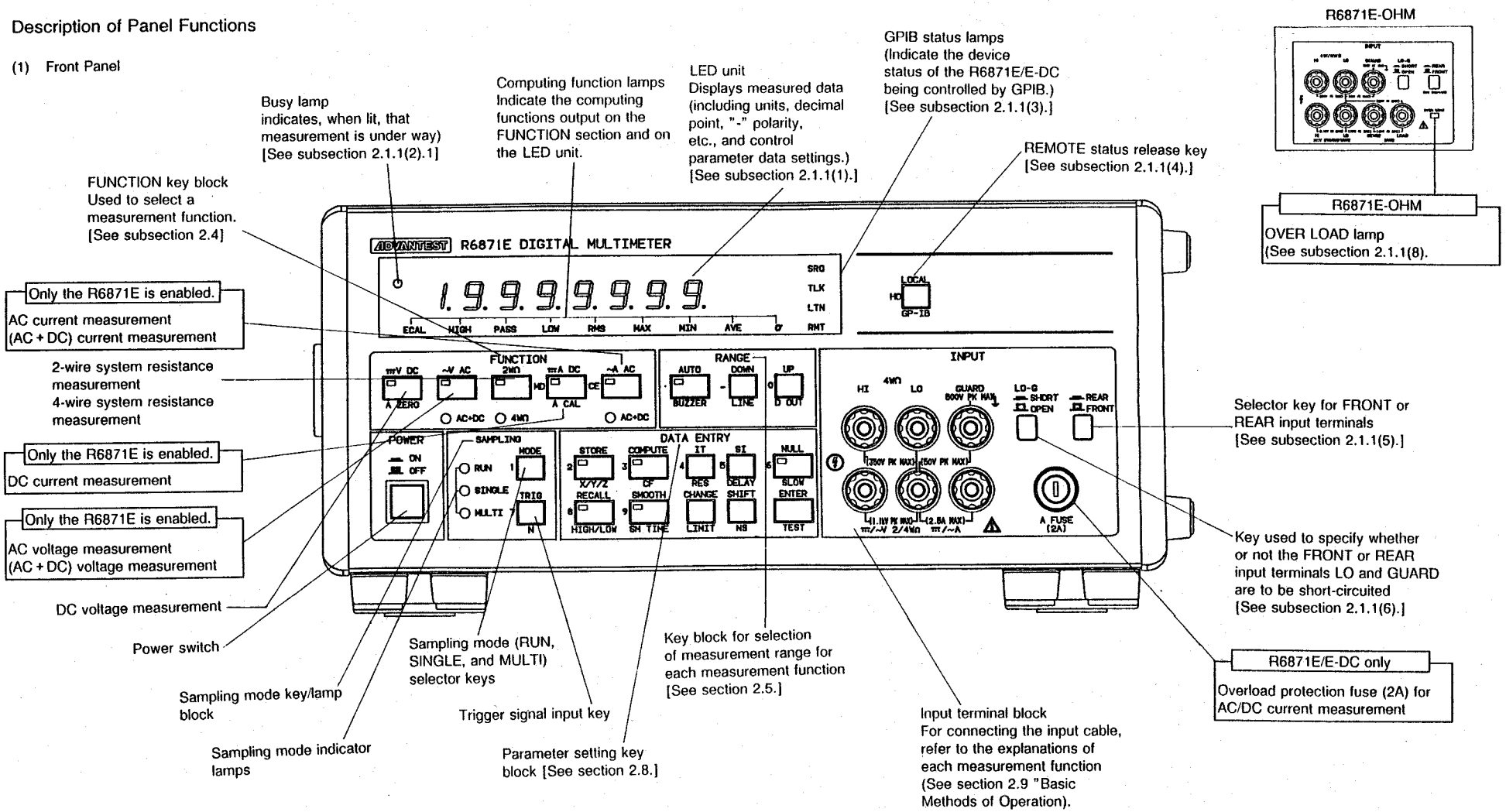
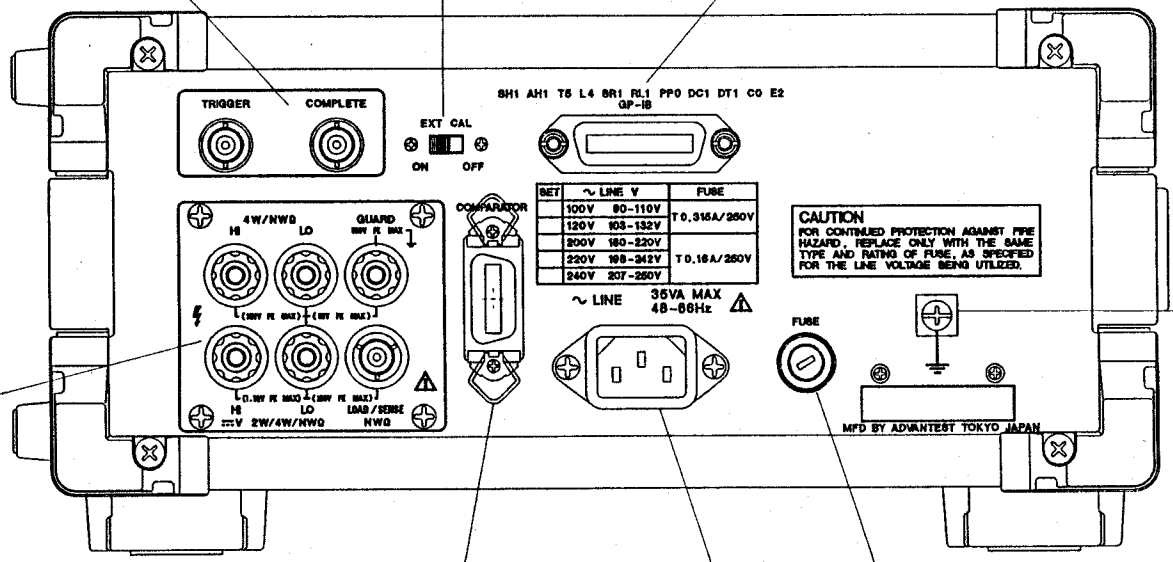
2. OPERATION METHOD-I (PARAMETER SETTING)

