DataCatcher3

USER'S MANUAL

Communication line monitor

DataCatcher3

HEARTLAND.DATA

DataCatcher 3 USER'S MANUAL

This manual indicates the specifications, basic operations, and other detailed function and setting of **DataCatcher 3** ("DC3").
DC3 is operated according to the method of operation DCNEXT.
Unless otherwise specified, please substitute the ″DC3″ ″DCNEXT″ in this manual.

●Reproduction in any manner whatsoever without the written permission of Heartland. Data Co.,Ltd. is strictly forbidden.

●The specifications and information of this product in this document are subject to change without notice.

●We are not responsible for any losses or damages if you use DC3.

●Trademarks used in this text: Windows, WindowsXP, WindowsVista, Windows7, Windows8/8.1, Windows 10 are registered trademarks of Microsoft Corporation. Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Heartland. Data Co.,Ltd. disclaims any proprietary interest in trademarks and trade names other than its own.

Contents

1. Features

1-1:General High Speed Communication Line Monitor

DC3 is the line monitor for embedded systems development, which was developed for the purpose of debugging of the communication of a microcomputer.

Formerly, to confirm the communication data, a signal was confirmed directly with digital oscilloscope etc. In the case that LSI that is connected with a microcomputer and serial or parallel interface is used and the system that does a communication with a microcomputer fellow, when I develop it.

Conventional method(digital oscilloscope)
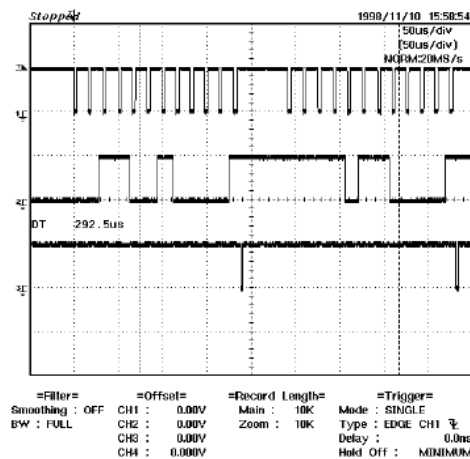
1/0 bit pattern is transformed into a numerical value to confirm the contents of a communication. And, the procedure that understands the processing contents corresponding to the numerical value in reference to the specifications of LSI was necessary. Also, it was difficult to analyze the whole processing, because the surveillance in the long time is impossible in a digital oscilloscope.

Innovative method(DC3)

Main Features of DC3

(1)Dividing communication data as packet it displays it every 1 packet.

(2)It displays it clearly with the letter that the user defined communication data.

(3)The data that received it displays it with the real time.

(4)The interval of packet and packet it can measure with 0.1/1.0msec resolution. Therefore, the inspection of the communication timing is easy.

We recommend DC3 to the following people.

Software Engineer of Embedded System
  ➢ Please use it for the reduction of debugging work.

Evaluation Engineer of Embedded System
  ➢ Please use it with the evaluation of software.

Hardware Engineer of Embedded System
  ➢ Please use it for the unification of the intention with a software engineer.

By using DC3, the debugging work time of communication processing can be reduced substantially.

2. Hardware Specifications

2-1:Pitching Function

        a) Max Channel   : 3CH

        b) Input Format   : PULLDOWN to GND(1MΩ) at470KΩ

        c) Input Voltage Range   : 0V to 5V

        d) Input Level   : IN_A - IN_E(Schmidt Trigger input)

                                          VIH=2.31V , VIL=0.99V

                            :IN_AX - IN_EX(3.3V mode)

                                          VIH=2.00V , VIL=0.8V

                            :IN_AX - IN_EX(1.8V mode)

                                        VIH=1.17V , VIL=0.63V

        e) Max Input Frequency   : 20MHz

2-2:A/D Input (use Analog BOX)

        a) Max Channel   : 8CH

        b) Input Format   : PULLDOWN to GND(100KΩ) at 1MΩ

        c) Input Voltage Range   : 0V to 24V (Input range switching required)

        d) Sampling Frequency   : 10 KHz / 50KHz

        e) AD Input Resolution   : 8bit

2-3:External Trigger Input

        a) Input Line   : 1CH

        b) Input Format   : PULLDOWN to GND(1MΩ)

        c) Input Voltage Range   : 0V to 5V

        d) Input Level   :VIH=2.00V, VIL=0.8V

2-4:Event Output Line

        a) Output Line   : 1CH

        b) Output Level   : 0V to 3.3V

        c) Max Output Current   :Max 24mA

3. Supporting Communication Protocols

3-1:3 Wire Synchronous Serial Communication

- 3 wire synchronous serial communications has CLOCK, DATA, and STB.
- Supported clock frequency Max 20MHz.
- 3ch is able to be used simultaneously.
- Even the communication type that there is not STB is able
   to take it as packet by the change of ″the type file″.
- Enable catch/pitch the communication data.
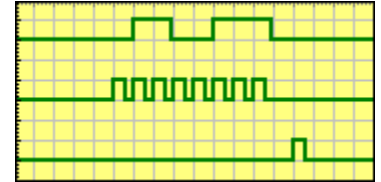
3-2:I2CBUS

- Supported Max 4MHz Clock Frequency
- You can use 2ch simultaneously
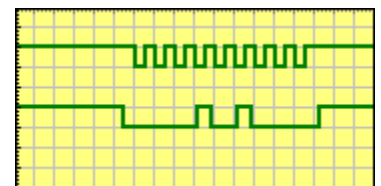
3-3:UART

- Supporting bitrate from 100bps to 1000000bps.
   If the fixed value, supporting bitrate from 110bps to 921600bps.
- You can use 2ch simultaneously
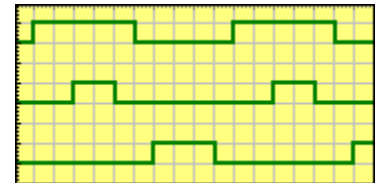
3-4:16bit Parallel

- Supported data lines Max 16 bit.
- Supporting Max 3.5MHz Clock Frequency when continuous data.
- Supporting Max about 10MHz Clock Frequency when non-continuous data.
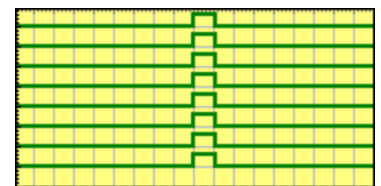
3-5:Data Logger

- CMOS Level Digital input line :   8ch.
   Sampling rate10KHz / 50KHz.
- AD converting input from 0.1V to 24V, 8bit resolution. : 2ch
   Sampling rate10KHz / 50KHz.
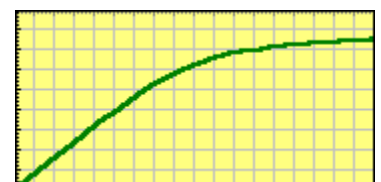
4. Specification List

Function / SPEC		DataCatcher3
		Three wire synchronous serial communication Data
Data catch	Clock Frequency	20 MHz MAX
	Restriction	Non
		UART
Data catch	Clock Frequency	100 BPS ～ 1000000 BPS (※If the fixed value, it's 110 BPS ～ 921600 BPS.)
	Restriction	2CH concurrent use is possible also at 921600BPS.
		I2C BUS
Data catch	Clock Frequency	4 MHz MAX
	Restriction	Non
		Pararell communication
Data catch	Clock Frequency	10 MHz MAX (If continuous data, it is 3.5MHz.)
	Input Data Bit	16 Bit MAX
	Restriction	Non
		Data Logger
Sampling time(frequency)		20usec(50KHz) / 100usec(10KHz)
Digital input (CMOS)		8 Line
A/D input (0V～24V)		2 Line (use Analog Box)
A/D input resolution		8 Bit
		Etc.
Maximum data log number		One million
Connection with PC		USB2.0
Input voltage range		・Depending on the target, can be switched to a 3.3V or 1.8V power supply type of Threshold. 　(5V input is possible) ・Threshold Level 　　IN_A～IN_E(Schmitt trigger input) 　　　VIH＝2.31V VIL＝0.99V 　　IN_AX～IN_EX(3.3V mode) 　　　VIH＝2.00V VIL＝0.8V 　　IN_AX～IN_EX(1.8V mode) 　　　VIH＝1.17V VIL＝0.63V

＜ Note ＞
  ・Enable to use the setting files, Log/Command/Type/Condition files, for DC2000/DCNEXT to DC3.
  ・UART baud rate is any value can be specified up to 100 ~ 1000000BPS, but error caused by the ratio of the
   clock divider. This error can be calculated by the following math formula.

   "T" is baud rate value user-specified. "N" is divider value. "R" is actual baud rate. "E" is Error rate.
     $N = INT(C / (T * 8))$
     $R = INT(C / N / 8)$ [bps]
     $E = (1 - (T / R) * 100$ [%]

   It is as follows if T = 115200 [bps].
     N = 56
     R = 115327[bps]
     E = 0.11[%]

5. System Requirement

5-1:OS

Microsoft Windows XP, Windows Vista, Windows 7, Windows 8/8.1, Windows 10

5-2:PC

PC/AT Compatible that above OS can work on.

5-3:CPU

Over 800MHz Intel Pentium Processor recommended.

5-4:Memory

Over 256MB recommended

5-5:Others

4MB available HDD space

USB 2.0 port

6. Install procedure

6-1:PC Application

1. Insert the attached CD-ROM "DC3 Install Disc" to CD-ROM drive, then click the icon [setup.exe].

2. Click [NEXT], after the following screen is displayed.

3. Click [NEXT], after the following screen is displayed.
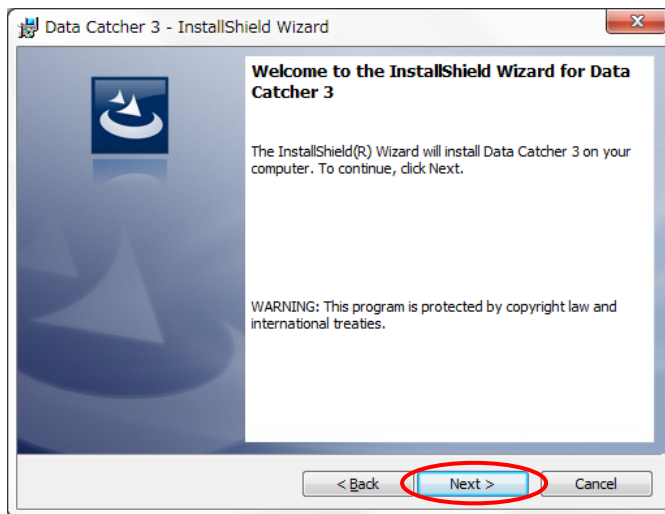
4. Click [NEXT], after [Destination folder] is displayed.
    Please click [NEXT] if it is available for you.
    If you would like to install to another folder, please click [Change...] and then select the folder.
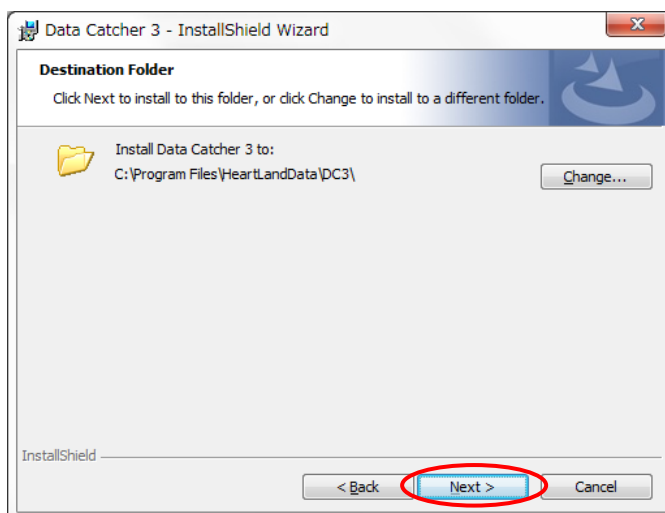
5. Click [Install], after [Ready to Install the Program] is displayed.
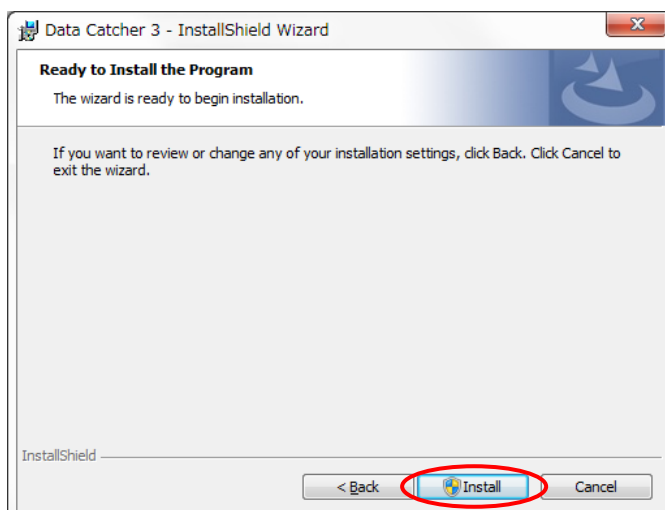
6. [Installing Data Catcher Ⅲ] is displayed, and installation is performed.
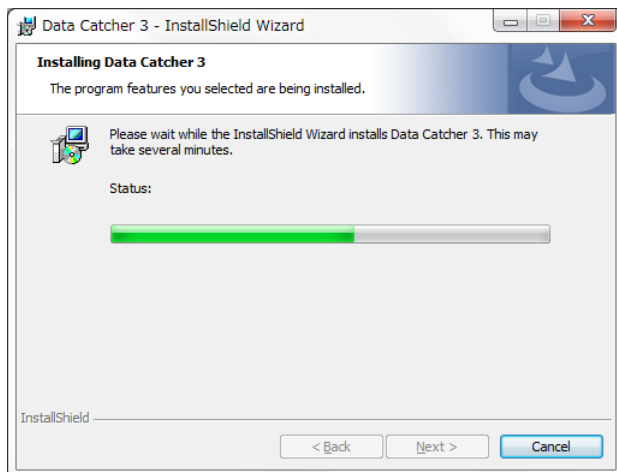
7. Click [Finish], [InstallShield Wizard Completed] is displayed.
   Please take out the CD-ROM "DC3 Install Disc" after click [Finish].
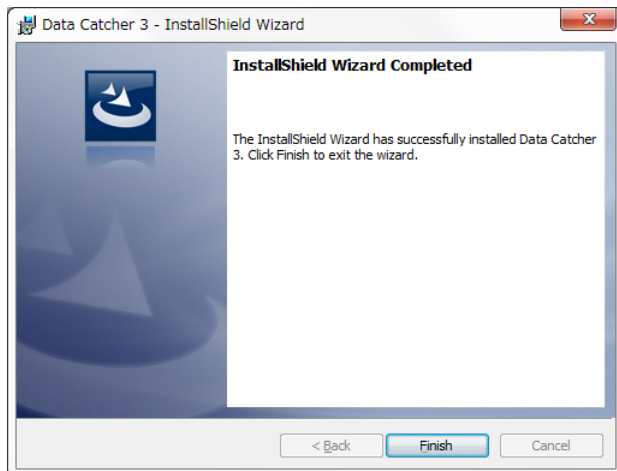
Installation completed.

6-2:USB Driver Installation(Windows XP)

1. Connect DC3 body with PC by the attached USB cable.

2. Power up DC3.
Connect AC adapter with DC3, then switch [POWER] ON in front of DC3 body.

3. Confirm lighting of LED.
[POWER] lamp is lit green when the power is turned on.
[Found New Hardware Wizard] is shown after the [POWER] lamp light up.
CAUTION: Power on while unfastening prove.

4. The Found New Hardware Wizard is appears.
Select [No, not this time] and then click [Next].

Found New Hardware Wizard

Welcome to the Found New Hardware Wizard

Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy

Can Windows connect to Windows Update to search for software?

○ Yes, this time only
○ Yes, now and every time I connect a device
● No, not this time

Click Next to continue.

< Back   Next >   Cancel

5. Select [Install from a list or specific location (Advanced)] and then click [Next].

Found New Hardware Wizard

This wizard helps you install software for:

DataCatcher3

If your hardware came with an installation CD or floppy disk, insert it now.

What do you want the wizard to do?

○ Install the software automatically (Recommended)
● Install from a list or specific location (Advanced)

Click Next to continue.

< Back   Next >   Cancel

10
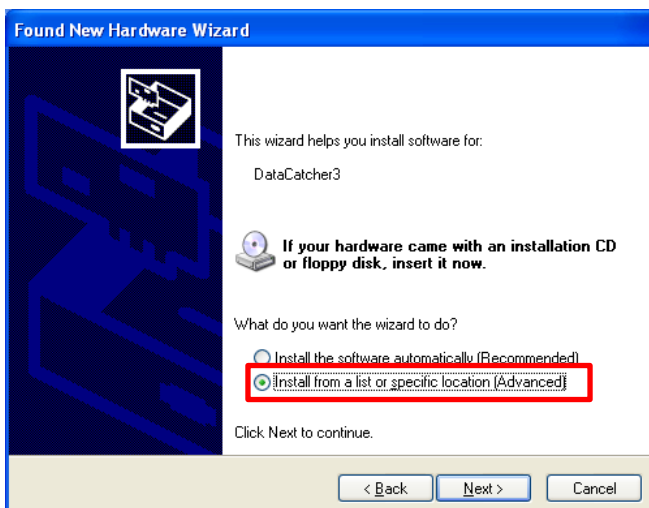
6. [Please choose your search and installation options.] is shown.
   [Search for the best driver in these locations] is checked.
   [Include this location in the search] is checked, and click [Browse].
   Select the folder that "Drive name where DC3 driver is saved / Folder name (Heartland Data) / Folder name (DC3) / [driver] folder", and click [OK].
   Confirm that the destination for the drivers is displayed, and click [Next].
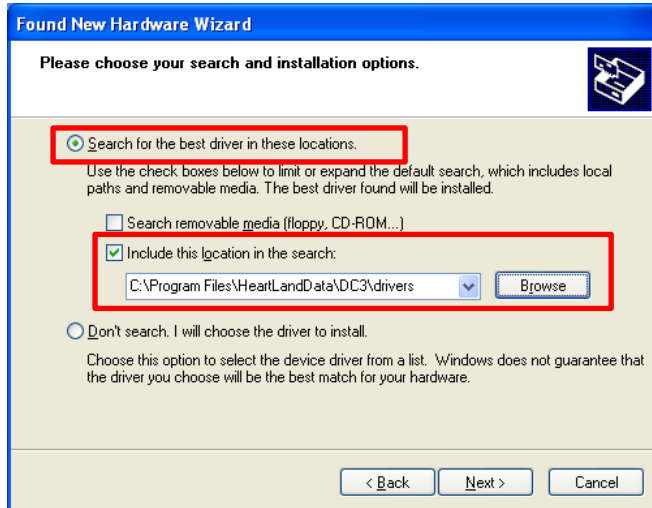
7. The following window is shown, and selects [Continue Anyway].
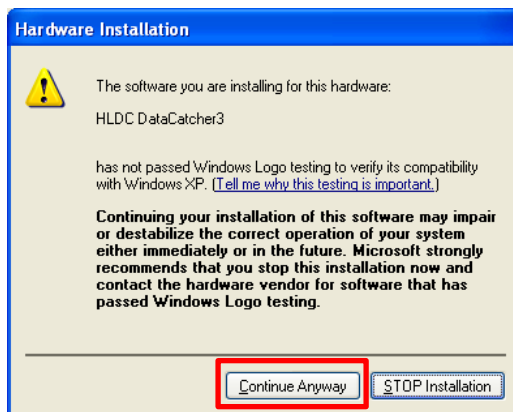
8. [Completing the Found New Hardware Wizard] is shown, and clicks [Finish].
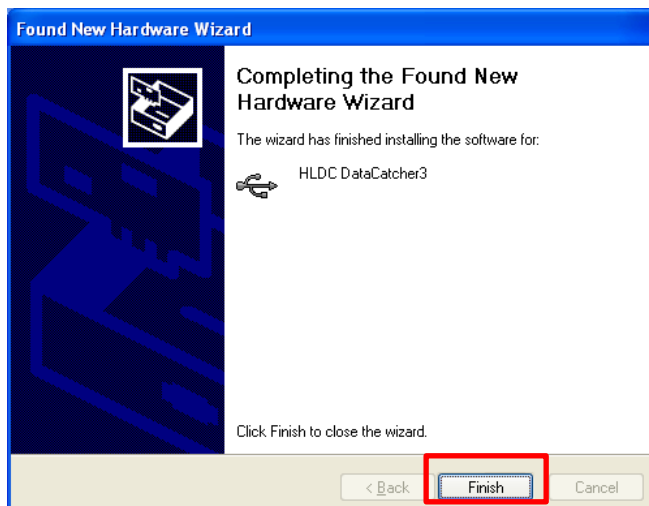
   Installation is complete.

