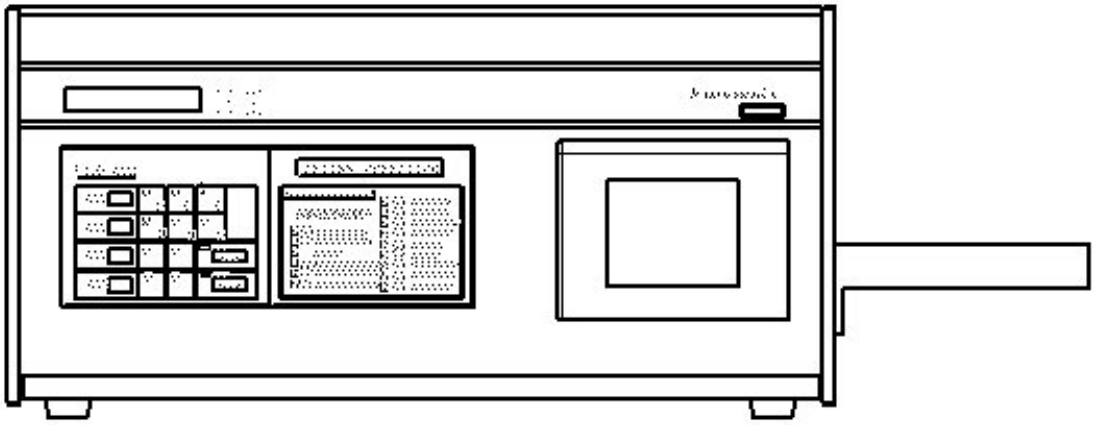
Panasonic®

OPERATING MANUAL

MODEL UD－716AGL
TL Badge Automatic Reader



2010.4

SAFETY INSTRUCTION

Please use this equipment correctly after reading this "Safety Instructions" well
The contents for preventing beforehand the harm to those who use,
all others and the damage to property are indicated.


:This mark means "Prohibition matter"


This mark means "A compulsory prohibition matter"

WARNING


■Do not put into microwave oven.
Equipment may emit heat ,catch on fire and destroy parts.


■At the time of assembly or disassembly, please be careful
of the corner and edge of the case.
The corner and edge of the case may cause injury if mishandled.


■Do not damage the power cable and the plug.
When the power cable is used while damage
I cause the electric shock, the short circuit, and a fire..
Please ask the shop about the repair of cable and the plug.


■Please remove the dust etc. of the power plug regularly.
It become an insulation failure because of moisture etc.
when dust etc.
collect in the plug and cause a fire.
Please wipe the surface with a dry cloth.


■Please definitely insert the power plug.
When insertion is imperfect, it cause a fire by the electric shock
and generation of heat.
Please use neither damaged plug nor the loosening outlet.


■Do not operate power plug with a wet hand.
It cause the electric shock.


■Do not use AC power which exceeds ratings
When ratings are exceeded by spaghetti junction etc.
It cause a fire by generation of heat.


■ELECTRIC HAZARD
CAN SHOCK,BURN OR CAUSE REATH, DO NOT TOUCH

CAUTION

DISASSEMBLY PROHIBITED
DO NOT OPEN THIS COVER,TRAINED SERVICE PERSONNEL ONLY

■Do not apply strong shock and drop.
■Do not drop.
A strong shock and drop may cause failure.

■Do not expose to rain, heavy moisture, dripping and splashing.
Liquids such as water and sweat may cause failure.

Warning
This is a class A product. In a domestic environment this product may cause radio Interference in whitch case the user may be required to take adequate measures.

SPECIFICATIONS WITHIN THIS MANUAL ARESUBJECT TO CHANGE WITHOUT NOTICE

TABLE OF CONTENTS

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications.

It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operating a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

1.Introduction

The UD-716AGL is a multi-purpose digital thermo-luminescent dosimeter (TL Badge) reader featuring compactness, and ease of use. The UD-716AGL can measures 50 TL Badges.

The heating method employed is PANASONIC original infrared heating. The built-in microcomputer enables full corrections and arithmetic handling of the measured data and performs data transmission to and from the external computer.

Thus, the reader offers high quality, high performance and full range of functions.

All in all, this TL Badge system is best suited for personnel and environmental the monitoring of radiations.

1.1 Principle of measurement

When a thermo-luminescent element is heated, accumulated radioactive energy is emitted in the form of light. The dose is measured by detecting this light. In the UD-716AGL, the thermo-luminescent elements are heated by the infrared lamp lit up in three pulse method, and emit the luminescence. This light is detected by the highly sensitive photo-multiplier, and counted up either by the P-counter in the photon counting method or by the F-counter in the frequency counting method. (Refer to Fig. 2-1.)

Featuring high sensitivity and low dark noises, the photon counting method is best suited to detect weak light. Under intense light, however, this counting method causes piling up phenomena for random photon pulses. Therefore, high dose should be measured by the frequency counting method in which photo-multiplier signal current is directly integrated. The crossover point for these two methods depends on the photo-multiplier sensitivity. As a reference, it is several R (several tens mSv) for $CaSO_4$ type elements.

1.2 Outline of TL Badge system

① Composition

The PANASONIC TL Badge system is composed of the UD-716AGL reader, the TL Badge, and the UD-740A magazine.

(1) The UD-716 AGL is a thermo-luminescent dosimeter reader employing a microprocessor
(2) The TL Badge is available in $CaSO_4$ type and $Li_2B_4O_7$ type.
(3) The UD-740A is a magazine loading 50 TL Badges.

② Measured DATA and correction processing

After measuring a TL Badge, direct reading value, that is, measured data unprocessed yet is shown on the display unit. This reader can also store this directly read data and perform correction processing, such as correction in terms of element correction factor(ECF) for each element and subtraction of background value (BG). This arithmetically processed data can be displayed on the LCD(Liquid Crystal Display) and transmitted to an external unit.

1.3 Cautions for use


CAUTION

The operating temperature of this reader is 0 to 40℃. Preferably, however, use at the ambient temperature of 15 to 25℃.


CAUTION

Avoid damp, dust or vibrating places.
Be careful not to give any shock when moving or transporting the reader.
A cooling fan is installed on the rear. Place the reader over 10 cm away from the wall.


WARNING

Do not touch the inside of the reader while the power is fed. A high voltage power source is built in.


CAUTION

After turning on the power, allow to stabilize the internal circuits for around 30 minutes before operation.


CAUTION

If any abnormality occurs, an error code is shown on the display unit.

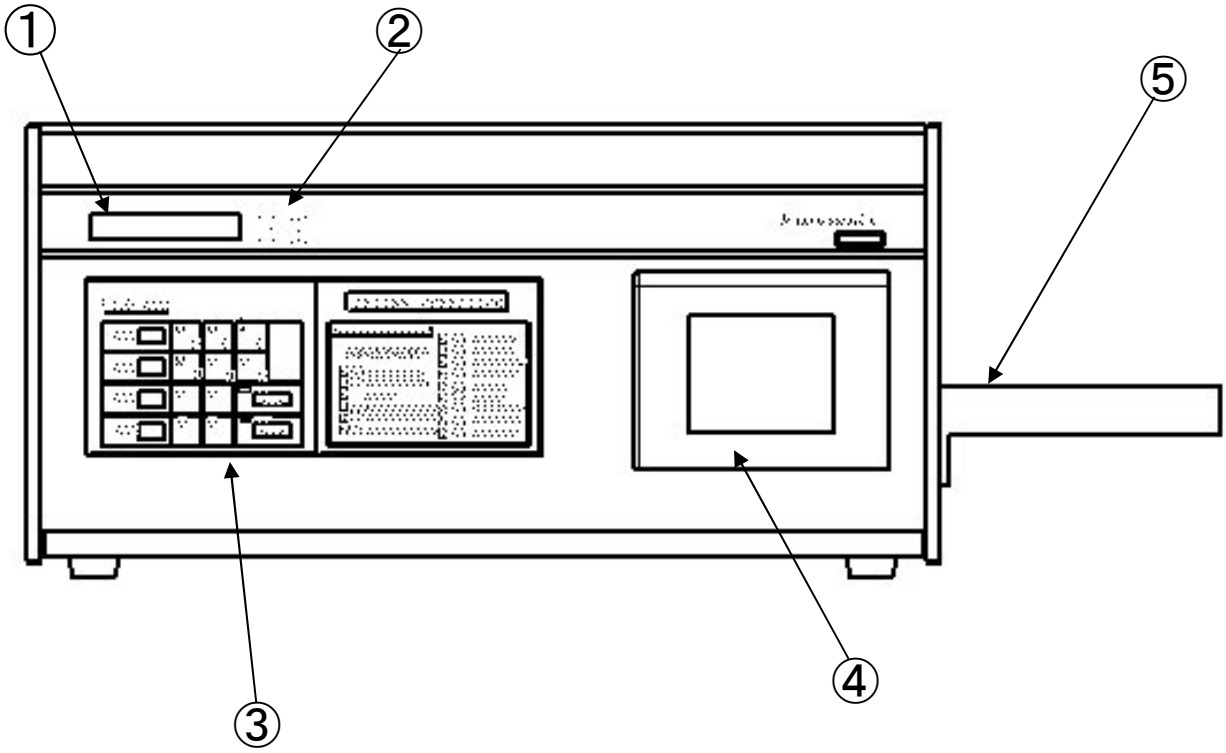

CAUTION

If dangerous state occurs　disconnect ac plug in the rear panel.

2. Method of handling

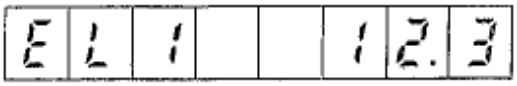
2.1 Description of parts

(FRONT PANEL)



① Display unit 8-digit display

a. TL Badge measurement (normal display)



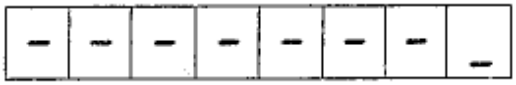
μ Sv or mR

Measured value

○ ID number, dark read value, reference element read value and slot number are also displayed.

b. Setting operation (service menu selection mode).

○ By operating the key switch on the operation unit, service menu selection mode is displayed.



c. Error code is also displayed here.

