8～64CH COUNTER TIMER

(N)CT08-64-01F

USER'S MANUAL

4004（Rev2／2020.1.18）

TSUJICON   APPLICATION   OF   ELECTRONIC   DEVICES

TSUJI ELECTRONICS CO.,LTD

3739 Kandatsu-machi Tsuchiura-city
Ibaraki-Pre 300-0013 Japan
Phone +81-(0)29-832-3031
Fax   +81-(0)29-832-2662
URL http://www.tsujicon.jp
E-mail info2@tsuji-denshi.co.jp

CT08-01F～CT64-01F Command list（Available LAN, USB）   a command used a lot

Red word is a correction of omissions or errors in writing.   Blue word shows Version up.

COMMAND	FUNCTION	DETAIL
ALM?	alarm read 0-7ch	read out the cause of overflow 0-7CH and timer Reply: overXXXXTM or overXXXX--
ALMX?	alarm read extended to 0-xxch xx: 08 to 64	read out the cause of overflow 0-xxCH and timer Reply: overXXXXXXXXXXXXTM or overXXXXXXXXXXXX--
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:00-63
CLCTxxyy	clear counter xx to yy	clear counter channel xx to yy xx、yy:00-63
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 counter ch uu to vv uu, vv: 00-63 Reply: 10 digits in dec ww: 00/no timer, 01/timer
CTMRH?uuvvww	counter uu to vv and timer read	read counter ch uu to vv uu, vv: 00-63 Reply: 8 digits in hex ww: 00/no timer, 01/timer
CTR?xx	counter xx read	read out channel xx counter xx:00-63 Reply: 10 digits in dec
CTRH?xx	counter xx read	read out channel xx counter xx:00-63 Reply: 8 digits in hex
CTR?xxyy	counter xx to yy read	read counter ch xx to yy xx:00-63 Reply: 10 digits in dec (separated by space)
CTRH?xxyy	counter xx to yy read	read counter ch xx to yy xx, yy:00-63 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:10dig. in dec
RDALH?	read all counter and timer	read out all counter and timer reply: 8dig. 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 ver info. ex. reply:"1.00 19-11-07 CT48-01F"

VERH?	hardware version information	read hardware ver info ex.reply:"HD-VER1"
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(use internal RAM)

  Preparation of data acquisition commands

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

  GATE signal synchronous data acquisition commands

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)

  Internal timer clock synchronous data acquisition commands

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 set to 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

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 in dec. data number is x1000, if (K) is added to command.
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 in hex (Available LAN Hi-speed read mode)
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

Store data commands for synchronous gate signal and timer clock for FLASH ROM

Preparation of data acquisition commands

FF_NAME_ABCD・・・	Name the data those will be saved after start sequence	Name the data those will be saved after start sequence. (within 16 characters) Clear currend addr.
FF_NAME?	Read data name acquisition data Number read	Read data name. reply : ABCD・・・
FF_GSEDddd・・・	Gate Synchronous acquisition End data Number set to	input gate synchronous data acquisition end data address (unit: K). after end addr. acquisition stop
FF_GSED?	Gate Synchronous acquisition End data Number read	read gate synchronous data end address (unit: K) reply : 0 ～ 9999

Synchronous GATE signal data acquisition commands

FF_GSTRT	Gate synchronous data acquisition STaRT	start gate synchronous data acquisition and write (just after turn on power, it's stop condition)
FF_GESTRT	Gate Edge synchronous data acquisition STaRT	start gate edge synchronous data acquisition and write (just after turn on power, it's stop condition)

Synchronous internal clock data acquisition commands

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 set to zero)
GTOFF？	Gate Timer synchronous OFF time read	read out synchronous timer data OFF time
FF_GTSTRT	Gate Timer synchronous data acquisition STaRT	start internal clock synchronous data acquisition and write. (Just after power on, it's stop condition)

Synchronous data acquisition common commands

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
FF_ECC 0	FLASH data read mode 0 RD without correction	set to FLASH data read mode 0 RD without correction (High Speed : 2MB/s)

FF_ECC 1	FLASH data read mode 1 RD with ECC code	set to FLASH data read mode 1 RD with ECC code (High Speed : 2MB/s)
FF_ECC 2	FLASH data read mode 2 RD after correction	set to FLASH data read mode 2 RD after correction (Slow Speed : 50KB/s)
FF_ECC ?	current mode info. request	read FLASH data read mode Reply: read out mode
FF_LIST?	Read data List in the Flash Name, Size, Block Number	Read data List in the Flash Name, Size, Block Number
FF_READ?ABCD···	File read from the Flash Fine name : ABCD···	Read all data from file ABC··· in Flash.
FF_BKRD?bbbbcccc	Gate synchronous acq. data read from bbbb to cccc	Read data from bbbb to cccc. bbbb, cccc : 4 digits in dec, 0001～4095 Data read stops, if there is a EOF between them
FF_NEW_BLOCKS?	Read New Blocks number those are not written yet	Read New Blocks number those are not written yet. (maximum 4095)
FF_ERASE	Erase All Flash	Erase All data in Flash ROM
FF_ERRDRD	Error Data Read	Read out the error block addresses from Flash. (Error blocks are not used.)

Continuous data downloading command. (Data are acquired synchronously to the timer or gate signal)

TSDL(H)uvw	Timer Synchronous DownLoad ch u to v and timer	Specify the counter ch from u to v and 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 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 Reply (example) : H_uu_vv_ww, D_uu_vv_ww ″H″:hex ″D″:dec
TSDTxxx	Timer Synchronous DownLoad interval Time	Set interval time of downloading per ms.
TSDT ?	interval Time read	interval Time read
TSDSTRT	Download START	Timer synchronous Downloading START
TSDSTOP	Download STOP	Timer synchronous Downloading STOP
XSDL(H)uvw	eXternal Gate Synchronous DownLoad ch u to v and timer	Specify the counter ch from u to v and 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 ww: 00/no timer data, 01/timer data Reply: dec w/o ″H″, hex w/ ″H″
XSDL?	eXternal Gate Synchronous DownLoad Setting Read	Read out the counter ch and w/ or w/o timer data Reply (example) : H_uu_vv_ww, D_uu_vv_ww ″H″:hex ″D″:dec
XSDSTRT	Download STaRT	eXternal Gate edge synchronous Download STaRT
GSDSTRT	Download STaRT	eXternal Gate synchronous Download STaRT
XSDSTOP	Download STOP	eXternal Gate synchronous Download STOP
STOP	stop counter and Download	stop counter and Download