2.1 Description of Panel Functions

(1) Front Panel



(2) Rear Panel



Control signal connectors
TRIGGER input terminal and
COMPLETE output terminal
[See subsection 2.1.1(11).]

EXT CAL key
For external calibration of
each measurement function
[See subsection 2.1.1(10).]

GPIB connector
Used to provide external
control of the R6871E/E-DC
from GPIB

REAR input terminals
For connecting the input cable,
refer to the explanations of
each measurement function
[See section 2.9 "Basic
Methods of Operation].

GND (Grounding) terminal
[See subsection 2.1.1(9).]

R6871E-OHM only
Output connector for comparator results

AC power connector
[See subsection 2.1.1(8).]

Power fuse

2.1.1 Supplementary Description of Panel Functions

[Front Panel]

(1) LED Unit

The LED (light emitting diode) section displays measured data (including the units of measurement, the decimal point, and "-" polarity) and control parameter data settings.
Data is displayed in ten digits: the first eight digits are provided by a 7-segment LED, and the remaining two digits are provided by an LED of a 5x7 dot matrix. The maximum data that can be displayed is "19999999" (7 1/2 digit display).
Of the first eight digits, the least significant digit becomes blank during 6 1/2 digit display, the low-order two digits become blank during 5 1/2 digit display, and the low-order three digits become blank during 4 1/2 digit display.
If an excessive load (overcurrent or overvoltage) is applied, then the message "OL" (overload) is displayed. The decimal point is also displayed at this time to allow easy identification of the measurement range being used during an overload.

(2) BUSY Lamp

This lamp, which indicates that measurement is under way, lights up during measurement or during output of recall data.

(3) GPIB Status Lamps

These lamps indicate the device status of the R6871E/E-DC when it is placed under the control of GPIB.

- The SRQ lamp lights up when the R6871E/E-DC transmits a service request signal to the controller.
- The TLK lamp lights up when the R6871E/E-DC enters a talker status in which data can be transmitted from the multimeter.
- The LTN lamp lights up when the R6871E/E-DC enters a listener status in which data can be received by the multimeter.
- The RMT lamp lights up when remote control is provided to the R6871E/E-DC.
  When the RMT lamp is lit, all panel keys are in operative with the exception of the LOCAL key.

(4) LOCAL Key

The LOCAL switch is used to release the remote-controlled status of the R6871E/E-DC (RMT lamp lit), thus allowing control of the multimeter from the front panel. (The remote-controlled status cannot be released if the "LLO" (Local Lockout) command is set using the GPIB.)

(5) INPUT Key (Selector Key for Input Terminal Block)

This key is used to select input terminals. It is possible with this key to select which of the two types of input terminals (FRONT and REAR) is to be used for each measurement.
Pressing the key allows REAR input, and re-pressing the key allows FRONT input.
When measuring the current, set the INPUT key to FRONT input regardless of which type of input terminals (FRONT or REAR) is used.

(6) LO-G SHORT Key

This key is used to short-circuit the LO and GUARD terminals of the FRONT or REAR input terminals selected with the INPUT key.
Pressing the key causes short-circuiting of the above two terminals, and re-pressing the key causes opening of the terminals.

(7) OVERLOAD -- R6871E-OHM only --

[Rear Panel]

(8) AC Power Connector

This connector is used to connect the AC power supply to the R6871E/E-DC. The power cable (supplied) is to be used.

(9) GND (Grounding) Terminal

This terminal is used to ground the R6871E/E-DC. When using a power cable together with the 2-pin adapter (supplied), be sure to connect either the adapter pin (see Figure 1-2) or the GND terminal to ground.

(10) EXT CAL Key

This key is used for external calibration of each measurement function. Normally, set the key to the OFF position.
If the key is set to the ON position, the E CAL lamp below the LED display comes on.

(11) Control Signal Connectors

The TRIGGER input terminal is used to send a measurement start signal to the R6871E/E-DC from an external equipment. The input signal is of the TTL level, negative pulse type (pulse width : 100μsec or more).
The COMPLETE output terminal is used to generate a strobe signal for output of measured data or arithmetically processed data. The output signal is of the TTL level, negative pulse type (pulse width : 130μsec or more).

