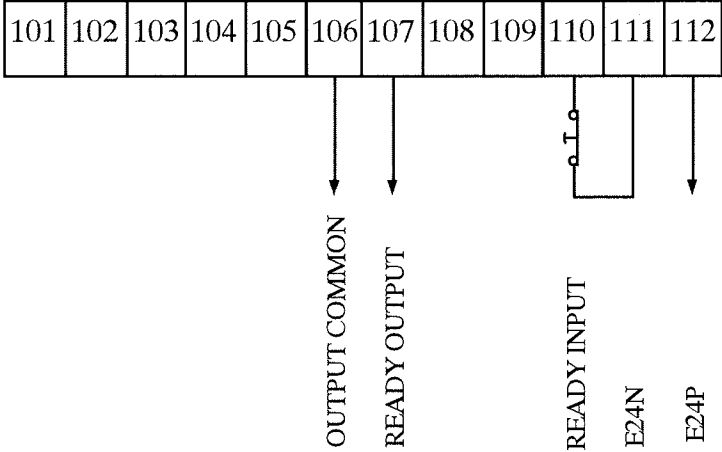
(The terminal block is locked by machine screws at ends.)

\*3 : The connection connector of teaching box or reset box is sliding lock type.

\*4 : The option terminal block is for option functions, primary cable checking etc..



**3-2. I/O signal of terminal block**



### 3-4. Function and operation 1

I/O	Signals	Description	Remarks
Input	Pilot 1	ON : Initiations sequence. When signal input, # 1 weld condition sequence.	
	Pilot 2	ON : Initiations sequence. When signal input, # 2 weld condition sequence.	
	Pilot 3 (4)	ON : Initiations sequence. When signal input, # 3 weld condition sequence.	
	Pilot 4 (8)	ON : Initiations sequence. When signal input, # 4 weld condition sequence.	
	Weld/No weld	ON (short) : Weld mode OFF (open) : No weld mode	Note 1
	Stepper reset	ON : Resets step No. and step weld counts and turns off stepper complete output. This signal resets in common with 15 schedules.	
	Fault reset	ON : Turns off fault output and prepare for next pilot.	
	Transformer thermostat	Connect this signal to the thermostat signal from weld transformer.	Note 1
	Input common	Input common for each input signals.	
	Leak check	ON : Check secondary diode breaking.	Note 3
Output	Weld complete	ON : When sequence complete. OFF : When pilot input is turned off. If the pilot input is already off when sequence completes, or in puls pilot, approx.5 cycles puls is put out. This signal is not turned on at fault.	
	Fault	ON : If any faults detected.	
	Stepper complete	ON : Stepper of any schedules completes. OFF : When stepper reset input is turned on.	
	Final step	ON : Stepper of any schedules reaches the final step (# 4 step). OFF : Except final step (# 4 step).	
	Output common	Output common for each output signals.	
	Valve1	DC24V output for valve 1.	
	Valve2	DC24V output for valve 2.	
	Valve common + Valve common -	Power source common for valve 1, 2 and retract valve. DC24V output for retract valve. ON : Any time (While the controller power is turned on).	

Note 1 : When shipment, those signal is shorted on timer unit terminal block.

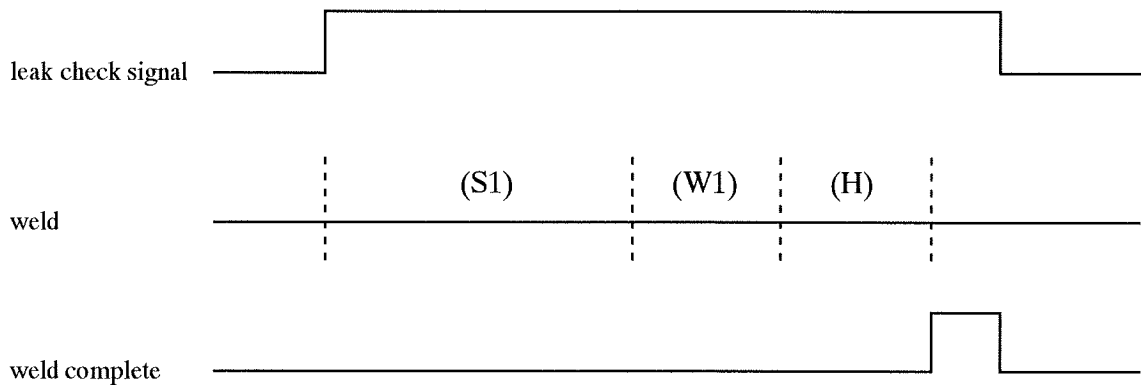
Note 2 : Turn off pilot signals when the controller power is turned on.

Note 3 : Refer to "Secondary cable short detection" of next page.

### Secondary cable short detection (Note 3)

Leak check is the special schedule for secondary diode breaking check. So in this schedule the normal welding is not done. And this welding in leak check is done in condition of the primary current 40A setting and the gun is opened. Fault is detected when the primary current average is over 10A.

The sequence is as following.



If the repeat or stepper is on, it works as both of these switches is off.

The details of data will be indicated on common monitor #1 secondary current (X0, Y79). This data is ignored the unit [kA] and the decimal point. Common monitor schedule number (X0, Y71) is turned "0".

#### Example

The data display 3.1 [kA] means 31 [A].

#### (Caution)

Leak check is fixed sequence regardless of any setting data as following.

