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User's Manual

SE-70000

CAN Bus Analyzer

Installation

Document No. U15560EJ2V0UM00(2nd edition)
Date Published September 2003 CP(K)

This equipment complies with the EMC protection requirements

WARNING

This is a 'Class A' (EN 55022: 1998) equipment. This equipment can cause radio frequency noise when used in the residential area. In such cases, the user/operator of the equipment may be required to take appropriate countermeasures under his responsibility.

EEDT-ST-001-11

CAUTION

This equipment should be handled like a CMOS semiconductor device. The user must take all precautions to avoid build-up of static electricity while working with this equipment. All test and measurement tool including the workbench must be grounded. The user/operator must be grounded using the wrist strap. The connectors and/or device pins should not be touched with bare hands.

EEDT-ST-004-10

CAUTION

To operate this attached ferrite must be applied with the interface as shown in the photo. Make sure that the ferrite is located as next to the Host-PC as possible.

Contents Summary

Pentium is the trademark of U.S. Intel Corp.
Microsoft Windows is registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.

PC/AT is the trademark of U.S. IBM Corp.

INTRODUCTION

Readers This manual is intended for user engineers who use microprocessors with an on-chip CAN controller compliant with the CAN specification ISO 11898 and debug CAN systems.

Purpose This manual is intended to give users an understanding of the installation method, operation method, and hardware specifications of the SE-70000.

Organization

The organization of this manual and the details in each chapter are as follows.

- CHAPTER 1 GENERAL
  →This chapter describes an overview of the SE-70000.
- CHAPTER 2 TERMINOLOGY
  →This chapter describes the terms used in this manual.
- CHAPTER 3 CAN BUS ANALYZER
  →This chapter describes the PC-Card interface card, which allows 2-channel CAN communication.
- CHAPTER 4 CAN BUS CARD
  →This chapter describes the software that monitors CAN communication and transmits packets.
- CHAPTER 5 TRANCEIVER CABLE (CAN-1050/54-MT)
  →This chapter describes the cable with an in-built transceiver IC.
- CHAPTER 6 CAN BUS TERMINATOR (CAN-TERM)
  →This chapter describes the CAN BAS terminate resistance.
- CHAPTER 7 SE-70000 Supplementary Manual (Update of PC-Card Driver)
  →This document describes how to update the PC-Card driver.

Conventions

Data Significance : Higher digits on the left and lower digits on the right

Note : Footnote for item marked with Note in the text

Caution : Information requiring particular attention

Remark : Supplementary information

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CHAPTER 1 GENERAL

This manual describes the installation method, operation method, and hardware specifications.

1.1 Organization of Products

The SE-70000 consists of a PC-Card interface card that allows 2-channel CAN communication (CAN Bus Card) and software that monitors CAN communication and transmits packets (CAN Bus Analyzer).

The following are included with this product. Check these accessories first.

1. CAN Bus Card (SE-70000-01) ... 1
2. Transceiver cable (CAN-1050/54-MT□ ... 1
3. CAN line extension cable ... 2
4. CAN line polarity conversion connector ... 2
5. CAN Bus Analyzer installation CD-ROM ... 1
6. CAN Bus Terminator (CAN-TEAM) ... 1
7. SE-70000 User's Manual (this manual) ... Stored as a PDF file in the CD-ROM

CAN Bus Card (SE-70000-1) is a PC-Card-type CAN communication card compliant with PCMCIA 2.1/JEIDA 4.2. It supports up to 2 channels. The transceiver cable is used to connect this card to the CAN line.

The transceiver cable (CAN-1050/54-MT) is a cable with an in-built transceiver to support the physical layer of the CAN line. CAN-1050/54-MT can be used by switching the transceiver, the Philips TJA1050 (high-speed type; up to 1 Mbps) and TJA1054 (low-speed type; up to 125 kbps), on each channel.

The CAN line extension cable is a D-SUB 9-pin male-female cable. This is used as an extension cable connected to the end of the transceiver cable if it is not long enough.

The CAN line polarity conversion connector is a connector to convert polarity of the D-SUB 9-pin male-female. This is used when the polarity of the connector in the CAN line side does not match the polarity of the connector of transceiver cable.

CHAPTER 2 TERMINOLOGY

This chapter explains the terms used in this manual.

Sampling count: The number of times the signal line status is sampled in one bit on the CAN bus line. Either 1 or 3 can be set. If 3 is set, the level sampled the most is adopted as the value on the CAN bus line.

Trace : Monitoring and displaying the status on the CAN line is called "trace". The Trace window displays the trace results.

Packet : Data frames, remote frames, and error frames on the CAN line are collectively called "packets".

Event : The Trace window displays occurrences of trigger input and bit string transmission as well as data/remote frames and error frames (packets). These packets and other phenomena are collectively called "events".

The types of events are shown below.

Table 2-1. List of Events

Event Name	<Trace> Window Display	Description
Reception	Rx	Indicates that a data or remote frame was received from the CAN line.
Transmission	Tx	Indicates that a data frame or remote frame was transmitted to the CAN line due to a transmission request.
Transmission request	TxReq	Indicates that a request for transmission of a data frame or remote frame was sent to the CAN card.
Errorframe reception	ErrorRx	Indicates that an error frame was received from the CAN line. Also displayed when an error frame was received by the CAN card.
Errorframe transmission	ErrorTx	Indicates that an error frame was transmitted to the CAN line due to an error frame transmission request.
Errorframe transmission request	ErrorTxReq	Indicates that a request for transmission of an error frame was sent to the CAN card.
Error	Error	Indicates that an error such as occurrence of a bus off or internal buffer overflow occurred.
Bitstring transmission	BitTx	Indicates that a bit string was transmitted to the CAN line due to a bit string transmission request.
Bitstring transmission request	BitTxReq	Indicates that a request for transmission of a bit string was sent to the CAN card.
Trigger output	TrigOut	Indicates that a trigger (low pulse) was output from the end of the transceiver cable due to a trigger output request.
Triggeroutput request	TrigOutReq	Indicates that a request for output of a trigger from the end of the transceiver cable was sent to the CAN card.
Trigger input	TrigIn	Indicates that a change occurred at the trigger input pin at the end of the transceiver cable.

Bit string transmission

: Function to transmit any bit string to the CAN line. Because the specified bit string is transmitted to the CAN line as is, a bit stuff error or CRC error can be intentionally generated.

In-frame length : Indicates the data length information of the frame output to the CAN line in a data or remote frame. This value is normally the number of bytes of data for a data frame, or normally zero for a remote frame. However, for a data frame, the in-frame can be 8 to 15 in length when the data is 8 bytes, or 0 to 15 for a remote frame.

Monitoring start/stop

: To start monitoring means to start reception and transmission operations. When monitoring starts, the Trace window, Statistical Information window, and Graph window are all cleared. Because the frame log file is opened again when monitoring starts, it is overwritten if the same file as the previous monitoring is still specified. When monitoring is stopped, all reception and transmission operations are stopped. Reception can be paused during monitoring by using the reception start/stop function.

Reception start/stop

: After monitoring starts, reception can be started due to the occurrence of an event, or paused due to occurrence of an event during reception. In this case, "reception" means that the reception status is displayed on the Trace window and output to the frame log.

Text log and frame log

: There are two types of logs. The text log contains events saved in the Trace window in a text file in the same format as that displayed on the Trace window. When user performs a save operation after the monitoring stops, the events saved in the Trace window at that time are saved in this log.