Remarks
(1) On opening LCD(④), push the dot of the lower side of LCD(④).
(2) On closing LCD(④), lift the LCD(④), and pull down the support behind the LCD(④).

② Unit display

a. The units μSv、mSv、Sv（or mR, R, and kR ）are automatically shown according to the measured value.
b. The “OVR” mark is shown when the measured value exceeds the measuring range of the TL phosper type.
c. The symbol “V” represents the unit of voltage when photo-multiplier, heating lamp and discriminator level voltages are displayed.
d. The “CNT” mark shows that the displayed value represents the count for dark, reference element, or automatic calibration read value.

③ Operation unit (key switches)

These key switches are used for TL Badge measurement operations and setting operations.

The [←] and [→] key ([SHIFT] + [9] and [SHIFT] + [0]) are used for moving the magazine.

④ Liquid Crystal Display (LCD)

This displays glow curves, ID number, dark read value, reference element read value, photo-multiplier high voltage and discriminator voltage.

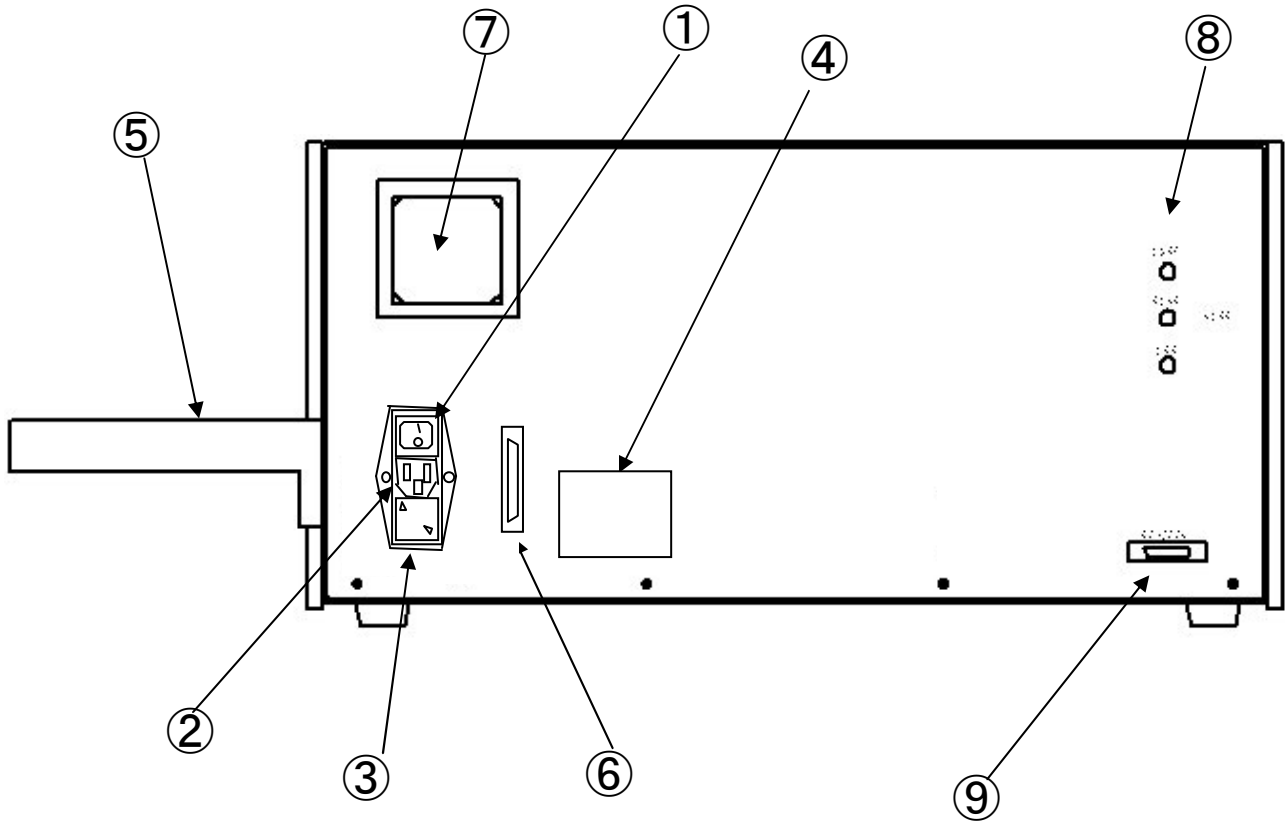
⑤ Magazine guide

A magazine is setting on this.

⑥ Buzzer

It sounds when the key operation is effective, when the operation is over, or when an error occurs.

(Rear panel)



① Power switch
This is the switch to turn on or off the power of the reader.

② AC line
Plug for the furnished power code into the specified AC power outlet. Be sure to connect also the ground wire.

③ Fuse
2.0A delay type fuses for circuit protection is built in. (2 pieces)

④ Name plate

⑤ Magazine Guide

⑥ Magazin changer I/F (future release)

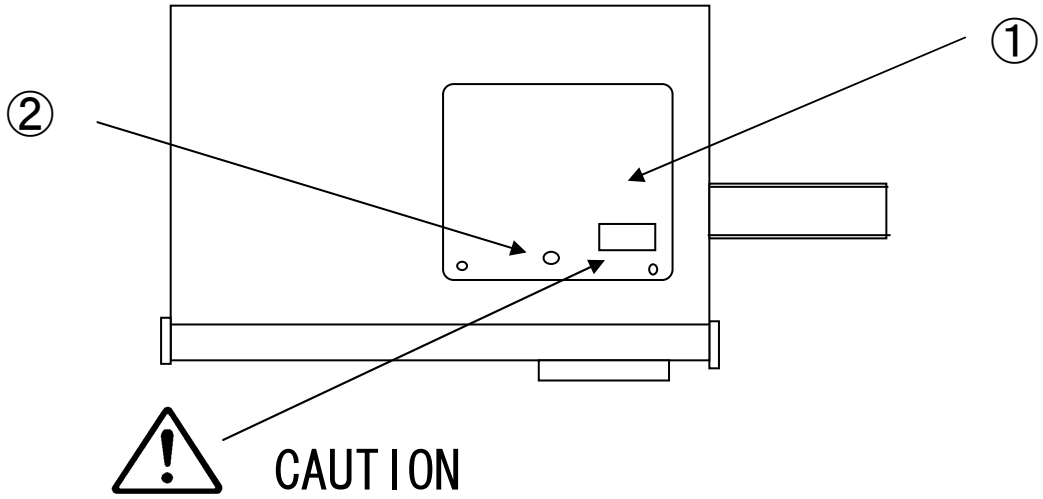
⑦ Cooling fan

⑧ Glow terminals
There are three terminals: the HIGH for the F-counter analogue signal, the LOW for the P-counter analogue signal, and the LAMP for the heating lamp driving signal.

Do not touch these terminals after turning on the power..

⑨ RS-232C terminal
A terminal for an external RS-232C type unit.

(top panel)

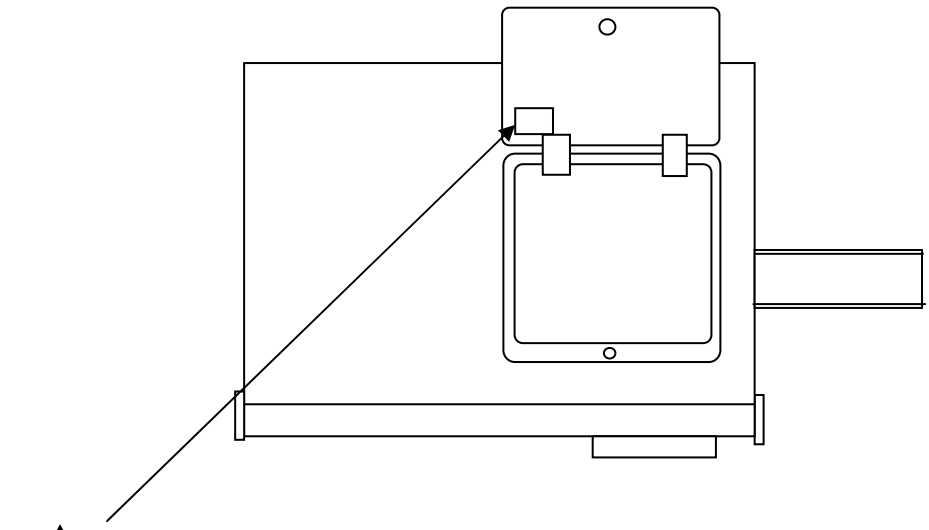


DISASSEMBLY PROHIBITED
DO NOT OPEN THIS COVER,TRAINED SERVICE PERSONNEL ONLY.

① Maintenance door
This door can be used by only Panasonic maintenance person.
This door can be used above power off state.
And only maintenance operator

② Maintenance door key hole

(Top panel maintenance door open)