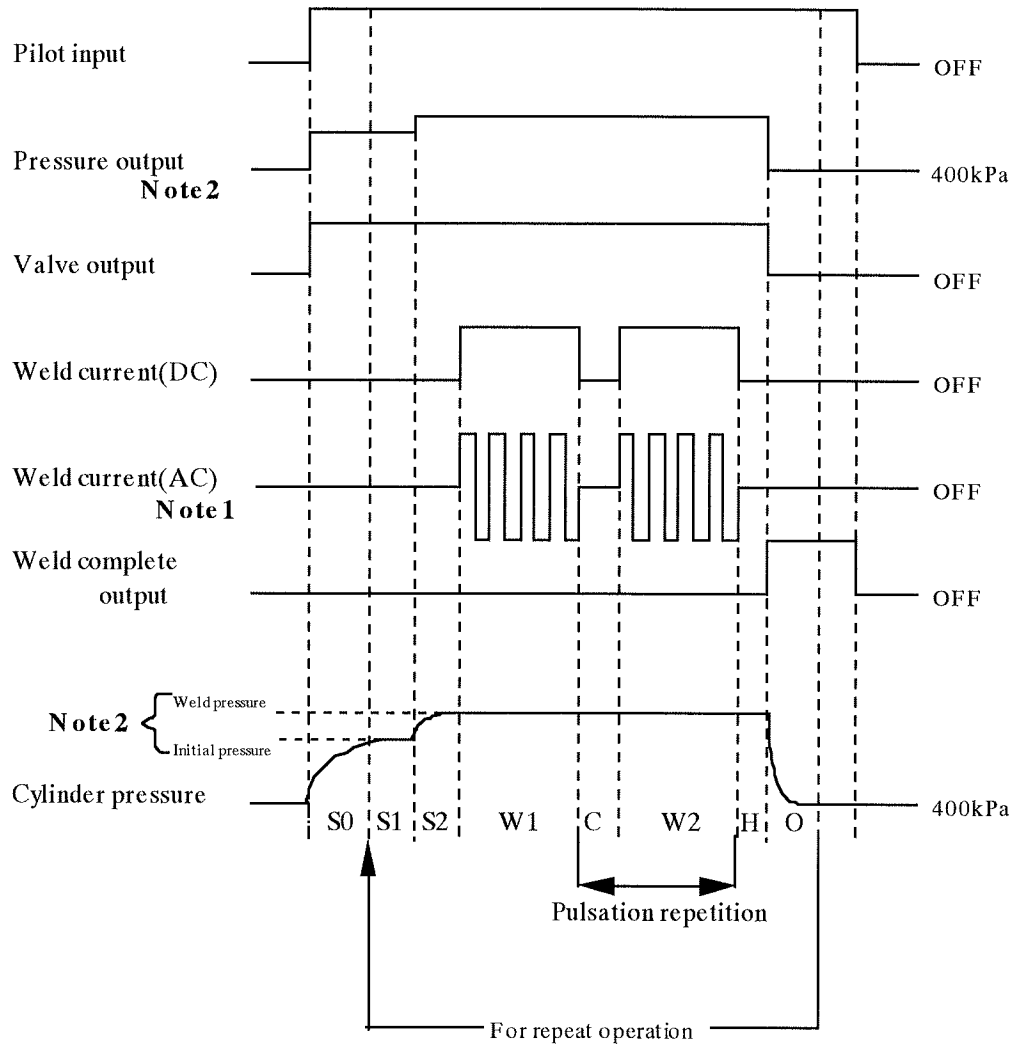
squeeze time	: S1	2 cycles
#1 weld time	: W1	1 cycle
hold time	: H	1 cycle

### 3-4. Function and operation 2 (TB3)

Signals	Description	Remarks
Ready output	ON : State of weld possibility.	
Ready input	ON : Connection the timer contactor and the welding transformer. OFF : Disconnection the timer contactor and the welding transformer.	

## 4. Operation

### 4-1. Basic weld sequence



S0 : Pre-squeeze time      S1 : Squeeze time      S2 : Press. stable time

W1 : # 1 weld time      CT : Cool time      W2 : # 2 weld time

H : Hold time      O : Off time (Only repeat operation)

**Note 1**

It is impossible to use function of Up slope and Down slope by AC control.  
Frequency is 50Hz or 60Hz.

**Note 2**

This function is option

## 4-2. Wave form control (Caution : Except for AC control.)

This function will control the wave form for the weld current according to various weld conditions such as material to be welded, shapes of work, pressure force and so on, not only simple up slope and down slope.

Selection of the wave form can be done by means of the wave form No. (wave No. 0--19).

Variety of wave form is following table.

Use method of wave form

Variety of welding current wave form		
WAVE No.	Variety of wave form	Qty. provided
0	Basic wave form (without wave form control)	1
1 ~ 4	for demonstration	4
5 ~ 9	for start up control	5
10 ~ 14	for peak position control	5
15 ~ 19	for peak value control	5

In the graph of WAVE No. 0--19, scale 1.0 on the vertical axis is corresponding to the designated weld current value, and 100% on the horizontal axis corresponding to the duration weld time goes on. When a wave number between No. 1 and No. 19 is selected, up slope and down slope will become void.

(When wave form control is not used, select WAVE No. 0.)

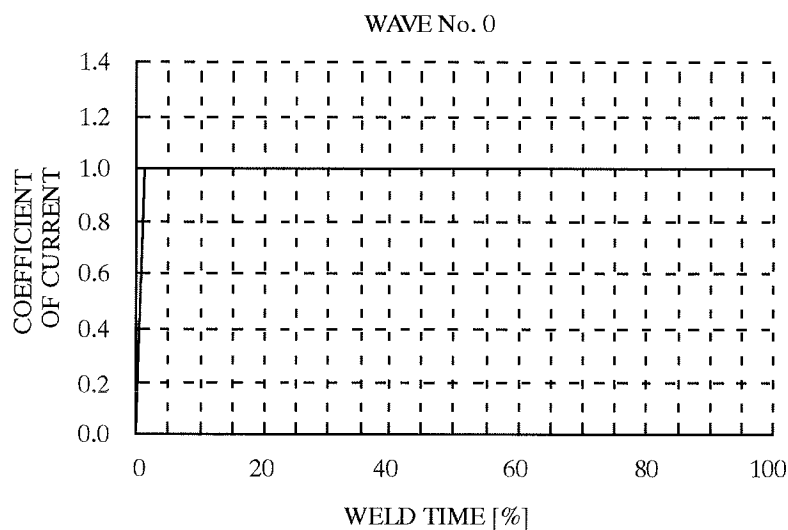
Example)

When WAVE No. 1, 6 cycles of up slope time, 10 cycles of #1 weld time and 15,000A of #1 weld current have been designated, the designated current coordinate 1.0 should corresponded 15,000A then 0.5 means 7,500A. And 100% of weld time should correspond to 10 cycles then 50% will means 5 cycles.

a) Basic wave form control (WAVE No. 0)

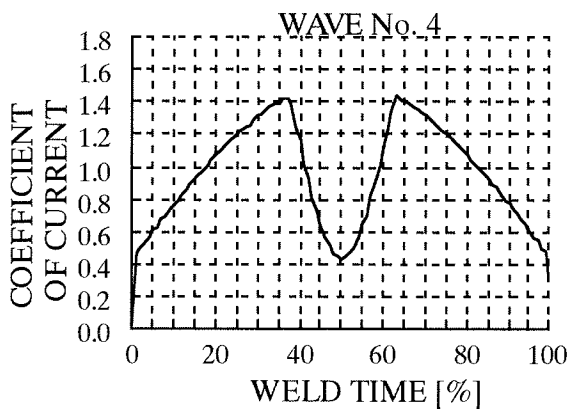
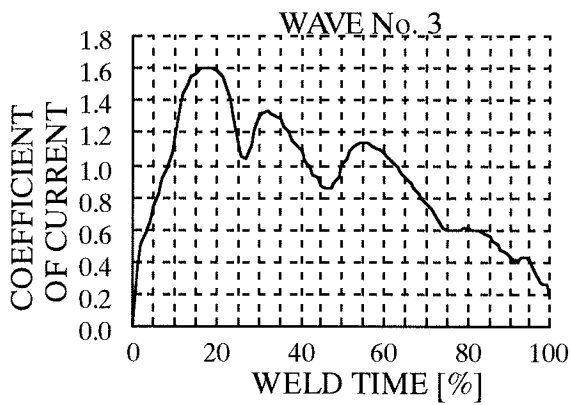
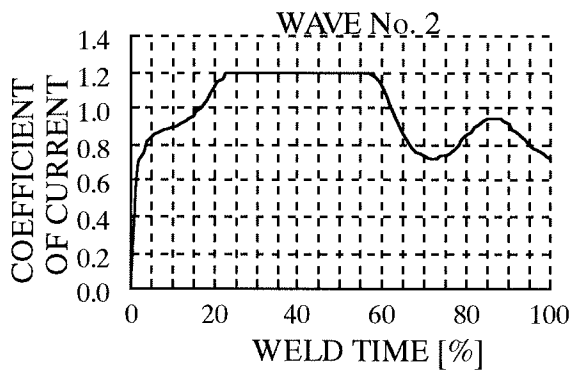
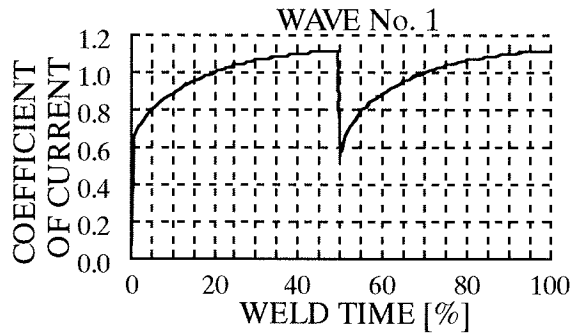
This control allowed constant weld current without any changes through weld time.