(12) Output Connector for Comparator Results -- R6871E-OHM only --

Comparator results are output by open collector.

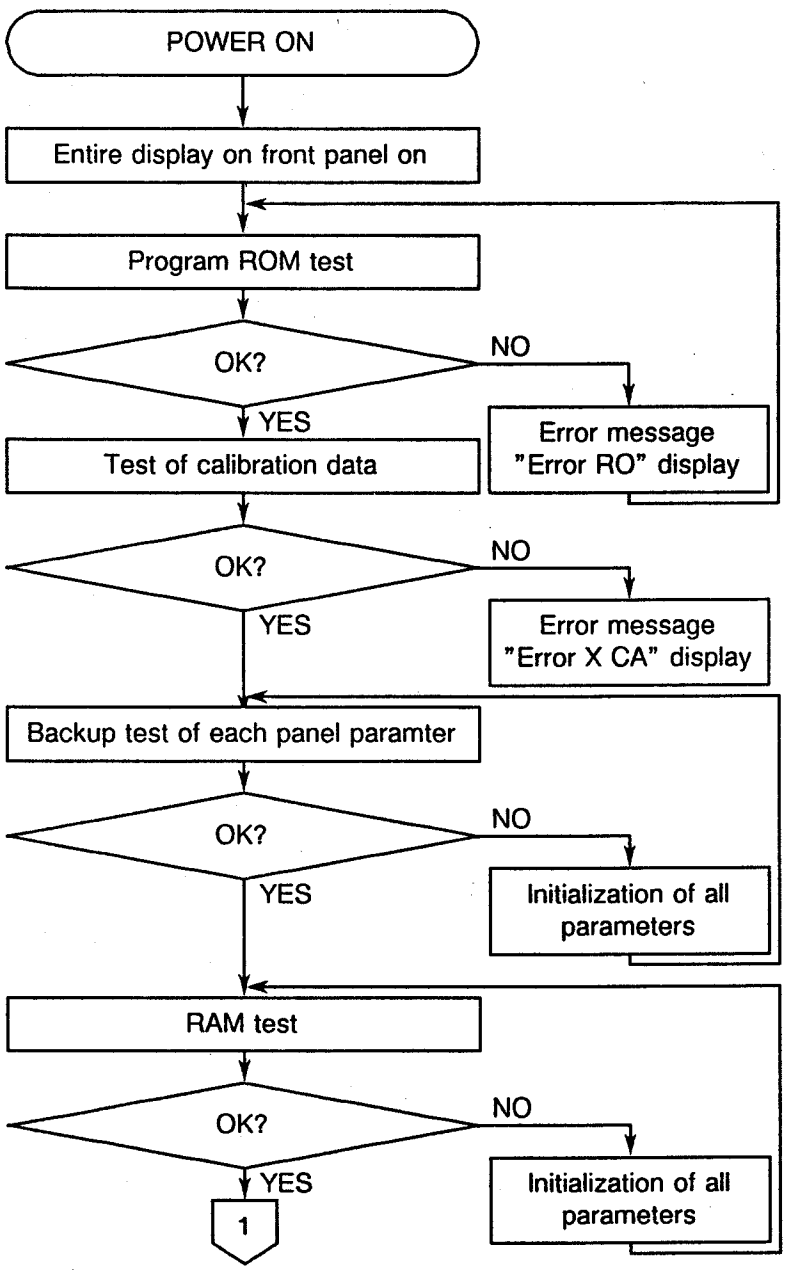
2.2 Power-On/Off Procedures

CAUTION

Although all functions activate upon power-on, 60 minutes or more should be allowed for warm-up to ensure the required accuracy.

