



Synway DST Series

SHR-24DA-CT/PCI

Digital Station Tap Board

Hardware Manual

Version 2.1

Synway Information Engineering Co., Ltd

www.synway.net

Contents

Contents	i
Copyright Declaration	ii
Revision History	iii
Chapter 1 Overview	1
1.1 Functions	1
1.2 Features.....	1
1.3 Operation Principle	3
1.4 Functional Modules.....	4
Chapter 2 Installation	5
2.1 Hardware Structure	5
2.2 System Requirements.....	7
2.3 Installation Procedure	7
Appendix A Technical Specifications.....	15
Appendix B Technical/sales Support.....	16

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Revision History

Version	Date	Comments
Version 1.0	2006-10	Initial publication
Version 2.0	2009-1	Changes: Added module number and channel number, updated and corrected some parts of the document.
Version 2.1	2009-5	Changes: Added new specifications of the RJ21 connecting line which is provided with the board.

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

Chapter 1 Overview

The DST Series SHR-24DA-CT/PCI is a 24-channel digital station tap board with PCI bus, used especially for recording of digital subscriber lines (extension lines).

1.1 Functions

- High-impedance recording of digital phone lines through parallel connection
- A variety of ways to start/stop recording
- Supports simultaneous recording on 24 channels, each with a different format
- Supports independent-recording of incoming, outgoing and mixed-recording modes
- ANI and DNIS support
- Synchronous acquisition of the information displayed on digital phones during recording
- Detects all modes of keying supported by user phones
- Activity/silence detection
- Automatic Gain Control (AGC) support in recording operation
- Call progress monitoring
- Automatically checks board to see if modules are correctly inserted and to determine the number of modules on the board
- Supports line-fault detection for digital station tap boards and digital phones

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; supports PCI-X slot.
- **Modularized Design**

This board is designed with modularized structure and can be configured in flexible ways. Each board can be fitted with up to 3 recording modules, and each module can support recording of up to eight 2-lead or four 4-lead digital phone lines. Now it is widely used in various systems.
- **Available RJ21 Connector**

This board has a 50-pin RJ21 connector which is often used for PBXes, making connection easy and malfunctions rare. With the help of a 24-port RJ21-to-RJ11 adapter that is supplied with the board, users can use the RJ11 jack for direct connection.

- **Fits Modules via Inter-plane Connectors**

The use of high-precision, streamlined, inter-plane connectors highlights the characteristic compact and highly-reliable advantage of Synway's all-in-one boards.

- **1 to 24 Port Hi-Z Monitoring of Digital Lines**

This board connects to monitored phone lines via high-impedance and parallel connection of 2 or 4-lead lines, with the access points flexibly positioned on communication lines between a digital PBX and some digital phones. In such way, it is widely used for recording multiple digital PBX and phone models.

- **Programmable Tone Detector**

Detects busy, ringback and fax answering tones, offering facility for use with a variety of PBXes and key telephone systems.

- **High-impedance Recording**

The recording impedance is up to 600Ω AC, ruling out interruption on transmission of monitored signals.

- **Instantly-upgradeable Hardware Circuit**

Using instantly-upgradeable hardware circuits, the board can support different models of PBXes and digital phones simply through software reconfiguration, i.e. there is no need to replace any hardware components. So far, a dozen of mainstream PBXes, such as Alcatel, Avaya, NEC, Siemens, Nortel, are supported.

- **Voice Processing & Signaling Analysis**

A single board is capable of processing voices and handling call-signaling analysis, and can constitute a recording system by itself without the need for supplementary boards or external devices.

- **Various CODECs Support**

Offers a large selection of voice CODECs, including hardware-based A-Law (G.711), μ-Law, IMA-ADPCM, G729A, and software-based 16-bit linear PCM, MP3.

- **Supports WAV File**

The recorded speech files can be played simply by the sound card.

- **Audio Output Interface**

This board is equipped with a tone amplifier circuit and an output interface, so it can connect directly to the headset or sound box, play back speech files and monitor a specified channel in real time via a simple function call.

- **TDM Capability**

Includes H.100 bus, facilitating smooth connectivity to third-party boards with H.100 bus for the transfer of acquired voice signals to other devices.

- **Unique Hardware Serial Number**

Each board has a unique hardware serial number written in the firmware to distinguish itself from other boards in a multi-board system. The number is available via an easy function call with applications.

- **Authorization Code Identification Circuit**

The on-board authorization code identification circuit is designed for software safety. Users can apply to our company for the authorization code.

- **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. Functions such as the detection and analysis of rings, tones and Caller IDs, are available via simple function calls on the driver platform, without having to understand complex call procedures.