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

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

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, when IP address become unknown)

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

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

ALL_REP_EN	All reply enable	Sets a reply for all the commands without response. "OK" or "NG" is replied for no response 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 $10\mu s$ to minimum pulse width of RUN output (TTL)

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

Input mode command

IN? xx	Return input mode settings of xx～xx+7
	
	xx: 00, 08, 16, 24, 32, 40, 48, 56
		Read input mode settings
		Reply:
		(xx=00)
		  CH 00 - 07 : TTL_Hi TTL_Hi TTL_50 TTL_50 NIM NIM TTL_50 TTL_50
		(xx=56)
		  CH 56 - 63 : TTL_Hi TTL_Hi TTL_50 TTL_50 NIM NIM TTL_50 TTL_50

THI ALL	Sets all channel to TTL Hi-Z	Set the input mode of all channels to TTL Hi-Z Reply: OK
THI x	Sets CHx and CHx+1 to TTL Hi-Z x: 0, 2, 4, ….. , 62	Set the input mode of CHx amd CHx+1 to TTL Hi-Z Reply: OK
T50 ALL	Sets all channel to TTL 50Ω	Set all channel input mode to TTL 50Ω Reply: OK
T50 x	Sets CHx and CHx+1 to TTL 50Ω x: 0, 2, 4, ….. , 62	Set the input mode of CHx amd CHx+1 to TTL 50Ω Reply: OK
NIM ALL	Sets all channel to NIM	Set all channel input mode to NIM Reply: OK
NIM x	Sets CHx and CHx+1 to NIM x: 0, 2, 4, ….. , 62	Set the input mode of CHx amd CHx+1 to NIM Reply: OK

CONTENTS

User's manual

1. Specifications

    1-1. Abstract

        This is the user's manual for all of CT08-01F, CT16-01F, CT32-01F, CT48-01F, CT64-01F.

        The difference is the number of channels on these equipment.

        This unit has 8～64 channel high speed 32bits counters and one timer.

        It counts during timer set interval or until the limited set count value.

        Setting interval for count is $1\mu s$ to 1,000,000s. Setting limited count value is 1cts to 4,294,967Kcts.

        CT08～16-01F is produced as EIA 1unit, and CT32～64-01F is produced as EIA 2units.

        There is NCT08-01F that is NIM type of CT08-01F. And there is not the display on NIM type counter.

        Using LAN or USB communication, you can able to use remote control.

        It's possible to store counting data which synchronized with ON/OFF of GATE IN signal or

        inner clock up to 8,000 memory address (64CH type) ～ 56,000 memory address (8CH type) (*1)

        (clock can preset ON time and OFF) .

                *1: 1 memory = number of counter channel x 4byte + number of timer x 4byte

                 e.g.) 1memory of 64CH = 64*4+1*4 = 260byte

        This unit is equipped with the LCD display.

        It can display two items into the two sections (upper row and lower row) from four items (a counting

        value, a timer value, a preset counter value, and timer preset values) by the command from

        the communication line.

        -01F type has 8GB FLASH ROM for save data. (About 8ch type; i.e.; CT08-01F can save 80,000,000 data.)

        And it has input mode selection (TTL Hi-Z, TTL 50Ω, NIM) via command line.

    1-2. Appearance (example: CT48-01F)

        Front panel layout
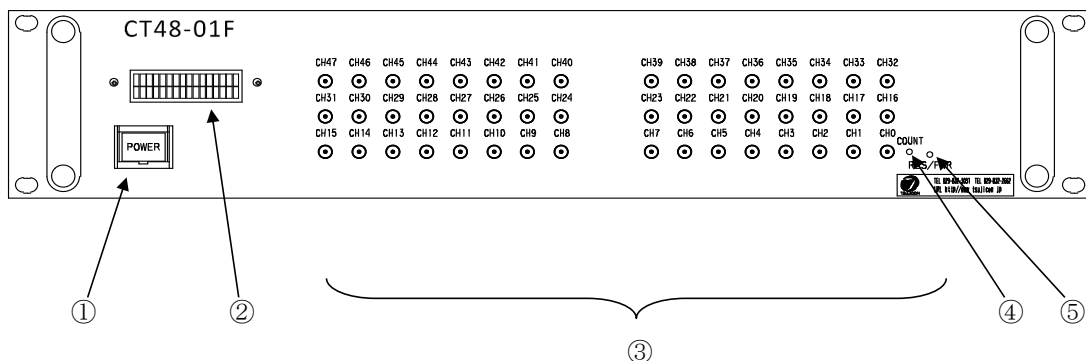
    ①   Power switch

        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 CH47. (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
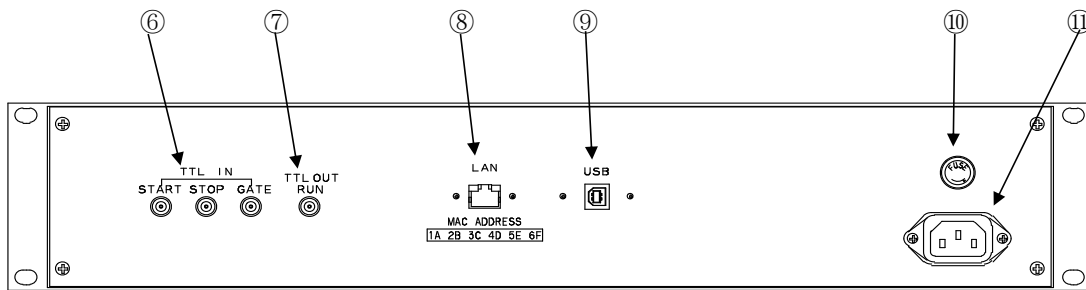
⑥ Connect TTL level signal (3.3 – 5V) from external unit.

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 Fuse holder 3A(200V) mini fuse available.
⑪ AC90V to 240V power supply cable.

