Synway SSW Series

SHT-16C-CT/PCI/EC(SSW)
SHT-16C-CT/PCI/FAX(SSW)
Analog Voice Board
Special-for-Switch

Hardware Manual

Version 1.1

Synway Information Engineering Co., Ltd

www.synway.net

Contents

Copyright Declaration

Revision History

Version	Date	Comments
Version 1.0	2010-8	Initial publication
Version 1.1	2011-8	Add description on pins connection with the audio jack.

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

Chapter 1 Overview

The Synway CTI Series SHT-16C-CT/PCI/EC(SSW), SHT-16C-CT/PCI/FAX(SSW) are the 16-channel analog voice boards with PCI bus. They are used special for switch. All functions found on general voice boards and specific station boards are available with this board by configuring the various functional modules in different ways.

1.1 Functions

- A single board can be installed with at most 8 dual-channel modules, supports 16 voice channels
- Supports ring-alert for external calls
- Station phones on-hook/off-hook detection
- Direct connection between trunk and station keeps a call uninterrupted during power outage
- Calling party info (Caller ID) detection/transmission, DTMF and FSK support
- Activity/silence detection
- Automatic Gain Control (AGC) support in recording operation
- DTMF transmission and detection
- Automatic line voltage detection
- Automatically checks the board to determine the number and type of modules on the board
- 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
- 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
- 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 authorization code identification circuit is designed for software safety. Users can apply to our company for the authorization code
- Equipped with hot-swap circuit, supports hot swapping of boards during system running, making maintenance and backup easy.

- The on-board lightning-proof circuit reaches the telecom standard and eliminates the damage caused by the lightning
- SHT-16C-CT/PCI/FAX(SSW) shares the fax channel with all voice channels on it, supporting the transmit/receive rate of 14400bps
- SHT-16C-CT/PCI/EC(SSW) supports 64ms echo cancellation per channel
- Compatible with other series of voice boards from Synway

1.2 Features

- **On-board SIMM Slots**

  Fit modules to board. Contacts on both sides greatly improve connection and ease installation.

- **Module Configurable**

  8 on-board dual-channel modules can be freely arranged in pairs or groups for various complex, multi-functional applications, such as call center and recording functions available on a single board.

- **Available Outlet Board with RJ21 or RJ11**

  There are two kinds of outlet boards for you to choose. One is RST161 with RJ21 connector, facilitating the use of patch panel for connection layout. The other is RST162 with RJ11 connector, helping the use of telephone jack for direct connection.

- **Selectable Ringing Current & Battery Feed Power Supply Module**

  You may choose to install this module on the board to substitute the external ringing current and battery feed power supply, which will provide station modules with battery feed, and enable the phones that are linked to station channels to ring.

- **Programmable Tone Detector**

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

- **Hot Swapping Supported**

  Both the motherboard and the outlet board support hot swapping, allowing users to replace and maintain the board during system running.

- **A Particular Separation Design**

  As the mainboard and the outlet board are designed independent from each other, when you pull out the mainboard or reinsert it or replace it with other boards, there is no need to reconnect lines as long as the outlet board is not changed or removed.

- **Professional Driver Algorithm**

  Uses SPECDial - a professional driver algorithm - to perform a complete automatic dial process through analog lines, accurately identifies called-party statuses and precisely distinguishes an answering machine from a fax machine that is responding at the remote end.

- **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. Compared with the B Series voice boards, the C Series EC boards have the enhanced capability in echo cancellation, i.e. each channel supports 64ms echo cancellation, designed especially for the VoIP and teleconferencing applications.

- **Various CODECs Support**

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

- **Supports WAV File**

  The recorded voice 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. 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