The frame log is a file in binary format and saves all the events that are received by the Trace window from monitoring start to stop. This log generates a file during monitoring. The frame log can be converted from binary format to text format by the Convert Frame Log to Text function.

Event transmission

: The event transmission function transmits the events set in the transmission list in order after the specified time for each event has elapsed according to the transmission start conditions.

Transmission start conditions include "Pressing Specified Key", which starts the transmission when the specified key is pressed, "Specified Time Cycle", which starts the transmission in a certain cycle, and "Specified Frame Reception", which starts the transmission when the specified event is received.

CHAPTER 3 CAN BUS ANALYZER

This chapter explains the overview, installation method, and operation method of the CAN Bus Analyzer.

3.1 Required System

To use the CAN Bus Analyzer, a PC with a Pentium™ 233 MHz or faster (500 MHz or faster is recommended) microprocessor and 64 MB or more of RAM (128 MB or more recommended) is required. To browse Help, a Web browser is required. Microsoft™ Internet Explorer (Version 5.0 or later) is recommended for the Web browser.

3.2 Supported OS

IBM PC/AT compatible machines with Microsoft Windows 98,2000,XP are supported. The installation disk must have 2 MB of free space.

Caution This product cannot be used in the NEC PC-9800 series (except NX series).

3.3 Features

The CAN Bus Analyzer has the following features:

- Monitors up to 2 CAN line channels
- Supports baud rates of up to 1 Mbps. Has the Baud Rate Setting Wizard to simplify baud rate setting.
- Traces only necessary packets by using multiple filtering conditions.
- Stops and resumes trace by multiple conditions.
- Writes the trace results to a file.
- Transmits packets by using the specified time cycle, input from the keyboard, or occurrence of the specified event as a trigger.
- Generates various errors on CAN by using bit string transmission.
- Allows hardware trigger input from the outside and hardware trigger output to the outside.

3.4 Installation

Installation is executed in the following steps.

1. Install the CAN Bus Analyzer from the CD-ROM.
2. Insert the CAN Bus Card in the PC, and install the drivers by using the Wizard.

3.4.1 Installing CAN Bus Analyzer

To install the CAN Bus Analyzer, execute Setup.exe in the attached CD-ROM, and use the Wizard that is displayed.

3.4.2 Installing PC-Card driver

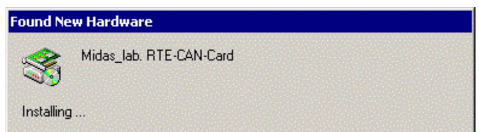
When the CAN Bus Card is installed in the PC for the first time, the New Hardware Found dialog box is displayed, and the New Hardware Detection Wizard starts.

Cautions

1. To install the driver, administrator privileges are required.
2. If the New Hardware Detection Wizard does not start when the CAN Bus Card is inserted, the CAN Bus Card must be deleted by using the Device Manager or the Add New Hardware of Control Panel. The CAN Bus Card must then be removed from the PC, and re-inserted to start the wizard.

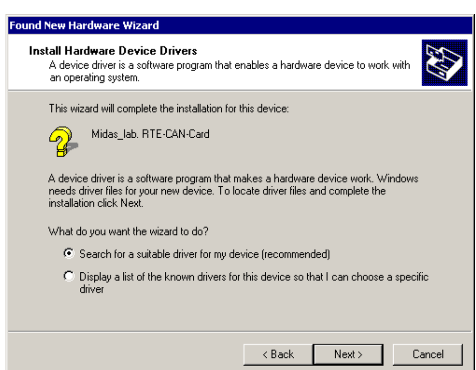
The installation procedure of the driver is as follows.

<1> When the CAN Bus Card is inserted, the following dialog box is displayed.

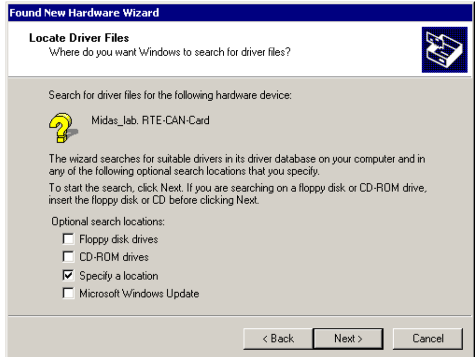


<2> The Wizard starts up. Click the [Next] button.

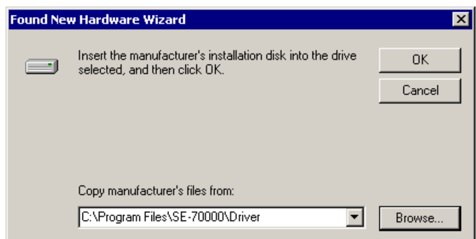
<3> Select "Search for optimal driver for the device (recommended)", and then click the [Next] button.



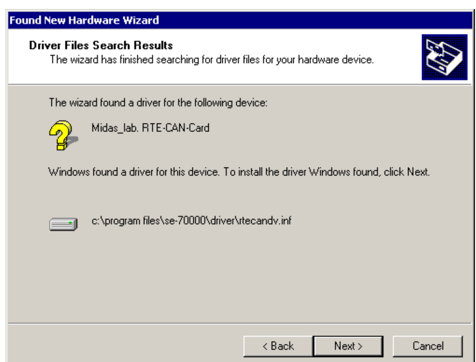
<4> Check "Specify location" only, and then click the [Next] button.



<5> Select the Driver directory in the directory where CAN Bus Analyzer is installed, and then click the [OK] button.



<6> The driver is detected. Click the [Next] button.



<7> The driver has been installed. Click the [Complete] button.

3.5 Using CAN Bus Analyzer

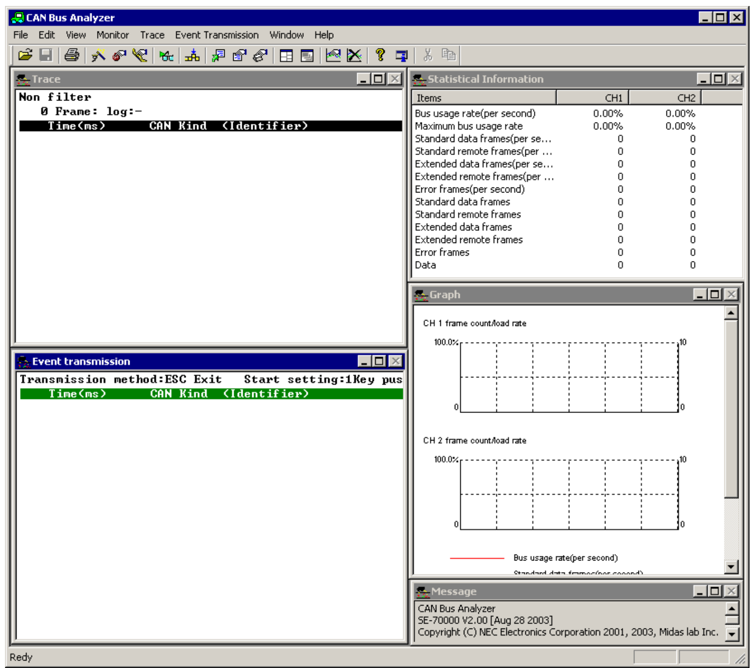
This section explains how to use the CAN Bus Analyzer step by step. For functions not described in this section, refer to Help.

3.5.1 Startup and window layout

Firstly click the CAN Bus Analyzer icon registered on the Start menu during installation. When the CAN Bus Analyzer starts, adjust the size of the outermost window of the CAN Bus Analyzer to the desired size. Then, select [Window]-[Display at Default Position] from the menu bar.

