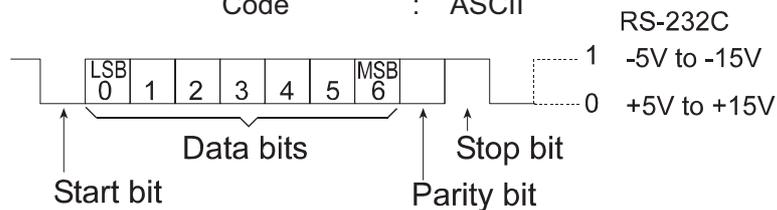


16. RS-232C SERIAL INTERFACE / EXTERNAL INPUT

RS-232C

The balance is a DCE device. Connect the balance to a personal computer (DTE), using a straight through cable or a modem cable.

Transmission system : EIA RS-232C
 Transmission form : Asynchronous, bi-directional, half duplex
 Data format : Baud rate : 600, 1200, 2400, 4800, 9600 bps
 Data bits : 7 or 8 bits
 Parity : Even, Odd (Data bits 7 bits)
 None (Data bits 8 bits)
 Stop bit : 1 bit
 Code : ASCII



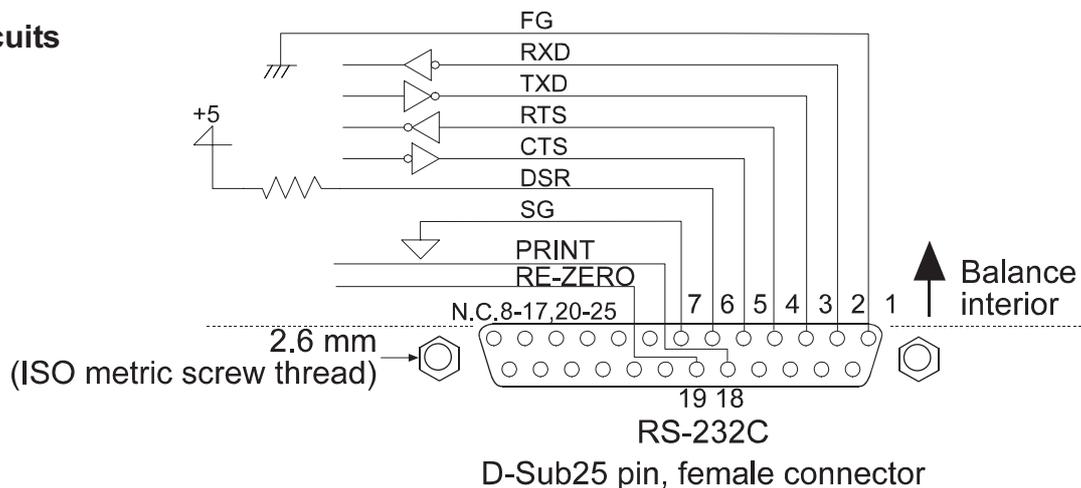
Pin connections

Pin No.	Signal name	Direction	Description
1	FG	-	Frame ground
2	RXD	Input	Receive data
3	TXD	Output	Transmit data
4	RTS	Input	Ready to send
5	CTS	Output	Clear to send
6	DSR	Output	Data set ready
7	SG	-	Signal ground
18	PRINT	Input	Same as the PRINT key
19	RE-ZERO	Input	Same as the RE-ZERO key
8 – 25 (Excluding 18 and 19)	-	-	Not connected

Note

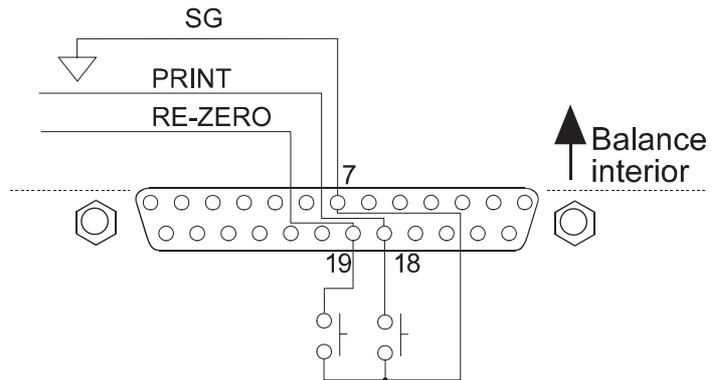
The signal names for the RS-232C are the same as those for the DTE side except TXD and RXD.