When a wave form control is not requested, this WAVE No. 0 is available in deed.

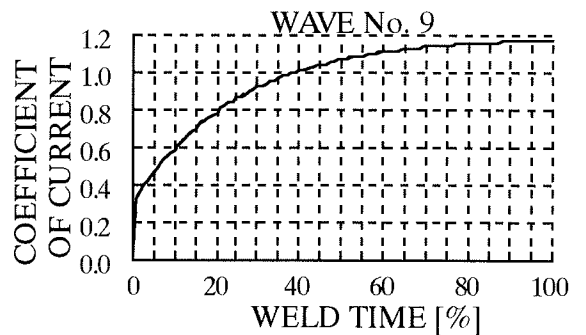
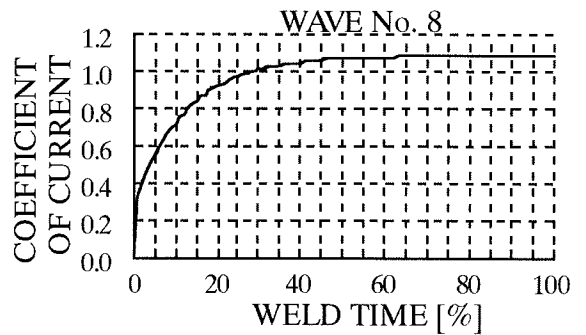
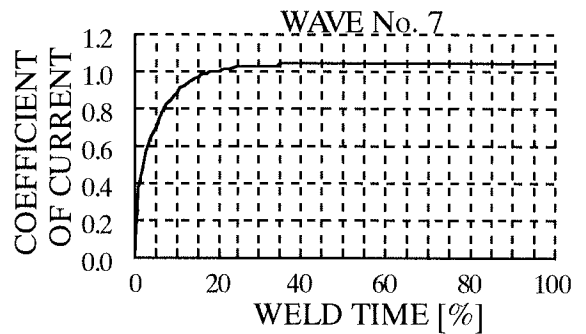
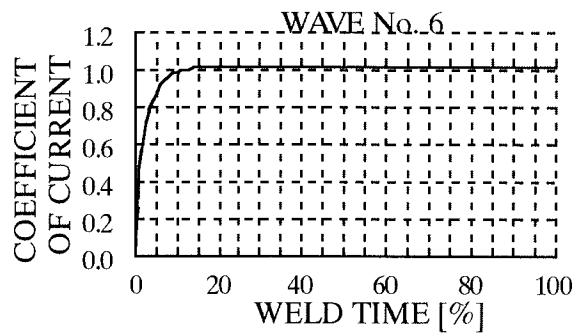
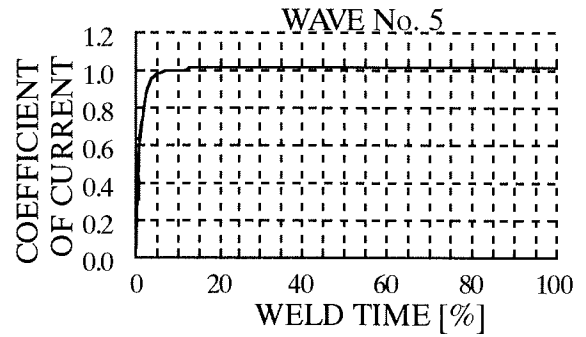


b) Wave form demonstration  
(WAVE No. 1--4)

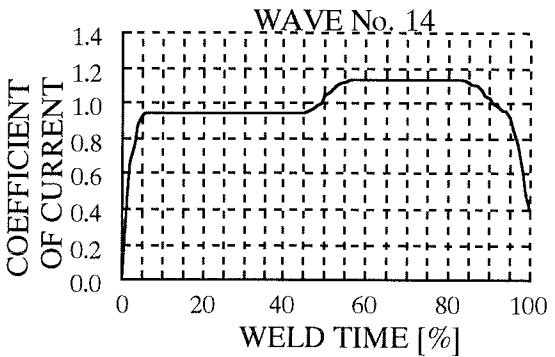
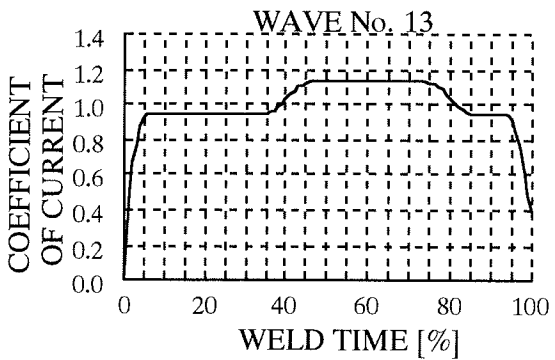
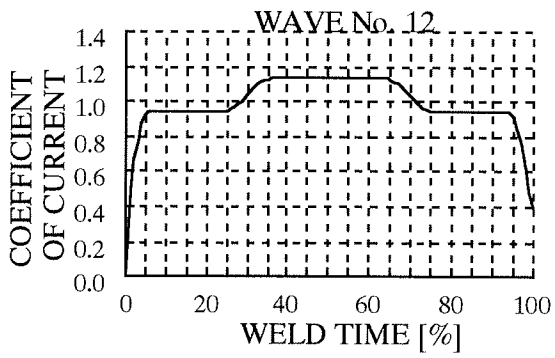
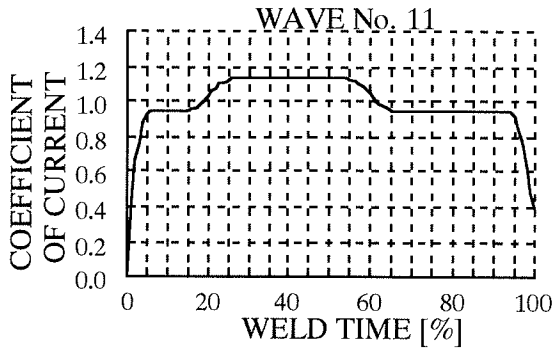
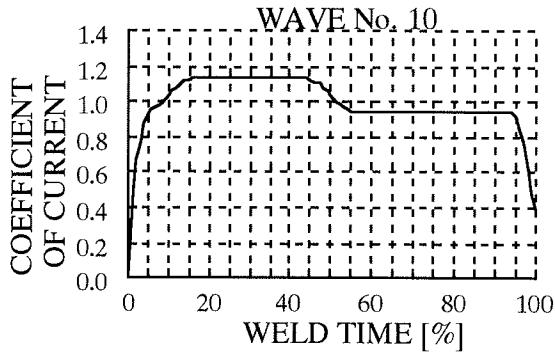
This wave form is not for actual welding operation, but to evaluate characteristics in response for the control.