1.3 Operation Principle

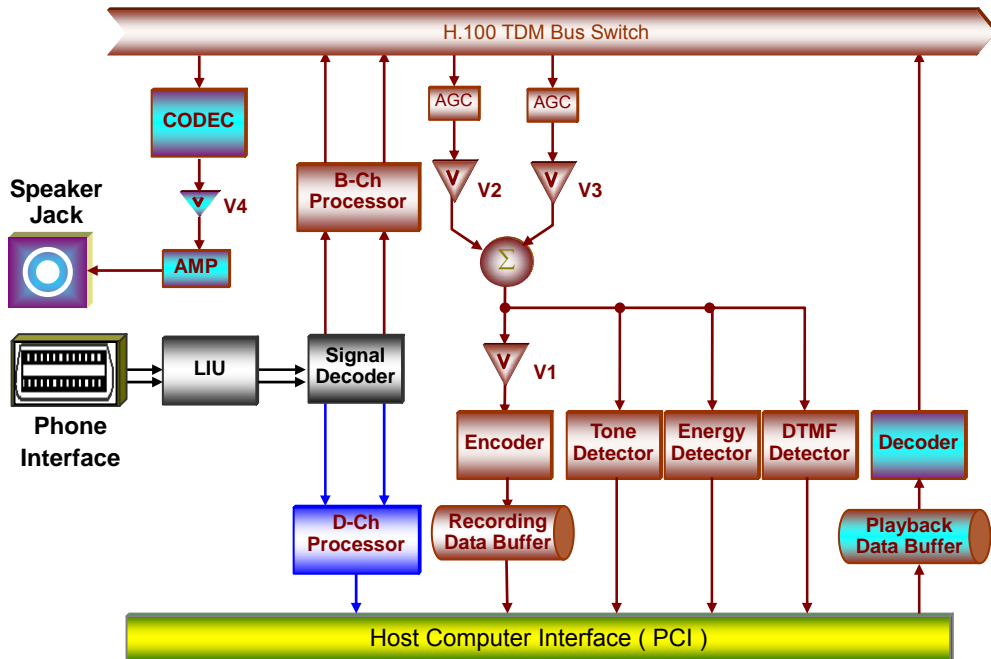


Figure 1-1 Operation Principle

1.4 Functional Modules

This board requires only one type of modules, i.e. the 8-port digital-call parallel-recording module (see Figure 2-3), to record most digital PBXes and telephones via parallel connection together with the help of its firmware-loading feature. It fits up to 3 such modules and can automatically determine how many of them are inserted. In addition, there is another 4-port digital-call serial-recording module available for some PBX models such as Avaya INDeX, Mitel SX200/SX2000, Siemens Rolm 9751, etc. connected in series for call recording.