Circuits

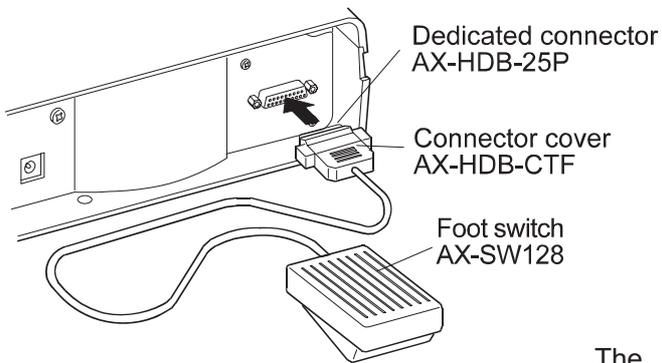


External input

Pin 18 and pin 19 perform the same function as pressing the **PRINT** and **RE-ZERO** keys respectively by connecting each pin to pin 7 for at least 100 m seconds.



Use of example



The external input connector (AX-HDB-25P/CTF) and the foot switch (AX-SW128) are sold separately.

17. CONNECTION TO PERIPHERAL EQUIPMENT

17-1 Connection to the AD-8121B Printer

Set the following parameters to use the AD-8121B printer.

Function setting	Description
<i>dout Prt 0-3</i>	Selects a print mode.
<i>dout AP-P 0-2</i>	Selects the polarity for the auto print mode.
<i>dout AP-b 0-2</i>	Selects the auto print difference.
<i>dout PUSE 0,1</i>	Selects data output pause.
<i>S iF bPS 2</i> Factory setting	2400 bps
<i>S iF btPr 0</i> Factory setting	7 bits, Even parity check
<i>S iF CrLF 0</i> Factory setting	CR, LF
<i>S iF Cts 0</i> Factory setting	CTS and RTS control, not used

When "MODE 1" or "MODE 2" of the AD-8121B printer is used	
<i>dout S-td 0</i> Factory setting	Not to output the time and date.
<i>dout S-id 0</i> Factory setting	Not to output the ID number.
<i>dout Rt-F 0</i> Factory setting	Not to use auto feed.
<i>S iF tYPE 0</i> Factory setting	A&D standard format

When "MODE 3" of the AD-8121B printer is used.	
<i>dout S-td 0-3</i>	Outputs the time and date as necessary.
<i>dout S-id 0,1</i>	Outputs the ID number as necessary.
<i>dout Rt-F 0,1</i>	Uses auto feed as necessary.
<i>S iF tYPE 1</i>	DP format

When data is transmitted continuously. When all memory data is transmitted at one time.	
<i>dout PUSE 1</i>	Uses pause.

Note

The printer performs as follows, depending on the data memory setting.

Setting	What is printed
<i>dRtR 0</i>	The weighing data
<i>dRtR 2</i>	The weighing data stored in memory
<i>dRtR 3</i>	The calibration or calibration test data stored in memory

Refer to "11. ID NUMBER AND GLP REPORT" for a print sample.

17-2 Connection to a Computer

The GX series balance is of the DCE type (Data Communication Equipment), which can be connected to a personal computer using the RS-232C interface.

Before connection, read the personal computer manual thoroughly.

Use a standard DCE cable for connection (cable type: straight-through).

17-3 Using Windows Communication Tools (WinCT)

When Windows is used as an operating system in a personal computer, the provided WinCT can be used to transmit the weighing data to the personal computer.

The WinCT has two communication methods: "RsCom" and "RsKey". For details on WinCT, refer to the WinCT instruction manual.

The current version of the WinCT can be downloaded from the A&D website.

