Synway CTI Series

SHD-30/60/120A-CT/PCI
SHD-30/60B-CT/PCI/FAX

Digital Trunk Voice Board

Hardware Manual

Version 2.0

Synway Information Engineering Co., Ltd

www.synway.net

Contents

Copyright Declaration

Revision History

Version	Date	Comments
Version 1.1	2003-9	Initial publication
Version 2.0	2006-9	Changes: separated call-recoding boards from the CTI series to be a new series.

Note: Please visit our website http://www.synway.net to obtain the latest version of this document.

Chapter 1 Overview

The CTI Series SHD-30/60/120A-CT/PCI and SHD-30/60B-CT/PCI/FAX are digital trunk voice boards with PCI bus, and have almost all functions required by call/voice processing systems that connect to E1 trunks.

1.1 Functions

- A single board accommodates 1, 2 or 4 E1 trunks.
- Supports China SS1, SS7 and ISDN connection.
- Supports phone-calling and voice-processing functions.
- Multiple faxing channels can be used with any on-board voice channel for faxing.
- Activity/silence detection
- Automatic Gain Control (AGC) support in recording operation
- FSK detection and transmission
- Allows DTMF transmission and detection during voice recording or playback.
- Includes H.100 bus, compatible with MVIP bus, SC and ST bus, facilitating smooth connectivity to third-party boards with H.100 bus for the transfer of acquired voice signals to other devices.
- The flexible distributed conferencing system sets no limit on the number of simultaneous conferences and participants in each conference, allows monitoring and recording of the whole conference and each individual speaker.
- The on-board lightning-proof circuit reaches the telecom standard and eliminates the damage caused by the lightning.
- Each board has a unique hardware serial number written in the firmware to distinguish itself from other boards and prevent piracy. The number is available via an easy function call with applications.
- The on-board authorized code identification circuit is designed for software safety. Users can apply to our company for the authorized code.
- Compatible with other series of voice boards from Synway

1.2 Features

- **PCI 2.1 Bus Support**

  Includes PCI 2.1 bus with burst data transmission rate up to 133 MB/s; PNP (plug and play) feature eliminates the need for jumper leads.

- **Signaling Interface**

  SS1 provides two levels of interfaces respectively for MFC transmission/receipt and SS1 connection; SS7 provides two levels of interfaces respectively for MTP and TUP/ISUP, meeting various customer requirements.

- **Signaling Processing**

  Installed with loadable signaling processing module, each board supports SS1, SS7 and ISDN, eliminating the need for extra signaling boards. The singling can be upgraded via a simple software configuration, without having to change the hardware.

- **Signaling Links**

  Each board supports up to 4 singling links and the signaling hot-backup feature, i.e. signalings can be processed by the standby server at any time when something is wrong with the links being used, which increases the flexibility and reliability in a great extent. All the timeslots ranging from 1 to 31, not only the 16th one, can be used for SS7 and ISDN signaling.

- **Programmable Tone Detector**

  Detects single or dual tones at any frequency, offering facility for use with a variety of PBXes and key telephone systems.

- **Terminal Matching Method**

  Offers easy connection of similar interfaces that support either of two G.703-compliant terminal matching methods - use of the 75Ω unbalanced coaxial cable or the 120Ω balanced twisted-pair cable - with a variety of digital trunks and optical transceivers.

- **Specialized Driver Algorithm**

  The driver uses SPECDial - a specialized driver algorithm - to perform a complete automatic dial process through digital lines and to accurately identify the called-party status.

- **Echo Cancellation**

  The self-adaptive echo cancellation feature effectively eliminates echoes under various conditions, which cancels out the effect of voice playback on DTMF and busy tones detection, avoids self-excited oscillation and howling, and minimizes the

possibility of registering wrong DTMF and busy tones in a conference call.

- **Barge in**

  Supports the Barge-in function.

- **Various CODECs Support**

  Offers a large selection of voice CODECs, including hardware-based A-law (G.711), μ-law, IMA-ADPCM, software-based 16-bit linear PCM, MP3 and VOX.

- **Supports WAV File**

  The recorded speech files can be edited and played by audio tools such as Cooledit.

- **Synway's Unified SynCTI Driver Development Platform**

  Synway owns the intellectual property rights for the unified high-intelligence SynCTI driver development platform. Each system supports up to 2048 channels. The complex call procedures can be analyzed and controlled through simple function calls on the driver platform, without having to understand details.