The child windows of the CAN Bus Analyzer are positioned as shown in Figure 3-1.

Figure 3-1. CAN Bus Analyzer



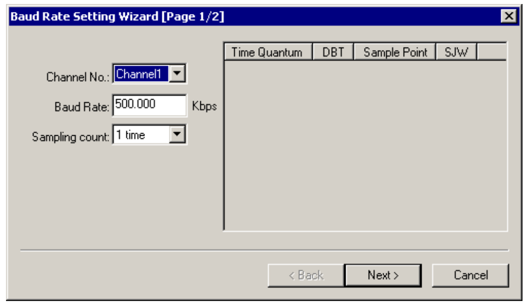
3.5.2 Baud rate setting

Next, set the baud rate. The baud rate can be set in the Channel Setting dialog box displayed by selecting [File]-[Channel Setting] from the menu bar. In this section, the Baud Rate Setting Wizard is used, which is simpler.

Select [File]-[Baud Rate Setting Wizard] from the menu bar. The Baud Rate Setting Wizard is displayed. From Channel Number, select Channel 1, enter "500" in the Baud Rate field, and then click the [Next] button.

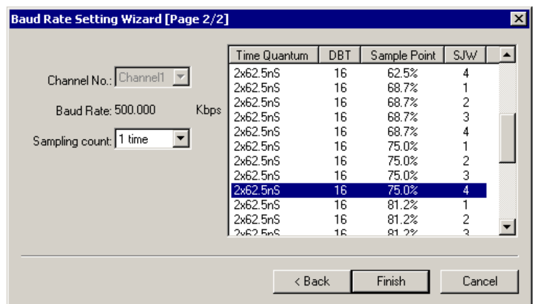
Remark The Baud Rate Setting Wizard can also be started by clicking the  button on the toolbar.

Figure 3-2. Baud Rate Setting Wizard Dialog Box 1



When the [Next] button is clicked, the list of setting parameters corresponding to the input baud rate is displayed on the right side of the dialog box.

Figure 3-3. Baud Rate Setting Wizard Dialog Box 2



Remark In the list displayed on the right side of the Baud Rate Setting Wizard dialog box, the items can be sorted by clicking one of the displayed titles, such as "Time Quantum".

Here, select the combination of "2x62.5nS", "16", "75.0%", and "4". Click the [Set] button.

Remark The guideline to select items in the Baud Rate Setting Wizard list is as follows.
Select an item with a sample point of about 75% the largest possible SJW (Synchronization Jump Width) value (the maximum value is 4).

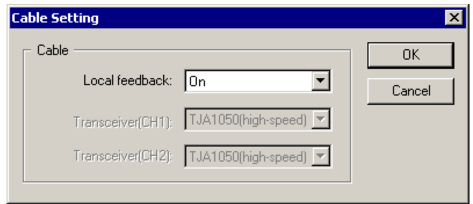
Set Channel 2 in the same way. (Since communication is performed with both Channel 1 and Channel 2 this time, both the channels must have the same baud rate).

Remark The settings in the Baud Rate Setting Wizard can also be referenced in the Channel Setting dialog box.

3.5.3 Feedback setting

Next, set the feedback so that Channel 1 and Channel 2 can communicate without connecting a cable. From the menu bar, select [File]-[Cable Setting] to open the Cable Setting dialog box.
In this dialog box, select "On" for "Local Feedback", and then click the [OK] button.

Figure 3-4. Cable Setting Dialog Box 1



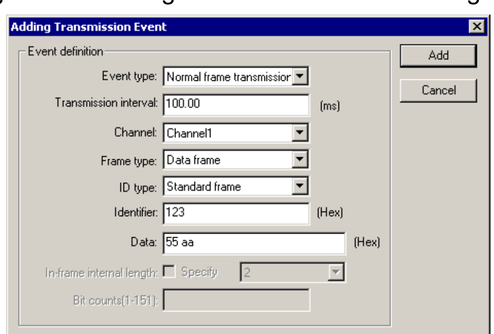
Remarks

1. The Cable Setting dialog box can also be started by clicking the button on the toolbar.
2. To use the transceiver cable, set "Local Feedback" in the Cable Setting dialog box to "Off", and select the transceiver to be used for each channel.

3.5.4 Setting transmission events

Next, set the event (packet) to be transmitted.
Right-click the Event Transmission window, and select "Add Transmission Event" from the popup menu. The Add Transmission Event dialog box is displayed. Input values as shown in Figure 3-5, and then click the [Add] button.

Figure 3-5. Adding Transmission Event Dialog Box



Remark The Adding Transmission Event dialog box can also be started by selecting [Event Transmission]-[Add Transmission Event] from the menu bar or by clicking the button on the toolbar while the Event Transmission window is active.

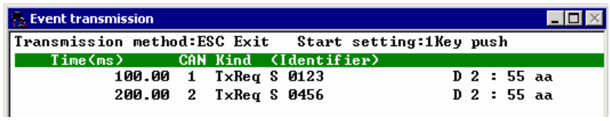
The settings made in Figure 3-5 indicate the following.

- This event is transmitted 100 ms after a transmission start condition is met (or after the previous event). (Transmission start conditions will be explained in the next section.)
- Transmission is from Channel 1.
- Data frames are transmitted.
- The identifier of the data frame is in the standard format.
- The identifier is 123h, and the data is 2 bytes, 55h and aah.

When the [Add] button is clicked in this state, this event is added to the Event Transmission window. Another event can then be added. In the dialog box in Figure 3-5, change the setting of "Channel" to "Channel 2" and "Identifier" to "456h", and then click the [Add] button. Then, click the [Cancel] button.

At this point, the Event Transmission window looks like Figure 3-6. The first event will be transmitted 100 ms after a transmission start condition (refer to **3.5.5 Setting transmission start conditions**) is met, and the second event will be transmitted 100 ms later.

Figure 3-6. Event Transmission Window 1



3.5.5 Setting transmission start conditions

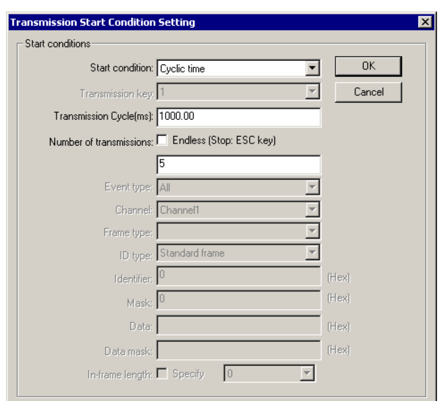
Next, set the transmission start conditions.

Remark

Transmission start conditions are conditions that define the timing to start transmitting the events set in the transmission event list. The events in the transmission event list are transmitted in order when the time for each event has elapsed after the transmission start condition is met. After the last event in the transmission event list has been transmitted, the channel waits for a transmission start condition again.

Right-click the Event Transmission window, and select "Set Transmission Start Conditions" from the popup menu. The Set Transmission Start Conditions dialog box is displayed. Enter values as shown in Figure 3-7, and then click the [OK] button.

Figure 3-7. Set Transmission Start Conditions Dialog Box



Remark The Set Transmission Event dialog box can be started by selecting [Event Transmission]-[Set Transmission Event] from the menu bar while the Event Transmission window is active.

The settings made in Figure 3-7 indicate the following.