9. Make sure that the installation was successful.
   In System Properties, select [Hardware] tab, and click [Device Manager].
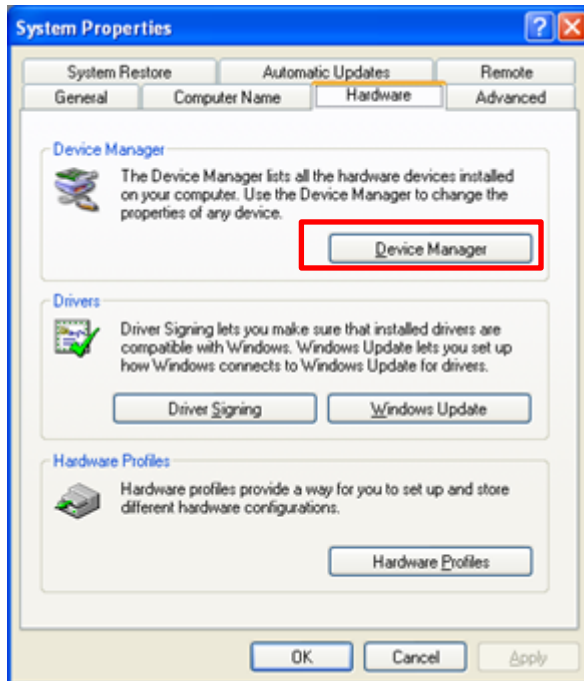
10. In "Universal Serial Bus controllers of Device Manager, Has been successfully installed if there is a display of "HLDC DataCatcher3".
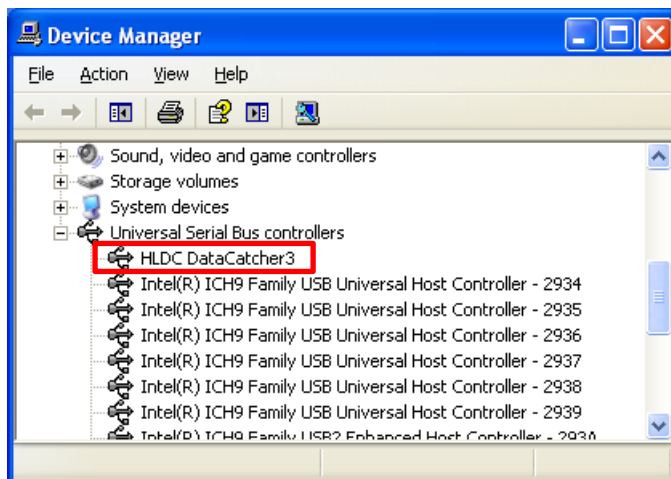
6-3:USB Driver Installation(Windows 7 32bit/64bit-OS)

If using Windows7, even though it puts the power connected to the DC3, USB device drivers are not installed automatically. You need to install manually.

How to install manual is as follows.

1. Open [Device Manager] in Control Panel.

2. Find the device of [DataCatcher3] in [Device Manager].
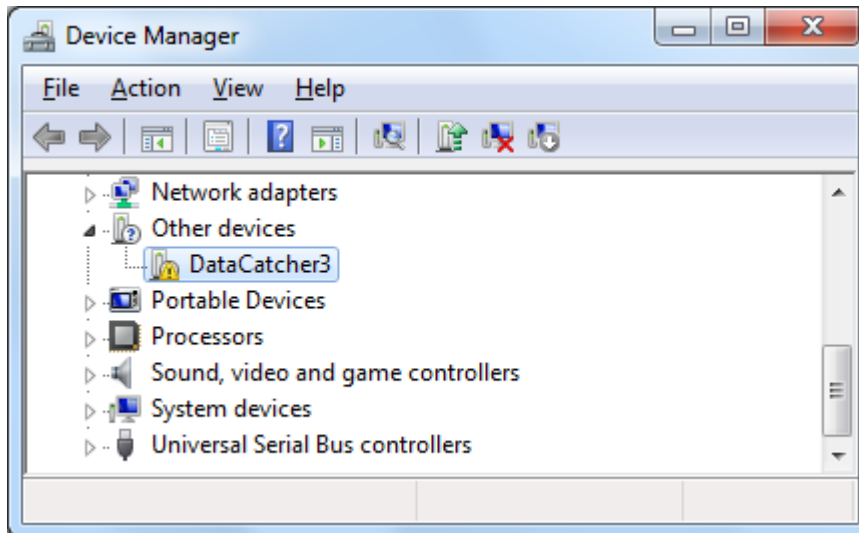
3. Right-click the device of [DataCatcher3], and click [Update Diver Software] in the menu.
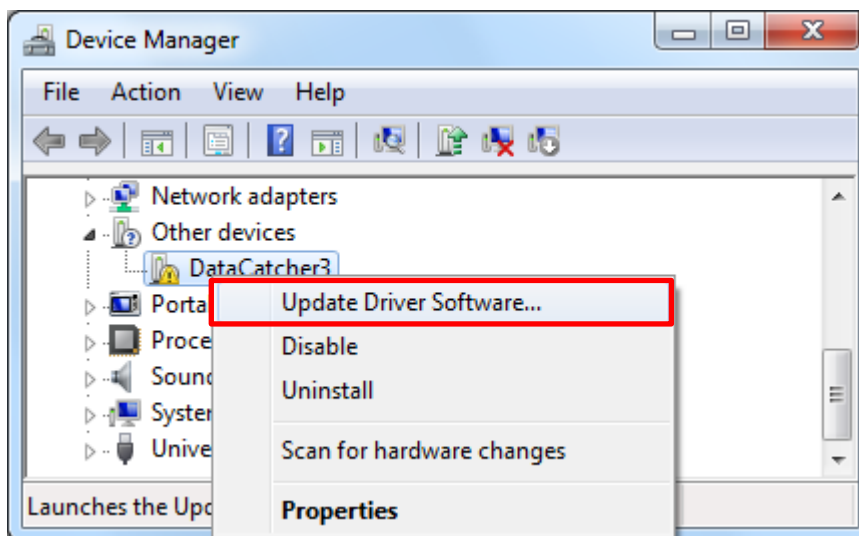
4. In Update Driver Software dialog, select [Browse my computer for driver software].
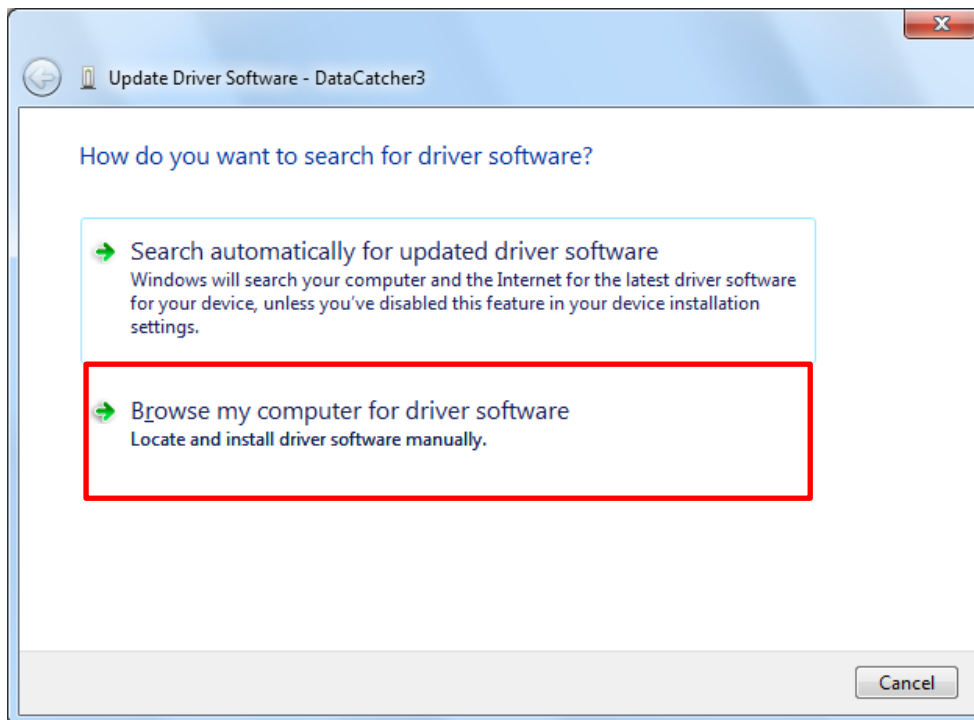
5. Click [Browse], and specify "drivers" folder in DC3 install folder

32bit-OS : "drivers¥x86" folder in DC3 install folder.
64bit-OS : "drivers¥x64" folder in DC3 install folder.
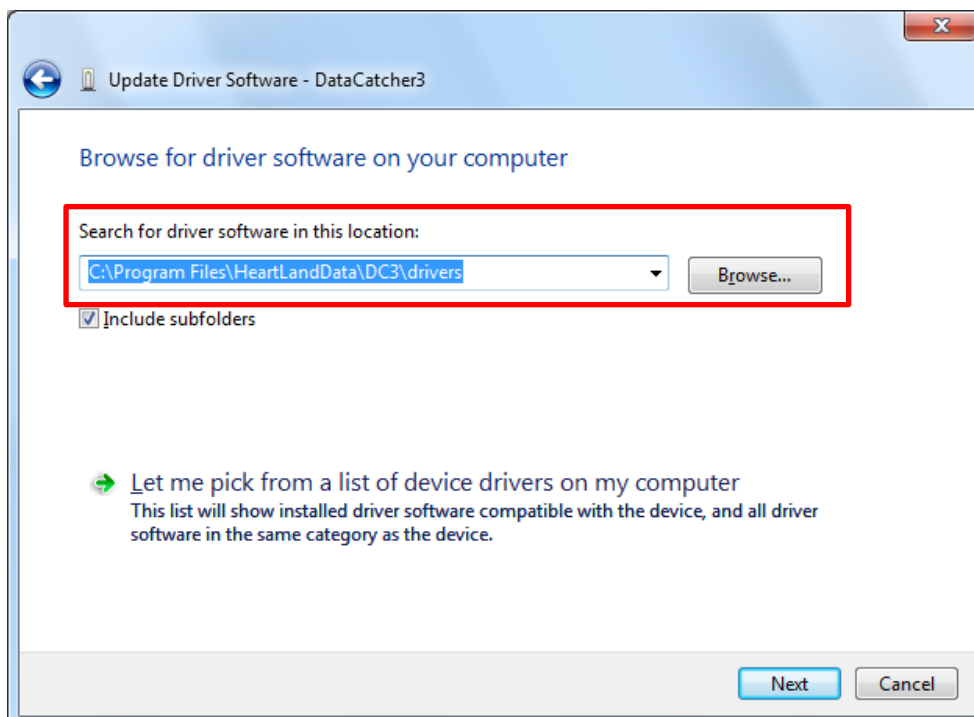
6. Click [NEXT].
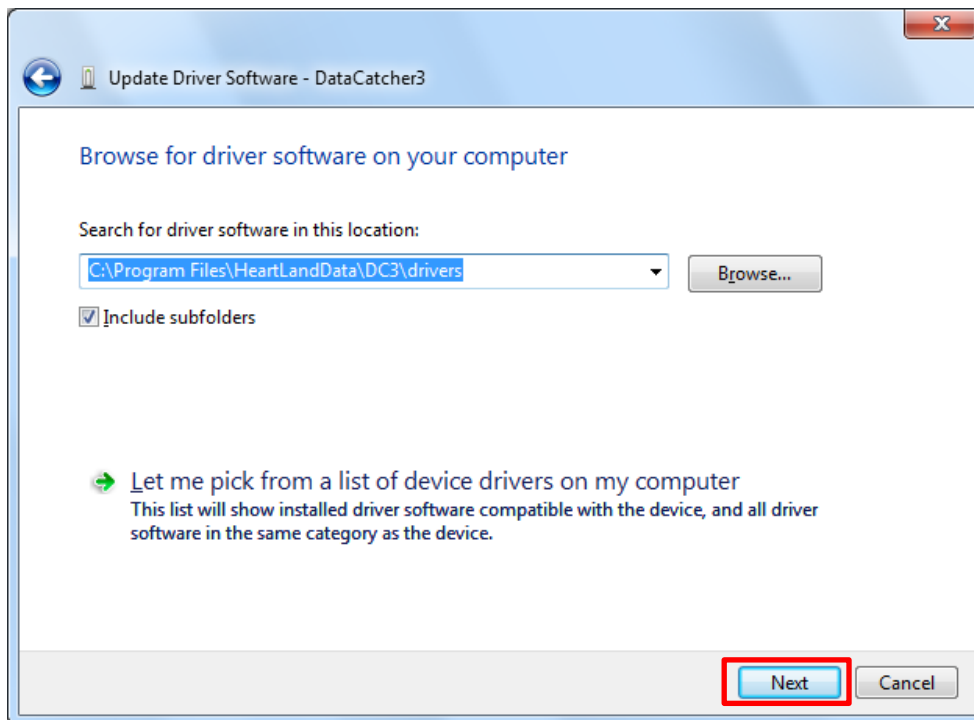
7. Start install of USB driver.

8. The following warning appears, select the [Install this driver software anyway].
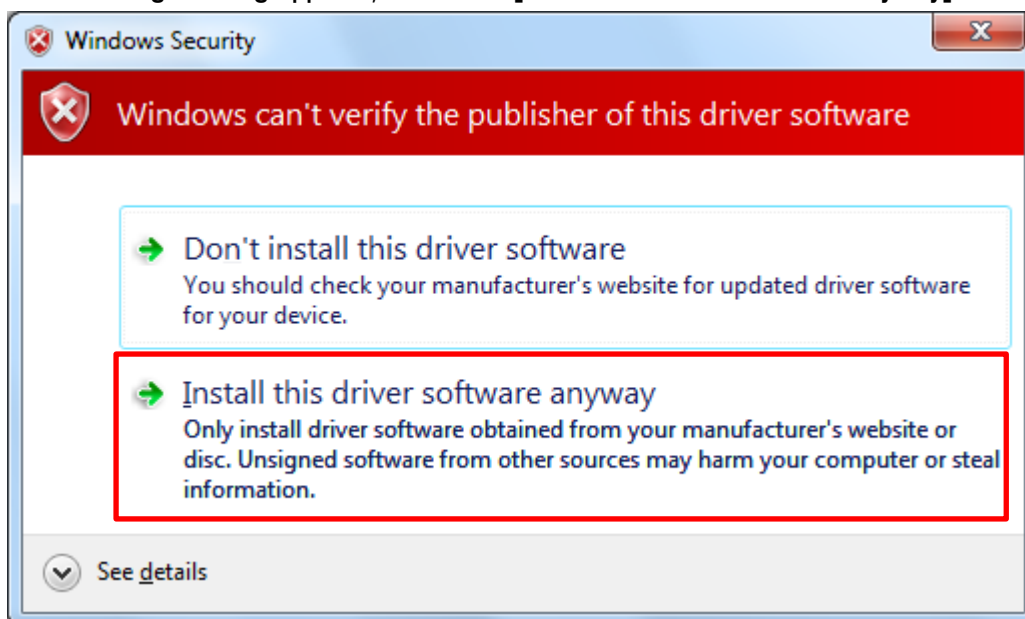
9. At the end of the installation of the driver, the following screen will be displayed.
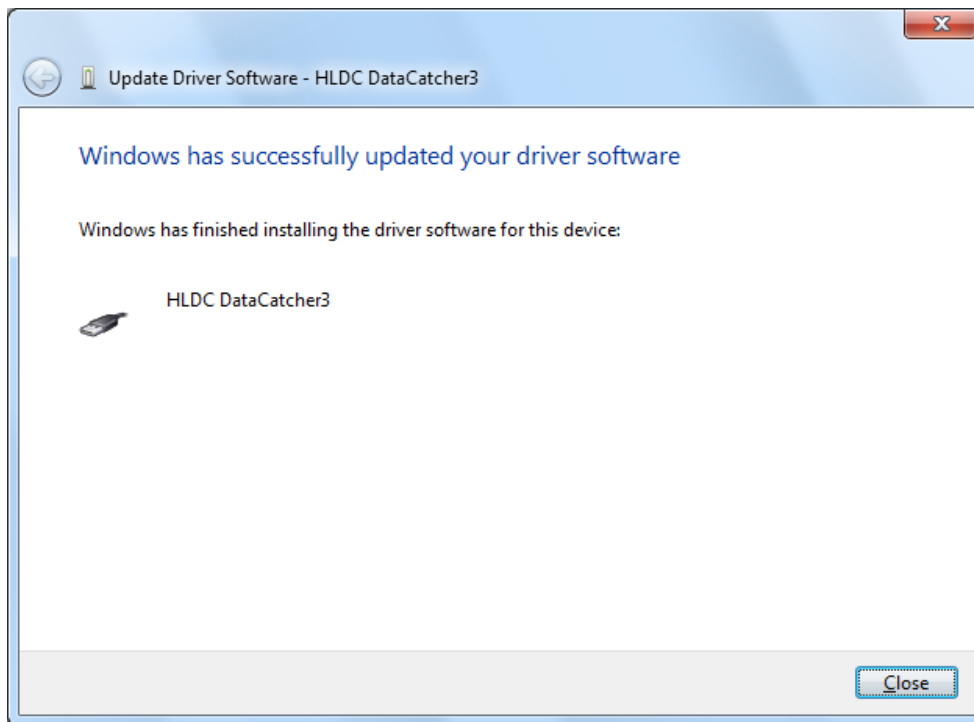
10. Click [Close], and installation completed.

