APPLICATION   OF   ELECTRONIC   DEVICES

TSUJI ELECTRONICS CO.,LTD

CT08-ER2〜CT16-ER2 Command list（Available LAN, USB）　

COMMAND	FUNCTION	DETAIL
ALM？	alarm read 0-15ch	read out the cause of overflow　0-15CH and timer Reply: overXXXXTM or overXXXX--
ALMX？	alarm read extended to 0-xxch 　　xx: 07 to 15	read out the cause of overflow　0-xxCH and timer Reply：overXXXXXXXXTM or 　　　　　overXXXXXXXX--
CLAL	clear all	clear timer and all channel counters
CLPC	clear preset counter	clear preset counter（CH7）
CLTM	clear timer	clear timer
CLCTxx	clear counter xx	clear counter channel xx　　　　　xx:00-15
CLCTxxyy	clear counter xx to yy	clear counter channel xx to yy　　xx、yy:00-15
CPR？	counter preset data read	read out preset counter data Reply: 8 digits in dec（Kcts unit）　（ex:00010000）
CPRF？	counter preset data read	read out preset counter data Reply: 8 digits in dec（cts unit）　　（ex:00010000）
CTMR？uuvvww	counter uu to vv and timer read	read out from channel uu to vv counter and timer 　　　　　　　　　　　　　　uu, vv:00-17 Reply: 10 digits in dec　　ww: 00/no timer, 01/timer
CTMRH？uuvvww	counter uu to vv and timer read	read out from channel uu to vv counter and timer 　　　　　　　　　　　　　　uu, vv:00-17 Reply:　8 digits in hex　　ww: 00/no timer, 01/timer
CTR？xx	counter xx read	read out channel xx counter　　　　xx:00-17 Reply: 10 digits in dec
CTRH？xx	counter xx read	read out channel xx counter　　　　xx:00-17 Reply:　8 digits in hex
CTR？xxyy	counter xx to yy read	read out channel xx counter　　　xx、yy:00-17 Reply: 10 digits in dec（separated by space）
CTRH？xxyy	counter xx to yy read	read out from channel xx to yy counter 　　　　　　　　　　　　　　xx、yy:00-17 Reply:　8 digits in hex（separated by space）
DSAS	disable auto stop	disable automatic stop until using STOP command
ENCS	enable counter stop	enable counter stop
ENTS	enable timer stop	enable timer stop
GATEIN_DS	gate in disable	gate in disable（counting, even if gate in）
GATEIN_EN	gate in enable	gate in enable（default）
GATEIN?	ask gate in mode	ask gate in mode　　　reply : EN or DS
MOD？	mode read	read out counter mode
RDAL？	read all counter and timer	read out all counter and timer/Reply: 10 digits in dec
RDALH？	read all counter and timer	read out all counter and timer/Reply:　8 digits in hex
SCPRdddd･･･	set counter preset data	set preset data to counter（Kcts unit）
SCPRFdddd･･･	set counter preset data	set preset data to counter（cts unit）
TPR？	timer preset data read	read out preset timer data（ms unit）
TPRF？	timer preset data read	read out preset timer data（μs unit）
STOP	stop counter	deactivate counting action
STPRdddd･･･	set preset counter to dddd･･･	set preset timer value（ms unit）
STPRFdddd･･･	set preset counter to dddd･･･	set preset timer value（μs unit）
STRT	start counter	start counting action
TMR？	timer read	read out timer value　　Reply: 10 digits in dec
TMRH？	timer read	read out timer value　　Reply: 10 digits in hex
VER？	version information read	read out software version information Reply: "1.00 11-11-11 CT08-ER2"　（example）
VERH？	hardware version information	read out hardware version information Reply: "HD-VER 1"　（example）
REST	reset and start	set the unit restart（It's same as power on sequence）
FLG?x (x:0, 1, 2, 3)	read internal flag	read out internal state flag inside

Store data commands for synchronous gate signal and timer clock

Preparation of data acquisition commands

COMMAND	FUNCTION	DETAIL
CLGSDN	Clear Gate Synchronous Data Number	clear current data acquisition address (set data address to zero)
CLGSAL	Clear Gate Synchronous acquired All data	clear current data address and all memory data (It takes 30 seconds in all data clear)
GSDNddd・・・	Gate Synchronous Data acquisition data Number set to	input gate synchronous data acquisition data address
GSDN?	Gate Synchronous Data acquisition data Number read	read out gate synchronous data acquisition data address　　Reply : 0 ～ 9999
GSEDddd・・・	Gate Synchronous acquisition End data Number set to	input gate synchronous data acquisition end data address.　(after end address, acquisition stop.)
GSED?	Gate Synchronous acquisition End data Number read	read gate synchronous data end address Reply : 0 ～ 9999
GT_ACQ_DIF	GateSync. Differential Data Acq.	Differential data acquisition mode
GT_ACQ_FUL	GateSync. Full Data Acq.	Full data acquisition mode（default)
GT_ACQ?	Ask Diff or Full	Ask acquisition mode　reply : FUL or DIF

Synchronous GATE signal data acquisition commands

COMMAND	FUNCTION	DETAIL
GSTRT	Gate synchronous data acquisition STaRT	start gate synchronous data acquisition (just after turn on power, it's stop condition)
GESTRT	Gate Edge synchronous data acquisition STaRT	start gate edge synchronous data acquisition (just after turn on power, it's stop condition)

Synchronous internal clock data acquisition commands

COMMAND	FUNCTION	DETAIL
GTRUNddd・・・	Gate Timer synchronous RUN time	input synchronous timer data RUN time (μ s units)
GTRUN？	Gate Timer synchronous RUN time read	read out synchronous timer data RUN time
GTOFFddd・・・	Gate Timer synchronous OFF time	input synchronous timer data OFF time （μ s units.　120ns as minimum, when the off time is zero.)
GTOFF？	Gate Timer synchronous OFF time read	read out synchronous timer data OFF time
GTSTRT	Gate Timer synchronous data acquisition STaRT	start internal clock synchronous data acquisition (Just after turn on power, it's stop condition)

Synchronous data acquisition common commands

COMMAND	FUNCTION	DETAIL
STOP	gate synchronous data acquisition STOP	stop gate synchronous data acquisition (Same as command "STOP" of a counting stop)
GSTS?	Gate synchronous data acquisition Status read	read out the status of gate synchronous data acquisition
GSDAL?	Gate synchronous acquired all data(0-7ch & time) read	read out all gate synchronous data (0 ～ the present data number - 1) Reply: dec
GSDALX?	Gate synchronous acquired all data(0-xxch & time) read	read out all gate synchronous data (0 ～ the present data number - 1) Reply: dec
GSDALH?	Gate synchronous acquired all data(0-7ch & time) read	read out all gate synchronous data (0 ～ the present data number - 1) Reply: hex
GSDALXH?	Gate synchronous acquired all data(0-xxch & time) read	read out all gate synchronous data (0 ～ the present data number - 1) Reply: hex
GSDRD?xxxxyyyy	Gate synchronous acquired data (0-7ch) read from xxxx to yyyy	read gate synchronous data from xxxx to yyyy Reply: dec
GSDRDX? xxxxyyyy(K)	Gate synchronous acquired data all ch read from xxxx to yyyy	read gate synchronous data from xxxx to yyyy data number is x1000, if (K) is added to command. Reply: dec
GSDRDH?xxxxyyyy	Gate synchronous acquired data (0-7ch) read from xxxx to yyyy	read gate synchronous data from xxxx to yyyy Reply: hex
GSDRDXH? xxxxyyyy(K)	Gate synchronous acquired data all ch read from xxxx to yyyy	read gate synchronous data from xxxx to yyyy (Available LAN Hi-speed read mode) Reply: hex
GSCRD? uvwxxxxyyyy	Gate synchronous acq. data read (u - v ch) from xxxx to yyyy	read gate synchronous data from xxxx to yyyy Reply: dec ch u to v, w:1 with timer
GSCRDX? uuvvwwxxxxyyyy(K)	Gate synchronous acq. data read (uu-vv ch)from xxxx to yyyy	read gate synchronous data from xxxx to yyyy Reply: dec ch uu to vv, ww: 01 with timer
GSCRDH? uvwxxxxyyyy	Gate synchronous acq. data read (u - v ch) from xxxx to yyyy	read gate synchronous data from xxxx to yyyy Reply: hex ch u to v, w:1 with timer
GSCRDXH? uuvvwwxxxxyyyy(K)	Gate synchronous acq. data read (uu-vv ch)from xxxx to yyyy	read gate synchronous data from xxxx to yyyy Reply: hex ch uu to vv, ww: 01 with timer

Synchronous internal clock data acquisition commands

COMMAND	FUNCTION	DETAIL
GTRUNddd・・・	Gate Timer synchronous RUN time	input synchronous timer data RUN time (μs units)
GTRUN？	Gate Timer synchronous RUN time read	read out synchronous timer data RUN time
GTOFFddd・・・	Gate Timer synchronous OFF time	input synchronous timer data OFF time (μs units. 120ns as minimum, when the off time is zero.)
GTOFF？	Gate Timer synchronous OFF time read	read out synchronous timer data OFF time

Synchronous data acquisition common commands

COMMAND	FUNCTION	DETAIL
STOP	gate synchronous data acquisition STOP	stop gate synchronous data acquisition
GSTS?	Gate synchronous data acquisition Status read	read out the status of gate synchronous data acquisition

Continuation synchronous reading command of a counter timer

COMMAND	FUNCTION	DETAIL
TSDL(H)uvw	Timer Synchronous DownLoad ch u to v and timer	Specify the counter ch from u to v and w/ or w/o timer data to download in synchronization with timer w: 0/no timer data, 1/timer data Reply: dec w/o "H", hex w/ "H"
TSDLX(H)uuvvww	Timer Synchronous DownLoad ch uu to vv and timer	Specify the counter ch from uu to vv and w/ or w/o timer data to download in synchronization with timer ww: 00/no timer data, 01/timer data Reply: dec w/o "H", hex w/ "H"
TSDL?	Timer Synchronous DownLoad Setting Read	Read out the counter ch and w/ or w/o timer data to download in synchronization with timer Reply (example) : H_uu_vv_ww, D_uu_vv_ww "H":hex "D":dec
TSDTxxx	Timer Synchronous DownLoad interval Time	Set interval time of download per ms.
TSDT？	interval Time read	interval Time read
TSDSTRT	Download START	Download START
TSDSTOP	Download STOP	Download STOP
XSDL(H)uvw	eXternal Synchronous DownLoad ch u to v and timer	Specify the counter ch from u to v and w/ or w/o timer data to download in sync with external gate signal w: 0/no timer data, 1/timer data Reply: dec w/o "H", hex w/ "H"
XSDLX(H)uuvvww	eXternal Synchronous DownLoad ch uu to vv and timer	Specify the counter ch from uu to vv and w/ or w/o timer data to download in sync with external gate signal ww: 00/no timer data, 01/timer data Reply: dec w/o "H", hex w/ "H"
XSDL?	eXternal Synchronous DownLoad Setting Read	Read out the counter ch and w/ or w/o timer data to download in sync with external gate signal Reply (example) : H_uu_vv_ww, D_uu_vv_ww "H":hex "D":dec
XSDSTRT	Download START	Download START
XSDSTOP	Download STOP	Download STOP
STOP	stop counter and Download	stop counter and Download

LCD display function command (for a type with a display)

COMMAND	FUNCTION	DETAIL
SDUxx	set display upper row xx channel	set xx channel to LCD display upper row xx:00-07
SDUTM	set display upper row timer data	set timer data to LCD display upper row
SDUCP	set display upper row counter preset data	set counter preset data to LCD display upper row
SDUTP	set display upper row timer preset data	set timer preset data to LCD display upper row
SDLxx	set display lower row xx channel	set xx channel to LCD display lower row xx:00-07
SDLTM	set display lower row timer data	set timer to LCD display lower row
SDLCP	set display lower row counter preset data	set counter preset data to LCD display lower row
SDLTP	set display lower row timer preset data	set timer preset data to LCD display lower row
BKON	Back Light ON	Turn on back light
BKOFF	Back Light OFF	Turn off back light

LAN command

COMMAND	FUNCTION	DETAIL
MAC?	MAC address read 　　Read only	reply (example) : 0050C2970018
IPAxxx_xxx_xxx_xxx	IP address set 　xxx: 000〜255	Set IP address Activated after power on again or command "RSET"
IPA？	IP address read	Read IP address Reply (example) : IPA192_168_001_155
PRTx···x	Set port number 　example: PRT7777	Set port number Activated after power on again or command "RSET"
PRT？	Port number read	Read port number Reply (example) : PRT 7777
GTWxxx_xxx_xxx_xxx	GateWay address set 　xxx: 000〜255	Set LAN Gate Way address Activated after power on again or command "RSET"
GTW?	GateWay address read	Read LAN Gate Way address Reply (example) : GTW192_168_001_001
SNMxxx_xxx_xxx_xxx	SubNetMask set 　xxx: 000〜255	Set LAN Sub Net Mask Activated after power on again or command "RSET"
SNM？	SubNetMask read	Read LAN Sub Net Mask Reply (example) : SNM255_255_255_000

Special command (internal ROM initialize command. Please use it by USB communication, when IP address became unknown, or, when a problem occurred and should be initialized.)