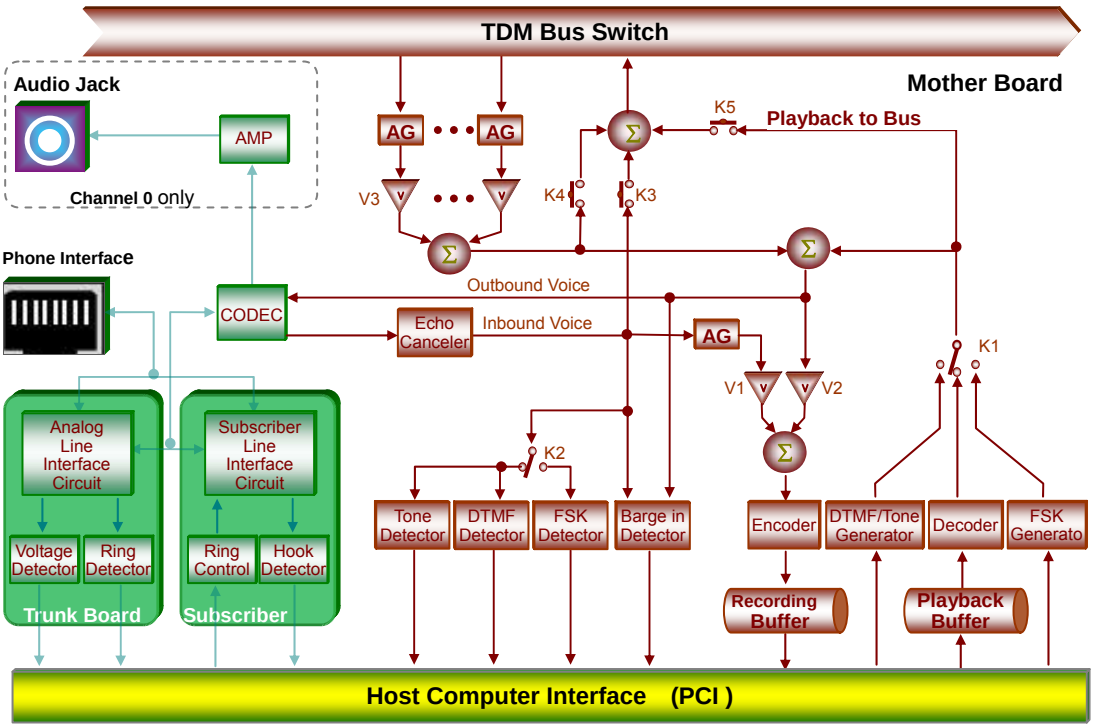

Figure 1-1 Operation Principle

1.4 Functional Modules

These boards can be used with the 2.0 series modules from Synway, including analog trunk module, station module, trunk-station composite module, trunk-record composite module and magnet module.

- **Analog Trunk Module**

  This module is equipped with the lightning-proof circuit that reaches the telecom standard, and connects its corresponding channel directly to local lines from Central Office Terminal (COT), with abilities to detect line voltage, diagnose line failure, and judge the on-hook/off-hook state of the station phone which is linked with it. See Figure 2-3 and Figure 2-4 for more information.

- **Station Module**

  This module functions either as a station phone provided it links directly to a telephone or as an extension phone for the PBX, supporting delivery of the calling party information in FSK/DTMF to the phone. It uses -40V battery feed voltage and the integrated overcurrent/overvoltage circuit protection system, can accommodate a subscriber line in length of up to 5.5km. Refer to Figure 2-5 and Figure 2-6 for details.

- **Trunk-Station Composite Module**

  This module accommodates an analog trunk channel and a station channel, ensuring safe communication via an automatic direct connection of the analog trunk channel and

the station channel when the driver is not running or the PC is powered off. See Figure 2-7 and Figure 2-8 for details.

- **Trunk-Record Composite Module**

This module embraces two channels. One is for high-impedance recording in parallel connection and the other works as an analog trunk. See Figure 2-9 and Figure 2-10 for more information.

- **Magnet Module**

This module enables the direct connection of its corresponding channel with a magnet phone line so as to simulate the functions provided by magnet telephones. Refer to Figure 2-11 and Figure 2-12 for details.

