MIYACHI

OPERATION MANUAL

WELD SCHEDULE PROGRAM
MONITOR UNIT

MA-201C

(M0027E FIRST EDITION)

ミヤチテクノス株式会社

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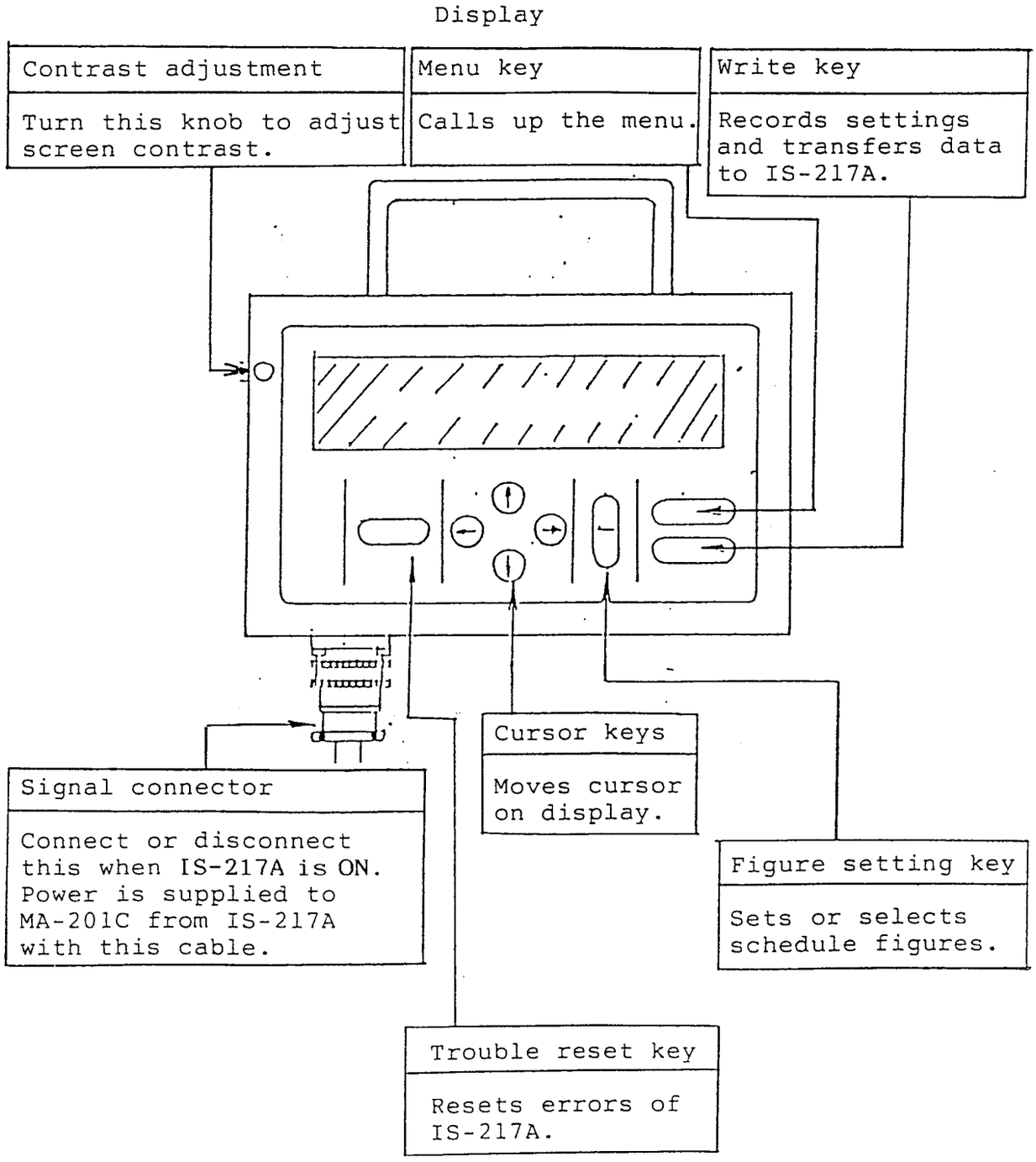
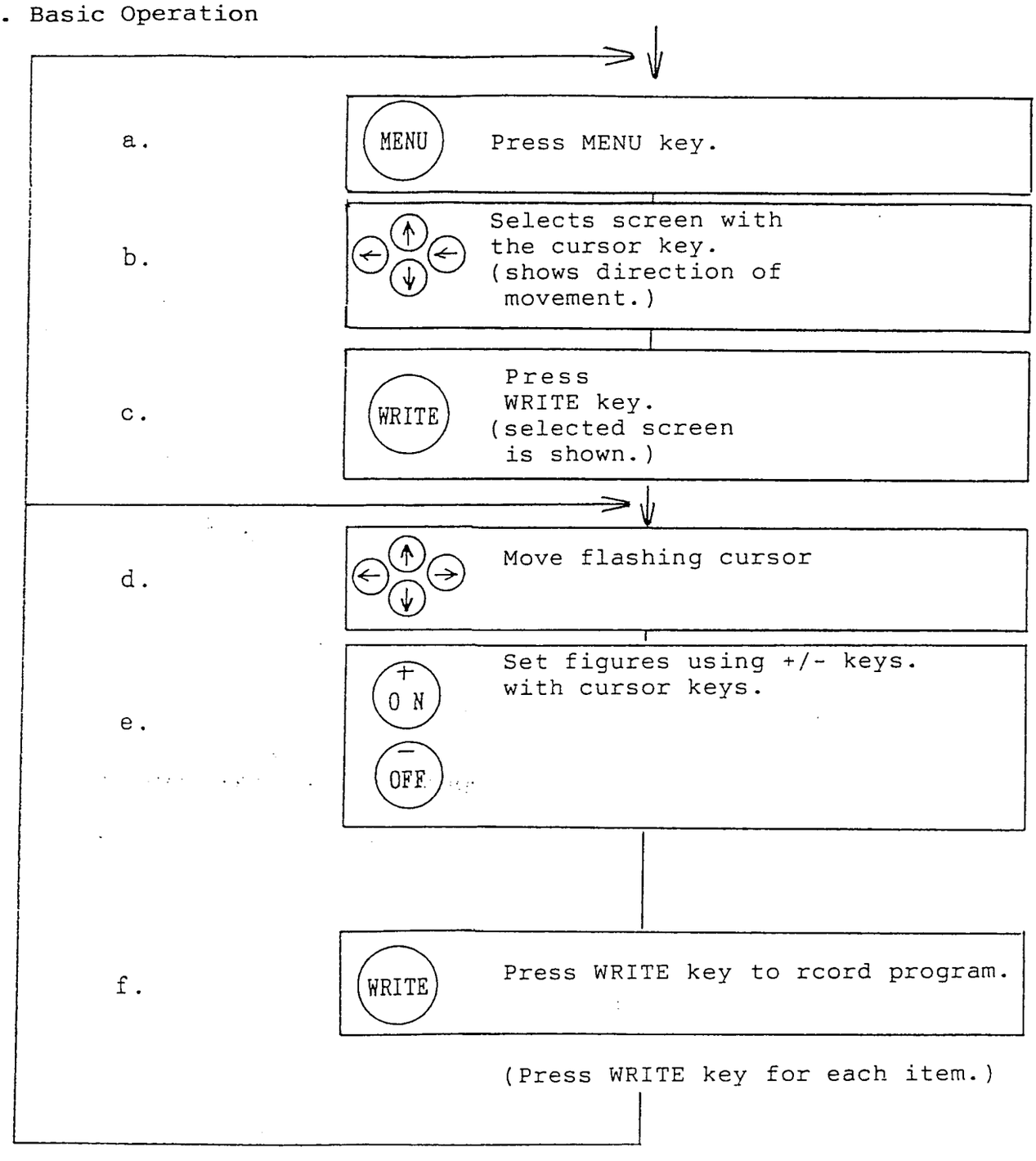
1. Introduction

MIYACHI MA-201C WELD SCHEDULE PROGRAM/MONITOR is designed primarily to set weld schedule for IS-217A Inverter Type Resistance Welding Power Supply, and also provides other features such as weld monitor, schedule copy, etc.