COMMAND	FUNCTION	DETAIL
INITROM	Internal ROM data 　Initialize	Initialize internal ROM data 　Please see the section 4-5-6 for detail of initialize.

Command return "O.K" or "NG", when a command is not required to response

COMMAND	FUNCTION	DETAIL
ALL_REP_EN	All reply enabel	Sets a reply for all the commands 　Reply "OK" or "NG" from the command 　except inquiry command
ALL_REP_DS	All reply disable	No reply from the commands except inquiry command
ALL_REP?	All reply mode request	Ask the status of "all reply enable" Reply: EN=enable, DS=disable

Command to set 10μs to minimum pulse width of RUN output (TTL)

COMMAND	FUNCTION	DETAIL
MIN10U_EN	Minimum 10u enable	Sets 10us to minimum pulse width
MIN10U_DS	Minimum 10u disable	Sets minimum pulse width as a condition
MIN10U?	MIN10U mode request	Ask MIN10U mode Reply: EN=mode on, DS=mode off

Command for Encorder Counter

COMMAND	FUNCTION	DETAIL
S30	Encorder chA read	chA counter read request Reply：RA±□□・・・□□　　（□:Decimal）
S32	Encorder chB read	chB counter read request Reply：RB±□□・・・□□　　（□:Decimal）
SA±□□・・・□□	Encorder chA preset	chA counter preset （□:Decimal）
SB±□□・・・□□	Encorder chA preset	chB counter preset （□:Decimal）
S20x	Encorder chA count mode set	Setting chA x: F/cw up, R/ccw up, 1/1times, 2/2times, 4/4times
S22x	Encorder chB count mode set	Setting chB x: F/cw up, R/ccw up, 1/1times, 2/2times, 4/4times
ZC□	counter clear by z-phese sig enable	Z-phase counter clear request □:A～B
ZN□	counter clear by z-phese sig disable	Z-phase counter clear cancel □:A～B
ZT□△	counter clear timing set	Select "Z-phase rising edge" or "Z-phase falling edge", to set the timing of clearing the counter. □:A～B, △:U/rise edge, D/fall edge
ZS□	counter clear setting read	Z-phase counter clear status read □:A～B
MW△±□□□.□□□□□□ (must be in the format)	Multiplier set	Scaling Parameter：multiplier setting △:A～B, □:Decimal number
MR△	Multiplier read	Scaling Parameter：multiplier read request reply：M△±□□□.□□□□□□
OW△±□□・・・□□	Offset set	Scaling Parameter：offset setting △:A～B, □:Decimal number
OR△	Offset read	Scaling Parameter：offset read request reply：O△±□□□□□□□□□□　　△:A～B, □:10digit
D△	Scaled value read	Scaled value read request reply：D△±□・・・□.□・・・□　　△:A～B, □:10digit

CONTENTS

User's manual

1. Specifications

1-1. Abstract

CT08 (16) -ER2 is based on the 8ch counter timer CT08-01D, it is a multifunction machine plus the function of 2ch encoder counter ER2C-04.Position information and counter information such as when continuously acquires the count data that depends on the position can be acquired simultaneously.

Set time until 0.000001 seconds to more than 1,000,000 seconds, set number of counts can be set to any until 1cts ~ 4,294,967Kcts. The case is EIA2. The 16-character × 2-stage LCD display of larger character size 8 × 5, from among timers and counters and encoder counter, two channels will be displayed. External communication is a LAN or USB.

In synchronization with the GATE IN signal ON / OFF or internal clock you can collect the data up to a maximum of 30,000. It can also be used as a counter-timer CT08 (16) -01D.

And it can also be used as an encoder counter ER2C-04.

If you want to collect data in accordance with the timing in timer synchronization and gate synchronization is a counter-timer function, will be collected at the same time as the counter data of the data also ch8, ch9 of encoder counter. In the case of the CT16, the data of the encoder counter will be collected at the same time as the counter data to ch16, ch17.

1-2. Appearance（CT08－01E）

Front panel layout
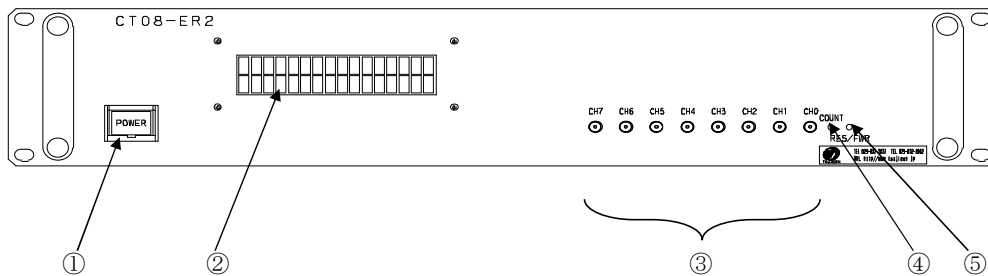
① Power switch   The lamp of the switch is on when the power is on.

② LCD display (16 characters and Two lines)

It can display two items from the following 4 items into the two sections (upper row and lower row).

Count value, Timer value, Preset count value, Timer preset value

③ Input connectors for the Counters. There are CH0 to CH17. (INPUT)

It's possible to set preset value only for CH7.

④ It shows the beginning of count action. LED "ON" means the Counter gate open.

⑤ Reset button.

If the pushing is less than 1 second, the same reset action as power-up is executed

If the pushing is more than 3 seconds, the Counter moves to the firmware version up mode.

Please refer to the section "7. Firmware update" for details.

Rear panel layout
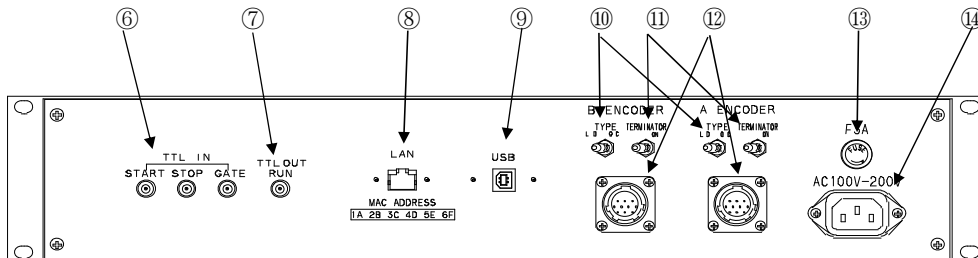
⑥ Connect TTL level signal (3.3 – 5V) from external unit.

START: When upward edge signal is "ON" ("H"), it starts counting. (INPUT)

Normally (not connected) START signal is "L".

When count mode is selected to "Counter 07 stop" or "Timer stop" and count value or timer value goes on limit, START can't become true.

STOP: When upward edge signal is "ON" ("H"), counting action stopped. (INPUT)

                     Normally (not connected) STOP signal is "L".

GATE: When GATE signal goes "L", count action stopped during this level. (INPUT)

                     When it goes "H", count action starts again.

                     Normally (not connected) GATE signal is "H".

⑦   TTL (3.3V) output connector while counter is operating.

You can synchronous operation by the highest counter if you connect GATE connector of other modules.

    With inner DIP switches, you can invert logic level on START, STOP, GATE, and RUN signals. Default setting is "ON" ("H"). If you change corresponding DSW2 switches on printed-circuit board ON to OFF, they changes "OFF" ("L").

⑧   This one is ETHERNET(LAN)connection port. It's adapted to 10BASE-T,100BASE-T communication.

⑨   This one is USB port.

⑩   Select Encorder Counter type for ⑫ connector

        L.D: Line driver   O.C: Open collector

⑪   Selsect Termination(120Ω)

⑫   Input Signals from Encorder counter

Pannel side connector   SRCN2A16-10S(JAE)

Cable side connector   SRCN6A16-10P(JAE)

	1	2	3	4	5	6	7	8	9	10
Line driver	+5V	GND	(N.C)	Phase A	Phase A‾	Phase B	Phase B‾	Phase Z	Phase Z‾	F.G
Open Collector	+5V	GND	(N.C)	Phase A	(N.C)	Phase B	(N.C)	(N.C)	Phase Z	F.G

Line driver input (in case of pin4-5. pin6-7,pin8-9 are also same)

pin4

120Ω

Select termination by ⑪ switch

pin5
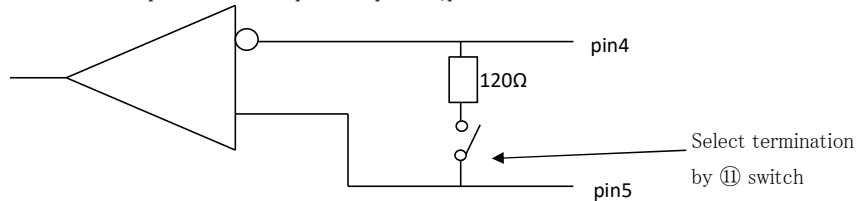
⑬   Fuse holder 3A(200V) mini fuse available.

⑭   AC90V to 240V power supply cable.

1-3. Block diagram(CT08-ER2)
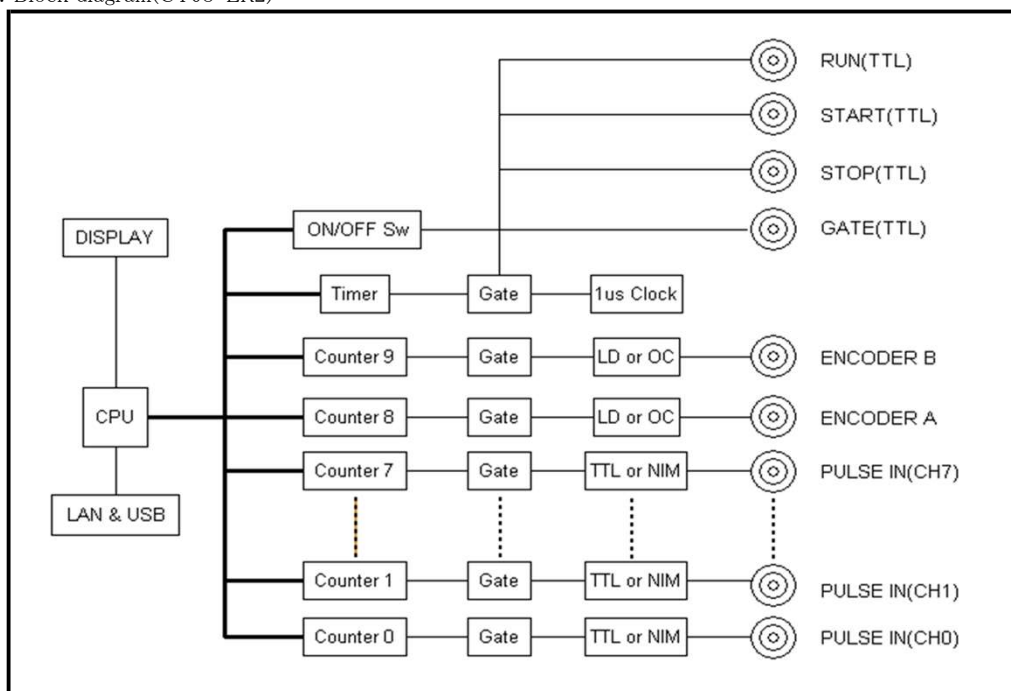
2. Before using

2-1. Select input signal level for count

CT08(16)-ER2 can select count input signal from TTL or NIM on each channels.