1-3. Block diagram
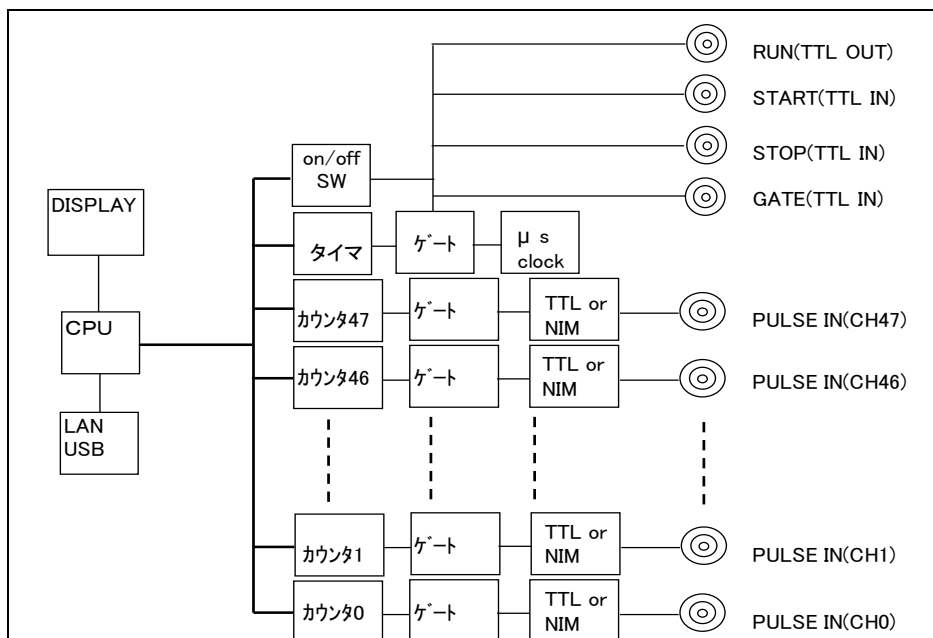
2. Before using

    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 CT48-01F.
(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 "1.00 12-02-23 CT48-01F", then communication line is right.
"Telnet" function contains hardwa ← It depends on the type of unit, date, and firmware version.
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, CT48-01F 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 12-07-26 CT48-01F", 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/YS_USBCOM.EXE

By installing this software, connecting is done like a COM port connection.

Switch on a CT48-01F, 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 such as "1.00 19-11-07 CT48-01F", 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. Select input signal level for count and read input mode settings

    CT48-01F can select count input signal mode from TTL Hi-Z, TTL 50Ω or NIM.

    TTL Hi-Z is the factory setting.

Type of command	
THI ALL	Sets all channel to TTL Hi-Z.
Reply：OK	
THI x	Sets CHx and CHx+1 to TTL Hi-Z.
Reply：OK	
T50 ALL	Sets all channel to TTL 50Ω.
Reply：OK	
T50 x	Sets CHx and CHx+1 to TTL 50Ω.
Reply：OK	
NIM ALL	Sets all channel to NIM.
Reply：OK	
NIM x	Sets CHx and CHx+1 to NIM.
Reply：OK	
IN? xx	Read input mode settings.
Reply example：	
CH 00 – 07 : TTL_Hi TTL_Hi TTL_50 TTL_50 NIM NIM TTL_50 TTL_50	

2-4-3. Connect count signal

    Connect count signal cable to CH0 ～ (CH7), (15), (31), (47), CH63 LEMO connector which are on front panel. It's possible to count maximum 8～64 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)

2-4-4. 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.

2-4-5. 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.

2-4-6. 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 56,000 memory addresses for CT08 type, and stored up to 8,000 memory addresses for CT64 type.

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

2-4-7. 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.

From firmware V1.04, "all reply modes" have been added to answer for "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.

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. Enable Gate function and 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 μs 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 μs.

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

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

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

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 μs.

Type of command

TMRH?	To read timer value in hexadecimal.

Reply example

000161C602	
	Reply data is 8 digit in hexadecimal. Unit is μs.

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 continuous downloading of timer, counter data synchronous to internal timer clock

     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.

Case 1 : Continuous downloading every interval (1ms ～ 2900ms)

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 2900.

Type of command

TSDT?	Ask timer synchronous interval time.

     Reply example

"010ms"	It shows the interval time is 10ms.

Case 2 : Continuous downloading every sum of counter on and off time

Type of command

GTRUNdddd	Set ON(RUN) time by dddd(in μ s unit)
GTOFFdddd	Set OFF time by dddd(in μ s unit)
GTON?, GTOFF?	Read out ON time or OFF time

Type of command

TSDSTRT	Start downloading according to the specified timing and details
	Just after TSTDxxxx command the downloading interval is xxxx,
	and after GTRUNxxxx/GTOFFyyyy command the downloading interval is
	xxxx + yyyy .

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 continuous downloading of timer counter data those are synchronous to 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 - 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

"XSDLX004701"	Download data from the counter ch 0 to ch47 and the timer.
"XSDLX474700"	Download data from only the counter ch 47.
"XSDLXH004701"	Download a hexadecimal data from the counter ch 0 to ch47 and the timer.
"XSDLXH070700"	Download a hexadecimal data from only the counter ch 7.

Type of command

XSDSTRT	Start continuous downloading of data of the timer and counters, those are counted all the time after starting, synchronously to the gate input.
GSDSTRT	Start continuous downloading of data of the timer and counters, those are counted while external gate input is ON state, synchronously to the gate.

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" 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.

(Example)

over000000000001--	It means counter CH0 is overflow.
over000000000009--	It means counter CH0 and CH3 are overflow.
over000000000039--	It means counter CH0,CH3, CH4 and CH5 are overflow.
over000100000000TM	It means counter CH40,CH32 and timer are overflow.
over000000000000--	It means no overflow.

3-6. Inquiry of software version information

Type of command

VER?   To inquiry about software version information

Reply example

1.00 10-06-25 NCT48-01F
                        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"
- 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 data "04" mean "Counter number 2 overflow".