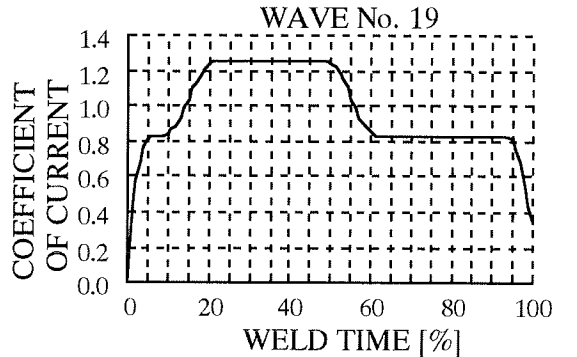
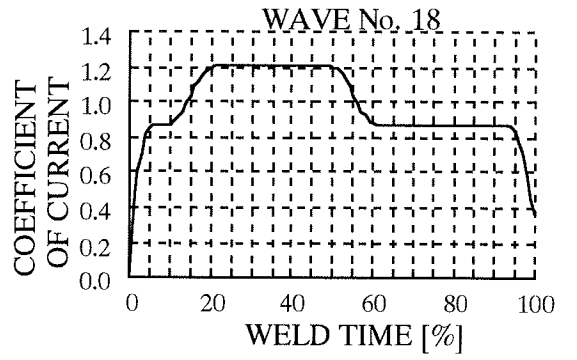
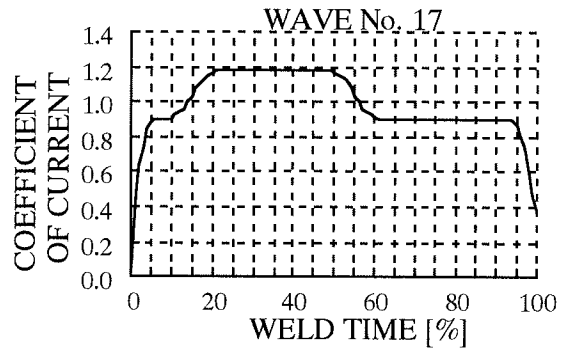
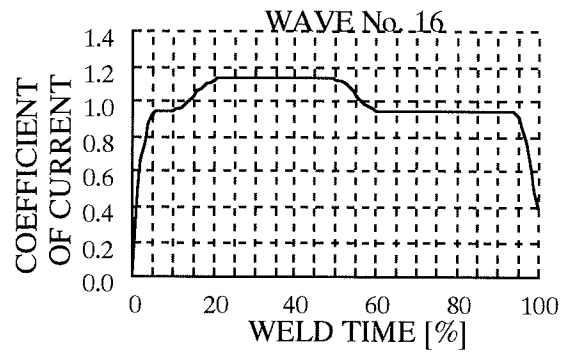
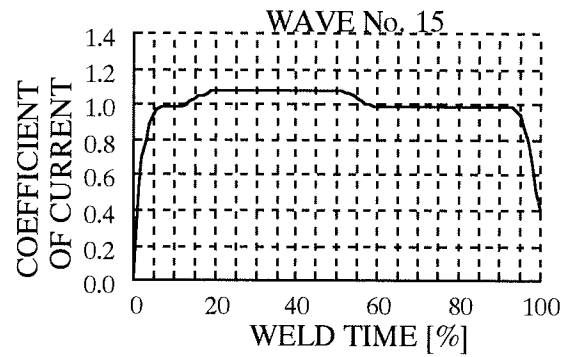
c) Wave form for start up control  
(WAVE No. 5--9)



d) Wave form peak position control  
(WAVE No. 10--14)



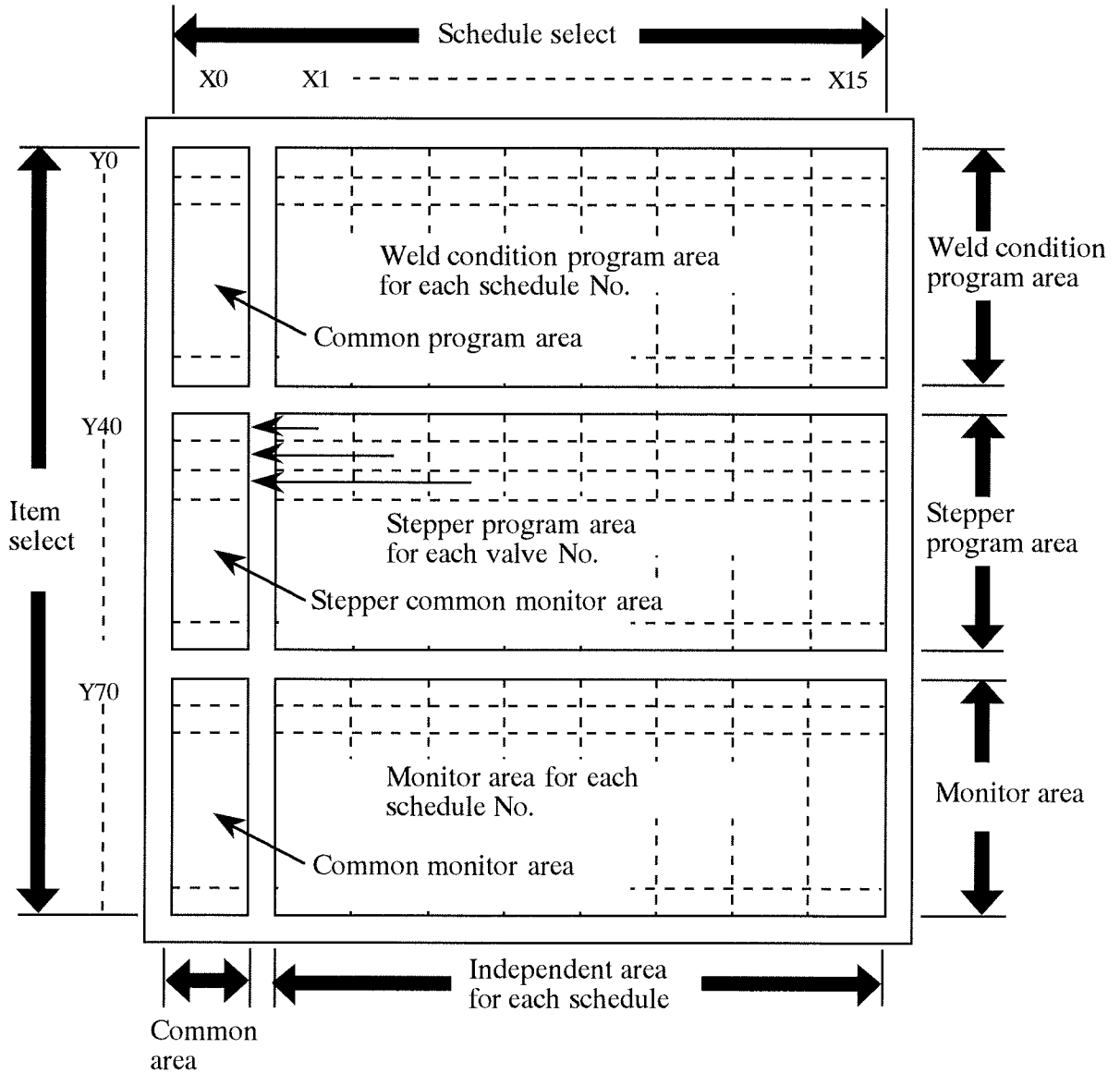
e) Wave form peak value control  
(WAVE No. 15--19)