6-4:USB Driver Installation(Windows 8/8.1, Windows 10 : 32bit/64bit-OS)

Connect the HLDC DataCatcher3 to the PC and switch it on, then USB device driver is installed automatically via Windows Update.

7. DC3structure

DC3 catches the communication data on target board and uploads it to PC.

PC receives the data, analyzes and then shows on the monitor.

8. DC3 Overview

8-1:Back

Power connector

Mini USB connector　　Power lamp　　　Power switch

OFF | | ON

USB 2.0　　　　　　DC5V/15W　　　　　POWER
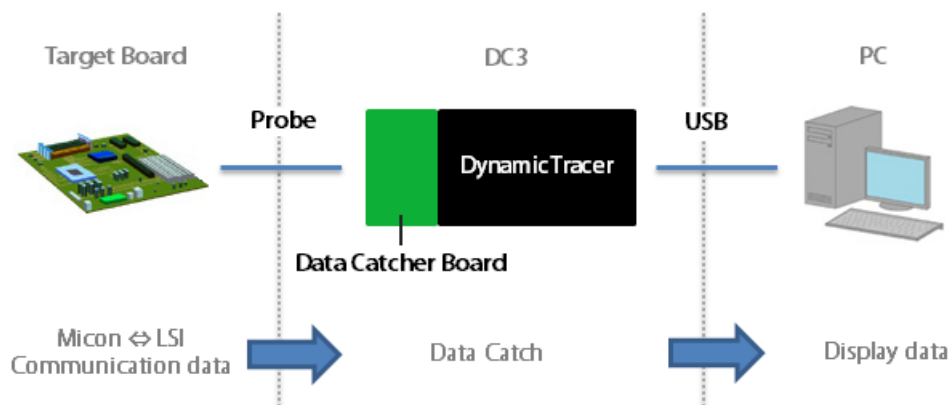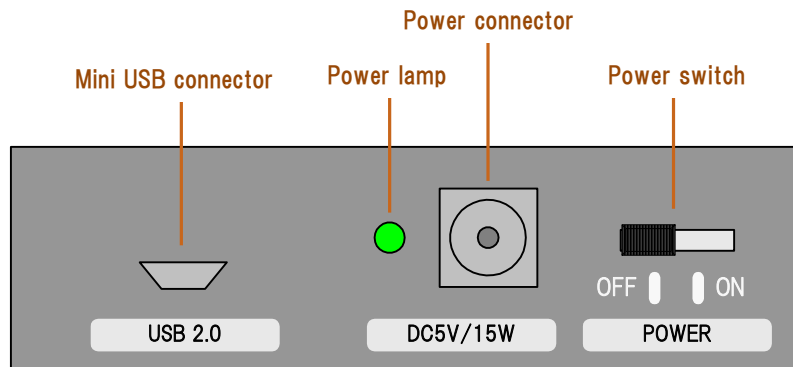
8-2:Data Catcher Ⅲ I/F Board

DIP SW9 for the selection of input port
IN_A~E(CN1) or IN_AX~EX(CN2)
Switch whether to use either port A or B.
※Also you need to change the settings for the PC apps

Select input level
when you use IN_AZ~EX(CN2).

CN1
(The lower side
of a substrate)

CN2
(The lower side
of a substrate)

CN3
(The lower side
of a substrate)

Jumper for connecting to GND.
Connect to the target either of the
jumpers on both sides of the GND.

Jumper for connecting to GND.
Connect to the target either of the
jumpers on both sides of the GND.

IN_A~E(CN1) part of signal, and trigger,
event are output to the check pins.
When you would like to connect without
probes, connect this terminal.

8-3:Description

Jumper for GND	GND terminal for DC3 board. Connect with target system by attached GND cable
POWER	Lighting while power supplying to DC3 board.
Prove connector pin (CN1/2/3)	Connect the communication line by using attached prove. Position depends on the communication format. Please refer to Connector List.
POWERSW	Power SW for DC3 board.
Mini-USB Connector	Connect with PC by using attached USB cable.
Power supply connector	Connect with attached AC adapter.

9. Hardware handling

1. Connect with PC.
   Connect PC with DC3 BOARD by attached USB cable.

2. Power on.
   Power on by POWER SW after insert AC adapter.
   [POWER] lights blue after Power on.
   [CONNECT] lights after 20sec from Power on.
   Setup complete.

3. Start Application.
   Boot PC Application.
   Please refer to "10-1: Star up DC3".

4. Connect GND.
   Connect with DC3 attached GND cable.

5. Setting of input port
   By the DIP switch, select either using IN_A~IN_E or using IN_AX~IN_EX. (You need to switch the port settings of the PC app.)
   Please use the normally IN_A~IN_E. It's less noise port.
   If you choose to IN_AX ~ IN_EX port, please select the threshold level is SW2.
   If the supply voltage of 3.3V to 5V, select 3.3V. And If the supply voltage of 1.8V, select 1.8V.
   (In either case, the input voltage can be up to 5V.)

6. Connect communication line.
   Connect communication line with DC3 attached prove cable.
   (Also, it is possible to connect from check pins of the substrate upper part.)
   Position depends on the communication format. Please refer to Connector List.

Please take care following items for hardware:
- Power on while unfastening prove.
- Connect target GND with DC3 board GND.
- Check the power setting of your PC when you catch the data long time
   to prevent power cut for HDD automatically or Windows transmitting to standby mode.

10. Basic Operation

1. Double-click the [DC3] Icon or Select the[Data Catcher 3]Program.
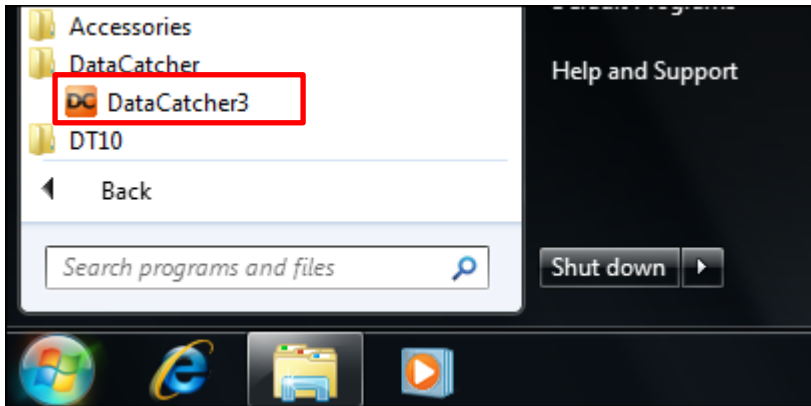
2. Select Catch Program.
Data log window is shown by select Catch Program and then click [OK].
If [Cancel] is clicked, data log window is shown as 3WIRE_CATCH.
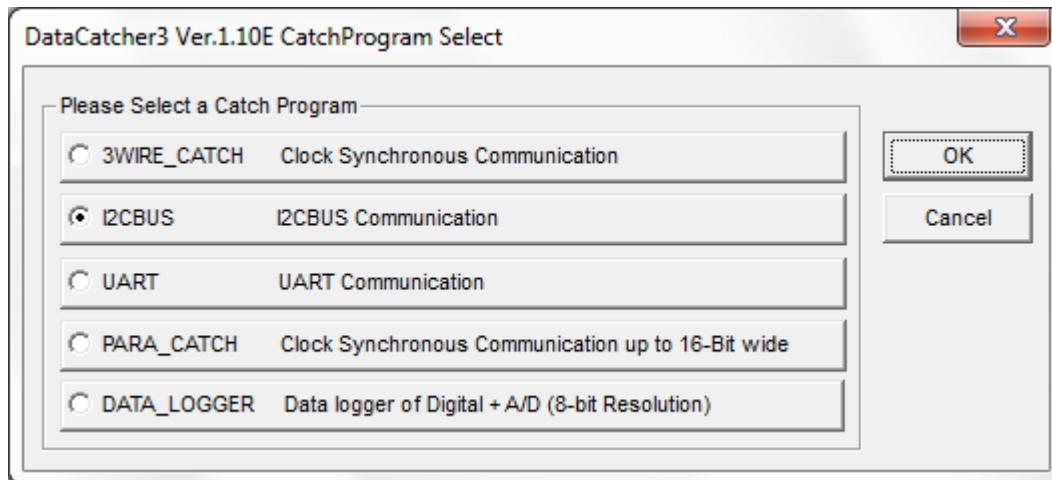
1O-2:Data Log window
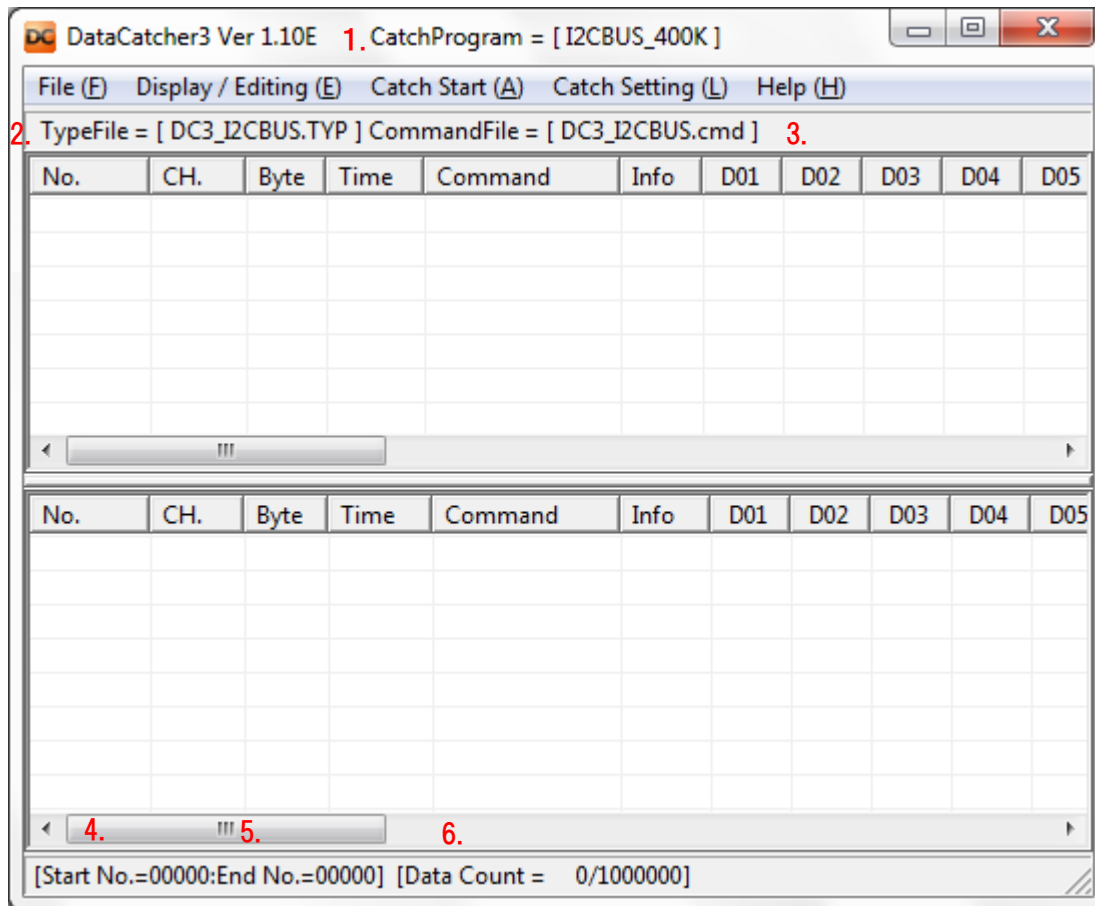
1. Log window is shown.

1	The catch program name that selected it is shown.
2	The file name of the catch type that selected it is shown.
3	The definition file name for the command analysis in the selection is shown.
4	Start No. of catch data is shown.
5	Completion No. of catch data is shown.
6	The data number that received it is shown.

The communication data of 1,000,000 packets can be received.
Also, communication packet over 1,000,000 packet case receives it with the ring form.

1O-3:Various File Operation

The file menu does the save of reading and, log file of a/the type file, command file.
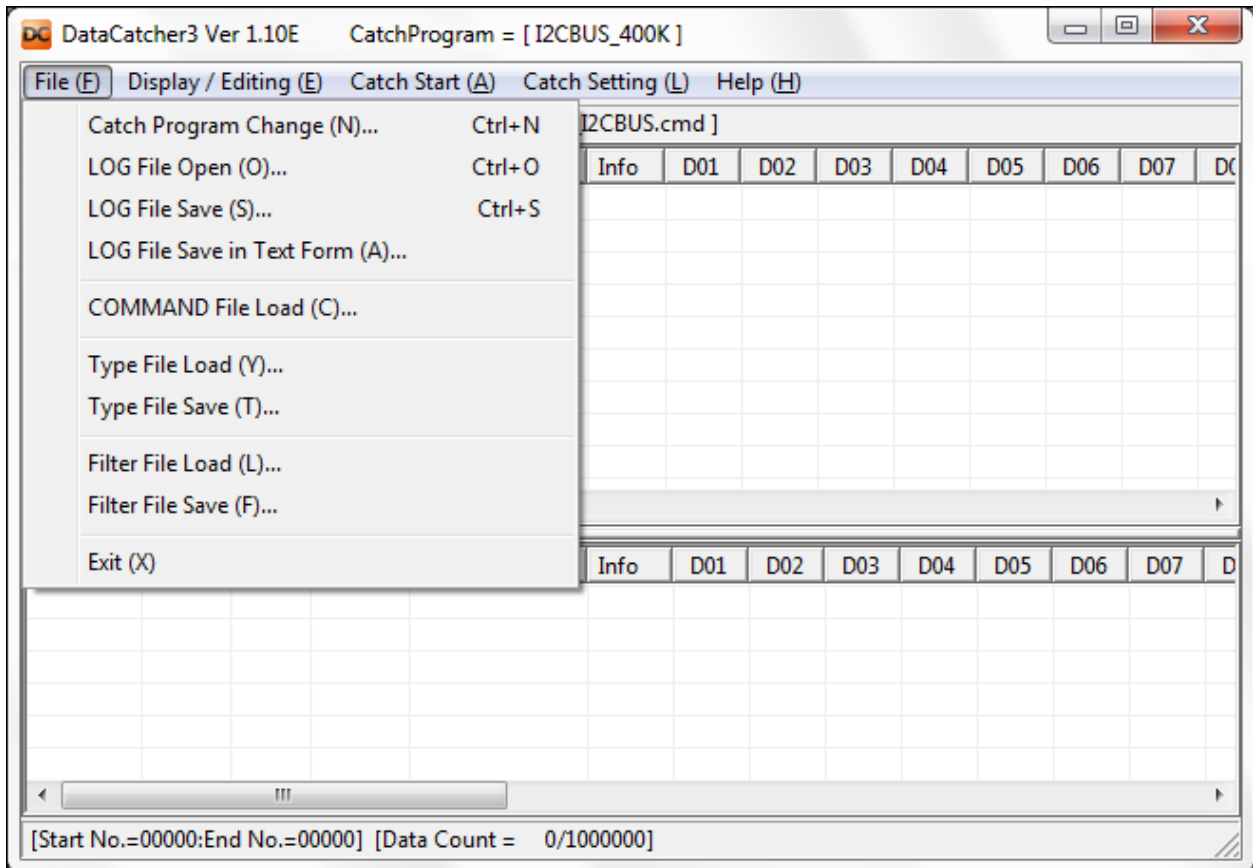
-Catch Program Change
　　　This does the change of the catch program. In this way, even the catch data is clear.

-Log File Open
　　　The log file of the log form is opened.
　　　The display contents are displayed with the contents that were displayed to before.

-Log data Saves
　　　This preserves catch data with the log form.

-Log Data save in text form
　　　The catch data is preserved with the text form.
　　　This preservation form is the one that divided each data period with a ″,″.
　　　Therefore the editing is possible with EXCEL etc.

-Command File Load
　　　This reads the command file. The extension of this file is cmd.

-Type File Load
　　　This reads the type file. The setting contents for the communication type are preserved, in a type file.

-Type File SaveA type file save

        The setting contents for the communication type are preserved.

        Please refer to the manual for each catch program about the setting of a catch type.

-Filter File Load

        This reads the bit file. The setting contents for the various kinds filter are preserved, in a bit file.

-Filter File Save

        This preserves the setting contents of the various kinds' condition to the bit file.

-Exit

        The data catcher is ended.

10-4:Display Operation

This section explains it about the operation of display data.
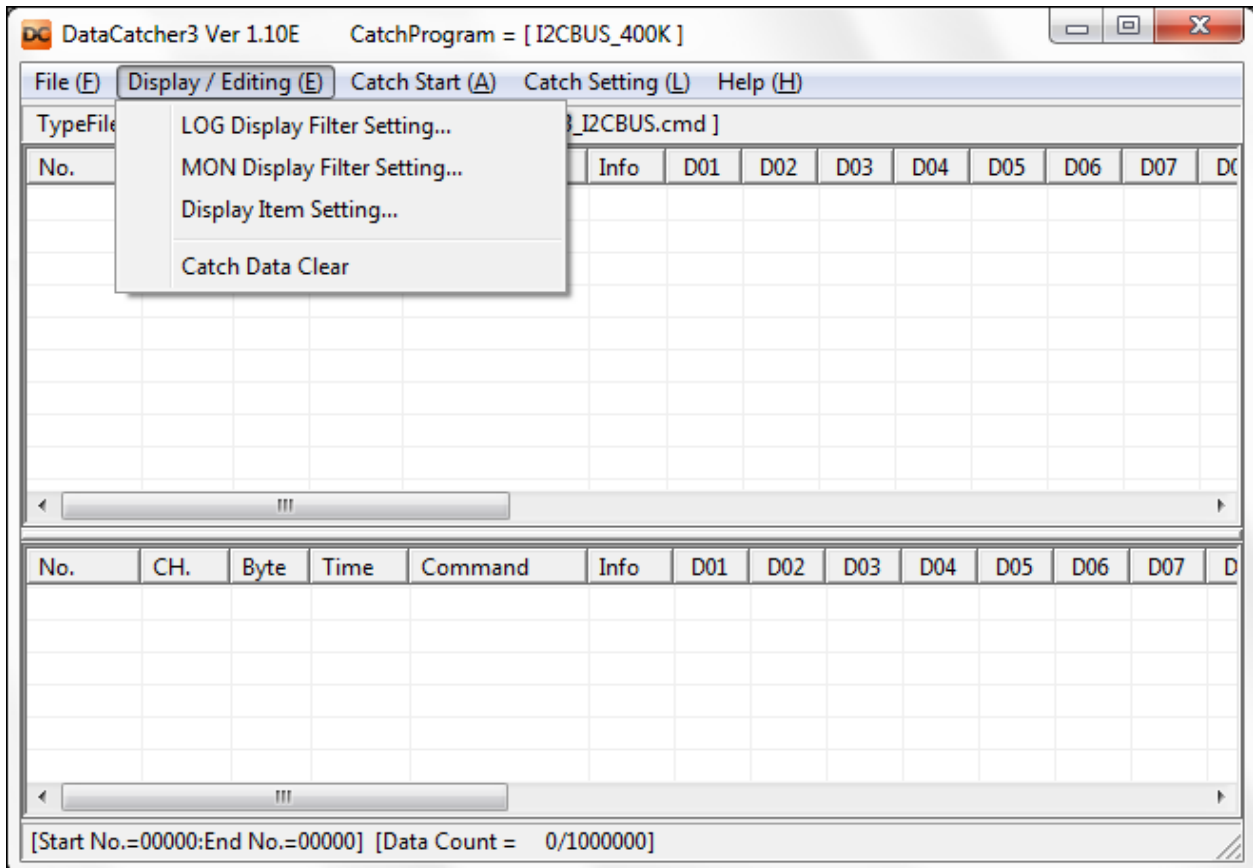
- Log Display Filter Setting
    Setting for limitation of log data display.
    Log Display filter setting window is opened by selects this one.