1.3 Operation Principle

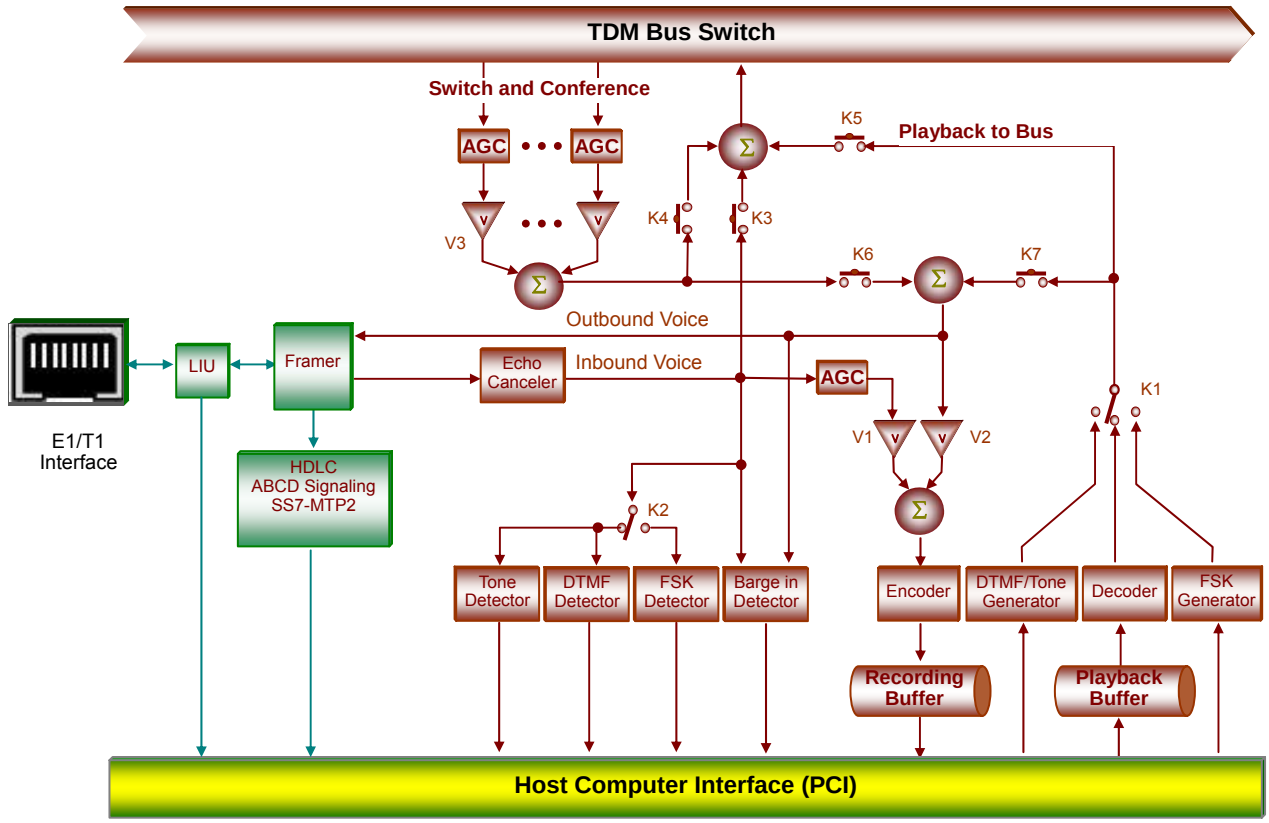

Figure 1-1 Operation Principle

Chapter 2 Installation

2.1 Hardware Structure

- **SHD-30A-CT/PCI/SS7 board**

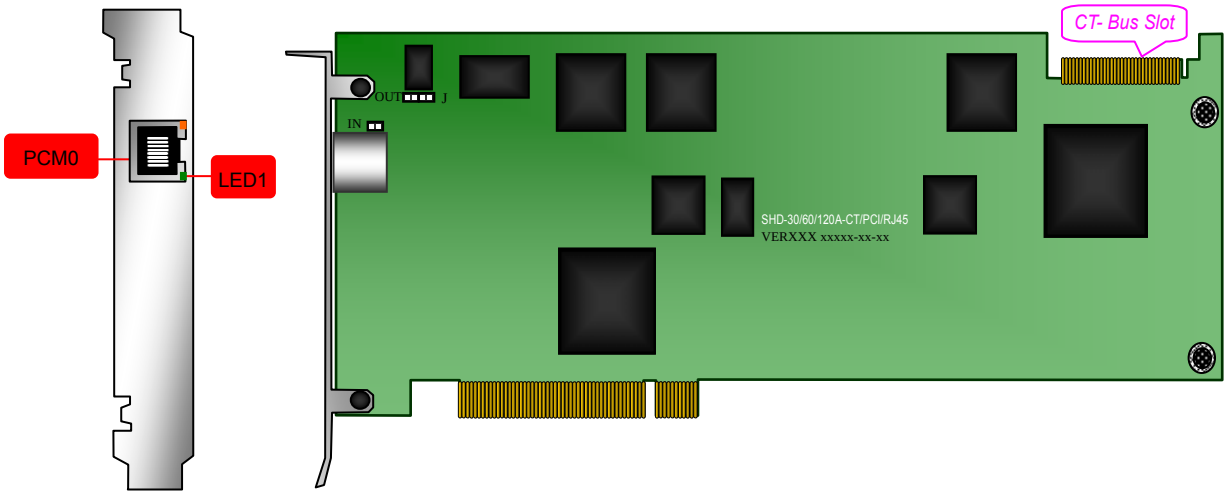

Figure 2-1 Front Side

Notes: In Figure 2-1, PCM0 and LED1 refer to the E1 interface and its synchronization indicator; IN and OUT respectively represent the grounding jumpers at the receiving end and the transmitting while J indicates the impedance jumper.