RsCom

- Can transmit commands to control the balance.
- Can make a bi-directional communication between the balance and a personal computer using the RS-232C interface.
- Can display or store the data using a text file format. Can also print the data using a printer connected to the personal computer.
- When several ports of a personal computer have balances connected, the personal computer can communicate with each balance simultaneously.
- Can share a personal computer with other application software.
- Can receive the balance GLP report.

RsKey

- Can transmit the weighing data output from the balance directly to other application software such as Microsoft Excel.
- Can be used with most application software.
- Can receive the balance GLP report.

Note

Windows and Excel are the registered trademarks of the Microsoft Corporation.

Using the WinCT, the balance can do the following:

- 1 Analyzing the weighing data and the statistics input by "RsKey"
The weighing data can be input directly into an Excel worksheet. Then, Excel can analyze the data to obtain total, average, standard deviation, maximum and minimum value, and display them in a graph.
- 2 Controlling the balance using commands from a personal computer
By using "RsCom", the personal computer sends commands such as "re-zero" or "send weighing data" to the balance and controls the balance.
- 3 Printing the balance GLP report using your printer
The balance GLP report can be printed using a printer connected to the personal computer.
- 4 Receiving weighing data at a certain interval
The weighing data can be received at a certain interval and data characteristic with elapsed time can be obtained.

5 Using the GX series balance memory function

The weighing data, instead of outputting it immediately to an external device, can be stored in the balance's memory. Later, all of the weighing data stored can be output to a personal computer at one time.

6 Using a personal computer as an external indicator

With the "RsKey" test mode function, a personal computer can be used as an external weight indicator for the balance. (To do this, set the balance data output mode to stream mode.)

18. COMMANDS

18-1 Command List

Commands to query weighing data

C	Cancels the S or SIR command.
Q	Requests the weighing data immediately.
S	Requests the weighing data when stabilized.
SI	Requests the weighing data immediately.
SIR	Requests the weighing data continuously.
^E_{sc}P	Requests the weighing data when stabilized.

Note: The “Q” and “SI” commands, the “S” and “^E_{sc}P” commands behave the same.

Commands to control the balance

CAL	Same as the CAL key.
MCL	Deletes all data in memory.
MD:nnn	Deletes weighing data with the data number nnn.
OFF	Turns the display off.
ON	Turns the display on.
P	Same as the ON:OFF key
PT:***. ** \cup g	Sets the tare value. The unit added is the unit that is output in the A&D standard format. For the counting or percent mode, gram is used. Set the tare value so that the total value of the sample and the tare does not exceed the weighing capacity. Negative values can not be used.
?PT	Requests the tare value. Outputs the tare value set by the TR or PT: command.
PRT	Same as the PRINT key
R	Same as the RE-ZERO key
SMP	Same as the SAMPLE key.
U	Same as the MODE key
T	Same as the RE-ZERO key
TR	Tares the balance (Cancels the container’s weight.) Available only when the load on the weighing pan is greater than the zero point. The zero point is set by the R, T or Z command, by pressing the RE-ZERO key, or using the external input.
Z	Same as the RE-ZERO key
^E_{sc}T	Same as the RE-ZERO key

Note: The “R”, “T”, “Z” and “^E_{sc}T” commands behave the same.

Commands to control the memory function

?MA	Outputs all data in memory.
?MQnnn	Outputs weighing data with the data number nnn.
?MX	Outputs the number of weighing data in memory.
MCL	Deletes all data in memory.
MD:nnn	Deletes weighing data with the data number nnn.
UN:mm	Changes the unit mass stored in memory with the number of mm (01-20).
?UN	Outputs the unit mass number of the selected unit mass.
UW:***. ** \cup g	Sets the unit mass value. e.g., UW:+0.123 \cup g (to set the unit mass to 0.123 g: \cup represents a space.)
?UW	Outputs the unit mass value of the selected unit mass number.
?ID	Requests the ID number.
?SN	Requests the serial number.
?TN	Requests the model name.

Commands to control the comparator function

HI:***. **_ _g	Sets the upper limit value. e.g.,HI:+2.34_ _g (to set the upper limit value to 2.34 g; _ represents a space.)
LO:***. **_ _g	Sets the lower limit value. e.g.,LO:+1.23_ _g (to set the lower limit value to 1.23 g; _ represents a space.)
?HI	Outputs the upper limit value.
?LO	Outputs the lower limit value.