2.2 Composition of the reader

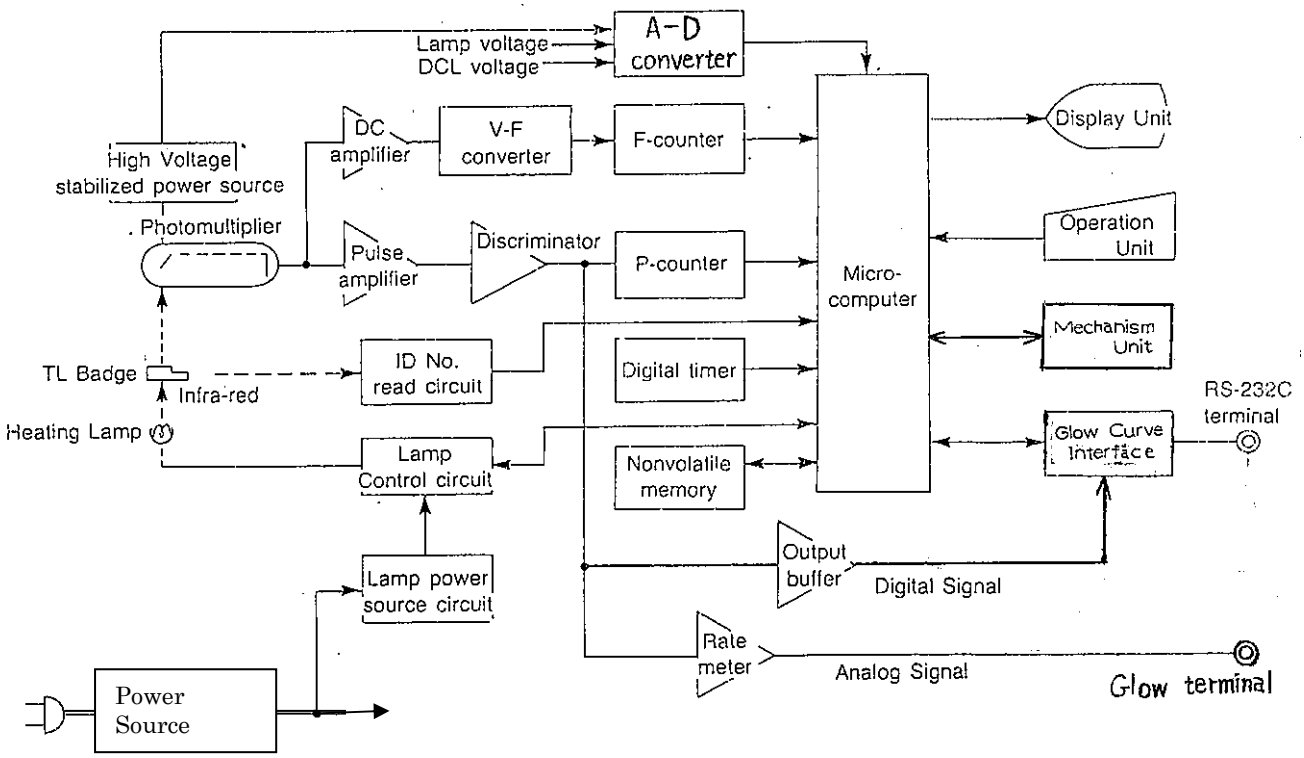


Fig. 2-1 Circuit configuration of UD-716AGL13C

2.3 Setting reader

a) Set Magazine guide to right side panel.
(use screwdriver and three screws)

b) Set equipment on the horizontal level Table.

c) Equipment side space Fig.2-2

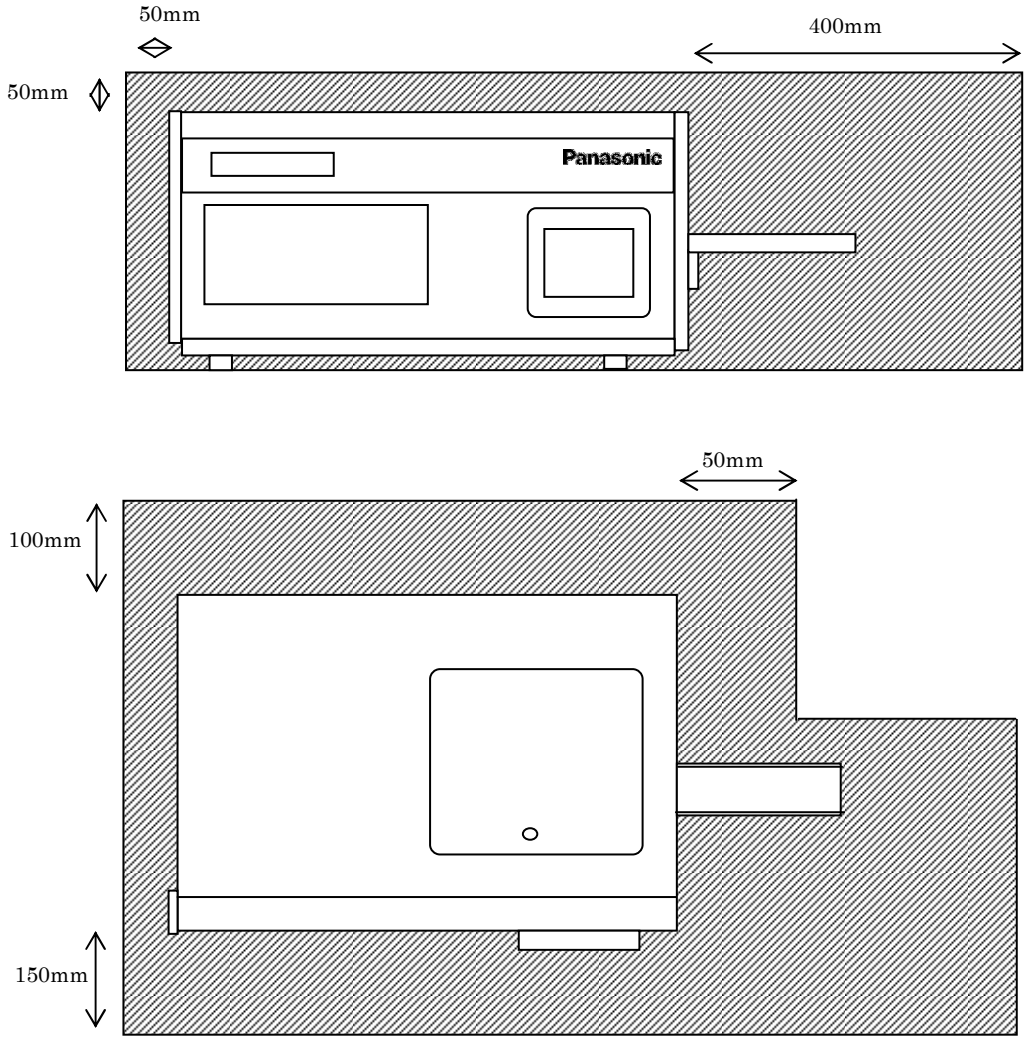


Fig.2-2 Equipment side space area

3. Specifications and features

Item	Contents
Dose display range	1 μSv to 999 Sv (0.1 mR to 99.9 kR)
Measuring range	$CaSO_4$:10 μSv to 500mSv (1 mR to 50 R) $Li_2B_4O_7$: 100 μSv to 10 Sv (10mR to 1000 mR)
Display	8-digit digital display
Measuring time	Approx. 35 sec./Badge
TL Badge loading	Automatic loading by magazine (50 Badges)
Measured data memory	Measured data before correction; for 500 TL Badges (for 999 TL Badges when ECFs are not used.)
Memory of ECF	Element Correction Factor for each element for 500 TL Badges
ID number	7 digits
External output	RS-232C transmission output (Including digital glow curve) Glow output; analog signal
Operating temperature, humidity	0 to 40℃, 10 to 80% RH
Power source	AC 110-120V / 220－240 V 50/60 Hz, 2 A
Dimensions	Approx. 622(W) × 418(D) × 322(H) mm (excluding projecting parts)
Weight	Approx. 42Kg
Sound Level	< 70dB

Features

(1) Because of the infrared heating method, measurements of high reproducibility and high precision can be performed in a short time.
(2) 50 TL Badges can be measured.
(3) Based on stored sensitivity correction factors for each element(ECF) and measured data, arithmetic operations for data correction, mean and standard deviation of data are performed.
(4) The built-in program serves easy check of heating.
(5) Using the UD-815, automatic calibration of the reader can be performed.
(6) The standard RS-232C interface allows the reader to connect to external units such as computer.
(7) The glow curve output signals are the digital glow and the analogue glow.

4. Procedure of operation

4.1 Outline of operating procedure

Preparation and normal operation for measurement of TL Badges, and setting operation (service request) are outlined in Fig. 4-1.

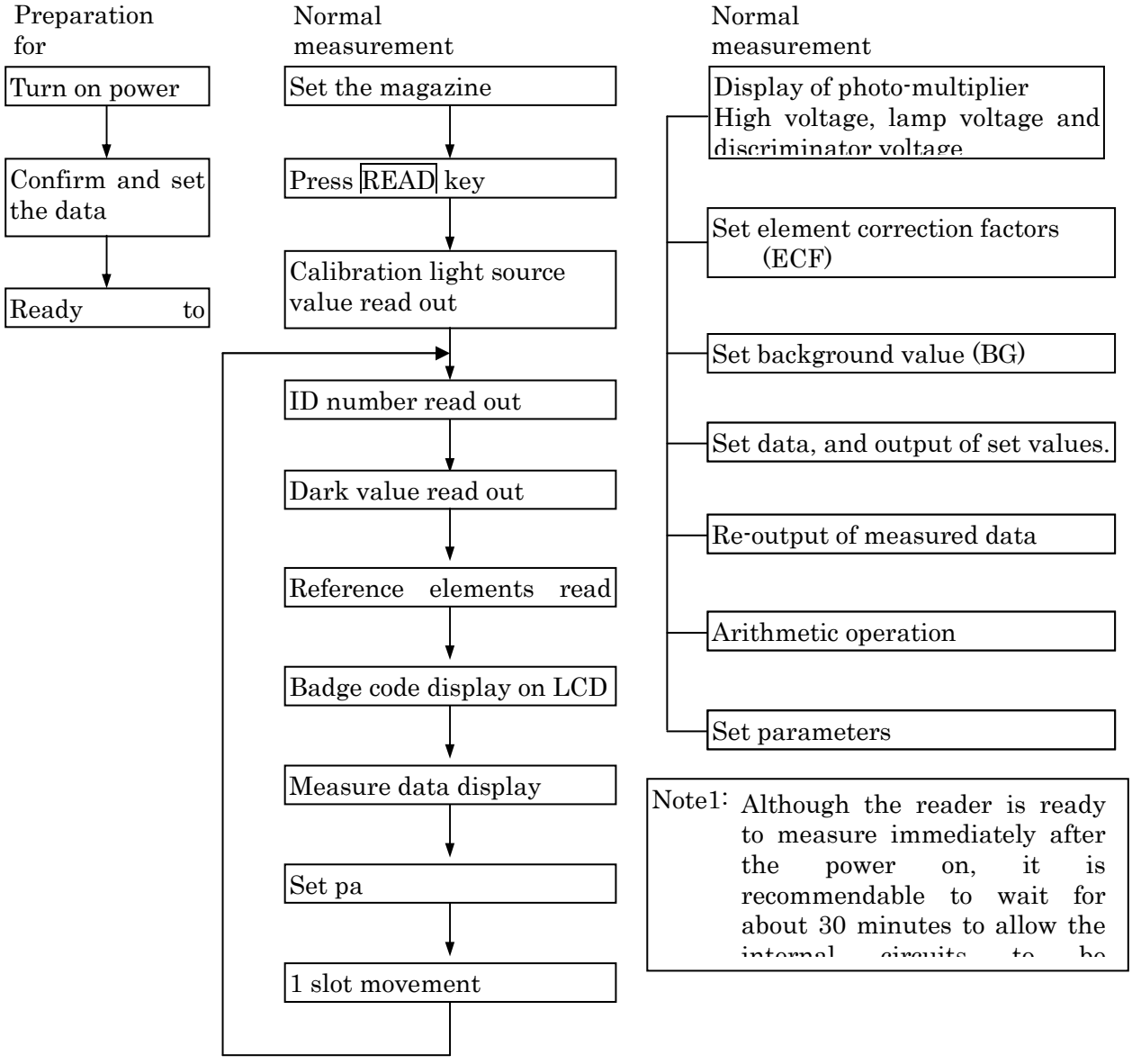


Fig. 4-1 Outline of operating

4.2 Measurement preparation operation

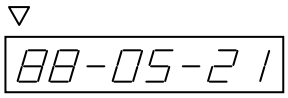
Preparation procedure from turning on the power is described below.