- MON Display Filter Setting
    Setting for limitation of monitor data display.
    MON Display filter setting window is opened by selects this one.

- Display Item Setting
    Setting for display type of items. Display item setting window is opened by select this one.

- Catch Data Clear
    Clear the displayed data on the monitor.

10-5:Catch Setting Menu

By this menu, you can set up filter condition and, event, trigger condition of catch data.
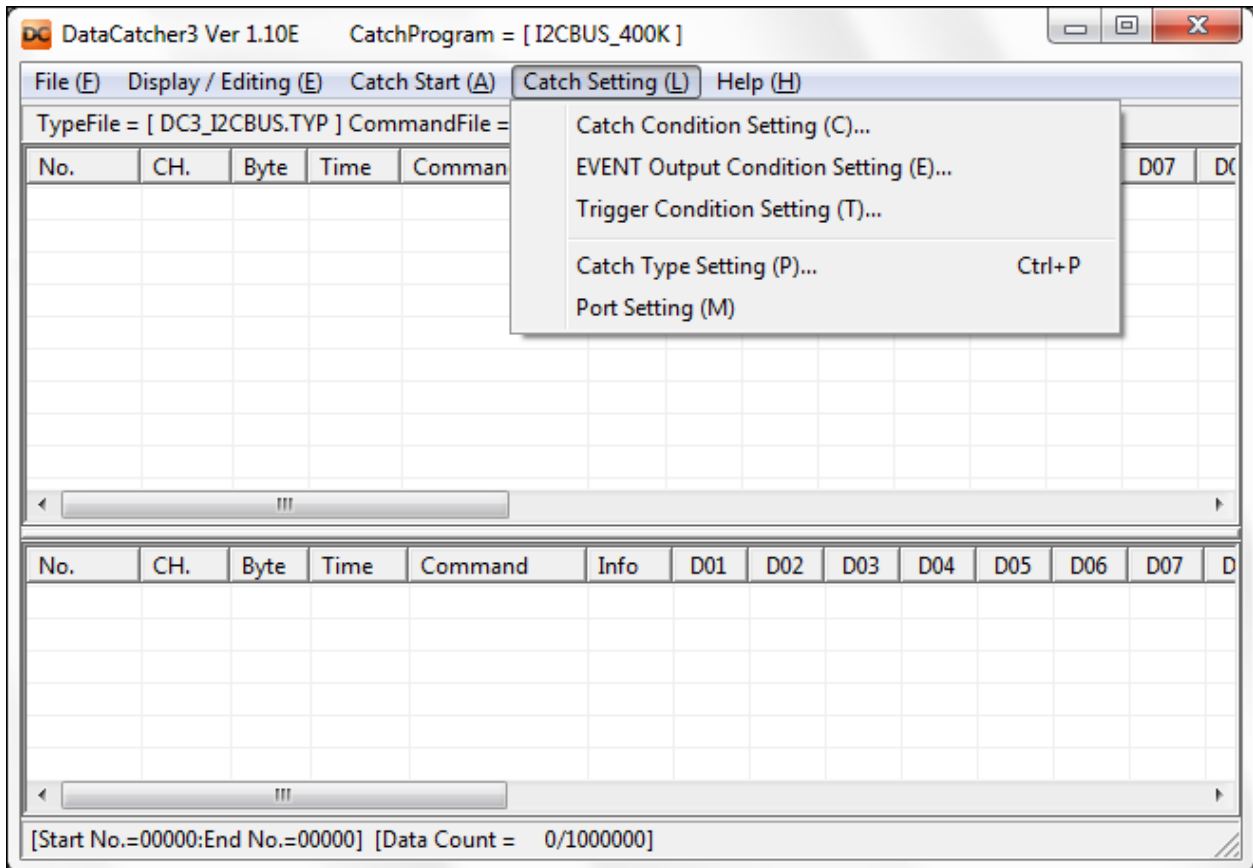
-Catch Condition Setting

You can reject, and also receive the only communication data that agreed with the condition, by setting up the filter condition.

When this item is selected the catch filter setting window opens.

-EVENT Output Condition Setting

When the data that agreed with a designated condition is received the event can be output.

When this item is selected the event filter setting window opens.

-Trigger Condition Setting

When the data that agreed with the condition is received the condition that does the catch start/stop can be set up.

When this item is selected the trigger condition setting window opens.

-Catch Type Setting

Please refer to the manual for each catch program.

-Port Setting

Setting of Input Port.

Please use the normally IN_A~IN_E. It's less noise port.

1O-6:LOG Display Filter Setting Window

Following window is opened after select Log Display Filter Setting.

[About each setting content]
-Don't DisplayFilter [Usually DisplayFilter] check box
- Only the data in accord with a/the condition does not display it in the case of on.
Only the data in accord with the condition displays it in the case of off.
- This check box is common setting for all filter setting.

- Don't Display when Same Channel in Same Data.
- ON : When same data are catched over twice, 2nd or later are not shown.
OFF : All catched data are shown without change.
- This check box is common setting for all filter setting.

-Filter effective check box
- You can do the filter condition that was checked effectively.
The check is not applied about the condition without being done.

-MASK Bit setting button
- When you push this button the setting window of the mask bit can be opened.

1O-7:Catch Filter Setting Window

Following window is opened after select Catch Filter Setting.

[Settings]
- [Don't Catch Filter[Usually Catch Filter] check box.
  - ON : Filter setting is used as not to catch the data conforming setting data.
    OFF : Filter setting is used as to catch the data conforming setting data.
  - This check box is common setting for all filter setting.

-Filter effective check box
  - You can do the filter condition that was checked effectively.
    The check is not applied about the condition without being done.

-MASK Bit setting button
  - When you push this button the setting window of the mask bit can be opened.

1O-8：Event Filter Setting Window

When [Event output condition setting] is selected this window opens.

-EVENT effective check box

    Available only filter condition checked.

    Not available others.

    EVENT output port becomes 0V with a catch start.

    When catch data agrees with the setting condition EVENT output port becomes 3.3V.

-MASK Bit setting

    You can open the setting window of a/the mask filter, by clicking this button.

10-9:Trigger Filter Setting Window

When Trigger Condition Setting is selected the following window opens.

- Page1 -
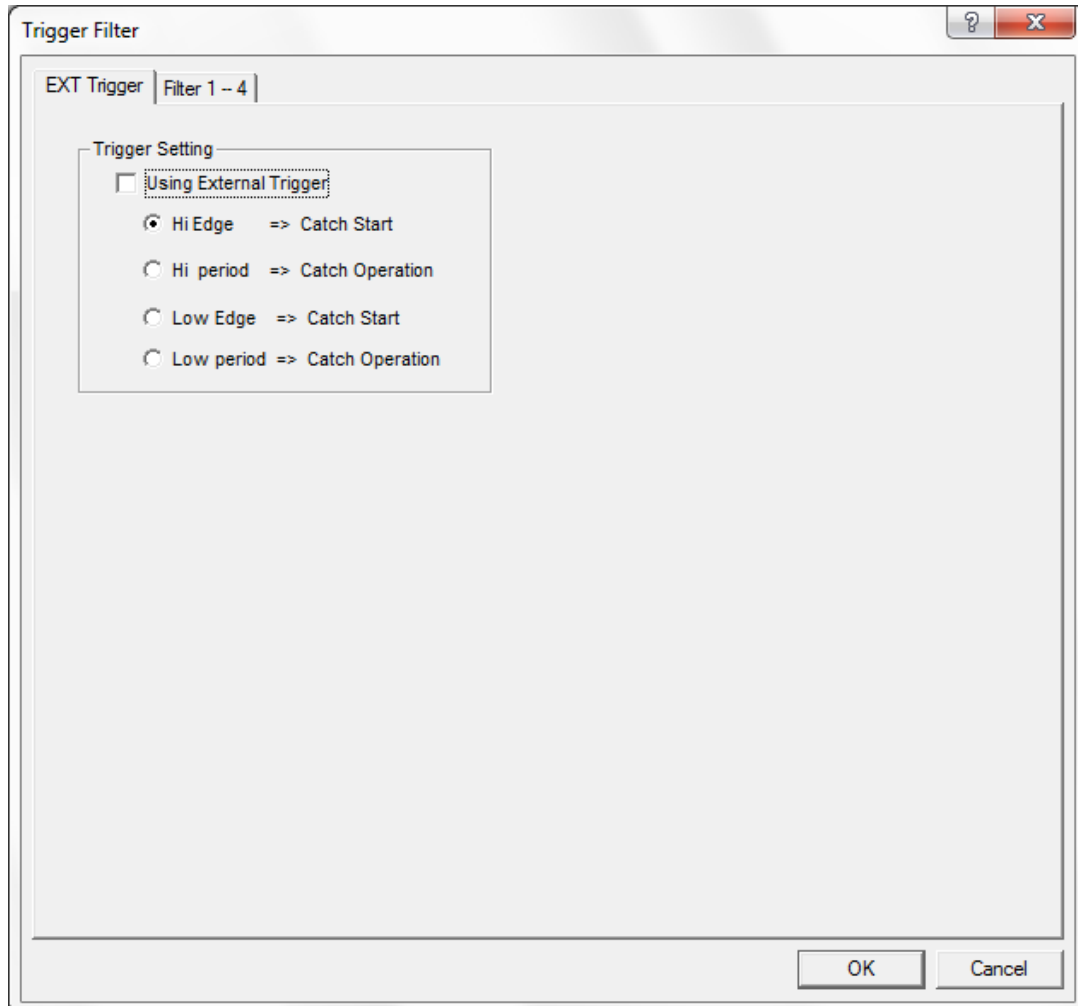
-「Using External Trigger」check box
  - You can select the trigger port.

      - [Hi Edge => Catch Start] Radio button
          - Detecting that the condition of the trigger port became HI the catch is started.

      - [Hi period => Catch Operation] Radio button
          - Trigger port does a catch only the period of HI.

      - [Low Edge => Catch Start] Radio button
          - Detecting that the condition of the trigger port became LOW the catch is started.

      - [Low period => Catch Operation] Radio button
          - Trigger port does a catch only the period of LOW.

- Page 2-

-Catch start is effective check box
 - Catch is started by the detection of the data that agreed with the setting condition,
    by turning on this check box.

-The catch end is effective check box
 - Catch is stopped by the detection of the data that agreed with the setting condition,
    by turning on this check box.

-MASK Bit setting
 - You can open the setting window of a/the mask filter, by clicking this button.

10-10:Mask Filter Setting Window

By clicking the MASK Bit setting button that is in a various kinds filter setting window the following window is displayed.
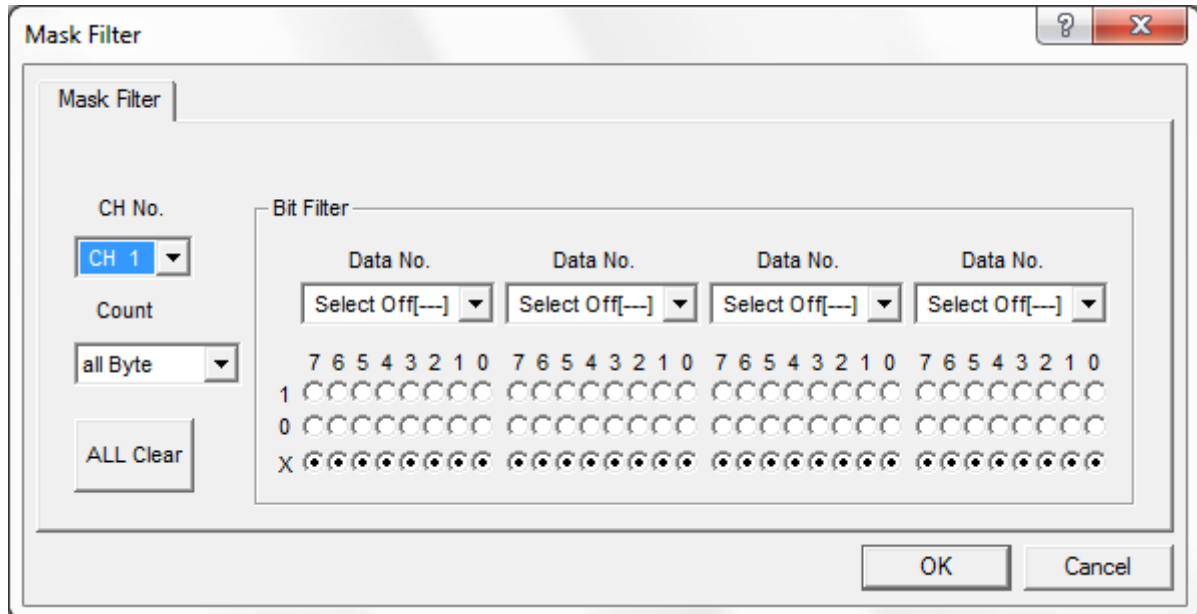
-CH No. Dropdown list
　- You can select the channel that sets up the mask filter.

-Count Dropdown list
　- You can designate it with Byte or Bit unit about the length of the communication packet
　　that applies the setting condition. The unit differs by each catch program.

-ALL Clear button
　- All the setting conditions are initialized.

-Bit Filter field
　- You can set up the filter condition with a bit unit.
　　- Data No. Dropdown menu
　　　- You can select DATA No. that sets up the filter condition.
　　- Radio button for bit setting
　　　- You can designate the data that becomes a filter condition every 1 bit. X shows don't care.

11. Signal that is able to catch by [3WIRE CATCH]Catch Program

11-1:Wave Form of 3 Wire Serial Communication

DC3 supports the following "3 wire serial communication.

CLOCK

DATA

STB
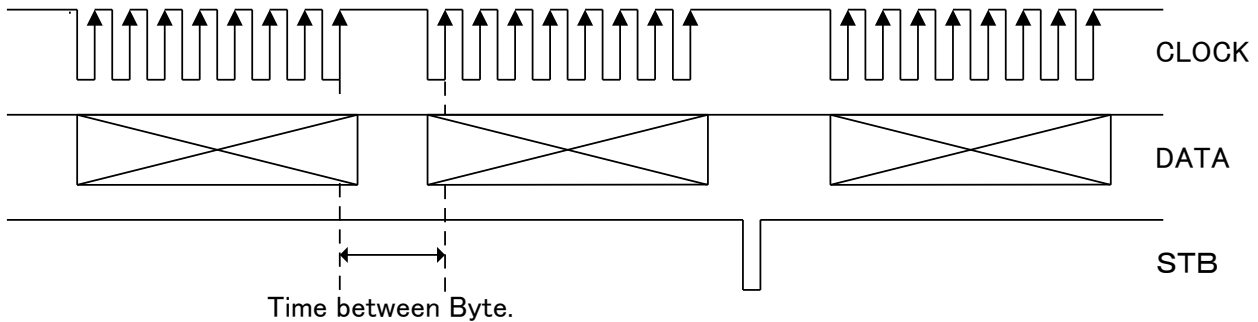
Time between Byte.

There is a STB signal general "3 line synchronous serial communications",
the catch is possible regarding the type that there is not a STB signal.
- Form that settles communication packet in the time between Byte.
- Form with the data that designates the length of communication packet
  into communication data.
- Form with the data that instructs the completion of communication packet.
- Form with the data that settles the length of communication packet.

12. Setting of [3WIRE CATCH]Catch Program

<Channel Setting> the dialog box can be opened with [Catch setting (L)]-[Catch Type Setting (P)] of the click.
By changing this setting various 3 wires serial communications can be received.
The setting contents it does explanation below.
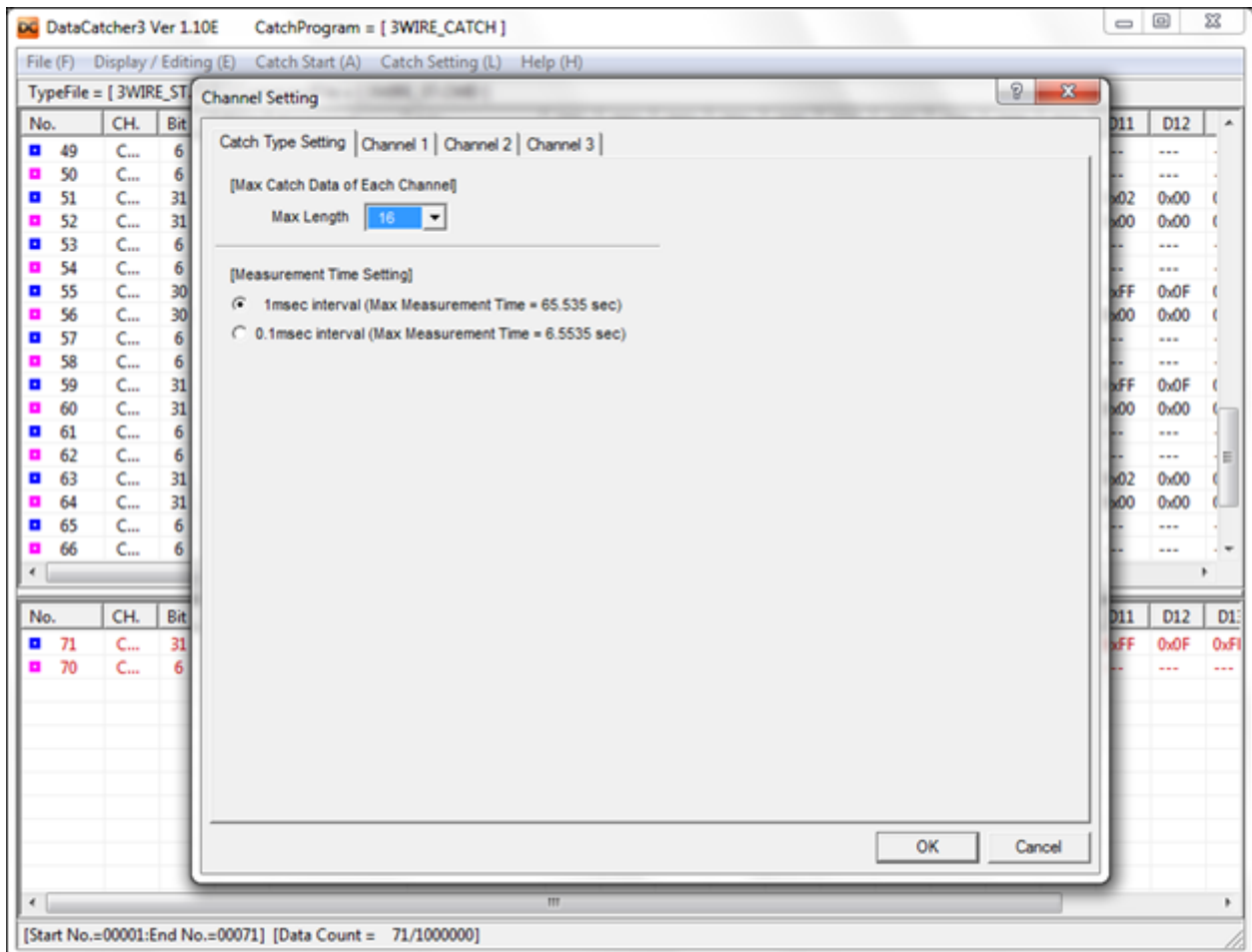
12-1:<Catch Type Setting> the setting contents in this tab

[Max Catch Data of Each Channel]
<Max Length>
The number of the DATA line that is displayed to the screen is set up.
When Max Length is set up with 10 D01-D10 is displayed to the DATA line.
MAX value is 32.