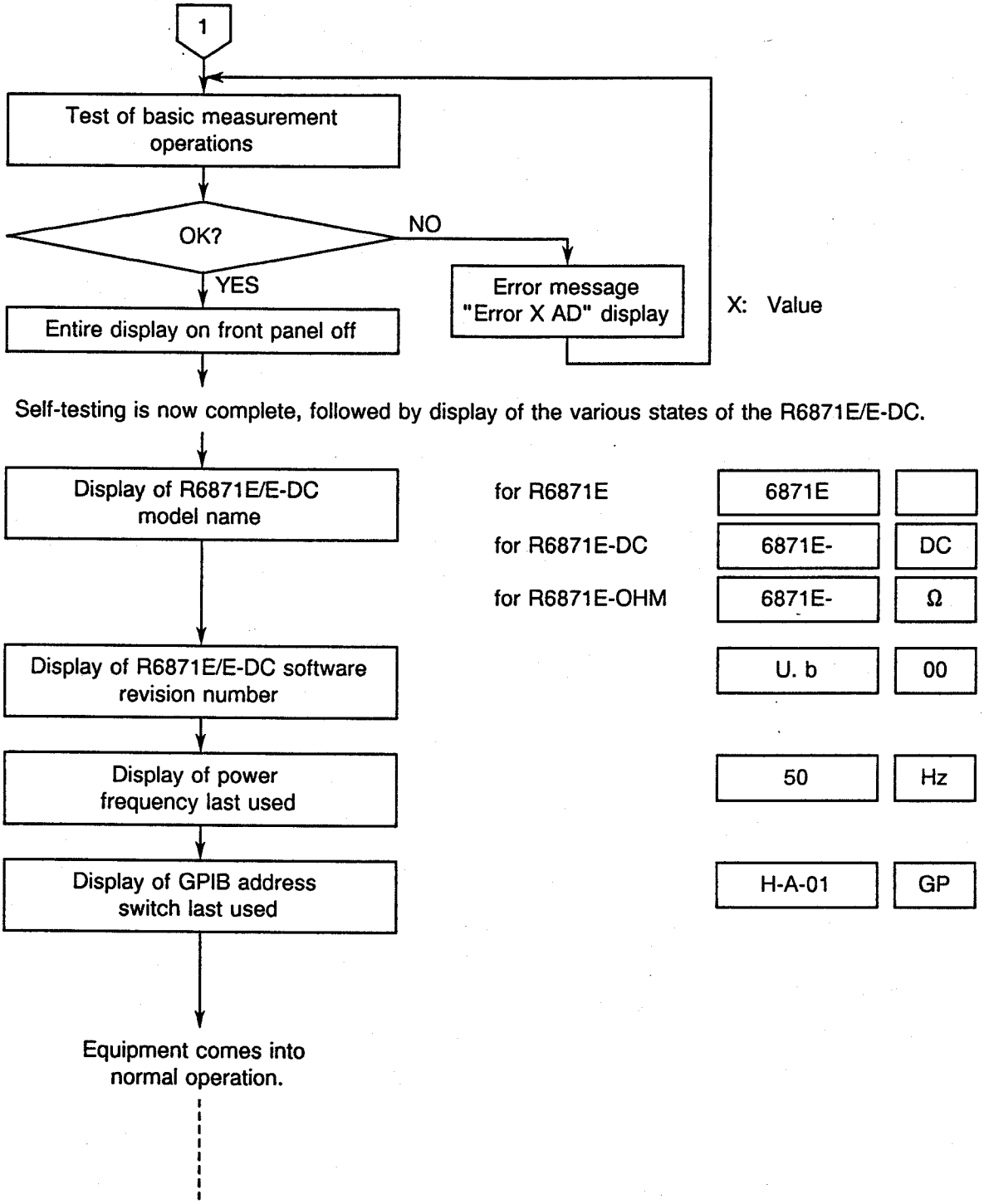
2.2.1 Power-on Procedure

(1) Pressing the POWER switch causes the entire display on the front panel to appear. At the same time, the various states of self-tests and the R6871E/E-DC are displayed and then the multimeter enters the normal measurement mode.
The following shows an operation flow starting with the power-on action:



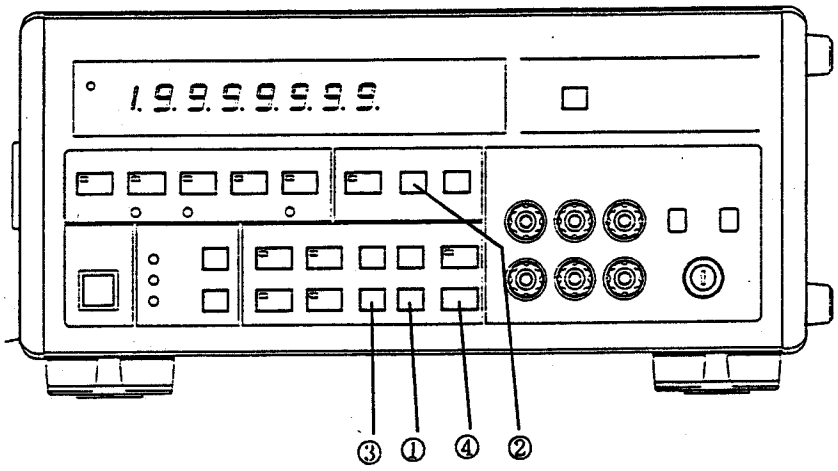
See section 5.2 for details of error messages. If POWER ON error message display occurs during this power-on procedure, the R6871E/E-DC is malfunctioning. In such cases, turn the power off with the error message left on the display and then contact the sales division or agency nearest your place of business.

X: Value


1
Test of basic measurement operations
OK?
NO
YES
Error message "Error X AD" display
X: Value
Entire display on front panel off
Self-testing is now complete, followed by display of the various states of the R6871E/E-DC.
Display of R6871E/E-DC model name
for R6871E
6871E
for R6871E-DC
6871E-
DC
for R6871E-OHM
6871E-
Ω
Display of R6871E/E-DC software revision number
U. b
00
Display of power frequency last used
50
Hz
Display of GPIB address switch last used
H-A-01
GP
Equipment comes into normal operation.

(2) After the R6871E/E-DC has come into normal operation, first set the power frequency (50Hz or 60Hz) using the following procedure:

[Setting procedure]



[These numbers indicate the following procedure numbers.]

LINE parameter setting

① Press the SHIFT key.

Each of the keys will then work as the parameters inscribed below the keys.

5 0 H z

② Press the LINE key.

The power frequency setting last used will then be displayed on the LED unit.

Power frequency selection

③ Select the power frequency (50Hz or 60Hz) using the CHANGE key.