## 5. Programming

### 5-1. Outline of program sheet

Both the program data and the monitor data are arranged with X and Y addresses defined as shown in the following chart.



Note : This figure schematically shows the concept of the entire program sheet, and therefore there is some difference in configuration from the actual program sheet.

Note to programming :

1. Data that exceeds the range can not be programmed.
2. The X address for stepper program is not related to the schedule No., and therefore conforms to the valve/stepper select value for each schedule No..

## 5-2. Initialized data sheet

The following data sheet is showed initialized data of shipment or welding data initialization by teaching box.

PROGRAM SHEET		TIMER No.															DATE				
==SEQUENCE PROGRAM==		X 1	X 2	X 3	X 4	X 5	X 6	X 7	X 8	X 9	X 10	X 11	X 12	X 13	X 14	X 15					
ADDR	PROGRAM ITEMS	S E Q U E N C E															N O .				
Y 0	PRE-SQUEEZE TIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 1	SQUEEZE TIME	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30					
Y 2	PRESSURE STABLE TIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 3	UP SLOPE TIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 4	#1 WELD TIME	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10					
Y 5	#1 WELD CURRENT	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0					
Y 8	COOL TIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 9	#2 WELD TIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 10	#2 WELD CURRENT	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0					
Y 11	DOWN SLOPE TIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 12	HOLD TIME	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10					
Y 14	OFF TIME	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10					
Y 15	PULSATION	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Y 16	WELD WAVE SELECT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 20	TURNS RATIO	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0					
Y 21	VALVE/STEPPER SELECT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Y 25	SQUEEZE PRESSURE	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400					
Y 26	WELD PRESSURE	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400					

Note: Y3 and Y11 is fixed as 0 cycle.

PROGRAM SHEET		TIMER No.															DATE				
==STEPPER PROGRAM==		X 1	X 2	X 3	X 4	X 5	X 6	X 7	X 8	X 9	X 10	X 11	X 12	X 13	X 14	X 15					
ADDR	PROGRAM ITEMS	S E Q U E N C E															N O .				
Y 40	STEP 0 CURRENT RATE	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100					
Y 41	STEP 0 WELD COUNT	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100					
Y 42	STEP 1 CURRENT RATE	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105					
Y 43	STEP 1 WELD COUNT	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300					
Y 44	STEP 2 CURRENT RATE	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110					
Y 45	STEP 2 WELD COUNT	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500					
Y 46	STEP 3 CURRENT RATE	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115					
Y 47	STEP 3 WELD COUNT	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700					
Y 48	STEP 4 CURRENT RATE	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120					
Y 49	STEP 4 WELD COUNT	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900					

PROGRAM SHEET		TIMER No.															DATE				
==COMMON PROGRAM==		X 1	X 2	X 3	X 4	X 5	X 6	X 7	X 8	X 9	X 10	X 11	X 12	X 13	X 14	X 15					
ADDR	PROGRAM ITEMS	S E Q U E N C E															N O .				
Y 2	LOW CURRENT LIMIT	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90					
Y 3	HIGH CURRENT LIMIT	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120					
Y 10	FAULT AT WARNING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 11	REPEAT FUNCTION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 12	STEPPER FUNCTION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 13	PRESSURE CONTROL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 14	BINARY PILOT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Y 15	PULSE PILOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 16	FAULT RESET BY PILOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 17	RE-WELD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 18	PRIMARY CABLE CHECKING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 19	AC WELDING CONTROL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

COMMON MONITOR		TIMER No.															DATE				
ADDR	MONITOR	X 1	X 2	X 3	X 4	X 5	X 6	X 7	X 8	X 9	X 10	X 11	X 12	X 13	X 14	X 15					
Y 71	SCHEDULE NUMBER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Y 72	FAULT CODE																				
Y 73	#1 SECONDARY CURRENT (kA)																				
Y 80	#1 LINE VOLTAGE (%)																				
Y 85	#2 SECONDARY CURRENT (kA)																				
Y 86	#2 LINE VOLTAGE (%)																				

FAULT CODE TABLE		TIMER No.															DATE				
CODE	DETECTION ITEMS	X 1	X 2	X 3	X 4	X 5	X 6	X 7	X 8	X 9	X 10	X 11	X 12	X 13	X 14	X 15					
E01	SYSTEM FAILURE																				
E10	LOW LINE VOLTAGE																				
E11	ILLEGAL POWER FREQUENCY																				
E12	LOW VOLTAGE IN WELD																				
E13	HIGH LINE VOLTAGE																				
E20	MEMORY DATA ERROR																				
E21	CURRENT PROGRAMMING ERROR																				
E24	BATTERY DOWN																				
E31	EXCESSIVE CURRENT																				
E32	MAIN FUSE OPEN																				
E41	SECONDARY CABLE SHORT																				
(E42)	EP VALVE CABLE BREAK																				
(E43)	EP VALVE CABLE SHORT																				
(E47)	FRI CABLE BREAK WARNING																				
(E48)	FRI CABLE GROUND WARNING																				