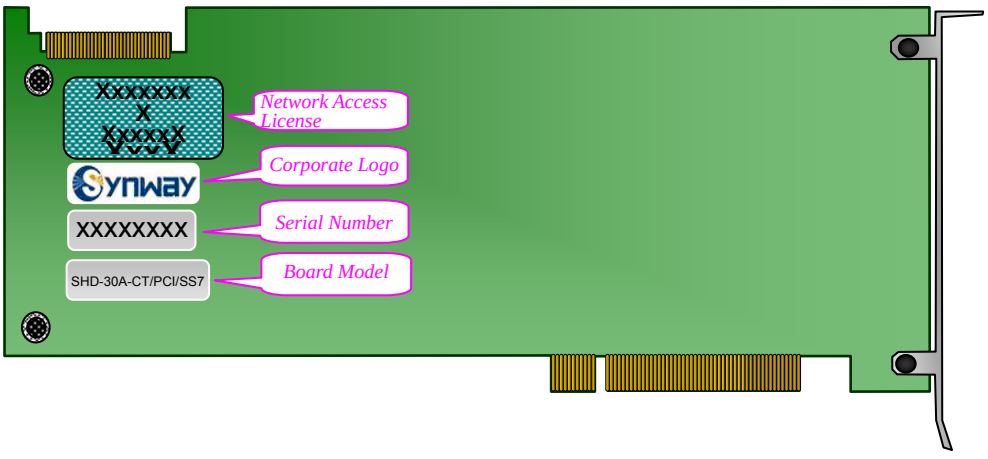

Figure 2-2 Reverse Side

- **SHD-60A-CT/PCI/SS7 board**

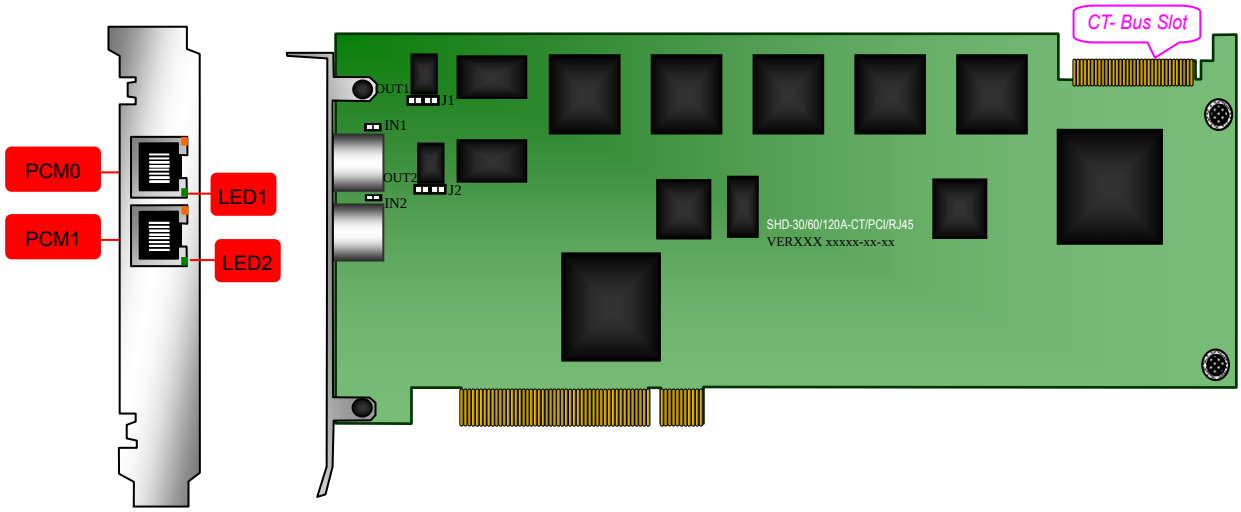

Figure 2-3 Front Side

Notes: In Figure 2-3, PCM0 and PCM1 indicate the 1st and 2nd E1 interfaces while LED1 and LED2 represent their synchronization indicators; IN1, OUT1 and J1 respectively indicate the grounding jumpers at the receiving end and the transmitting and the impedance jumper for the 1st E1 while IN2, OUT2 and J2 for the 2nd E1.