2. Front Panel



3. Basic Operation



a, b and c show display selection, while schedule setting is done by repeating d, e, and f.

4. Display

(1) MENU display

```
- MENU -
  CONTROL NO. /DATE          COPY SETUP DATA
  SCHEDULE                   MODE SELECT (1)
  MONITOR                    MODE SELECT (2)
  STEP NO.
  STEP COUNT
  HEAT CHANGE%
  WELD COUNT
```

This MENU display is the display to select subsequent screens.
The above display shows the initial display, and can be called up with the MENU key on the front panel anytime.

CONTROL NO./DATE display
This display is for inputting the model number and program date.

SCHEDULE display
Is for setting welding schedules.

MONITOR display
Displays the results of the previous weld.

STEP NO. display
Is for inputting Step-up No. to 4 pressure valve system.

STEP COUNT display
Is for inputting step-up count numbers.

CURR CHANGE% display
Sets current increase rate.

WELD COUNT display
Sets number of welds for weld count monitor.

COPY SET UP DATA display
Is for copying data.

MODE SELECT (1) display
Is for setting the control system, monitor upper/lower limits, transformer turn ratio, etc.

MODE SELECT (2) display
Is for turning functions ON and OFF.

(2) CONTROL NO./DATE display

```
-CONTROL NO. /DATE

 CONTROL NO.                    0001
 PROGRAM DATE                   1990. 01. 01

 MA-201C        V1-01A
 IS-217A        V1-01A
```

The control unit number and program date are input at this screen. (it does not affect control functions)

CONTROL NO. Set the unit number.
PROGRAM DATE Set the program date.

(3) SCHEDULE display

```
-SCHEDULE  =01  SOL  NO.1

          SQZ WE1  COOL  WE2  HOLD  OFF
 TIME     000  00    00    00    00   000   CYC
 UP  SLOPE     00          00               CYC
 DOWNSLOPE                 00               CYC
 HEAT          0. 40       0. 40          KA (STEP1)
 PULSATION              -------- X1
```

Welding schedules are input at this screen.
Note a) Press the WRITE key for each item when storing data.
Note b) When msec measurement is used, CYC changes to ms, UP SLOPE to RISE, DOWN SLOPE to FALL.

Both SCHEDULE and MONITOR screens can be selected from the other one by pressing the TROUBLE RESET key without having to MENU.

One of the following 2 modes will be shown on this SCHEDULE display.
   a) schedule display showing milliseconds
   b) schedule display showing cycles
The selection for the above modes is done at MODE SELECT (2).

1) SCHEDULE display data (millisecond measurement)

Item	Setting Range	Unit	Explanation
SCHEDULE	01-15		schedule number selection
Sol No.	1-4		valve number setting
Sqz (TIME)	000-999	ms	squeeze time setting
WE 1 (TIME)	00-99	ms	weld 1 time setting
WE 1 (RISE)	0-49	ms	rise time setting
WE 1 (HEAT)	0.40-5.00	KA	heat setting for constant current control
WE 1 (HEAT)	0.20-5.00	KW	heat setting for constant power control
COOL (TIME)	00-99	ms	cool time setting
WE 2 (TIME)	00-99	ms	weld 2 time setting
WE 2 (RISE)	0-49	ms	rise time setting
WE 2 (FALL)	0-49	ms	fall time setting
WE 2 (HEAT)	0.40-5.00	KA	heat setting for constant current control
WE 2 (HEAT)	0.20-5.00	KW	heat setting for constant power setting
HOLD (TIME)	000-999	ms	hold time setting
OFF (TIME)	00-999	ms	off time setting
PULSATION	1-9		number of impulses

2) SCHEDULE display data (cycle measurement)