① [Power on]

Right after the power is turned on, the display changes sequentially from [00000000] to [FFFFFFFF], and the unit, [READY] and [READ] lamps are lit one after another. If a magazine is loaded in the reader, the magazine is moving for initializing the mechanism. When automatic checking of the reader is over, comes the date confirming mode.

② [Date confirmation and setting]

Date confirm mode



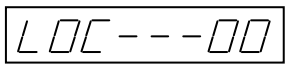
Year-Month-Day

- ○ The mark ▽ shows the starting position for input.
- ○ If there is no need to change the date on the display, press [ENTER] key.
- ○ When changing the date, specify the year, month and day by using the numeric keys [0] to [9] then press [ENTER] key.

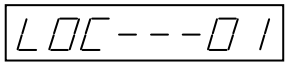
  Note) The date may also be set in the following ways:
  Month-Day-year or Day-Month-Year.

4.3 Normal measurement operation

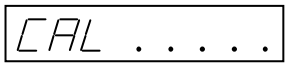
The operation method of TL Badge measurement is described below. The TL Badge readings by this operation are direct readings. In this reader these value are stored, and then corrections are made when the correction service is requested by the setting operation described in 4.4.

(1) Normal display-1 mode 

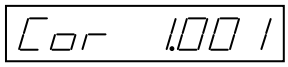
○ The reader is in this state when a magazine is not in the measurement position.
○ If a magazine is set and pushed into the reader, the state goes ahead to (2).

(2) Normal display-2 mode 

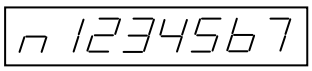
○ The reader is in this mode when a magazine is in the measurement position and the lower two digits show the slot number of a magazine.
If [←] or [→] key is pushed, a magazine is moved, and the number of the display is changed according to the slot position of a magazine.

(3) CAL measuring mode 

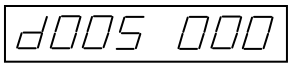
○ When [READ] key is pressed or before measurement of each magazine in connected with the UD-736AB, CAL measurement is started. As measuring time is elapsed, the number of periods on the display increases one by one. When the CAL measured value exceeds ± 20% of the predetermined reference value, the buzzer sounds, the error code is displayed.

(4) CAL end mode 

○ When CAL measurement is over, the above mode is established.
○ "Cor" (correction factor) is the reader sensitivity correction factor, which is stored and is automatically corrected to the TL Badge reading value.

(5) ID number read mode 

○ The ID number information of the TL Badge is read, displayed.

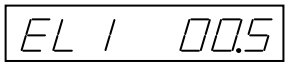
(6) Dark value read out mode 

○ In this mode, the dark value of the photo-multiplier is read and displayed. Then comes the mode (7). The three digits at the left represent the P-count value, and the three digits at the right, F-count value.

(7) Reference element read mode

○ The dark value is read, then the reference element is read, displayed. The three digits at the left represent the P-count value, the three digits at the right, F-count. The data of (4)~(7) mode are displayed on LCD as Fig. 4-1.
The left digit and right digits of Badge Code show Badge type and rank code, respectively.

(8) Element measurement end mode



○ When the measurement is over, the measured value is displayed and the glow curve is displayed on LCD. Then the reader measures the next elements.
○ When all measurements are over, the reader measures the next slot.

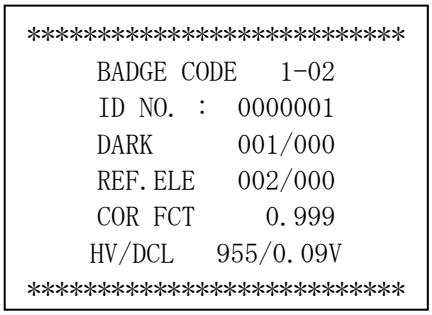
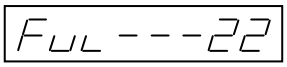


Fig. 4-1 Badge code LCD display

(9) Data area overflow mode 

- ○ When sequence number exceeds 500, the above message is displayed. The lower two digits show the slot number. In the measurement without ECFs, 999 data can be stored. In this case, this overflow occurs when sequence number exceeds 999. See 4.4 ⑤ - (5) Clear of all measured data.
- ○ When overflow occurs, measurement can be continued. However, by setting the parameter, subsequent measurements can be prohibited.
- ○ When all necessary data processing operations are over, clear all measured data in the memory following the instructions described in 4.4 ⑤ - (5).

4.4 Setting operation (service request)

The setting operations, mostly on corrections and arithmetic operations, are described here. All of the setting operations are shown in Appendix A List of setting operations.

Operating procedure

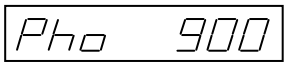
Press [REQST] key in the normal display-1 mode or the normal display-2 mode.

Then the service menu selection mode [▽ _ _ _ _ _ _ _ _] is displayed.

The mark ▽ shows the starting position for key-in. Press a desired symbol [A] to [F] while pressing a numeric key [1] to [6] or [SHIFT] key. The specified mode described below is established. In order to correct the setting on the way, press [RESET] key.
When [RETRN] key is pressed, the service menu selection mode comes back, and subsequent pressing of [RESET] key calls back the normal display-1 or –2 mode.

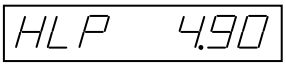
①

Displays of the photo-multiplier high voltage、Lamp voltage and discriminator voltage

(1) Photo-multiplier high voltage display mode 

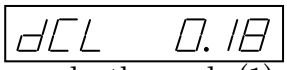
V

○ Press [REQST] [1] [ENTER] subsequently in the service menu selection mode, then the above display appears.
○ Then press [ENTER] key, next comes the mode (2).

(2) Lamp voltage display mode 

V

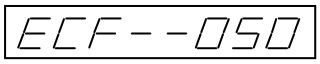
○ Press [ENTER] key in this mode, then the following display appears.

(3) Discriminator level voltage display mode 

V
○ When [ENTER] key is pressed in this mode, the mode (1) comes back.
○ Pressing [RETRN] key in any mode of (1) to (3) calls back the service menu selection mode.

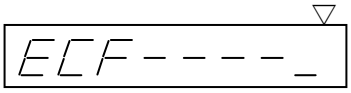
② Setting of element sensitivity correction factor (ECF) for each TL Badge

ECF can be set individually for up to 500 TL Badges.

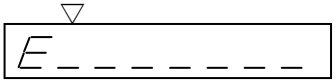
(1) Number of badge display mode 

○ Press [REQST] [E] [ENTER] in succession, then the above mode is established, and the number of TL Badges for which ECFs are stored is displayed.

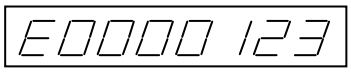
○ When ENTER key is pressed, the mode advances to (2).

(2) Badge type input mode 

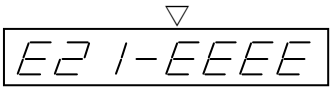
○ Enter the badge type (0 to F) at the position indicated by the mark ▽ , then press [ENTER] key. The mode advances to (3).

(3) ID number input mode 

Enter ID number from the position of ▽ . Then press [ENTER] key, the mode advances to (4). When input of all 7 digits is not necessary, enter just necessary lower digits to be changed.

(4) ID number display mode 

When [ENTER] key is pressed, the mode advances to (5).

(5) ECF input mode 

In this display, the second digit from the left represents badge type, the third digit, element number.

Remark: Badge type, here, is a symbol representing the TL Badge element type.

Example UD-802 -- 2, UD-810 -- A

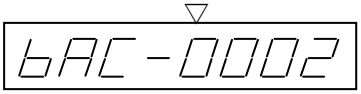
○ Enter 4-digit ECF value from the mark ▽ using the numeric keys 0 to 9, then press. [ENTER] The element number is incremented by 1 for next ECF input.

○ After the input of ECF for the 4th element, the mode (3) comes back. If ECF for the same type of badge is already stored, next comes the mode (4).

○ Press [RETURN] key three times in the mode (3) or (4), then the service menu selection mode comes back.

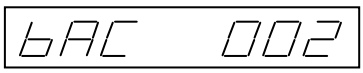
③ Setting of background (BG)

In personnel or environmental radiation monitoring, the natural radiation dose should be subtracted. This value is called as BG or background.

1) BG value input mode 

○ Press [REQST] [B] [ENTER] keys, the this mode is established.

○ Enter a BG value in the 2-byte packed format, then press [ENTER] key.
The mode advances to (2).

2) BG value display mode 

When [ENTER] key is pressed, the operation returns to the service menu selection mode.

Note: 2-byte pack format

$$abcd = bcd \times 10^{n} \ \mu Sv \text{ (or mR)}$$

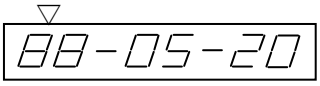
The digit "a" represents exponent and the digits "bcd" represent mantissa part. The relationship between a and n is shown below in Table 4-1.

a		7	0	1	2	3
n	R unit	-1	0	1	2	—
	Sv unit	—	0	1	2	3

Table 4-1

Examples) R unit 7012 = 012 × 10^{-1} mR = 1.2 mR
Sv unit 0012 = 012 × 10^{0} μ Sv = 12 μ Sv

④ Date setting and output of set values

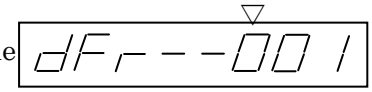
(1) Date setting mode 

○ Press [REQST] [4] [ENTER] keys in succession, then this mode is established.