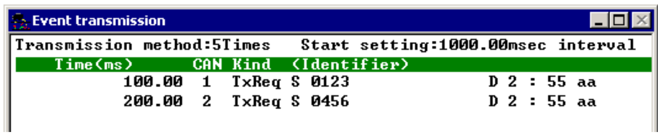
- The events in the transmission event list are transmitted in a certain time cycle.
- The time cycle is 1000 ms (1 second).
- The events in the transmission event list are transmitted 5 times.

Remark

If the "Unlimited" checkbox is checked for "Transmission Count", the events in the transmission event list are transmitted repeatedly from monitoring start to stop.

The Event Transmission window at this point looks like Figure 3-8.

Figure 3-8. Event Transmission Window 2



Remark The settings that are made in the Event Transmission window can be saved to a file. To do this, right-click the Event Transmission window, and select "Save Event Transmission Settings" from the popup menu.

The settings saved to the file can be loaded by selecting "Load Event Transmission Settings" from the same popup menu.

3.5.6 Starting monitoring

Monitoring is now ready to start. When monitoring starts, transmission of the events in the transmission event list specified in the Event Transmission window also starts.

Select [Monitor]-[Start Monitoring] on the menu bar.

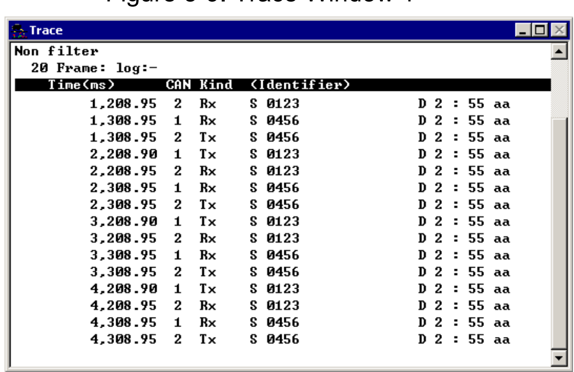
Remarks

1. Monitoring can also be started by clicking the button on the toolbar.
2. During monitoring, operation of the Event Transmission window is prohibited. To operate the Event Transmission window, monitoring must be stopped.

When monitoring starts, transmission of events starts, and the events are received by the other (non-transmitting) channel.

The status is displayed on the Trace window. Figure 3-9 shows the Trace window.

Figure 3-9. Trace Window 1



Remark In Figure 3-9, reception in Channel 1 (Rx) is displayed before transmission from Channel 2 (Tx), but this is normal. Transmission events are displayed when the transmission finishes. Therefore, both events, reception in Channel 1 and transmission from Channel 2, occur almost at the same time.

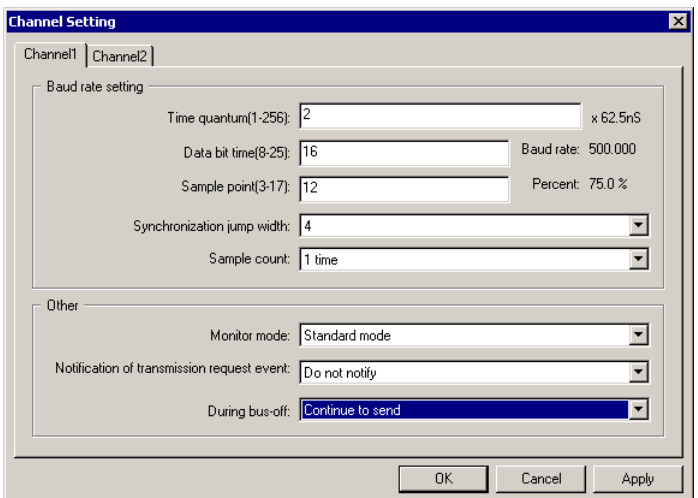
Due to the hardware configuration, if events occur in Channel 1 and Channel 2 at the same time, Channel 1 is processed first. Therefore, of the two events, Channel 1 is displayed first.

If the Trace window does not look like Figure 3-9 and "ErrRx" is displayed, an error frame has occurred. This indicates that transmission failed due to some cause. In this case, stop monitoring and check the following two points.

First, check the feedback setting. Refer to **3.5.3 Feedback setting** and check if the settings are correct.

Second, check whether or not the baud rate settings of Channel 1 and Channel 2 are the same. To check the baud rate setting, select [File]-[Channel Setting] from the menu bar. The current settings are as shown in Figure 3-10. Compare Channel 1 and Channel 2 to check whether or not the settings are the same.

Figure 3-10. Channel Setting Dialog Box



Remark The Channel Setting dialog box can also be opened by clicking the button on the toolbar.

3.5.7 Stopping monitoring

To stop monitoring, select [Monitor]-[Stop Monitoring] from the menu bar.

Remark Monitoring can also be stopped by clicking the button on the toolbar.

3.5.8 Displaying Trace window

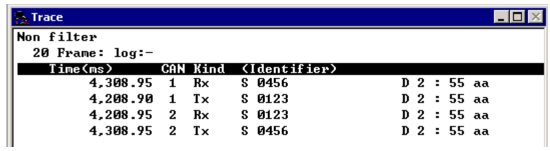
There are two display methods used in the Trace window.

The first method is to scroll events that occurred in the order of time, as shown in **3.5.6 Starting monitor**. This method is used to see the order in which events occurred.

The second method is to display only the last event in terms of time for each type of event. This method is called "Display only last event". This is helpful when users want to know the packet value that occurred last for each type of event.

To switch to "Display only last event", right-click the Trace window, and select "Display only last event" from the popup menu. The window looks like Figure 3-11 when "Display only last event" is selected.

Figure 3-11. Trace Window 2

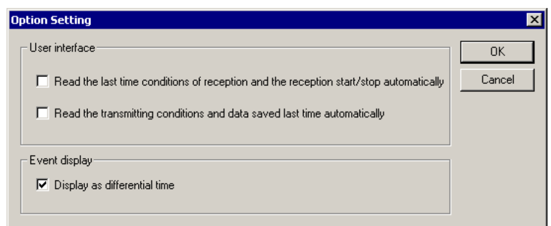


3.5.9 Differential time display

Up to this point, the time display in the Trace window and Event Transmission window has been in absolute time. The time display can be changed into differential time display. Differential time display is a mode that displays the time difference from the previous event.

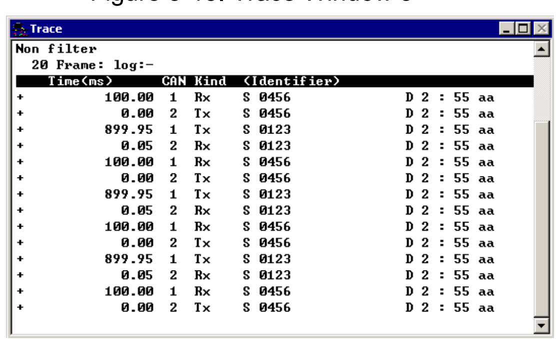
From the menu bar, select [File]-[Option Setting] to open the Option Setting dialog box.

Figure 3-12. Option Setting Dialog Box



Check the "Display in differential time" check box under "Event Display", and click the [OK] button. The Trace window then looks like Figure 3-13.

Figure 3-13. Trace Window 3



Remark If "Display only last event" is selected for the Trace window, the absolute time is always displayed regardless of the settings in "Option Setting". To display the Trace window in differential time, cancel "Display only last event".

3.5.10 Saving events to files

The events received during monitoring can be saved to a file. There are two methods for saving: one is saving in a text log, and the other is saving in an event log.