## 6. Special functions

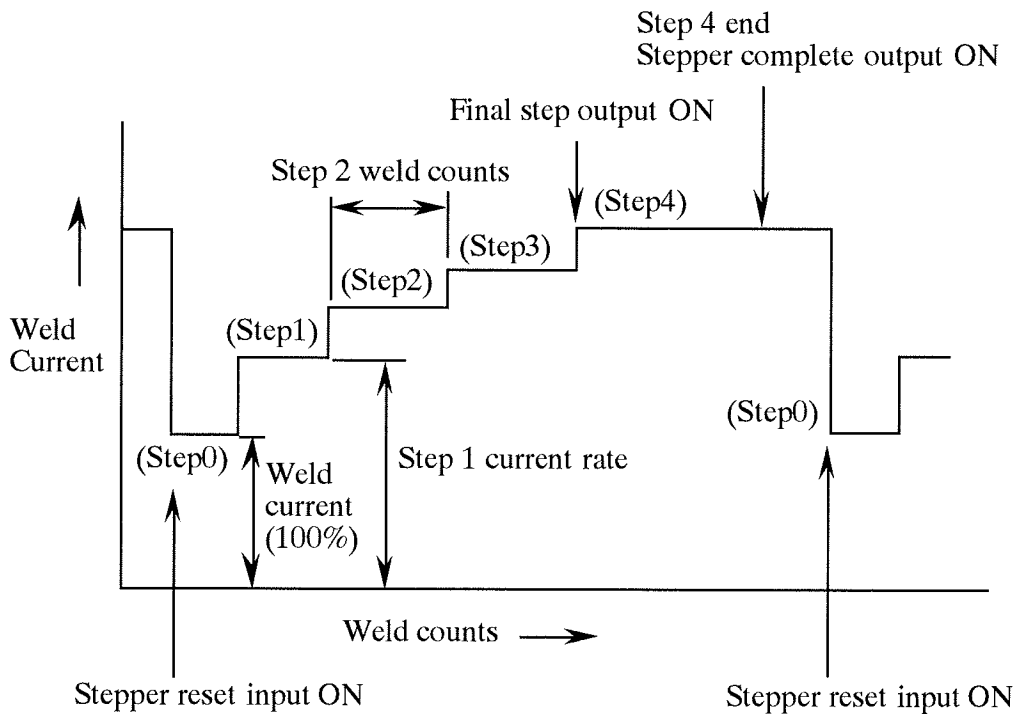
### 6-1. Stepper function

Advantage :

Improvement in weld quality.

The appropriate time of dressing or replacing the electrode tips can be determined by the stepper complete.

Operation :



Setting :

- (1) Set the stepper function at "ON."  
Set the data on (X0,Y12) at "1."
- (2) Set the valve/stepper select
- (3) Set the stepper program data  
X1--X15 , Y40--Y49

## 6-2. The other functions

### (1) Repeat function

As long as the pilot input is on, the sequence from the squeeze time to the off time is repeated, and the weld complete at off time output is on.

Setting : Set the repeat function (X0, Y11) at "1."

### (2) Pressure control function (option)

This function can control gun pressure using pressure controller option. The air pressure while not pressurized is 400kPa constant.

Setting : Set the pressure control (X0, Y13) at "1".

Set the squeeze pressure (X1--15, Y25) and the weld pressure (X1--15, Y26) at the desired value.

Caution : Be sure set to "0" when controller do not have this function.

### (3) Pulse pilot function

Pulse signal can be used for the pilot input. As much pulse width as approx. 5 cycles is necessary. The weld complete output is put out for approx. 5 cycles.

Setting : Set the pulse pilot (X0, Y15) at "1."

### (4) Fault reset by pilot function

Fault reset is not made after the fault is detected but reset start is made by pilot input.

Setting : Set the fault reset by pilot function (X0, Y16) at "1."

### (5) Reweld at fault function

If extremely low current (E60) and low current (E61) are caused, weld again. If the reweld results in normal weld, the sequence will end. If the reweld results in abnormal weld, fault will be issued.

Setting : Set the reweld at fault function (X0, Y17) to "1."

### (6) Low current limit set function

The level at which the low current can be detected can be set in % when the weld current is taken as 100%.

Setting : Set the % data to the low current limit (X0, Y2) (50 to 99%).

### (7) High current limit set function

The level at which the high current can be detected can be set in % when the weld current is taken as 100%.

Setting : Set the % data to the high current limit (X0, Y3) (101 to 150%).

(8) Binary pilot function

Signal input pilots are 4 sequences by using pilot 1--4.

Binary pilots are 15 sequences by using bit 0 (pilot 1), bit 1 (pilot 2), bit 2 (pilot 3) and bit 3 (pilot 4).

Setting : Setting the binary pilot (X0, Y14) to "0" is single input pilot, "1" is binary pilot.

(9) Primary cable checking function (option)

This function can detect primary cable ground warning.

Setting : Set the primary cable checking (X0, Y18) to "1".

Caution : Be sure set to "0" when controller do not have this function.

(10) Fault at warning function

This function can output the fault output when the warning happen.

Setting : Set the fault at warning (X0, Y10) to "1".

(11) AC welding control function

This function can be used AC welding control of inverter type.

Setting : Set the AC welding control (X0, Y19) to "1".

Caution : AC welding control synchronize power frequency.

Please use AC welding transformer when AC welding control.

Up slope and down slope function is fixed as '0' cycle when AC welding control.

## 7. Current control method

### Constant current control

This controller controls weld current to setting value by using feedback of primary CT every time that IGBT is turned on. Therefore, fluctuation in the welding power source or in load can be compensated for at high speed.

Setting of current : Value of current should be set directory.

Minimum setting unit is 100A.

Available setting range : 2,000A--25,500A

Transformer ratio : Designated turn ratio should be set.

Factor to be compensated : Line voltage and fluctuations of load.

## 8. Monitor function

### 8-1. Monitor function of teaching box and reset box.

#### (1) Schedule monitor (X1 to X15)

Y72 Tr. margin :

This indicates the margin of the weld transformer in %.

Y73 Inverter frequency :

This indicates inverter control frequency.

#### (2) Common monitor (X0)

Y71 Schedule No. :

This shows the schedule No. piloted.

Y72 Fault code :

The fault code in any number but 0 is the fault code for the fault caused during the weld sequence.

Y79 #1 weld current (kA) :

This shows the average weld current for #1 weld time in the constant current control.

Y80 #1 line voltage (%) :

This shows the average weld power source for #1 weld time in % taking the rated voltage as 100%.

Y85 #2 weld current (kA) :

This shows the average weld current for #2 weld time in the constant current control.

Y86 #2 line voltage (%) :

This shows the average weld power source for #2 weld time in % taking the rated voltage as 100%.

### (3) Input / output monitor

This function is able to monitor the state of input and output signal in the sequence, using function select mode on the teaching box.

Refer to the teaching box instruction manual about operation of teaching box.