If you are going to change input signal settings, remove the screws that hold the top cover and remove top cover. Regarding CH08-CH15, it is easy to touch the slide switch on input lemo connector are, and it is easy to change the switch setting. Regarding CH00-CH07, the slide switches are hidden under the print circuit board. Thus, the print circuit board must be removed, if the slide switches are required to change the switch setting.

Please ask us to change the switch setting regarding CH00-CH07, if you have difficulty to change this.

Where a front panel is seen in the front, it is NIM mode, if a slide switch is located to left.

It is TTL mode, if a slide switch is located to right.

It is TTL level at the time of shipping.

2-2. Setting LAN communication

2-2-1. Preparation for setting

To control this one by LAN communication, it's need to some setting items by 10Base-T/100Base-T communication cable. Setting protocol is telnet protocol by TCP/IP connection.

To connect network by this one, IP address, subnet mask, and Port NO must be set to this unit.

Factory default is "IP address is 192.168.1.123", "sub net mask is 255.255.255.0" and "Port NO is 7777 ".

When connecting PC directly, it's need to use cross cable. Otherwise using HUB module, it's no need to use cross cable.

The way of connecting PC directly is as follows.

It's need to set IP address and subnet mask to your PC.

Set IP address to 192.168.1.10, and subnet mask to 255.255.255.0, for example.

About the way of setting address to your PC, see your PC manual.

Select MS-DOS prompt and access command "ping" in MS-DOS prompt.

C:￥Windows＞ping 192. 168. 1. 123

  Pinging 192. 168. 1. 123 with 32 bytes of data:

  Reply from 192.168.1.123: bytes=32 time=2ms TTL=255
  Reply from 192.168.1.123: bytes=32 time=1ms TTL=255
  Reply from 192.168.1.123: bytes=32 time=1ms TTL=255
  Reply from 192.168.1.123: bytes=32 time=1ms TTL=255

C:￥Windows＞

  If replies are listed above, physical connection is correct.
  If physical connection is not correct, communication replies are these.

C:￥Windows＞ping 192. 168. 1. 123

  Pinging 192. 168. 1. 123 with 32 bytes of data:

  Request timed out.
  Request timed out.
  Request timed out.
  Request timed out.

C:￥Windows＞

  In this case please retry the connection again after confirming the cable connection.

２−２−２. Change setting of network

Once you check connection is correct, enter new IP address and new telnet port NO of CT16-ER2.

(If default NO is OK, you don't have to do this operation.)

Default IP address is 192.168.1.123, and default port number is 7777.

IP address must be changed according to your network system.

If a port number doesn't need change, you may use number 7777.

Let's try connecting test by optional Windows software such as "telnet".

Example test data is "telnet 192.168.1.123 7777" in MS-DOS prompt screen.

(Use default setting, or use the current setting.)

When in telnet operation, send data "VER?" which are expected reply data.

If reply data is like "1.04 15-05-19 CT08-ER2", then communication line is right.

"Telnet" function contains hardware and software function, when disconnect line, line must be cut off
by "telnet" software operation before hardware disconnection.

Next, please change IP address, port NO., Gate Way, and Sub net mask by telnet.

Change IP address :
    IPAxxx_xxx_xxx_xxx
    If you need to change IP address to 192.168.1.60, please execute the command as below.
    IPA192_168_001_060
Confirm IP address :
    IPA?
    And return is as follow.
    IPA192_168_001_060
Change port number :
    PRTxxxx
    If you need to change port number to 10999, please execute the command as below.
    PRT10999
Confirm port number :
    PRT?
    And return is as follow.
    PRT 10999
If need, you can change sub net mask, and Gate Way address.

After the above changes, CT48-01E is working with new setting, if the one of three is executed.
    ・Send the command "RSET"
    ・Push RES/FWR switch 1sec at the front panel
    ・Power off, and power on after few seconds.
When LAN setting such as IP address became unknown, a setting change by LAN is not possible.
In that case, using USB communication at section 2-3, you can confirm and change.

２−２−３. Turn back PC set data

When PC settings were changed, move to the initial PC settings.

２−２−４. Connecting test

Let's try connecting test by optional Windows software such as "telnet".

Example test data is "telnet 192.168.1.123 7777" in MS-DOS prompt screen.

(IP address number must to be set number preliminary.)

When in telnet operation, send data "VER?" which are expected reply data.

If reply data is like "1.04 15-05-19 CT08-ER2", then communication line is right.

"Telnet" function contains hardware and software function, when disconnect line, line must be cut off
by "telnet" software operation before hardware disconnection.

２－３. Setting USB communication
　２－３－１. Preparations for setting
　　　　　Driver software for USB (Universal Serial Bus) operation is downloaded from our web server.
　　　　　　http://www.tsuji-denshi.co.jp/download_file/YS_USBCOM.EXE
　　　　By installing this software, connecting is done like a COM port connection.
　　　　Switch on a CT48-01E, connect USB cable, then there will be message box that shows "New hardware device was found (CDC-RS232)". According to PC directions, specify 'the folders of downloaded driver software.
　　　　 When the driver software installs are done, open the "Control Panel" (START → Control Panel), click the "System" icon. Then property display of system appears. Select the "Device Manager". Confirm the USB Serial Port (Com*) number in the tree between Port display.
　　　　You can see like "YS USB COM Port (COM5)" in port "COM and LPT" in tree.
　　　　 Select the USB Serial Port (Com*), click Advanced in Port Setting display. It's possible to change COM Port number. Click the check box Disable PNP □ , it's possible to short operation time in connecting USB cable again.
　　　　You don't need to change RS232C setting like baud rate.

　２－３－２. Connecting test
　　　　 Launch RS-232C communication software such as hyper-terminal including PC.
　　　　Set COM port number which is known in previous item, it's need to check communication line is available or not. In this case It's no need to set baud rate. Send the command data such as "VER?", then get the reply "1.04 15-05-19 CT08-ER2", there is no problem for communication.

２－４. Connect communication cables
　２－４－１. Connect communication cables
　　　　Connect the communication cable to USB port or LAN port on rear panel.
　　　　There is no need to connect both side, but there will be no problem even if connect both side.
　　　　If connected both side, latest command will be valid to the unit.
　　　　The Counter accepts 8 LAN connections at the same time.
　　　　However, only one connection is available regarding download.
　　　　During download, there is no reply message for the speed improvement.
　　　　But, the Counter accepts the command to stop download.
　　　　During high speed download (hexadecimal download), it may be unable to stop in the middle of run.
　　　　Because, the Counter is busy to receive data, and the software may be unable to send the stop command from the same line. (It becomes easy to occur when COMM monitor is being displayed.)
　　　　In this case, you can send the stop command via other software and other LAN/USB port, and stop the Counter.

　２－４－２. Connect count signal
　　　　Connect count signal cable to CH0 ～ 15 LEMO connector which are
　　　　on front panel. It's possible to count maximum 16 channel signals.
　　　　Before connecting the cable it's need to set signal change switch (TTL side or NIM side), according to input signal. (See the section 2-1)

　２－４－３. Start signal (TTL positive logic)
　　　　TTL positive logic signal starts counting action.
　　　　The width of start signal pulse must be more than 100ns.
　　　　If pulse width is long, please set to "L" before next stop.
　　　　It's possible to check the count start status by LED lamp on front panel.
　　　　It counts from start signal "ON" to stop signal "ON".
　　　　When the start signal is not used, it's possible to start by software commands.

2－4－4. Stop signal (TTL positive logic)

TTL positive logic signal quits counting action.

The width of stop signal pulse must be more than 100ns.

If pulse width is long, please set to "L" before next start

It's possible to check the count stop status by LED lamp on front panel.

It counts from start signal "ON" to stop signal "ON".

When the stop signal is not used,, it's possible to quit counting by software commands.

2－4－5. Gate signal (TTL positive logic)

Gate signal is TTL positive logic signal.

When gate signal goes "L" counting action stopped during "L" period. ∗)

When gate signal goes "L" LED lamp is "OFF" during this period.

LED lamp goes "ON" during gate signal is "H" when counter starts.

When gate signal is no connection, gate signal is equal to logic "H", because of internal pull-up.

When gate signal has been changed to "OFF", the count data are stored in memory on synchronous gate data acquisition mode.

Memory size is about 5MB. Data can be stored up to 30,000 memory addresses for CT08 type, and stored up to 15,000 memory addresses for CT16 type.

　　　∗) On synchronous gate edge data acquisition mode, the counting action continues to work,
　　　　　even if gate signal goes "L".

2－4－6. Monitor out signal (In counting, TTL positive logic)

Run signal goes "H" when counting action is valid. It means count start and "Gate signal" are in "H" logic, and LED goes "ON".

It's useful to use more than two counter units. Connecting this line to "Gate signal input" of another unit, another units go active counting action.

Please see the section "8. Synchronous drive of multi units" for more details.

You can adjust pulse width, if the signal is difficult to use as trigger for other equipment because of narrow width ($<10\mu$ s).

3. Communication commands

3－1. Communication commands

Command characters are ASCII data.

The delimiter of communication command is CR+LF in transmit and receive case.

In "all reply modes", CT16-ER2 replies "OK" or "NG",

even if the command doesn't require a reply. Please see the section 3-7.

3-2. Read-out commands for counter set and the status of setting

3-2-1. Stop enable by count value

Type of command

ENCS   Enable to stop count by counter(CH7).

                    Also, memorized to ROM.

                    When count value of preset channel (CH7) reach to preset value,

                    count action automatically stopped.

                    On synchronous gate data acquisition mode, this command will be ignored.

3-2-2. Stop enable by timer value

Type of command

ENTS   Enable to stop count by timer.

                    Also, memorized to ROM.

                    When timer value reach to preset timer value, count action

                    automatically stopped.

                    On synchronous gate data acquisition mode, this command will be ignored.

3-2-3. Stop disable by counter timer

Type of command

DSAS   Disable to stop count by counter (CH7) or timer.

                    Also, memorized to ROM.

                    Counter doesn't stop automatically.

                    To quit counter action, it's valid for "STOP" command or "STOP" input

                    signal (TTL Level) or meet the condition of stopping GATE data acquisition

                    mode.

3-2-4. Inquiry of action mode

Type of command

MOD?   The latest counter mode is read.

       Reply

    R_SN_T_O   R: remote mode (fixed)

                   SN: single mode (fixed)

                   T: T/timer stop mode, C/counter stop mode, N/not stop mode

                     (When power switch on, the last mode is memorized)

                   O: O/counter On, F/counter off

                     (When power switch on, count function is "OFF".)

3-2-5. Setting and readout of preset counter

Type of command

SCPRdddd····   To set preset value dddd····· in decimal to preset counter.

                    Unit is Kcts.

                    Maximum value is 4,294,967 Kcts.

SCPRFdddd····   To set preset value dddd····· in decimal to preset counter.

                    Unit is cts.

                    Maximum value is 4,294,967,295 cts.

Type of command

CPR?   To read out preset count value.
   Reply
   0001000   Reply data is 8 digit decimal value. (Kcts unit)
CPRF?   To read out preset count value.
   Reply
   0001000   Reply data is 8 digit decimal value. (cts unit)
                         (If reply data is over 8 digit, the digit is as the count digit.)

3-2-6. Setting and readout of preset timer
Type of command

STPRdddd・・・・   To set preset value dddd・・・・ in decimal to timer. (ms unit)
                         Maximum timer set value is 1,099,511,627 ms.
STPRFdddd・・・・   To set preset value dddd・・・・ in decimal to timer.(μ s unit)
                         Maximum timer set value is 1,099,511,627,776 μ s.

Type of command

TPR?   To read out preset timer value.
   Reply
   0001000   Reply data is 8 digit decimal value. (ms unit)
TPRF?   To read out preset count value.
   Reply
   0001000   (If reply data is over 8 digit, the digit is as the timer digit.)

3-3. Commands of counter operation
3-3-1. Counter start
Type of command
STRT   Enable counter start.