[Measurement Time Setting]
Data catcher measures the time from the settlement of the settlement to, present communication packet of the communication packet of before and display.
You can set up the resolution in measuring time.

12-2:〈Channel1〉〈Channel2〉〈Channel3〉 the setting contents in this tab

[Select CLOCK EDGE]
  Select edge of CLOCK.

[Slect Bit order]
  Serial transmission method is selected.

[Select STB EDGE]
  EDGE of STB signal is selected.

[Select Catch Data order]
  The display turn of catch data is set up.

The following screen shows case that turned on [In order of Catched Time] option button.

No.	CH.	Bit	Time	Command	Info	D01	D02	D03	D04
	CH1	24				DATA1	DATA2	DATA3	

DataCatcher3 Ver 1.10E   CatchProgram = [3WIRE_CATCH]
File (F)   Display / Editing (E)   Catch Start (A)   Catch Setting (L)   Help (H)
TypeFile = [3WIRE_ST.TYP] CommandFile = [3WIRE_ST.CMD]

The following screen shows case that turned on [In order of near STB (latch)] option button.

No.	CH.	Bit	Time	Command	Info	D01	D02	D03	D04
	CH1	24				DATA3	DATA2	DATA1	

DataCatcher3 Ver 1.10E   CatchProgram = [3WIRE_CATCH]
File (F)   Display / Editing (E)   Catch Start (A)   Catch Setting (L)   Help (H)
TypeFile = [3WIRE_ST.TYP] CommandFile = [3WIRE_ST.CMD]

[Do you invert the logic of catch data?]
    Select the logic inverted or not.

[All Catch Data [0]]
    The processing method of case that all the data of communication packet were 0 is set up.

[AllCatch Data [1]]
    The processing method of case that all the data of communication packet were 1 is set up.

[When the Data is Decided, Other Dhannel Data?]
    A certain channel sets up it about the processing method of the data that received it
    with other channels in the time that settled communication packet, in middle
    that is receiving communication data.
    ＊ Please refer to "Restriction".

[Max Catch Data]
    <Max Length>
    The number of the DATA line that is displayed to the screen is set up.
    When Max Length is set up with 10 D01-D10 is displayed to the DATA line. MAX value is 32.
    Please set up it short than ″ Max catch data of each channel ″ of page before.

[If Max Btye is Catched?]
You can set up it about the processing method of case that received the data number that set up it with "Max Catch Data".

- On of "Discard the Data from Older Data" the option button
This receives it while discarding old data until communication packet settles.

- On of "Set the Data as a Continuous Data" the option button
This receives all the data, until communication packet is settled.
If the byte number of communication data becomes "Max catch data", to display the data to the PC, and then is displayed as a continuous channel.

The following item sets up it about the condition that settles communication packet.
[Decide by the Data which indicate the Last Byte]]
In the case that there is the data that shows the final byte the value of 0x00h-0xffh is set up.
Also, off is set up in the case that there is not the data that shows the final byte.

[Decide in Time after 1Byte reception]
Communication packet is settled in the time between BYTE.
As for the setting value, the selection is possible among 001-100 and the unit is msec.
When "off" was selected this setting becomes ineffective.

[Decided by the Data which incidicate length]
The data that designates the length of communication packet sets up this to be included to communication packet.

-Byte of what position?In the case that the data that designates the length of communication packet is included the position of the data is set up.
This value is to 01-32.
When "off" was selected this setting becomes ineffective.
-Correction Value :
For example the revision value is set up, in the case that the data of the position that the data of STX and ETX are included in communication packet and set up in the above does not include STX and ETX.
This value is to 01-32.
In the case that there is not revision data 00 are set up.

[Decided by the Data which decide length]

In the case that the data that settles the length of communication packet is included the position of the data is set up.

This value is to 01-32.

When ″off″ was selected this setting becomes ineffective.

The length of the communication packet corresponding to this data corresponds it like the next page by the type file.(The example of the next page is case with regard to channel 1)

For example, and the value (the position of data) ″18″ are set up and please edit as follows, to set up the length of communication packet with 16Byte. (Matrix form)

-Actual file contents-

```
CH1_COMMAND_STB=00
; :  00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f
$00=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$10=00, 00, 10, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$20=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$30=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$40=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$50=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$60=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$70=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$80=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$90=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$a0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$b0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$c0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$d0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$e0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$f0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
```

[Type File Edit(Need to Read)]

The type file is opened with a/the text editor. Please use it in the case that a direct type file is edited. The contents that changed it with channel setting window click ″OK″ the button once, in the case that they were already done a change, because they are not written in the file until they preserve the type file and choose from ″File″ the menu ″TYPE file save″ and please do type file editing once again, after they preserved it.

By clicking this button the following information window opens.

DataCatcher3 Ver 1.10E

TYPE FILE OPEN [C:\Program Files\HeartLandData\DC3\LIB\3WIRE_ST.TYP]
Open after I spare it in the case that already THE [TYPE FILE] is edited!

OK   Cancel
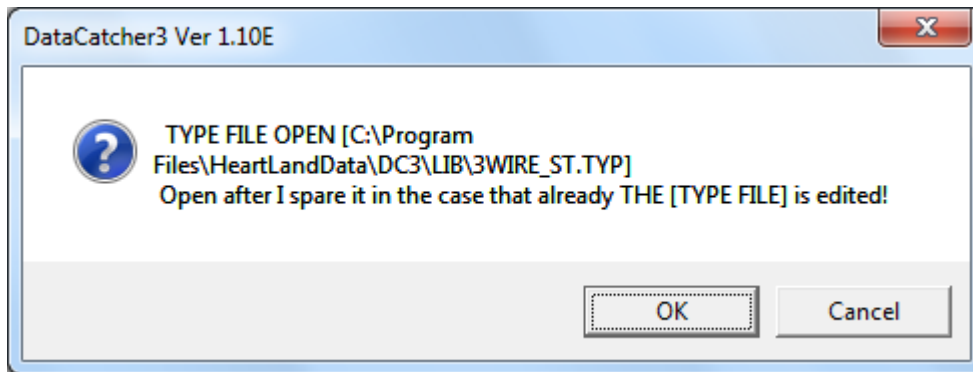
12-3:Port setting

  When you click [Catch setting] -> [Port setting], the menu of port setting at DC3 I/F Board is displayed.
Follow the instructions on the screen, please set similar to the DIP SW of the board.

12-4:Connector List

20pin connector pin array (The figure seen from the connector insertion opening)

2	4	6	8	10	12	14	16	18	20
1	3	5	7	9	11	13	15	17	19

CN1 / CN2 (Connector name on the back substrate)

	Pin name		Signal name
1	IN_A[0]	IN_AX[0]	CH1 CLK input
2	IN_A[1]	IN_AX[1]	CH1 DATA input
3	IN_A[2]	IN_AX[2]	CH1 STB input
4	IN_A[3]	IN_AX[3]	
5	IN_B[0]	IN_BX[0]	CH2 CLK input
6	IN_B[0]	IN_BX[1]	CH2 DATA input
7	IN_B[2]	IN_BX[2]	CH2 STB input
8	IN_B[3]	IN_BX[3]	
9	IN_C[0]	IN_CX[0]	CH3 CLK input
10	IN_C[1]	IN_CX[1]	CH3 DATA input
11	IN_C[2]	IN_CX[2]	CH3 STB input

CN3

	Pin name	Signal name
1	TRIG[0]	External trigger input
2	TRIG[1]	
3	EVENT[0]	Event Output that is set by event filter.
4	EVENT[1]	

CAUTION:
        - Connect target GND with DC3 board GND.
           Please ground even so the catch data is unsteady.
        - Power DC3 before connecting probe with communication line. If not, it cause of trouble.
        - Need to connect each CLOCK input with target CLOCK signal when multi channel data catching.

12-5:Restrictions

The highest frequency of a reception possible clock	20MHz

- Feature : Clear another channel data when data is fixed.

CLOCK

DATA

STB_1

STB_2

More then 1ms   More then 1ms
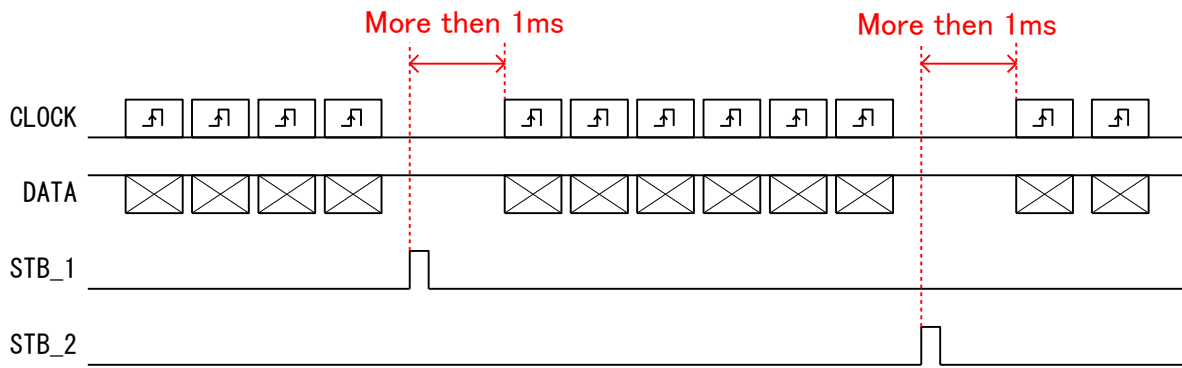
- Needed over 1msec in upper case from packet data fixing to next clock signal.

13. The Setting of [I2CBUS_400K]Catch Program

By clicking [Catch setting]-[Catch Type Setting] the < Channel Setting > dialog box can open.
Please do the setting with regard to the I2C communication.
Please set up it in accordance with the following explanation.
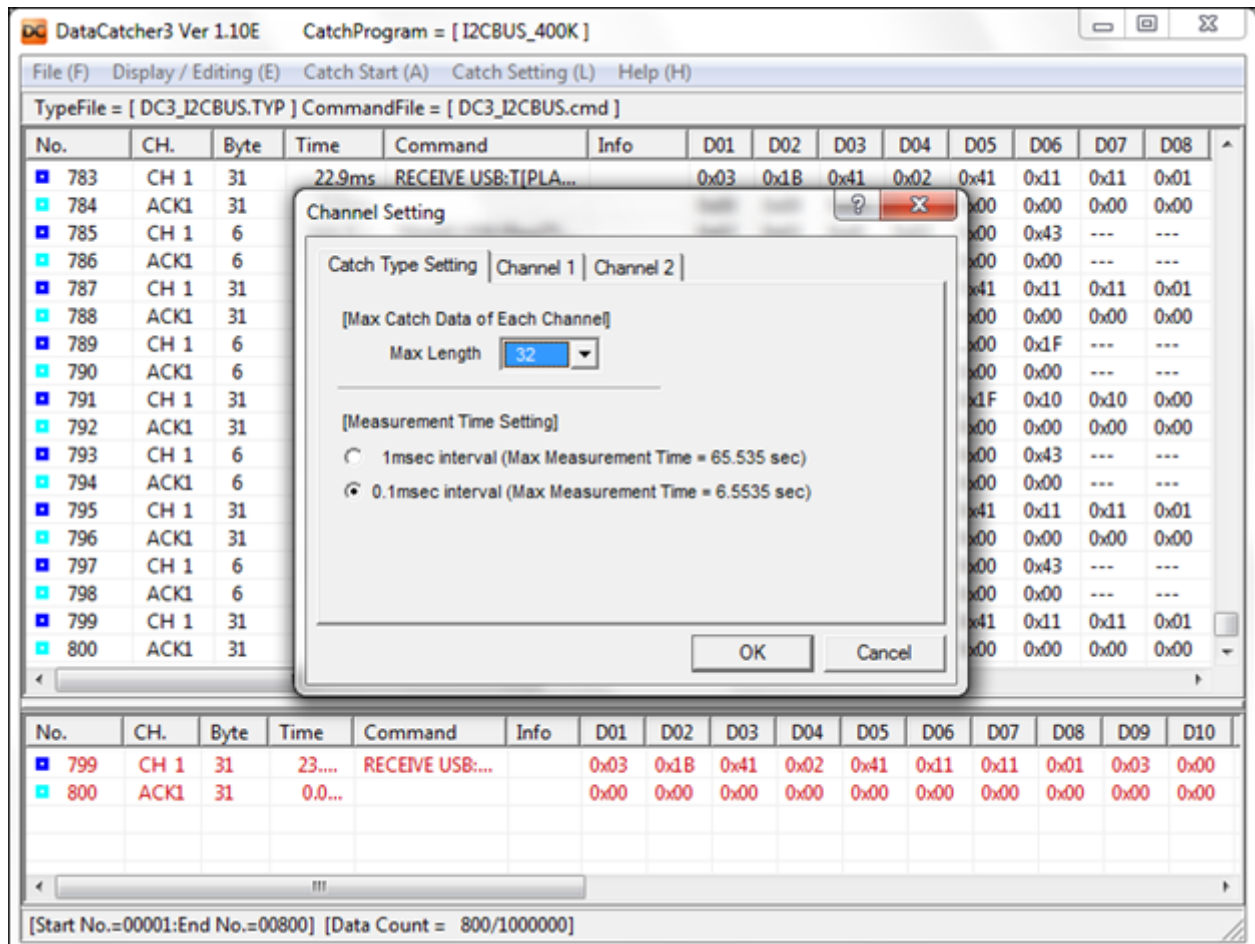
13-1:<Catch Type Setting> The setting contents in this tab

[Max Catch Data of Each Channel]

        <Max Length>
        The number of the DATA line that is displayed to the screen is set up.
        When Max Length is set up with 10 D01-D10 is displayed to the DATA line.
        MAX value is 32.

[Measurement Tiome Setting]

        Data catcher measures the time from the settlement of the settlement to, present communication
        packet of the communication packet of before and display.
        You can set up the resolution in measuring time.

13-2:<Channel1><Channel2> The setting contents in this tab
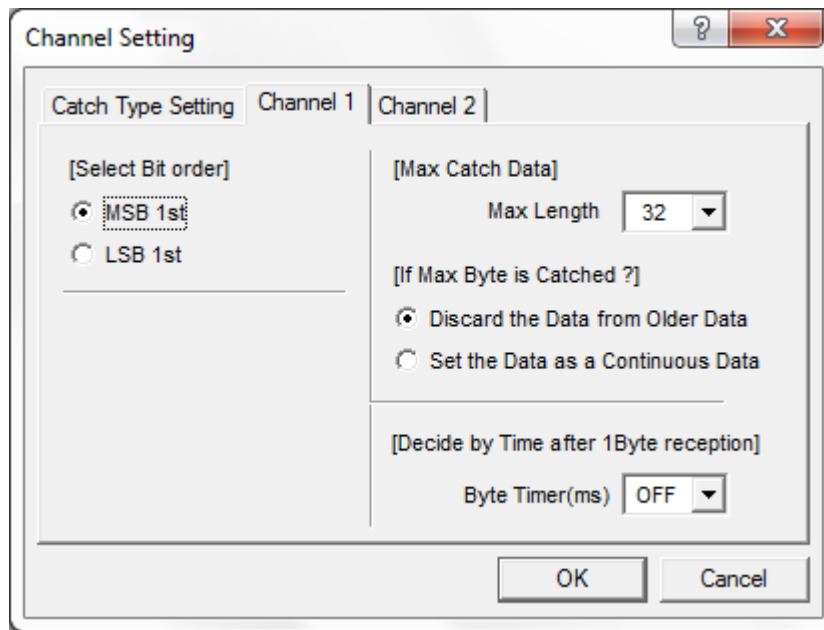
[Select Bit order]
        Select serial transmit method.

[Max Catch Data]
        <Max Length>
        The number of the DATA line that is displayed to the screen is set up.
        When Max Length is set up with 10 D01-D10 is displayed to the DATA line.
        MAX value is 32.

[If Max Byte is Catched?]
        You can set up it about the processing method of case that received the data number that set up it
        with "Max Catch Data".

        - On of "Discard the Data From Older Data" the option button
                This receives it while discarding old data until communication packet settles.

        - On of "Decide by Time after 1Byte reception" the option button
                This receives all the data, until communication packet is settled.
                If the byte number of communication data becomes "Max catch data", to display the data to the
                PC, and then is displayed as a continuous channel.

    [Decide by Timer after 1Byte reception]
        Communication packet is settled in the time between BYTE.
        As for the setting value, the selection is possible among 001-100 and the unit is msec.
        When "off" was selected this setting becomes ineffective.

13-3:Port setting

When you click [Catch setting] -> [Port setting], the menu of port setting at DC3 I/F Board is displayed.
Follow the instructions on the screen, please set similar to the DIP SW of the board.

