Synway SSW Series

SHD-30E/60E-CT/PCI(SSW)
SHD-30E/60E-CT/PCI/EC(SSW)
SHD-30E/60E-CT/PCI/FAX(SSW)
SHD-120E/240E-CT/PCI(SSW)
SHD-120E/240E-CT/PCI/EC(SSW)
SHD-120E/240E-CT/PCI/FAX(SSW)
Digital Trunk 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	2009-10	Initial publication
Version 1.1	2010-7	Add description on the RSD043 Outlet Board.

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

Chapter 1 Overview

These Synway E-type digital trunk boards are earmarked for PBX. They have almost all functions needed for call/voice processing systems which are connected to them through E1/T1/J1 trunks. These boards are designed with the enhanced capability in echo cancellation and the DMA Read and Write function which speeds up the data transfer and minimizes the cost of CPU, further improving the system performance.

1.1 Functions

- A single board accommodates 1, 2, 4 or 8 E1/T1/J1 trunks
- Supports China SS1, SS7 and ISDN connections in E1/T1 mode
- Supports phone calling and voice processing
- Activity/silence detection
- Automatic Gain Control (AGC) support in recording operation
- Enhanced echo cancellation
- Up to 64 fax channels optional on a single board
- Allows DTMF transmission and detection during voice recording or playback
- Includes H.110 bus, facilitating smooth connectivity to third-party boards with H.110 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
- Equipped with hot-swap circuits to support board insertion and extraction during runtime, easy for maintenance and backup
- The on-board lightning-proof circuit reaches the telecom standard and surely eliminates the damage caused by lightning
- Equipped with the EMI circuit, effectively preventing the electromagnetic interference
- 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

- Compatible with other series of voice boards from Synway

1.2 Features

- **DMA Read and Write**

  Uses the DMA technology based on PCI bus to read and write data, greatly reducing the CPU cost.

- **E1/T1/J1 Support**

  Provides an easy selection of the E1, T1 or J1 trunk and its matching impedance via software reconfiguration, not requiring any change in hardware.

- **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 modules, each board supports SS1, SS7 and ISDN, eliminating the need for extra signaling boards. The signaling processing program can be upgraded via a simple software configuration, without having to change the hardware.

- **Signaling Links**

  Each board supports up to 8 signaling links and the signaling hot-backup feature, i.e. the signaling can be processed by the standby server whenever 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 TS16, can be used for SS7 and ISDN signalings.

- **Programmable Tone Detector**

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

- **Software-based Terminal Matching**

  A single board supports several kinds of trunks which differ in impedance. They are 100Ω T1, 110Ω J1 and 120Ω E1 twisted-pair cables and 75Ω E1 coaxial cable. Both transmit and receive terminals on the board are specified via software configurations, facilitating easy connections to 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 trunks 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 tone detection, avoids self-excited oscillation and howling, and minimizes the possibility of registering wrong DTMF and busy tones in a conference call. Among the products introduced in this file, the SHD-30/60E-CT/PCI/EC(SSW), SHD-120/240E-CT/PCI/EC(SSW), SHD-30/60E-CT/PCI/FAX(SSW), SHD-120E-CT/PCI/FAX(SSW) boards have an increased capability in echo cancellation and offer a much better effect in this aspect.

- **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.

- **Barge in**

  Supports the Barge-in feature.

- **Various CODECs Support**

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

- **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. 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