In a text log, the events held in the Trace window are saved in a text file in the same format. Therefore, saving to the text log can be done only after monitoring stops.

There is a limit to the number of events the Trace window can hold. Therefore, when saving events to the text log, some events may not be saved from monitoring start to stop. In this case, an event log can be used. For the event log, the file name can be specified when monitoring starts, and events are written to the file as they occur. Because the event log is a binary file, the contents are not understandable as is. There is a function to convert the event log to a text log.

(1) Saving the text log

To create a text log, right-click the Trace window, and select "Save Text Log" from the popup menu.

Remark A text log can also be created by selecting [Trace]-[Save Text Log] from the menu bar.

(2) Setting the event log

To create an event log, specify the file name of the event log before starting monitoring. Select [Trace]-[Set Event Log] from the menu bar to specify the file name of the event log.

Remark The event log can also be set by double-clicking "Log:" in the Trace window.

(3) Converting the event log to a text log

To convert the event log to a text log, select [File]-[Convert Event Log to Text] from the menu bar, and input the file names.

3.5.11 Setting reception filter

In the Trace window, a reception filter can be set to display only the desired events in the Trace window or record them in the event log.

Remark The events saved in the event log are the results after evaluation by the reception q filter. Therefore, events discarded by the reception filter are not recorded in the event log.

How to set a reception filter is explained next.

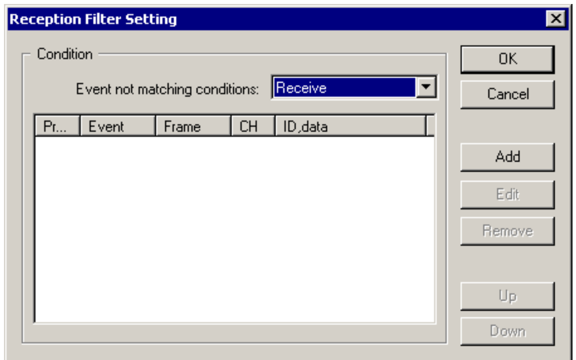
This time, set a filter so that only Channel 1 transmission (Tx) and Channel 2 reception (Rx) are received.

In this case, there may be two methods: registering events to be received as a filter list, and registering events not to be received as a filter list.

First, register events that are to be received as a filter list.

Right-click the Trace window, and select "Set Reception Filter" from the popup menu to start the Reception Filter Setting dialog box.

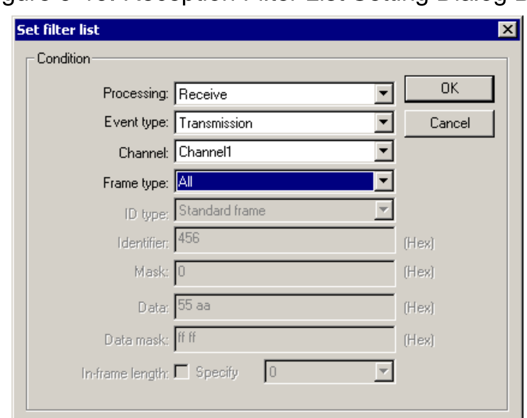
Figure 3-14. Reception Filter Setting Dialog Box 1



Received events are first compared with the filter conditions (filter list) displayed in the lower part of the dialog box. If the event matches a condition that event is either "received" or "discarded" according to the processing specified for that condition. If the received event does not match any condition, the processing selected in the "Event that does not match any condition" drop-down list is applied.

Next, click the [Add] button in this dialog box to open the Reception Filter List Setting dialog box. Enter values as shown in Figure 3-15, and then click the [OK] button.

Figure 3-15. Reception Filter List Setting Dialog Box

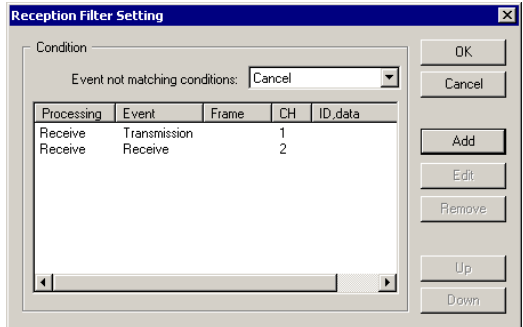


Here, Channel 1 transmission (Tx) is received regardless of its contents. Similarly, add a filter with "Reception" set for "Event Type" and "Channel 2" set for "Channel".

When the Reception Filter Setting dialog box is displayed again, set Event that does not match any condition to "discard".

The settings up to now are shown in Figure 3-16.

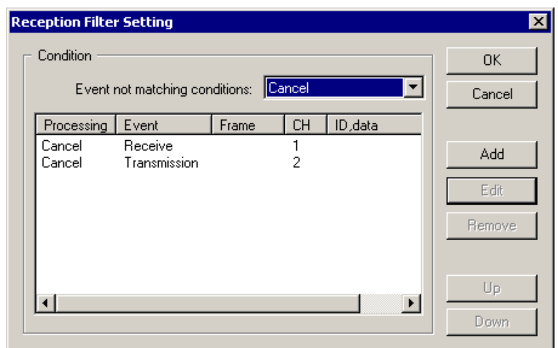
Figure 3-16. Reception Filter Setting Dialog Box 2



Click the [OK] button to set the reception filter.

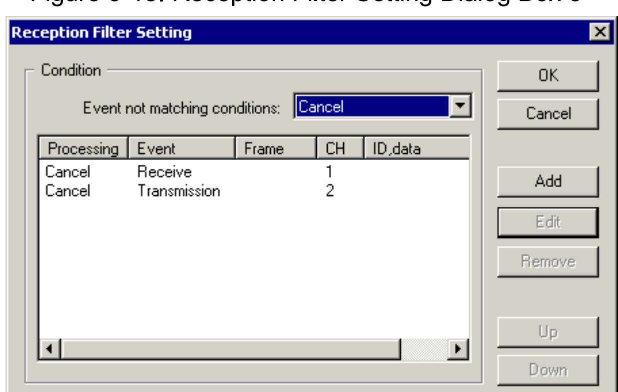
Now, start monitoring. Only the events specified in the conditions are displayed in the Trace window. This is illustrated in Figure 3-17.

Figure 3-17. Trace Window 4



To register events that are not to be received as a filter list and obtain a similar filtering result, the dialog box is set as described below.

Figure 3-18. Reception Filter Setting Dialog Box 3



3.5.12 Multiple Trace windows

More than one Trace window can be opened and a reception filter and event log file set for each window. Thus, the event log can be collected or the trace details viewed for various purposes during one monitoring.

To open a second and subsequent Trace window, select [Trace]-[Open Trace Window] from the menu bar. An open window can be closed by selecting [Trace]-[Close Trace Window].

3.5.13 Connecting transceiver cable

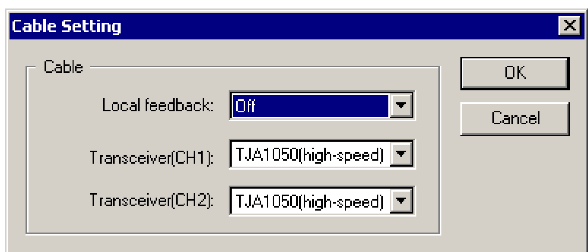
When the transceiver cable is inserted/removed, the CAN Bus Analyzer must be terminated first.

Caution Do not install or remove the transceiver cable while the CAN Bus Analyzer is running as it may cause a malfunction.