Notes

- “nnn” and “mm” indicate, respectively, three-digit and two-digit numerical values.
E_{SC}: 1Bh in ASCII code
- Before transmitting a command, add the terminator (<CR><LF> or <CR>), that is specified in the “Terminator (E_{RLF})” parameter of “Serial interface (S_{IF})” in the function table, to the command.
- To use a command to control the comparator function, set the “Input method (E_{Pin})” parameter to “0” or “1”.

18-2 Acknowledge Code and Error Codes

When the “Serial interface function (S_{IF})” parameter is set to “E_{rdl}”, the balance outputs <AK> code or error code to each command as follows:

<AK> (06h) Acknowledge in ASCII code.

- When the balance receives a command to request data and can not process it, the balance transmits an error code (EC, Exx).
When the balance receives a command to request data and can process it, the balance outputs the data.
- When the balance receives a command to control the balance and can not process it, the balance transmits an error code (EC, Exx).
When the balance receives a command to control the balance and can process it, the balance transmits the acknowledge code.
- When a communication error has occurred due to external noise, or a parity error has occurred due to transmission error, the balance transmits an error code. In this case, send the command again.

Among commands to control the balance, the following transmit the acknowledge code both when the balance receives the command and when the balance has accomplished the command. If the command can not be processed properly, the balance transmits an error code (EC, Exx). This error can be released using the CAL command.

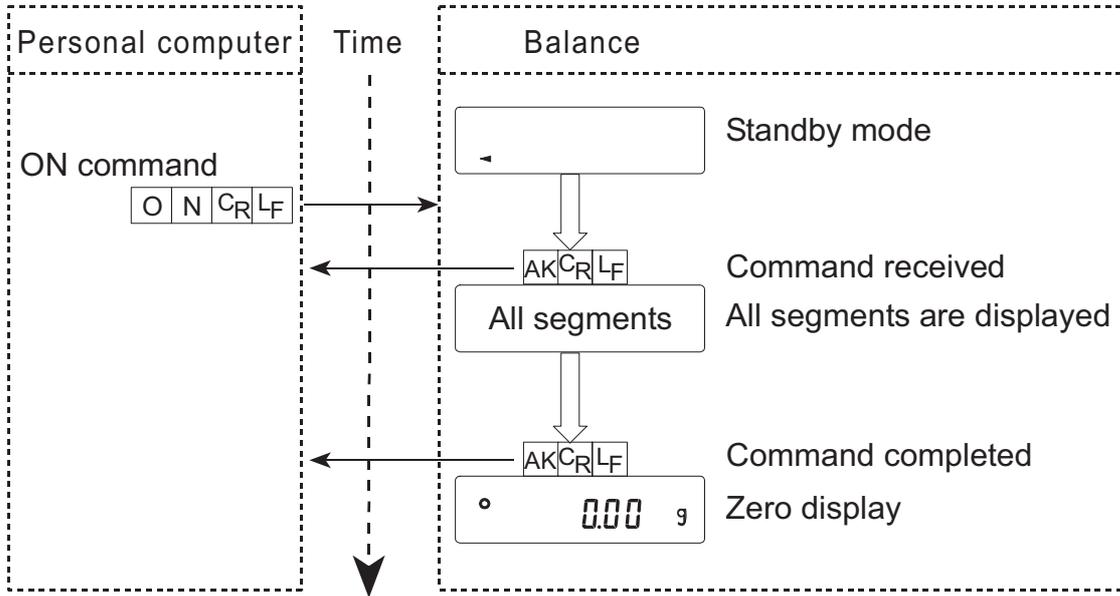
CAL command (Calibration command) ON command (Display ON command)

P command (Display ON/OFF command) R command (RE-ZERO command)