Each time the CHANGE key is pressed, the display changes as follows:

50Hz⇆60Hz

In this way, display the power frequency setting on the LED unit.

Setting of power frequency completed

④ Press the ENTER key.

The power frequency setting being displayed will then be stored in memory.

This completes the power-frequency setting sequence.

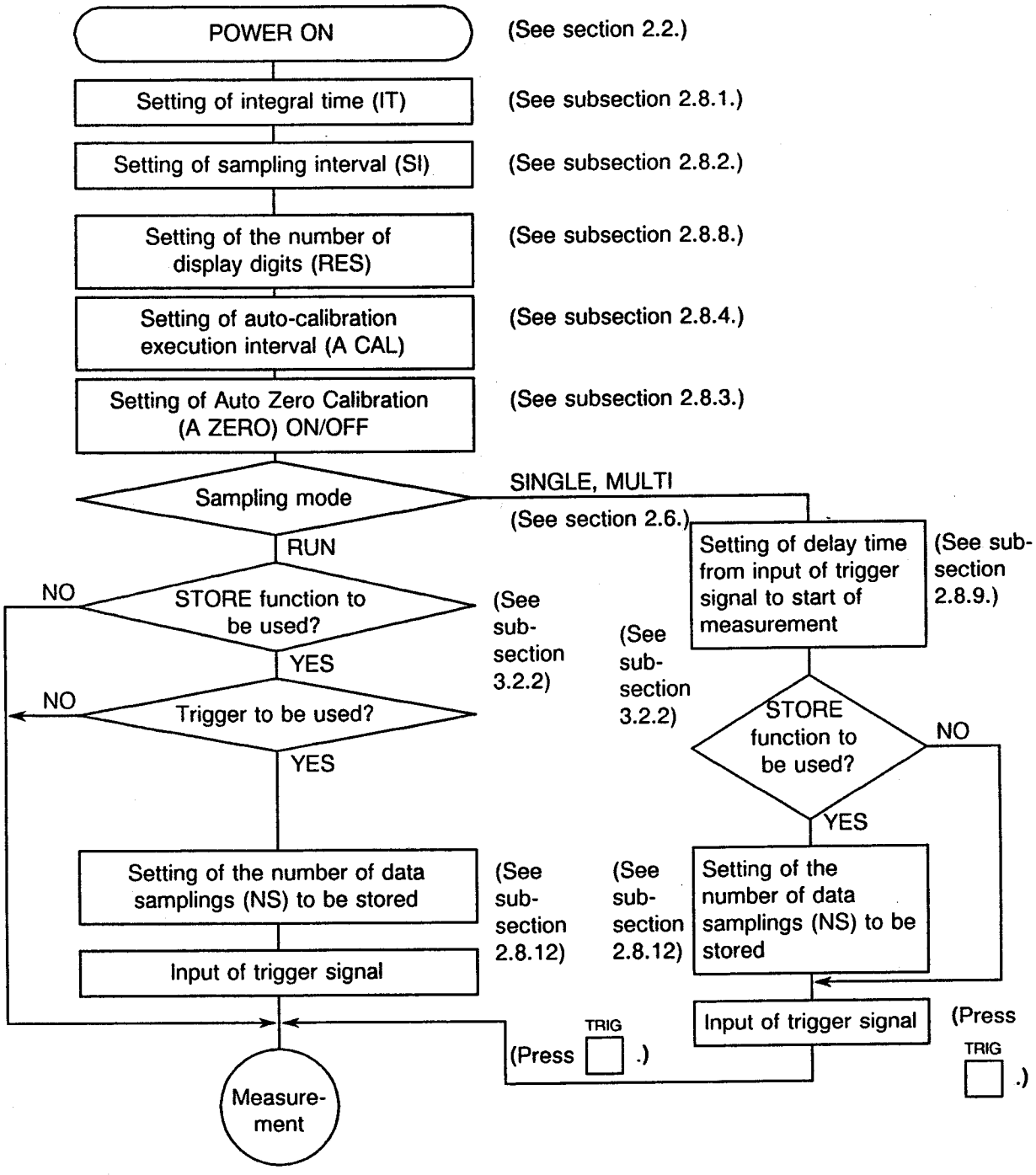
2.2.2 Power-off Procedure

Pressing the POWER switch with the power on will cause the power to turn off.

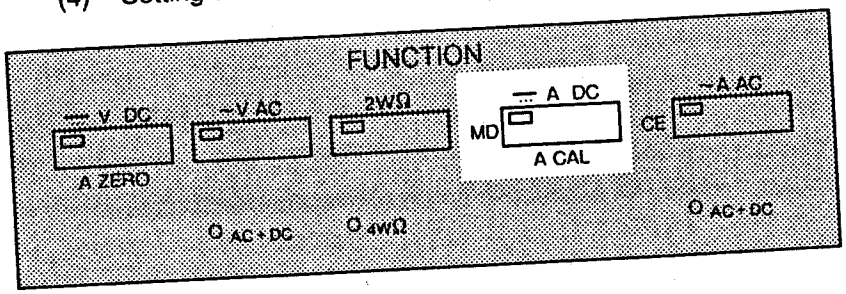
Built-in batteries provide backing-up of the parameters that have been set, and thus they are retained even when power is turned off.