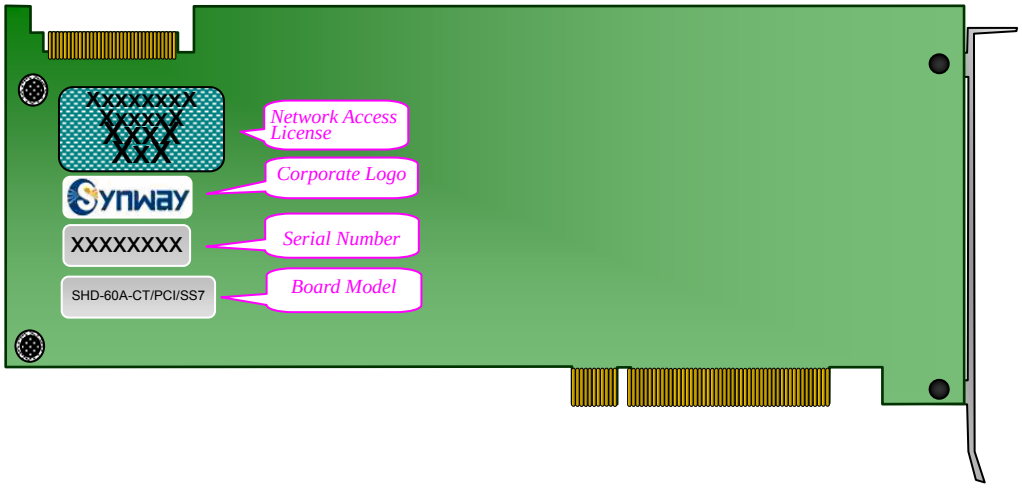

Figure 2-4 Reverse Side

- **SHD-120A-CT/PCI/SS7 board**

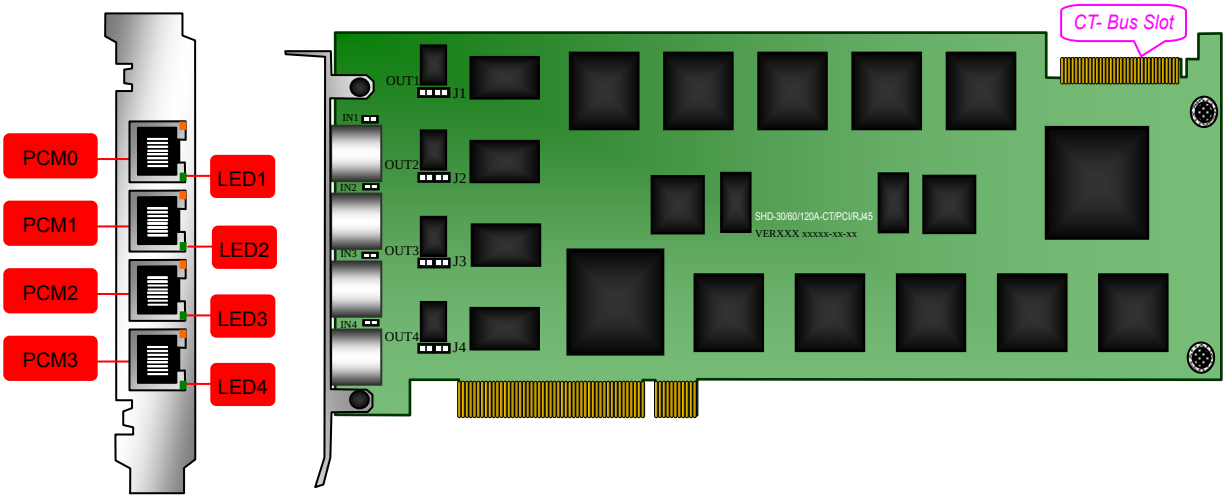

Figure 2-5 Front Side

Notes: In Figure 2-5, PCM0～PCM3 respectively indicate the 1st, 2nd, 3rd and 4th E1 interfaces while LED1～LED4 represent their synchronization indicators; INm, OUTm and Jm (m=1,2,3,4) refer to the grounding jumpers at the receiving end and the transmitting and the impedance jumper accordingly for the 1st, 2nd, 3rd or 4th E1.

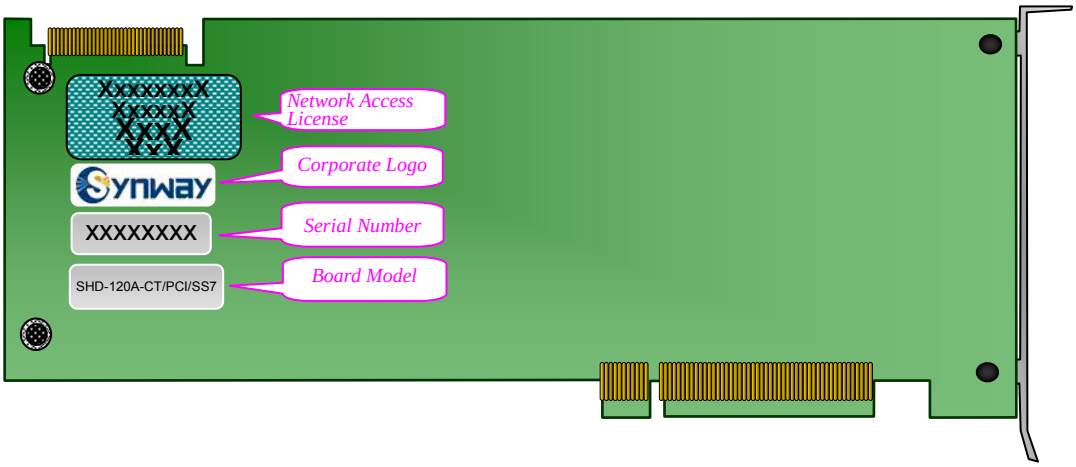

Figure 2-6 Reverse Side

The synchronization indicators illustrated above function as follows:

LED	Definition	Lamp Status	Implication
Green Lamps	Sync	ON	synchronous
		OFF	asynchronous
		FLASH	synchronous but unsteady

Table 2-1 On-board Synchronization Indicators

