

**OPERATION MANUAL**

WELD CHECKER

**MM-315A-00-01**

( M0264E FIRST EDITION )

**MIYACHI TECHNOS CORP.**

## TABLE OF CONTENTS

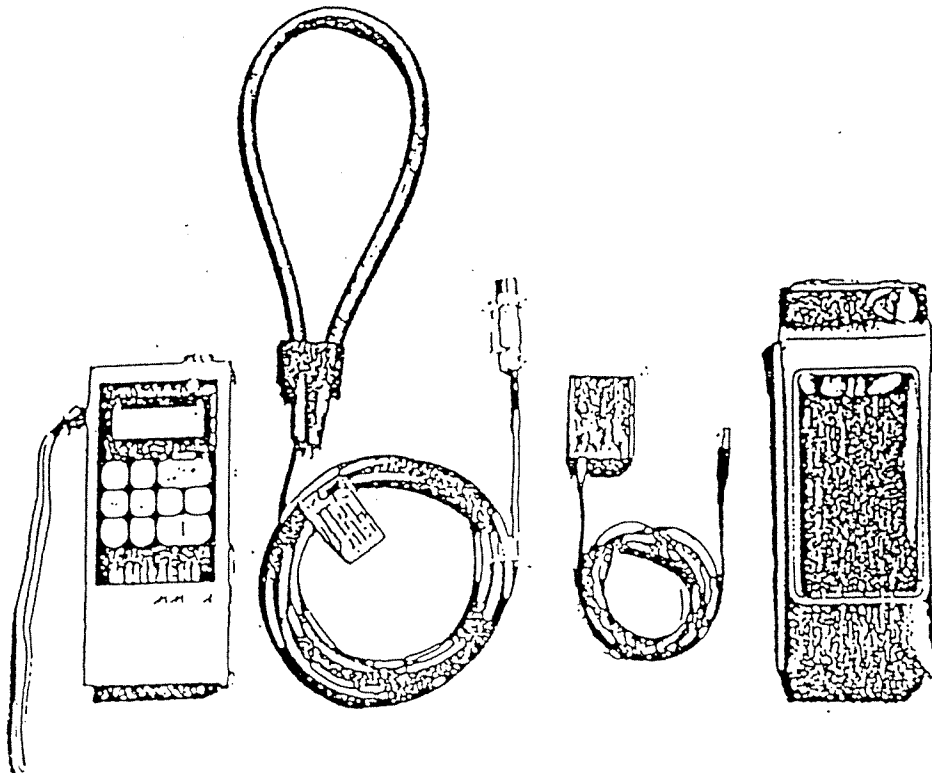
INTRODUCTION	P. 1
MEASUREMENT	P. 3
SUPPLYING POWER	P. 4
CHECKING MEASUREMENT SETTINGS	P. 5,6
RANGE SETTING	P. 6
IMPULSE SETTING	P. 7-9
CYCLE SETTING	P. 10
CHECKING CONDUCTION DEGREES	P. 11
CURRENT MEASUREMENT FOR INVERTERS	P. 12, 13
IMPULSE MEMORY	P. 14-16
HALF CYCLE WELDING	P. 17
OVERFLOW DISPLAYS	P. 17
SWITCHES AND FUNCTIONS	P. 18-20
SPECIFICATIONS	P. 21
BATTERY CHARGING	P. 23, 24

## 1. INTRODUCTION

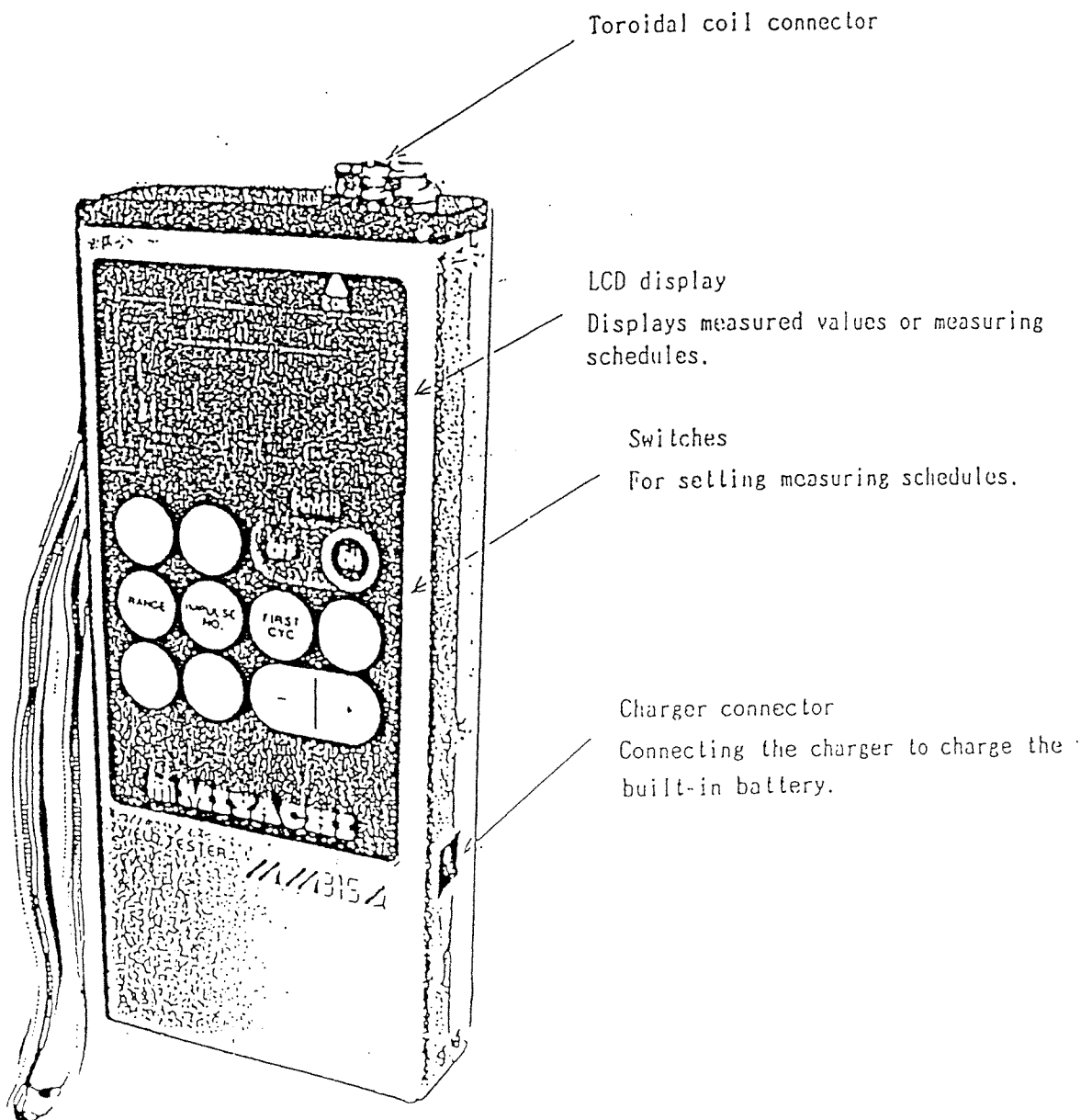
Thank you for your purchase of the Miyachi MM-315A Weld Checker. The MM-315A is a useful and effective instrument for measuring weld current. Please read this operations manual before using your checker.