Reply for command "FLG?1"
- b7:
- b6:
- b5:
- b4:
- b3:
- b2:   Counter number 6 overflow
- b1:   Counter number 5 overflow
- b0:   Counter number 4 overflow

Reply data "04" mean "Counter number 6 overflow".

	Reply for command "FLG?2"		Reply for command "FLG?3"
b7:		b7:	
b6:	RUN OUT	b6:	
b5:	COUNTER ON	b5:	
b4:	Timer overflow	b4:	
b3:	Counter number 7 overflow	b3:	
b2:	TTL GATE	b2:	Gate Edge mode ON
b1:	TTL STOP	b1:	Timer Gate mode ON
b0:	TTL START	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.

From VER1.08 13-06-06 CTxx-01D/E, it became possible to collect difference data.

(GATE MODE)

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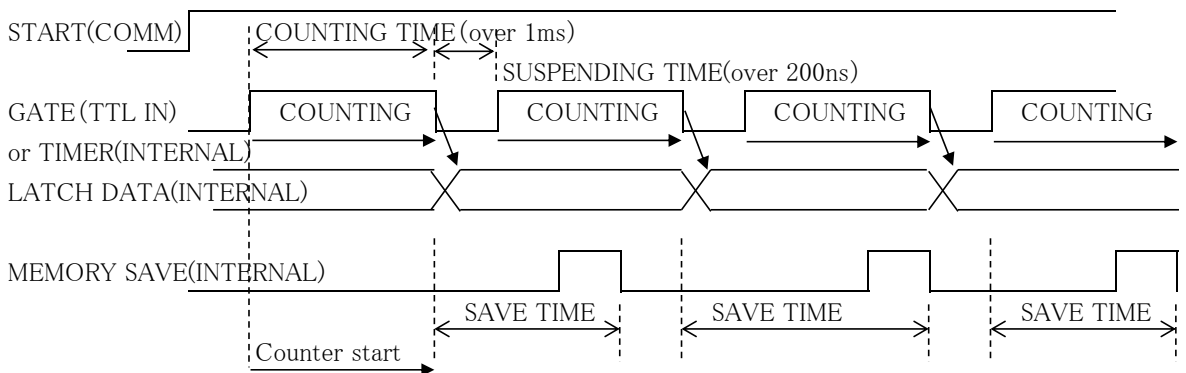
To meet the condition of SAVE TIME >= 1ms,

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". Data are acquired by next Gate signal rising edge.

Data was acquired for every falling edge until "HD-VER 3", the count of first acquisition data for clock pulse time has decreased. You can confirm Hardware version by the command "VERH?".

Please ask us about Hardware version up.
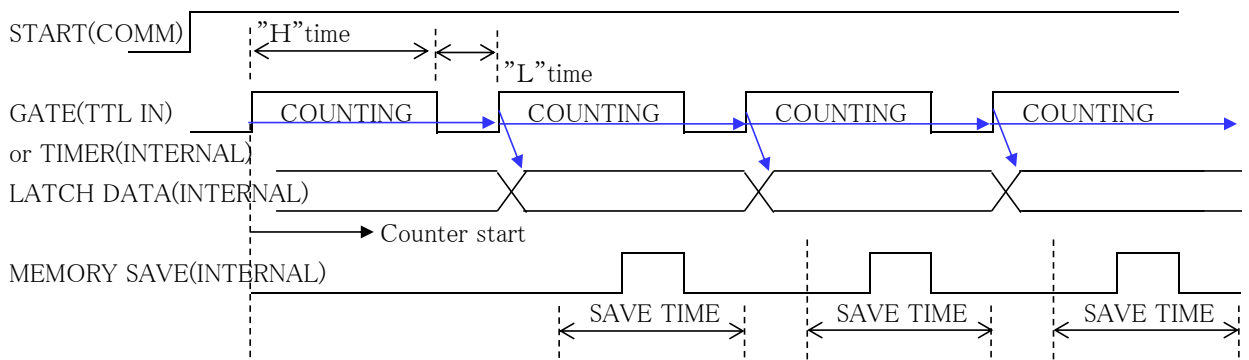
To meet the condition of SAVE TIME >= 1ms,

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.

CT08-01F: 56,000   CT16-01F: 30,000   CT32-01F, 15,000
CT48-01F: 10,000   CT64-01F: 8,000

4-2. Preparation for data acquisition commands

Data are stored on memory(Address:0～9999).

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 ～ 9999   Reply on a decimal value.

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

It is available on VER1.08 or later. 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,

NCT08-01B 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,

CT48-01F 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 timer clock data acquisition commands

In this mode, data acquisition is synchronized by clock generated by NCT08-01B.

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, NCT08-01B 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 GATE in and inner TIMER synchronous data acquisition.

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  ・・・・      ch47    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	・・・・	chR47	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	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 ····   ch47   timer

Reply   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 ch47 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   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    ┌─────────────────────────────────────────────┐
         │ 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～ch47.

　　　　　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 CT48-01F 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)

ダウンロード速度例

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

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

note) CT08-01F (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. Count data collection command for FLASH ROM
5-1-1. FLASH ROM structure
FLASH ROM has 8GB capacity and it is comprised of 4096blocks. 1block is comprised of 256pages,
and 1page is comprised of 8KB.
If error blocks are less than 100 blocks, FLASH ROM is quality goods. Then, you can use about 4000
blocks.
The Counter -1E series is using the first block (zero block) for the table of contents. So, you have to
use the 2nd block or later for data save. The error blocks are controlled by firmware, and not used.
It is not able to overwrite to Flash ROM directly. You have to erase Flash ROM before overwriting to it.

5-1-2. Limitation of FLASH read/write

FLASH memory can be written by a page unit. Therefore, Flash has a buffer for one page. This buffer has FIFO composition. And it writes sequentially, and reads sequentially. Therefore, after sending the data for 1 page into a buffer at the time of writing, a block and a page are specified and the data of 1 page is written in at a stretch. When reading, the equipment specifies a block and a page and reads them to a buffer. And it reads sequentially. Since the read-out address (0-8191) of a buffer can be specified, read-out from the middle address is possible. But in this firmware, read-out from the middle address is not permitted. But, the supplier guarantees that it's 3000 times to write/erase, and then, the firmware has taken the method of writing in consideration of this.