Notes: This file only illustrates three board models with the above figures but is also applicable to some other models which have similar hardware structure as listed below in Table 2-2. Always check the label on the board to get the board model. Interfaces on these boards are all RJ45 connectors. Users may convert them into BNC connectors by using the RJ45-to-BNC adapter supplied with the board.

No.	Model	Interface
1	SHD-30A-CT/PCI/SS1	1E1
2	SHD-30A-CT/PCI/ISDN	1E1
3	SHD-30A-CT/PCI/SS7	1E1
4	SHD-30B-CT/PCI/SS7/FAX	1E1
5	SHD-60A-CT/PCI/SS1	2E1
6	SHD-60A-CT/PCI/ISDN	2E1
7	SHD-60A-CT/PCI/SS7	2E1
8	SHD-60B-CT/PCI/SS7/FAX	2E1
9	SHD-120A-CT/PCI/SS1	4 E1
10	SHD-120A-CT/PCI/ISDN	4 E1
11	SHD-120A-CT/PCI/SS7	4 E1

Table 2-2 Board Model List

2.2 System Requirements

Host System Requirements

CPU: 300MHz Intel® Pentium®Ⅱ or above

Memory: 256M or more

HD: Depends on individual requirements

Supported Operating Systems

Refer to *SynCTI Programmer's Manual.pdf.*

2.3 Installation Procedure

Step 1: Configure the impedance jumper.