When the transceiver cable is attached to the CAN Bus Card and the CAN Bus Analyzer started, select a transceiver using "Cable Setting". A transceiver can be selected by setting the local feedback to off.

In Figure 3-19, the high-speed type (TJA1050) transceiver is selected for both Channel 1 and Channel 2.

Figure 3-19. Cable Setting Dialog Box 2



Caution If the high-speed type is selected as the transceiver, there must be 120 ohm termination at 2 positions on the CAN line to be connected. If Channel 1 and Channel 2 are connected by using the attached CAN line extension cable and polarity conversion connector, normal communication cannot be established because there is no termination.

3.5.14 Reception start/stop conditions

Reception start/stop conditions can be set for each Trace window, in the same way as the settings of the reception filter.

This function allows users to suspend monitoring when event A occurs (an event matching a reception stop condition), and resume monitoring when event B occurs (an event matching a reception start condition).

In the same way as for the reception filter, reception start/stop conditions are also valid for the event log.

CHAPTER 4 CAN BUS CARD

4.1 Features

The features of the CAN Bus Card are as follows.

- TYPE II PC-Card compliant with PCMCIA 2.1/JEIDA 4.2
- Supports frames with 11-bit and 29-bit identifiers that comply with the CAN specification ISO 11898
  - Supports 2 CAN line channels
  - Supports a baud rate of up to 1 Mbps
- Allows transmission of error frames and any bit strings as well as the data and remote frames that are the standard CAN packets

4.2 Specifications

The specifications of the CAN Bus Card are as follows:

Type/configuration: PCMCIA 2.1/JEIDA 4.2 TYPE II 16-bit I/O card

Control CPU: NEC's V850E series CPU

CAN controller: NEC's CPU built-in controller

Current consumption: 300 mA at +5 V

4.3 Cautions

Cautions on using the CAN Bus Card are described below

- Do not install or remove the CAN Bus Card or transceiver cable while the CAN Bus Analyzer is running, as it may cause a malfunction.
- Do not remove the CAN Bus Card from the PC-Card slot while the CAN Bus Analyzer is running.
- The transceiver cable cannot be turned on when local feedback is set to on under “Cable Setting” of the CAN Bus Analyzer. Also, the external trigger input/output function of the transceiver cable cannot be used.

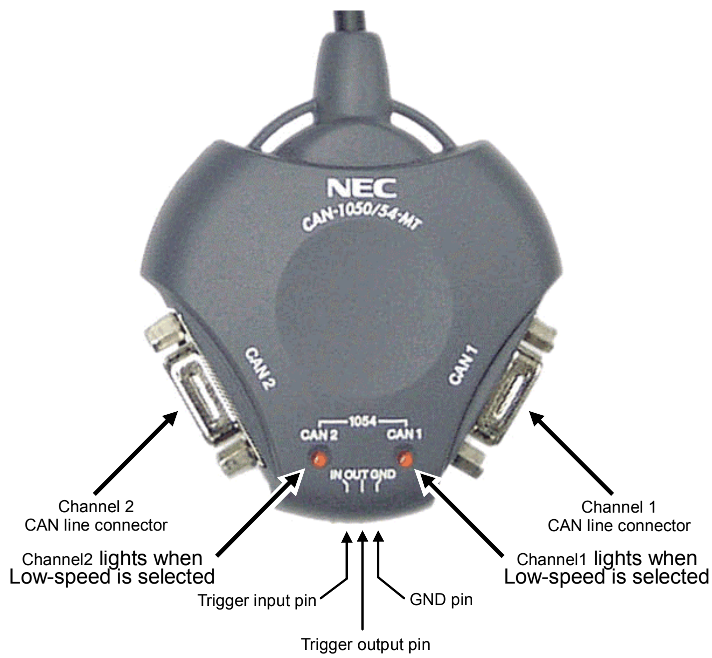
CHAPTER 5 TRANSCEIVER CABLE (CAN-1050/54-MT)

CAN-1050/54-MT is a cable that allows users to switch between the Philips TJA1050 (high-speed) and TJA1054 (low-speed) transceiver IC. The transceiver can be switched by the setting of the CAN Bus Analyzer cable.

5.1 External View

Figure 5-1 shows the external view of the transceiver cable.

Figure 5-1. External View of Transceiver Cable



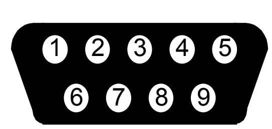
5.2 Connectors

5.2.1 CAN1 and CAN2 connectors

The CAN1/CAN2 connector is a D-SUB 9-pin male connector to connect to the CAN line.

Figure 5-2 shows the pin layout.

Figure 5-2. Pin Layout of CAN1/CAN2 Connector



The signal names for the pins are as follows.

Table 5-1. Signal Name for Each Pin of CAN1/CAN2 Connector

CAN1/2 Pin Number	Signal Name
1	N/C
2	CAN-L
3	GND
4	N/C
5	FG
6	N/C
7	CAN-H
8	N/C
9	N/C

5.2.2 Trigger connector

The gold pin at the end is the connector for a trigger. Table 5-2 shows the correspondence with the silk characters on the cable casing.

Table 5-2. List of Silk Characters on Casing

Silk Characters on Casing	Function
GND	Signal ground
OUT	Trigger output pin. When a trigger occurs, it outputs a low pulse for about 1 µs at the 5V-TTL level.
IN	Trigger input pin. Input at the 5V-TTL level. The rising and falling edges of the signal at this pin are detected. A pulse width of at least 200 ns is required for both low and high.

5.2.3 LED

The LED at the end of the cable lights when TJA1054 (low-speed) is selected as the transceiver and power is being supplied to the cable. The LED does not light even if TJA1054 (low-speed) is selected when the cable power supply is off.

The cable is turned on when the cable setting is done for the first time and the feedback turned off in the CAN Bus Analyzer cable setting, or when the monitoring starts.

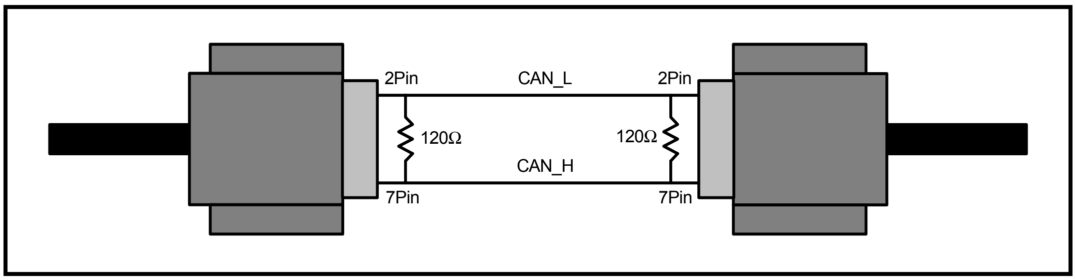
5.2.4 Signal levels and connections (TJA1050)

The signal levels and connections when TJA1050 (high-speed) is selected as the transceiver are shown below.

Table 5-3. Signal Levels When TJA1050 Is Selected

	CAN_L Level	CAN_H Level
Dominant	1.5V	3.5V
Recessive	2.5V	2.5V

Figure 5-3. Connection Diagram When TJA1050 Is Selected



Caution If TJA1050 (high-speed) is selected as the transceiver, there must be 120 ohm termination at two points on the CAN line, as shown in Figure 5-3.