Item	Setting Range	Unit	Explanation
SCHEDULE	01-15		schedule number selection
SOL NO.	1-4		valve number setting
SQZ (TIME)	00-999	CYC	squeeze time setting
WE 1 (TIME)	00-30	CYC	weld 1 time setting
WE 1 (UP SLOPE)	0-20	CYC	up slope time setting
WE 1 (HEAT)	0.40-5.00	KA	heat setting for constant current control
WE 1 (HEAT)	0.20-5.00	KW	heat setting for constant power control
COOL (TIME)	00-99	CYC	cool time setting
WE 2 (TIME)	00-30	CYC	weld 2 time setting
WE 2 (UP SLOPE)	0-20	CYC	up slope time setting
WE 2 (DOWN SLOPE)	0-9	CYC	down slope time setting
WE 2 (HEAT)	0.40-5.00	KA	heat setting for constant current control
WE 2 (HEAT)	0.20-5.00	KW	heat setting for constant power control
HOLD (TIME)	00-999	CYC	hold time setting
OFF (TIME)	00-999	CYC	off time setting
PULSATION	1-9		number of impulses

(4) MONITOR screen

```
-MONITOR                        SCHEDULE=01    SOL NO. 1

  STEP=1  STEP COUNT=0000    WELD COUNT=0000
  HEAT MONITOR  WELD1 ±00%  WELD2 ±00%

          TIME     CURR     VOLT     POWER    CONTROL%
  WELD1   00ms     0.00KA   0.00V    0.00KW     00.0%
  WELD2   00ms     0.00KA   0.00V    0.00KW     00.0%
```

This screen shows the results of the previous weld. By pressing the TROUBLE RESET key, you can change from monitor screen to schedule screen and mode 1 screen or vice versa without selecting the MENU screen.

mode screen → schedule screen → monitor screen

Welding time will be shown in cycles when SCHEDULE mode shows cycles (CYC).

Item		Schedule
	SCHEDULE	: schedule number
	SOL No.	: valve number
	STEP	: step number
	STEP COUNT	: weld count number of current step
	WELD COUNT	: weld count number when weld count monitor is functioning
HEAT MONITOR	WELD 1	: percentage of difference between weld 1 current setting and monitored current.
	WELD 2	: percentage of difference between weld 2 current setting and monitored current.
WELD 1	TIME	: weld 1 monitored time
	CURR	: weld 1 monitored current value
	VOLT	: weld 1 monitored voltage value
	POWER	: weld 1 monitored power value
	CONTROL %	: monitored percentage of pulse width against the pulse width control limit.
WELD 2	TIME	: weld 2 monitored time
	CURR	: weld 2 monitored current value
	VOLT	: weld 2 monitored voltage value
	POWER	: weld 2 monitored power value
	CONTROL %	: monitored percentage of pulse width against the pulse width control limit.

(5) STEP NO.; Step number setting

```
-STEP  NO.

          SOL1              1
          SOL2              2
          SOL3              3
          SOL4              4
```

This display is used to set the step-up number for each solenoid value.
SOL 1 STEP NO. : 1 - 5
SOL 2 STEP NO. : 1 - 5
SOL 3 STEP NO. : 1 - 5
SOL 4 STEP NO. : 1 - 5

(6) STEP UP COUNT; Step up weld number setting

```
-STEP UP COUNT    (TOTAL ALL SCHEDULE)
            SOL1     SOL2     SOL3     SOL4
STEP 1      0000     0000     0000     0000
STEP 2      0000     0000     0000     0000
STEP 3      0000     0000     0000     0000
STEP 4      0000     0000     0000     0000
STEP 5      0000     0000     0000     0000
```

This display is used to input step numbers and step count numbers for each valve. Count number for each step is set for each valve: 0000 - 9999

(7) HEAT CHANGE %; Current increase setting

```
-HEAT CHANGE %    SCHEDULE = 07

  STEP1     100%FIXED
  STEP2     100%
  STEP3     100%
  STEP4     100%
  STEP5     100%
```

This display is used to set step-up rate.

STEP 2 - 5 : 100 - 200%
STEP 1 is fixed at 100% of the initial setting values.

Note) When the step-up function is on and the step-up rate is set beyond MAX CURRENT value, the display shows SET ERROR when a start signal is input.