Upon opening your units box, please check to see that you have the following items:

1. Weld Checker
2. Toroidal Coil
3. Charger
4. Leather Case



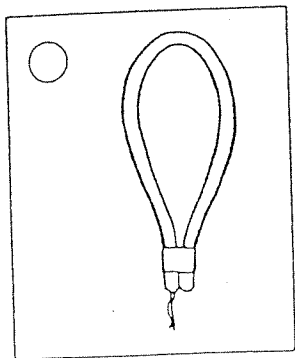
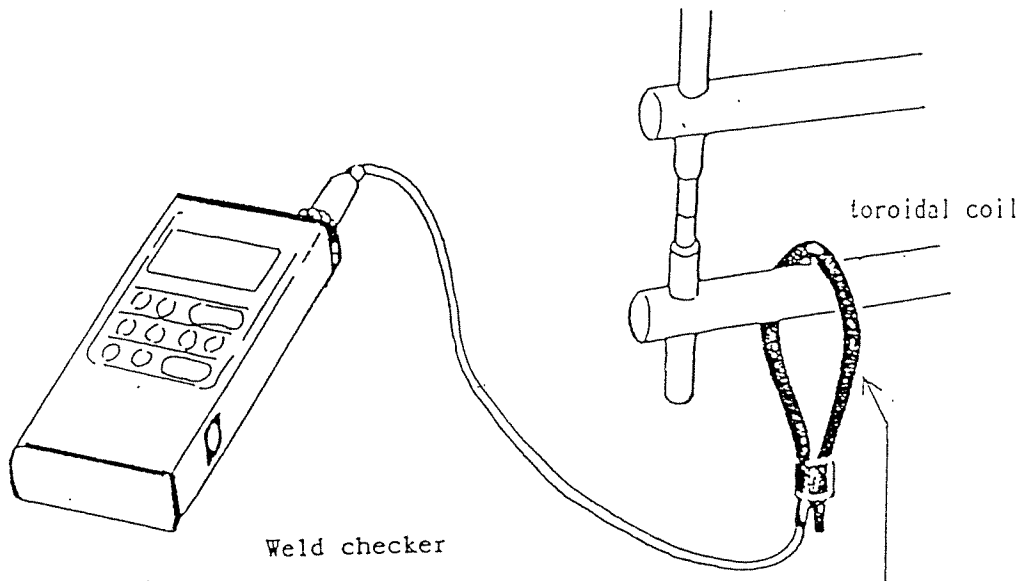
2. NAMES OF PARTS AND FUNCTION OF WELD TESTER



### 3. MEASUREMENT

#### 3-1 SETTING THE TOROIDAL COIL.

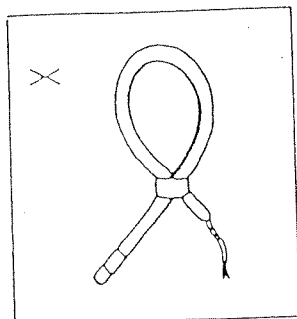
Mount the coil on the welder as shown below, and connect the cord to the connector of the MM-315A.



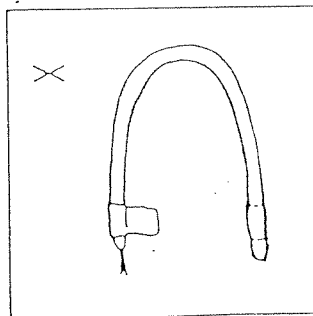
Place the center of the coil on the secondary of the welder.

Line up the ends of the coil, and fasten both ends using the velcro strips. The coil is calibrated in the center of the coil.

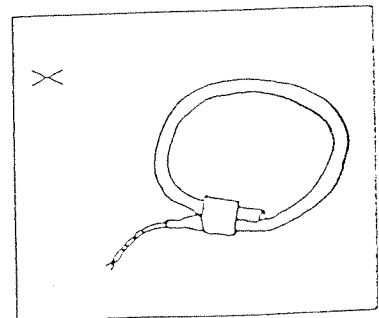
DON'T



cross the coil



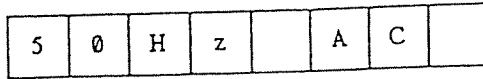
fasten with tape



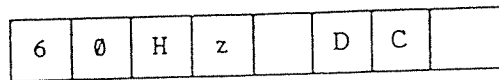
do this

P.3-2 SUPPLYING POWER

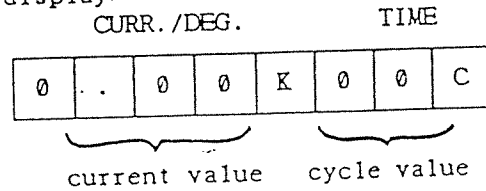
Press the ON switch.



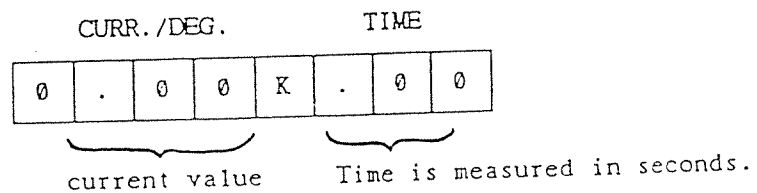
(ON) The measuring conditions are displayed for 0.7 seconds, and then the unit switches to the initial display. The above display shows the unit set at 50Hz AC. When it is set to 60Hz DC, the display shows:



<initial display>



K stands for current values in KA, C for CYCLES. The position of the decimal point shows that the Low range, 9.99KA range, has been selected. For DC welding, when measurement is in seconds (SEC) has been selected, the following display appears:

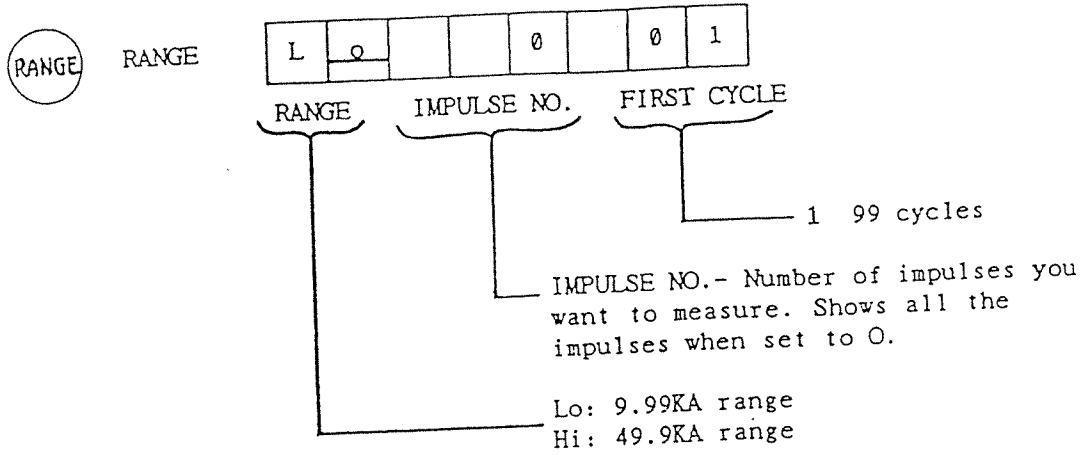


When the initial display is shown, the unit is ready for measurement. The measurement schedules are the ones set previously before the OFF switch was pressed. Weld current can be measured when the initial display is shown. If the initial display is shown after you have turned it on, the unit is ready for measurement. When the impulse No. is 0, it monitors all impulses.