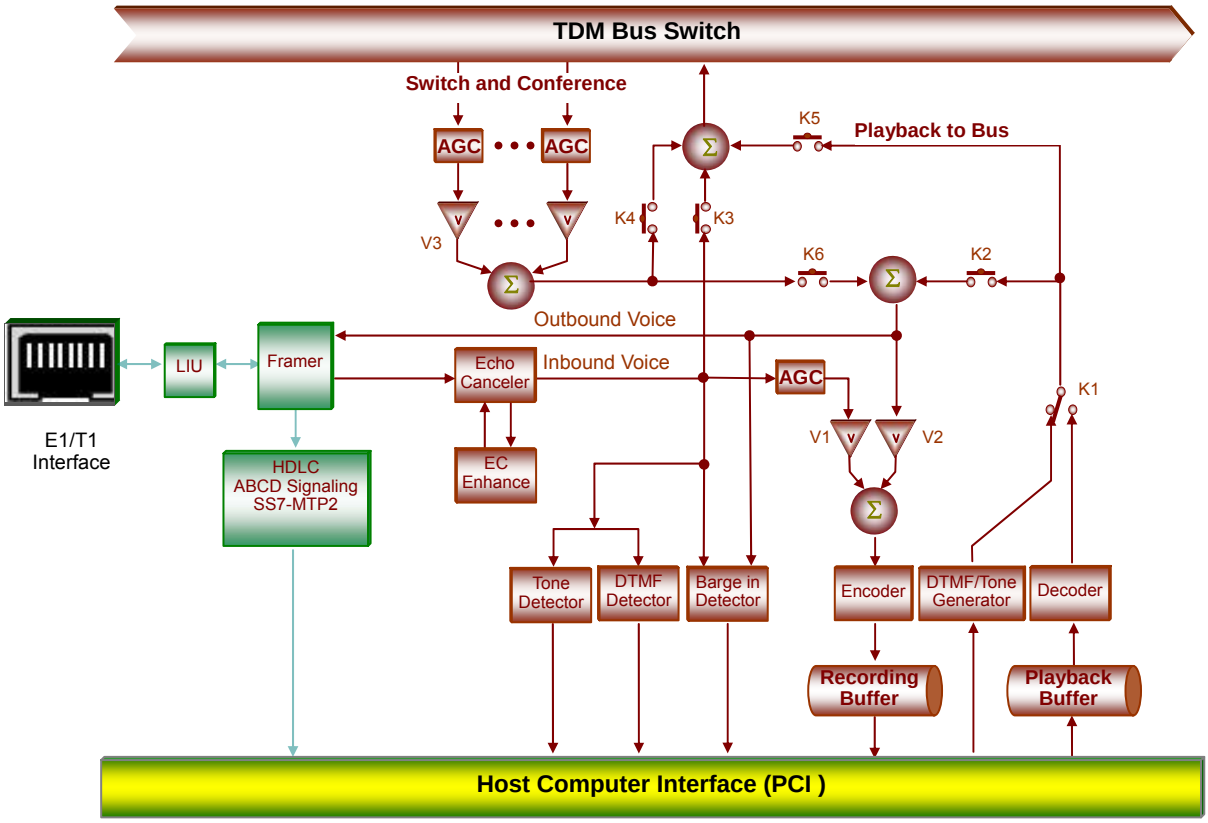

Figure 1-1 Operation Principle of SSW Series E-type Boards

Chapter 2 Installation

2.1 Hardware Structure

- **SHD-30E-CT/PCI(SSW) Mainboard**

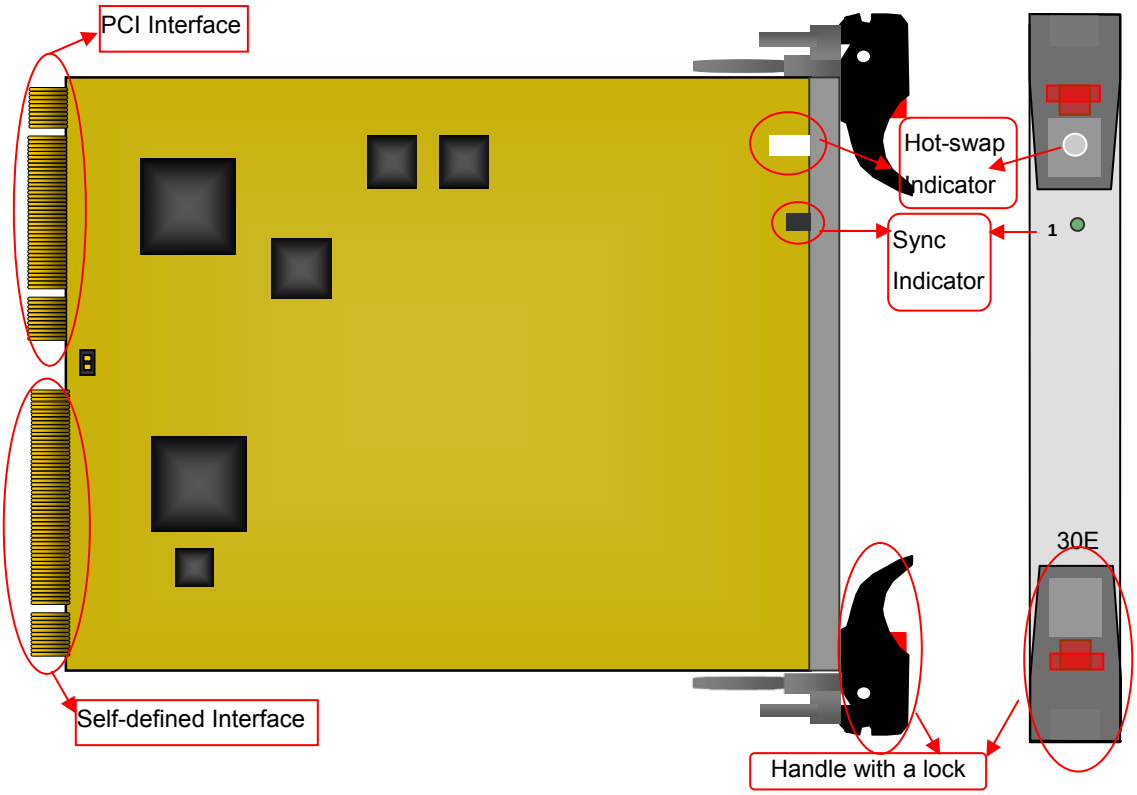

Figure 2-1 Right and Front Views

- **SHD-30E-CT/PCI/EC(SSW) Mainboard**

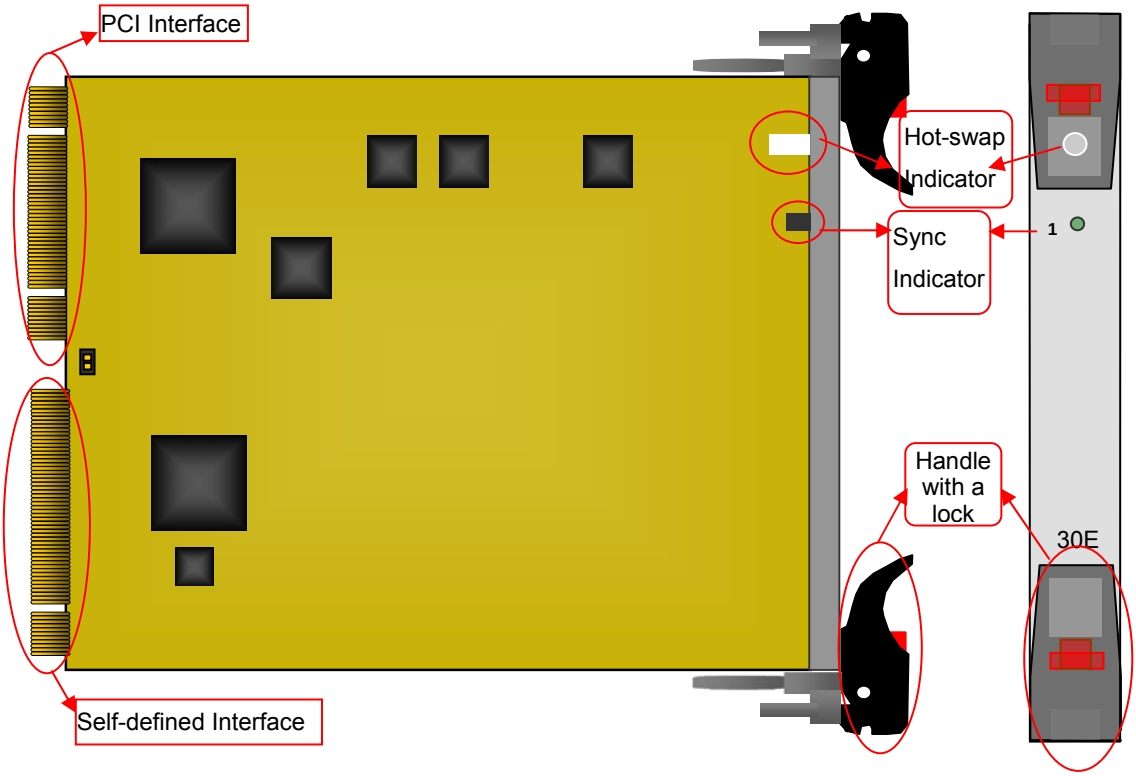

Figure 2-2 Right and Front Views

- **SHD-30E-CT/PCI/FAX(SSW) Mainboard**

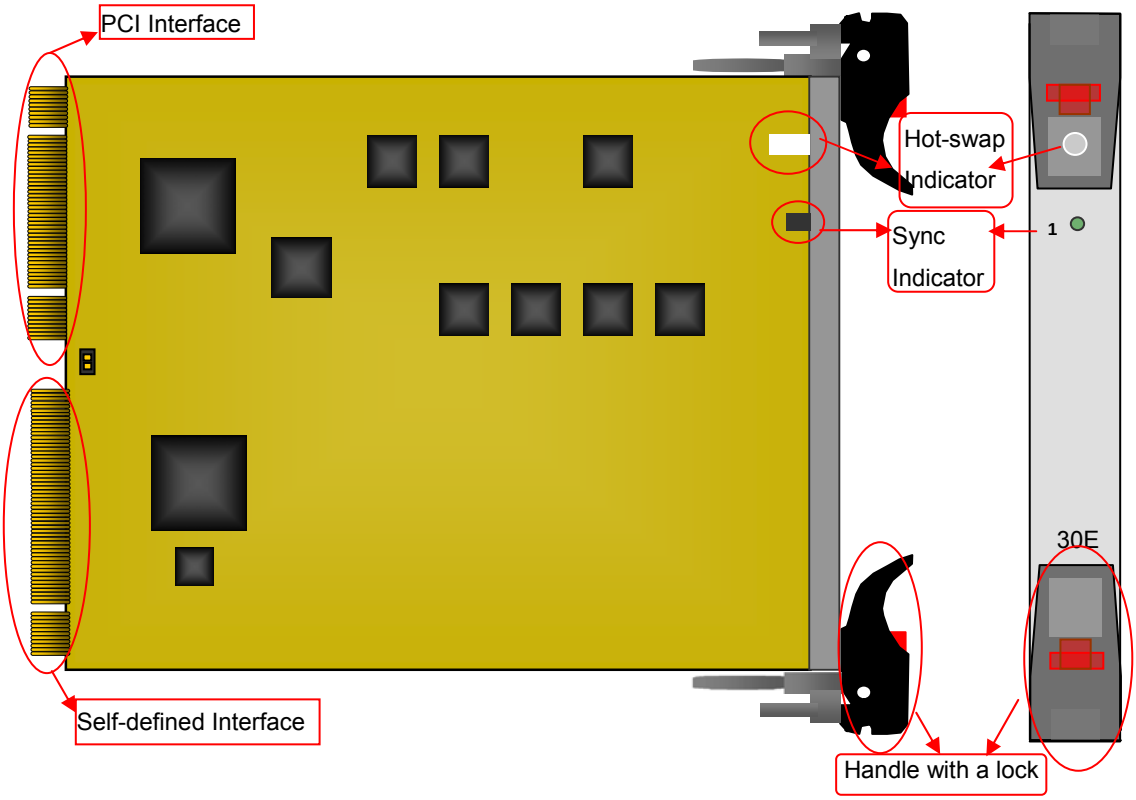

Figure 2-3 Right and Front Views

- **SHD-60E-CT/PCI(SSW) Mainboard**

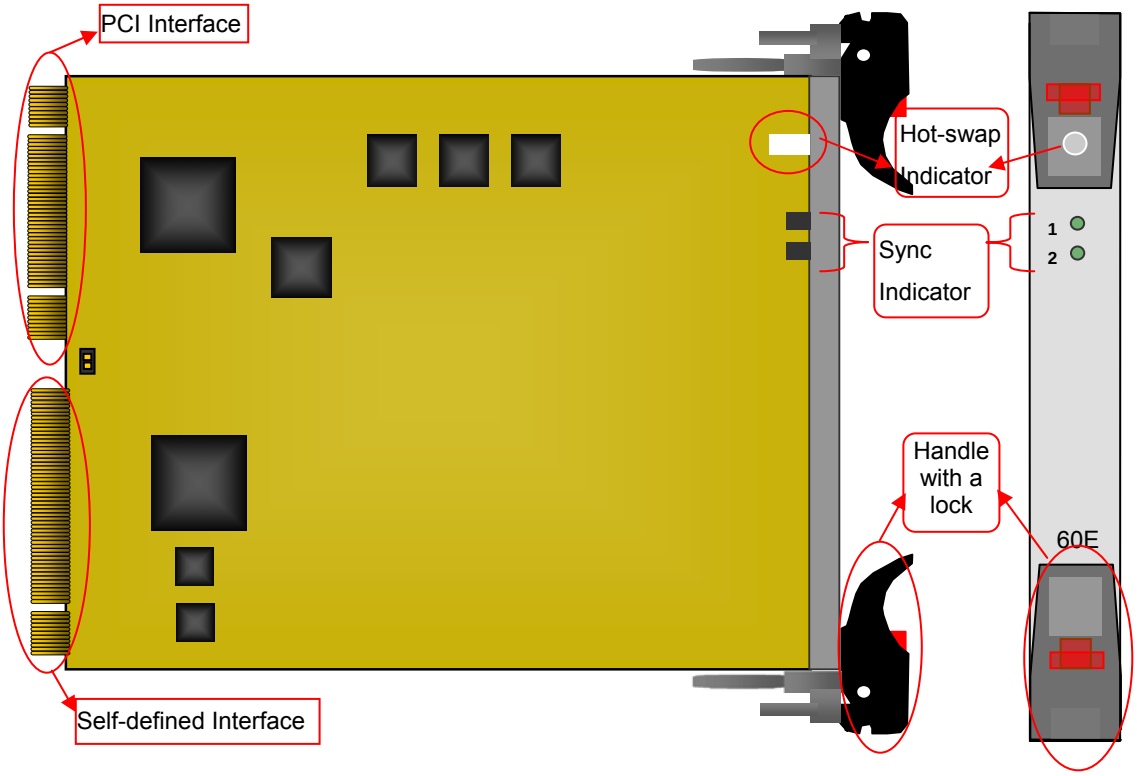

Figure 2-4 Right and Front Views

- **SHD-60E-CT/PCI/EC(SSW) Mainboard**

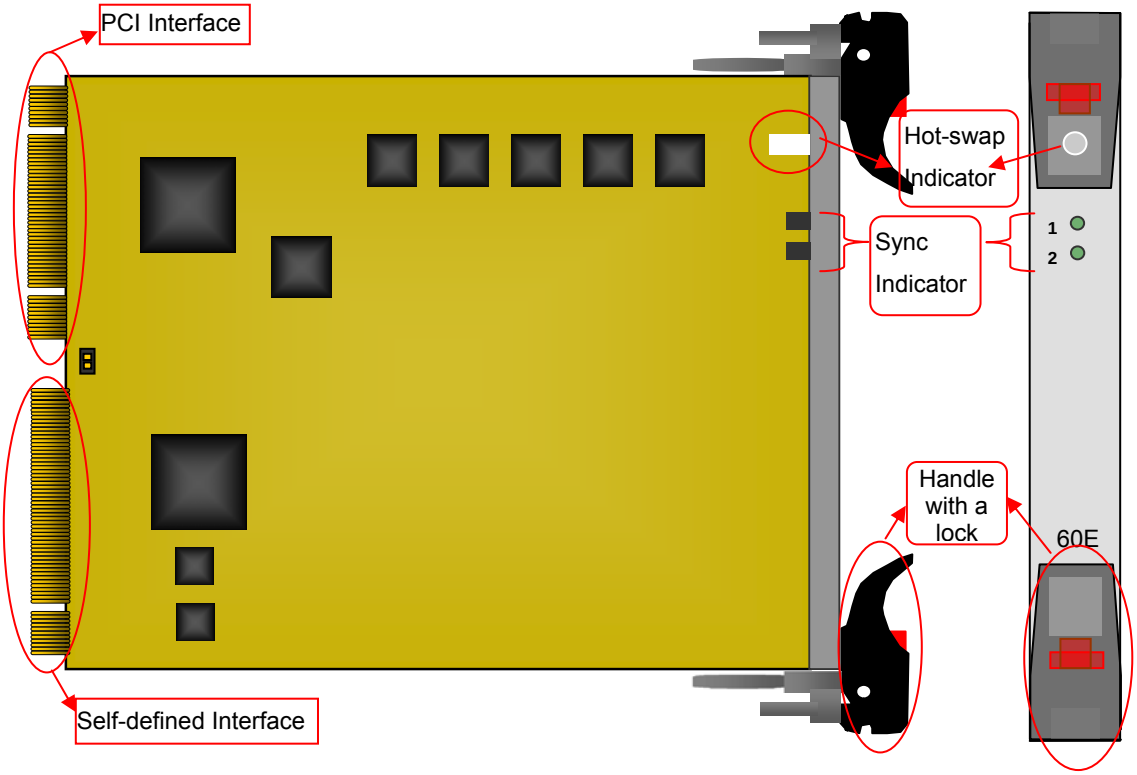

Figure 2-5 Right and Front Views

- **SHD-60E-CT/PCI/FAX(SSW) Mainboard**

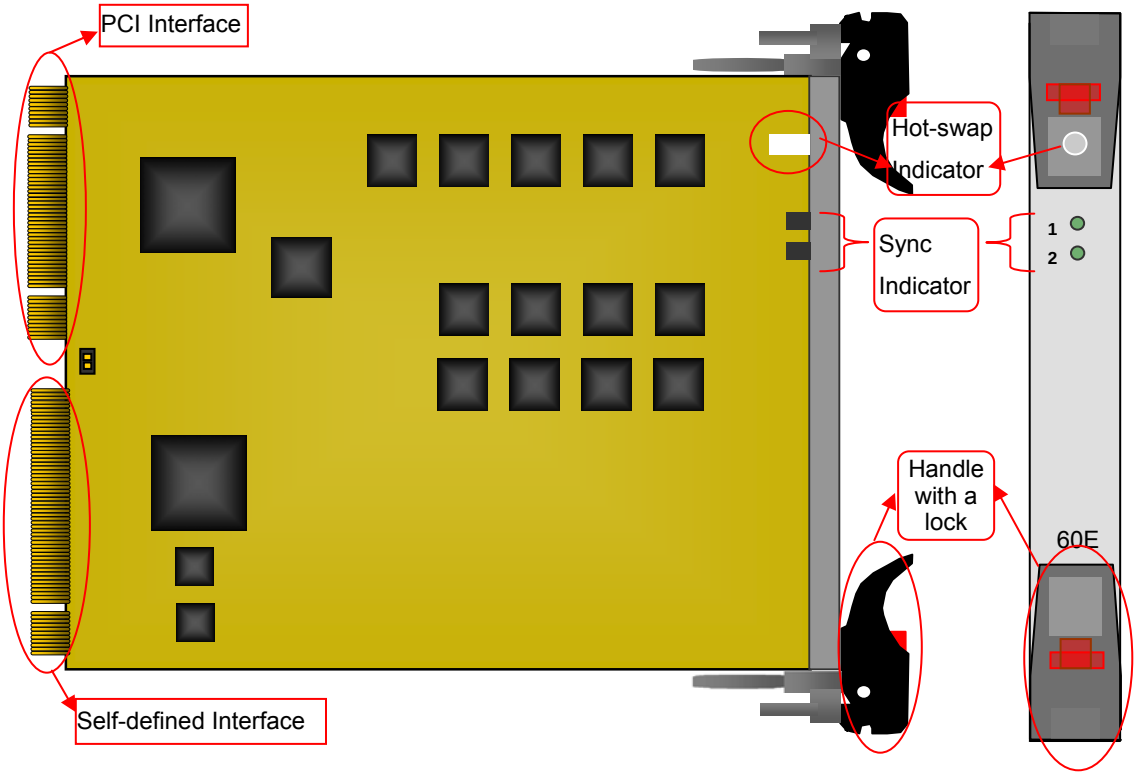

Figure 2-6 Right and Front Views

- **SHD-120E-CT/PCI(SSW) Mainboard**