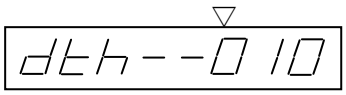
○ In order to change the date shown on the display, enter new date from the mark ▽ using [0] to [9], then press [ENTER] key. The new date is set and the operation returns to the service menu selection mode.

⑤ Correction of each measured value of TL Badge

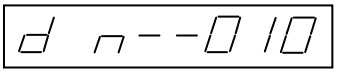
The measured value (direct reading) for each TL Badge is corrected and the calculated value for each element is displayed.
True value = direct reading (unprocessed data)÷ECF - BG
Since the direct reading is stored in the memory in correspondence to the sequence number starting from 001, a group of data to be corrected is specified by the top and last sequence numbers.

(1) Top sequence number setting mode 

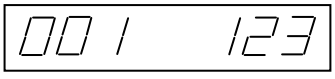
○ Press REQST D enter keys in succession, then the operation is in this mode. If no measured data is stored in the memory, the mode advances to (5).
○ When the top sequence number desired for output is entered from the mark ▽ and ENTER key is pressed, the mode advances to (2).

(2) Last sequence number setting mod 

○ Enter the last sequence number desired for output, and press ENTER key. The mode advances to (3).

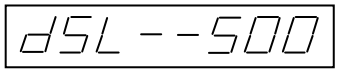
(3) Number of output badges display mode 

○ The number of badges between the top and last sequence numbers is displayed.
○ When ENTER key is pressed, the mode advances to (4).

(4) True value output mode 

Three digits at the left represent sequence number and three digits at the right represent corrected data true value.

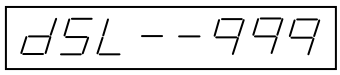
○ For the TL Badge element which is not measured, EEE is displayed.
○ When ENTER key is pressed on the way of output, the display is stopped, and the operation returns to the service menu selection mode.

(5) All clear of TL Badge measured values 

○ In the mode (1) for top sequence number input, enter E three times and press ENTER key, then the operation is in this mode. The above display shows the 500 data store mode.

○ Press ENTER key in this mode, then all measured data stored in the memory are cleared, and the operation returns to the service menu selection mode.

○ This mode is also established when the mode (1) for the top sequence number input is selected but no data is stored yet in the memory.

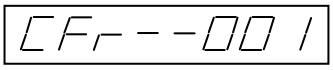
○ In order to changeover the 500 data store mode to the 999 data store mode, turn on the DIP switch -2 on the printed board (705A-001), then the display 

appears.

It must be noted that, when measured data are cleared in the 999 data store mode, ECFs are also cleared.

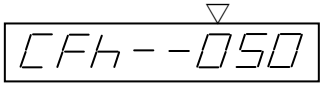
⑥ Calculation processing

The TL Badge measured values (direct readings) are corrected, and the mean, standard deviation, and coefficient of variation are displayed on the LCD.

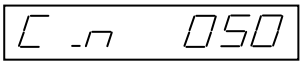
(1) Top sequence number setting mode 

○ When REQST C ENTER keys are pressed in succession, the above mode is established.

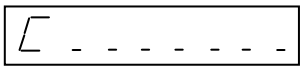
○ Enter the top sequence number of the group of data to be included in the calculation from the mark ▽ , and press ENTER key. The mode advances to (2).

(2) Last sequence number setting mode 

○ Enter the last sequence number of the group from the mark ▽ , and press ENTER key. The mode advances to (3).

(3) Number of badges display mode 

○ The number of badges between the top and last sequence numbers is displayed.
○ When ENTER key is pressed, the calculation starts and the mode advances to (4).

(4) In-calculation mode 

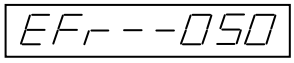
○ When all calculations are over, the mode advances to (5).

(5) End of calculation mode

○ The results of the calculation are displayed on the LCD and the operation returns to the service menu selection mode.

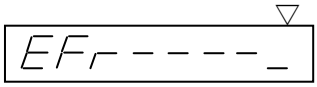
⑦ Output of element sensitivity correction factor(ECF)for each TL Badge

The ECFs stored in this reader can be displayed.

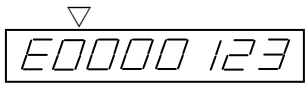
(1) Number of badges display mode 

○ Press [REQST] [F] [ENTER] keys in succession, then this mode is established.

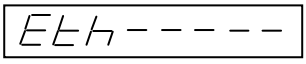
○ When [ENTER] key is pressed, the mode advances to (2), and when [ENTER] key is pressed with [SHIFT] key being pressed at the same time, the mode advances to ⑧ for ID number deletion.

(2) Badge type setting mode 

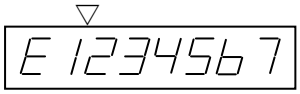
○ Enter the element type (0 to F) at the position indicated by the ▽ mark, and press [ENTER] key. ECFs of the elements of that type will be displayed in the mode (6). The mode advances to (3) after this.

(3) Top ID number setting mode 

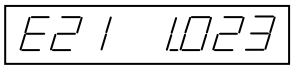
○ Enter the top ID number of the group to be printed out from the ▽ mark, and press [ENTER] key. The mode advances to (4).

(4) Last ID number transform mode 

○ When [ENTER] key is pressed, the mode advances to (5).

(5)Last ID number setting mode 

○ Enter the last ID number from the ▽ mark and press [ENTER] key. The mode advances to (6).

(6) ECF output mode 

○ The ECF of the specified ID number is displayed. In the display, the second digit from the left represents badge type, the third, element number.

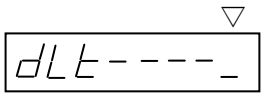
(7) Setting ECFs to 1.000

○ In the mode (3) described before, press [E] seven times and press [ENTER] key, then all ECFs for the elements of the selected type are set to the value 1.000, and the mode returns to the service menu selection mode.
By this operation, the ID numbers remain in the memory.
If both of ID numbers and ECFs are to be deleted, perform the procedure ⑧ .

⑧ Deletion of ID number of ECF

The ID number of ECF stored in the memory can be deleted.

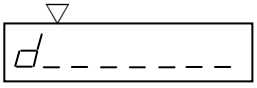
(1) Element type setting mode



○ Press [REQST] [F] [ENTER] keys,then [ENTER] key while pressing [SHIFT] key. This mode is established

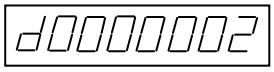
○ Enter element type (0 to F) at the ▽ mark, then press [ENTER] key. The mode advances to (2).
ID numbers for the specified type will be delected when the procrdure (3) or (4) is performed.

(2) Setting of ID number to be deleted



○ Enter the ID number to be deleted from the ▽ mark, and press [ENTER] key. The mode advances to (3).

(3) Display and deletion of ID number



○ Press [ENTER] key, then the ID number on the display is deleted from the memory, then the operation mode returns to (1).

(4) Deletion of all ID numbers

○ In the mode (2) described before, enter [E] seven times instead of ID number,

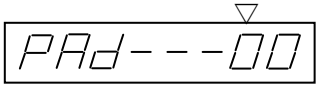
Then press [ENTER] key. The follwing display appears

○ When [ENTER] key is pressed subsequently, all ID numbers of the TL Badges of the specified type are deleted. The mode returns back to ⑦-(1) after this.

⑨ Setting of parameters

Since parameters are set before shipping, there is usually no need to rewrite them.

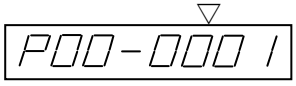
When some parameters must be changed, perform the following procedure after turning on the DIP switch No.4 on the printed board (705A-001).

(1) To change parameters 

a. Parameter address setting mode

○ Press REQST 7 ENTER in succession, then this mode is established.

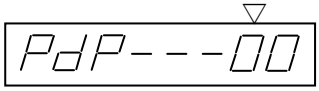
○ Enter two-digit address from the mark ▽ , then press ENTER key. The mode advances to b.

b. Parameter rewrite mode 

Enter four-digit parameter value from the mark ▽ , then press ENTER key.
The parameter is rewritten, then the address is incrimented by 1.
If ENTER key is pressed with SHIFT key,the address is decremented by 1.

(2) To output parameters

For this operation, there is no need to operate the DIP switch on the printed board (705A-001).

a. Parameter address setting mode 

○ Press REQST 8 ENTER keys in succession, then this mode is established.

○ Enter the head address (2 digits) form the mark ▽ , then press ENTER key. The mode advances to b.

b. Parameter output mode

○ Parameters are displayed one after another from the top to the last address then the operation returns to the service menu selection mode.

○ When RETRN key is pressed during output, display are stopped, and the operation returns to the servece menu selection mode.

5.Error code

If front panel display the error code, operator read the error code and read error code table (page 23-27).

Please connect our service office,and Directions of a service center are followed.

Sevice office List

North America area
Panasonic Industrial Company
Panasonic Way Secaucus,New J ersey 07094 USA

Europe area
Panasonic Industrial Europe GmbH (UK)
Willoughby Road, Bracknell,Berks.,RG12 8FP.THE UNITED KINGDOM

Japan area
MFD Panasonic Communications Co.,Ltd
Devices and Components Company
2111 Ueda Usa Oita 879-0493,Japan

ERROR CODES (1)

Error Code	Error Message	Meaning	Cause	Comment
01	CPU	1) CPU ran without reasonable control, or RAM for the stack pointer was destroyed. 2) The data read out from 8155 RAM didn't match with that written into it.	DC PCB (705A-001) faulty.	
02	ROM	1) The sum of the contents of PROM doesn't match with the check character (7FFD ∿ 7FFF).	Same as above.	
03	RAM	1) The data read out from CMOS RAM didn't match with that written into it.	Same as above.	
04	PARAM	1) The sum of the contents of a parameter doesn't match with the check character ($PARAM49_L$ ∿ 4A). 2) T0, T1, T3, T4, T7A to T7C, and/or T11 are more than 1,000. 3) Specific parameters are equal to 0000.	1) Same as above. 2) Values of input parameters are wrong.	
05	HEX	1) The content of the parameter is in hexadecimal, it should be in BCD, 2 byte packed. 2) The contents of the data and/or ECF are in hexadecimal.	1) Parameter input was wrong. 2) If the same error occurs even after clearing the memory, then 001 PCB faulty.	
06	NCR	1) The number read-out lamp abnormal.	1) The No. lamp faulty. 2) The number read circuit (716A-004) faulty.	
07	PARITY	1) Number code parity error. (The sum of open holes in the column is not odd.)	1) The TL badge faulty. 2) The number read circuit (716A-004) faulty.	
08	HV	1) The high voltage for the photomultiplier is not within the reference value (PARAM58) ±5% ($PARAM77_H$).	1) High voltage circuit (705A-003) faulty. 2) Pre-amplifier (710A-005) faulty.	