When the weld current is to be measured after the measurement schedules are checked and set as mentioned in 3-3, 3-4, press CURR/DEG switch to get the initial display.

3-3 CHECKING MEASUREMENT SETTINGS

Press the RANGE switch. The following display appears.



Above shows Low range, Impulse No. 0, First cycle is 1.

The above display will be shown when IMPULSE NO. or FIRST CYC. switches are pushed. Also, when 50Hz/60Hz, AC/DC, CYC/SEC switches are pushed, the setting of each can be checked. To change these settings, it is necessary to follow the procedures mentioned in 3-4. Item switches are only to check measurement schedules.

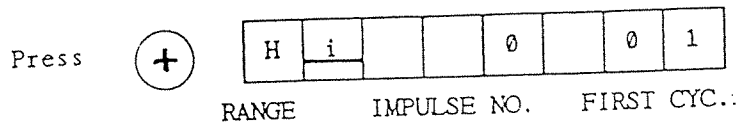
To measure the weld current, push CURR/DEG switch and get the initial display.

### 3-4 MEASUREMENT SETTINGS

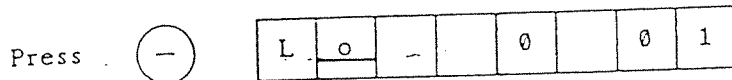
To set the measurement values. Use RANGE, IMPULSE NO., and the FIRST CYC. keys (white) to select each mode. Use + and - keys to set figures.

#### 3-4-1 RANGE SETTING

Use + or - keys to set data. The cursor is in the Lo Range at 3-3. It shows that this mode can be set. Press + in this situation.



The range display changes from Lo to Hi, showing that the 49.9KA range has been selected.



The range changes to Low again.

Current Ranges:

- Lo range: 1.0KA - 9.99KA
- Hi range: 5.0KA - 49.9KA



3-4-2 Impulse No. setting

IMPULSE  
NO.

L	o			0		0	1
RANGE		IMPULSE NO.			FIRST CYC		

Cursor moves to IMPULSE NO.

Press + key.

+

L	o			1		0	1
---	---	--	--	---	--	---	---

Impulse No. becomes 1.

Impulse No. is set to 1. Keep pressing + key till figure reaches 9.

L	o			1		0	1
---	---	--	--	---	--	---	---

↓

L	o			2		0	1
---	---	--	--	---	--	---	---

⋮

↓

L	o			9		0	1
---	---	--	--	---	--	---	---

Number increases up to 9.

To return to 1, press - key.

-

L	o			9		0	1
---	---	--	--	---	--	---	---

↓

L	o			8		0	1
---	---	--	--	---	--	---	---

⋮

↓

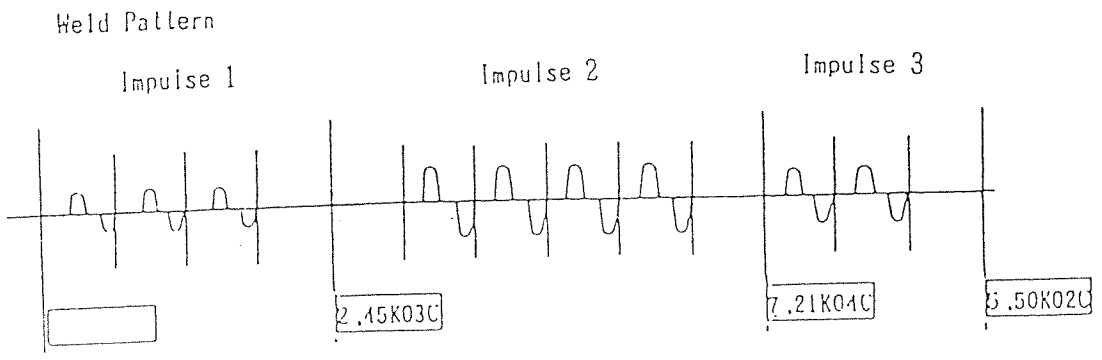
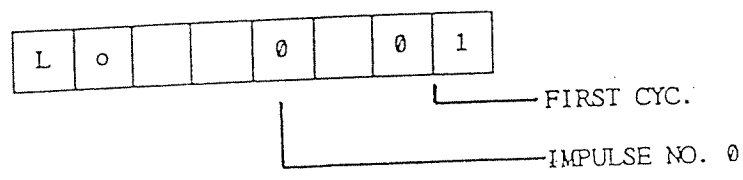
L	o			1		0	1
---	---	--	--	---	--	---	---

Impulse No. becomes 1.

Note 1: Impulse No. setting and display.

When the Impulse No. is 0 the Checker monitors all impulses. The display will disappear at the start of the weld, or the 1st impulse. Impulse No. 1 is displayed during Impulse No. 2.

For example, suppose the following settings were used to monitor the weld shown below.



display disappears at the start of weld

Imp.No.1 readout

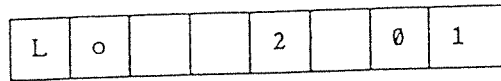
Imp.No.2 readout

Imp.No.3 readout

When Impulse No. is 1 - 9.

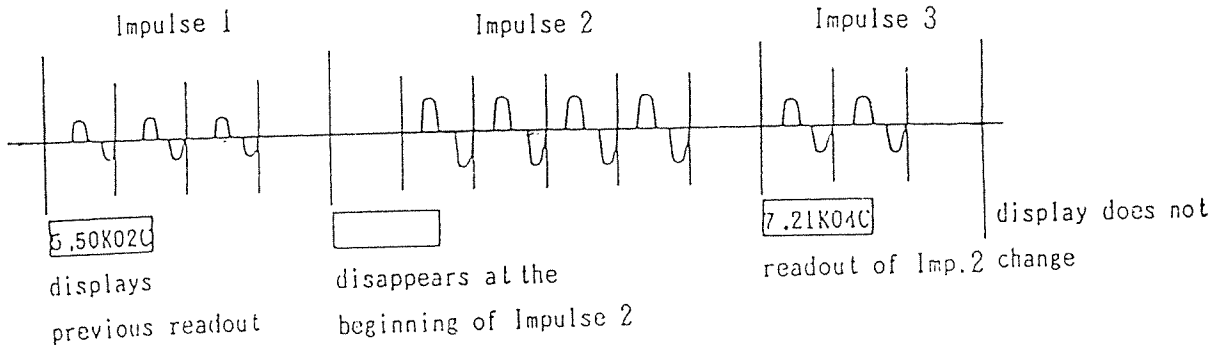
The display shows the information only for the number you set. Each impulse No. setting monitors only the impulse specified. For example, when Imp. No. is set to 2 and the weld pattern is the same as before, the following is displayed.

setting

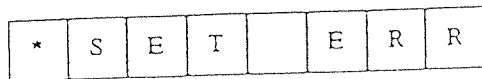


└── Impulse No. 2

Weld Pattern



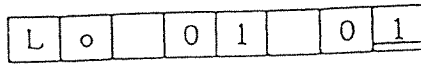
When measurement is done with CURR/DEG key pressed and there is no impulse for the number set,



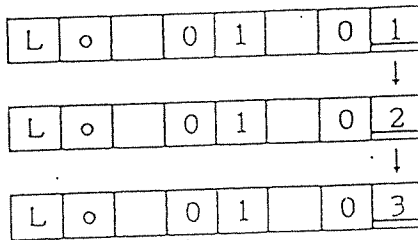
is displayed. As to the judgement of the Impulse No., refer to All Impulse Memory in 3-7.