The monitor value shows 16 bit or 8 bit data, and each bit means the state of input and output signal as follows:

1=on, 0=off

#### Input monitor display

*INPUT/OUTPUT MONITOR															
1 = INPUT MONITOR															
0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	1
i	j	k	l	m	n	o	p	a	b	c	d	e	f	g	h

- |                                       |                                  |
|---------------------------------------|----------------------------------|
| i : DIP switch 2                      | a : Weld/No weld input           |
| j : Dip switch 1                      | b : Transformer thermostat input |
| k : (Nothing)                         | c : Stepper reset input          |
| l : Ready input                       | d : Fault reset input            |
| m : Transformer thermostat            | e : Pilot 4 (8) input            |
| n : Cable break warning (normal : on) | f : Pilot 3 (4) input            |
| o : Cable ground warning              | g : Pilot 2 input                |
| p : Detecting internal leak input     | h : Pilot 1 input                |

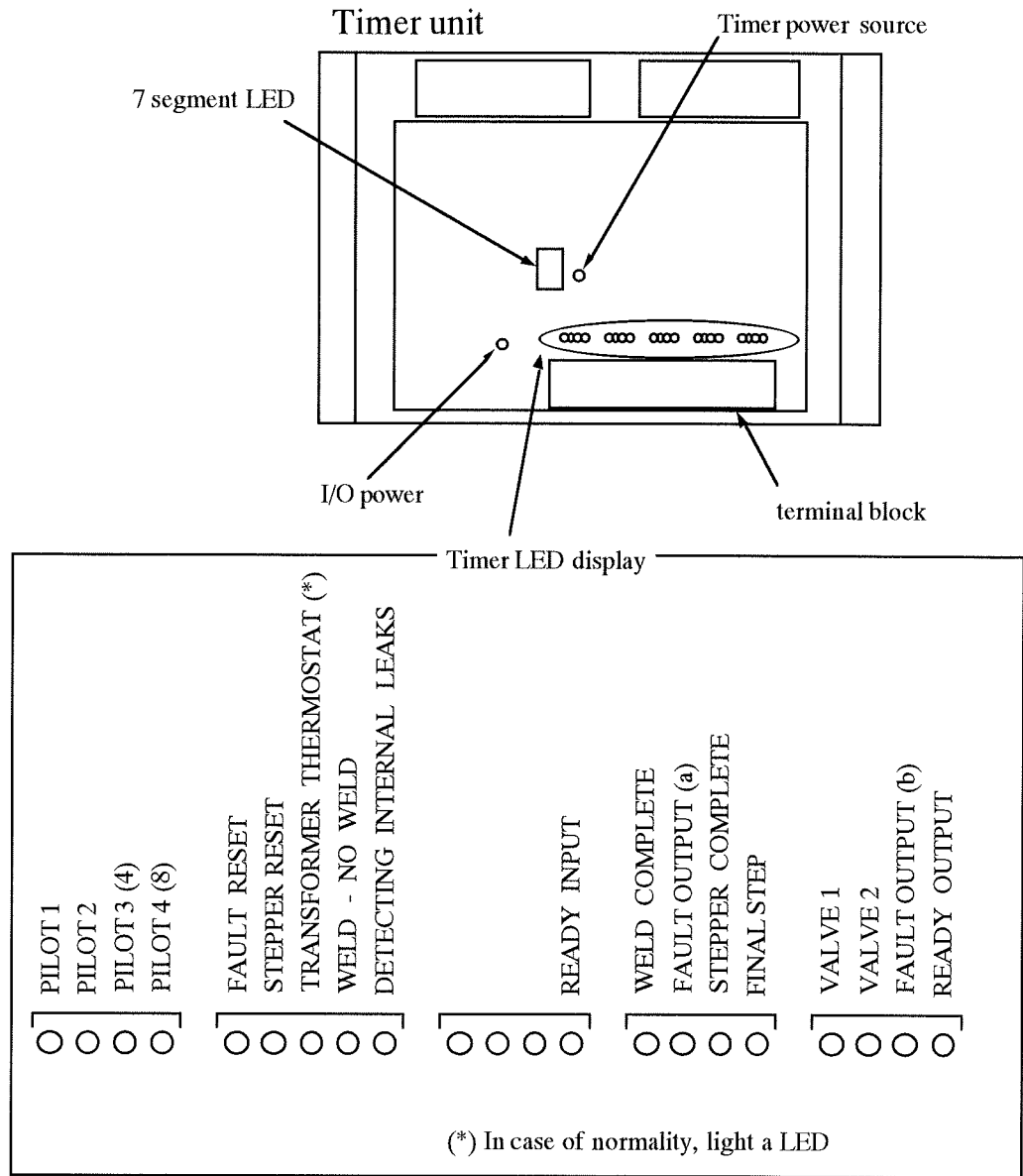
#### Output monitor display

*INPUT/OUTPUT MONITOR															
2 = OUTPUT MONITOR															
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
a	b	c	d	e	f	g	h								

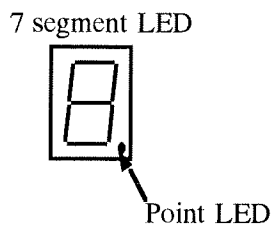
- a : Ready output
- b : Fault output (b contact)
- c : Valve 2 output
- d : Valve 1 output
- e : Final step output
- f : Stepper complete output
- g : Fault output (a contact)
- h : Weld complete output

## 8-2. Monitor of LED display

### (1) Monitor of I/O signals



### (2) 7 segment LED



The operation of the 7 segment LED

Point LED	Not flashing		Flashing (In weld sequence or error display)	
	Flashing	Flashing on and off	Flashing	Flashing on and off
7 segment LED	Flashing	Flashing on and off	Flashing	Flashing on and off
The content of the LED display	Slave No. (Weld mode)	Slave No. (Test mode)	Start No. (In weld sequence)	Error No. (Error occurred)

Error No. is showed "E", "the number of tens", "the number of units", "blank".

## 9. Troubleshooting

The followings are typical examples of the detected time, detected contents and remedies for the troubles of each fault code for use according to the situation.

### E01 System failure :

- This fault is checked for when the weld power source is turned on.
- If the memory IC is fatally damaged, fault output or communication to external units will be impossible.
- In this fault, reset is impossible, and therefore the timer unit must be replaced.

### E10 Low line voltage :

- This fault is always checked for while the weld power source is on, and alarmed immediately, if any.
- This fault indicates that the weld power voltage was below the voltage lower limit.
- Check the rated voltage and weld voltage of the controller for the appropriate level.

### E11 Illegal power frequency :

- This fault is checked for when the weld power source is turned on, and alarmed immediately, if any.
- This fault indicates that the frequency of the weld power source could not be identified when the weld power source was turned on.
- Check the weld power source for fluctuation.

### E12 Low voltage in weld :

- If the weld power source is shut off during the welding, this fault is checked for when the power source is turned on again, and alarmed immediately, if any. If the voltage drops extremely, it will be alarmed immediately.
- Check the power source capacity, and take proper measures to avoid the simultaneous weld.

### E13 High line voltage :

- This fault is always checked for while the weld power source is turned on, and alarmed immediately, if any.
- This fault indicates that the weld power voltage was above the voltage upper limit.
- Check the rated voltage and weld voltage of the controller for the appropriate level.