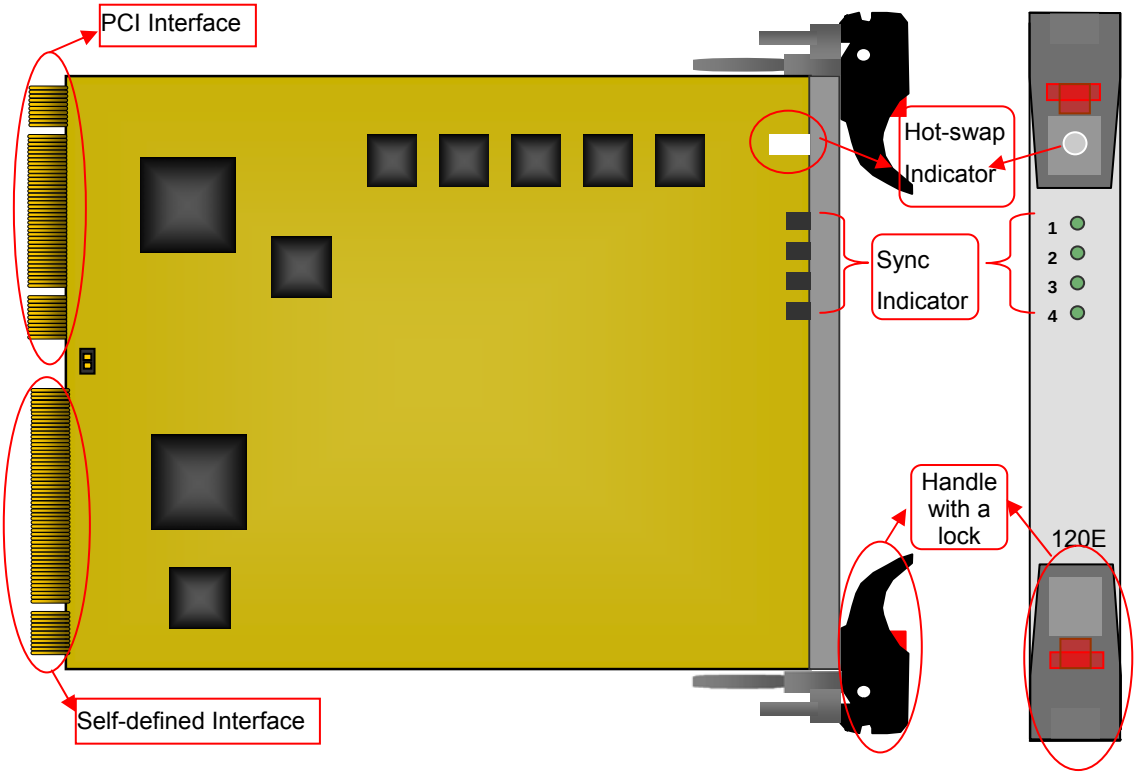

Figure 2-7 Right and Front Views

- **SHD-120E-CT/PCI/EC(SSW) Mainboard**

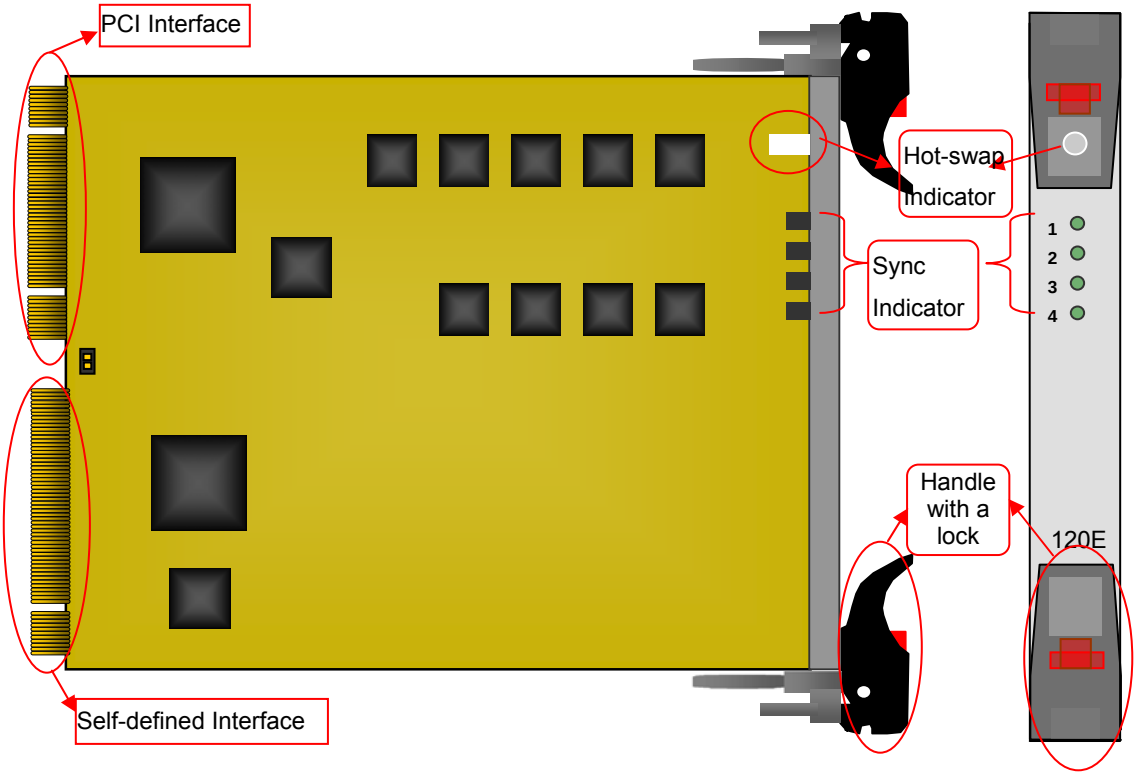

Figure 2-8 Right and Front Views

- **SHD-120E-CT/PCI/FAX(SSW) Mainboard**

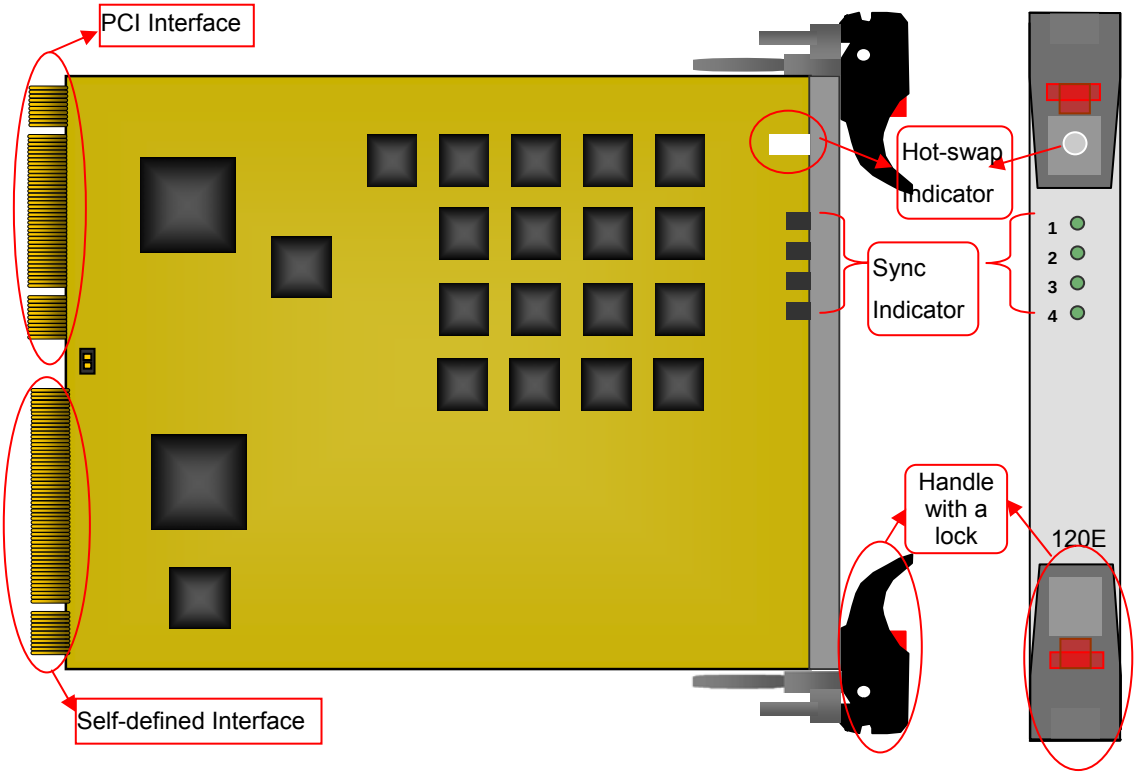

Figure 2-9 Right and Front Views

- **SHD-240E-CT/PCI(SSW) Mainboard**

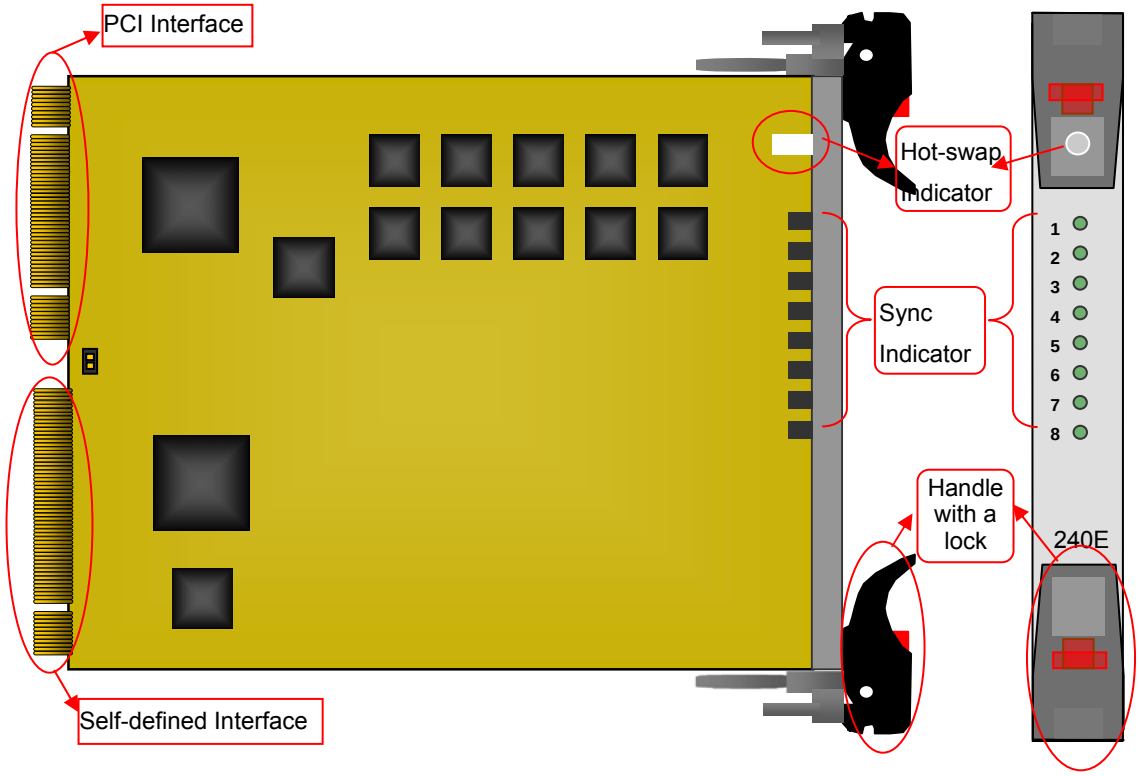

Figure 2-10 Right and Front Views

- **SHD-240E-CT/PCI/EC(SSW), SHD-240E-CT/PCI/FAX(SSW) Mainboards**

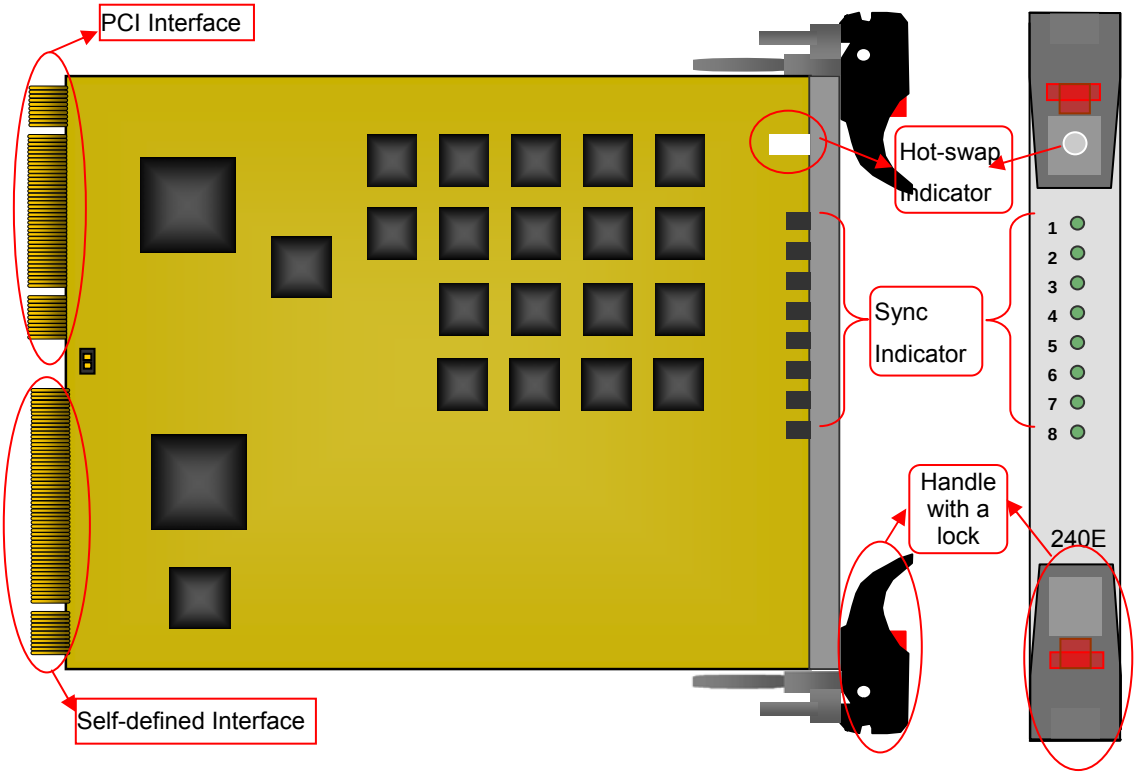

Figure 2-11 Right and Front Views

- **SSW E-type Mainboards**

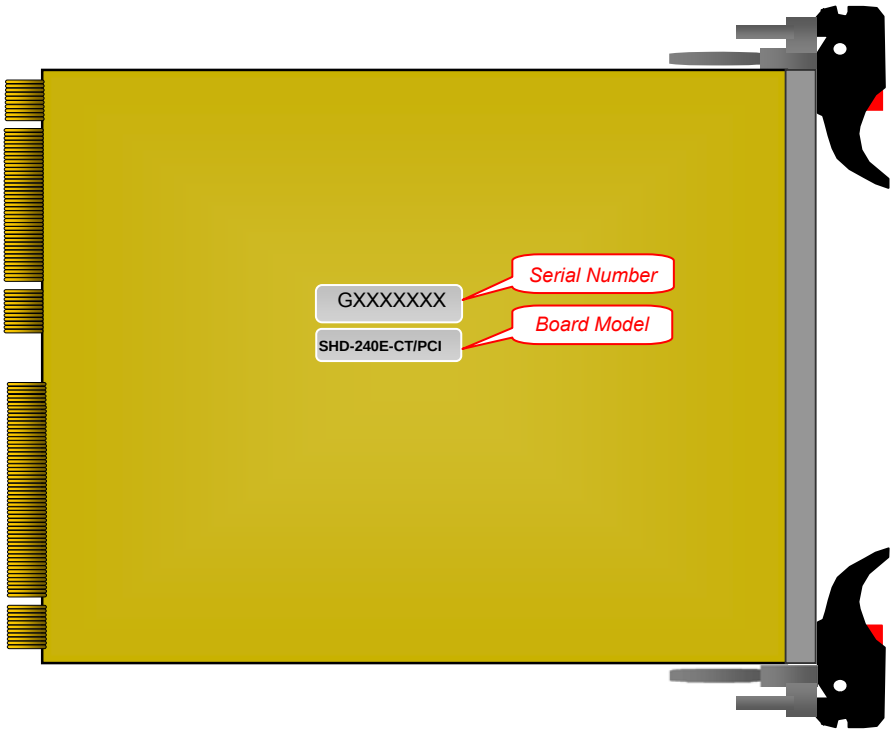

Figure 2-12 Rear View

- **RSD081 Outlet Board**

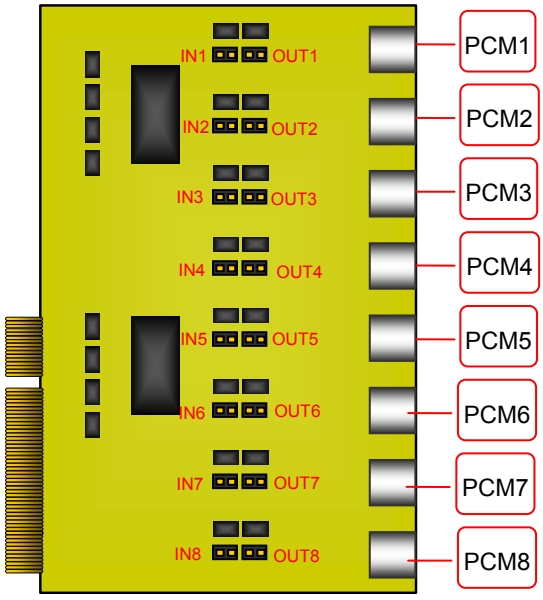

Figure 2-13 Front View

- **RSD082 Outlet Board**

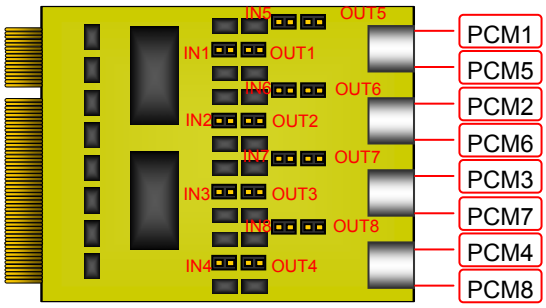

Figure 2-14 Right and Front Views