### 3-4-3 SETTING OF THE FIRST CYCLE

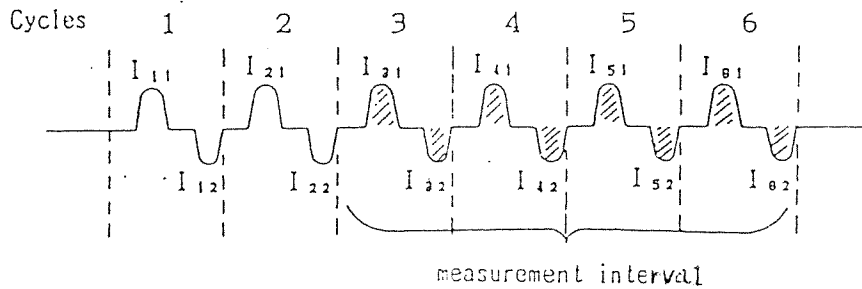
Press FIRST CYCLE.



Cursor moves to FIRST CYC. Press + and set First Cycle to 3.



First cycle is set to the 3rd cycle. To measure weld current, press CURR/DEG switch to get the initial display. When the First Cycle is set to 3, and if the following current is run, the measured interval will be as follows:



$$\text{displayed current values} = \frac{I_{31} + I_{32} + I_{41} + I_{42} + I_{51} + I_{52} + I_{61} + I_{62}}{8}$$

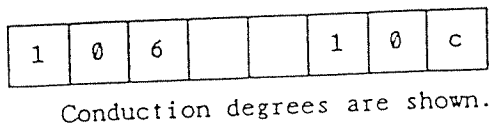
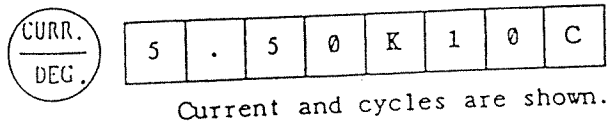
average true values

Measurement starts at the third cycle and the first and second cycles are ignored. To measure weld current, don't forget to press the CURR/DEG key to get the initial display.

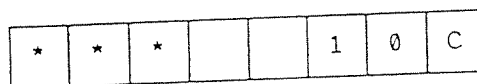
3-5 CHECKING CONDUCTION DEGREES

After weld current is measured, press CURR/DEG while current value is displayed. Conduction degrees can be checked.

Press CURR/DEG.

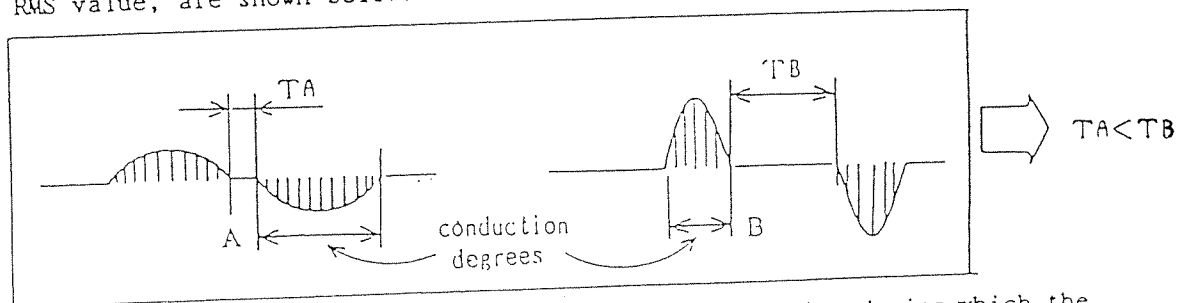


Press CURR/DEG again and current and cycle values are shown. Current and conduction degrees are measured at the same time. In DC measurement, the conduction degrees will be as follows:



About Conduction Degrees:

For single - phase AC welders, the wave forms A and B, which have the same RMS value, are shown below.



Even though the RMS current values are the same, the time during which the current doesn't flow is different (TA in A, TB in B). This time causes the heated work to cool down. Therefore, a good quality weld without splash is easier to obtain with A, where the time when no current flows is short. On the other hand, with B, the weld transformer has more capacity left, so the weld current can be increased.

### 3-6 CURRENT MEASUREMENT OF FREQUENCY INVERTER WELDERS

First Press the AC/DC key.

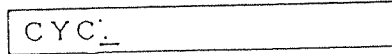


Present setting is shown.

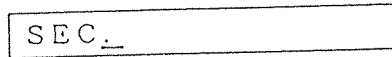
Press + to get DC mode.



Next, press CYC./SEC. key to get the time display SEC.

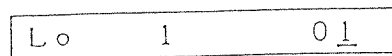


Press + and it shows SEC.



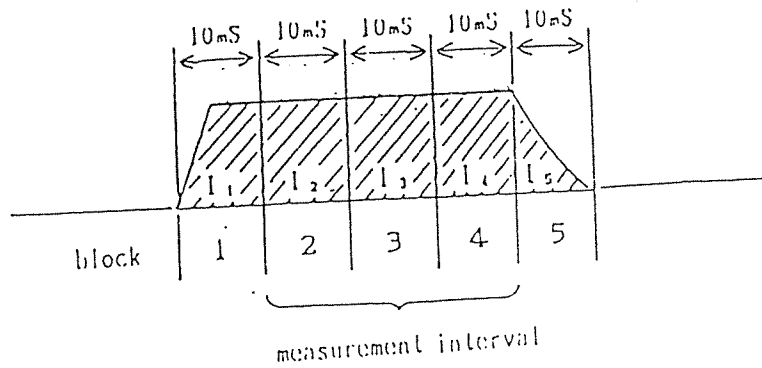
Now the time display will be 0.00 second when CURR./DEG. key is pressed.  
CYC./SEC. key does not function when the unit is not in DC mode.

Next, it is time to set the start of the measurement.  
Press FIRST CYC. key.



With the above procedure, setting of the measurement conditions is complete.  
To measure current, press CURR./DEG. key and get the initial display.

When the time shows SEC (second), the weld time is divided into 10mS blocks from the start of the weld and the number displayed shows at which block the measurement begins. For example, when this number is set to 2, the measurement interval is as follows. The blocks from 2 on will be measured.



$$\text{displayed current values} = \frac{I_2 + I_3 + I_4}{3}$$

average true values

In case of DC measurement, when  $I_5$  becomes 75% of  $I_4$ , measurement is over.

measured readout

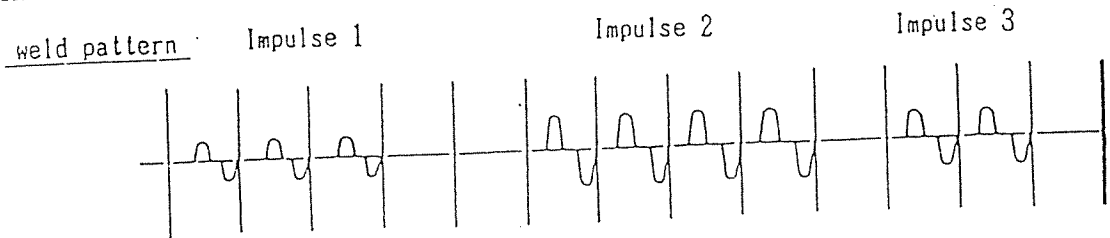
4	.	5	0	K	.	0	4
---	---	---	---	---	---	---	---

The above shows a current value of 4.50KA, and a weld time of 0.04s (40mS).