Chapter 2 Installation

2.1 Hardware Structure

- **SHT-16C-CT/PCI/FAX(SSW)**

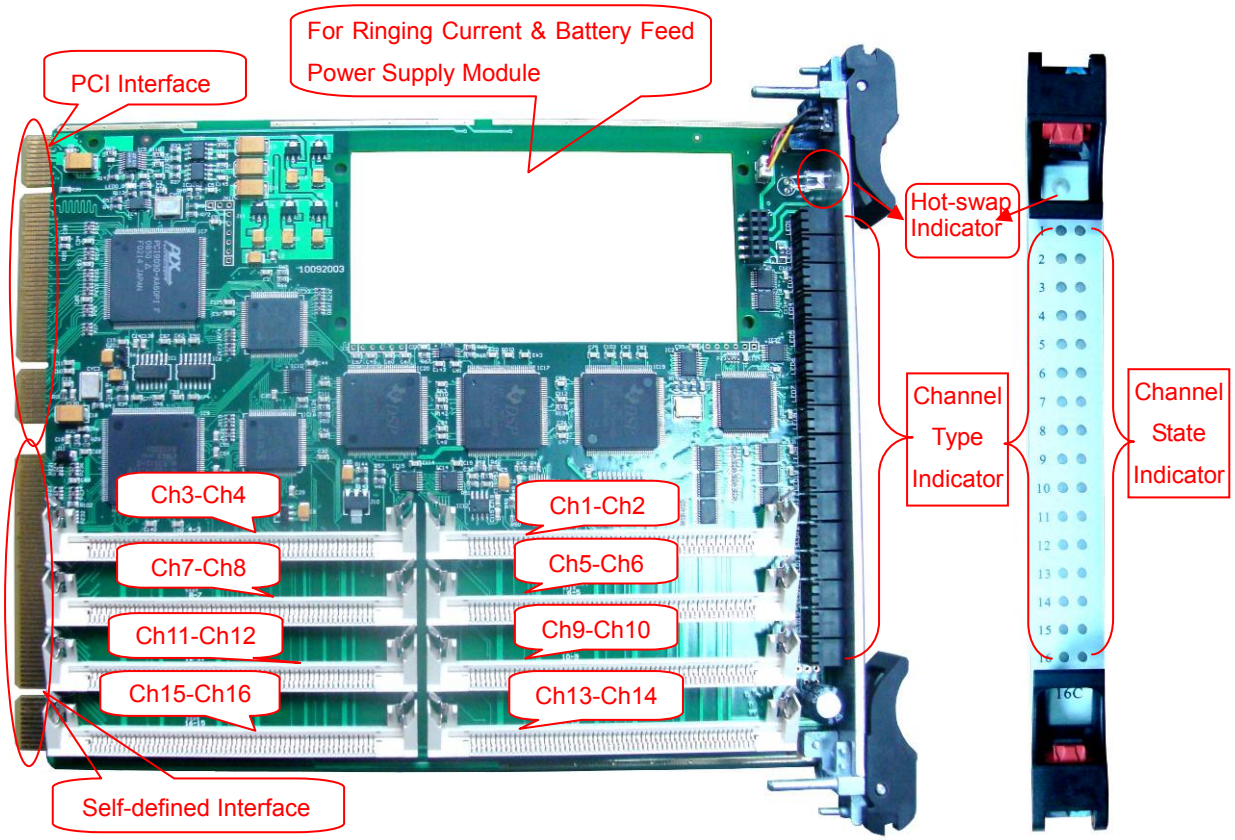

Figure 2-1 Right and Front Views

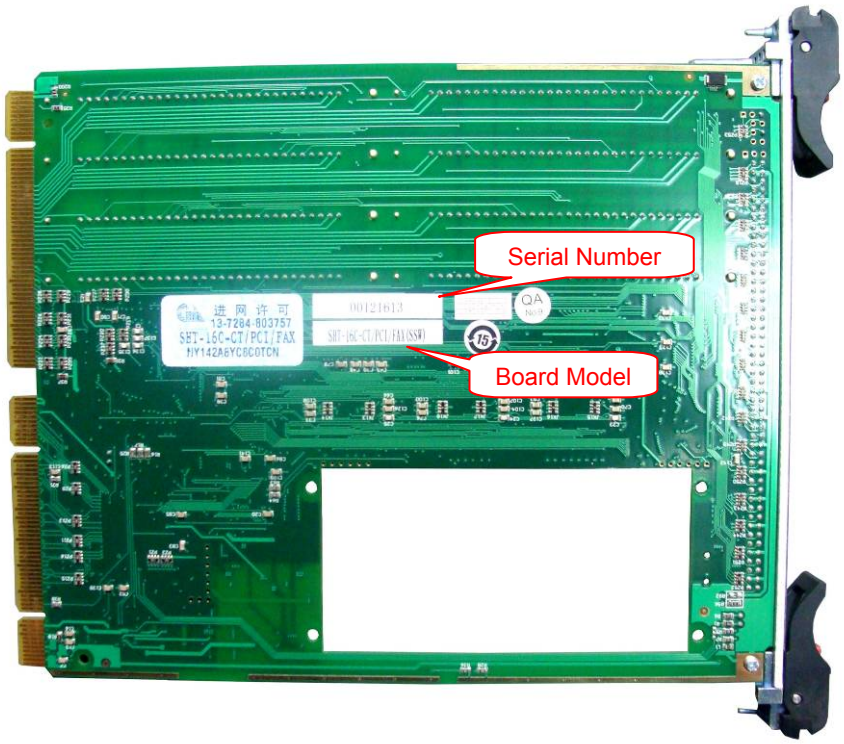

Figure 2-2 Rear View

Notes:

1) This file only illustrates the SHT-16C-CT/PCI/FAX(SSW) board with the above figures but is also applicable to the SHT-16C-CT/PCI/EC(SSW) board which has the similar hardware structure. Always check the label on the board to get the board model before your use.

2) Here below is the instruction for the indicators shown in Figure 2-1.

	Channel Type	Color
Channel Type Indicator	Analog Trunk Channel	Orange
	Station Channel	Green
	Recording Channel	Red
	Magnet Channel	Orange

Table 2-1 Channel Type Indicator

Note that the channel type indicator is off when no modules are installed.

Channel State Indicator	State	Implication
Green	ON	Channel off-hook
	OFF	Channel on-hook

Table 2-2 Channel State Indicator

Hot-swap Indicator	State	Implication
Blue	ON	In the course of hot swapping
	OFF	Normal
	Flash	Working