3-3-2. Counter stop
Type of command
STOP   Enable counter stop.
                         Synchronous gate data acquisition is ended compulsorily.

3-3-3. Gate in enable/disable
Gate is always made to an on-state, without desorbing a Gate connection cable.
This function is available from "HD-VER 4" or later.
Confirmed the hardware version by the command "VERH?"
Please ask us about Hardware version up.
Type of command
GATEIN_DS   Gate is always turned ON.
                         A counting can be started irrespective of the Gate status.
                         Gate synchronous data acquisition cannot be done in this status.

GATEIN_EN   GATE input becomes effective, according to an input state, it becomes
                         possibility of a counting, or prohibition.
                         GATE signal synchronism data acquisition is possible in this status.
                         After power-up, Gate Function is this mode.

GATEIN?   Ask GATE input status.
                         GATE function is enable, when the reply is EN.
                         GATE function is disable, when the reply is DS.

3-4.Read-out and clear commands for counter and timer

3-4-1.Read-out and clear commands for all counter and timer

Type of command

RDAL?   To read all counter channels and timer

Reply example

1234567890 2345678901 3456789012 ・・・・・ 0123456789

These data are 10 digit number in decimal.

The data order is CH0 CH1 CH2 ・・・・・・ CH7 timer.

Unit is cts for counter and μ s for timer.

Type of command

RDALH?   To read all counter channels and timer in hexadecimal.

Reply example

1DC2829F 07C38528 0451EEC3 106D8230 ・・・・・ 00FFE101 000161C602

These data are 8 digit in hexadecimal.

The data order is CH0 CH1 CH2 ・・・・・・ CH7 timer.

Units of counter is cts and timer is μ s.

Type of command

CLAL   To clear all counter channels and timer

3-4-2. Read-out and clear commands for all counter

Type of command

Command	Description
CTR?xx	To read count value of channel number xx.
CTR?xxyy	To read count value from channel number xx to channel number yy.

Reply example

1234567890   Reply data is 10 digit data in decimal. Unit is cts.

1234567890 2345678901 3456789012 ・・・・・ 0123456789

    Reply data is 10 digit data in decimal in order. Unit is cts.

Type of command

Command	Description
CTRH?xx	To read count value of channel number xx in hexadecimal.
CTRH?xxyy	To read count value from channel number xx to channel number yy in hexadecimal.

Reply example

1DC2829F   Reply data is 8 digit in hexadecimal. Unit is cts.

1DC2829F 07C38528 0451EEC3 106D8230 ・・・・・ 00FFE101

    Reply data is 8 digit in hexadecimal in order. Unit is cts.

Type of command

Command	Description
CLCTxx	To clear the count value of counter channel xx.
CLCTxxyy	To clear the count value from counter channel xx to channel yy.
CLPC	To clear the count value of preset counter channel 07.

3-4-3. Read-out and clear commands for timer and setting reading

Type of command

TMR ?   To read timer value.

Reply example

1234567890

    Reply data is 10 digit data in decimal. Unit is μ s.

Type of command

TMRH?   To read timer value in hexadecimal.

Reply example

000161C602

    Reply data is 8 digit in hexadecimal. Unit is μ s.

Type of command

CLTM   To clear timer value.

Type of command

CTMR?uuvvww   The current value of the specified counter timer is read with a decimal number.

    counter: uu ～ vv ch timer: ww/01 with read ww/00 without read

Reply example

1234567890 1234567890 1234567890 1234567890 1234567890 1234567890

    Reply with 10 characters of decimal numbers .

    counter: cts unit, timer μ s unit

Type of command

CTMRH?uuvvww   The current value of the specified counter timer is read with a hexadecimal
                   number.
                   counter: uu ～ vv ch timer: ww/01 with read ww/00 without read

   Reply example
1DC2829F 07C38528 0451EEC3 106D8230 ・・・・・ 00FFE101
                   Reply with 8 characters of hexadecimal numbers .
                   counter: cts unit, timer μ s unit

3-4-4. The continuation read of the synchronous timer counter by an internal timer
     At the fixed interval specified beforehand, a specified timer counter is read continuously.
     Type of command
     TSDL(H)uvw   The details of the timer synchronous download is specified.
                         If H is attached, a data will be acquired with a hexadecimal number.
                         If H is not attached, a data will be acquired with a decimal number.
                         (Timer Synchronous DownLoad)
                         u: 0 – 7 / top counter channel   v: 0 – 7 / end counter channel
                            Read out data from ch u to ch v.
                            If u => v, read out data from the counter u.
                         w: 0 / without timer data   w: 1 / with timer data

       Send example
     "TSDL071"   Download data from the counter ch 0 to ch7 and the timer.
     "TSDL770"   Download data from only the counter ch 7.
     "TSDLH071"   Download a hexadecimal data from the counter ch 0 to ch7 and the timer.
     "TSDLH770"   Download a hexadecimal data from only the counter ch 7.

     TSDLX(H)uuvvww   The details of the timer synchronous download is specified.
                         If H is attached, a data will be acquired with a hexadecimal number.
                         If H is not attached, a data will be acquired with a decimal number.
                         (Timer Synchronous DownLoad)
                         uu: 00 – 63 / top counter channel
                         vv: 00 – 63 / end counter channel
                            Read out data from ch uu to ch vv.
                            If uu => vv, read out data from the counter uu.
                         ww: 00 / without timer data
                         ww: 01 / with timer data

       Send example
     "TSDLX004701"   Download data from the counter ch 0 to ch47 and the timer.
     "TSDLX474700"   Download data from only the counter ch 47.
     "TSDLXH004701"   Download a hexadecimal data from the counter ch 0 to ch47 and the timer.
     "TSDLXH070700"   Download a hexadecimal data from only the counter ch 7.

     Type of command
     TSDTxxx   Timer synchronous interval time is specified per 1 ms.
                         xxx: Interval value of 1 ms units
       Send example
     "TSDT001"   Interval value is 1ms.
                         xxx is specified from 001 to 9999.

     Type of command
     TSDT?   Ask timer synchronous interval time.
       Reply example
     "010ms"   It shows the interval time is 10ms.

     Type of command
     TSDSTRT   To the specified timing, A continuation download of the specified details is
                         started.

Type of command

TSDSTOP	Stopped a timer synchronous continuation download.
STOP	Stopped a counter and a timer synchronous continuation download.

Decimal number download type

1234567890

1234567890 2345678901 3456789012 ・・・・・ 0123456789

Returned in order with 10 figures of decimal numbers.

If 10 figures is exceeded, it will be extended automatically.

A counter is a cts unit of measure.

Hexadecimal number download type

1DC2829F1234

1DC2829F5678 07C385289ABC 0451EEC3DEF1 106D82302345 ・・・・・ 00FFE101

Returned in order with 12 figures of hexadecimal numbers.

And returned in order with 10figures of hexadecimal numbers.

A counter is a cts unit of measure.

Example of a continuation read command sending of a Timer Counter

1)	″TSDLH671″	Specified to read a counter from ch6 to ch7 and a timer
2)	″TSDT010″ or ″TSDT10″	Set the read out interval to 10ms.
3)	″TSDSTRT″	Start to read out.
4)	″CLAL″	Clear the timer and all of the counters.
5)	″DSAS″	Disable a stop of a counter and a timer.
6)	″STRT″	Start to count.
7)	″TSDSTOP″	Stopped a continuation download.
8)	″STOP″	Stop a counter.

TSDLH671, ″TSDT010″, etc. must be executed before the above command 3) ″TSDSTRT″.

The command is saved once it executes.

It is okay ″STRT″ command is executed before ″TSDSTRT″ or later.

The quantity of a data and the specification of a read interval which are downloaded each time,

A data may be missing with the velocity of a communication line.

Please take into consideration ″Data read time″ of the section 4-5-7.

3-4-5. The continuation read of the synchronous timer counter by the external gate input

It is an interval in synchronization with an external-gate input timing, a specified timer counter is read continuously.

Type of command

XSDL(H)uvw	The details of an external-gate input synchronous download are specified.
	If H is attached, a data will be acquired with a hexadecimal number.
	If H is not attached, a data will be acquired with a decimal number.
	(eXternal Synchronous DownLoad)
	u: 0 - 7 / top counter channel v: 0 - 7 / end counter channel
	Read out data from ch u to ch v.
	If u => v, read out data from the counter u.
	w: 0 / without timer data w: 1 / with timer data

Send example

″XSDL071″	Download data from the counter ch 0 to ch7 and the timer.
″XSDL770″	Download data from only the counter ch 7.
″XSDLH071″	Download a hexadecimal data from the counter ch 0 to ch7 and the timer.
″XSDLH770″	Download a hexadecimal data from only the counter ch 7.

XSDLX(H)uuvvww   The details of an external-gate input synchronous download are specified.

If H is attached, a data will be acquired with a hexadecimal number.

If H is not attached, a data will be acquired with a decimal number.

(Timer Synchronous DownLoad)

uu: 00 - 17 / top counter channel

vv: 00 - 17 / end counter channel

     Read out data from ch uu to ch vv.

     If uu => vv, read out data from the counter uu.

ww: 00/ without timer data, 01/with timer data

Send example

"XSDLX001701"   Download data from the counter ch 0 to ch17 and the timer.

"XSDLX171700"   Download data from only the counter ch 17.

"XSDLXH000701"   Download a hexadecimal data from the counter ch 0 to ch7 and the timer.

"XSDLXH070700"   Download a hexadecimal data from only the counter ch 7.

Type of command

XSDSTRT   A continuation download of the specified details is started synchronizing with an external-gate input.

Type of command

XSDSTOP   Stopped an external-gate input synchronous continuation download.

STOP   Stopped a counter and an external-gate-input synchronous continuation download.

Decimal number download type

     1234567890

     1234567890 2345678901 3456789012 ····· 0123456789

         Returned in order with 10 figures of decimal numbers.

         If 10 figures is exceeded, it will be extended automatically.

         A counter is a cts unit of measure.

Hexadecimal number download type

     1DC2829F1234

     1DC2829F5678 07C385289ABC 0451EEC3DEF1 106D82302345 ····· 00FFE101

         Returned in order with 12 figures of hexadecimal numbers.

         And returned in order with 10figures of hexadecimal numbers.

         A counter is a cts unit of measure.

Example of a continuation read command sending of a Timer Counter

1) "XSDLH671"   Specified to read a counter from ch6 to ch7 and a timer

2) "XSDSTRT"   Start to read out. A gating input turns into a timing input signal by this command

3) "CLAL"   Clear the timer and all of the counters.

4) "DSAS"   Disable a stop of a counter and a timer.

5) "STRT"   Start to count.

6) "XSDSTOP"   Stopped a continuation download.

7) "STOP"   Stop a counter.

XSDLH671, "XSDT010", etc. must be executed before the above command 2) "XSDSTRT".

The command is saved once it executes.

It is okay "STRT" command is executed before "XSDSTRT" or later.

The quantity of a data and the specification of a read interval (Gate input timing) which are downloaded each time, a data may be missing with the velocity of a communication line.

Please take into consideration "Data read time" of the section 4-5-7.

3-5. Inquiry of over-flow count data

Type of command

ALM?   To inquiry about data overflow timer and count data ch0 ～ ch7

    Reply example

    overXXXX--   Timer is in normal.

    overXXXXTM   Timer is overflow.

     XXXX means overflow counter channel. XXXX is 4 digit hex data.

    (Example)

    over0001--   It means counter CH0 is overflow.   [0000 0001]

    over0009--   It means counter CH0 and CH3 are overflow.   [0000 1001]

    over0039--   It means counter CH0,CH3, CH4 and CH5 are overflow.   [0011 1001]

    over000ATM   It means counter CH1,CH3 and timer are overflow.   [0000 1010]

    over0000--   It means no overflow.   [0000 0000]

Type of command

ALMX?   To inquiry about data overflow timer and count data ch0 ～ ch47

    Reply example

    overXXXXXXXXXXXX--   Timer is in normal.

    overXXXXXXXXXXXXTM   Timer is overflow.

     XXXX means overflow counter channel. XXXX is 4 digit hex data.