2.3 Measurement Flowchart

The flowchart of the operating procedure from power-on to the start of measurement is shown below. See the relevant sections (or subsections) for details of the individual procedural steps.



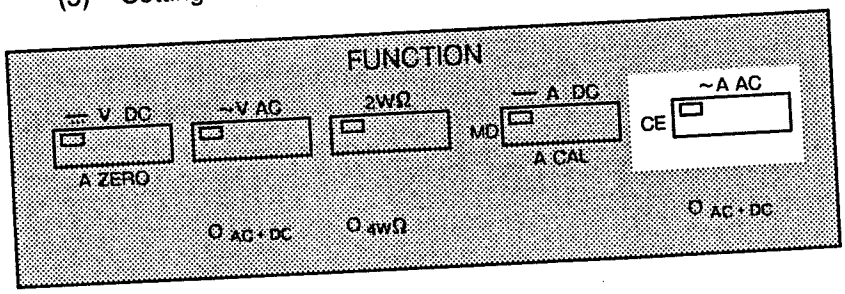
(4) Setting the DC current measurement function : Only the R6871E is enabled.



Press the MD A DC A CAL key.

The lamp of the key will then light up to indicate that setting is complete.

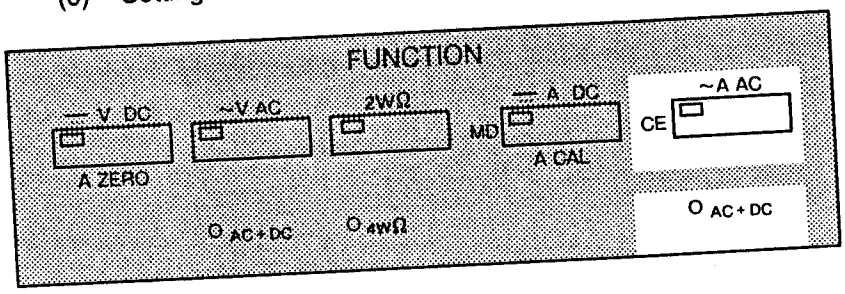
(5) Setting the AC current measurement function : Only the R6871E is enabled.



Press the ~A AC key.

The lamp of the key will then light up to indicate that setting is complete.

(6) Setting the AC + DC current measurement function: Only the R6871E is enabled.

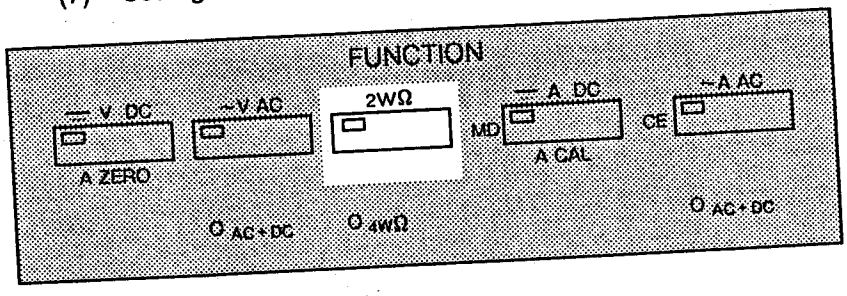


: Only the R6871E is enabled.

With the AC voltage measurement function set,

press the ~A AC key once again. The AC + DC lamp below the key will then light to indicate that setting is complete.

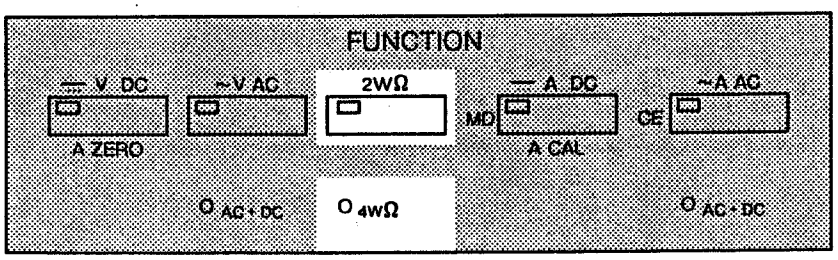
(7) Setting the 2-wire system resistance measurement function



Press the 2WΩ key.

The lamp of the key will then light up to indicate that setting is complete.

(8) Setting the 4-wire system resistance measurement function
(Network resistance measurement : Only the R6871E-OHM is enabled.)



With the 2-wire system resistance measurement function set, press the 2WΩ key once again. The 4WΩ lamp below the key will then light to indicate that setting is complete.

2.5 RANGE Section

[Functional description]

Keys in the RANGE section are used to select a measurement range.
The selected measurement range can be identified by checking the corresponding unit of display and the position of the decimal point.
The following table shows the range configuration of the R6871E/E-DC:

Table 2-1 Measurement Range Configuration

VDC	VAC*3, V(AC + DC)*3	ADC*3	AAC*3, A(AC + DC)*3	2/4WΩ*4, NWΩ
200mV	200mV	2000μA	2000μA	10Ω
2000mV	2000mV	20mA	20mA	100Ω
*1 10V	*2 20V	*2 200mA	*2 200mA	*4 1000Ω
*2 20V	200V	2000mA	2000mA	*2 10kΩ *4
200V	500V			*4 100kΩ
1000V				*4 1000kΩ
				*4 10MΩ
				100MΩ
				1000MΩ

*1 : The 10V range can be selected only when the EXT CAL key is placed in its ON position.