5-1-3. Flash ROM's data structure

The first block (zero block) is used for the table of contents.
The following data are written in the table of contents.

the name of acquisition data: file name, block number of the beginning, file size

When the first data acquisition is complete, the table of contents that the file name, the start block number and the size information were written in at is written in 0 pages of 0 blocks. When the 2nd data acquisition is complete, in addition to the first data, the 2nd data is written to the table of contents. Thus, if the N-th data acquisition is completed, the file name of the 1st ～ the N-th data, each start block, and the file size is written in N-1 pages of 0 blocks.

Therefore, if the last page is read, all the acquisition information will be acquired. This is the structure of the table of contents of Zero block.

Since 1 block is 256 pages (0-255), the table of contents cannot save information more than 256 files. When the number of files exceeds 256, Flash ROM is required to eliminate all. (In this firmware, only all the elimination is possible.)

There is no size restriction of one data (file). All the remaining blocks are able to use as one file. Data acquisition stops automatically when there is not the remaining blocks. The method of data acquisition is to direct the number of times of data acquisition. The new data (new file) is written from new block, because of file structure, even if writing has not completed in a block. The file size is expressed with number of blocks x 2MB. For this reason, a maximum of 2 MB of error is shown in the size information.

5-1-4. Outline of FLASH access

1. Writing

(Data acquisition by internal timer synchronization)

Input filename (Abbreviation is possible if an automatic filename is okay)
Set the number of times of data acquisition
Set "ON" time of Gate Timer
Set "OFF" time of Gate Timer
FF_GTSTRT command execution
In accordance with a timer setting, the progress of a counter is acquired and it adds to a file.
The status under obtaining can be checked by the command "MOD?".

(Data acquisition by external gate synchronized signal)

Input filename (Abbreviation is possible if an automatic filename is okay)
Set the number of times of data acquisition
FF_GSTRT   Execute this (In the case of a gating synchronous data-acquisition start)
FF_GESTRT   Execute this (In the case of a gating edge synchronous data-acquisition start)
In accordance with a gate input, the progress of a counter is acquired and it adds to a file.
The status under obtaining can be checked by the command "GSTS?".

2.Reading

  Read out file name, start block no., file size.

    FF_LIST?

    There are three types of reading flash data. (see 5-7-10)

    Before reading flash data the type of reading style should be selected by

    "FF_ECC x" (x:0, 1, 2) command.

        0: RD without correction, 1:RD with ECC code, 2: RD after correction

    The reading style can be seen by "FF_ECC?" command.

  Data download with file name.

    FF_READ?ABCD・・・   Download all data of file name "ABCD・・・".

  Data download with block no.

    FF_BKRD?Bbbbcccc   Download from the block bbbb to the block cccc.

  3.Erase FLASH ROM all data

    FF_ERASE

5-2. Count data acquisition commands for FLASH ROM

    These commands help you to store to 8GB FLASH (*) 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 FLASH ROM.

    (GATE MODE)

      Counts while GATE signal is H, and count data is stored on the memory (*) at falling edge.
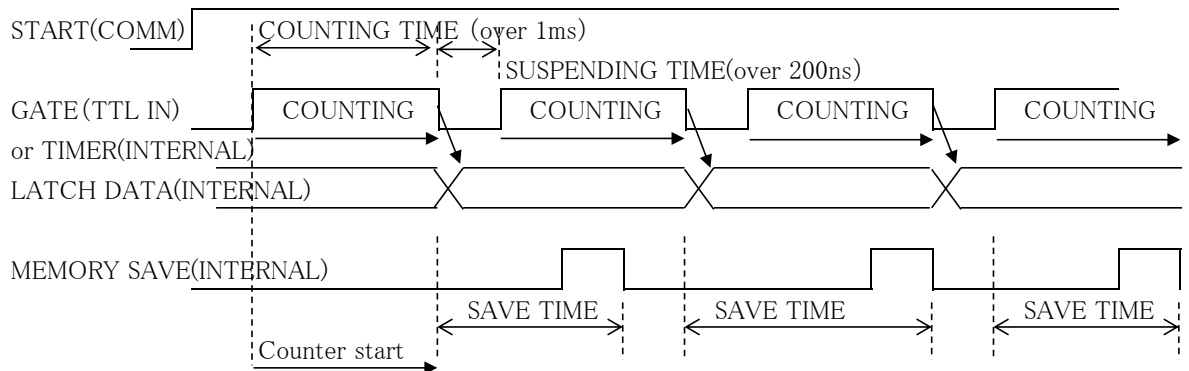
                                    To meet the condition of SAVE TIME >= 1ms,
                                    with ECC time(4ms) ,
                                    please input COUNTING TIME + SUSPENDING TIME >= 5ms.

    (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". Data are acquired by next Gate signal rising edge.
      Data was acquired for every falling edge until "HD-VER 3", the count of first acquisition data
      for clock pulse time has decreased. You can confirm Hardware version by the command "VERH?".
      Please ask us about Hardware version up.

START(COMM)

"H"time

"L"time

GATE(TTL IN)
or TIMER(INTERNAL)

COUNTING   COUNTING   COUNTING   COUNTING

LATCH DATA(INTERNAL)

Counter start

MEMORY SAVE(INTERNAL)

SAVE TIME   SAVE TIME   SAVE TIME
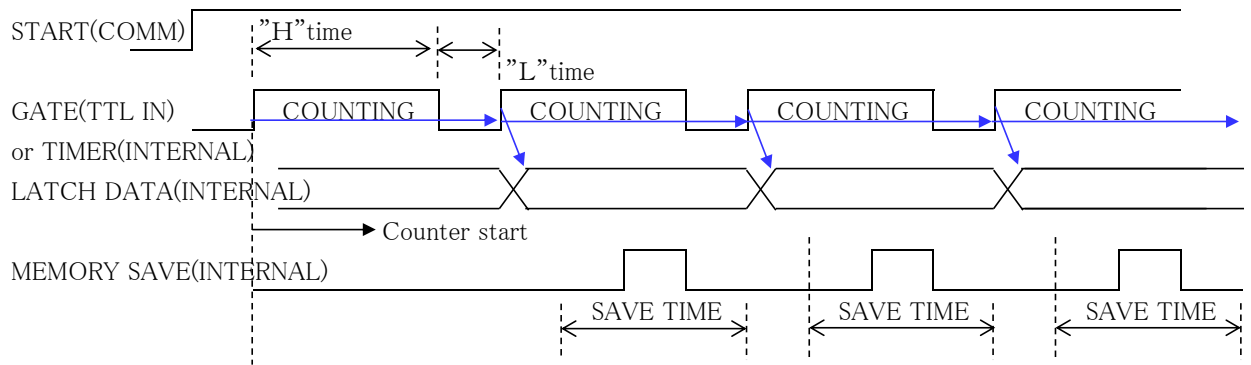
To meet the condition of SAVE TIME >= 1ms,
with ECC time(4ms) ,
please input "H" TIME + "L" TIME >= 5ms.