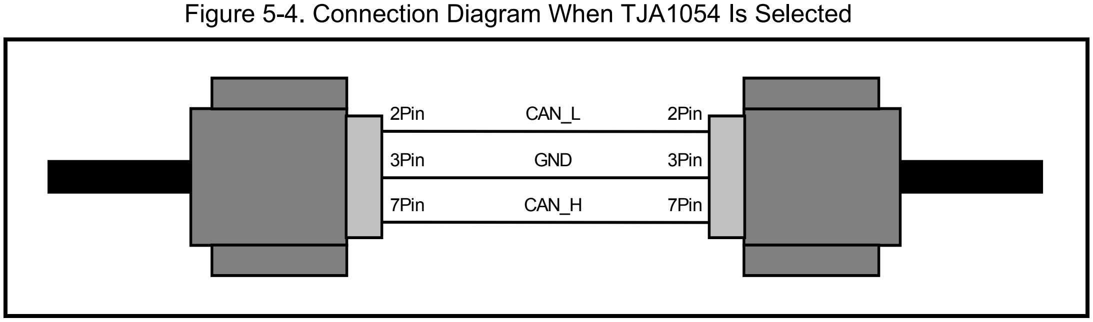
5.2.5 Signal levels and connections (TJA1054)

The signal levels and connections when TJA1054 (low-speed) is selected as the transceiver are shown below.

Table 5-4. Signal Levels When TJA1054 Is Selected

	CAN_L Level	CAN_H Level
Dominant	1.4V	3.6V
Recessive	4.8V	0.2V

Figure 5-4. Connection Diagram When TJA1054 Is Selected



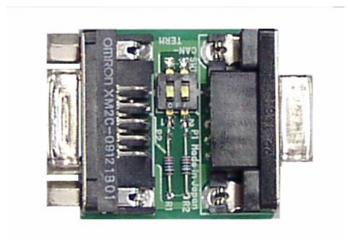
CHAPTER 6 CAN BUS TERMINATOR (CAN-TERM)

CAN-TERM is used to terminate the CAN bus. Male and female D-SUB 9-pin connectors are installed one-to-one, so that CAN-TERM can be installed as a relay between cables, allowing termination with 120 Ω or 60 Ω.

6.1 External Appearance

Figure 6-1 is the External Appearance external appearance of CAN-TERM.

Figure 6-1. External Appearance of CAN-TERM



6.2 Connectors

6.2.1 P1 and P2 connectors

P1 is the D-SUB 9-pin female connector, and P2 is the D-SUB 9-pin male connector.

Figure 6-2 and 6-3 show the pin layouts.

Figure 6-2. Pin Layout of P1 Connector (Female)

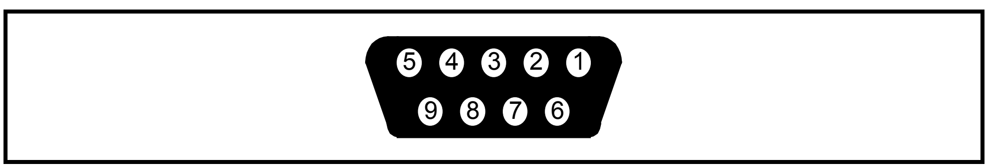


Figure 6-3. Pin Layout of P2 Connector (Male)

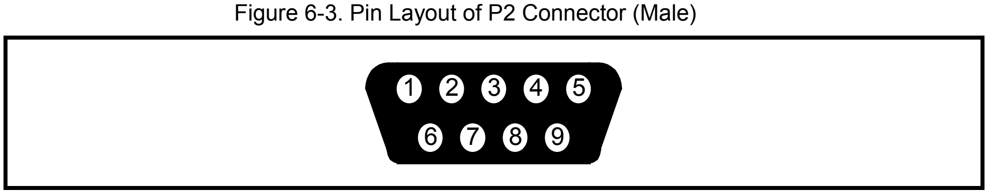


Table 6-1. shows the internal connections.

Table 6-1. Connections of P1 and P2 Connectors and Signal Name for Each Pin

P1 Pin Number	P2 Pin Number	Signal Name
1	1	N/C
2	2	CAN-L
3	3	GND
4	4	N/C
5	5	FG
6	6	N/C
7	7	CAN-H
8	8	N/C
9	9	N/C

6.2.2 SW1 settings

SW1 is a switch to set the resistance value of the termination.

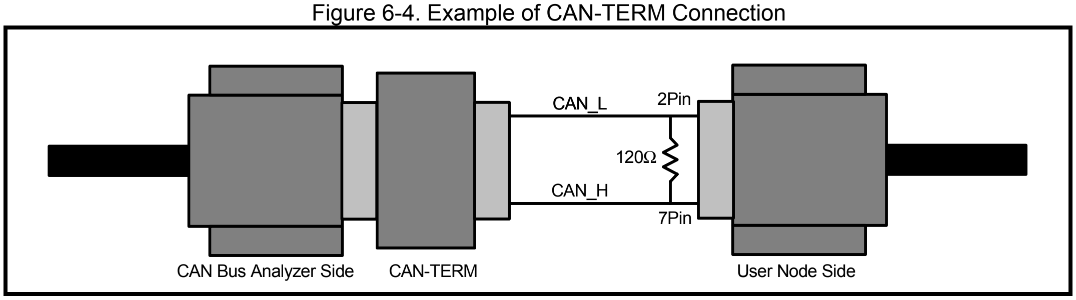
Table 6-2. Functions of SW1

SW1-2	SW1-1	Function
OFF	OFF	Terminal resistance is not connected.
OFF	ON	Terminated with 120 Ω.
ON	OFF	Terminated with 120 Ω.
ON	ON	Terminated with 60 Ω.

6.2.3 Method of use

When TJA1050 (high-speed) is selected as the transceiver, 120 Ω termination is required at two locations on the CAN line, as shown in Figure 5-3. When the CAN Bus Analyzer is connected one to one to a node, the combined resistance on the bus must be set to 60 Ω. Figure 6-4 shows an example of connection.

Figure 6-4. Example of CAN-TERM Connection



CHAPTER 7 SE-70000 Supplementary Manual (Update of PC-Card Driver)

This document describes how to update the PC-Card driver for the SE-70000 (CAN Bus Analyzer). If the PC-Card driver is being installed for the first time, the driver does not have to be updated. For installation of the PC-Card driver, refer to 3.4.2 Installing PC-Card driver in the User's Manual.

7.1 Checking Version of PC-Card Driver (Windows 2000)

The procedure to check the version of the PC-Card driver in Windows 2000 is as follows. To check the version, the CAN Bus Card must be inserted in the PC.

<1>From the Start menu, select Settings, and then select Control Panel to open the Control Panel.

<2>Double-click System in the Control Panel to open the System Properties dialog box.

<3>Select the Device Manager tab in the System Properties dialog box, and click the [Hardware] button.

<4>In the displayed hardware items, double-click RteCanCard to open it. Then, double-click SE-70000 (CAN Bus Card).

<5>Select the Driver tab in the SE-70000 (CAN Bus Card) Properties dialog.

<6>The displayed version is the file version of the PC-Card driver. The correspondence between the file version and PC-Card version is shown below.

File version : **1.0.1.0**

PC-Card driver version : **V 1.0 1**

7.2 Checking Version of PC-Card Driver(Windows 98)

The procedure to check the version of the PC-Card driver in Windows 98 is as follows. To check the version, the CAN Bus Card must be inserted in the PC.

<1>From the Start menu, select Settings, and then select Control Panel to open the Control Panel.

<2>Double-click System in the Control Panel to open the System Properties dialog box.

<3>Select the Device Manager tab in the System Properties dialog box.