(8) WELD COUNT; Weld number count monitor

```
-WELD COUNT

        SOL1          000
        SOL2          000
        SOL3          000
        SOL4          000
```

This screen is used to set weld count numbers for monitoring.
Count numbers : 000 - 999

(9) COPY SETUP DATA; Data transfer

```
-COPY SETUP DATA

  IS-217A  ---->   MA-201C     (MEMORY  1)
  IS-217A  ---->   MA-201C     (MEMORY  2)

  IS-217A  <----   MA-201C     (MEMORY  1)
  IS-217A  <----   MA-201C     (MEMORY  2)
```

This dsiplay is used to transfer data.

a) IS-217A ---> MA-201C
b) IS-217A <--- MA-201C

With a), all the data settings in the IS-217A are transferred to MEMORY 1 or 2 of the MA-201C Program Unit. With b), the data stored in MEMORY 1 or 2 of the MA-201C are transferred to the IS-217A.

The data transferred from the control to Program Unit are retained for about 30 minutes even if the Program Unit is turned off (power cord is disconnected).

(10) MODE SELECT (1); Control/Monitor mode setting

```
-MODE SELECT (1)              SHCEDULE=01
FEED BACK TYPE        0       PRIMARY CURRENT
CONTROL GAIN          0       AUTO VARIABLE GAIN*2
PIS COUNT             000.0
MAX CURRENT           9.99
PULSE WIDTH LIMIT     100%
HEAT ERROR LIMIT      +00%    -00%
MONITOR WELD NO.      1
```

This display is used to set the control system mode, monitor upper/lower limits, weld transformer turn ratio, etc.

Item	Setting Range	Unit	Explanation
SCHEDULE	01 - 15		Schedule number setting
FEED BACK TYPE	0 - 4		Control system selection 1)
CONTROL GAIN	0 - 8		Feedback volume setting 2)
P/S COUNT	000.0-200.0		Weld transformer turn ratio setting 3) 4)
MAX CURRENT	1.00-5.00	KA	Weld transformer maximum current setting 5)
PULSE WIDTH LIMIT	010-100	%	Control limit setting (Max. pulse width setting)
HEAT MONITOR LIMIT+	00-99	%	Upper limit of current (power) monitor
HEAT MONITOR LIMIT-	00-99	%	Lower limit of current (power) monitor
MONITOR WELD NO.	0-3		Monitor selection 6)

1) Control system selection
Set control system as shown below.

Set No.		Explanation	
0	PRIMARY CURRENT	Primary constant current control	(1)
1	SECONDARY CURRENT	Secondary constant current control	(2)
2	POWER	Constant power control	(3)
3	PRIMARY CURRENT LMT	Primary current limiter control	(4)
4	FIXED PULSE	Fixed pulse weld	(5)

(1) Primary constant current control
Primary current of weld transformer is controlled in constant.

(2) Secondary constant current control
Secondary current is controlled in constant.

(3) Constant power control
Multiplied value of secondary current and voltage between tip is kept in constant.

(4) Primary current limiter control
Primary current peak value of weld transformer is kept in constant. In this control, there is no monitoring.

(5) Fixed pulse weld
The weld runs in the pulse width set in PULSE WIDTH LIMIT. In this control, monitor does not function.

2) Feedback level setting

Set No.	Explanation
0 AUTO VARIABLE GAIN	Automatic feedback
1	feedback value: small
2	↑
3	↑
4	↑
5	↑
6	↑
7	↑
8	feedback value: big

This setting is to adjust control value.
Usually, it is set to 0 for automatic feedback control, but it is possible to set feedback level manually from 1 to 8.

3) Weld transformer turn ratio setting
This must be set for primary constant current control or primary current limiter control. It is not needed for secondary constant current control and constant power control.

4) Weld transformer maximum current setting
Be sure to set this setting.
When maximum current is set greater than actual value and greater current than maximum current runs, it may break weld transformer.

5) Control limit setting (maximum pulse width for PWM control)
This value is usually set at 100%, but it can be used as a limiter when small current is used and high power should be avoided.
Generally speaking, with constant current control, PWM control becomes fullwave when contact with the workpiece is not good. If good contact suddenly occurs in this situation, a high amount of current suddenly occurs and there may be splash or workpiece damage. To prevent this, weld current pulse width upper limit with PWM control can be set to 10 - 100%.
When the current is at a fullwave for more than 5ms or 3 cycles continuously, it is judged as a fullwave error (E-07) and caution signal is output.