    例)

    over00000001－－   It means counter CH0 is overflow.

    over00000009－－   It means counter CH0 and CH3 are overflow.

    over00000039－－   It means counter CH0,CH3, CH4 and CH5 are overflow.

    over00000000－－   It means no overflow.

3-6. Inquiry of software version information

Type of command

VER?   To inquiry about software version information

    Reply example

    1.04 15-05-19 CT08-ER2

                Reply is in order, version number, date and type of the unit.

Type of command

VERH?   To inquiry about hardware version information

    Reply example

    HD-VER 1   Reply is in order, "HD-VER", version number.

3-7. Other commands

1) All reply mode : Command return "O. K" or "NG", when a command is not required to response

As for the command without responses, such as "ENTS" and "ENCS", it was unknown whether the
command had arrived. By executing the following commands, you can confirm whether a command is
handled by a reply of "OK" and "NG". NG is returned when not analyzed correctly.
Regarding the case of "OK", it shows that the processing has been advanced. And, this is not
the evidence that the command is working correctly or not.
Please use this mode for "debug" of the communications (LAN, USB).

Type of command

ALL_REP_EN   Right after "all reply mode" has been activated, the reply is
                 "OK" or "NG" even if the command doesn't require a reply.
                 And after receive this command, there is a reply "OK".

Type of command

ALL_REP_DS   There is not reply, if the command doesn't require a reply.

Type of command

ALL_REP?   Read "all reply mode" setting.

                    The mode is active, if the answer is "EN".

                    The mode is not active, if the answer is "DS".

2) Command to read internal flag of counter

Type of command

FLG?0 FLG?1 FLG?2 FLG?3

                    The status of 8 bits of internal flags is returned with the hexadecimal of double

                    figures.

Reply for command "FLG?0"   Reply data "04" mean "Counter number 2 overflow".

    b7:

    b6:

    b5:

    b4:

    b3:   Counter number 3 overflow

    b2:   Counter number 2 overflow

    b1:   Counter number 1 overflow

    b0:   Counter number 0 overflow

Reply for command "FLG?1"   Reply data "04" mean "Counter number 6 overflow".

    b7:

    b6:

    b5:

    b4:

    b3:

    b2:   Counter number 6 overflow

    b1:   Counter number 5 overflow

    b0:   Counter number 4 overflow

Reply for command "FLG?2"

    b7:

    b6:   RUN OUT

    b5:   COUNTER ON

    b4:   Timer overflow

    b3:   Counter number 7 overflow

    b2:   TTL GATE

    b1:   TTL STOP

    b0:   TTL START

Reply for command "FLG?3"

    b7:

    b6:

    b5:

    b4:

    b3:

    b2:   Gate Edge mode ON

    b1:   Timer Gate mode ON

    b0:   Gate mode ON

4. Counter data acquisition commands for internal RAM

4-1. About counter data acquisition commands

These commands help you to store the count data changing from moment to moment.

There are two timings of storing counter data, one is through GATE signal, the other is internal TIMER.

As the following figure shows, the data which increased input pulse in count time are stored sequentially in memory.

(GATE MODE)

Counts while GATE signal is H, and count data is stored on the memory (∗) at falling edge.
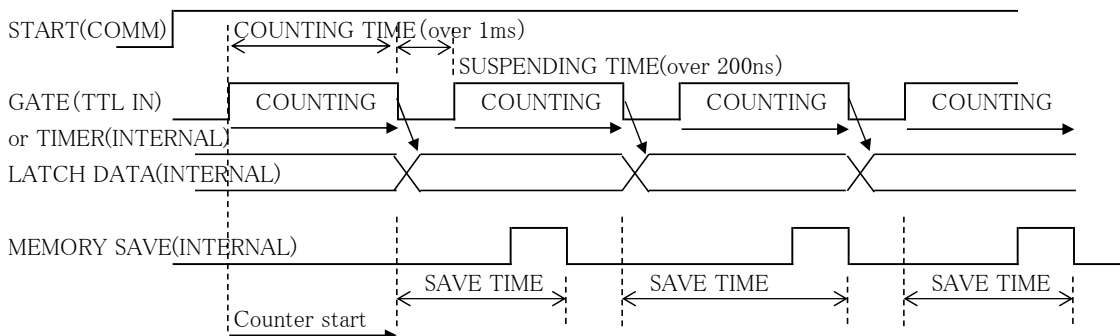
To meet the condition of SAVE TIME >= 1ms,

please input COUNTING TIME + SUSPENDING TIME >= 1ms.

(GATE EDGE MODE)

Count data is stored on the memory (∗) at the falling edge of GATE signal.

Counter starts at the first falling edge of GATE signal after STRT command. And the Counter continues to count, even if GATE signal is "L".
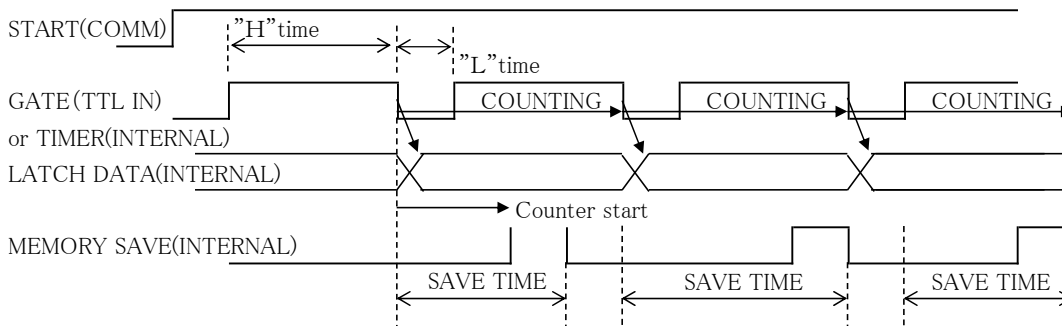
To meet the condition of SAVE TIME >= 1ms,

please input "H" TIME + "L" TIME >= 1ms.

(∗) Internal memory size is about 5MB. Therefore, numbers of channels differ depending on the model of a counter, and the numbers of data which can be saved differ.

CT08－ER2:30000、 CT16－ER2:15000

4-2. Preparation for data acquisition commands

Data are stored on memory(Address:0～14999 or 29999)

You can set up acquisition starting data address and end.

Data acquisition stops automatically if current data address reach the acquisition end data address.

You can read current data acquisition address.

4-2-1. Clear current data address

    Type of command

    CLGSDN   Clear current data address.

                                Set data acquisition starting address to zero.

4-2-2. Clear current data address and all stored data

    Type of command

    CLGSAL   Clear current data address and all memory data.

                                Set data acquisition start address to zero and clear all memory data.

                                It takes 30 sec to complete the command.

                                Please be careful, it is not possible to communicate until the command finishes.

                                Current data is overwritten even if it does not clear all the data.

4-2-3. Set and read gate synchronous data acquisition current data address

    Type of command

    GSDNddd···   Set current data address with a decimal value.

                                ddd··· : 0 ～ 9999

    Type of command

    GSDN?   Read out current data address.

        Reply

          0 ～ 9999

4-2-4. Set and read gate synchronous data acquisition end data address

    Type of command

    GSEDddd···   Set acquisition end data address.

                                  Data acquisition stop automatically if current data address reach end address.

    Type of command

    GSED?   Read data acquisition end address.

        Reply

          0 ～ 14999 or 29999   Reply on a decimal value.

4-2-5. Setting of an accumulated data acquisition and an increment data acquisition

    It can choose whether to record the data to collect with a raw
counting value (accumulation value), or to collect increment data.
When Power-up, the accumulation value is chosen.

    Type of command

    GT_ACQ_DIF   Increment data are collected.

                                  It is the difference data which subtracted the last counter value from the present counter value.

    Type of command

    GT_ACQ_FUL   Accumulation values are collected. When power-up, this mode is chosen.

                                  The value of the read counter becomes a data as it is.

    Type of command

    GT_ACQ?   The data to collect asks a raw counting value or increment.

        Reply   FUL: A raw counting value   DIF: Increment counting value

4-3. Synchronous GATE signal data acquisition commands

Type of command

GSTRT   Start to store gate synchronous data. (Just after turn on power,
                                 it's stop condition)
                                 Entering this command after preparation of section 4-2,
                                 CT16-ER2 starts data acquisition synchronized gate signal.
                                 It stores signal data from current data address to end data address
                                 synchronized by Gate signal.
                                 Inputting "STOP" command, data acquisition stops immediately.

Type of command

GESTRT   Start to store gate edge synchronous data. (Just after turn on power,
                                 it's stop condition)
                                 Entering this command after preparation of section 4-2,
                                 counter gate opens at the first falling edge of gate signal,
                                 CT16-ER2 starts synchronous falling edge of gate signal data acquisition.

                                 It stores signal data from current data address to end data address
                                 synchronized by falling edge of Gate signal.
                                 Inputting "STOP" command, data acquisition stops immediately.

4-4. Synchronous internal clock data acquisition commands

In this mode, data acquisition is synchronized by clock generated by CT16-ER2.
It's necessary to preset the value of clock ON time and clock OFF.
External gate input signal works gate signal during data acquisition operation.
If you're going to store data synchronized clock gate signal only, please set gate signal to ON.
(GATE ON = input OPEN:positive /Default setting is positive.)

4-4-1. Set and read synchronous Timer RUN time

Type of command

GTRUNddd···   Set synchronous timer data RUN time
                                 (1μs～4,294,967,295μs : μs units.)
                                 To make sure of time enough to store data, it's recommended that
                                 the sum of gate RUN time and STOP is over 10,000(=10ms).

GTRUN?   Read synchronous timer data RUN time
   Reply
   20000   Read by μs units.   Ex. 20,000 = 20ms

4-4-2. Set and read synchronous timer OFF time

Type of command

GTOFFddd···   Set timer synchronous data STOP time
                                 (1μs～4,294,967,295μs : μs units. If you input 0, set about 200ns.)
                                 To make sure of time enough to store data, it's recommended that
                                 the sum of gate RUN time and STOP is over 10,000(10ms).

Type of command

GTOFF?   Read the timer synchronous data STOP time
   Reply
   20000   Read μs units.   Ex. 20,000 = 20ms

4-4-3. Start synchronous timer clock data acquisition

Type of command

GTSTRT   Start to store clock synchronous data.

(Just after turn on power, it's stop condition)

Entering this command after preparation of section 4-2-1～3 and
4-3-1～2, CT16-ER2 starts synchronous clock signal data acquisition.
It stores signal data from current data address to end data address
synchronized by clock signal.
Inputting "STOP" command, data acquisition stops immediately.

4-5. Common commands on synchronous data acquisition

These are common commands both in GATE synchronous data acquisition and in inner TIMER.

4-5-1. Counter stop

Type of command

STOP   Stop counting immediately.

Data acquisition for synchronous GATE signal and internal timer also stops.

4-5-2. Read out the status of synchronous gate data acquisition

Type of command

GSTS?   Read out the data acquisition status.

Reply

Gate mode ON	Data acquisition on gate mode.
Timer Gate mode ON	Data acquisition on timer gate mode.
Gate Edge mode ON	Data acquisition on gate edge mode.
Now Hex Conversion	When the data is converted to hexadecimal number (the conversion for high speed read), if data are acquired in the interval of 1ms～10ms, the hexadecimal number conversion for high speed read does not meet to the end of data acquisition. And this message is outputted to an enquiry till the completion of a translation after data acquisition completion.
Gate mode OFF	Gate mode is not active.

4-5-3. Read out all stored data(0～current data address)

Type of command

GSDAL?   Read out all stored data from 0 to current data address.

Current data address is set the next address to end data address
just after data acquisition.   Read out ch0～ch7.

```
                    ch0     ch1     ch2 ・・・・     ch7     timer
Reply example:  00123, 00456, 07890, ・・・・・, 01234, 234567    ←  Data of No.0
                00123, 00456, 07890, ・・・・・, 01234, 234567    ←  Data of No.1
                  ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・
                00123, 00456, 07890, ・・・・・, 01234, 234567    ←  Data of No.n (n:acquisition end)
```

Data are output in order counter ch0 to ch7 and timer on one line.
Each data is output at 5 digits added 0 on head if the number of digit is below 5.
If over 5, each data is output at maximum digits of them.