### 3-7 IMPULSE MEMORY

How to store data.

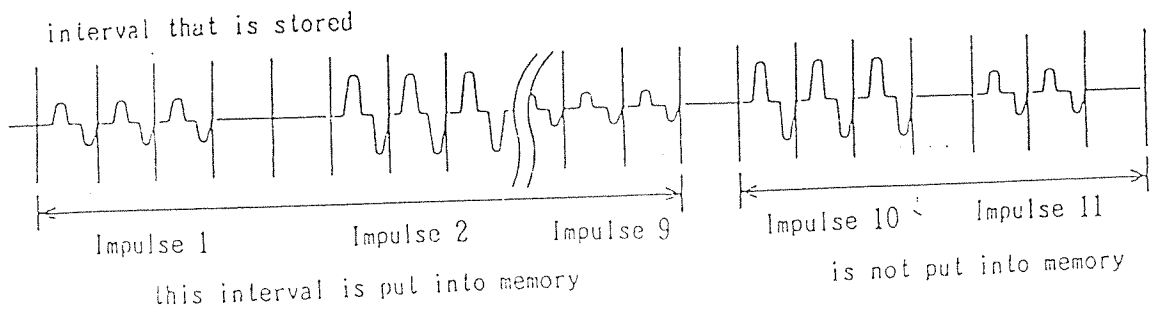
The MM-315A is able to store up to 9 pulsations with more than 1 cool cycle in the memory.



The following table shows the weld pattern:

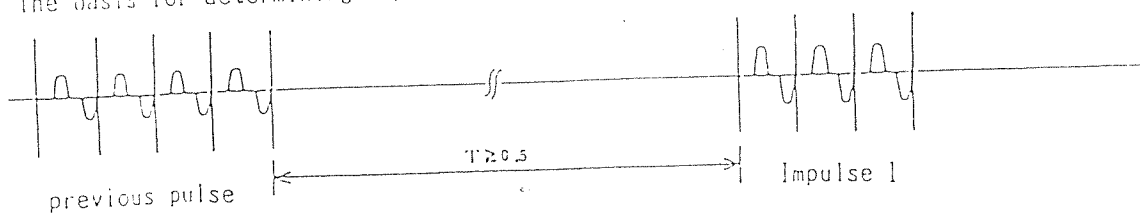
Impulse No.	Current	Time	Conduction Degrees
1	2.45KA	3 cycles	84
2	7.21KA	4 cycles	137
3	5.50KA	2 cycles	118

The unit stores current, time, and conduction degree values in its memory for up to 9 pulses. Those from 10 on are not stored. Also, when the interval between impulses is more than 0.5 seconds, the following weld is considered Impulse No. 1 and stored.



$$1 \text{ cycle} \leq \text{cool cycle} < 0.5 \text{ second}$$

The basis for determining Impulse 1 is



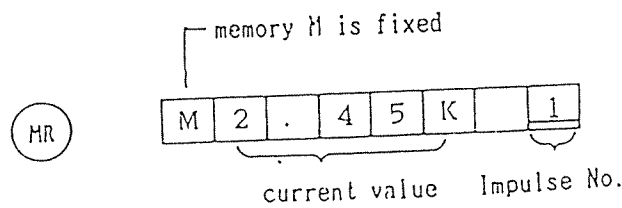


If there is more than 0.5 seconds between pulsations, the next weld is considered impulse No. 1.

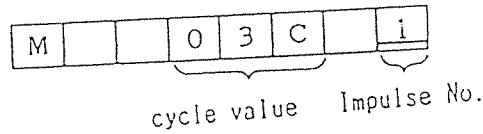
All previous memory information is cleared when the power is shut off or a new weld is run.

Confirmation of All Impulse Memory

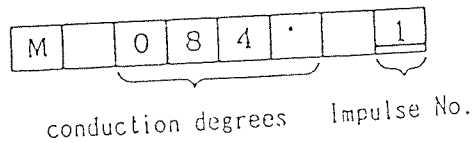
After the weld is run with the previous weld schedule, press the MR key.



The impulse No. 1 current value is shown. To check the time, press MR again.



The cycle value of Impulse No. 1 is shown. To check the conduction degrees, press MR again.

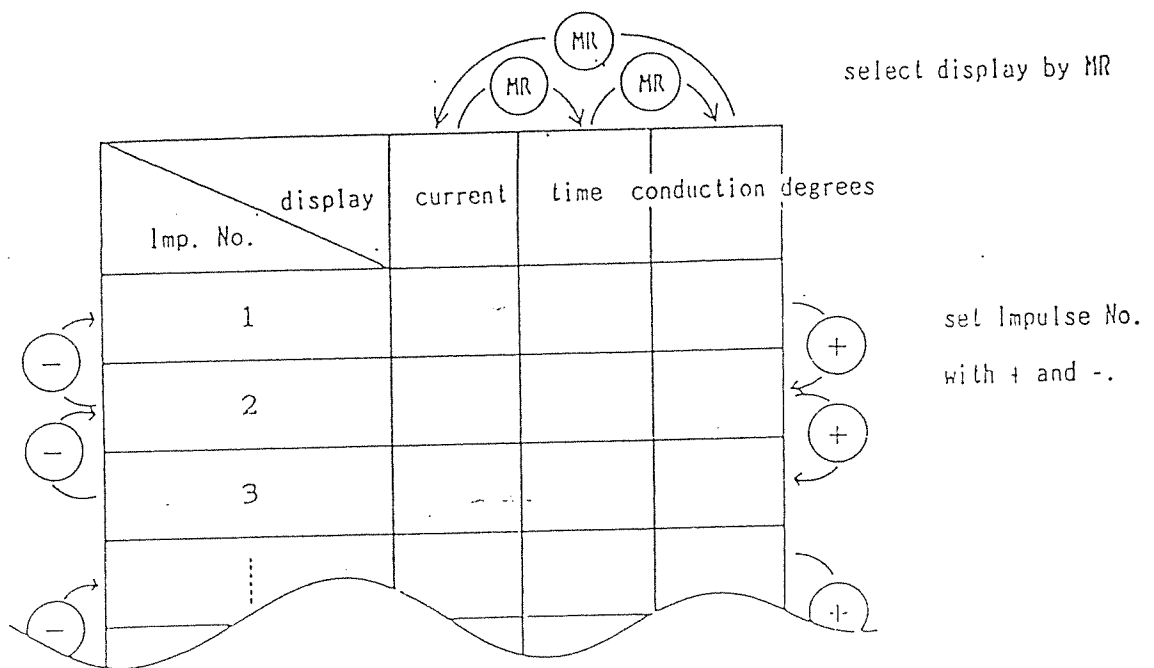


The conduction degrees of Impulse No. 1 is shown. By using the + and switches it is possible to change the Impulse No. and check the values.