*2 : Initial value.

*3 : Only the R6871E is enabled.

*4 : Only the R6871E-OHM is enabled. Accuracy is not guaranteed though the measurement operation is done in 10Ω, 100Ω, 100MΩ or 1000MΩ range.

Table 2 - 2 Automatic Range Levels

Function	Range	Max. No. of display digits	Full-scale	UP level	DOWN level
VDC	200mV	6 1/2	1999999	2000000	–
	2000mV	7 1/2	19999999	20000000	1799999
	20V	7 1/2	19999999	20000000	1799999
	200V	7 1/2	19999999	20000000	1799999
	1000V	7 1/2	11000000	1100***1	1799999
VAC *1 V(AC + DC) *1	200mV	5 1/2	199999	200000	–
	2000mV	5 1/2	199999	200000	17999
	20V	5 1/2	199999	200000	17999
	200V	5 1/2	199999	200000	17999
	500V	5 1/2	50000	500*1	17999
ADC *1 *2 AAC *1 A(AC + DC)*1	2000µA	5 1/2	199999	200000	–
	20mA	5 1/2	199999	200000	17999
	200mA	5 1/2	199999	200000	17999
	2000mA	5 1/2	199999	200000	17999
2WΩ	10Ω	6 1/2	1199999	1200000	–
	100Ω	7 1/2	11999999	12000000	999999
	1000Ω	7 1/2	11999999	12000000	999999
	10kΩ	7 1/2	11999999	12000000	999999
	100kΩ	7 1/2	11999999	12000000	999999
4WΩ	1000kΩ	7 1/2	11999999	12000000	999999
	10MΩ	7 1/2	11999999	12000000	999999
NWΩ *3	100MΩ	7 1/2	11999999	12000000	999999
	1000MΩ	7 1/2	11999999	12000000	999999

*1 : Only the R6871E is enabled.

*2 : ADC is displayed in a maximum of 6 and a half digits

*3 : Only the R6871E-OHM is enabled.

Note : For the least significant digit of output-digit mode data, "1",. For all other digits, "0".

2.6 SAMPLING Section

[Functional description]

Keys in the SAMPLING section are used to select a sampling mode (RUN, SINGLE, or MULTI). MULTI BULK cannot be selected from the panel.
Keys for trigger signal input are also located in this section.
In each such mode, sampling is performed as follows:

(1) RUN mode : Sampling is automatically repeated at the cycle that has been set using the SI parameter. (See subsection 2.8.2, "SI : Sampling interval".)

(2) SINGLE mode : Sampling is performed just once each time the trigger signal is input.

(3) MULTI mode : Each time the trigger signal is input, sampling is performed in accordance with the NS parameter setting (number of times of sampling). The sampling cycle at this time refers to the SI parameter setting. (See subsection 2.8.12, "NS : Number of samples".)

(4) MULTI BULK mode : Each time the trigger signal is input, sampling is performed NS times at intervals of SI. After sampling is performed NS times, the measurement data for NS samples is output to the GPIB all together in response to the data output request. This is the sampling mode selectable in the GPIB system and cannot be selected from the panel.

Range

Features of sampling in each mode are outlined below.

(1) RUN mode :

① Sampling is performed at the sampling interval that has been set.
② Each time a sampling operation is performed, the BUSY lamp located to the left of the LED unit blinks just once and the measured value at that time is displayed.

(2) SINGLE mode :

① If this mode has been selected, sampling can be done with the TRIG key.

② Pressing TRIG causes sampling to be performed after the lapse of the trigger delay time that has been set using the DELAY parameter. (See subsection 2.8.9, "DELAY".)

③ Sampling can be done only once.

④ When sampling is performed, the BUSY lamp located to the left of the LED unit will blink just once and the measured value at that time will be displayed.

⑤ Sampling is not performed until TRIG is subsequently pressed once again.

(3) MULTI mode :

① If this mode has been selected, sampling can be done with the TRIG key.

② The only one difference from the SINGLE mode is that while the SINGLE mode allows sampling to be performed just once, the MULTI mode allows continuous sampling to be performed in accordance with the specified number of times of sampling.

③ Pressing TRIG causes sampling to be started after the lapse of the trigger delay time that has been set using the DELAY parameter.

④ Sampling is performed at the set sampling interval.

⑤ Each time a sampling operation is performed, the BUSY lamp located to the left of the LED unit blinks just once and the measured value at that time is displayed.