- **RSD042 Outlet Board**

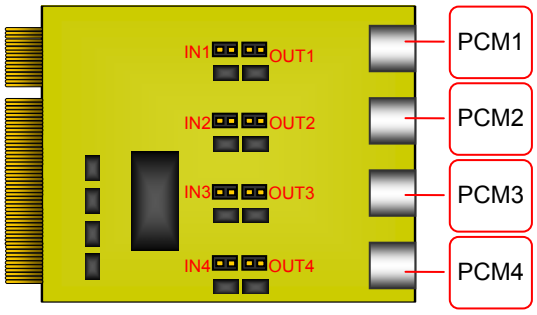

Figure 2-15 Right and Front Views

- **RSD043 Outlet Board**

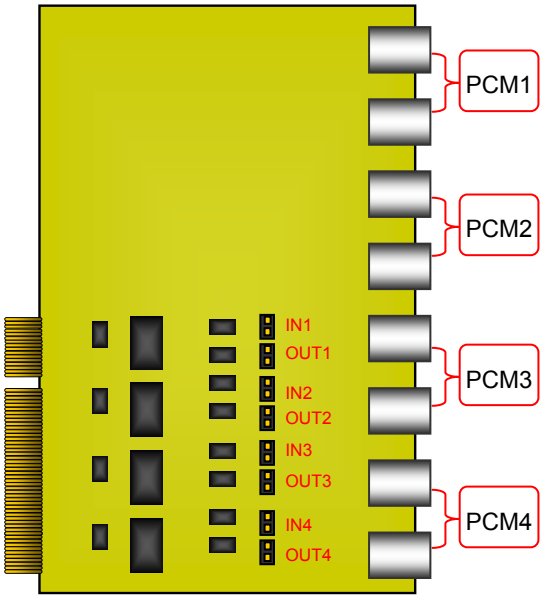

Figure 2-16 Right and Front Views

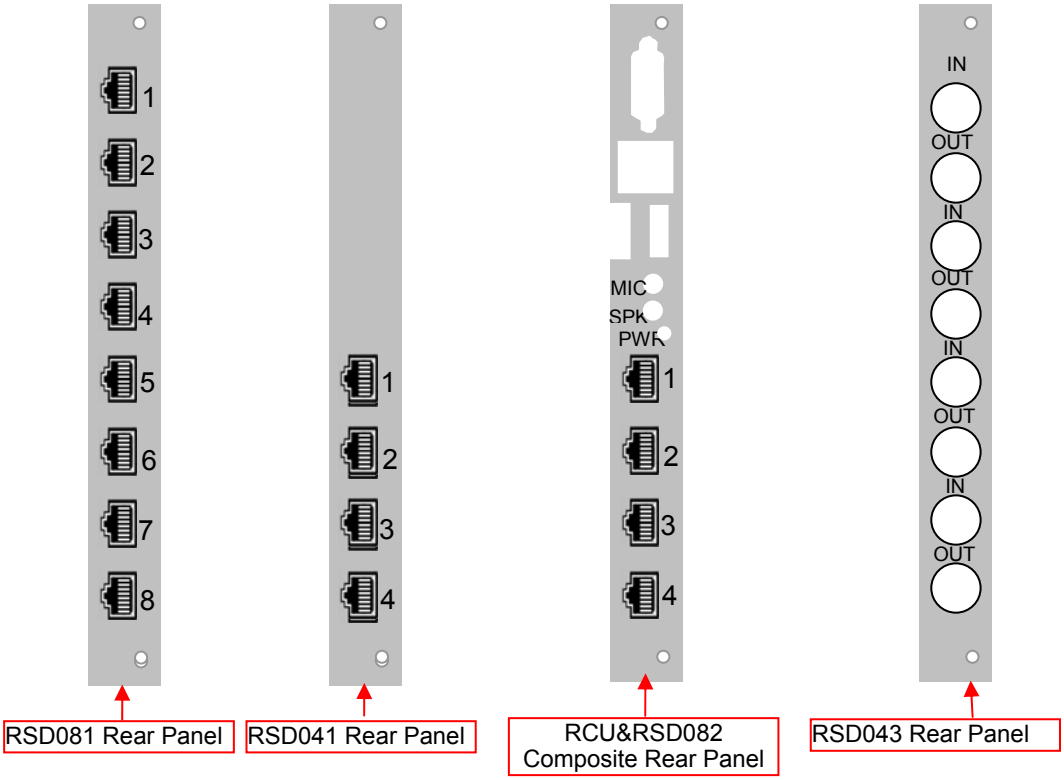

Figure 2-17 Rear Panels associated with Outlet Boards

Notes:

① Both RSD081 and RSD043 outlet boards are full-length, while RSD082 and RSD042 outlet boards are half-length.

② All kinds of rear panels are made of metal and with U-shaped cross sections.

③ The RSD081 rear panel can work only with the RSD081 outlet board.

④ The RSD043 rear panel can work only with the RSD043 outlet board.

⑤ The RSD041 and RCU&RSD082 rear panels can work only with half-length outlet boards.

Remarks:

① Here above illustrates the hardware structure of Synway E-type boards which are used exclusively for PBX. Always check the label on the back of a board to get the exact board model.