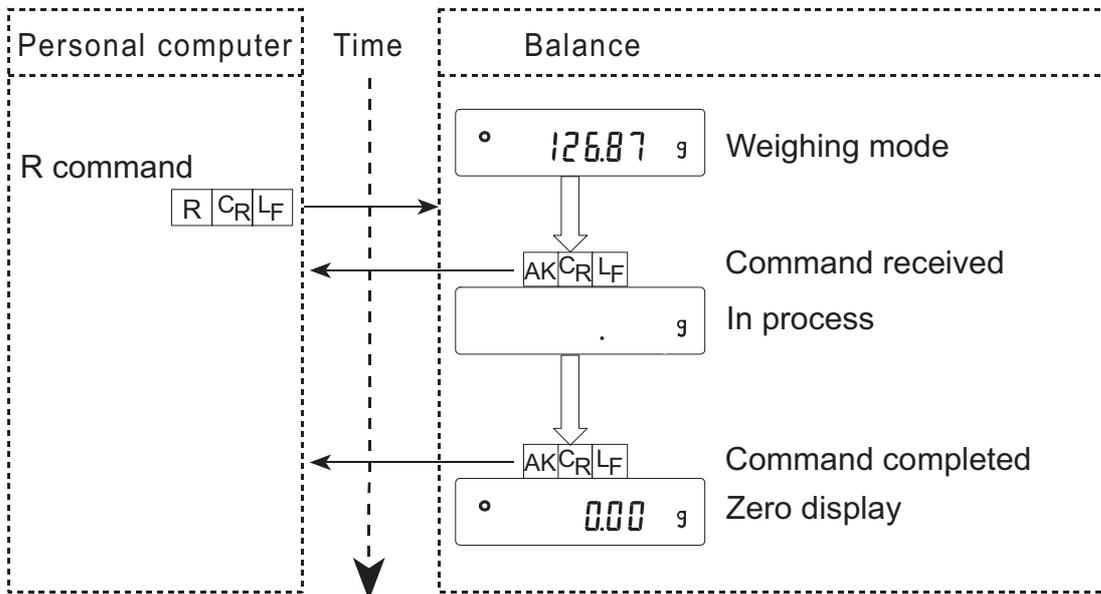
TR command (Tare command)