Type of command

GSDALX?   Read out all stored data from 0 to current data address.

Current data address is set the next address to end data address
just after data acquisition.   Read out ch0～chX-1. X:16, 32, 48, 64

```
                    ch0     ch1     ch2 ・・・・     ch31    timer
Reply example:  00123, 00456, 07890, ・・・・・, 01234, 234567    ←  Data of No.0
                00123, 00456, 07890, ・・・・・, 01234, 234567    ←  Data of No.1
                  ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・
                00123, 00456, 07890, ・・・・・, 01234, 234567    ←  Data of No.n (n:acquisition end)
```

Data are output in order counter ch0 to chX-1 and timer on one line.

Each data is output at 5 digits added 0 on head if the number of digit is below 5.

If over 5, each data is output at maximum digits of them.

Type of command

GSDALH?　　　　　　　Read out in hexadecimal.

　　　　　　　　　　Read out all stored data from 0 to current data address.

　　　　　　　　　　Current data address is set the next address to end data address

　　　　　　　　　　just after data acquisition.　　Read out ch0～ch7.

```
              ch0        ch1  ・・・・   ch7      timer
```

Reply example:　│1DC2829F,07C38528,・・・00FFE101,000161C602│　←　Data of No.0

　　　　　　　　│1DC2829F,07C38528,・・・00FFE101,000161C602│　←　Data of No.1

　　　　　　　　│　・・・・・・・・・・・・・・・・・・・・・・・・・・・・　│

　　　　　　　　│1DC2829F,07C38528,・・・00FFE101,000161C602│　←　Data of No.n(n:acquisition end)

Data are output in order counter ch0 to ch7 and timer on one line.

Counter data is 8 digit output, and timer is 10 digit output.

Type of command

GSDALXH?　　　　　　　Read out in hexadecimal.

　　　　　　　　　　Read out all stored data from 0 to current data address.

　　　　　　　　　　Current data address is set the next address to end data address

　　　　　　　　　　just after data acquisition.　　Read out ch0～chX-1.　X:16, 32, 48, 64

```
              ch0        ch1  ・・・・   ch31     timer
```

Reply example:　│1DC2829F,07C38528,・・・00FFE101,000161C602│　←　Data of No.0

　　　　　　　　│1DC2829F,07C38528,・・・00FFE101,000161C602│　←　Data of No.1

　　　　　　　　│　・・・・・・・・・・・・・・・・・・・・・・・・・・・・　│

　　　　　　　　│1DC2829F,07C38528,・・・00FFE101,000161C602│　←　Data of No.n(n:acquisition end)

Data are output in order counter ch0 to ch7 and timer on one line.

Counter data is 8 digit output, and timer is 10 digit output.

4-5-4. Read out stored data of specific range

Type of command

GSDRD?xxxxyyyy　　　　Read out acquired data from data address of xxxx to yyyy in decimal.

　　xxxx, yyyy :When you input below 3 digits number, please put 0 on head and 4 digits.

　　Ex. GSDRD?01234567

　　　　　　　This is an example of reading out data address from 123 to 4567.

```
          ch0    ch1    ch2 ・・・・    ch7      timer
```

Reply example:　│02123, 00456, 07890, ・・・・・, 01234, 234567│　←　Data of No.123

　　　　　　　│03123, 00456, 07890, ・・・・・, 01234, 234567│　←　Data of No.124

　　　　　　　│　・・・・・・・・・・・・・・・・・・・・・・・・・・・・　│

　　　　　　　│04123, 00456, 07890, ・・・・・, 01234, 234567│　←　Data of No.4567

Data are output in order counter ch0 to ch7 and timer on one line.

Each data is output at 5 digits added 0 on head if the number of digit is below 5.

If over 5, each data is output at maximum digits of them.

Type of command

GSDRDX?xxxxyyyy(K)   Read out acquired data from data address of xxxx to yyyy in decimal.

    xxxx, yyyy :When you input below 3 digits number, please put 0 on head and 4 digits.

    If K is attached to an end, it expresses x1000. Please use this for 9999 or more numbers.

    Ex. GSDRD？01234567

        This is an example of reading out data address from 123 to 4567.

            ch0   ch1   ch2 ····   ch31   timer

Reply example: 02123, 00456, 07890, ····· , 01234, 234567   ← Data of No.123

                03123, 00456, 07890, ····· , 01234, 234567   ← Data of No.124

                ·····························

                04123, 00456, 07890, ····· , 01234, 234567   ← Data of No.4567

    Data are output in order counter ch0 to ch31 and timer on one line.

    Each data is output at 5 digits added 0 on head if the number of digit is below 5.

    If over 5, each data is output at maximum digits of them.

Type of command

GSDRDH?xxxxyyyy

        Read out stored data from data address of xxxx to yyyy in hexadecimal.

Type of command

GSDRDXH?xxxxyyyy(K)

        Read out stored data of all ch and timer from data address of xxxx to yyyy in hexadecimal.

        High-speed reading (more than 1MB/s) is possible at LAN connection.

        If K is attached to an end, it expresses x1000. Please use this for 9999 or more numbers.

Type of command

GSCRD?uvwxxxxyyyy   Read out stored data from data address of xxxx to yyyy.

    u:read out start channel v:end channel w: if 1,read out timer data, if 0, don't read.

    xxxx, yyyy :When you input below 3 digits number, please put 0 on head and 4 digits.

    Ex. GSCRD?24101234567

        This is an example of reading out data address from 123 to 4567 of ch2 to 4, and timer.

            ch2   ch3   ch4   timer

Reply example: 02123, 00456, 07890, 234567   ← Data of No.123

                02123, 00456, 07890, 234567   ← Data of No.124

                ····························

                04123, 00456, 07890, 234567   ← Data of No.4567

    Data are output in order required counter (ch0 to ch7) and timer on one line.

    Each data is output at 5 digits added 0 on head if the number of digit is below 5.

    If over 5, each data is output at maximum digits of them.

Type of command

GSCRDX?uuvvwwxxxxyyyy(K)   Read out stored data from data address of xxxx to yyyy.

    uu:read out start channel vv:end channel ww: if 01,read out timer data, if 00, don't read.

    xxxx, yyyy :When you input below 3 digits number, please put 0 on head and 4 digits.

    If K is attached to an end, it expresses x1000. Please use this for 9999 or more numbers.

    Ex. GSCRDX?02040101234567

        This is an example of reading out data address from 123 to 4567 of ch2 to 4, and timer.

```
                  ch2     ch3    ch4    timer
Reply example: │02123, 00456, 07890,  234567│          ← Data of No.123
               │02123, 00456, 07890,  234567│          ← Data of No.124
               │···························│
               │04123, 00456, 07890,  234567│          ← Data of No.4567
```

Data are output in order required counter (ch0 to ch7) and timer on one line.

Each data is output at 5 digits added 0 on head if the number of digit is below 5.

If over 5, each data is output at maximum digits of them.

Type of command

GSCRDH?uvwxxxxyyyy

Read out acquired data from data address of xxxx to yyyy in hexadecimal.

This is the command for ch0～ch07.

Type of command

GSCRDXH?uuvvwwxxxxyyyy(K)

Read out acquired data from data address of xxxx to yyyy in hexadecimal.

This is the command for ch0～ch31.

If K is attached to an end, it expresses x1000. Please use this for 9999 or more numbers.

4-5-5. LAN setup commands

New LAN setting becomes effective, if the one of three is executed.

・Send the command "RSET"

・Push RES/FWR switch 1sec at the front panel

・Power off, and power on after few seconds.

It continues working by old setup till the above one of three is executed.

Type of command

MAC?   Read out MAC address.

Reply example

0050C2970018   Reply is 12 digits in hexadecimal.

Type of command

IPAxxx_xxx_xxx_xxx   xxx: 000～255

Set IP address.

Ex. IPA192_168_001_055   Set IP address to 192.168.1.55.

Type of command

IPA?   Read out P address.

Reply example

IPA192_168_001_055

Type of command

PRTxxx_xxx_xxx_xxx   xxx: 000～255

Set port address.

Ex. PRT 7777   Set port address to 7777.

Type of command

PRT?   Read out port address.

Reply example

PRT 7777

Type of command

GTWxxx_xxx_xxx_xxx   xxx: 000～255

Set Gate Way address.

Ex. GTW192_168_001_001   Set gate address to 192. 168. 1. 1

Type of command

GTW?   Read out Gate Way address.
    Reply example
    GTW192_168_001_001

Type of command

SNMxxx_xxx_xxx_xxx   xxx: 000～255
        Set sub net mask.
        例)SNM255_255_255_000   Set sub net mask to 255.255.255.0.

Type of command

SNM?   Read out sub net mask.
    Reply example
    SNM255_255_255_000

4-5-6. Special commands

    Important information is stored in the internal ROM.
    This command can initialize the internal ROM. 'When LAN access becomes out of condition,
    a power supply is re-started after this command is executed by USB communication, it will be initialized.

    Type of command

    INITROM   Initialized internal ROM as follow.

        Initialization contents
            IP Address : 192.168.1.123   Gateway address : 192.168.1.1
            Subnet mask : 255.255.255.0   Port Number : 7777
            Timer preset value : 1000ms   Counter preset value : 1,000,000
            Upper display: Timer   Lower display:Counter07(preset counter)
            Backlight ON
            Timer Synchronous DownLoad data：ch0～ch7 ＆ Timer & decimal
            Timer Synchronous DownLoad interval：100ms
            All command reply : disable   Minimum Pulse out 10μs : disable
            Timer/Counter stop disable

4-5-7. Data read time

    The read-out time of data is based on the processing time of an internal microcomputer, and the speed
    of the communications department. However, since this counter uses the interface to LAN, and DMA
    of a microcomputer, it is downloadable at high speed (a maximum of 1MB/(second) or more).
    (data acquisition method)
    For high-speed download, not only a raw counting data, but also a hexadecimal number conversion data
    is saved. If it is only raw data store, it can save at the interval for 1 ms or more.
    However, the hexadecimal number conversion takes longer time (about 10 msec is required for 48 times
    of 32-bit conversion). For example of CT48-01E case, if 10000 data are acquired in 1 ms, a hexadecimal
    data is not downloadable unless it waits for 90sec (= 10ms x 10,000 - 10sec) after the completion of an
     data acquisition (after 10 seconds). When a data is acquired every 10 ms, since a hexadecimal translation
    is also finished to the quit of a data acquisition, and a simultaneous, it can download immediately.
    Although a status changes with a model or data volume, please take care of the data acquisition,
    if the interval is about 1ms.
    You can confirm by the command "GSTS? (section 4-5-2)" that it is in the middle of the data conversion
    to hexadecimal number. If the reply of this command became "Gate mode OFF", a hexadecimal
    conversion was completed.

(Download commands and download speed)

Download commands are classified as follows.

(1) Download the data specified in the data address (0〜9999) from all channels in hexadecimal.

    GSDALXH?   GSDRDXH?xxxxyyyy(K)

(2) Data download except (1) in hexadecimal.

    GSDALH?   GSDRDH?xxxxxyyyy   GSCRDH?xxxxyyyy

    GSCRDXH?uuvvwwxxxxyyyy(K)

(3) Data download in decimal.

    GSDAL?   GSDALX?   GSDRD?xxxxyyyy   GSDRDX?xxxxyyyy(K)

    GSCRD?uvwxxxxyyyy   GSCRDX?uuvvwwxxxxyyyy(K)

Download Speed example

		classification1	classification2	classification3
LAN	speed	1.2MB／S	0.8MB／S	40KB／S
	time	0.8S／MB	1.3S／MB	25S／MB

		classification1	classification2	classification3
USB	speed	100KB／S	100KB／S	35KB／S
	time	10S／MB	10S／MB	28S／MB

note) CT08-01E (8ch type) was measured.

    16ch type 〜 64ch type are faster than 8ch type.

    Regarding 16ch type, 10,000 data that is about 0.85MB is downloaded about 1 sec by LAN

    communication. And it is downloaded about 9sec by USB communication.