6) Monitor selection
Weld 1, 2 heat values and monitor ON, OFF are set as follows:

Set No.	Monitoring time
0	No monitoring
1	Weld 1 monitor
2	Weld 2 monitor
3	Weld 1 and weld 2 are monitored

(11) MODE SELECT (2) screen

```
-MODE SELECT (2)
LOCK SEQUENCE   OFF      WELD COUNT    OFF
RE-WELD         OFF      NO PROGRAM    OFF
END MODE        OFF      CYC WELD      OFF
MODE RESET      OFF      READY SIGNAL  OFF
4  START        OFF
PARITY BIT      OFF
HEAT STEP UP    OFF
```

This screen is used to turn each function ON/OFF.

Function	Explanation
LOCK SEQUENCE	Turns start input signal self hold ON and OFF.
RE-WELD	Turns reweld ON and OFF.
END MODE	Determines hold end signal operation when an error occurs.
MODE RESET	Determines reset and warning alarm operation when an error occurs.
4 START	Selects input signals for 4 schedules (ON) or 15 schedueles (OFF).
PARITY BIT	Turns start input signlas parity check bit ON and OFF.
HEAT STEP UP	Turns step-up function ON and OFF.
WELD COUNT	Turns weld count monitor function ON and OFF.
NO PROGRAM	Turns programmability ON and OFF.
CYC WELD	Turns measurement in cycles ON and OFF.
READY SIGNAL	Turns READY output mode ON and OFF.

a) LOCK SEQUENCE
Turns start input signal self hold ON and OFF.
ON Start input signal is held from the start of squeeze time.
OFF Start input signal is held from the start of weld time.
Note) Signal is held when this is ON, but the signal must be at least 20ms long.

b) RE-WELD
Turns reweld function ON and OFF.
ON When current (power) falls below monitor settings, no hold end signal is output, and current is increased 5% and a reweld occurs. Hold end signal is output after reweld.
OFF No rewelding.
Note) Rewelding does not operate with seam welding.

c) END MODE
Switches hold end signal operation when an error occurs.
ON When current warning (E-06 OUT LIMIT OF CURRENT ERROR) or fullwave warning (E-07 FULLWAVE) happens, no hold end signal is output.
OFF A hold end signal is output 20ms after a current error or fullwave error.

d) MODE RESET
Determines reset and warning alarm operation when an error occurs.
ON When a current warning or fullwave warning occurs, an error signal is output and the next start input signal is not accepted. The unit must be reset by an error reset signal.
OFF When a current warning or fullwave warning occurs, a warning signal is output and the next start input signal is accepted. The unit is reset at the next start input signal or by an error reset signal.

e) 4 START
Selects input signals for 4 schedules or 15 schedules.
ON Start input signal is for one of 4 schedules. (1st, 2nd, 4th or 8th schedule)
OFF Start input signals are 4- bit binary codes for 15 schedules.

f) PARITY BIT
Turns start input signal parity check bit ON and OFF.
ON Turns start input signal parity check on when 15 schedule 4-bit binary start input signals are used (odd number parity).
OFF Turns start input signal parity check off when 15 schedule 4-bit binary start input signals are used.

g) HEAT STEP UP
Turns step-up function ON and OFF.
ON Stepper operates according to STEP NO. settings.
OFF Stepper does not operate.
Note) When step-up function is used, set data with (4) STEP NO., (5) STEP COUNT, (6) CURR CHANGE screens.

h) WELD COUNT
Turns weld count monitor function ON and OFF.
ON The number of welds is counted while the weld count input relay is closed.
(Refer to Count Monitor Timing Chart of IS-217A Operation Manual)
OFF Weld count input terminals are used for interlock input, and the number of welds is not counted.

i) NO PROGRAM
Turns programmability ON and OFF.
ON Program cannot be changed.
OFF Program can be changed.

j) CYC WELD
Turns measurement in cycles ON and OFF.
ON Squeeze time, cool time, weld time, hold time, and off time are measured in CYCLEs.
OFF Squeeze time, cool time, weld time, hold time, and off time are measured in milliseconds.

k) READY SIGNAL
Turns ready output mode ON and OFF.
ON Rear terminal 32-33 relay output serves as the ready output.
(Refer to Ready Output of IS-217A Operation Manual)
When MODE RESET is OFF, this is not output even if a current or fullwave warning occurs.
OFF Rear terminal 32-33 relay output serves as the caution output.