② See Table 2-1 below for detailed information about the synchronization indicators of on-board trunk interfaces mentioned above.

LED	Lamp Status	Implication
Green Lamps	ON	synchronous
	OFF	asynchronous
	Flash	synchronous but unsteady

Table 2-1 On-board Synchronization Indicators

Hot-swap Indicator	Lamp Status	Runtime Status

Blue Lamp	ON	in the course of hot-swap
	OFF	normal

Table 2-2 Hot-swap Indicator

③ Interfaces on outlet boards are all RJ48C connectors. Users may convert them into BNC connectors by using the RJ48C-to-BNC adapter supplied with the board. Board models introduced in this file are all listed below.

No.	Model	Trunk	Associated Outlet Board	Physical Interface
1	SHD-30E-CT/PCI(SSW)	1E1/T1/J1	RSD042	1 common RJ48C
			RSD043	2 L9
2	SHD-30E-CT/PCI/EC(SSW)	1E1/T1/J1	RSD042	1 common RJ48C
			RSD043	2 L9
3	SHD-30E-CT/PCI/FAX(SSW)	1E1/T1/J1	RSD042	1 common RJ48C
			RSD043	2 L9
4	SHD-60E-CT/PCI(SSW)	2E1/T1/J1	RSD042	2 common RJ48C
			RSD043	4 L9
5	SHD-60E-CT/PCI/EC(SSW)	2E1/T1/J1	RSD042	2 common RJ48C
			RSD043	4 L9
6	SHD-60E-CT/PCI/FAX(SSW)	2E1/T1/J1	RSD042	2 common RJ48C
			RSD043	4 L9
7	SHD-120E-CT/PCI(SSW)	4E1/T1/J1	RSD042	4 common RJ48C
			RSD043	8 L9
8	SHD-120E-CT/PCI/EC(SSW)	4E1/T1/J1	RSD042	4 common RJ48C
			RSD043	8 L9
9	SHD-120E-CT/PCI/FAX(SSW)	4E1/T1/J1	RSD042	4 common RJ48C
			RSD043	8 L9
10	SHD-240E-CT/PCI(SSW)	8E1/T1/J1	RSD081	8 common RJ48C
			RSD082	4 special RJ48C
11	SHD-240E-CT/PCI/EC(SSW)	8E1/T1/J1	RSD081	8 common RJ48C
			RSD082	4 special RJ48C
12	SHD-240E-CT/PCI/FAX(SSW)	8E1/T1/J1	RSD081	8 common RJ48C
			RSD082	4 special RJ48C

Table 2-3 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 grounding jumpers.