5. Encorder counter

    5－1. Read and Preset

      5－1－1. Encorder Counter read command

        Type of command

        S20   chA counter read request.(the least significant 7 digit)

          Reply example

          RA±□□□□□□□   (□: Decimal number)

        Type of command

        S30   chA counter read request.(10 digit)

          Reply example

          RA±□□・・・□□   (□: Decimal number)

        Type of command

        S22   chB counter read request.(the least significant 7 digit)

          Reply example

          RB±□□□□□□□   (□: Decimal number)

        Type of command

        S32   chA counter read request.(10 digit)

          Reply example

          RB±□□・・・□□   (□: Decimal number)

      5－1－2. Encorder Counter preset command

        Type of command

        SA±□□・・・□□   (must be in within 10digit)

             Preset chA counter

             If the value is over the range,maximun(or minimum) value is set.

        Type of command

        SB±□□・・・□□   (must be in within 10digit)

             Preset chB counter

             If the value is over the range,maximun(or minimum) value is set.

    5－2. Encorder Counter setting command

      5－2－1. Direction of rotation and Count UP/DOWN

        Type of command

        S20x   Set chA encorder counter.

              x: F /CW: count up、CCW：count down

                   R /CCW:count up、CW:count down

                   1 /1 times

                   2 /2 times

                   4 /4 times

        Type of command

        S22x   Set chB encorder counter.

              x: F /CW: count up、CCW：count down

                   R /CCW:count up、CW:count down

                   1 /1 times

                   2 /2 times

                   4 /4 times

5－2－2. Setting confirmation command

    Type of command

    S20S?   read out chA encorder counter setting.

        Reply example

            1F   1 times、CW: count up

            2R   2 times、CCW:count down

    Type of command

    S22S?   read out chB encorder counter setting.

        Reply example

            1F   1 times、CW: count up

            2R   2 times、CCW:count down

5－3. Clear Encorder Counter by Z-phase signal

    Type of command

    ZC□   Z-phase counter clear request

            The request is cancelled by Z-phase signal input or "ZN□" command.

            □:A～B   (ch A～B)

    Type of command

    ZN□   Z-phase counter clear cancel

            □:A～B   (ch A～B)

    Type of command

    ZT□△   Select "Z-phase rising edge" or "Z-phase falling edge",to set the timing of clearing the counter.

            □:A～B   (ch A～B)

            △:U or D   (U:rise edge, D:fall edge)

        (＊)   When Encorder counter setting is 1times ,

            you cannot use ZT□△ command.

    Type of command

    ZS□   Read out Z-phase counter clear mode.

            □:A～B   (ch A～B)

        Reply example

            Z□○△

                □:A～B   (ch A～B)

                ○:C or N   (C:clear mode on, N:clear mode off)

                △:U or D   (U:rise edge, D:fall edge)

5－4. Set scaling parameter

  5－4－1. Multiplier set command

    Type of command

    MW△±□□□.□□□□□□

    (must be in the format)

            Set scaling parameter:multiple

            multiple range：±0.000001～999.999999

            △:A～B   (ch A～B)

            □: Decimal number

Type of command

MR△　　Read out scalingparameter (multiple).

　　　　　△：A〜B　　　(ch A〜B)

　　Reply example

　　　　M△±□□□.□□□□□□

　　　　（reply is sent in the format）

　　　　　　　△：A〜B　　　(ch A〜B)

　　　　　　　□：Decimal number

5−4−2. Offset set command

　　Type of command

　　OW△±□□・・・□□

　　（must be in within 10 digit）

　　　　　　　Set scaling parameter : offset

　　　　　　　offset range:0〜±2147483647

　　　　　　　If the value is over the range, maximun(or minimum) value is set.

　　　　　　　△：A〜B　　　(ch A〜B)

　　　　　　　□：Decimal number

　　Type of command

　　OR△　　Read out scaling paratmeter (offset)

　　　　　　△：A〜B　　　(ch A〜B)

　　　Reply example

　　　　　O△±□□□□□□□□□□

　　　　　（reply is sent in the format）

　　　　　　　　△：A〜B　　　(ch A〜B)

　　　　　　　　□：Decimal number

5−4−3. Scaled value read command

　　Type of command

　　D△　　Read out scaled value.

　　　　　　△：A〜B　　　(ch A〜B)

　　　Reply example

　　　　　D△±□・・・□.□・・・□

　　　　　（reply is sent in the 19 digit format. Number of decimal plases is 6.）

　　　　　　　　△：A〜B　　　(ch A〜B)

　　　　　　　　□：Decimal number

6. Abstract of LCD display

6-1. Spec of LCD display

16 characters and Two lines, LED back light (ON or OFF)

Displays "Count value: 0～4,294,967,295" , "Timer value: 0～1,099,511.62s".

It can display two items from the following 4 items into the two sections (upper row and lower row) by the command via the communication line.

　Count value, Timer value, Preset count value, Timer preset value

The view list items and LED back light status (on or off) are saved.

Display example 1 (upper line: count value, lower line: timer value)

C	N	T	0	1		0	0	0	0	0	0	0	0	0	0
T	I	M	E	R		0	0	0	0	0	0	0	.	0	0

Display example 2 (upper line: preset count value, lower line: timer preset value)

C	N	T	P	R		0	0	0	0	0	0	0	0	0	0
T	I	M	P	R		0	0	0	0	0	0	0	.	0	0

6-2. LCD display commands

Type of command

SDU00～17	To LCD upper line, it shows one of a count value from ch0 to ch17 .
	CT08-ER2:CH8 is Encorder A,CH9 is Encorder B.
	CT16-ER2:CH16 is Encorder A,CH17 is Encorder B.
SDUTM	To LCD upper line, it shows a timer value.
SDUCP	To LCD upper line, it shows a preset counter value.
SDUTP	To LCD upper line, it shows a timer preset value.
SDL00～17	To LCD lower line, it shows one of a count value from ch0 to ch17 .
	CT08-ER2:CH8 is Encorder A,CH9 is Encorder B.
	CT16-ER2:CH16 is Encorder A,CH17 is Encorder B.
SDLTM	To LCD lower line, it shows a timer value.
SDLCP	To LCD lower line, it shows a preset counter value.
SDLTP	To LCD lower line, it shows a timer preset value.

6-3. Backlight control commands

Type of command

BKON	Turn on the backlight
BKOFF	Turn off the backlight

6-4. Scalting function

You can use scalling function by setting scaling parameter.

Pulse counter and encorder counter is scaled by parameter (multiple , offset).

(Number of significant digits of the converted value is 15 digits)

Scaled value = (pulse-count + offset)×multiplier

parameters are set by communication commands.

・offset　　　　0～±2147483647 (initial data:0)

・multiplier　　±0.000001 ～ 999.999999 (initial data:1)

When multiplier is 1 and offset is 0, count value is not scaled.

In other paramter, display value is integer part 3 digits, the fractional part 6 digits.

Display example 1 (upper line: encorder chA scaled value, lower line: encorder chB scaled value)

E	N	C	0	0	+	9	9	9	.	9	9	9	9	9	9
E	N	C	0	1	－	9	9	9	.	9	9	9	9	9	9

Display example 1 (upper line: counter ch0 scaled value, lower line: counter ch1 scaled value)

C	N	T	0	0	+	9	9	9	.	9	9	9	9	9	9
C	N	T	0	1	－	9	9	9	.	9	9	9	9	9	9

7. Firmware update

For CT16-ER2 it's possible to upgrade firmware via communication tools.

Here is an overview of operation.

Firmware is updated via USB communication line, and the Counter is connected with PC with USB cable.
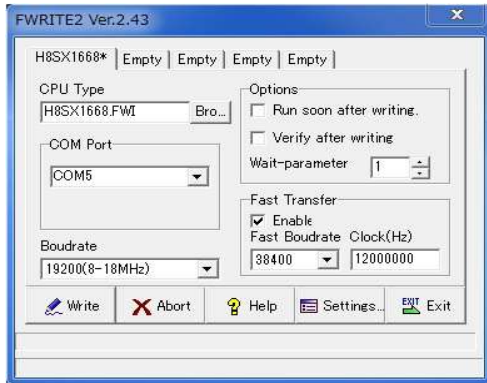
Beforehand, please download the version up file (latest version) from HP site.

Hereafter, FLASH ROM write-in software assumes that it has prepared beforehand.

Please refer to "1st time of version up" at the last of this section, if FLASH ROM write-in software is not prepared.

Version up procedure

1. Execute FLASH ROM write-in software "FWRITE.exe".

Please set up like the left window.

Please input a deemed port number to a COM port, when the USB connection is made.

Please refer to the section 2-3 for details.

2. Move to write mode.

To move to write mode, please continue pushing the button SW which is showing in the RES/FWR hole of the front panel 3 seconds or more. (The Counter will be reset, if the pushing time is shorter.)

You can judge whether it has moved to Write mode or not, if the next session (write program into ROM) is succeeded.

3. After click, to erase ROM is started. And then the file to write in is required, soon.

It takes 1 to 2 seconds to write the version up file.

4. Press the Exit button to complete write in.

Please turn off the power switch and wait 5 to 6 seconds or more. Please turn on the power switch, a new program will start. The following data beforehand are saved.

LAN data's (IP address etc.), preset values, etc.

When updating for the first time

When the update is the first time, you need the software for writing the program into Flash ROM.

Please ask us to send the software, and we will send the software. Because, the software is not uploaded to our homepage.

USB communication must be set up to PC, and USB driver have to be installed to PC.

Please refer to "2-3. setting USB communication".

he preparation of FRASH ROM writing software.

1. Please execute FWRITE.exe that is sent from us.

The window like the below will appear.

At first, please select "H8SX1668.FWI" in "CPU type".

2. Please activate "Fast Transfer Enable", and activate "Fast Transfer Enable".

Don't need to change Boudrate 19200(8～18MHz) and Fast Boudrate 38400
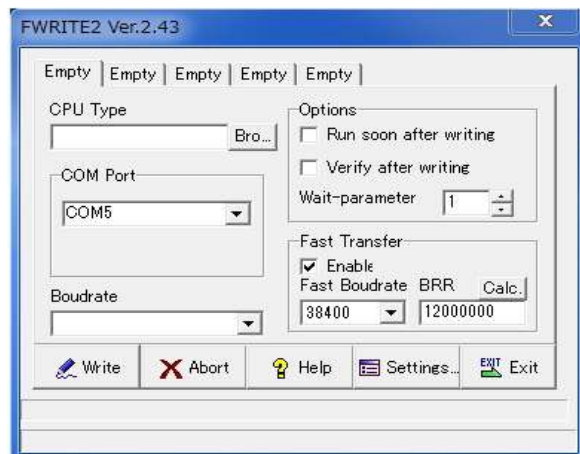
3. After the preparation, the writing software become like the picture.

The software remembers the inputs, the same inputs will appear at the next time.

Please move to the section "version up procedure 1" for update.

8. Synchronous drive of multi units

It's possible to operate multi units synchronously.

Then CTXX-01 contains XX CH counters, it's possible to count more channels at synchronous mode
using multi units of the same series.

Here are procedures of this usage.

Connect the RUN signal (TTL OUT) of first unit to the GATE signal (TTL IN) port of second unit.

It's the same way to the third unit.

Send "DSAS" command to latter unit. The latter units don't stop counting automatically.

Send "START" command to latter unit. The latter units start counting action.

Depend on your usage, put on "GATE" signal to first unit.

Depend on your usage, preset timer stop command to first unit. ("CLTM","ENTS","STPRdddd")

Depend on your usage, preset counter stop command to first unit. ("CLPC","ENCS","SCPRdddd")

Activate count mode of first unit by the command "START".

This procedure activate more than one unit at the same timing chart.

Similarly, if you use several CTXX-01E,you will acquire multi channels data with gate signal data acquisition.

9. Designation and cancellation of RUN output TTL pulse width 10 μ s at the minimum

A RUN TTL level is outputted when the Counter is busy.

When connecting this signal to other equipment and taking a synchronous, since a pulse width is short,
a reliability may be unable to be kept. For example, since the progress of the Counter is saved in
the memory by internal timer synchronous, OFF time will be set to the minimum time that is 120ns,
if ON time is set to 10ms and OFF time is set to 0 μ s. However, even if this signal is connected to other
equipments, it may not work well because of the short pulse width. When RUN output is narrower than 10 μ s,
please execute the command "MIN10U_EN", it makes the minimum pulse width 10 μ s. MIN10U_DS is the
command to disable "MIN10U_EN".