13-4:Connector List

20pin connector pin array (The figure seen from the connector insertion opening)

2	4	6	8	10	12	14	16	18	20
1	3	5	7	9	11	13	15	17	19

CN1 / CN2 (Connector name on the back substrate)

	Pin name		Signal name
1	IN_A[0]	IN_AX[0]	CH1 CLK input
2	IN_A[1]	IN_AX[1]	CH1 DATA input
3	IN_A[2]	IN_AX[2]	
4	IN_A[3]	IN_AX[3]	
5	IN_B[0]	IN_BX[0]	CH2 CLK input
6	IN_B[1]	IN_BX[1]	CH2 DATA input
7	IN_B[2]	IN_BX[2]	
8	IN_B[3]	IN_BX[3]	

CN3

	Pin name	Signal name
1	TRIG[0]	External trigger input
2	TRIG[1]	
3	EVENT[0]	Event Output that is set by event filter.
4	EVENT[1]	

CAUTION:
- Connect target GND with DC3 board GND.
  Please ground even so the catch data is unsteady.
- Power DC3 before connecting probe with communication line. If not, it cause of trouble.
- Need to connect each CLOCK input with target CLOCK signal when multi-channel data catching.

13-5:Restrictions

The highest frequency of a reception possible clock	4MHz

14. Signal that is able to catch with 〔 I2CBUS_400K 〕Catch Program

14-1:Type that START CONDITION and END CONDITION is a pair
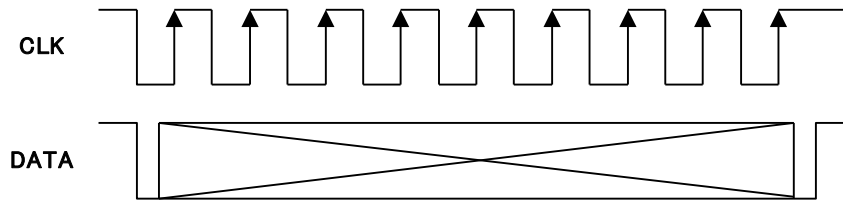
Please use 2 channels, to monitor 2 bus lines.

14-2:Type with the restart between START CONDITION and END CONDITION
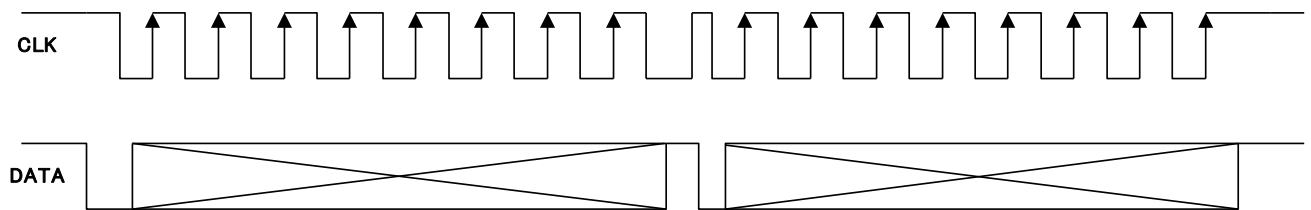
Please use 2 channels, to monitor 2 bus lines.

15. Signal that is able to catch with [UART] Catch Program

15-1:Low active signals

```
TXD

RXD
```
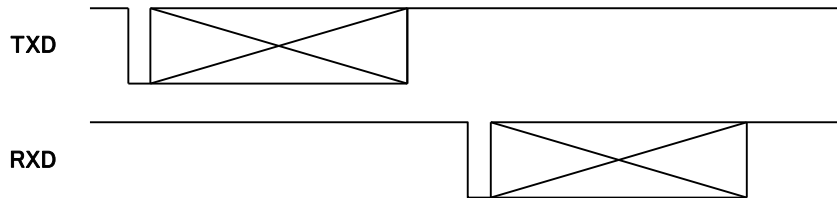
This is the communication method in a CPU and Device driver period.
By using 2 channels 2 communication lines can be received.

16. The Setting of [UART]Catch Program

By clicking [Catch setting]-[Catch Type Setting] the < Channel Setting > dialog box can open.
Please do the setting with regard to the UART communication.
Please set up it in accordance with the following explanation.
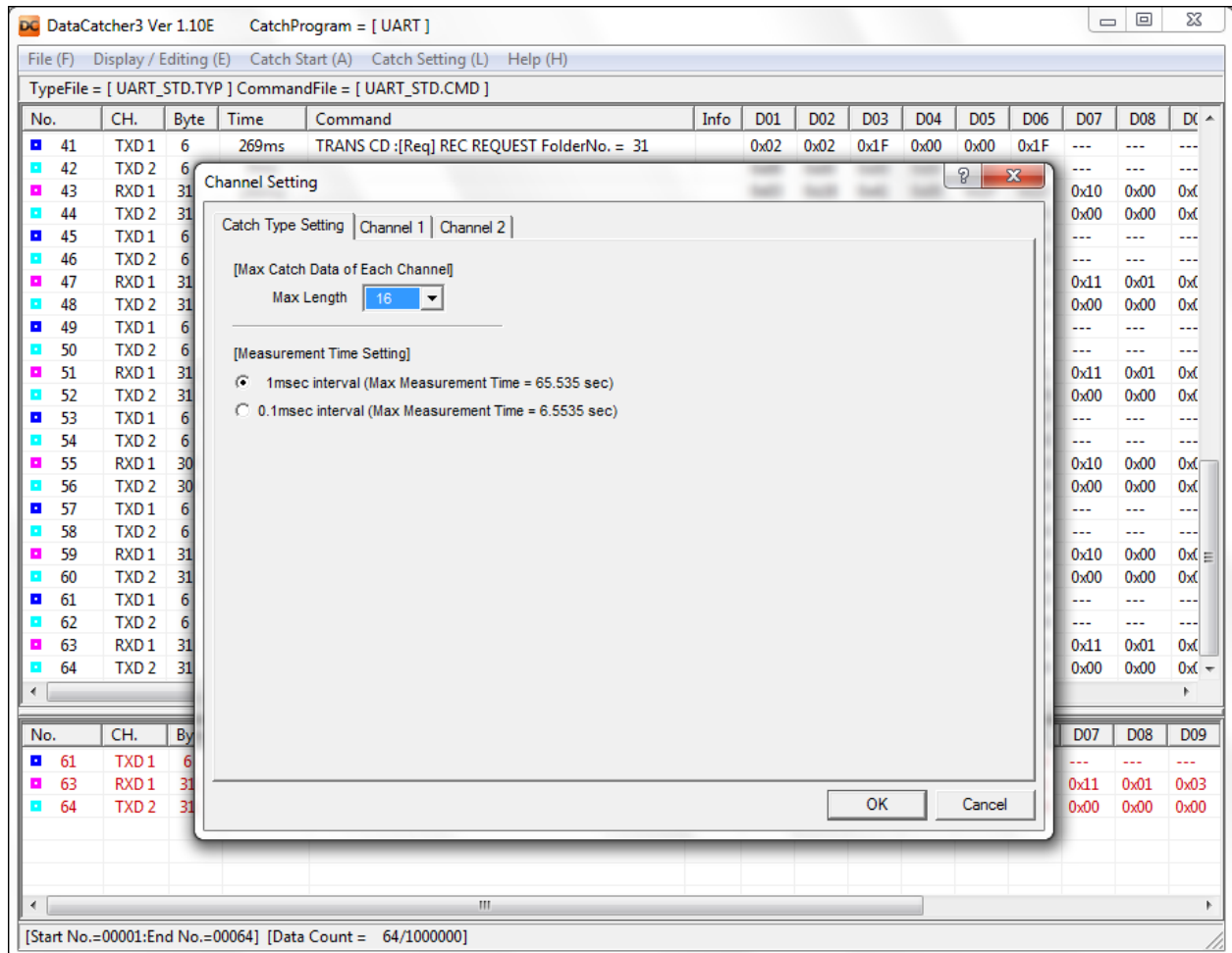
16-1:<Catch Type Setting> The setting contents in this tab

[Max Catch Data of Each Channel]

        <Max Length>

        The number of the DATA line that is displayed to the screen is set up.

        When Max Length is set up with 10 D01-D10 is displayed to the DATA line.

        MAX value is 32.

[Measurement Time Setting]

        Data catcher measures the time from the settlement of the settlement to, present communication packet of the communication packet of before and display.

        You can set up the resolution in measuring time.

16-2:<Channel1><Channel2> The setting contents in this tab

[Communication Setting]

        <BPS>   Communication speed is set up.

                                  Click ▼, and you can select a value from [110] to [921600].

                                  It is also possible to enter a value in the items of BPS from the keyboard directly.

                                  In that case, Value to be set up to [100] ~ [1000000″] is available.

        <BIT>   Bit number is set up.

        <STOP BIT>   Length of STOP BIT is set up.

        <PARITY>   PARITY BIT is set up.

[Select STB EDGE]

        <TXD>   Please set up EDGE of TXD.

        <RXD>   Please set up EDGE of RXD.

[When Start Bit is judged, TXD(RXD) ?]

        Please set up it about the processing method of the data in the catch in the time that the start bit of the other side is received, to middle that is receiving the data of TXD or RXD already.

[Max Catch Data]
        <Max Length>
        The number of the DATA line that is displayed to the screen is set up.
        When Max Length is set up with 10 D01-D10 is displayed to the DATA line.
        MAX value is 32.

[If Max Byte is Catched?]
        You can set up it about the processing method of case that received the data number that set up it
        with " Max Catch Data ".

        - On of "Discard from Older Data" the option button
          This receives it while discarding old data until communication packet settles.
        - On of "Set the Data as a Continuous Data" the option button
          This receives all the data, until communication packet is settled.
   If the byte number of communication data becomes "Max Catch Data", to display the data to the PC,
          and then is displayed as a continuous channel.

[Data which indicate Start Byte]
        In the case that there is the data that shows the top byte the value of 0x00h-0xffh is set up.
        Also, off is set up in the case that there is not the data that shows the top byte.

[Decide by the Data which indicate the Last Byte]
        In the case that there is the data that shows a/the final byte the value of 0x00h-0xffh is set up.
        Also, off is set up in the case that there is not the data that shows the final byte.

[Decide in Time after 1Byte reception]
        Communication packet is settled in the time between BYTE.
        As for the setting value, the selection is possible among 001-100 and the unit is msec.
        When "off" was selected this setting becomes ineffective.

[Decide by the Data which indicate length]
        The data that designates the length of communication packet sets up this
        to be included to communication packet.

        -Byte of what position? :
          In the case that the data that designates the length of communication
          packet is included the position of the data is set up.
          This value is to 01-32.
          When "off" was selected this setting becomes ineffective.

        -Correction Value :
          For example the revision value is set up, in the case that the data of the position
          that the data of STX and ETX are included in communication packet
          and set up in the above does not include STX and ETX.
          This value is to 01-32. In the case that there is not revision data 00 are set up.

[Decide by the Data which decide length]
　　　In the case that the data that settles the length of
communication packet is included the position of the data is set up. This value is to 01-32.
When "off" was selected this setting becomes ineffective.
The length of the communication packet corresponding to this data corresponds it like the next page by
the type file.(The example of the next page is case with regard to channel 1)
For example, and the value (the position of data) "18" are set up and please edit as follows, to set up
the length of communication packet with 16Byte. (Matrix form)

-Actual file contents-

```
CH1_COMMAND_STB=00
;  :  00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f
$00=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$10=00, 00, 10, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$20=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$30=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$40=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$50=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$60=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$70=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$80=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$90=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$a0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$b0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$c0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$d0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$e0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$f0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
```

[Type File Edit(Need to Reload)].
　　　The type file is opened with a/the text editor.
Please use it in the case that a direct type file is edited.
The contents that changed it with channel setting window click "OK" the button once,
in the case that they were already done a change,
because they are not written in the file until they preserve the type file
and choose from "File" the menu "TYPE file save"
and please does type file editing once again, after they preserved it.
By clicking this button the following information window opens

DataCatcher3 Ver 1.10E

TYPE FILE OPEN [C:\Program Files\HeartLandData\DC3\LIB\UART_STD.TYP]
Open after I spare it in the case that already THE [TYPE FILE] is edited!

[OK]   [Cancel]

16-3:Port setting

When you click [Catch setting] -> [Port setting], the menu of port setting at DC3 I/F Board is displayed.
Follow the instructions on the screen, please set similar to the DIP SW of the board.

16-4:Connector List

20pin connector pin array (The figure seen from the connector insertion opening)

2	4	6	8	10	12	14	16	18	20
1	3	5	7	9	11	13	15	17	19

CN1 / CN2 (Connector name on the back substrate)

	Pin name		Signal name
1	IN_A[0]	IN_AX[0]	CH1 TX input
2	IN_A[1]	IN_AX[1]	CH1 RX input
3	IN_A[2]	IN_AX[2]	CH1 TX-STB input
4	IN_A[3]	IN_AX[3]	CH1 RX-STB input
5	IN_B[0]	IN_BX[0]	CH2 TX input
6	IN_B[1]	IN_BX[1]	CH2 RX input
7	IN_B[2]	IN_BX[2]	CH2 TX-STB input
8	IN_B[3]	IN_BX[3]	CH2 RX-STB input

CN3

	Pin name	Signal name
1	TRIG[0]	External trigger input
2	TRIG[1]	
3	EVENT[0]	Event Output that is set by event filter.
4	EVENT[1]	

CAUTION:
- Connect target GND with DC3 board GND.
  Please ground even so the catch data is unsteady.
- Power DC3 before connecting probe with communication line. If not, it cause of trouble.
- Connect not used channel in TXD1/2 or RXD1/2 with GND.

17. Signal that is able to catch with [PARA_CATCH] Catch Program

17-1:Parallel communication 16Bit DATA width signals
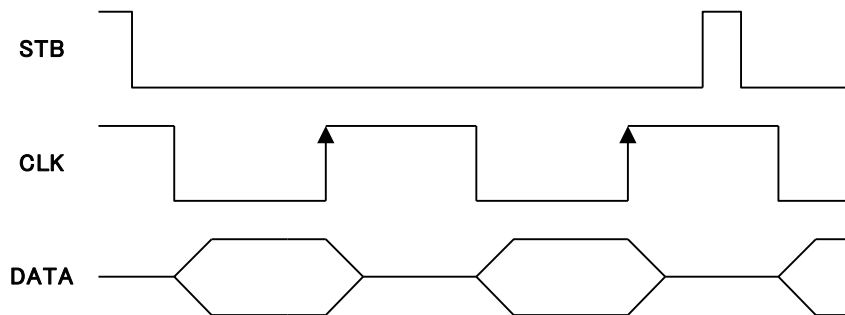
There is a STB signal general "Parallel communications",
the catch is possible regarding the type that there is not a STB signal.

- Form that settles communication packet in the time between Byte.
- Form with the data that designates the length of communication
  packet into communication data.
- Form with the data that instructs the completion of communication packet.
- Form with the data that settles the length of communication packet.

18. The Setting of [PARA_CATCH] Catch Program

By clicking [Catch etting]-[Catch Type Setting] the < Channel Setting > dialog box can open.
Please do the setting with regard to the UART communication.
Please set up it in accordance with the following explanation.
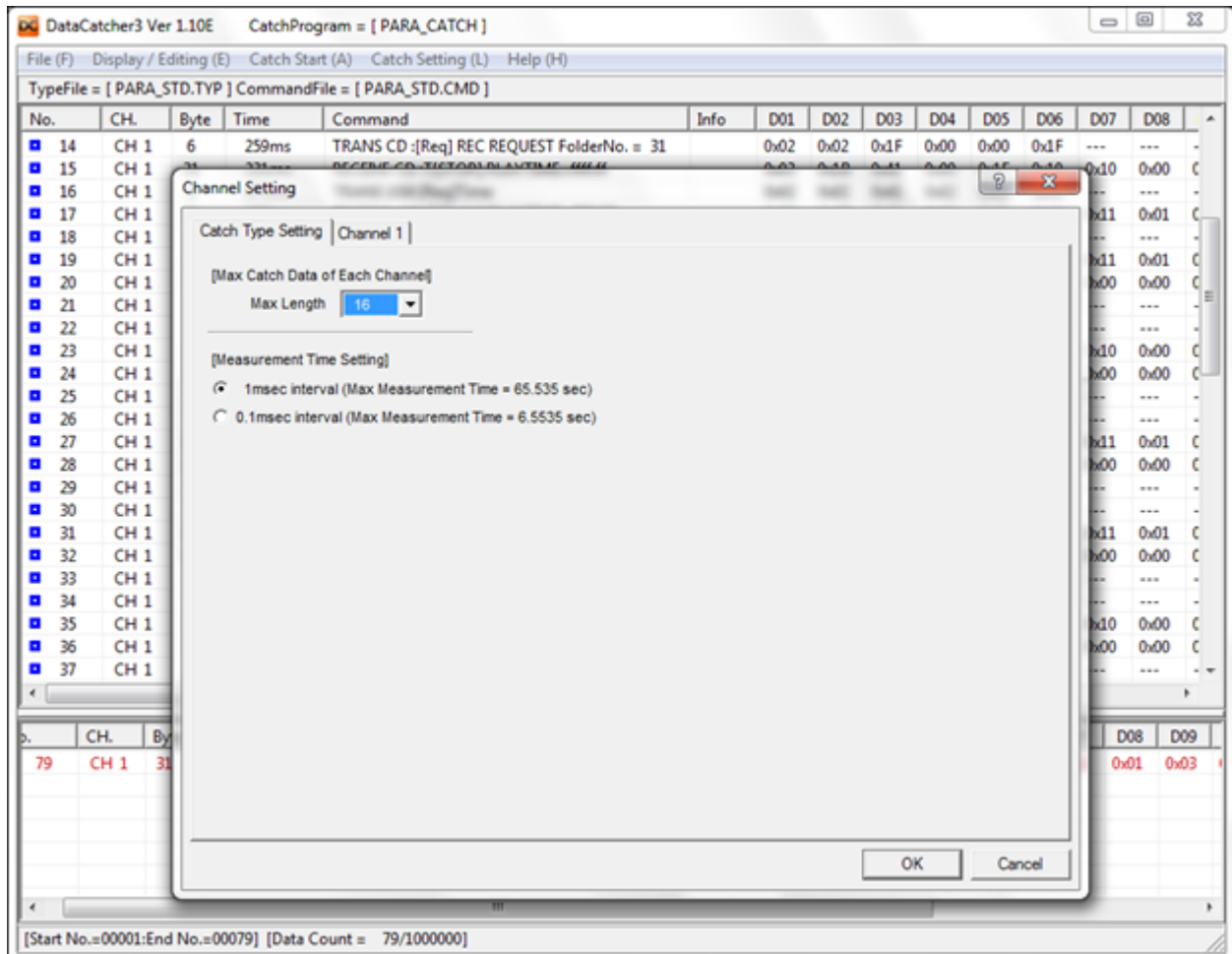
18-1:<Catch Type Setting> The setting contents in this tab

[Max Catch Data of Each Channel]
        <Max Length>
        The number of the DATA line that is displayed to the screen is set up.
        When Max Length is set up with 10 D01-D10 is displayed to the DATA line.
        MAX value is 32.