Table 2-3 Hot-swap Indicator

- **Analog Trunk Module**

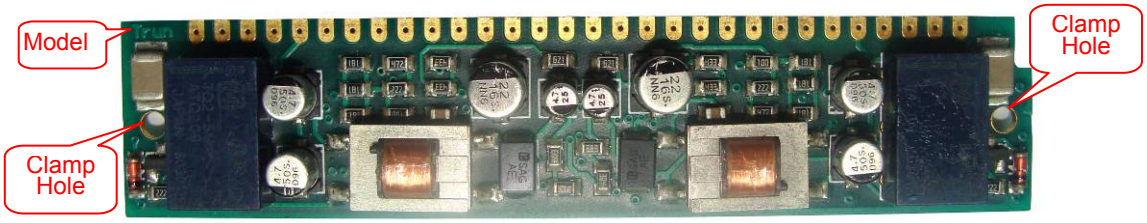

Figure 2-3 Front View

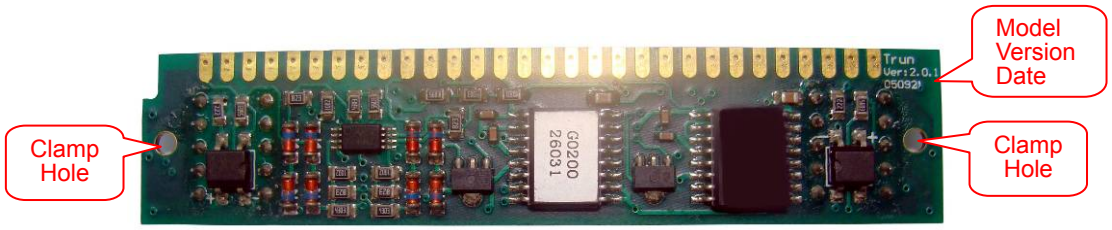

Figure 2-4 Rear View

- **Station Module**

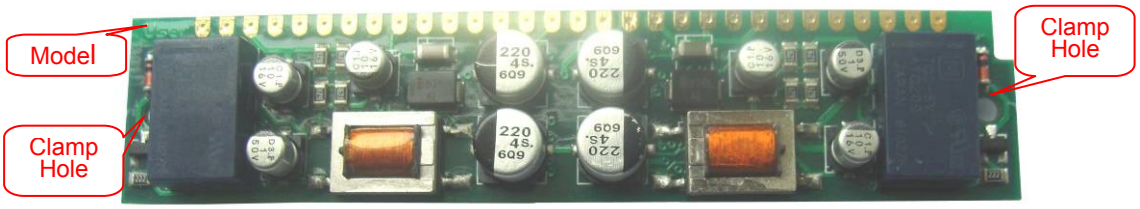

Figure 2-5 Front View

Figure 2-6 Rear View

- **Trunk-Station Composite Module**

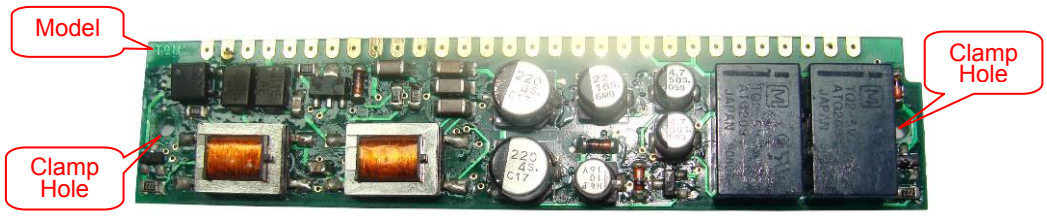

Figure 2-7 Front View

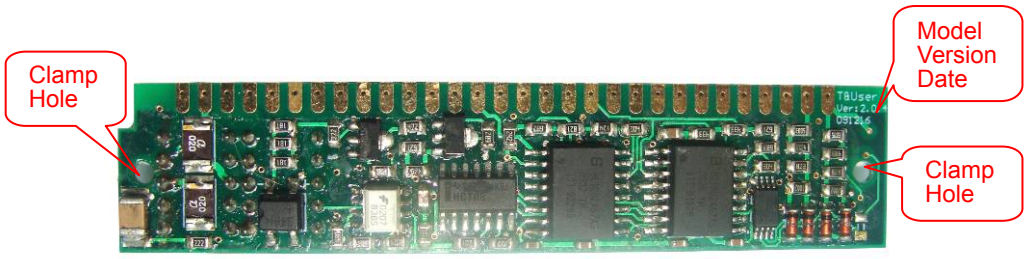

Figure 2-8 Rear View

- **Trunk-Record Composite Module**

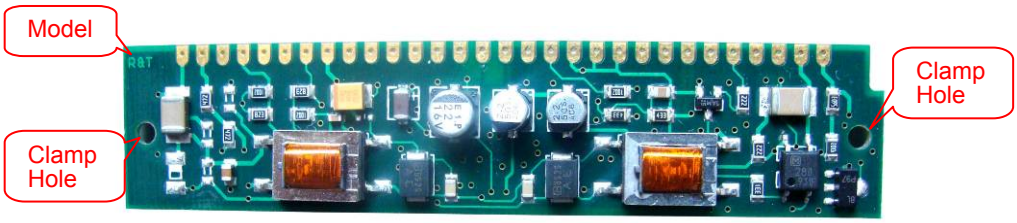

Figure 2-9 Front View