<4>From the displayed device managers, double-click RteCanCard to open it. Then, double-click SE-70000 (CAN Bus Card).

<5>Select the Driver tab in the SE-70000 (CAN Bus Card) Properties dialog box, and then click the [Details] button for the driver file.

<6>In the Details dialog box of the driver file, select RTECANDV.SYS. The displayed version is the file version of the PC-Card driver. The correspondence between the file version and PC-Card version is shown below.

File version : **1.0.1.0**

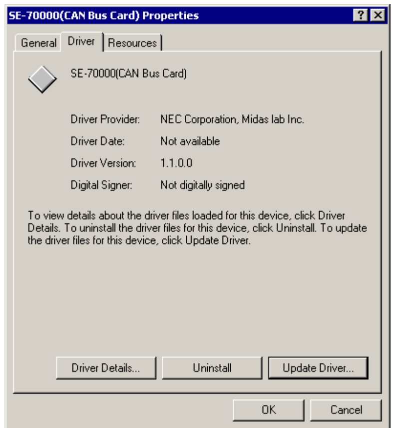
PC-Card driver version : **V1.0 1**

7.3 Update Procedure for PC-Card Driver(Windows 2000)

This section describes the update procedure for the PC-Card driver in Windows 2000. To update the driver, the CAN Bus Card must be inserted in the PC.

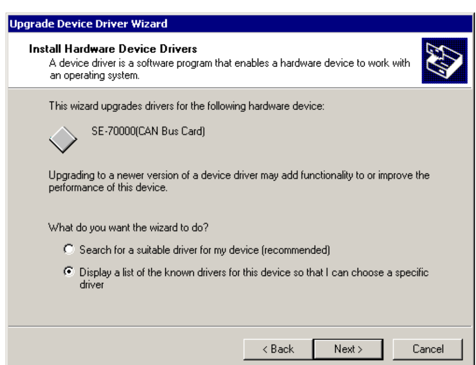
Note To update the driver, administrator privileges are required.

<1>In the SE-70000 (CAN Bus Card) Properties dialog box opened to check the PC-Card version, select the Driver tab, and then click the [Update Driver] button.

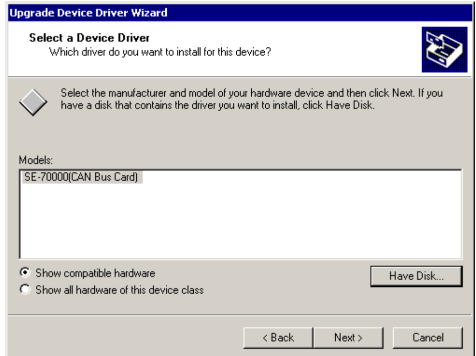


<2>The wizard starts up. Click the [Next] button.

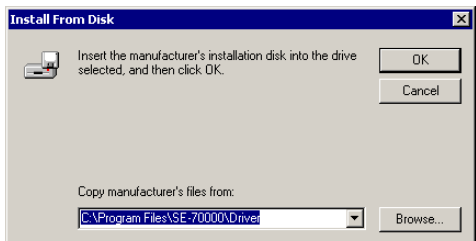
<3>Select "Display known drivers for this device and select from the list", and then click the [Next] button.



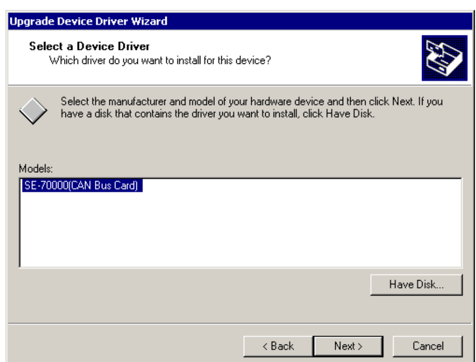
<4>Click the [Use Disk] button.



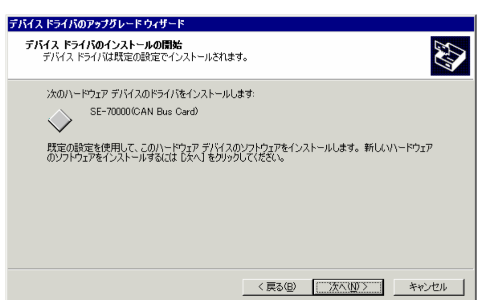
<5>Select the Driver directory in the directory where the CAN Bus Analyzer is installed, and then click the [OK] button.



<6>Click the [Next] button.



<7>Click the [Next] button. When the driver update is complete, the dialog box in Step 1 appears again. The version has been updated.



7.4 Update Procedure for PC-Card Driver (Windows 98)

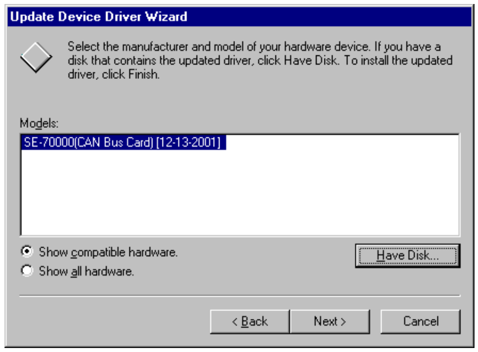
This section describes the update procedure for the PC-Card driver in Windows 98. To update the driver, the CAN Bus Card must be inserted in the PC.

<1> In the SE-70000 (CAN Bus Card) Properties dialog opened to check the PC-Card version, select the Driver tab, and then click the [Update Driver] button.

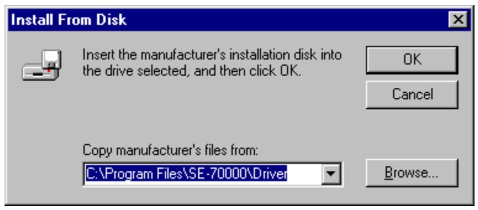
<2> The wizard starts up. Click the [Next] button.

<3> Select "Create a list of all drivers in the specified location and select the driver to install", and then click the [Next] button.

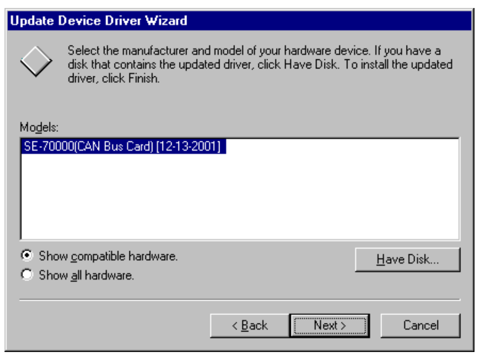
<4> Click the [Use Disk] button.



<5> Select the Driver directory in the directory where the CAN Bus Analyzer is installed, and then click the [OK] button.

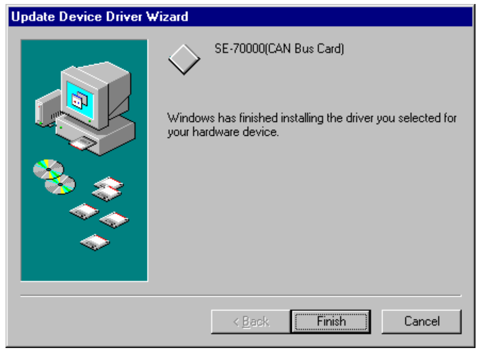


<6> Click the [Next] button.



<7> Click the [Next] button.

<8> Click the [Complete] button. The dialog in Step 1 appears again. That the version has been updated can be checked by clicking the [Driver File Details] button.



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