Chapter 2 Installation

2.1 Hardware Structure

- **SHR-24DA-CT/PCI Board**

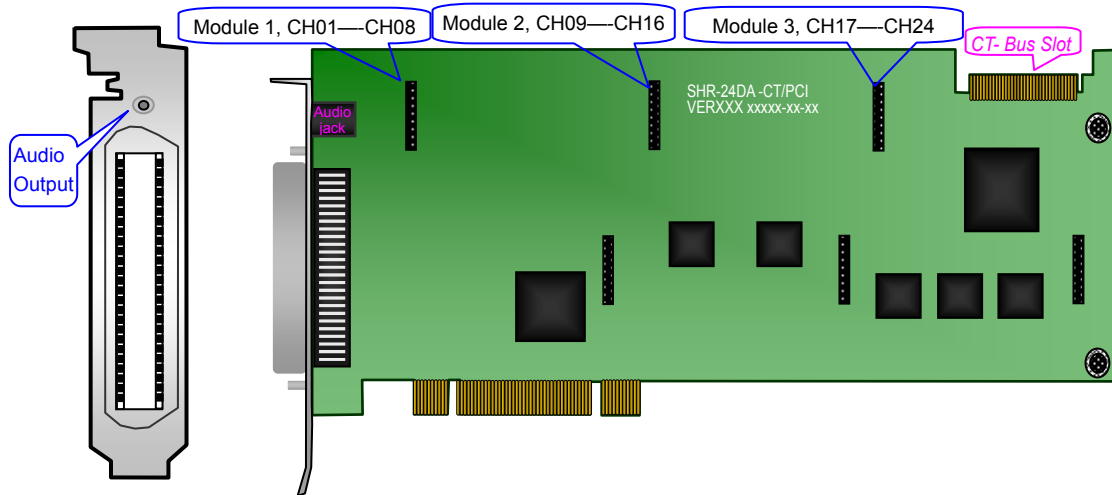


Figure 2-1 Front View

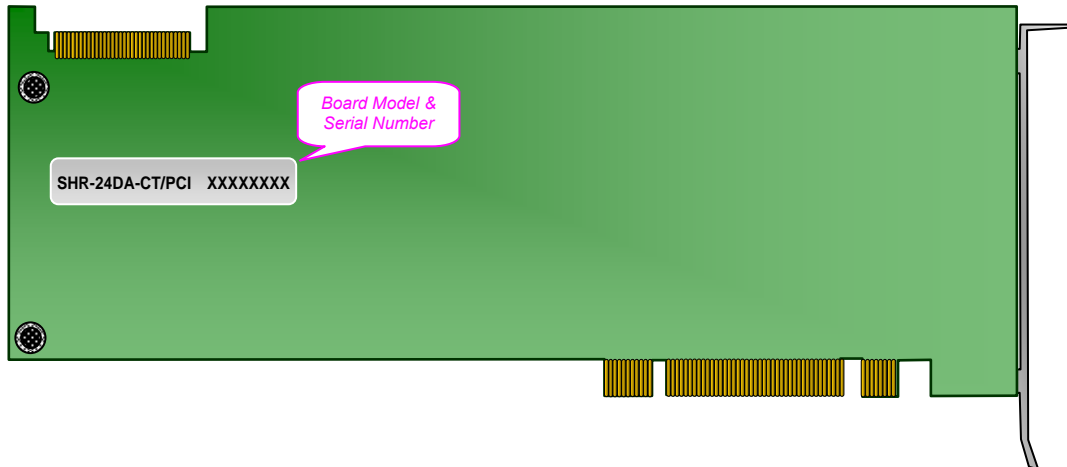


Figure 2-2 Rear View

- **Digital Call Recording Module**

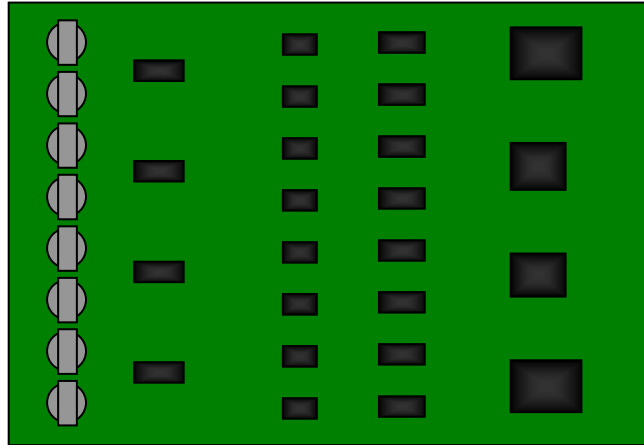


Figure 2-3 8-port Digital-call Parallel-recording Module (MOD_24DA)

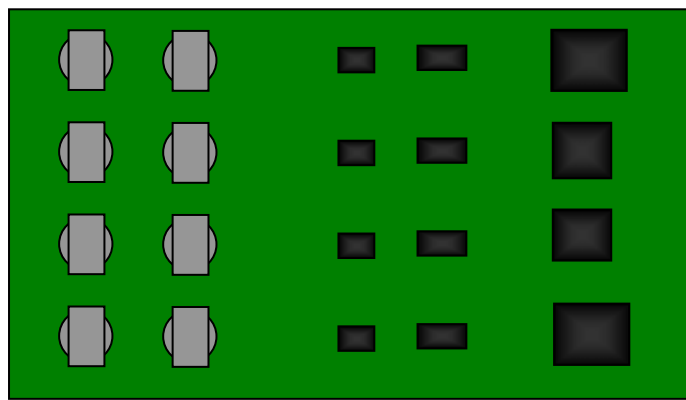


Figure 2-4 4-port Digital-call Serial-recording Module (MOD_24DAS)

- **Connection Model for SHR-24DA-CT/PCI**

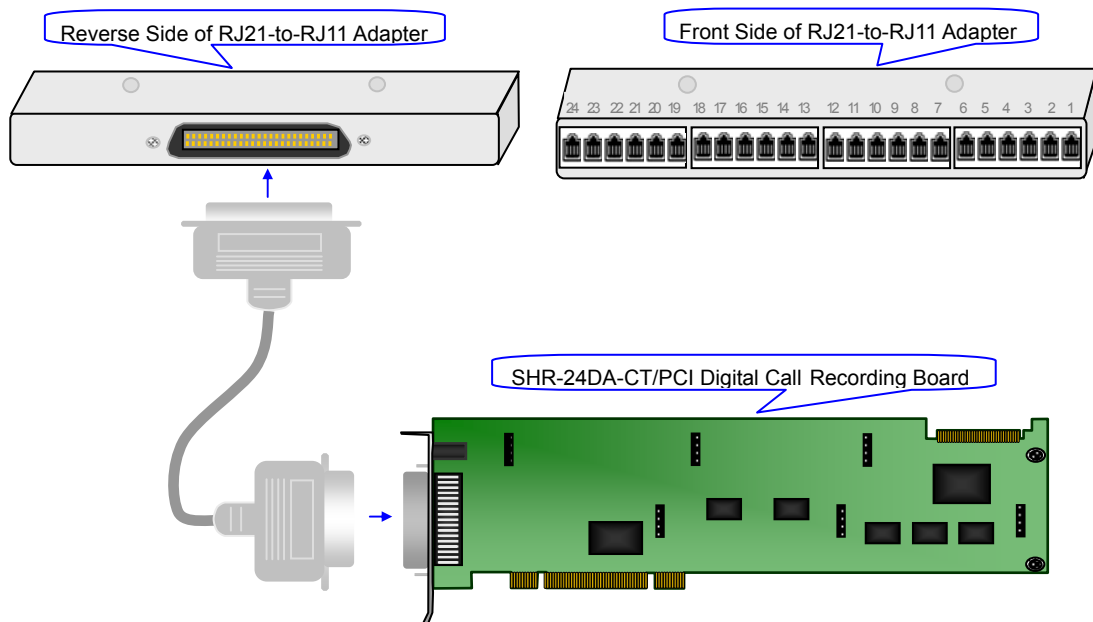


Figure 2-5 SHR-24DA-CT/PCI Connection Model

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

Note: Always turn off the power before installation!