ERROR CODES (2)

Error Code	Error Message	Meaning	Cause	Comment
10	CVOPEN	The microswitch is off, i.e., the main housing is open.	Operation error.	
11	CAL	The read out value through the calibration lamp (CAL) isn't within the reference value (PARAM57) ±20% ($PARAM78_H$).	Either one of the high voltage circuit, the photo-multiplier, or the built-in CAL light source faulty.	
12	OVER	TLB value isn't within the measurement range, or the counter went out of the range.	The dose was too large, or the counter circuit (705A-001) faulty.	
14	DSR	RS-232C DSR signals are in "L", although the communication is in DATA LINK or BASIC mode.	1) The external equipments (including the cables) are not adequate or faulty. 2) RS-232C control circuit (705A-001) faulty.	
15	CTS	RS-232C CTS signals are in "L", although the communication is in DATA LINK or BASIC mode.	Same as above.	
16	TXD	1) In BASIC mode of RS-232C communication, no ACK or DC4 signal was returned, although the data was sent three times. 2) TLB measured data or CAL measured data remain untransmitted.	Same as above.	
17	ENT	Input error occured while ECF, parameters, or measured data were being sent from the external equipment.	Same as above.	
19	ZERO	The read in value for the reference element was not within the reference value (PARAM53) ± the value for range (PARAM56).	The parameters given were wrong.	

ERROR CODES (3)

Error Code	Error Message	Meaning	Cause	Comment
20	DARK	1) P-count value for the DARK read in value exceeds the specified maximum (PARAM54). 2) F-count value for the DARK read in value exceeds the specified maximum (PARAM55).	1) The photomultiplier faulty. 2) HI PCB (705A-003) faulty. 3) The ground terminal is not well connected.	
21	LAMP	1) The lamp voltage isn't within the reference value (PARAM59) ± 10% ($PARAM77_L$). 2) No current flows into the lamp when it should light.	1) Power source for the lamp faulty. 2) The lamp drive circuit (705A-003) faulty.	
22	FLASH	The lamp has already lit more than 1,000,000 times.	The lamp life over.	
23	P-CNTR	P-counter abnormal. (The abnormality occurs only during CAL measurement.)	The counter circuit (705A-001) faulty.	
24	F-CNTR	F-counter abnormal. (The abnormality occurs only during CAL measurement.)	Same as above.	
25	NO ELE	None of Element 1 to 4 were specified for calculation and/or data re-output. (A8 to A11 of $PARAM51_H$ are all zero.)	The parameters given were wrong.	

ERROR CODES (4) - Mechanism -

Error Code	Error Name	Meaning	Cause	Comment
30	M 0	Timing sensor (RSR10) did not detect a signal within specified time limit, though specified pulses (25 pulses) were transfered to the pulse motor 3 (PM3).	1. Something blocked up the path of magazine. 2. Failure of the pulse motor or sensor itself, or PC board of mechanism controller.	
31	M 1	1. End sensor (RSR7) did not detect a signal within specified time limit, though specified pulses (1250) were transfered to the PM3. 2. After magazine end was detected, end sensor did not turn over, though specified reverse pulses were transfered.		
40	B 0	Upper sensor (RSR8) did not detect a signal within specified time limit, though 96 pulses were transfered to the PM2 for badge insertion.	1. Something blocked up the path of badge, or magazine position is not correct. 2. Failure of the pulse motor or sensor itself, or mechanism controller.	
41	B 1	Lower sensor (RSR9) did not detect a signal within specified time limit, though 96 reverse pulses were transfered to the PM2.	1. Something blocked up the path of push-up rod. 2. Failure of the pulse motor or sensor itself, or mechanism controller.	
42	B 2	Badge sensor (RSR6) did not detect a signal within specified time limit, though lower sensor (RSR9) detected the down of push-up rod.	1. Something blocked up the path of badge. 2. Failure of sensor itself.	

ERROR CODES (5) - Mechanism -

Error Code	Error Name	Meaning	Cause	Comment
43	B 3	1. Origin sensor (RSR3) did not detect a signal within specified time limit, though specified pulses were transfered to the PM1 for TL-plate extraction. 2. Origin sensor (RSR3) detected a signal, before specified pulses were completely transfered.	1. Something blocked up the path of TL-plate. 2. Failure of the pulse motor or sensor itself, or mechanism controller.	
44	B 4	At initiation, end sensor (RSR1) did not detect a signal within specified time limit, though 101 pulses were transfered to the PM1.		
45	B 5	End sensor (RSR1) detected a signal during normal operation.	1. Misoperation of motor driving circuit of mechanism controller. 2. Failure of the pulse motor or sensor itself.	
46	B 6	Measuring position sensor did not detect a signal within specified time limit, though specified pulses were transfered to the PM1 for TL-plate extraction.	1. Something blocked up the path of TL-plate. 2. Failure of the pulse motor or sensor itself, or mechanism controller.	
47	B 7	1. Opacity sensor (RSR4) detected a signal at the origin of slider position. 2. Opacity sensor (RSR4) did not detect a signal within specified time limit, though specified pulses were transfered to the PM1 for TL-plate extraction.	1. Something blocked up the path of TL-plate. 2. Failure of the sensor or pulse motor, or mechanism controller.	

6. Output data formats

The Output timing of data to the RS-232C includes the normal measurement of TLD element, CAL reading, automatic calibration processing, BG processing, and external unit output processing (output of set value, re-output of measured data, etc.).

① No data Link mode

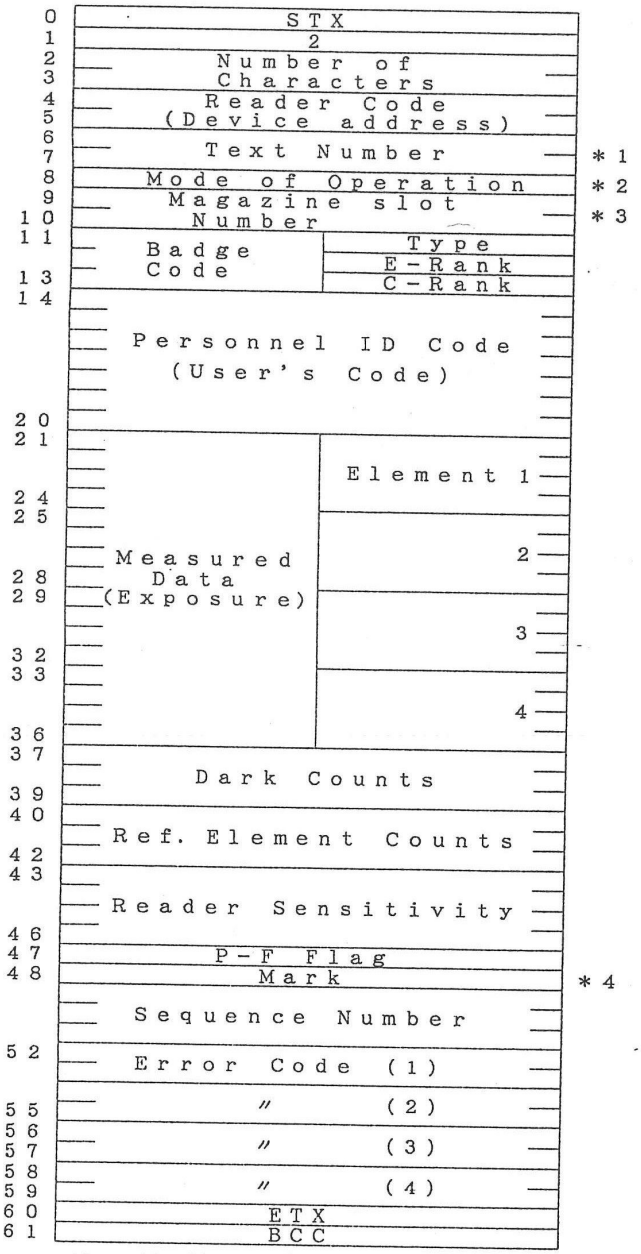
In both Fig. 6.1. and Fig. 6.2., STX, ETX, BCC (block check character) are deleted, and the other data is transmitted.

② Data Link mode

Same as in No Data Link mode, STX, ETX, BCC are deleted, and the other data is transmitted.