Note: The MR key is used to select current, time and conduction degree displays. These are horizontal movements. The + and - switches are used to set the impulse No.. These are for vertical movement.

Use MR for horizontal movement and + or - keys for vertical movement.

Look for the spot you want to see using MR , + and - keys.



Press CURR/DEG key to measure current.

3-8 HALF CYCLE WELDS

A half cycle weld is indicated by adding a decimal point to the left of the cycle symbol C. The point indicates 0.5 cycle, for example, when a 12.5 cycle weld runs. The display will be:

8	.	5	0	K	1	2	.C
---	---	---	---	---	---	---	----

decimal point indicates 0.5 cycle.

When the batteries become weak, the C will be displayed in reverse highlight to indicate that the batteries must be recharged.

8	.	5	0	K	1	2	⋄C
---	---	---	---	---	---	---	----

3-9 OVERFLOW DISPLAY

When the measured current values go beyond the maximum setting range, the overflow mark (↑) will be shown. Also, when the time goes over 99 cycles in AC, and 40 cycles in DC, the overflow mark (↑) will be shown in the time display.

↑	.	↑	↑	K	1	2	C
↑	↑	.	↑	K	1	2	C
8	.	6	0	K	↑	↑	C

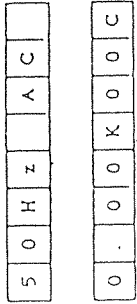
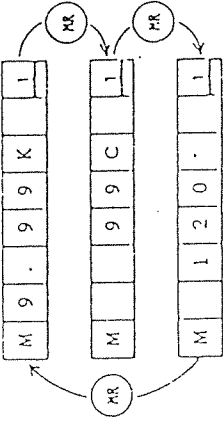

current is over limit in Lo range  
 current is over limit in Hi range  
 time is over limit in Lo range

Overflow mark display standards.

Current values : Low range >9.99KA  
 High range >49.9KA

Time: AC > 99 cycles  
 DC  
 CYC.> 40 CYCLES  
 SEC.> 0.80

4. Switches and Functions


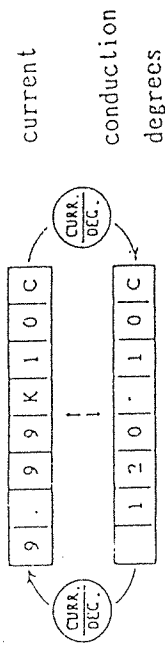

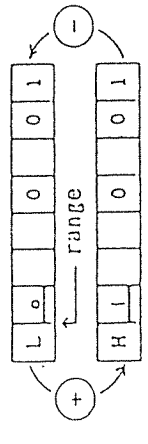

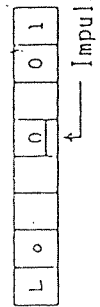

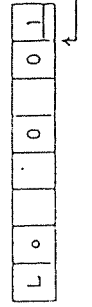

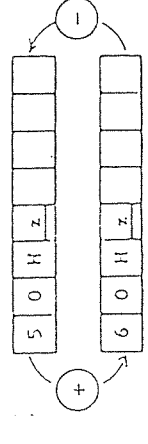

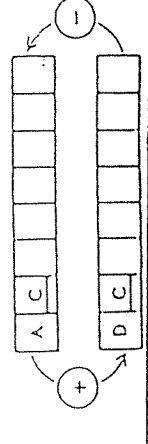
<p>ON</p>	<p>Power ON switch</p>  <p>initial display</p>	<p>Display indicates the set frequency, AC or DC current measurement for 0.7 seconds and returns to the initial display.</p>
<p>OFF</p>	<p>Power OFF switch</p>	<p>Power OFF switch</p>
<p>MR</p>	<p>Memory Read switch Maximum 9 welds can be put into memory</p>  <p>current values display Impulse No. and Cycle values display Conduction degrees display</p> <p>when no data to measure</p> 	<p>Press MR switch and the current values of Impulse No. on the right are shown. Press MR switch again and the cycle values are shown. Press MR switch again and the conduction degrees values are shown. Press MR switch again and the current values are shown. Use + or - key to change Impulse No.</p> <p>when there is no weld, NO DATA appears.</p>


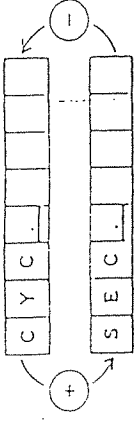


Power ON/OFF

to check pulsation

to measure current

to check measurement schedules

	<p>Current/Conduction Degrees Selection Switch</p> 	<p>Whenever CURR/DEC switch is pressed, it selects current or conduction degrees. Do not press it while welding as measured values become inaccurate. Can measure only in this mode.</p>
	<p>Range switch</p> 	<p>Selects the range.          + Hi ... 49.9KA range          - Lo ... 9.99KA range</p>
	<p>Impulse No.</p> 	<p>Sets Impulse No. No.0 - 9          + increase number          - decrease number</p>
	<p>First Cycle:</p> 	<p>Sets First Cycle 1 - 99 cycles          + increase number          - decrease number</p>
	<p>50/60Hz selection switch</p> 	<p>Selects 50Hz, 60Hz.          + 60Hz          - 50Hz</p>
	<p>AC/DC select switch</p> 	<p>Selects AC, DC.          + DC          - AC</p>

	<p>DC measur. item select switch</p> 	<p>Receives switch input only when in DC mode. Sets time measuring item in DC mode. + for SEC - for CYC.</p>
	<p>data increase key</p>	<p>Increase data by 1 with + key when number is set.</p>
	<p>data decrease key</p>	<p>Decrease data by 1 with - key when number is set.</p>

To set measurement schedules

press measurement schedule switches you want to set

## 5. Specifications

Pick up : by toroidal coil (MB-500-15)

Measurement :

Current

Measurement range : 1KA - 9.99KA (9.99KA range, Lo range)

5KA - 49.9KA (49.9KA range, Hi range)

Measured values : root mean square (RMS)

Accuracy :  $\pm 2\%$  against full scale

Impulse Number : 0 - 9

First Cycles : 1 - 99 cycles

Measurement End : AC less than 2% of full scale

DC less than 75% of preceding cycle

Display : three-digit

Weld Time

Measurement Range : AC 1 - 99 cycles

DC cycles 1 - 40 cycles

seconds 0.01 - 0.80 seconds

Measured Values : Numbers of cycles or time for full welding cycle

Accuracy :  $\pm 0$  cycle

Display : 2-digit

Conduction Degrees

Measurement Range : 30 - 180°

Measured Values : maximum conduction degrees of measured interval

Accuracy :  $\pm 5\%$

Display : 3-digit

Multi-step Welds Memory Function

Impulse No. : up to 9 steps are put into memory

Impulse No. is reset to the initial setting with more than  
0.5 seconds of cool time.