Any board model in this series supports both 120Ω and 75Ω terminal-matching impedances. Selection between the use of 75Ω unbalanced coaxial cables and 120Ω balanced twisted-pair cables can be made simply by changing the jumper mode for the board, without having to change the hardware.

Find the corresponding impedance jumper by the way that PCM0 corresponds to J1, PCM1 to J2, … (See Figure 2-1, 2-3 and 2-5). Make choice of the terminal-matching method depending on your real situation. If you use the jumper cap to short-circuit two

pins, this line works under the 75Ω-unbalanced-coaxial-cable mode. Otherwise, it works under the 120Ω-balanced-twisted-pair-cable mode. Our board uses the 75Ω one by default.

Step 2: Properly fit the required digital trunk board into the PCI slot on the chassis.

Step 3: Connect to digital trunks.

In case the on-board interface (RJ45) differ in type from that of the connected digital trunk (BNC), the RJ45-to-BNC adapter as shown below (see Figure 2-7) is required.

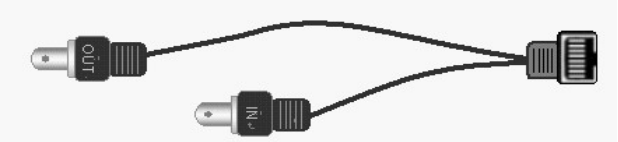

Figure 2-7 RJ45-to-BNC Adapter

If users would like to construct lines for conversion by themselves, they should not only make the line match the on-board interface, but also ensure correct connection of the receive line and its corresponding transmit line. Figure 2-8 is the pin layout for RJ45.

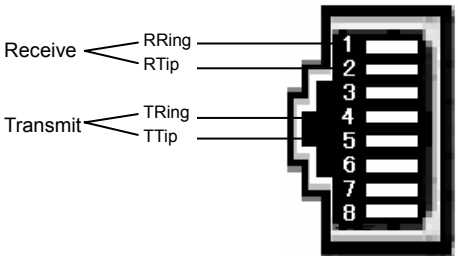

Figure 2-8 Pin Layout for RJ45

Notes:

① Prevent the cross connection of transmit and receive lines. Such mistake can be found out by observing the on-board synchronization indicators. If the indicator is on, that means the receive line is in a normal state; if the indicator is off or flashing, that means the receive line goes abnormal (probably due to the cross connection). However, the state of transmit lines can not be judged via synchronization indicators but should be examined by the opposite terminal.

② On-board synchronization indicators start working only after the PC is powered on and the board is successfully initialized.

Step 4: Connect the bus cable with the H.100 bus on each board.

Skip this step if there is no need for bus exchange between multiple boards.

Note:

① See Figure 2-9 for correct insertion. Do not twist or insert in the opposite direction.

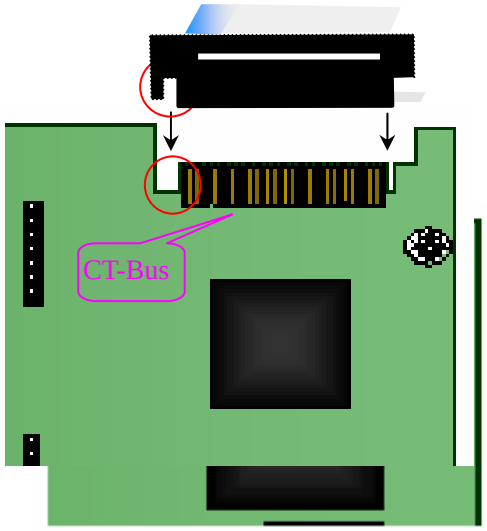

Figure 2-9 Connection of H.100 Bus

② There are two clock settings for our boards: When between-board bus exchange is not required, each board sets its own clock and does not have to be connected to the bus cable; otherwise, each board must be connected to the bus cable to follow the clock of the cable.