(＊) FLASH ROM size is about 8GB. Therefore, numbers of channels differ depending on the model of
a counter, and the numbers of data which can be saved differ.
CT08-01F: 560,000,000   CT16-01F: 300,000,000   CT32-01F, 150,000,000
CT48-01F: 100,000,000   CT64-01F: 80,000,000

5-3. Preparation for data acquisition commands
A file name is beforehand attached to the data acquisition
After acquisition start, it is automatically stored in the predetermined place in FLASH sequentially.
If the data count has been reached to the planned acquisition number, data acquisition will be stopped
automatically. Data size is measured and recorded simultaneously.

5-3-1. File name When a file name is omitted, a file is named automatically as data_001 ～)
Type of command
FF_NAME_ABCDEFGH   A file name is flatly distinguished in 8 alphanumeric characters.
When a file name is set up by eight or more characters, it distinguishes by
eight characters of the beginning. Therefore, eight characters of the
beginning must not make it the same as others.

Type of command
FF_NAME?   Read the file name of the file to be written in from now on.
Read the file name that is attached automatically, when the file name is not
inputted.

5-3-2. Set up the number of data acquisition (= the last data number)
Type of command
FF_GSEDddd…   Set the last data number in decimal.
ddd… : 0 ～ 99999 (unit: x1K)
Type of command
FF_GSED?   Read the last data number.
Reply
0 ～ 99999

5-4. Synchronous GATE signal data acquisition commands

Type of command

FF_GSTRT
Start to store gate synchronous data. (Just after turn on power, it's stop condition)
Entering this command after preparation of section 5-2, CT48-01F 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 5-2, counter gate opens at the first falling edge of gate signal,
CT48-01F 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.

5-5. Synchronous internal clock data acquisition commands

In this mode, data acquisition is synchronized by clock generated by CT48-01F.
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.)

5-6-1. Set and read synchronous Timer RUN time

Type of command

GTRUNddd···
Set synchronous timer data RUN time (1 μs～4,294,967,295 μs : 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).
Since it changes with the number of channels of a counter, please use after confirming that a data acquisition is done correctly

GTRUN?
Read synchronous timer data RUN time

Reply

20000
Read by μs units.   Ex. 20,000 = 20ms

5-6-2. Time specification of Gate timer OFF and read

Type of command

GTOFFddd···
Set timer synchronous data STOP time
(1 μs～4,294,967,295 μs : 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).
Since it changes with the number of channels of a counter, please use after confirming that a data acquisition is done correctly

GTOFF?
Read the timer synchronous data STOP time

Reply

20000
Read μs units.   Ex. 20,000 = 20ms

5-6-3. Start synchronous timer clock data acquisition

Type of command

FF_GTSTRT   Start to store clock synchronous data. (Just after turn on power, it's stop condition)

Entering this command after preparation of section 5-5-1～2, CT48-01F 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.

5-7. Common commands on synchronous data acquisition

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

5-7-1. Counter stop

Type of command

STOP   Stop counting immediately.

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

5-7-2. Read out the status of Gate synchronous data acquisition

Type of command

GSTS?   Read out the status of Gate synchronous data acquisition

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.

5-7-3. Read out data from FLASH ROM

Type of command

FF_LIST?   Read out the list of saved files.

Example of read:

data_000	,0001, 0002MB	←file name: data_000, start block 0001, file size: 2MB
data_001	,0002, 0002MB	←file name: data_001, start block 0002, file size: 2MB
··················		
data_007	,0014, 0030MB	←file name: data_007, start block 0014, file size: 30MB
EOF		←End of list

5-7-4. All data download by file name (0～the last data number)

There are three types of reading flash data. (see 5-7-10)

Before reading flash data the type of reading style should be selected by

"FF_ECC x" (x:0, 1, 2) command.

        0: RD without correction,　1:RD with ECC code,　2: RD after correction

The reading style can be seen by "FF_ECC?" command.

Type of command

FF_READ?data_000　　　　　Read all the data (0～the last data number) of the collected file name

                            (data_000) at high speed.

Reply example(CT48-01F)

| data No. | ch0 | ch1 | ・・・・ | ch47 | timer |

```
00000000, 1DC2829F,07C38528,・・・ 00FFE101,000161C602        ← Data of No.0
00000001, 1DC2829F,07C38528,・・・ 00FFE101,000161C602        ← Data of No.1
   ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・
0000000n, 1DC2829F,07C38528,・・・ 00FFE101,000161C602        ← Data of No.n (n:last number)
EOF                                                       ← End of file
```

Data is outputted to one line by a hexadecimal number in order of eight counters (ch0-ch7) and
timers. It is a hexadecimal number because high-speed ASCII conversion can be carried out
compared with a decimal number. A data number is a decimal number.

5-7-5. Data download by block No.

Type of command

FF_BKRD?00140015　　　　　Read the block No.0014～0015 of the collected data at high speed.

Reply example(CT48-01F)

| data No. | ch0 | ch1 | ・・・・ | ch47 | timer |

```
38528,・・・ 00FFE101,000161C602                             ← Data of No.m-1
0000000m, 1DC2829F,07C38528,・・・ 00FFE101,000161C602       ← Data of No.m
   ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・
0000000n, 1DC2829F,07C38528,・・・ 00FFE10EOF               ← Data of No.n(n:last number)
```

Data format is the same as data download by file name.