E20 Memory data error :

- This fault is checked for when the weld power source is turned on and weld is piloted, and alarmed immediately, if any.
- This fault indicates that the memory data was broken or is not within the set range.
- Set the data again or initialize the data, whether the whole area of the program and monitor is used or not.

E21 Current program error :

- This fault is checked for during the weld current control, and alarmed after the sequence ends, if any.
- This fault indicates that the current exceeded the control range during the constant current control calculation.
- Check the set current and the turns ratio of the weld transformer.

E24 Battery down :

- This fault is checked every 24 hours and when the weld power source is turned on, and alarmed immediately, if any.
- This fault indicates that the battery will be dead soon.
- Replace the battery. Refer to the section 11 (how to replace).
- This fault is no effect on the control operation and not put out fault output.

E31 Excessive current :

- This fault is checked for during weld, and alarmed immediately, if any.
- This fault indicates that IGBT is in the short status.
- Check the primary cable short. If the primary cable is normal, exchange the timer contactor, it is in need of repair.

E32 Main fuse open :

- This fault is checked for during weld, and alarmed immediately, if any.
- The fuse of IGBT unit is broken.
- The power is in off immediately, exchange the timer contactor, it is in need of repair.

E41 Secondary cable short :

- This fault is checked during the secondary cable short detection sequence.
- This fault indicates that the secondary cable is short or the diode of transformer is broken.
- Exchange the secondary cable or welding transformer.

E42 EP valve cable break (option)

- This fault is checked for when the weld is piloted, and alarmed immediately, if any.
- Check the break of EP valve or the detection wire.
- If it is broken, exchange it.

E43 EP valve cable short (option)

- This fault is checked for when the weld is piloted, and alarmed immediately, if any.
- Check the short of EP valve or the detection wire.
- If it is short, exchange it.

E47 PRI cable break warning (option)

- This fault is checked for when the weld is piloted, and alarmed immediately, if any.
- This fault indicates that the primary cable (signal wire in cable) will break before long.
- Check the primary cable.

E48 PRI cable ground warning (option)

- This fault is checked for when the weld is piloted, and alarmed immediately, if any.
- This fault indicates that the primary cable (shield in cable) will be grounding before long.
- Check the primary cable.

E49 PRI cable grounding

- This fault is checked for during weld, and alarmed immediately, if any.
- This fault indicates that the primary cable is grounding.
- The power is turned on after checking the primary cable. If the primary cable is normal, exchange the timer contactor.

E50 Transistor overheat :

- This fault is checked for when the weld is piloted, and alarmed immediately, if any.
- This fault indicates that the transistor was overheated.
- Check the duty factor and the temperature and flow rate of cooling water.

E52 Weld transformer overheat :

- This fault is checked for when the weld is piloted, and alarmed immediately, if any.
- This fault indicates that the weld transformer was overheated.
- Check the duty factor and the temperature and flow rate of cooling water.

E60 Extremely low current :

- When weld/no weld becomes to no weld mode during weld, weld will stop immediately. Then this fault indicates.
- This fault is checked for after the weld current control, and alarmed after the sequence, if any.
- This fault indicates that the weld current was extremely low.
- Check the weld cables for break and the electrode tips and work for dirt.

E61 Low current :

- This fault is checked for after the weld current control, and alarmed after the sequence, if any.
- This fault indicates that the weld current was lower than the low current limit.
- Check the weld cables for break and the electrode tips and work for dirt.
- This fault indicates that the transformer margin is short.
- Check whether the weld line voltage down for the same time welds. And check the current and weld transformer turns ratio have been properly set or not.

E62 High current :

- This fault is checked for after the weld current control, and alarmed after the sequence ends, if any.
- This fault indicates that the weld current was higher than the high current limit.
- Check the weld current for unreasonable set.

E63 AC control disable :

- This fault is checked for during weld, and alarmed immediately, if any.
- Connected welding transformer is not AC welding transformer, or it is impossible to weld by setting data, because of heavy load.
- Check the welding transformer. If AC welding transformer is, please improve load condition.

E98 Communication error :

- This fault is always checked for but not alarmed, even if any, because the display is made only in T/B or R/B and the controller keeps operation.
- This fault indicates that some trouble was caused to the communication.
- When this fault is detected at the power on, check that pilot input is on. In this case, the power supply is turned on again after pilot input is turned off.

## 10. Maintenance parts

### 10-1. Replace battery

#### (1) Battery specification

A lithium battery is used for backing up the memory data.

Life : 5 years or more

Type : Lithium battery CR2032

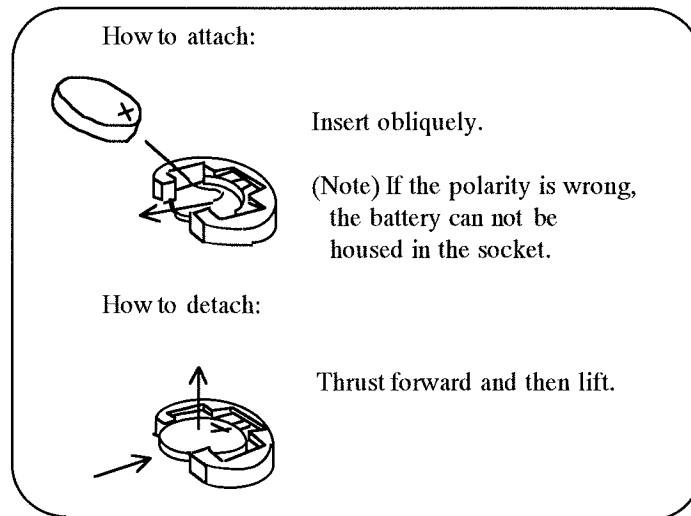
#### (2) How to replace the battery

Remove the timer cover, and the battery will be found at the lower part of the PC board.

Replace the battery by using the procedure as shown in the following figure.

When the battery is removed, the data in the memory is stored for only a few seconds.

So copy the data from timer to teaching box before replacing the battery, and copy again the data from teaching box to timer after replacing the battery.



### 10-2. Replace fuse

#### (1) Timer unit

The two fuses are placed at the upper part of the timer PC board.

F1 : For teaching box or reset box power (FGMB, 125V, 1A)

F2 : For valve output circuit (FGMB, 125V, 1A)

- When the power is turned on, neither teaching box nor reset box indicates at all.

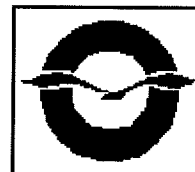
Check the teaching box and reset box power protection fuse (F1) on the timer unit.

- If the Valve output is used and when any schedule is piloted, but the weld gun does not press at all. Check the press circuit protection fuse (F2) on the timer unit.

Date Mar . 7 . 2000  
Up Date Sep . 19 . 2000  
Drawing No. 9 9 C 1 1 - 3 0 0 - 2

Press.

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