③ The bus cable houses stiff conducting material. Therefore, when it has been shaped, do not bend it repeatedly or violently lest it is broken.

Step 5: Configure the grounding Jumper

In consideration of various line conditions, this series boards are equipped with two grounding jumpers for each PCM which respectively control the grounding of the transmitting end and the receiving. ①In the 120Ω-balanced-twisted-pair-cable mode, you must disconnect the grounding jumpers and ensure both the transmitting and receiving ends not grounded; ②In the 75Ω-unbalanced-coaxial-cable mode, the grounding jumpers at the receiving end should be disconnected and the ones at the transmitting end be short-circuited, provided that the PC is properly grounded. This configuration is the factory default setting and applicable in most situations so that there is usually no need to change it. ③If there is difficulty in grounding of the PC at the local terminal, you may short-circuit the on-board grounding jumper at the receiving end and use the transmitting end at the opposite terminal for grounding. ④If the receiving end at the opposite terminal is grounded (improper operation), the on-board grounding jumper at the transmitting end must be disconnected. Refer to Table 2-3 for details.

Generally speaking, in the case of proper grounding at both terminals, only the external layer of the coaxial cable (E1 trunk) at the transmitting end is allowed to be grounded. The grounding of both transmitting and receiving ends may result in a current loop with ground wires, bringing instability to signals. Therefore, such grounding must be strictly avoided.

Opposite Terminal / Local Terminal					
	Transmit End	**grounded**	**grounded**	**non-grounded**	**non-grounded**
	Receive End	**non-grounded**	**grounded**	**non-grounded**	**grounded**
PC grounded	Transmit End	**short-circuited**	**disconnected**	**short-circuited**	**disconnected**
	Receive End	**disconnected**	**disconnected**	**short-circuited**	**short-circuited**
PC not grounded	Transmit End	**short-circuited**	**short-circuited**	**manage to make the PC grounded**	**short-circuited**
	Receive End	**short-circuited**	**disconnected**		**short-circuited**

Table 2-3 Configuration of Grounding Jumpers in 75Ω-unbalanced-coaxial-cable Mode

Step 6: Boot your computer and install the driver.

Regarding driver installation, refer to *Driver Installation Manual*.

Step 7: Configure the operating parameters for the board

Refer to our *Programmer Manual* for details.

Key Tips:

- As the system is expected to run for long hours unmanned, ‘energy-saving’ mode should be turned off for both the CPU and the HD in CMOS or WINDOWS operating system. This is to ensure full-speed operation of the computer, or it may lead to a drop in performance or unexpected errors after running for some time.
- A chassis installed with voice boards must be grounded for safety reasons, according to standard industry requirements. A simple way is earthing with the third pin on the plug. No or improper grounding may cause instability in operation as well as decrease in lightning resistance

Appendix A Technical Specifications

Dimensions

310×115mm^2 (excluding L-bracket)

Weight

≈ 250g

Environment

Operating temperature: 0℃—55℃

Storage temperature: -20℃—85℃

Humidity: 8%—90% non-condensing

Storage humidity: 8%—90% non-condensing

Input/output Interface

E1 interface: Compliant with G.703, including 75Ω unbalanced interface and 120Ω balanced interface

Audio Specifications

CODEC: CCITT A/μ-law 64kbps, IMA ADPCM 32kbps

Distortion: ≤3%

Frequency response: 300-3400Hz (±3dB)

Signal-to-noise ratio: ≥38dB

Echo suppression: ≥40dB

Maximum System Capacity

Up to 8 digital trunk boards concurrently per system; up to 30/60/120 channels per board

Power Requirements

Maximum power consumption: ≤8W

Signaling

SS1: Compliant with DL and MFC standards stipulated in GF002-9002

SS7: Compliant with related provisions stated in Q771-Q795

DSS1: Compliant with Q.933

Audio Encoding & Decoding

16Bit PCM	*128kbps*
8Bit PCM	*64kbps*
A-Law	*64kbps*
μ-Law	*64kbps*
VOX	*32kbps*
ADPCM	*32kbps*
GSM	*13.6kbps*
MP3	*8kbps*

Sampling Rate

8kHz

Safety

Lightning Resistance: Level 4

Certification: FCC; CE; CCC

Appendix B Technical/sales Support

Thank you for choosing Synway. Please contact us should you have any inquiry regarding our products. We shall do our best to help you.

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