Net Weight : 500grams (including 4 batteries)

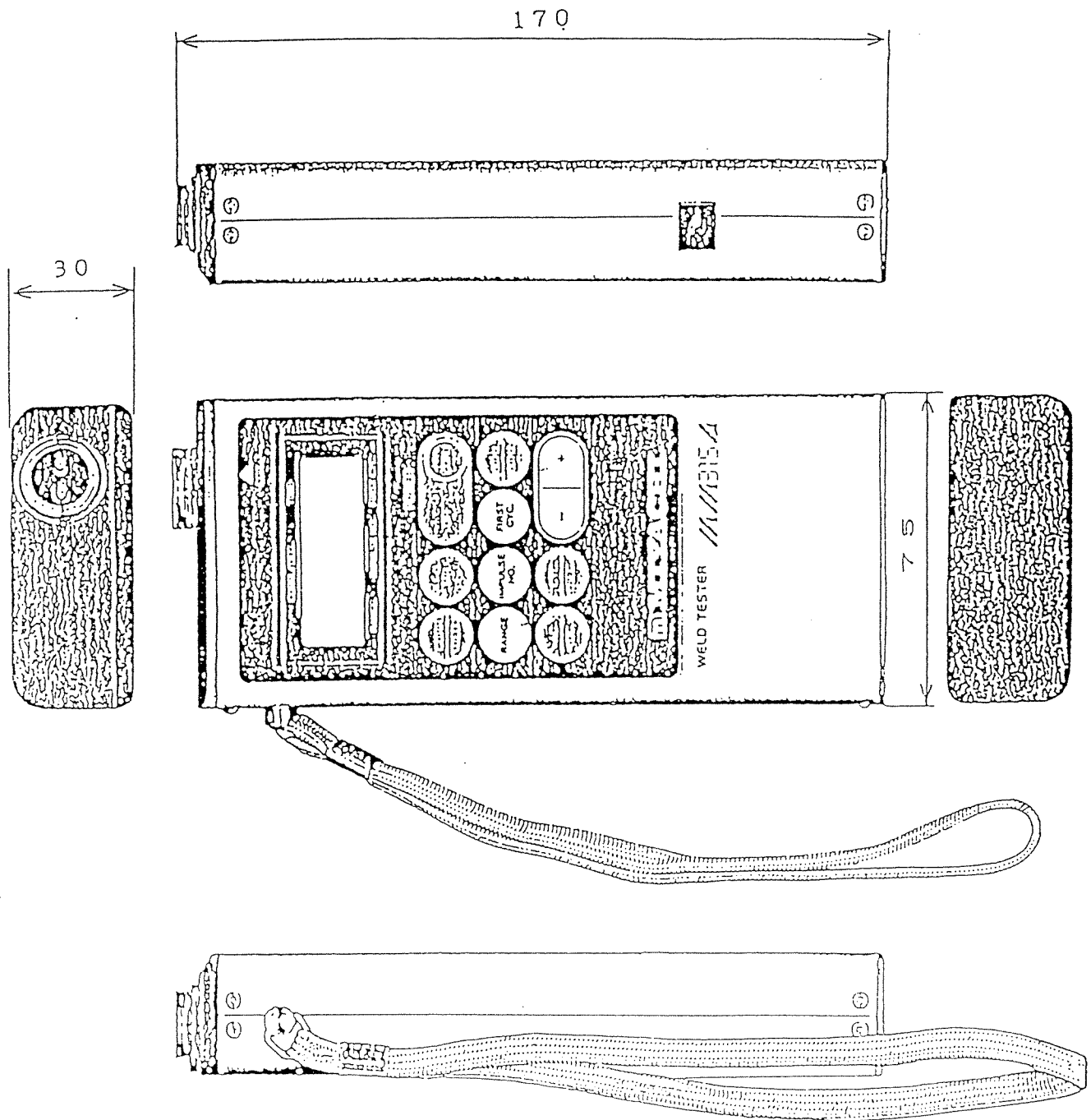
Dimensions : 170(H) x 75(W) x 30(D)

Power Source : Four 1.2V nickel cadmium batteries

Ambient Temperature : 0 ~ 40 °C

Accessory Charger : Input AC 120V 50/60Hz

6. Appearance

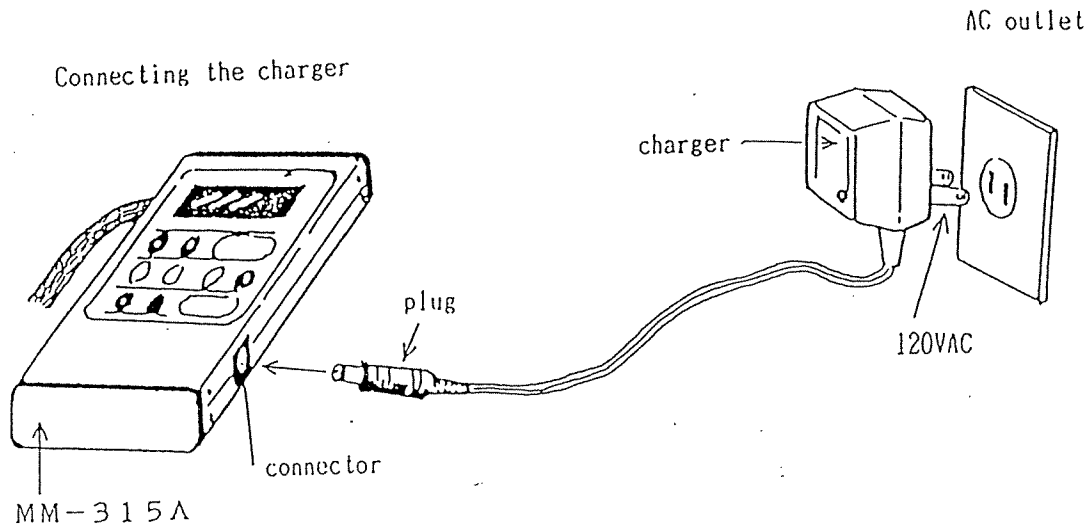




7. How to charge the battery

7-1 Connecting the unit and the charger

This model is designed to be used only with nickel cadmium batteries.  
Recharging is done with the accessory charger.

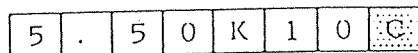


Connect the plug to the recharge connector of the unit and plug the charger into a 120VAC outlet. It takes 15 hours to charge.

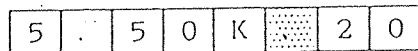
7-2 When should it be recharged?

Recharge it when the reversed highlight letter appears on the weld time display.

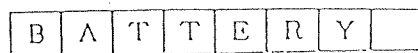
1) When measuring cycles, the letter C is displayed in reverse highlight.



2) When measuring seconds, the decimal point is displayed in reverse highlight.



3) Or the following word appears and the power is shut off.



When the battery discharge is excessive, the above displays may not be shown.

7-3 Measurement while recharging

It is possible to do measurement with the recharge plug inserted in the unit, but in order to obtain more accurate measurement, it is recommended that you measure after recharging is done and the plug is removed.