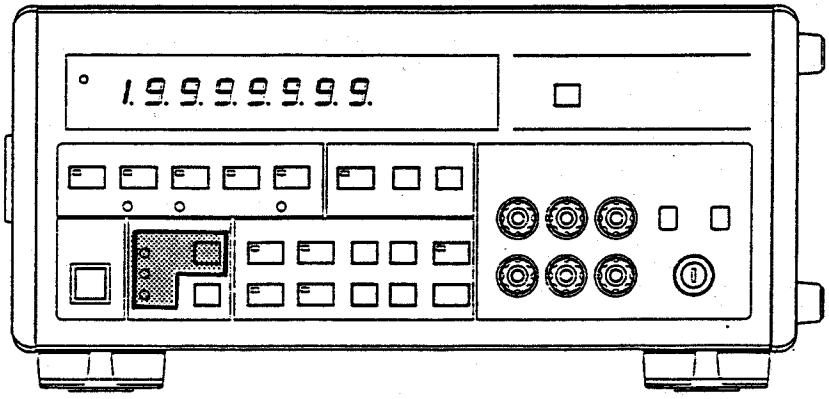
⑥ Sampling takes place by the specified number of times and then terminates automatically.

⑦ Sampling does not occur until the TRIG key is subsequently pressed once again.

(4) MULTI BULK mode : See Chapter 4. MULTI-SAMPLING BULK OUTPUT.

[Setting procedure]

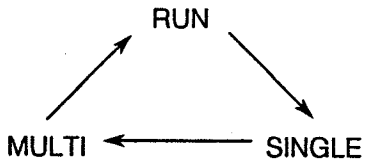
The procedure for setting the sampling mode is described below.



Setting of the sampling mode

Select a sampling mode (RUN, SINGLE, or MULTI) using the MODE key.

Each time the key is pressed, the lamp located to the left of the MODE keys light up in the following order:

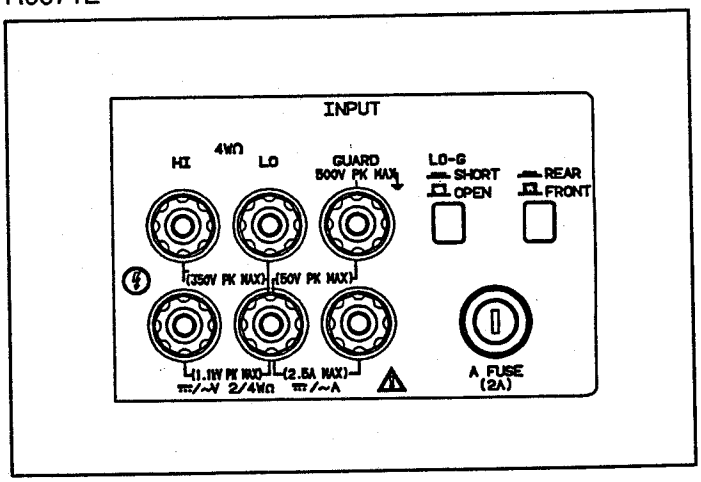


Setting is complete when the lamp of the mode to be set comes on.

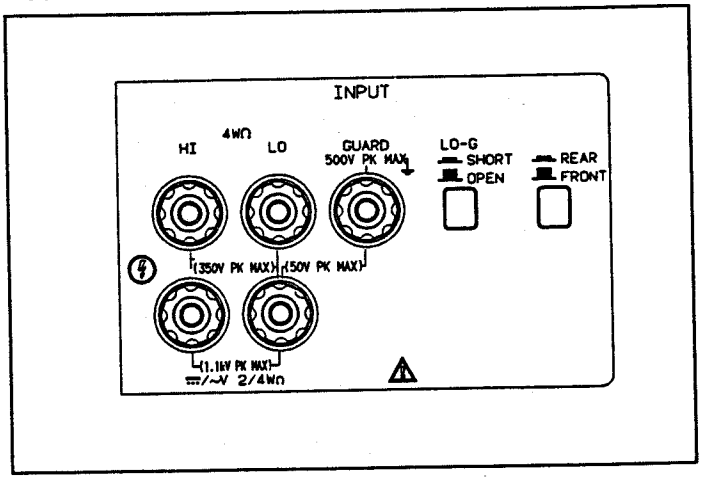
2.7 INPUT Section (Selection of Input Terminal)

FRONT/REAR terminal selection

R6871E



R6871E-DC



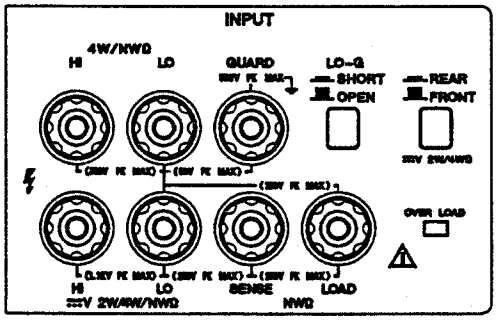
Make the selection using the

REAR
FRONT

selector switch located in the upper right section of the front panel input terminals of the R6871E/E-DC. This switch usually assumes either a protruding state (▬) or a recessed state (▬).

The switch changes between these two states each time it is pressed. Place the switch in its protruding state (▬) to select the FRONT terminals, and place the switch in its recessed state (▬) to select the REAR terminals.

R6871E-OHM



CAUTION

Only the R6871E is enabled.

For current measurement, use one of the FRONT and REAR sets of input terminals. Current measurement is possible only when the INPUT key is set to the FRONT position, irrespective of whether the input terminal blocks on the front panel is being used or that on the rear panel is being used.

Only the R6871E-OHM is enabled.

For network resistance, use one of the FRONT and REAR sets of input terminals (LOAD/SENSE), irrespective of pressing INPUT key.