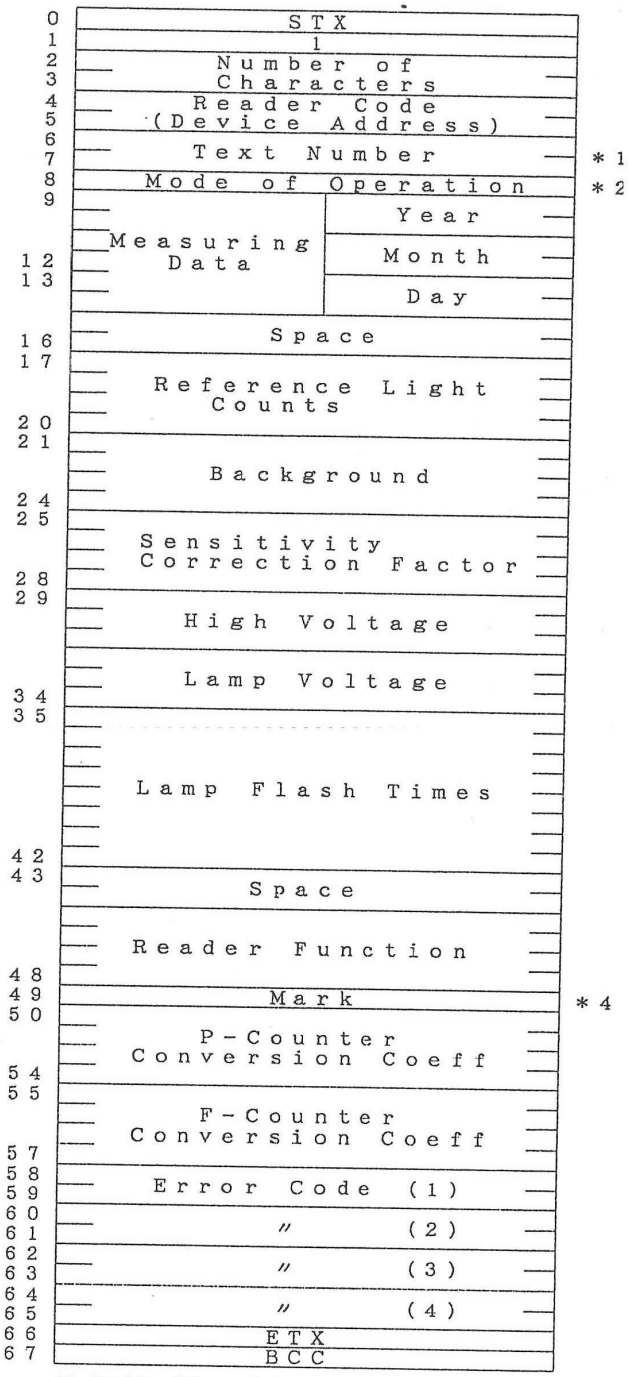
③ Basic mode

In both Fig. 6.1. and Fig. 6.2., STX, ETX, BCC are added and transmitted together. BCC is a horizontal parity check byte, and calculates from the next byte of STX through ETX, thereby compositing an even parity.



*1 cyclic (00 to 99)
*2 SP: Normal measurement
Z : Dark & reference element
D : Re-output of measured data (corrected)
R : 〃 (direct readings)
A : Automatic calibration reading
H : Heating check
*3 Cyclic (00 to 50)
*4 Reader mark : Y

Fig. 6. 1
TLD measurement data format



*1 Cyclic (00 to 99)
*2 SP: CAL measurement
P : Output of set value
A : Automatic calibration result
*3 Reader mark : Y

Fig. 6. 2
CAL data format

7. RS－232C interface

7.1 Specifications

The standard shown here must be referred to when connecting for serial binary data interchange with data terminal equipment (DTE) or data communication equipment (DCE). This section also relates to the interface composition specification for applying the system.
In either case, the composition of converting circuit and others should conform to the specification of the manufacturer of the individual equipment.

Table 7.1 shows the interface specifications of UD-716AGL13C conforming to the RS-232C standard.

Table 7.1 RS-232C Interface Specifications

Electric specifications

Communication system	Transmit only or half duplex.
Communication line	2 lines or 4 lines.
Signal timing	Asynchronous method.
Baud rate	Variable setting: 1200, 2400, 4800, 9600, 19200 bits/sec.
Load side impedance	3 to 7kΩ (voltage 3 to 15 V); 2,500 pF or less
Open circuit voltae	2 V or less(load); 25 V or less(signal source)
Short-circuiting current	0.5 A or less between any two lines.
Signal voltage	5 to 15 V in magnitude(between interchange circuit and signal GND)
Signal discrimination	
Rise characteristics of data and timing signal, control	30 V/μ sec or less

Signal	Signal voltage	
	< -3V	> +3V
Data signal	"1"	"0"
timing and control signal	OFF	ON

Mechanism specifications

Connector	25-pin connector(female connector)
Cable	Max. 15m cable(a slightly longer cable is possible if the load capacity is 2,500 pF or less)

Interconnection circuit

Pin configuration	See Fig. 7.1
Data transmision	DTE does not transmit if ON condition is not established in any one of RTS, CTS, DSR, DTR signal.
Timing signal	None.

Interconnection

No data Link mode	Connected to digital printer (without CTS, DSR reply check)
Data Link mode	Connected to digital printer (with CTS, DSR reply check)
Basic mode	Connected to computer

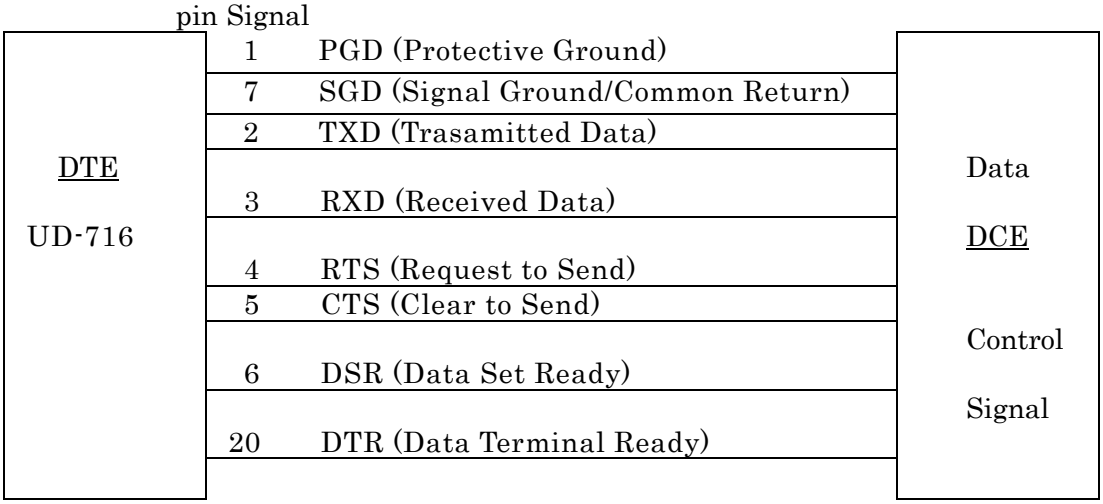


Fig. 7.1 Pin configuration of RS-232C interface

7.2 Control procedure

In addition to RS-232C interface, the control method of Basic mode conforming to ISO-STD-1745 can be used between the UD-716AGL13C and computer in the half duplex communication system. Generally, the control procedure of data transmission is established on the following state.

(1) Connection of transmission line
(2) Establishment of data link
(3) Transfer of information
(4) Termination
(5) Disconnection

The ISO-STD-1745 recommends the control or procedure using the transmission control character specified for states (2),(3), and (4). However, since the transmission control character is required for external units such as teletypewriter and digital printer, these control procedures are not employed. For the computer, this standard is used in the transmission control including the error control. Connection to individual units is mentioned later in relation to the transmission control mode obtained by feeding specified parameters.

① No Data Link mode

This mode is used when transferring the output data of UD-716AGL13C without checking the control signals of the connected external unit. The connection diagram of output data is shown in Fig.7.2. In this case, therefore, it does not result in error if measured without connecting the external unit.

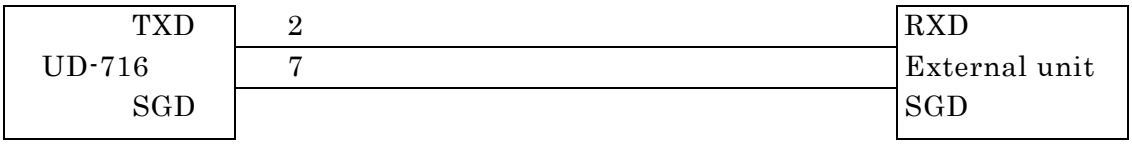


Fig.7.2. Connection to extenal unit

② Data Link mode

(1) This mode is used when transferring the output data of UD-716AGL13C directly to a digital printer, such as RP-80 (EPSON). The usable printer must be furnished with RS-232C interface and have a capacity to print one record of output data in on line.

(2) The data link between the UD-716AGL13C and printer is established when the power source disconnection of cable and to check if the reader is ready to transmit data.

(3) Figure 7.3 is a connection diagram to the printer RP-80. This is a only reference diagram, and the method of connection varies depending on the printer to be used if the RS-232C interface is provided.

(4) RC(Reverse Channel) is turned to the low level when the printer is busy.

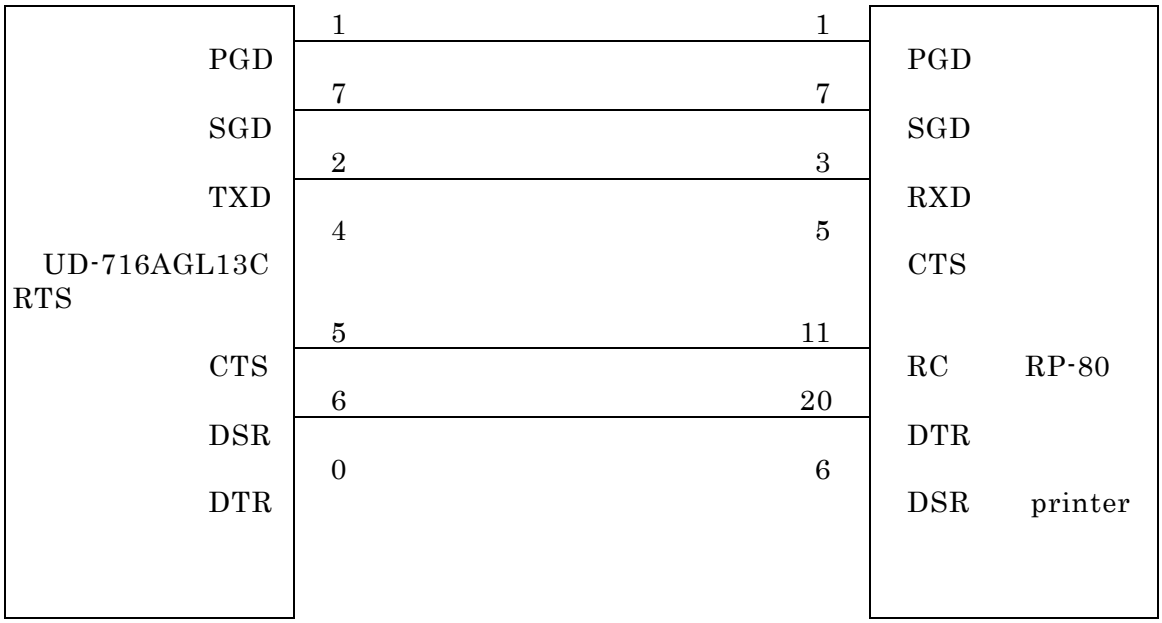


Fig.7.3. Connection to printer

① Basic mode

This mode can connect the UD-716 with a computer operating in half duplex serial asynchronous data transmission system.