Step 1: Properly fit the board with modules into the PCI slot on the chassis.

Step 2: Connect the board to communication lines between the digital PBX and telephones either in parallel or in series.

In parallel, connect one end of the phone line to a point on the communication line between the PBX and a digital phone, and the other end to the on-board RJ21 connector or to the RJ21-to-RJ11 adapter linked with the board.

In series, respectively connect the phone lines from the PBX and the digital phone to the on-board RJ21 connector or to the RJ21-to-RJ11 adapter linked with the board.

Interface description:

The SHR-24DA-CT/PCI digital station tap board has a 50-pin RJ21 connector (often used for PBXes), which can be converted into twenty-four 2-pin RJ11 jacks through an RJ21-to-RJ11 adapter. See Figure 2-5 for the physical layout of the connector.

Notes on Connection:

① In case of connection with RJ11 jacks, our company provides an RJ21 connecting line and an RJ21-to-RJ11 adapter and recommends the following connection methods:

1. When using the parallel-recording module, there are two alternatives:
 - a. Connection by 2-lead lines: See Figure 2-6 below. Connect the 2-lead line to the middle 2 pins of each jack which correspond to one channel. Note that the outer 2 pins of each jack cannot be used for connection in this case.

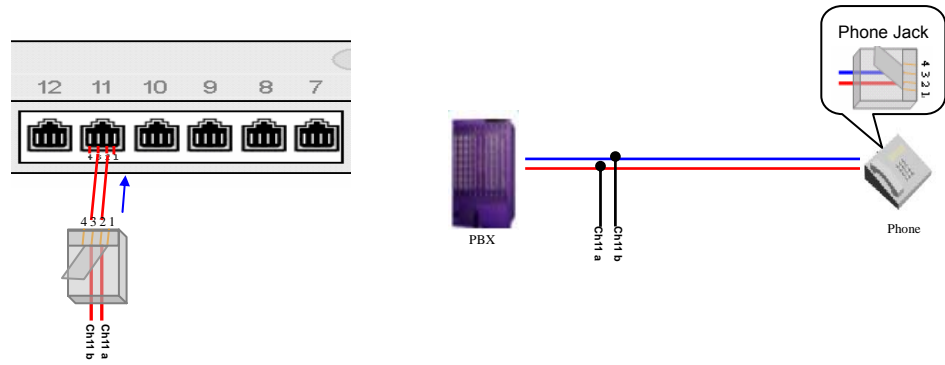


Figure 2-6

However, the Panasonic PBX makes an exception. It requires the access point for parallel connection at the outer two pins of the transmission line, as shown in Figure 2-7 below.

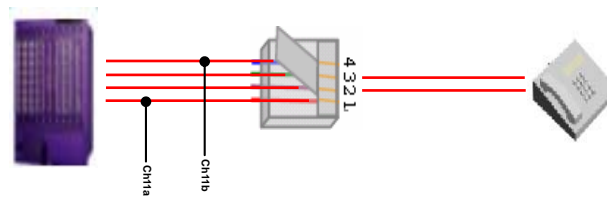


Figure 2-7

b. Connection by 4-lead lines: Directly insert the phone lines into odd-numbered RJ11 jacks on the RJ21-to-RJ11 adapter. See below for details.

- 1) eON and AVAYA-4W digital phones: See Figure 2-8 below. In parallel, connect the 1st and 2nd leads of the communication line between the PBX and a phone to the 1st and 4th pins of each odd-numbered RJ11 jack on the adapter, and the 3rd and 6th leads to the 2nd and 3rd pins.

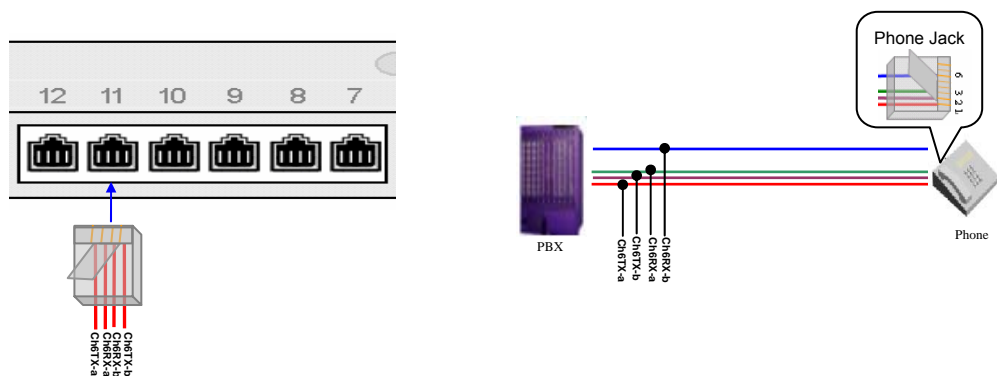


Figure 2-8

- 2) PHILIPS-4W and ISDN digital phones: Just follow the one-to-one relationship as shown in Figure 2-9 below for parallel connection.