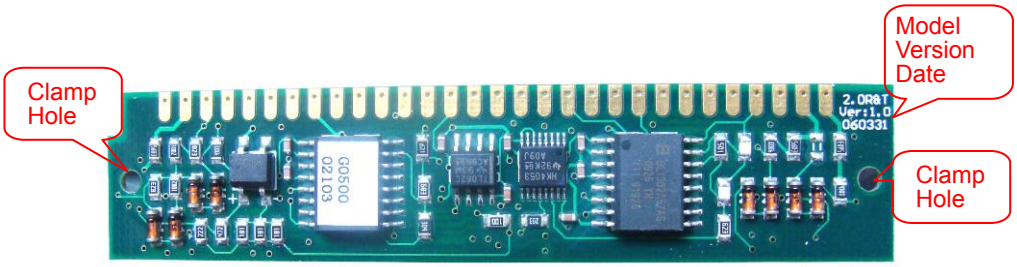

Figure 2-10 Rear View

- **Magnet Module**

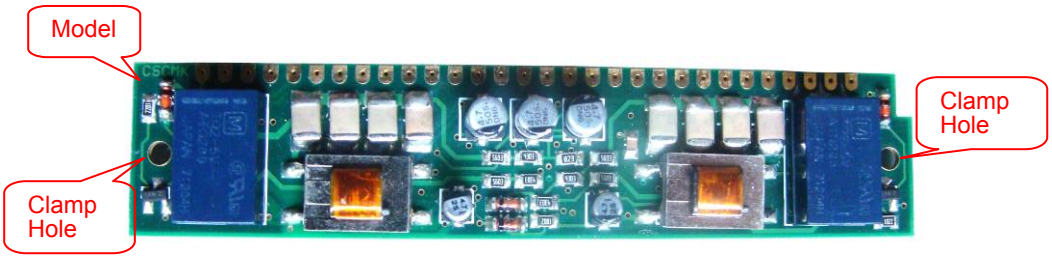

Figure 2-11 Front View

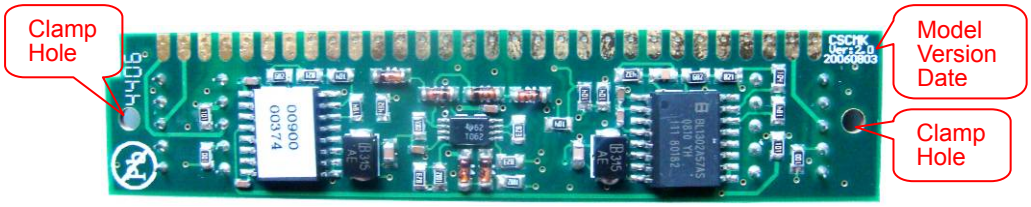

Figure 2-12 Rear View

- **Ringing Current & Battery Feed Power Supply Module**

Figure 2-13 Front View

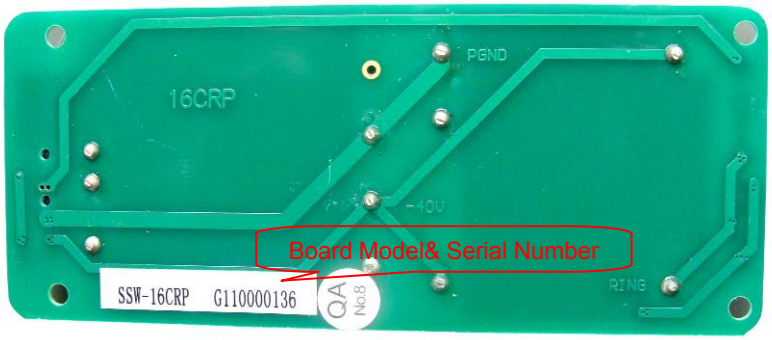

Figure 2-14 Rear View

- **RST161 Outlet Board**

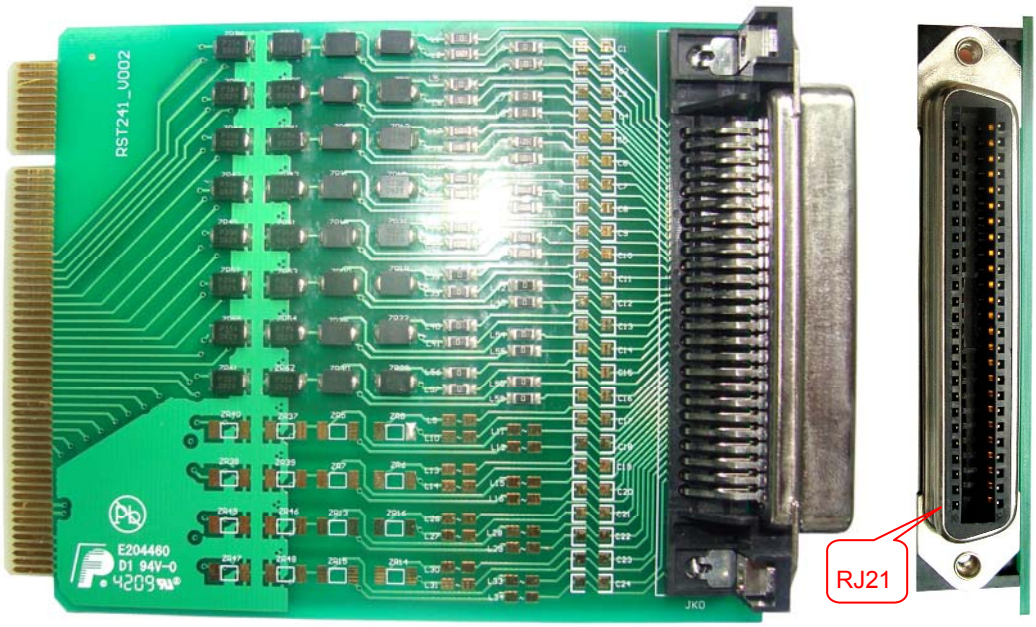

Figure 2-15 RST161 Front Panel

Figure 2-16 RST161 Rear Panel

Figure 2-17 RCU&RST161 Composite Rear Panel

Notes:

1) **The RST161 outlet board is half-length.**
2) **The RCU&RST161 composite rear panel is used when the RST161 outlet board and the RCU board need be fitted in slots of the same row** (special for the SSW030A series switches)**.**

- **RST162 Outlet Board**

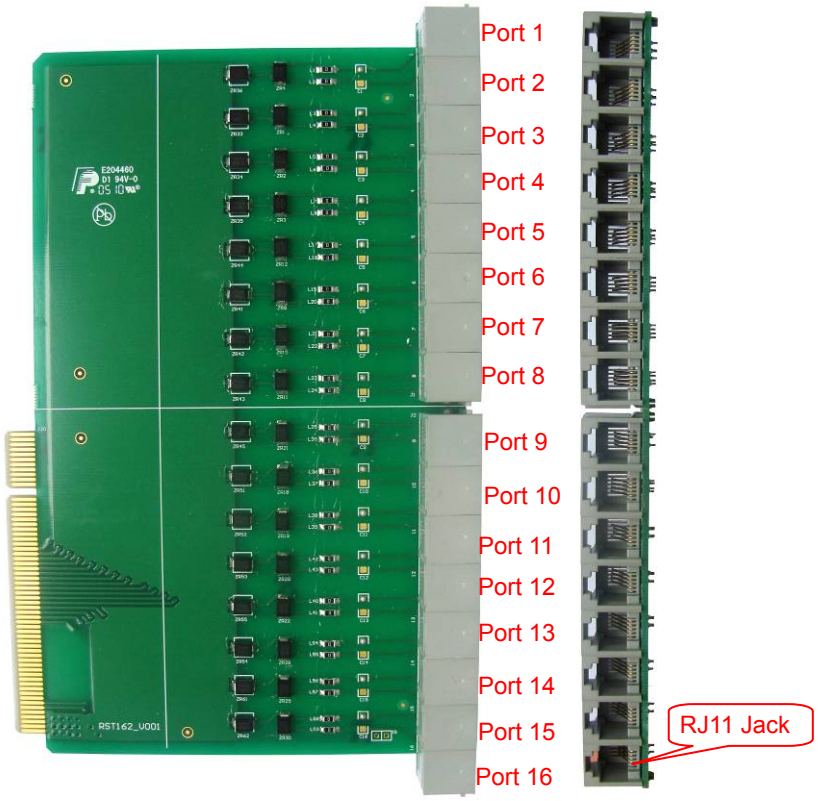

Figure 2-18 RST162 Front Panel

Figure 2-19 RST162 Rear Panel

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!

Step1: Install the ringing current & battery feed power supply module.

Skip this step if station modules or trunk-station composite modules are not used.

Install the module and screw it.