Please send the command "MIN10U?" to know the status, reply is "EN" or "DS".

10. Regulations and guidelines

Regarding CT16-ER2 when it receives data read command, it stops count and timer action for 120 ns.

This stopping period is essential to get latest data to latch 32 bits count data.

If you read out count data 20 times/sec, total stopping period of counter is 120ns×20 = 2.4 μ s/sec.

Even if you read one or all counter at once, all counter and timer stops simultaneously, and
stopping period is always 120ns. Therefore, you may read data by minimum commands.

On timer stop mode or counter stop mode, there is no error measurement caused by counter stop on reading.

For example, a Counter has been set to stop after 1 second by timer stop mode.

If counting value read is done 10 times in 1 second, as compared with the time of not doing a readout,
a timer will stop behind 1.2 μ s (= 120ns x 10times).

On the other hand, the Counter stopped a total of 1.2 microseconds that is the same period of the Timer.

And the Counter and the Timer has finished the action at the same time.

Therefore, it means that the counting action was done by the specified time.

When in counting pulse during "GATE" signal which comes from outside, you'll notice that counting period
is shorter than read out period.

When in timer stop mode or counter stop mode, there is no dead time to read out count values.

(※) Notes when multiple counter units at simultaneous control

(See 7. Synchronous operation by multi counter units.)

In case of using multiple counter units at simultaneous control, if you read count in progress data of each
units, only units which are read count data stop count operation in 120ns.

Therefore, note that it occurs some errors among count data of modules because of condition of count pulse,
timing of reading, and dispersion of times of reading.

Example: Case of reading 20 times a second to one module only

This module have 120ns ＊ 10 = 1.2 μ s delay in every seconds.

Count error occurs by 1.2 μ s/s(0.00012%)

11. Interface with external devices
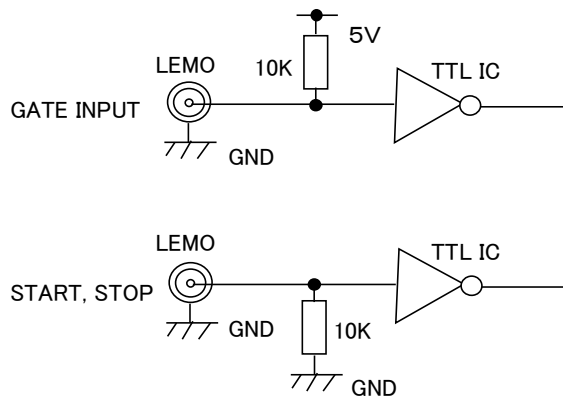
◆ Regarding to remote controlled input termination switch (2019/10/29 new functionality)
   Products that supports remote controlled input termination selection
   can use the following commands to control input termination type.

```
IN?␣00      Query termination type for channels 0 to 7.
IN?␣08      Query termination type for channels 8 to 15.

THI␣ALL     Switch all channels to TTL Hi-Z termination.
THI␣x       Switch channel x (where x=0,2,4,…,14) to TTL Hi-Z termination.
            (Channel x+1's setting will follow that on channel x)

T50␣ALL     Switch all channels to TTL 50 Ohm termination.
T50␣x       Switch channel x (where x=0,2,4,…,14) to TTL 50 Ohm termination.
            (Channel x+1's setting will follow that on channel x)

NIM␣ALL     Switch all channels to NIM termination.
NIM␣x       Switch channel x (where x=0,2,4,…,14) to NIM termination.
            (Channel x+1's setting will follow that on channel x)
```

12. Trial Software

In Ct16-ER2, Windows control software, which has been in use in CT08-01E will be used.

From our web site, please download and use the latest version.

If you use this software you will be able to control the CT16-ER2 from Windows PC.

CT16-ER2 CONTROLLER

Display Area Select
0 1 2 3 4 5 6 7

com intval(ms)
Version 1.04 15-05-19 CT16-ER2   50

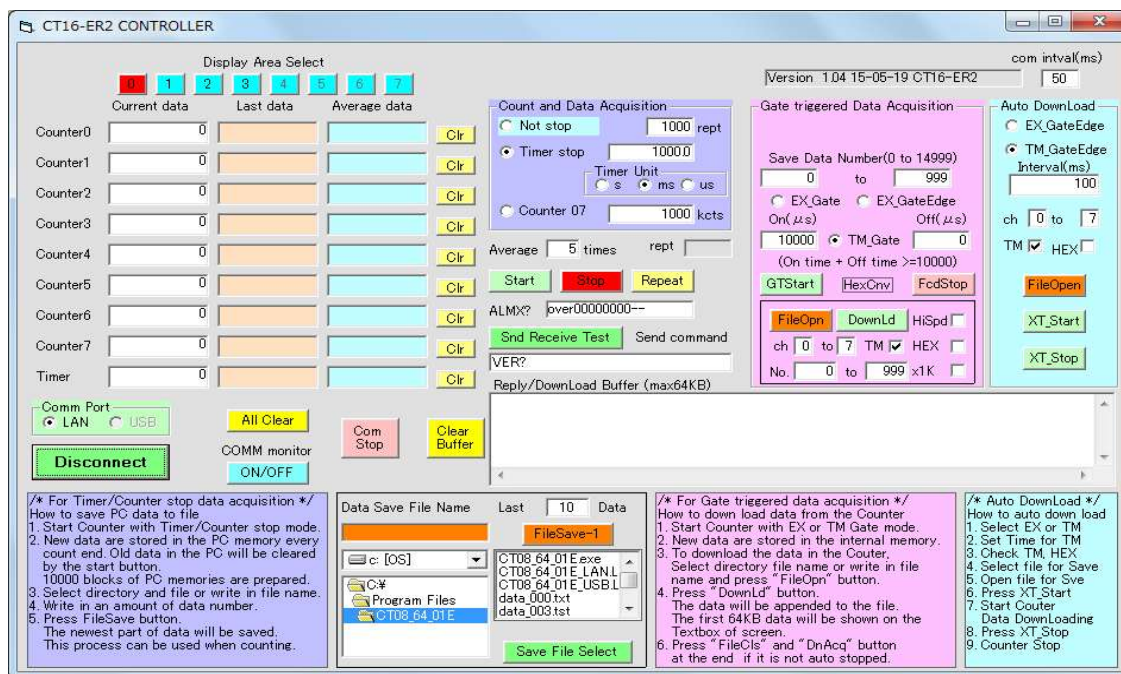|	Current data	Last data	Average data	
Counter0	0			Clr
Counter1	0			Clr
Counter2	0			Clr
Counter3	0			Clr
Counter4	0			Clr
Counter5	0			Clr
Counter6	0			Clr
Counter7	0			Clr
Timer	0			Clr

Count and Data Acquisition
Not stop   1000 rept
Timer stop   1000.0
Timer Unit: s / ms / us
Counter 07   1000 kcts
Average   5 times   rept
Start   Stop   Repeat
ALMX?   over00000000--
Snd Receive Test   Send command
VER?

Gate triggered Data Acquisition
Save Data Number(0 to 14999)   0 to 999
EX_Gate / EX_GateEdge
On(μs)   Off(μs)
10000 / TM_Gate   0
(On time + Off time >=10000)
GTStart   HexCnv   FcdStop
FileOpn   DownLd   HiSpd
ch 0 to 7   TM ✔ HEX
No.   0 to 999 x1K

Auto DownLoad
EX_GateEdge
TM_GateEdge
Interval(ms)   100
ch 0 to 7
TM ✔ HEX
FileOpen
XT_Start
XT_Stop

Comm Port: ● LAN ○ USB
Disconnect
All Clear
COMM monitor ON/OFF
Com Stop
Clear Buffer

Reply/DownLoad Buffer (max64KB)

/* For Timer/Counter stop data acquisition */
How to save PC data to file
1. Start Counter with Timer/Counter stop mode.
2. New data are stored in the PC memory every count end. Old data in the PC will be cleared by the start button.
   10000 blocks of PC memories are prepared.
3. Select directory and file or write in file name.
4. Write in an amount of data number.
5. Press FileSave button.
   The newest part of data will be saved.
   This process can be used when counting.

Data Save File Name   Last 10 Data
FileSave-1
c: [OS]
C:¥
  Program Files
  CT08_64_01E
CT08_64_01E.exe
CT08_64_01E_LAN.L
CT08_64_01E_USB.L
data_000.txt
data_003.tst
Save File Select

/* For Gate triggered data acquisition */
How to down load data from the Counter
1. Start Counter with EX or TM Gate mode.
2. New data are stored in the internal memory.
3. To download the data in the Couter, Select directory file name or write in file name and press "FileOpn" button.
4. Press "DownLd" button.
   The data will be appended to the file.
   The first 64KB data will be shown on the Textbox of screen.
5. Press "FileCls" and "DnAcq" button at the end if it is not auto stopped.

/* Auto DownLoad */
How to auto down load
1. Select EX or TM
2. Set Time for TM
3. Check TM, HEX
4. Select file for Save
5. Open file for Sve
6. Press XT_Start
7. Start Couter
   Data DownLoading
8. Press XT_Stop
9. Counter Stop

13. Performance and specifications

POWER	AC90～240V 10W　(NCT08-01E: +6V 0.85A from NIM BIN)	
Counter	TTL Input level (3.3V～5V)	Voltage level 3.3V or 5V
		Zin = 10KΩ　　　　　Count frequency　more 100MHz
	NIM Input level	Current level -12mA～-36mA:"1"　-4mA～+20mA:"0"
		Zin = 50Ω　　　　　Count frequency　more 300MHz
	Input Connector	LEMO ERA00250CTL
	Channels	0～xxChannels (CH7 is preset counter) xx : 8, 16
	digit of count	32bits(0～4, 294, 967, 295)
Encorder Counter	type	Line driver or Open collector (phaseA,B type)
	input frequency	0～1MHz
	power supply	5V for encorder
	Channels	2ch (CT08-ER2: ch8, ch9/CT16-ER2:ch15,ch16)
	digit of count	32bit(0～4, 294, 967, 295)
	termination	120Ω selectable (when Line Driver type)
timer	Number of ch.	1 channel 40bit 1～1,099,511,627,775μs
	Resolution	0.000001sec(1μs)　　Accuracy 0.005%
	Preset time	1～1, 099, 511, 627, 775μs　or　ms
fixed counter	Number of ch.	1 channel CH7 Fixed
	Preset count	1cts ～ 4,294,967 Kcts or cts
Count mode	single mode	By start trigger or "STRT" command, CT08-ER2 counts input pulse once within preset time or count. Count stops immediately by stop trigger or "STOP" command. If you prohibit preset timer stop and count, count operation never stop unless using stop trigger or "STOP" command.
Count data acquisition mode (save to RAM)	synchronous gate mode	Store total data automatically up to 10,000 times on the timing of turning OFF synchronous gate signal. Over 1ms the total time of gate ON and OFF requires.
	synchronous clock mode	Store total data automatically up to 10,000 times on the timing of turning OFF synchronous clock signal. Over 1ms the total time of clock RUN and OFF requires.
Gate in TTL	TTL Gate input enables count mode control with all channels and timer. Open or "H" level is count mode. You can invert logic level by inner switches. Used as a synchronous signal on gate synchronous data acquisition mode.	
LED in counting	In count mode LED turn on "green"	
Signal out in counting (RUN OUT)	TTL output shows counter is now operating. If you use some modules, you can activate them simultaneously by the highest module to connect between "TTL output" and "TTL gate in" on another module. You can invert logic level by inner switches. If the pulse width is narrower than 10us, it makes the pulse width 10μs.	
Control input	Count start input (by TTL rising edge), count stop input (by TTL rising edge) You can invert logic level by inner switches.	
LCD display	number of character	16 columns x 2 lines
	value	Count data、timer data、preset count data、timer preset data
	count value	0～4, 294, 967, 295cts
	timer value	0～1, 099, 511. 62s
scaling	Can use scaling function	
Communication	LAN(TCP/IP SOCKET CONNECTION, possible to connect 8connections), USB	
Version upgrade	upgrade firmware software by communication	
Case	EIA2U (H88*W482*D330)	

For the further information, feel free to ask us.