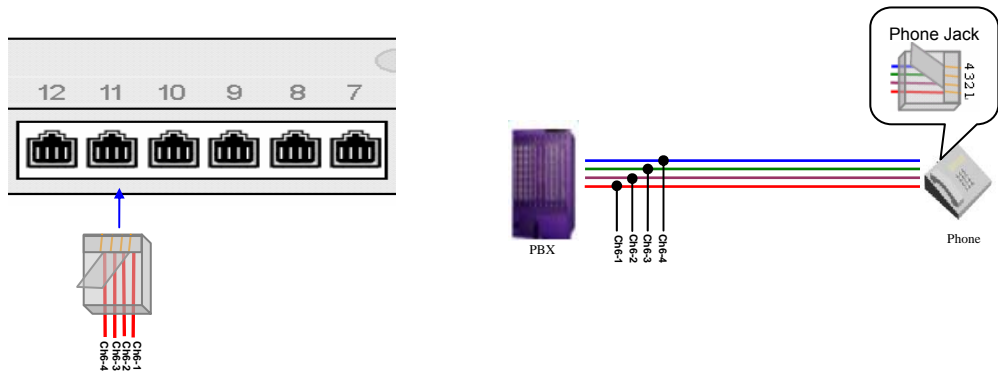


Figure 2-9

- 3) NOTEL M2250 digital phones: See Figure 2-10 below. In parallel, connect the 1st and 2nd leads of the communication line between the PBX and a phone to the 2nd and 3rd pins of each odd-numbered RJ11 jack on the adapter, and the 3rd and 4th leads to the 1st and 4th pins.

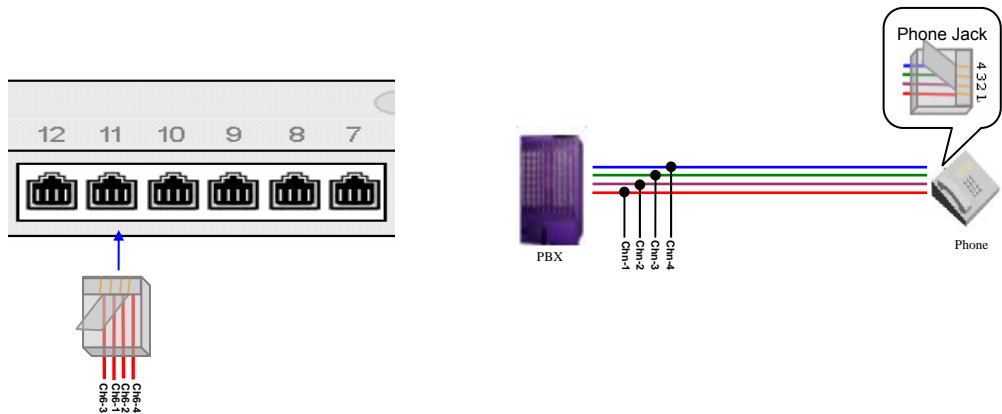


Figure 2-10

2. When using the serial-recording module, cut off the original communication line between the PBX and a phone, connect the two leads from the PBX to an odd-numbered RJ11 jack on the adapter, and the two from the phone to the following adjacent even-numbered RJ11. See Figure 2-11. Note that only the middle 2 pins of each jack can be used for connection in this case.

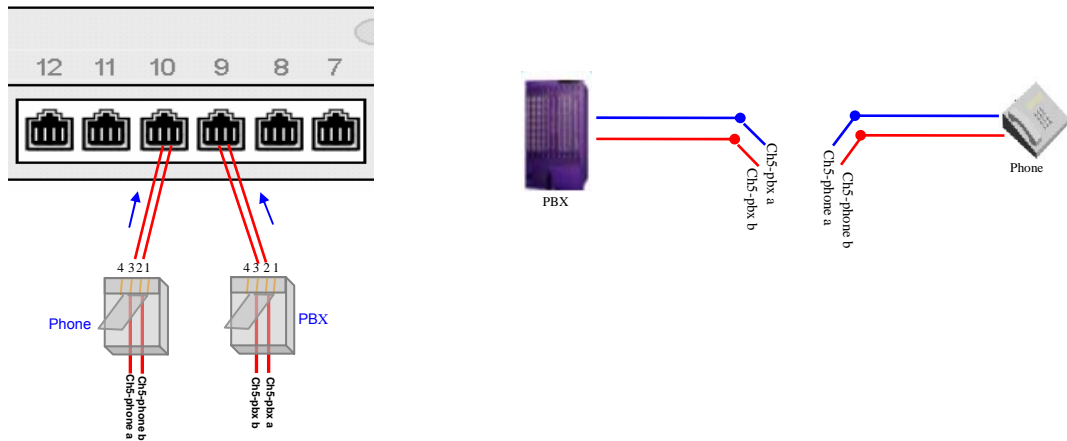


Figure 2-11

② In case of direct connection to the on-board RJ21 connector, we suggest the following connection methods:

1. When using the parallel-recording module, there are two alternatives:

a. Connection by 2-lead lines: Simply perform a corresponding connection with CHn-a and CHn-b as shown in Figure 2-12 below.

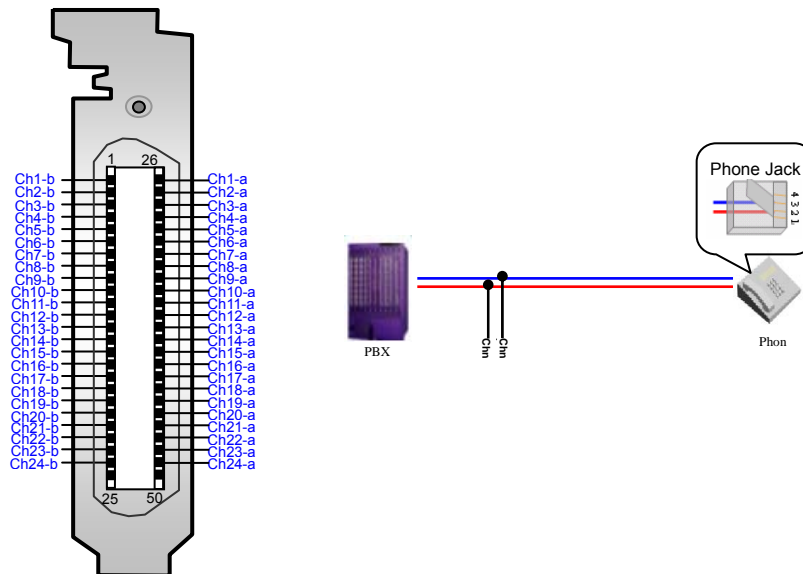


Figure 2-12

b. Connection by 4-lead lines (e.g. eON, ISDN, AVAYA-4W and PHILIPS-4W): See below for details.

1) eON and AVAYA-4W digital phones: See Figure 2-13 below. In parallel, connect the 1st and 2nd leads of the communication line between the PBX and a phone to CHn Tx-a and CHn Tx-b, and the 3rd and 6th leads to CHn Rx-a and CHn Rx-b.

2) PHILIPS-4W and ISDN digital phones: See Figure 2-13 below. In parallel, connect the 2nd and 3rd leads of the communication line between the PBX and a phone to CHn Rx-a and CHn Rx-b, and the 1st and 4th leads to CHn

Tx-a and CHn Tx-b.

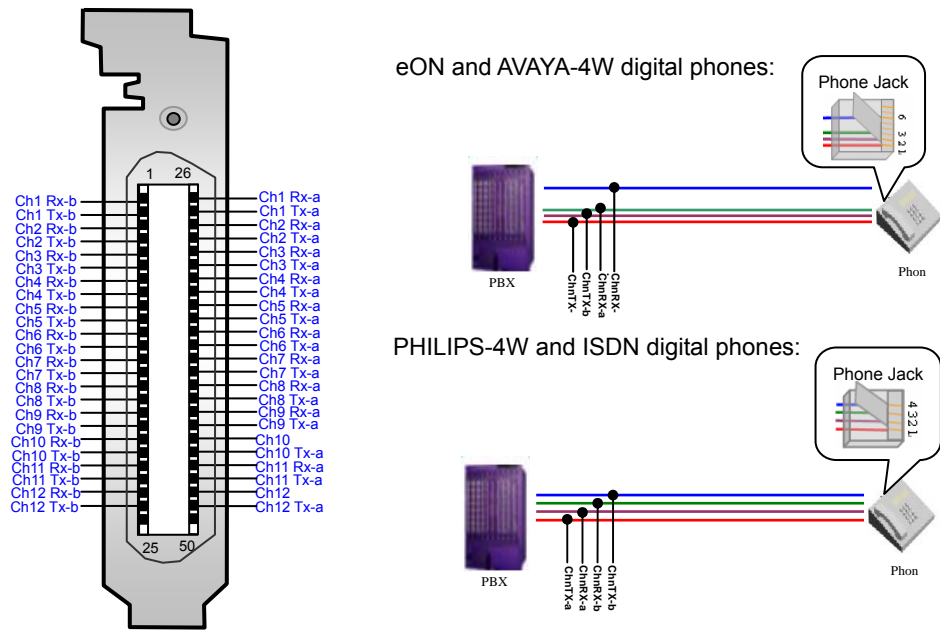


Figure 2-13

- 3) NOTEL M2250 digital phones: See Figure 2-14 below. In parallel, connect the 1st and 2nd leads of the communication line between the PBX and a phone to CHn-1 and CHn-2, and the 3rd and 4th leads to CHn-3 and CHn-4.