18-3 Command Examples

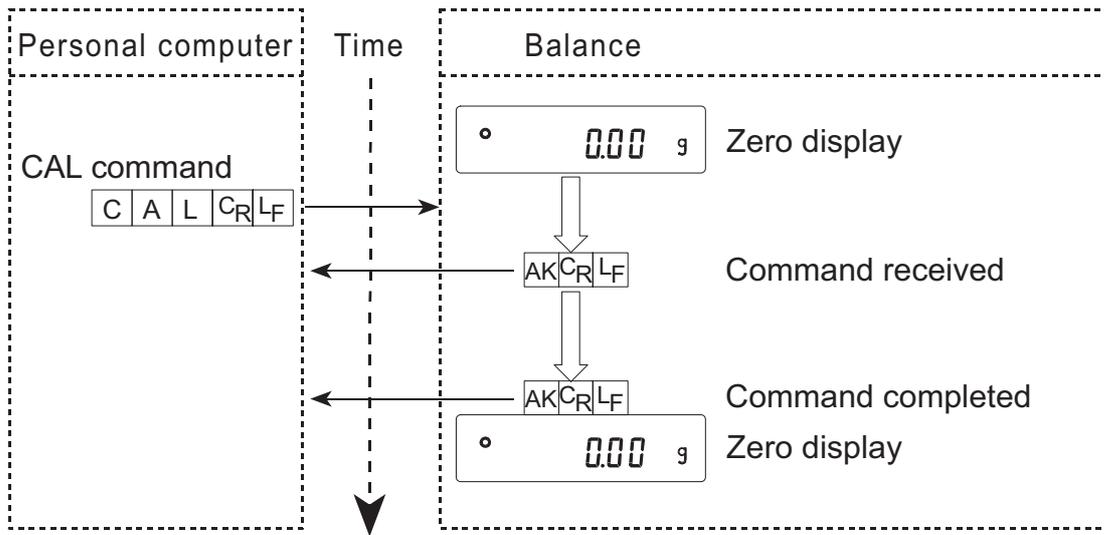
ON command



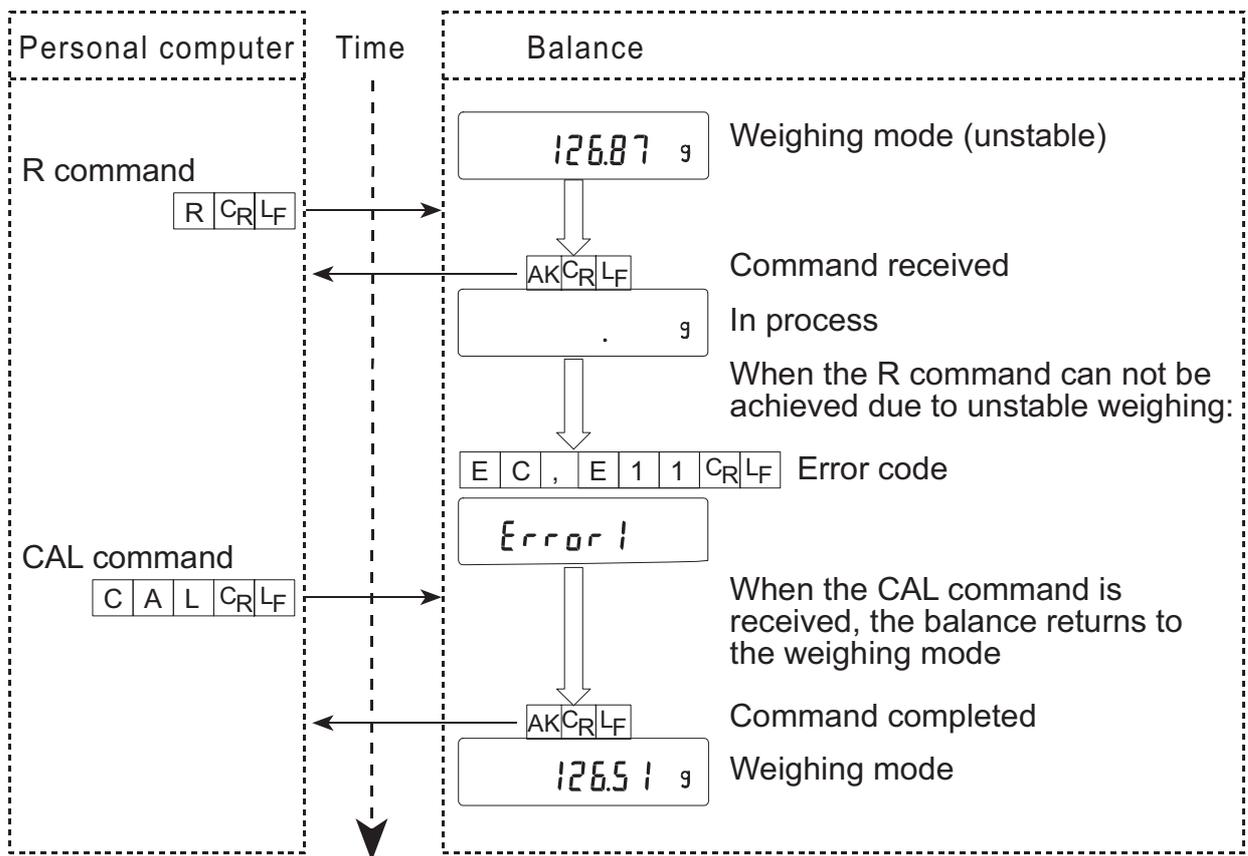
R command



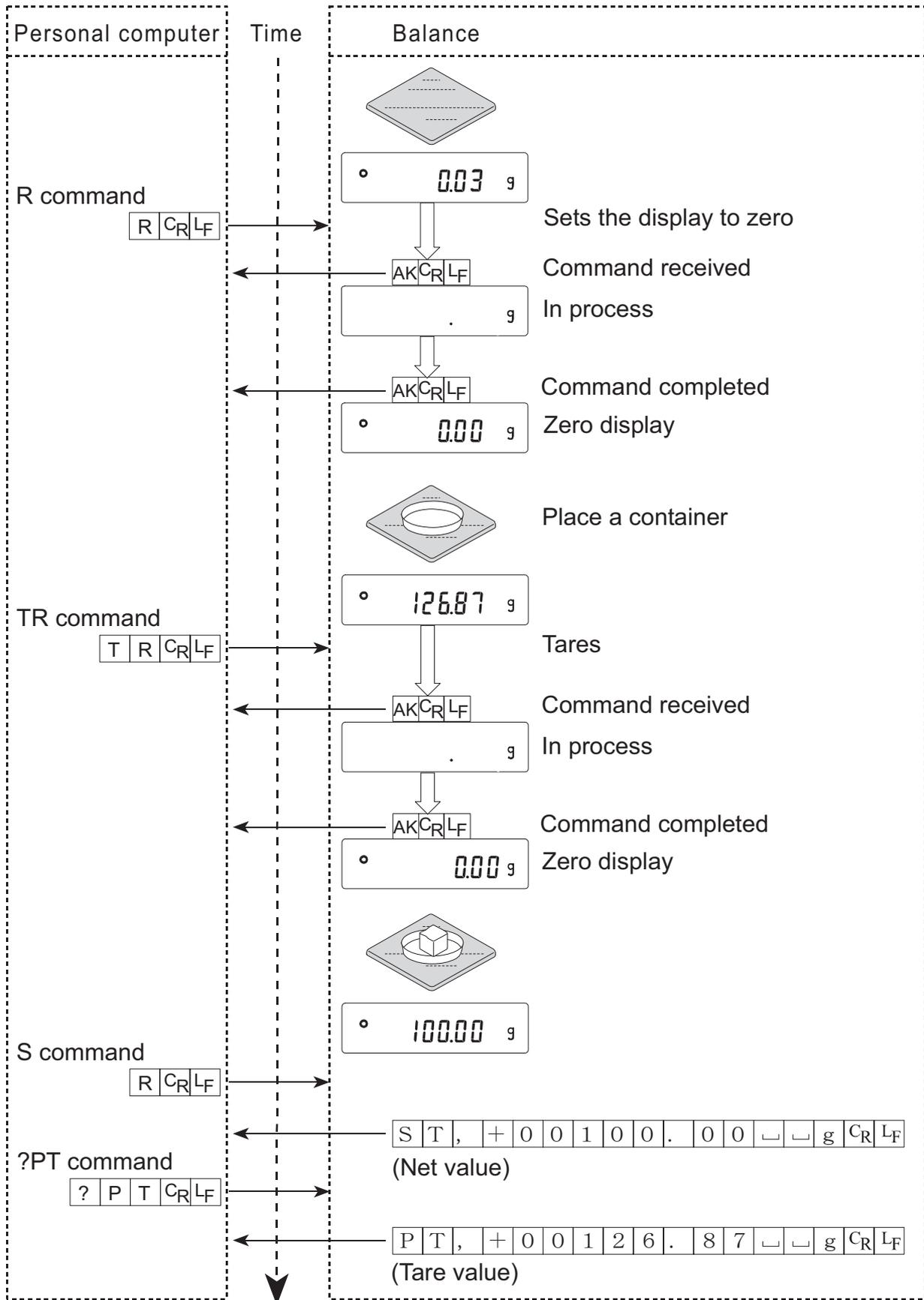
CAL command



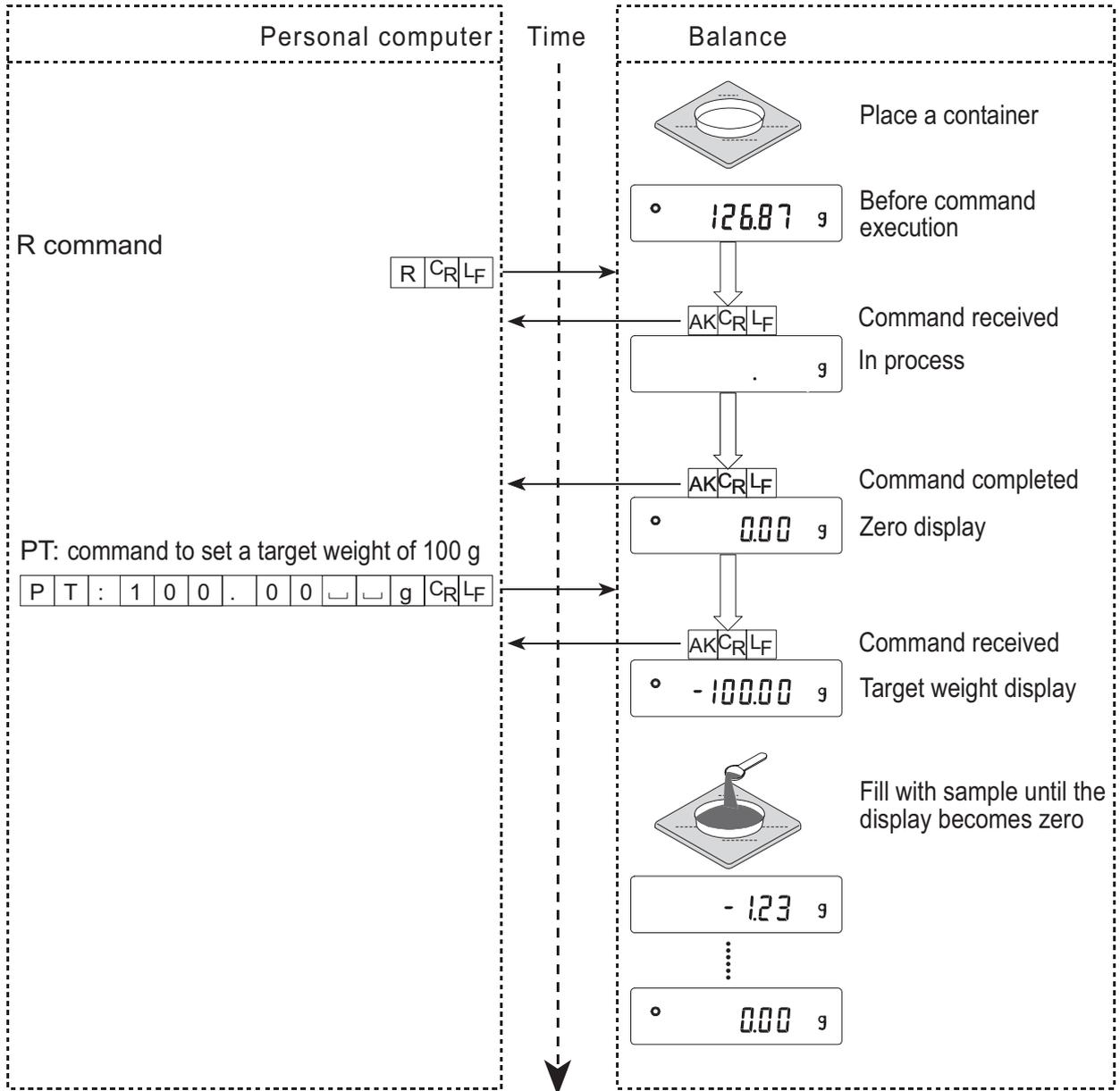
Error code



Weighing with a tare



Setting a negative target value and filling with a sample until the display becomes zero



18-4 Control Using CTS and RTS

Depending on the “*CTS*” parameter of “Serial interface (*SIF*)”, the balance performs as follows:

CTS 0

Regardless of whether the balance can receive a command or not, the balance keeps the CTS line Hi. The balance outputs data regardless of condition of the RTS line.

CTS 1

The CTS line is kept Hi normally. When the balance can not receive the next command (e.g. while the balance is processing last command), the balance sets the CTS line to Lo. The balance confirms the level of the RTS line before outputting a set of data. If the RTS level is Hi, the balance outputs data. If the RTS level is Lo, data is not output (The data is canceled).

18-5 Settings Related to RS-232C

Concerning the RS-232C, the balance has two functions: “Data output (*dout*)” and “Serial interface (*SIF*)”. Set each function as necessary.