However, since read-out starts or finishes with the boundary of a block, the first line and the last
line may become irregular. If the specification block range contain the block which a file finishes
in the middle of it, read-out is completed in the end of a file.

5-7-6. Read out number of blocks not used

Type of command

FF_NEW_BLOCKS?　　　　　Read out number of blocks not used in FLASH（number which can be
                             written in)

Reply example

New Data Number = 008 of 255 and 4065 blocks of 4093 are usable

    "New Data Number = 008 of 255" shows the next data number.

    "4065 blocks of 4093 are usable" shows number of blocks not used in FLASH.

5-7-7. Erase all data in FLASH

Execute, when it becomes impossible to write in more or it becomes impossible to read FLASH.

Erased data will not be recovered, if all data are erased.

Please download data, then erase all data in FLASH.

Type of command

FF_ERASE   Erase all data in FLASH内.

                            It takes about 15 sec to erase all data.

5-7-8. Read Error Block information

FLASH contains error blocks that mustn't be used. Firmware is programed not to use these error blocks. This command reads the information of error blocks.

Type of command

FF_ERRDRD   Read the information of error blocks.

Reply example

02 Flash Error Found 05A 05B

This reply example shows there is 2 error blocks; 05A and 05B (hexadecimal).

User doesn't need to know this information.

5-7-9. Data read time

The data is saved by hexadecimal-number ASCII at FLASH at the time of the acquisition. Therefore, data is downloaded without carrying out a data transformation. So, the download of the read of the data from FLASH is available at high speed.

In a data-acquisition interval, if smaller than 10 ms, a hexadecimal-number ASCII translation will take time. And also after a measurement finishes, it may be carrying out the hexadecimal-number ASCII translation.

When you acquire a lot of data, please set up an interval with a margin enough.

The buffer for raw data before a translation is prepared by 0-9999 points, and the data exceeding this is stored from the beginning (data address No.0). Will be overwritten from first buffer (No.0), if the data conversion is not completed yet and is reached to the end of buffers.

'Although a status changes with numbers of channels, please take care of the data acquisition, if the interval is about 1ms. You can confirm by the command "GSTS? (section 5-7-2)" 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 command and Download Speed)

The download command of FLASH has a filename specification and a block No specification.

These download speeds are the same as follows.

Ex. of download speed (LAN)

speed	1.2MB/S
time	0.8S/MB

Ex. of download speed (USB)

speed	100KB/S
time	10S/MB

5-7-10. Bit error pf FLASH data (Very Important)

Bit errors occur in NAND type FLASH, because of its characteristics.

The probability of a bit error is very low. Moreover, there is an algorithm for correcting this.

In this unit the ECC(Error Correction Code) are embedded every 256 byte data while acquisition.

You can choose one of three type of reading flash data below.

① Read out the data directly in the flash(RD without correction). High speed reading(2MB/s)

② Read out 32 ECCs (total 256B) after every 8KB data(RD with ECC code).
High speed reading(2MB/s)

③ Read out after correction by ECC(RD after correction). Slow speed reading(50KB/s)

These type of reading are chosen by "FF_ECC 0", "FF_ECC 1", "FF_ECC 2" command.

The current style of reading are read by "FF_ECC?" command.

The read out data for ② are below.

```
Reply example(CT48-01F)
data No.      ch0         ch1    ····      ch47       timer
   ································
00000080 ,00000000 ,00062EFE ,···· ,00000000 ,00062E08
00000081 ,00000000 ,00064289  ,···· ,00000000 ,00          ← last data of previous page
ecc_code_beg                                               ← ECC begin
99A557 0300FF 0F030F 3FC033 ···· CC0CCF FFCC03            ← ECC(192 byte)
ecc_code_end                                               ← ECC end
064190                                                     ← first data of next page
00000082 ,00000000 ,00065614  ,···· ,00000000 ,00065518
00000083 ,00000000 ,0006699F  ,···· ,00000000 ,000668A0
   ································
```

The reading speed for ③ Reading after correction are below.

Speed of downloading(LAN)

Speed	50KB／S
Time	20S／MB

Speed of downloading(USB)

Speed	25KB／S
Time	40S／MB

Caution)

For the sake of ECC calculation, the "N" characters are written in the final area of the final page.

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

6-2-1. LCD display commands

Type of command

Command	Description
SDU00～63	To LCD upper line, it shows one of a count value from ch0 to ch63 .
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.
SDL00～63	To LCD lower line, it shows one of a count value from ch0 to ch63 .
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.

6-2-2. Backlight control commands

Type of command

Command	Description
BKON	Turn on the backlight
BKOFF	Turn off the backlight

7. Firmware update

For CT48-01F, 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.
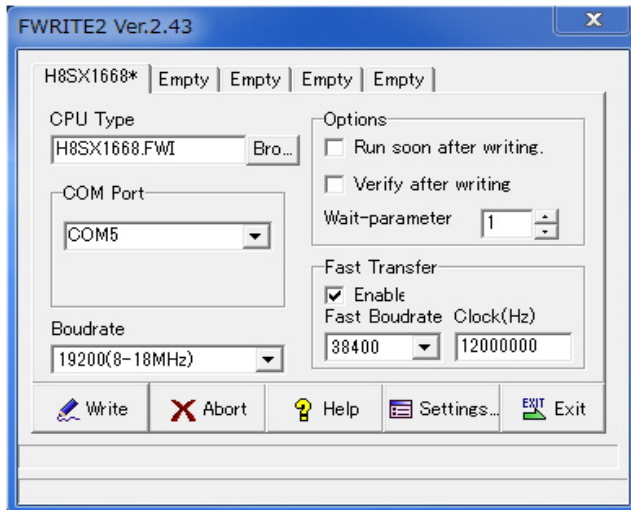
Beforehand, please download the version up file (latest version) from HP site.

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.

7-1. Version up procedure

7-1-1. 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.

7-1-2. 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.

7-1-3. Press the Write button in program window.

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.

7-1-4. 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.