#### 7-4 Life of nickel cadmium batteries

##### 1) cycle life of charge/discharge

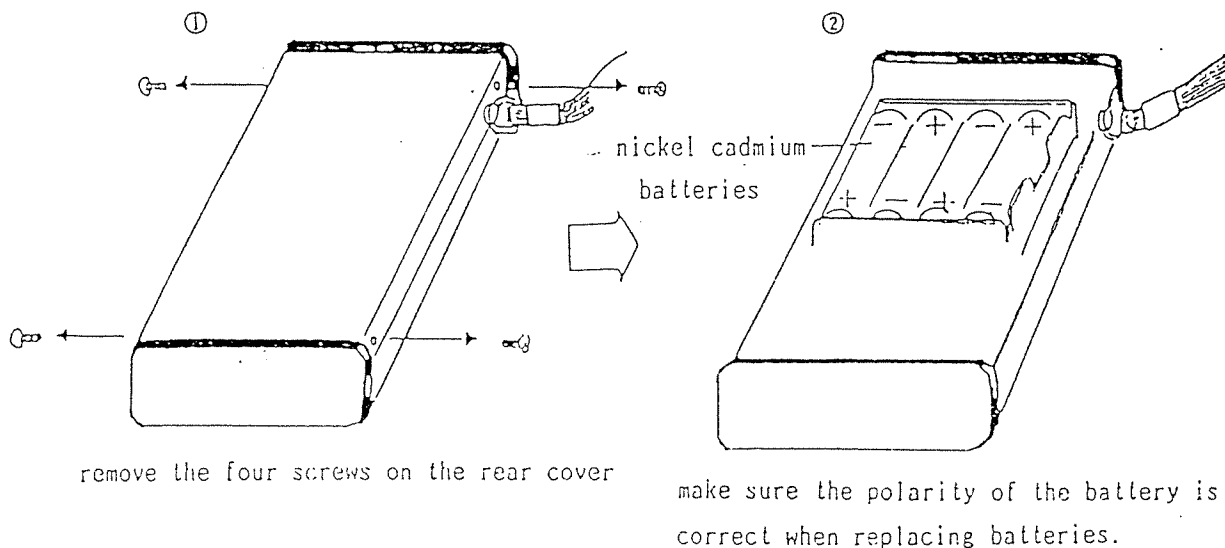
More than 500 charges/discharges are possible with proper use. If the length of use becomes very short, even when the batteries are charged properly, it may be time to change the batteries.

##### 2) Batteries after long period of use

Normally the batteries can be used 3 - 5 years under average conditions.

If they are kept for a long period of time without being used, their life will be shortened.

#### 7-5 How to change the nickel cadmium batteries

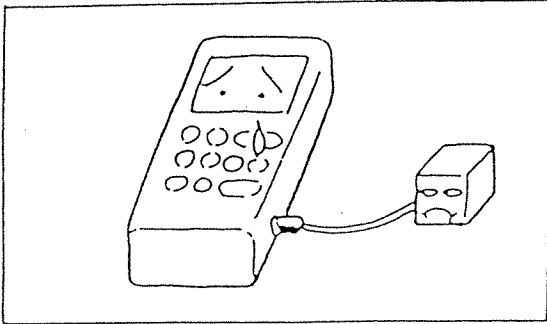


when the batteries are changed, be sure to change all four batteries.

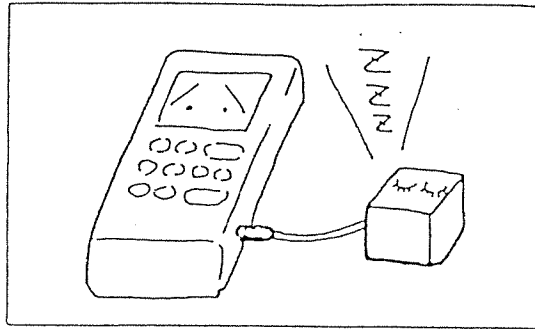
Recommended batteries: JIS Model KR-AA Nickel cadmium battery (UM-3)

Voltage 1.2V Capacity 500mAh

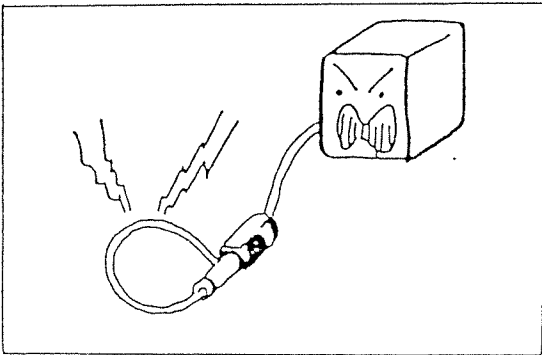
do not use another charger.



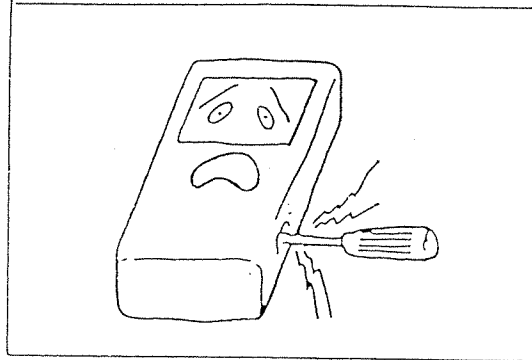
do not charge more than 16 hours.



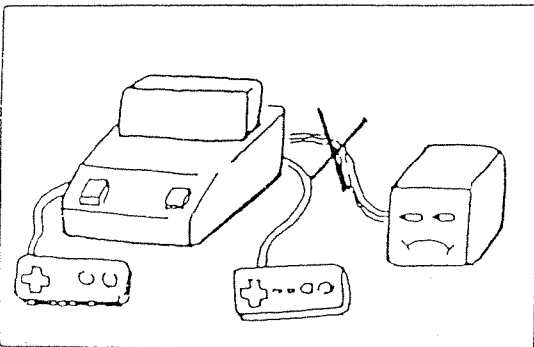
do not short circuit the plug while the charger is connected to an outlet.



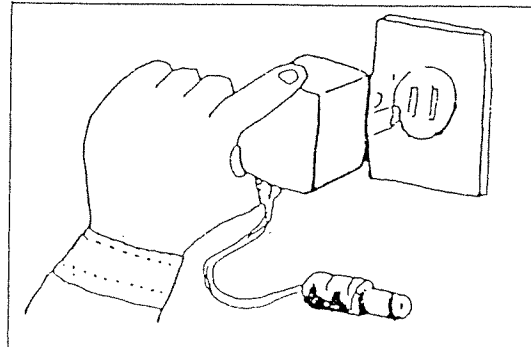
do not short circuit the connector of the charger with screw drivers, etc.



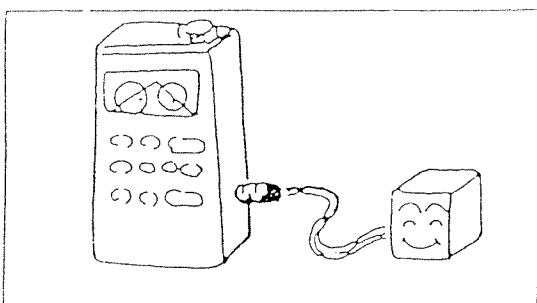
do not use the accessory charger for anything other than MM-315A.



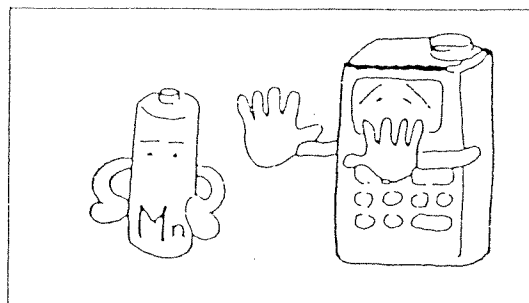
remove the charger from the outlet when it is not used for charging.



even if the unit is not used for a long time, charge it once very six months.



do not use regular batteries.



## Notice

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- (2) The contents of this manual are subject to change without notice.
- (3) If you have any questions on the contents of this manual or find any errors or omissions in it, please notify Miyachi Technos Corporation.

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