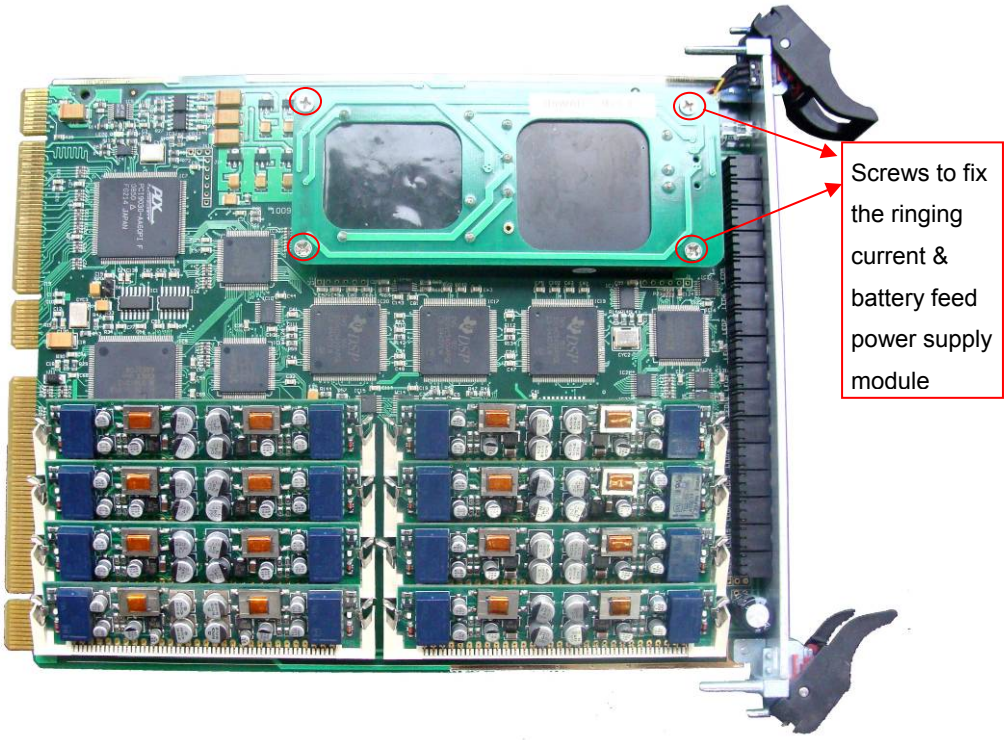

Figure 2-20 Installation of Ringing Current & Battery Feed Power Supply Module

Step2: Plug the desired modules into the module slots on the board, and fit the board into the Synway UMCT intelligent switch.

Step3: Connect to analog phone lines or telephones.

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

Interface description:

An RST161 outlet board has a 50-pin RJ21 connector and an RST162 outlet board

has 16 RJ11 jacks. Each RJ21 connector can be converted into twenty-four 2-pin RJ11 jacks through an RJ21-to-RJ11 adapter. See Figure 2-21 above for the physical layout of the RJ21 connector. Chn-a and Chn-b are a pair of phone lines. Up to 24 pairs of phone lines like this can be connected at the same time. As to the last pair of pins (i.e. the 25th and 50th pins) in RJ21, they respectively represent spk+, spk-(GND) and can connect to the audio jack. See Figure 2-22 for the connection of this pair of pins.

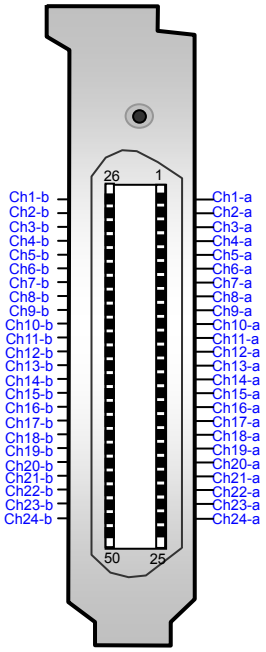

Figure 2-21 RJ21 Connector

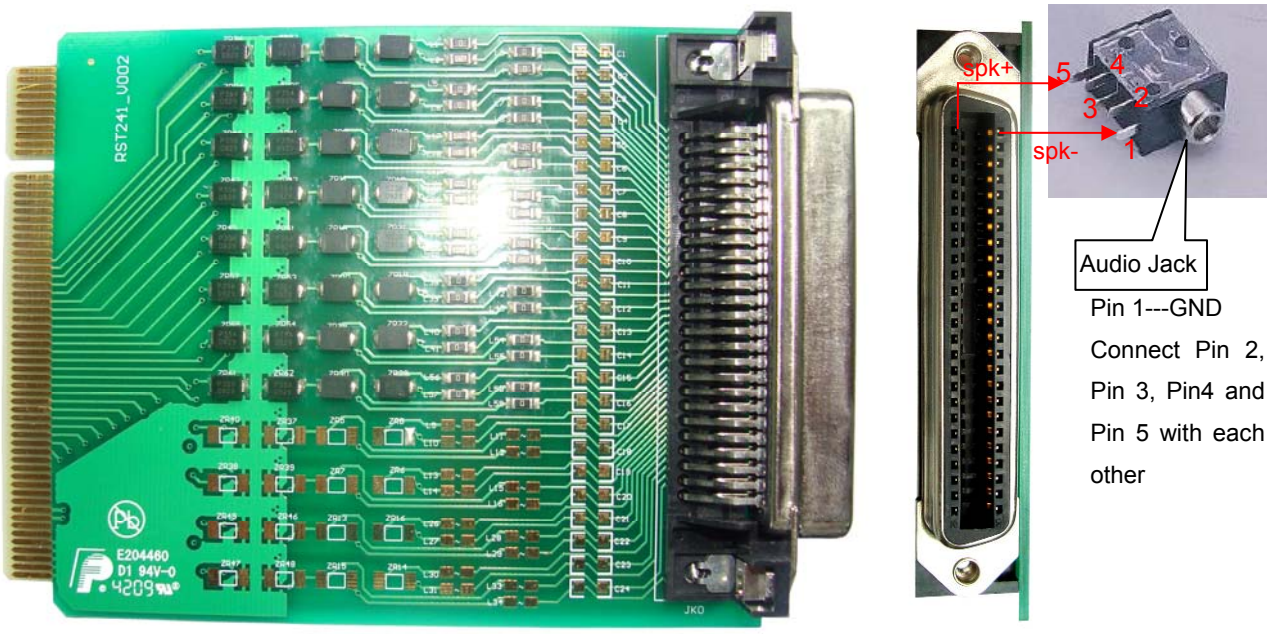

Figure 2-22

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:

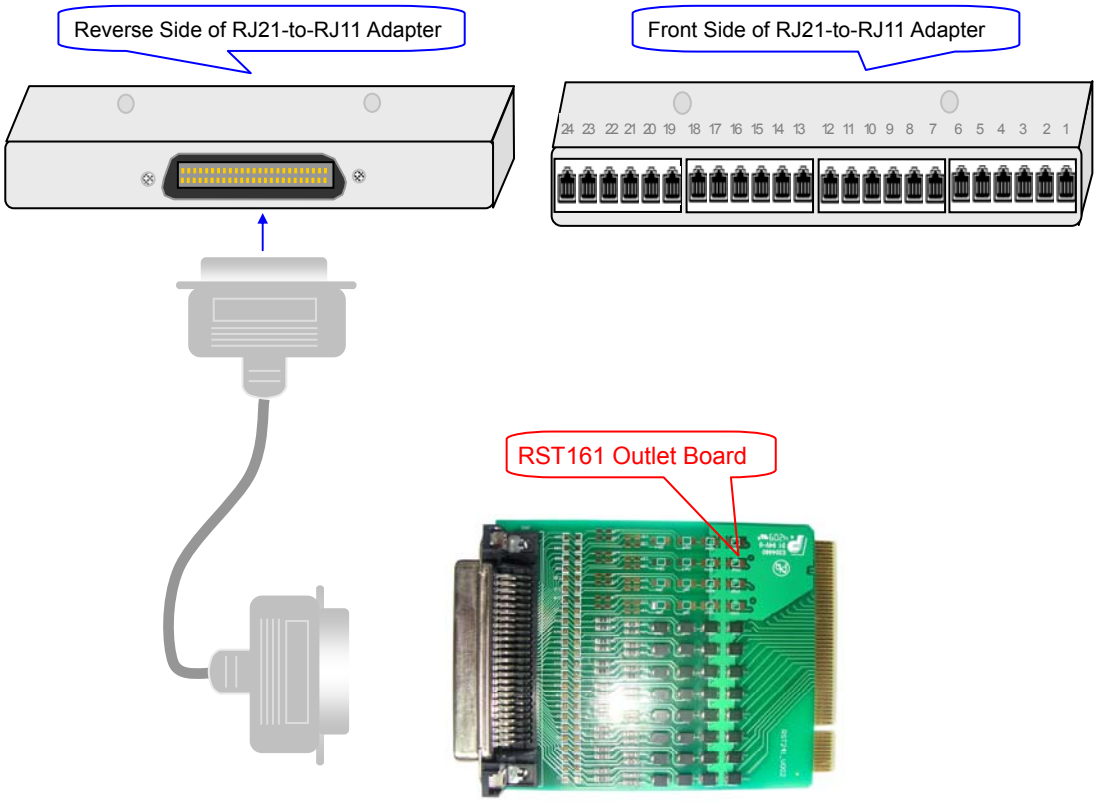

Figure 2-23

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

Perform a corresponding connection of Chn-a and Chn-b for each pair of phone lines as shown in Figure 2-21 above.

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. See Table 2-4 below for the color of these 25 pairs of pins in RJ21. (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 16 pairs are used by 16-channel boards.)

Pair Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Color	White Blue	White Orange	White Green	White Brown	White Grey	Red Blue	Red Orange	Red Green	Red Brown
Pair Number	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Color	Red Grey	Black Blue	Black Orange	Black Green	Black Brown	Black Grey	Yellow Blue	Yellow Orange	Yellow Green
Pair Number	**19**	**20**	**21**	**22**	**23**	**24**	**25**		

Color	Yellow Brown	Yellow Grey	Purple Blue	Purple Orange	Purple Green	Purple Brown	Purple Grey		

Table 2-4 Color of 25 Twisted Pairs in RJ21

Step4: Connect to the trunk-station composite module.

Skip this step if direct connection between internal and external lines is not required when the PC is powered off.

A trunk-station composite module contains a trunk channel and a station channel, and is seated in a dual-channel module slot. Before the board is powered on or the driver software is initialized, you may link the station phone and the phone line which share the same module directly to each other, to guarantee the emergency telecommunication. Once the board application program starts to run, the link automatically breaks and the internal and external lines become independent.

Note: When trunk-station composite modules are used, the adjacent two channels are by default a station channel and an analog trunk channel. Users can set whichever channel to be a station channel or an analog trunk channel by modifying the configuration file.

Step5: Boot your computer and install the driver.

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

Key Tips:

- As the system is expected to run for long hours unmannedly, ‘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

Mainboard: 218.5×174.5mm²

RST161: 180×115.1mm²

RST162: 90×115.1mm²

Weight

Main board: ≈400g (excluding modules)

RST161: ≈170g

RST162: ≈75g

Environment

Operating temperature: 0℃—55℃

Storage temperature: -20℃—85℃

Humidity: 8%—90% non-condensing

Storage humidity: 8%—90% non-condensing

Input/output Interface

Telephone line jack: One 50-pin RJ21 or Sixteen 2-pin RJ11

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 voice boards concurrently per system; up to 16 channels per board

Power Requirements

Maximum power consumption: ≤20W

Impedance

Input impedance: ≥1MΩ/500V DC; ≥10kΩ/1000V AC

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

Telephone line impedance:

Compliant with the national standard impedance for three-component network

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

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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