5. Error Codes and Their Meanings

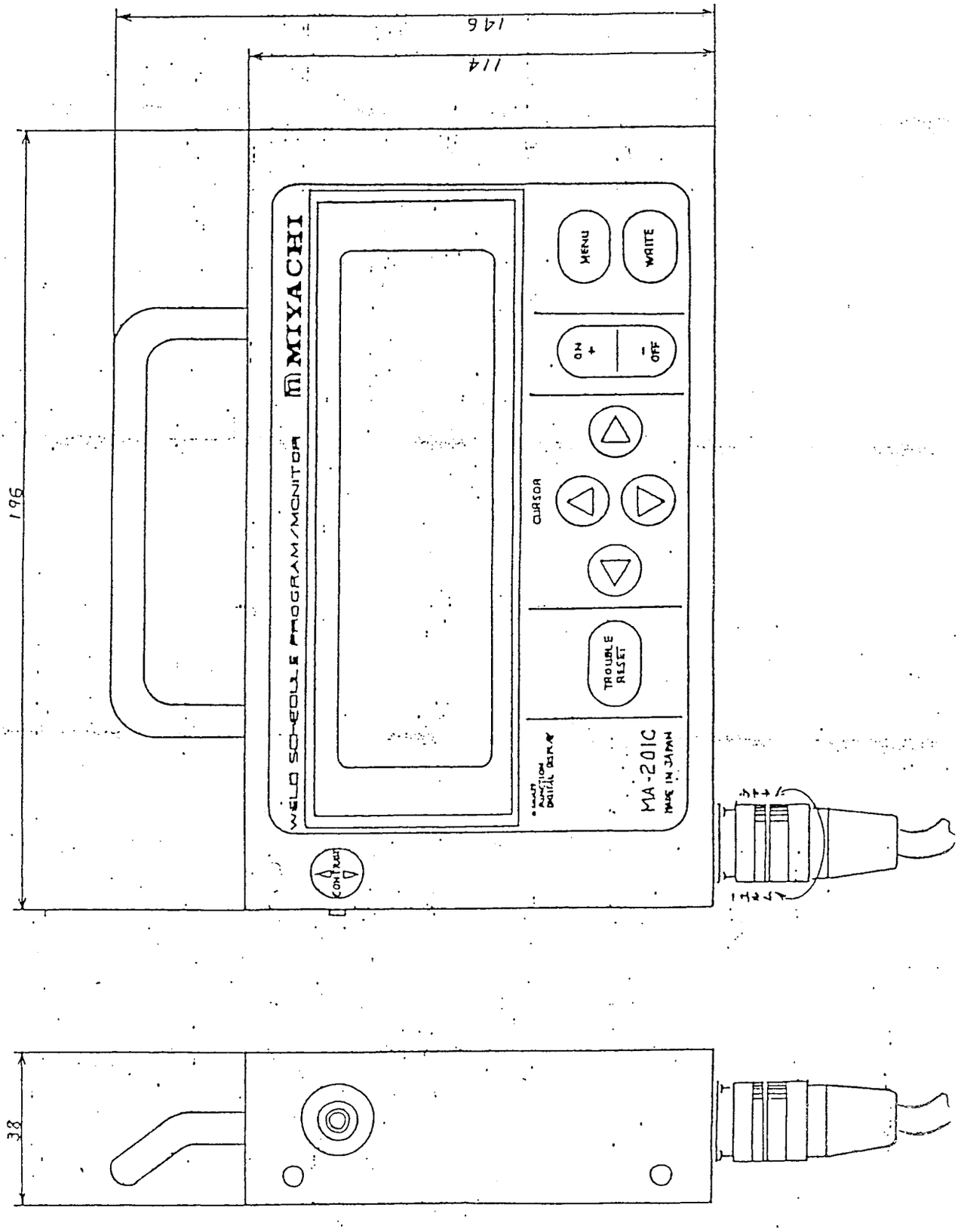
(1) Error troubleshooting

Code	Meaning	Cause	Check and Solution
E-01	Self diagnosis error Memory error	Scheduel memory was rewritten for unknown reason. Lithium battery power is gone.	Push Trouble Reset key, check each schedule setting again. Replace battery.
E-02	Start input error (detected only with parity bit ON) Parity error	Parity error has occured. The total of 4 start and 1 parity input signal is not an odd number.	Check each start signal and parity input signal cable. Also, check signal input timing. Error occurs when all signals are not ready within 20ms.
E-03	Weld transf. thermostat	Weld transf. thermostat has tripped.	Check weld transf. cooling water (pressure, leak), and also check duty rating.
E-04	Power transistor thermostat	Power diode thermostat has tripped.	Check power source duty rating.
E-05	No current	When there is no or very low current between tips.	Check pressure and welder operation, and primary and secondary cables. Check toroidal coil and cable.
E-06	Current warning	When weld current exceeds +/- setting.	Check work piece and welder.
E-07	Control limit fullwave error	When weld pulses from timer reach control limit setting.	Check weld voltage, work resistance, and secondary conductor of welder.
E-08	Insufficient welds	When weld monitor function is ON and weld count is insufficient.	Check number of welds.

E-09	Step end	When step up function is used and last step count is over.	Reset when step reset signal is input.
E-10	Schedule setting error	Error in transf. turn ratio and current setting in primary constant control, or set curr. exceeds max. current.	Set current values to be within max. primary current (200A) x transf. turn ratio. Set current not to exceed maximum current value.
E-11	Step-up rate error	When current set value including step-up rate exceeds 9.99KA or max. current value.	Correct step-up rate or current setting so that with step up rate they do not exceed 9.99KA or max. current value.