[Measurement Ttime Setting]
        Data catcher measures the time from the settlement of the settlement to,
        present communication packet of the communication packet of before and display.
        You can set up the resolution in measuring time.

18-2:<Channel1><Channel2> The setting contents in this tab

[Select CLOCK EDGE]
     Select the edge to confirm data.

[Data Bit]
     Select DATA lines Bit length.
     Max length is 16Bit when 9Bit over selected.

[Select STB EDGE]
     Please select EDGE of "Latch" signal.

[Select Catch Data order]
     The display turn of catch data is set up.

STB

CLOCK

DATA1　　　　DATA2　　　　DATA3
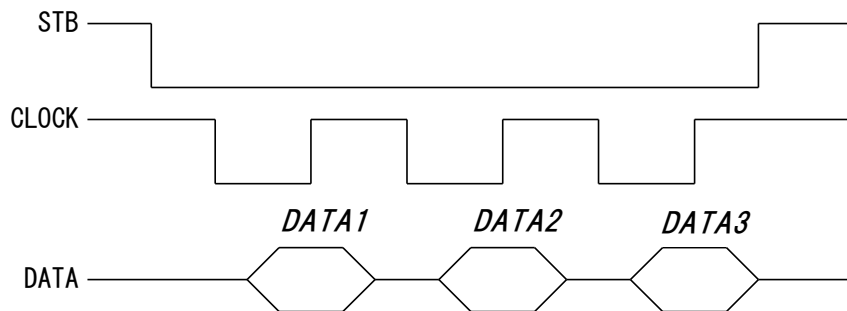
DATA

Following window is shown after click the optional button in [In order of catched time].

No.	CH.	Byte	Time	Command	Info	D01	D02	D03	D04
	CH1	24				DATA1	DATA2	DATA3	

DataCatcher3 Ver 1.10E　　CatchProgram = [PARA_CATCH]

File (F)　Display / Editing (E)　Catch Start (A)　Catch Setting (L)　Help (H)

TypeFile = [PARA_STD.TYP] CommandFile = [PARA_STD.CMD]

The following screen shows case that turned on [In order near STB (latch)] option button.

DataCatcher3 Ver 1.10E　　CatchProgram = [PARA_CATCH]

File (F)　Display / Editing (E)　Catch Start (A)　Catch Setting (L)　Help (H)

TypeFile = [PARA_STD.TYP] CommandFile = [PARA_STD.CMD]

No.	CH.	Byte	Time	Command	Info	D01	D02	D03	D04
	CH1	24				DATA3	DATA2	DATA1	

[Do you invert the logic of Catch Data?]
　　　Select the logic inverted or not.

[All Catch Data　: [0]]
　　　The processing method of case that all the data of communication packet were 0 is set up.

[All Catch Data　: [1]]
　　　The processing method of case that all the data of communication packet were 1 is set up.

[Max Catch Data]
　　　<Max Length>
　　　The number of the DATA line that is displayed to the screen is set up.
　　　When Max Length is set up with 10 D01-D10 is displayed to the DATA line.
　　　MAX value is 32.
　　　＊Please set up it short than ″ Max catch data of each channel ″ of page before.

[If Max Byte is Catched?]
　　　You can set up it about the processing method of case
　　　that received the data number that set up it with ″Max Catch Data″.

- On of ″ Discard the Data from Older Data ″ the option button
  This receives it while discarding old data until communication packet settles.
- On of ″ Set the Data as a Continuous Data ″ the option button
  This receives all the data, until communication packet is settled.
  If the byte number of communication data becomes ″Max catch data″, to display the data to the PC,
  and then is displayed as a continuous channel.

The following item sets up it about the condition that settles communication packet.

[Decide by the Data which indicate the Last Byte]
  In the case that there is the data that shows the final byte the value of 0x00h-0xffh is set up.
  Also, off is set up in the case that there is not the data that shows the final byte.

[Decide in Time after 1Byte reception]
  Communication packet is settled in the time between BYTE.
  As for the setting value, the selection is possible among 001-100 and the unit is msec.
  When ″off″ was selected this setting becomes ineffective.

[Decide by the Data which indicate length]
  The data that designates the length of communication packet sets up
  this to be included to communication packet.

  -Byte of what position? :
    In the case that the data that designates the length of communication packet is included
    the position of the data is set up.
    This value is to 01-32. When ″off″ was selected this setting becomes ineffective.

  -Correction Value :
    For example the revision value is set up, in the case that the data of the position that
    the data of STX and ETX are included in communication packet and set up
    in the above does not include STX and ETX.
    This value is to 01-32. In the case that there is not revision data 00 are set up.
    ∗ Available when DATA Bit length under 8BIT.

 [Decide by the Data which decide length]
  In the case that the data that settles the length of communication packet is included the position of the
  data is set up.
  This value is to 01-32. When ″off″ was selected this setting becomes ineffective.
  The length of the communication packet corresponding to this data corresponds it like the next page by
  the type file.(The example of the next page is case with regard to channel 1)
  For example, and the value (the position of data) ″18″ are set up and please edit as follows, to set up
  the length of communication packet with 16Byte. (Matrix form)
    ∗ Available when DATA Bit length under 8BIT.

- Actual file contents -

```
CH1_COMMAND_STB=00
; :  00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f
$00=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$10=00, 00, 10, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$20=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$30=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$40=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$50=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$60=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$70=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$80=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$90=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$a0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$b0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$c0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$d0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$e0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
$f0=00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
```

[Type File Edit (Need to Reload)]

The type file is opened with a/the text editor. Please use it in the case that a direct type file is edited.
The contents that changed it with channel setting window click "OK" the button once,
in the case that they were already done a change, because they are not written
in the file until they preserve the type file and choose from "File" the menu "TYPE file save"
and please does type file editing once again, after they preserved it.
By clicking this button the following information window opens.

DataCatcher3 Ver 1.10E

TYPE FILE OPEN [C:\Program Files\HeartLandData\DC3\LIB\PARA_STD.TYP]
Open after I spare it in the case that already THE [TYPE FILE] is edited!

OK   Cancel

18-3:Port setting

When you click [Catch setting] -> [Port setting], the menu of port setting at DC3 I/F Board is displayed.
Follow the instructions on the screen, please set similar to the DIP SW of the board.

18-4:Connector List

20pin connector pin array (The figure seen from the connector insertion opening)

2	4	6	8	10	12	14	16	18	20
1	3	5	7	9	11	13	15	17	19

CN1 / CN2 (Connector name on the back substrate)

	Pin name		Signal name
1	IN_A[0]	IN_AX[0]	CLK input
2	IN_A[1]	IN_AX[1]	STB input
3	IN_A[2]	IN_AX[2]	
4	IN_A[3]	IN_AX[3]	
5	IN_B[0]	IN_BX[0]	DAT0 input
6	IN_B[1]	IN_BX[1]	DAT1 input
7	IN_B[2]	IN_BX[2]	DAT2 input
8	IN_B[3]	IN_BX[3]	DAT3 input
9	IN_C[0]	IN_CX[0]	DAT4 input
10	IN_C[1]	IN_CX[1]	DAT5 input
11	IN_C[2]	IN_CX[2]	DAT6 input
12	IN_C[3]	IN_CX[3]	DAT7 input
13	IN_D[0]	IN_DX[0]	DAT8 input
14	IN_D[1]	IN_DX[1]	DAT9 input
15	IN_D[2]	IN_DX[2]	DAT10 input
16	IN_D[3]	IN_DX[3]	DAT11 input
17	IN_E[0]	IN_EX[0]	DAT12 input
18	IN_E[1]	IN_EX[1]	DAT13 input
19	IN_E[2]	IN_EX[2]	DAT14 input
20	IN_E[3]	IN_EX[3]	DAT15 input

CN3

	Pin name	Signal name
1	TRIG[0]	External trigger input
2	TRIG[1]	
3	EVENT[0]	Event Output that is set by event filter.
4	EVENT[1]	

CAUTION:
- Connect target GND with DC3T board GND.
   Please ground even so the catch data is unsteady.
- Power DC3 before connecting probe with communication line. If not, it cause of trouble.

18-5:Restrictions

Max receivable CLOCK frequency.	10 MHz MAX (If continuous data, it is 3.5MHz.)

- Following feature is available when DATA Bit length under 8BIT.
    - Fixed packet data by ordering Byte length.
    - Fixed packet by ordering Byte length.

19. [DATA_LOGGER]Catch Program

19-1:Catch of digital signal

- Enable to judge the analog signal HI or LOW continuously by using CMOS level as threshold.
- Enable to select catch interval 10 KHz/50KHz.
- Enable to use 8 channels.

19-2:Catch of analog signal
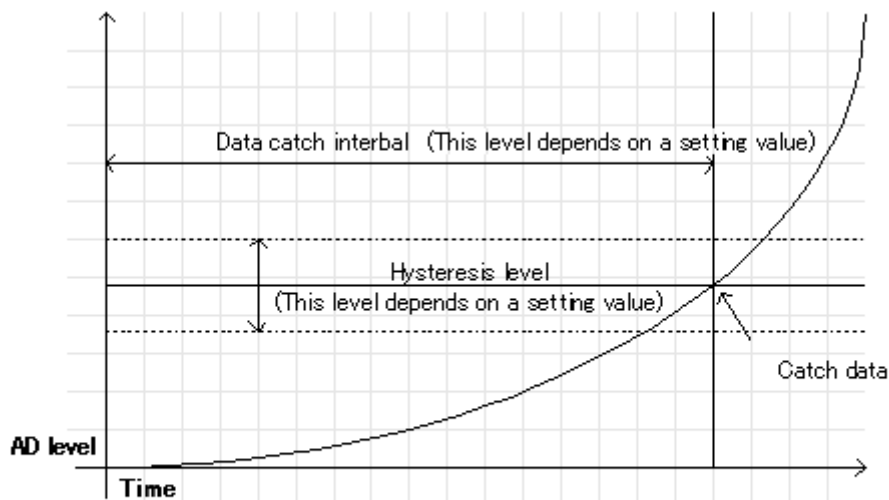
- Enable to catch AD level with 8bit resolution.
- Enable to select catch interval 10 KHz/50KHz.
   The change signal level is shown on the monitor when the change is detected.
- Enable to adjust amount of change by setting of hysteresis.
- Enable to use 8 channels.
- For analog input, you need to purchase a separate Analog Box.

20. About the setting of Data logger

20-1:<Catch Type Setting> the setting contents in the tab

By clicking [Catch setting]-[Catch Type Setting] the < Channel Setting > dialog box can open.

Please do the setting with regard to the Data logger.

Please set up it in accordance with the following explanation.
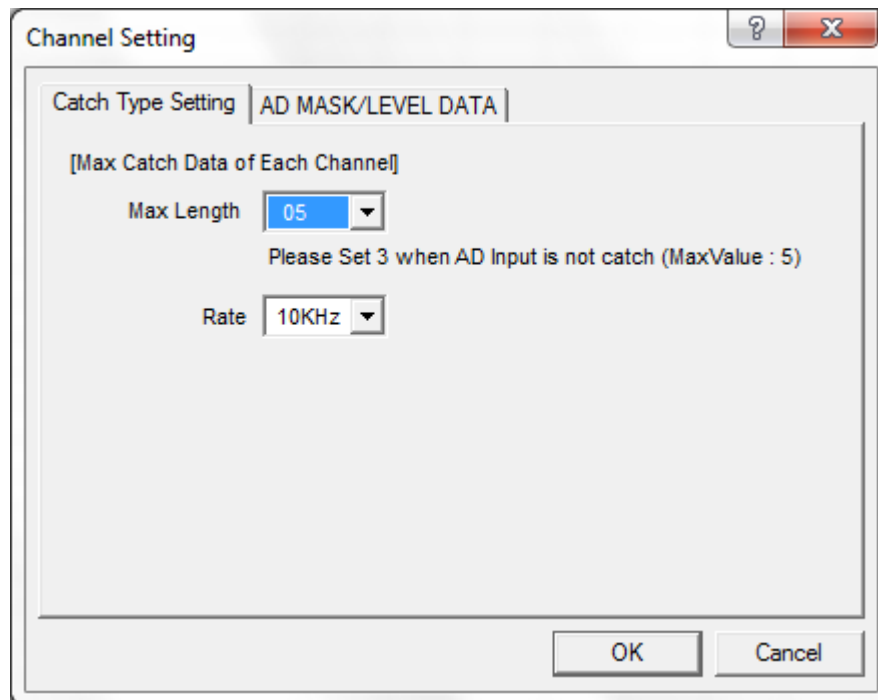
[Max Catch Data]

  <Max Length>

  The number of the DATA line that is displayed to the screen is set up.

  When Max Length is set up with 3, D01-D3 is displayed to the DATA line.

  MAX value is 5.

  <Rete>

  Select Sampling Rate. 10KHz or 50KHz selectable.

The method of the catch of AD is able to be set up.
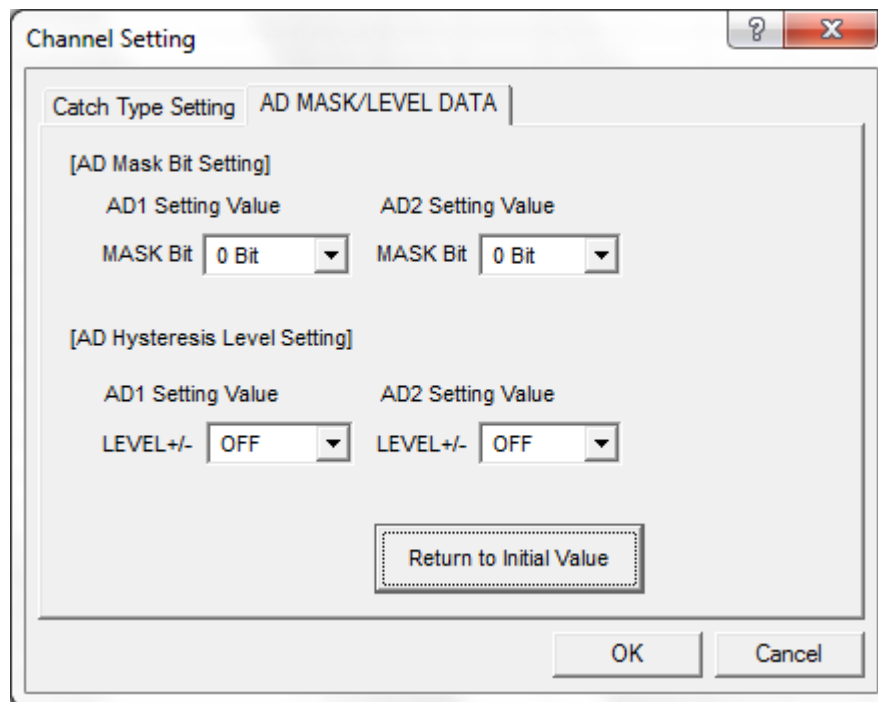
[AD Mask Bit Setting]
> The bit number that masks to AD data is set up.

[AD Hysteresis Level Setting]
> Hysteresis of AD catch is set up.
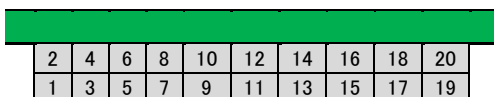
2O-3:Port setting

When you click [Catch setting] -> [Port setting], the menu of port setting at DC3 I/F Board is displayed.
Follow the instructions on the screen, please set similar to the DIP SW of the board.

2O-4:Connector List

20pin connector pin array (The figure seen from the connector insertion opening)

2	4	6	8	10	12	14	16	18	20
1	3	5	7	9	11	13	15	17	19

CN1 / CN2 (Connector name on the back substrate)

	Pin name		Signal name
1	IN_A[0]	IN_AX[0]	DAT0 input（Digital）
2	IN_A[1]	IN_AX[1]	DAT1 input（Digital）
3	IN_A[2]	IN_AX[2]	DAT2 input（Digital）
4	IN_A[3]	IN_AX[3]	DAT3 input（Digital）
5	IN_B[0]	IN_BX[0]	DAT4 input（Digital）
6	IN_B[1]	IN_BX[1]	DAT5 input（Digital）
7	IN_B[2]	IN_BX[2]	DAT6 input（Digital）
8	IN_B[3]	IN_BX[3]	DAT7 input（Digital）

CN3

	Pin name	Signal name
1	TRIG[0]	External trigger input
2	TRIG[1]	
3	EVENT[0]	Event Output that is set by event filter.
4	EVENT[1]	

※Analog input of 2Ch is inputted from connector of Analog Box.

CAUTION:
- Connect target GND with DC3 board GND.
  Please ground even so the catch data is unsteady.
- Power DC3 before connecting probe with communication line. If not, it cause of trouble.

21. How to make Command Analyzing Definition File

Command Analyzing Definition File is the file that is defined in how to expand the catch data
(Display Image-1 D01~D10 bellow) and how to display them in the position shown "expanded result"
in Display Image-1. File extensions of this file should be ".cmd" though this file can be saved
in any directories. When installing, files such as "3Wire_st.cmd" etc. are made in
"Heartland Data¥DC3¥lib", please refer to these files.

[Display image-1]

21-1:Feature (Useful to do this)

- Possible to expand and display the catch data (D01-) in the form easy
   to understand in "Command" column and "Info" column.
- Only describing the expression (left is the catch data and right is the form to display)
   in Command Analyzing Definition File with a text editor
- Possible to display multiply the form, Dec, Hex, ASCII, Bits, Strings
- The form is similar to printf() function in the C and easy to learn
   -Easy to confirm the modified item immediately loading the file in the Catch Window

21-2:Restriction/Limitation

- Cannot use "," (comma) in strings
- Please describe "%%" when using "%" in strings
- The number of character in one line is up to 256
- Lines which begin with ";" (semi-colon) are comment line

21-3:Section

【1】3WIRE_CATCH

─ **Describing form** ─
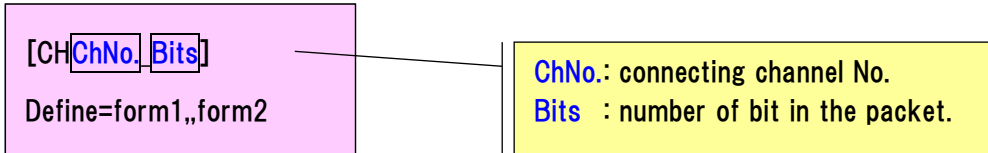
[CH ChNo. Bits]

Define=form1,,form2

ChNo.: connecting channel No.
Bits : number of bit in the packet.

─ **Comments** ─

When describing [CH1_008], this means the definition to the packet made of 8 bits in chanel-1.
This system limits the number of data possible to display in one line to 32 bytes.
For example, the packet made of 36 bytes is displayed in two lines. Each data 33~36th
are displayed as D01~D04 in the line with "CHCONTX"(X is CHNo.) in "CH" column. In this case,
the form in this line is
[CHCONTChNo._Bits], and the description is [CHCONT1_032].