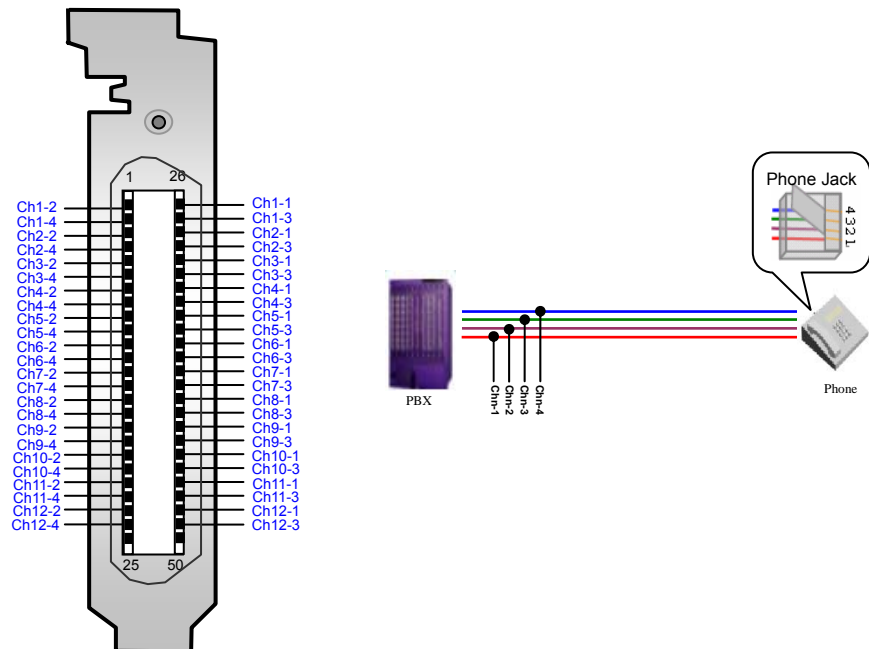


Figure 2-14

2. When using the serial-recording module, cut off the original communication line between the PBX and a phone, connect the two leads from the PBX to CHn-pbx a

and CHn-pbx b, and the two from the phone to CHn-phone a and CHn-phone b. See Figure 2-15.

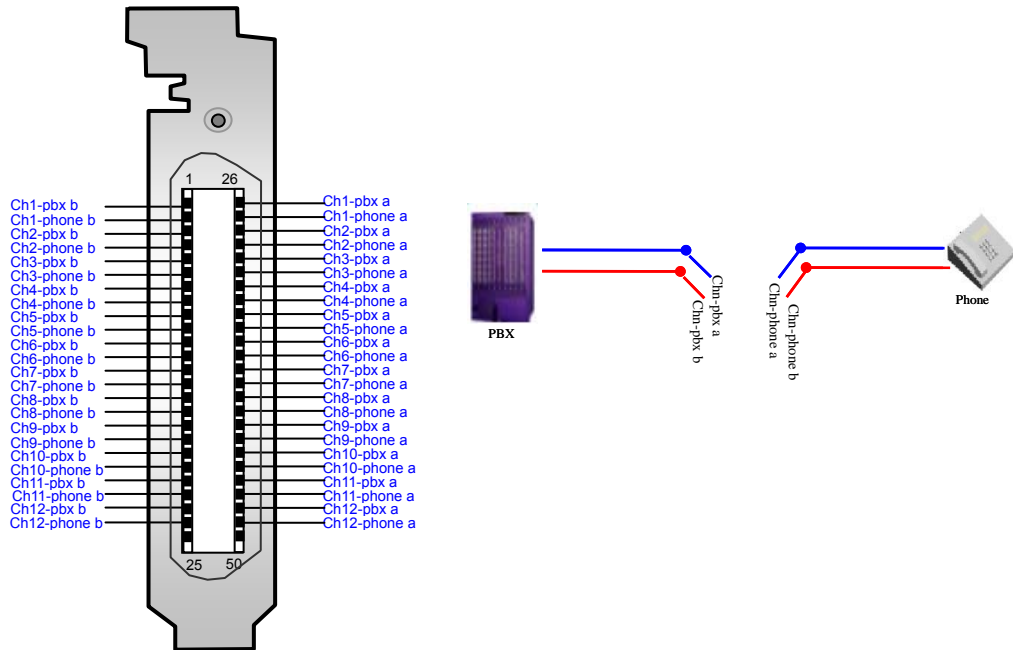


Figure 2-15

Note: The RJ21 connecting line we provide has 3 specifications (3m, 5m and 10m) for you to choose. They are all 25-twisted-pair communication cables using the international standard spectrum, can connect directly to our board. The 25 pairs of pins in RJ21 can be arranged by color in two different ways. See Table 2-1 and Table 2-2 for details. (To be exact, the 1st and the 26th pins are the first pair; the 2nd and the 27th pins constitute the second pair; ...; the 24th and the 49th pins are the 24th pair; the 25th and the 50th pins constitute the 25th pair. Actually, only the first 24 pairs are used by 24-channel boards.)