7-2. 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.
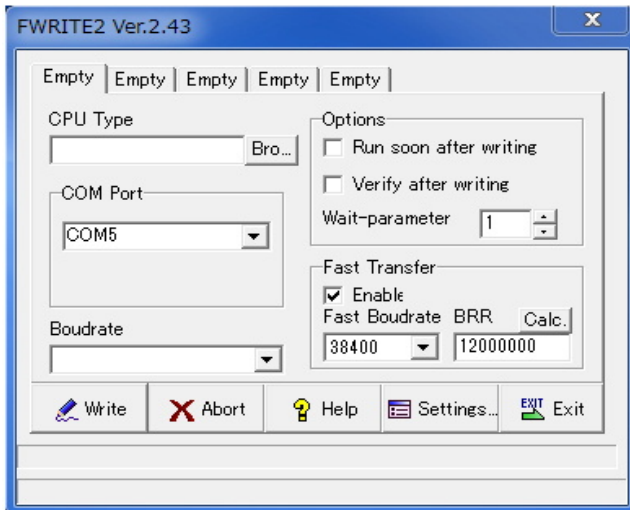
USB communication must be set up to PC, and USB driver have to be installed to PC.
Please refer to "2-3. setting USB communication".

7-3. The preparation of FRASH ROM writing software.

7-3-1. 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".

7-3-2. Please activate "Fast Transfer Enable", and activate "Fast Transfer Enable".
Don't need to change Boudrate 19200(8~18MHz) and Fast Baud rate 38400

7-3-3. After the preparation, the writing software become like the picture of 7-1-1.
The software remembers the inputs, the same inputs will appear at the next time.
Please move to the section "7-1. version up procedure" for update.

8. Synchronous drive of multi units
It's possible to operate multi units synchronously.
Then CTXX-01F 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-01F,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 CT48-01F 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.

(b) 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
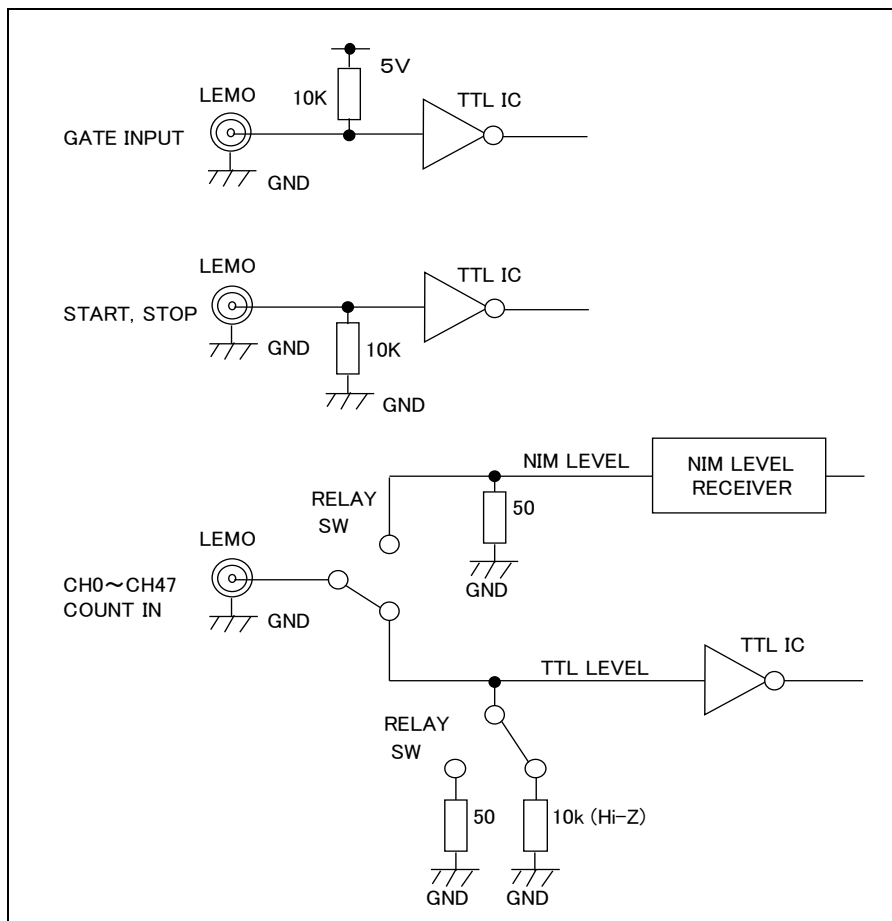units, only units which are read count data stop count operation in 120ns.
Therefore, note that it occurs some errors among count data of modules because of condition of count pulse,
timing of reading, and dispersion of times of reading.

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

12. Performance and specifications

POWER	AC90～240V（NCT08-01F: +6V from NIM BIN）		
Counter	Select input mode from TTL Hi-Z (factory setting), TTL 50Ω and NIM level via command line.		
	TTL Input level （3.3V～5V）	Voltage level 3.3V or 5V Zin = 10KΩ or 50Ω 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, 32, 48, 64	
	digit of count	32bits（0～4, 294, 967, 295）	
timer	Number of ch. Resolution Preset time	1 channel 40bit 1～1,099,511,627,775μs 0.000001sec(1μs) Accuracy 0.005% 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, NCT08-01B 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) FLASH can store about 8000 times of 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	
Communication	LAN（TCP/IP SOCKET CONNECTION, possible to connect 8connections），USB		
Version upgrade	upgrade firmware software by communication		
Case	EIA1U(H44*W482*D330)/8CH, 16CH EIA2U(H88*W482*D330)/32CH～64CH		

For the further information, feel free to ask us.

Tsuji-Electronics Co.,Ltd

TEL: +81-(0)29-832-3031 FAX: +81-(0)29-832-2662

E-mail : info2@tsuji-denshi.co.jp

URL : http://www.tsujicon.jp

3739, Kandatsu-machi, Tsuchiura-city, Ibaraki 300-0013, Japan

Revision history		
Correction history		
Ver No.	Contents(Abstracts, Place, Reason, etc.)	Date
Ver 1	Issued for common manual of CT08-01F～CT64-01F Written from Japanese manual Ver 1(2019.11.07)	2019/11/07
Ver 2	Correction Case hirght: 1U 88mm to 44mm, 2U 132mm to 88mm	2020/1/18