When describing [CH1_000], the number of bit in the packet is ignored and all catch packets in
chanel-1 will be expanded and displayed.
The form is divided by ","(comma, comma), so that form1 can be displayed as "[MUTE-∞]" in
Command column (refer to "expanded result" Image-1), and form2, "1 byte" in Info column.
Define form and Display form is mentioned later.

─ **Notes** ─

Please set the number of Bit in 3-digit number.

Example	Description
When a packet in chanel-1 is 8 bit data.	[CH1_008]
When a packet in chanel-1 is 16 bit data.	[CH1_016]
When a packet in chanel-1 is 128 bit data.	[CH1_128]

Alphabets can be described in both capital letter and small letter but cannot be mixed.

【2】I2CBUS_400K

― Describing form ―

[CH ChNo. Byte]

Define=form1„form2

ChNo. : connecting channel No.
Byte : number of byte in the packet.

― Comments ―

When describing [CH1_008], this means the definition to the packet made of 8 bits in chanel-1.
This system limits the number of data possible to display in one line to 32 bytes.
For example, the packet made of 36 bytes is displayed in two lines.
Each data 33~36th are displayed as D01~D04 in the line with "CHCONTX"(X is CHNo.)
in "CH" column. In this case, the form in this line is [CHCONTChNo._Bytes],
and the description is [CHCONT1_004].

When describing [CH1_000], the number of byte in the packet is ignored
and all catch packets in chanel-1 will be expanded and displayed.

The form is divided by "„"(comma, comma), so that form1 can be displayed
as "[MUTE] -∞" in Command column (refer to "expanded result" Image-1),
and form2, "1 byte" in Info column.

Define form and Display form is mentioned later.

― Notes ―

Please set the number of Bit in 3-digit number.

Example	Description
When a packet in chanel-1 is 8 byte data.	[CH1_008]
When a packet in chanel-1 is 16 byte data.	[CH1_016]

Alphabets can be described in both capital letter and small letter but cannot be mixed.

— Describing form —

[ACK ChNo._ Byte]

Define=form1,,form2

ChNo. : connecting channel No.
Byte : number of byte in the packet.

— Comments —

In I2C Standard, 2 lines are 1 set, in first line, displayed communication data,
in second line, ACK/NACK to the communication data.
When describing **[ACK1_002]**, this means the definition to ACK/NACK
in the packet made of 2 bytes in chanel-1.

【3】UART

— Describing form —

[TX ChNo._ Byte]

Define=form1,,form2

ChNo. : connecting channel No.
Byte : number of byte in the packet.

— Comments —

When describing **[TX1_008]**, this means the definition to the packet made of 8 bytes in chanel-1.
This system limits the number of data **possible to display in one line to 32 bytes**.
For example, the packet made of 36 bytes is displayed in two lines.
Each data 33~36th are displayed as D01~D04 in the line with "**CHCONTX**"(**X** is CHNo.)
in "CH" column. In this case, the form in this line is **[TXCONTChNo._Bytes]**,
and the description is **[TXCONT1_004]**.

When describing **[TX1_000]**, the number of byte in the packet is ignored
and all catch packets in chanel-1 will be expanded and displayed.

The form is divided by ",,"(comma, comma), so that form1 can be displayed
as "**[MUTE] -∞**" in Command column (refer to "expanded result" Image-1),
and form2, "**1 byte**" in Info column.

Define form and **Display form** is mentioned later.

— Notes —

Please set the number of Byte in 3-digit.

Example	Description
When a packet of TXD in chanel-1 is 8 byte data.	[TX1_008]
When a packet of TXD in chanel-1 is 8 byte data.	[TX1_016]

Alphabets can be described in both capital letter and small letter but cannot be mixed.

― Describing form ―

[RXChNo. Byte]

Define=form1,,form2

ChNo. : connecting channel No.
Byte : number of byte in the packet.
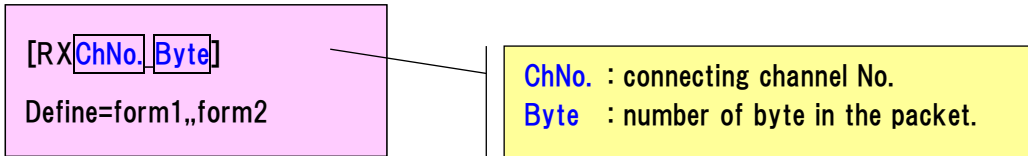
― Comments ―

When describing [RX1_008], this means the definition to the packet made of 8 bytes in chanel-1.
This system limits the number of data possible to display in one line to 32 bytes.
For example, the packet made of 36 bytes is displayed in two lines.
Each data 33~36th are displayed as D01~D04 in the line with "RXCONTX"(X is CHNo.)
in "CH" column. In this case, the form in this line is [RXCONTChNo._Bytes],
and the description is [RXCONT1_004].

When describing [RX1_000], the number of byte in the packet is ignored
and all catch packets in chanel-1 will be expanded and displayed.

21-4:Definition

There are 2 kinds of HEX and BIT forms in the Definition.

[1] Definition of HEX form.

— **Describing form** —

$HEX h or $HEX H

HEX   : Hexadecimal number 0~f

— **Comments** —

Please do not use a character except the number and en a(A), b(B), c(C), d(D), e(E), f(F), x(X).

The following HEX number is considered as a fixed number.
0,1,2,3,4,5,6,7,8,9, a(A),b(B),c(C),d(D),e(E),f(F)
When HEX number is x or X, the data of its part is ignored.

— **Example** —
$10h=
$0xh=
$xxh=
$12h34h=
$12hxxhxxhxxh=

[2] Definition of Bit form.

— **Describing form** —

$BIN b 又は $BIN B

BIN   : Binary number 0 or 1

— **Comments** —

Please do not use a character except 0,1,x(X).

When BIN number is 0 or 1, it is considered as a fixed number.

When HEX number is x or X, the data of its part is ignored.

— **Example** —
$10000000b=
$0000xxxxb=
$xxxxxxxxb=
$00010010B00110100B=
$00010010bXXXXXXXbXXXXXXXbXXXXXXXXb=

[3] Definition mixed HEX form and bit form.

In the 1BYTE unit, the mixture of the HEX form and BIT form are possible.

— **Describing form** —

$BIN b HEX h

$HEX h BIN b

BIN	: Hexadecimal number 0~f
HEX	: Binary number 0 or 1

— **Example** —

$10000000b20h=
$0000xxxxbXXh=
$xxhxxxxxxxxb=
$00010010B00110100B=
$xxh00010010b00110100Bxxh=

The line which begins with "$=", all data are correspond to this.
The data is expanded and displayed when it corresponds to the definition comparing with the definition in order. Therefore, the definition with "$=" in the head is correspond to all data, please be careful.

21-5:Form

The usual string is displayed as it is in the "Command" column or "Info" column.

The definition whose form is designated as follow is displayed in accordance with the form contents.

— **Describing form** —

%(widthtype,Argument)

width	: narrowest width of display field
type	: display form type
Argument	: data to be expanded

— **Comments** —

【1】 *width*

width to be set as the narrowest width display field

n   At least the n character is displayed. The blank is filled in left if the actual display width is smaller than n character.

0n   At least the n character is displayed. 0 is filled in left if the actual display width is smaller than n character.

【2】 *type*

type to be set as how to display in display field

d   Integer displayed in signed decimal number
u   Integer displayed in unsigned decimal number
b   Integer displayed in binary number
x   Integer displayed in hexadecimal number (use small letter)
X   Integer displayed in hexadecimal number (use capital letter)
C   character displayed in ASCII character
S??   Strings set the kind of string pattern table

【3】 *Argument*

Argument shows the DATA No. in 'DATA' column in accordance
with the instruction of width and type.

dmm-dnn

This shows DATAmm~DATAnn. 'mm' and 'nn' are the number of 01~32.

dnn is lower byte. When -dnn is omitted, 1 byte data designated by dmm is shown.

dmmbn-doobp

This shows DATAmm.BITn~DATAoo.BITp. 'mm' and 'oo' are the number of 01-32.
'n' and 'p' are the number of 1~8.

doobp is lower. When -doobp is omitted, 1 bit data designated by dmmbn is shown.

21-6:String Pattern Definition

― Describing form ―

[S??]
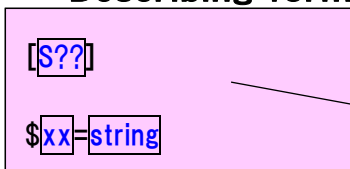
$xx=string

??	: section No. to define string
xx	: the number 00~ff
string	: string to be displayed

― Comments ―

In S??, the section which defines S01~S99(total 99 kinds) string pattern can be designated.
In $xx, 256 table data($00~$ff) can be designated.
The number of character of string is to 63.

― Example ―

[S01]
$00=strings A   : display 'STRING-A' when argument is 00hex
$3F=strings B   : display 'STRING-B' when argument is 3Fhex

The definition which straddles a screen line is possible.
This is effective when the Byte number of communication packets exceeds 32.
Possible to define display form regarding 2 lines
This is useful in the case the number of byte in the packet is over 32.

― Example ―

[CHCONT1_000]
$-1txxh01h=ZERO=%(4b,d01b4-d01b1)

― Content of Packet ―

00h,01h,03h,02h,05h,08h,01h,04h,0fh,00h

CH1Line Part   CONT1 Line Part

― Displaying Image ―

No.	command	CH.	Byte	D01	D02	D03	D04	D05	D06	D07	D08
1		CH1	8	0x00	0x01	0x03	0x02	0x05	0x08	0x01	0x04
2	ZERO=1111	CONT1	2	0x0f	0x00	0x00	0x00	0x00	0x00	0x00	0x00

― Comments ―

There should be the definition to each No.1 and No.2 line in above display contents, because the definition of command analysis is to define in each display line in this system.

In the setting menu of the communication type,
the communication packet can be displayed in 2 lines
(referring to the manual of each catch program).
(When the number of byte in communication packet is over 32,
after 33rd byte is automatically displayed next line.)
In that case, this definition is useful.

The above example shows the definition to No.2 line,
but the reference of the previous line is possible by using $-1t.
In this case, using $-1t, D02 in No.1 line is the object to define.
Also, using $+xt is possible, and the data before x lines is the object to define.
x is possible to describe in 1~9 range.

21-8:Description Example and Display Image

[1] This is the description example and display result about the case: displaying "[Test Data]" in "Command" column and "32bit" in "Info" column when D01 in No.2 is 0xF8.

― **Example** ―
[CH1_032]
$F8hxxhxxhxxh=[Test Data],,32Bit

― **Display Image** ―

No.	CH.	Bit	Time	Command	Info	D01	D02	
■ 1	CH 1	32	5584ms	[Test Data]	32Bit	0xF8	0x00	
■ 2	CH 1	32	2045ms	[Test Data]	32Bit	0xF8	0x00	
■ 3	CH 1	32	4072ms	[Test Data]	32Bit	0xF8	0x00	
■ 4	CH 1	32	1842ms	[Test Data]	32Bit	0xF8	0x00	

DataCatcher3 Ver 1.10E   CatchProgram = [3WIRE_CATCH]
File (F)   Display / Editing (E)   Catch Start (A)   Catch Setting (L)   Help (H)
TypeFile = [3WIRE_ST.TYP] CommandFile = [DC3_Command.cmd]

[2] This is the description example in the case of defining above D01 in binary form.
In this case display result will be same with above display image.
― **Example** ―
[CH1_032]
$11111000bxxhxxhxxh=[Test Data],,32Bit

[3] This is the description example and display result about the case: displaying decimal number in 5-digit (filled in blank left if the display digit is smaller than 5) after "[Test Data] : Data4=" in "Command" column when D03 in No.2 is 0xF8.
― **Example** ―
[CH1_032]
$F8hxxhxxhxxh=[Test Data] : Data3=%(5d,d04),,32Bit

― **Display Image** ―

No.	CH.	Bit	Time	Command	Info	D01	D(
■ 5	CH 1	32	5584ms	[Test Data]:Data3= 4	32Bit	0xF8	0x(
■ 6	CH 1	32	2045ms	[Test Data]:Data3= 4	32Bit	0xF8	0x(
■ 7	CH 1	32	4072ms	[Test Data]:Data3= 4	32Bit	0xF8	0x(
■ 8	CH 1	32	1842ms	[Test Data]:Data3= 4	32Bit	0xF8	0x(

DataCatcher3 Ver 1.10E   CatchProgram = [3WIRE_CATCH]
File (F)   Display / Editing (E)   Catch Start (A)   Catch Setting (L)   Help (H)
TypeFile = [3WIRE_ST.TYP] CommandFile = [DC3_Command.cmd]

[4]This is the description example in the case of changing above definition to display in 2-digit.

── **Example** ──

[CH1_032]
$F8hxxhxxhxxh=[Test Data] : Data3=%(2d,d03),,32Bit

── **Display Image** ──

No.	CH.	Bit	Time	Command	Info	D01	D...
9	CH 1	32	5584ms	[Test Data]:Data3= 4	32Bit	0xF8	0x...
10	CH 1	32	2045ms	[Test Data]:Data3= 4	32Bit	0xF8	0x...
11	CH 1	32	4072ms	[Test Data]:Data3= 4	32Bit	0xF8	0x...
12	CH 1	32	1842ms	[Test Data]:Data3= 4	32Bit	0xF8	0x...

DataCatcher3 Ver 1.10E   CatchProgram = [3WIRE_CATCH]
File (F)   Display / Editing (E)   Catch Start (A)   Catch Setting (L)   Help (H)
TypeFile = [3WIRE_ST.TYP] CommandFile = [DC3_Command.cmd]

[5]This is the example in the same condition with[3]in the case filled in 0 left if the display digit is smaller than the digit set by user

── **Example** ──

[CH1_032]
$F8hxxhxxhxxh=[Test Data] : Data3=%(05d,d03),,32Bit

── **Display Image** ──

No.	CH.	Bit	Time	Command	Info	D01	D...
13	CH 1	32	5584ms	[Test Data]:Data3=00004	32Bit	0xF8	0x...
14	CH 1	32	2045ms	[Test Data]:Data3=00004	32Bit	0xF8	0x...
15	CH 1	32	4072ms	[Test Data]:Data3=00004	32Bit	0xF8	0x...
16	CH 1	32	1842ms	[Test Data]:Data3=00004	32Bit	0xF8	0x...

DataCatcher3 Ver 1.10E   CatchProgram = [3WIRE_CATCH]
File (F)   Display / Editing (E)   Catch Start (A)   Catch Setting (L)   Help (H)
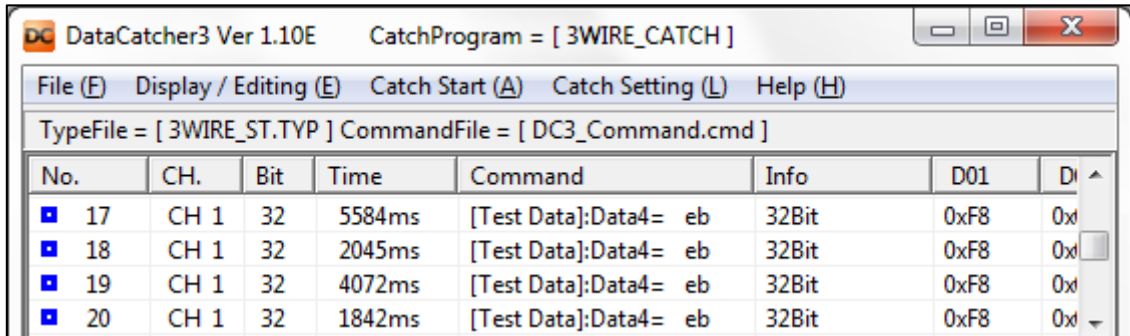TypeFile = [3WIRE_ST.TYP] CommandFile = [DC3_Command.cmd]

[6]This is the description example and display result about the case: displaying D04 in No.2 as a hexadecimal number after "[Test Data] : Data4=" in "Command" column.

— Example —

[CH1_032]

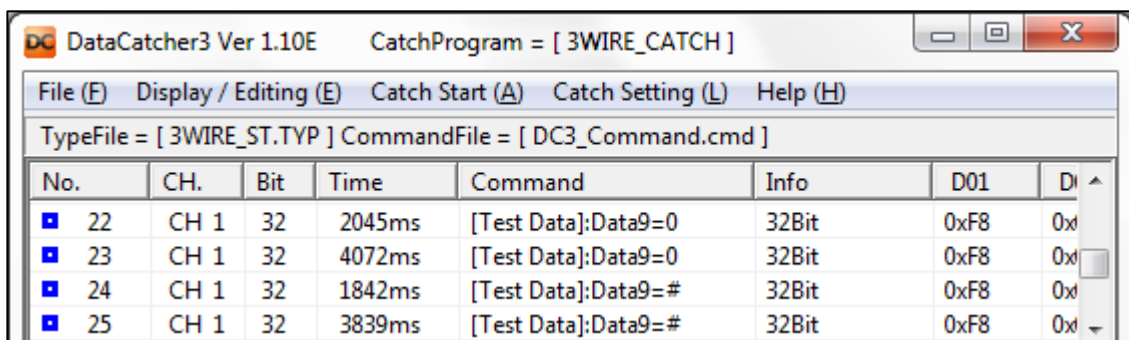$F8hxxhxxhxxh=[Test Data] : Data4=%(5x,d04),,32Bit

— Display Image—

[7]This is the description example and display result about the case: displaying D09 in No.2 as an ASCII character after "[Test Data] : Data4=" in "Command" column.

— Example —

[CH1_032]

$F8hxxhxxhxxh=[Test Data] : Data9=%(c,d09),,32Bit

— Display Image —

[8]This is the description example and display result about the case: displaying "MUTE" after "[Test Data] : Data4=" in "Command" column when D01 in No.2 is 0xF8.

— Example —

[CH1_032]
$F8hxxhxxhxxh=[Test Data] : Data1=%(S01,d01),,32Bit

[S01]
$F8=MUTE

— Display Image —

No.	CH.	Bit	Time	Command	Info	D01	D
■ 27	CH 1	32	5584ms	[Test Data]:Data1=MUTE	32Bit	0xF8	0x
■ 28	CH 1	32	2045ms	[Test Data]:Data1=MUTE	32Bit	0xF8	0x
■ 29	CH 1	32	4072ms	[Test Data]:Data1=MUTE	32Bit	0xF8	0x
■ 30	CH 1	32	1842ms	[Test Data]:Data1=MUTE	32Bit	0xF8	0x

DataCatcher3 Ver 1.10E   CatchProgram = [3WIRE_CATCH]
File (F)   Display / Editing (E)   Catch Start (A)   Catch Setting (L)   Help (H)
TypeFile = [3WIRE_ST.TYP] CommandFile = [DC3_Command.cmd]

HEARTLAND.DATA

361 Fukui-cho, Ashikaga-shi,

Tochigi-Pref, 326-0338, Japan

TEL:+81-284-22-8791 / FAX:+81-284-22-8792

URL: http://www.hldc.co.jp/