E-12	Emergency stop	When error occured in control unit. When cool time exceeds 0 cycle in cycle measurement, and total time of weld 1 and weld 2 exceeds 0.6S.	Resupply power. If error occurs again, it needs repair. Check schedule setting.
E-14	Excessive current	When primary peak current reaches 1.1 times the output of 200A.	Check if weld transf. or cables are shorted.

(2) Operation when problems occur

Error Code	Error Message	Time Detected	Operation MR=ON	Operation MR=OFF	Reset MR=ON	Reset MR=OFF
E-01	MEMORY TROUBLE	when power is turned on	cannot start		error reset	
E-02	PARITY ERROR	at start	cannot start		error reset or start	
E-03	TRIP OF TRANS THERMO	any time	Squeeze. & weld are off; cannot start		error reset	
E-04	TRIP OF POWER TRANSISTOR THERMO	anytime	Squeeze. & weld are off; cannot start		error reset	
E-05	NO CURRENT OR TRANSISTOR THERMO	during welding	Squeeze. & weld are off; cannot start		error reset	
E-06	OUT LIMIT OF CURRENT ERROR	end of welding	cannot start	can start	error reset	error reset or next start
E-07	FULL WAVE	end of welding	cannot start	can start	error reset	error reset or next start
E-08	LACK OF WELD COUNT	when count monitor signal shuts off	can start		weld count monitor reset	
E-09	END OF STEP	end of weld	can start		step reset	
E-10	SET ERROR	when data are set	cannot start		error reset or next start	
E-11	SET OVER	when data are set	cannot start		"	
E-12	EMERGENCY	any time	cannot start		"	
E-13	OVER CURRENT	during welding	cannot start		"	

	End Signal EM=ON	EM=OFF	Alarm Output MR=ON	MR=OFF
E-01	----		----	
E-02	no output		error	
E-03	no output		error	
E-04	no output		error	
E-05	no output		error	
E-06	no output	output after 20mS	error	warning
E-07	no output	output after 20mS	error	warning
E-08	output		weld count (interlock)	
E-09	output		step end	
E-10	no output		error	
E-11	no output		error	
E-12	no output		error	
E-13	no output		error	

6. Appearance Chart