The transmission control characters used in this mode are as follows.

STX: Start of Text	(X'02')
ETX: End of Text	(X'03')
ACK: Acknowledge	(X'06')
NAK: Negative Acknowledge	(X'15')
DC 4: Device Control	(X'14')

Figure 7.4 shows the general diagram to connect the UD-716AGL13C to a computer.

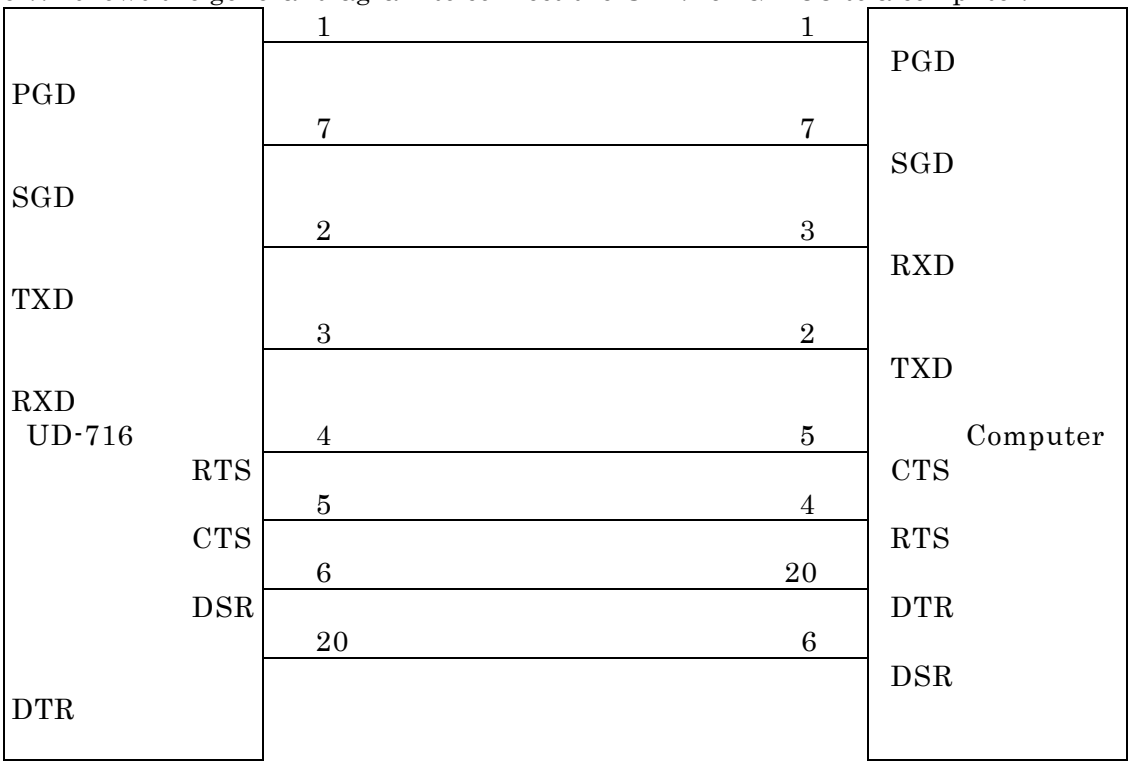


Fig. 7.4. Connection to computer

Figure 7.5 shows the Basic mode control procedure in the data transmission using transmission control characters. The control signals are used in the cable configuration shown in fig. 7.4.

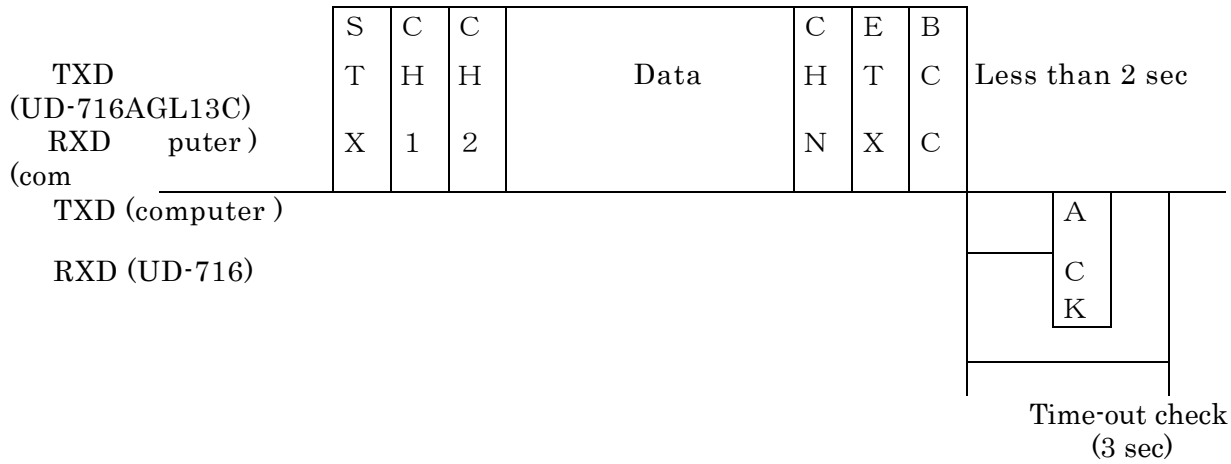


Figure 7.5 Basic mode transmissin control procedure

NOTES: 1. When transmission control character ACK is not returned from the computer to the reader, or when NAK is returned, the data is transmitted again according to the error control procedure of UD-716AGL13C.

2. The duration of time-out check can be varied by parameter $2B_H$.

7.3 Selection of transmission control mode

Modes of No Data Link, Data Link, and Basic can be changed over as follows.

(1) Reader function setting mode ▽

○ The above mode is established when REQST , 9 , ENTER keys are pressed in succession in the operation unit.

○ When a numeral conforming to the item below is fed after the triangle mark and ENTER key is pressed, it is set.

Mode	Value
No Data Link	0 F
Data Link	2 F
Basic	4 F

7.4 Others

(1) Baud rate (transmission speed)
The baud rate is preset at 19,200 bits/second, but it may be varied from 1,200 to 19,200 bits/second by changing the parameter $F8_{L.}$

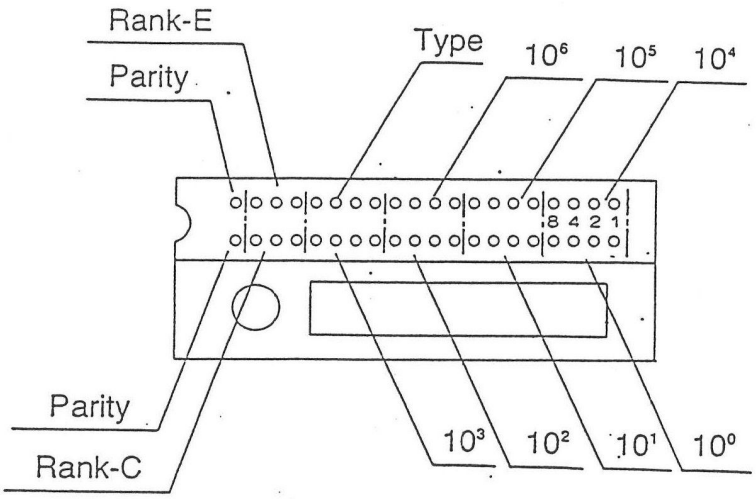
(2) Character length
Each character of data is 10 bits long, and is composed of start bit of 1 bit, ISO code of 7 bits, even parity of 1 bit, and stop bit of 1 bit.

Appendix A List of Setting Operations (Service Requests)

Press [REQST] key, a proper selection key [1] to [F], and then [ENTER] key.

NO.	Fundamental initial display	Foundation of LED display	Description	Application	Processing		
					Ordinary processing	External connection	Service company
1	PHo	PHOTOMULTIPLIER	Display of photomultiplier high voltage, lamp voltage and descriminator voltage	Applied voltage of the photomultiplier, lamp, and discriminator can be confirmed.	○		
2	HCh	HEATER CHECK PROCEDURE	Heating check	Heating check is performed.	○		
3							
4	88-05-21	(date)	Data setting and set values output	Setting of measurement date.	○		
5	Ent	INPUT (ENTRY) FROM EXTERNAL UNIT	input from external unit	From external unit (CPU), element sensitivity correction factors (ECF) and parameters are fed.	○	○	
6	Out	OUTPUT TO EXTERNAL UNIT	Output to external unit	ECFs, parameters, and measured data are outputted to external unit (external printer, CPU).	○	○	
7	PAd	PARAMETER ENTRY ADDRESS	Parameter input	For rewriting the parameters already set in the reader.			○
8	PdP	PARAMETER DUMP	Parameter output	For output of parameters to the display.			○
9	Fnc	READER FUNCTION	Setting of reader function	For changing the function flags of the reader.	○	○	○
A	ACL	AUTO CALIBATION	Automatic calibration	The reader can be calibrated by measuring the TL Badge irradiated with the standard radiation source so that measured value represents the correct dose.		○	○
B	bAC	BACK GROUND PROCEDURE	Background (BG) processing	For key-in of BG value.	○	○	
C	CFr	CALCULATION FROM A	Calculation processing	Mean, standard deviation and coefficient of variation are calculated from the measured values in the memory.	○		
D	dFr	DATA DUMP FROM A	Re-output of measured data	For re-output of measured data in the memory to the display.	○		
E	EAd	ELEMENT CORRECTION FACTOR ADDRESS	input of element sensitivity correction factor (ECF)	For key-in of ECFs.	○		
F	EFr	ELEMENT CORRECTION FACTOR FROM A	Output ECF	Element sensitivity factors in the memory are outputted to the display.	○		

Appendix. B Punched hole of ID number



Other checking item

(Contents in package of the reader)

Item	Name	Q'ty	Remarks
TLD Reader	UD-716AGL Power cord	1 1	
Accessories	Magazine Test badge Fuse Vinyl cover	1 1 2 1	
Others	Operating manual Factory test records (with parameter output list)	1 1	

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Panasonic Marketing Europe GmbH
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Manufacturer

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