Pair Number	1	2	3	4	5	6	7	8
Color	White Blue	White Orange	White Green	White Brown	White Grey	Red Blue	Red Orange	Red Green
Pair Number	9	10	11	12	13	14	15	16
Color	Red Brown	Red Grey	Black Blue	Black Orange	Black Green	Black Brown	Black Grey	Yellow Blue
Pair Number	17	18	19	20	21	22	23	24
Color	Yellow Orange	Yellow Green	Yellow Brown	Yellow Grey	Purple Blue	Purple Orange	Purple Green	Purple Brown

Table 2-1

Pair Number	1	2	3	4	5	6	7	8
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Color	Black Grey	Black Brown	Black Orange	Black Green	Black Blue	Red Grey	Red Brown	Red Orange
Pair Number	9	10	11	12	13	14	15	16
Color	Red Green	Red Blue	Yellow Grey	Yellow Brown	Yellow Orange	Yellow Green	Yellow Blue	Purple Grey
Pair Number	17	18	19	20	21	22	23	24
Color	Purple Brown	Purple Orange	Purple Green	Purple Blue	White Grey	White Brown	White Orange	White Green

Table 2-2

- ③ For above parallel connection methods, the phone lines between the access point and the board should be limited to 6 meters to minimize interruption on monitored lines and to improve monitoring accuracy.

Step 3: Connect the sound box or other proper sound devices.

Skip this step if there is no need to ‘monitor in real time’ or ‘play’.

Regarding how to choose proper sound devices, refer to ‘Input/output Interface’ and ‘Audio Specifications’ in *Appendix A Technical Specifications*.

Step 4: Connect H.100 bus interfaces on all boards by bus cable.

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

Note:

- ① See Figure 2-16 for correct insertion. Do not twist or insert in the opposite direction.

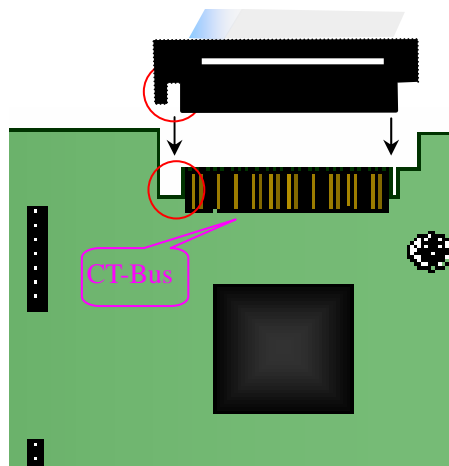


Figure 2-16 Connection of H.100 Bus

- 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: Boot your computer and install the driver.

Regarding driver installation, refer to *SynCti_InstManual.pdf*.

Step 6: Reset the PBX type in configuration files under the driver installation directory to conform to that of user's PBX. Alter the module type as well.

Step 7: Set voice coding formats for communication between the PBX and digital phones.

Different PBX and digital phone models support a variety of voice coding formats, which can be set and reset through software configuration for this board.

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 digital station tap 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

310×115mm² (excluding L-bracket)

Weight

≈ 350g (including 3 recording modules)

Environment

Operating temperature: 0 °C—55 °C

Storage temperature: -20 °C—85 °C

Humidity: 8%— 90% non-condensing

Storage humidity: 8%— 90% non-condensing

Input/output Interface

Headset jack: One φ3.5 stereo jack

Telephone line jack: One 50-pin RJ21 connector

Audio Specifications

Codec: CCITT A/μ-Law 64kbps

IMA ADPCM 32kbps

G.729A 8kbps

Output power: ≥50mW

Distortion: ≤2%

Frequency response: 300-3400Hz(±3dB)

Signal-to-noise ratio: ≥38dB

Maximum System Capacity

Up to 10 boards concurrently per system; up to 24 channels per board

Maximum Length of Telephone Lines

Less than 600 meters between digital phones and PBX

Less than 6 meters between line access point and digital station tap board

Power Requirements

Maximum power consumption: ≤12W

Impedance

Input impedance: ≥600Ω AC

Insulation resistance for PC isolation from telephone line: ≥2MΩ/500V DC

Audio Encoding & Decoding

16Bit PCM 128kbps

8Bit PCM 64kbps

A-Law 64kbps

μ-Law 64kbps

VOX 32kbps

ADPCM 32kbps

GSM 13.6kbps

MP3 8kbps

G.729A 8kbps

Sampling Rate

8kHz

Safety

Lightning resistance: Level 4

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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