Disconnect all grounding jumpers for use of the 100ΩT1, 110ΩJ1 or 120Ω E1 balanced twisted-pair cable.

In consideration of various line conditions, this series boards are equipped with two groups of grounding jumpers on each channel which respectively control the groundings of the transmitting and receiving ends. In case the 75Ω E1 unbalanced coaxial cable is used, the grounding jumpers at the receiving end should be disconnected while those at the transmitting end should be short-circuited, provided that the PC is properly grounded. This configuration is the factory default setting and applicable to most situations so that there is usually no need to change it. If it is difficult to ground the local PC, you may short-circuit the on-board grounding jumper at the receiving end and use the transmitting end at the opposite terminal for grounding. If 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 2-4 for details.

Generally speaking, even in the case of proper grounding at both terminals, only the external layer of the E1 coaxial cable 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 2-4 Configuration of Grounding Jumpers for Use of 75ΩE1 Unbalanced Coaxial Cable

Step 2: Properly fit the required mainboard and outlet board into the Synway PBX.

Insert the mainboard and outlet board into a pair of vacant slots on the Synway PBX.

With the mainboard completely inserted, push the upper and bottom handles inwards at the same time until a ‘click’ sound is heard. The board is now properly fitted.

Insert the outlet board properly into the slot on the back of PBX which corresponds to the mainboard. Push it home and then fasten the corresponding rear panel by two screws (on the upside and underside of the rear panel).

Notes:

① It is necessary to push the board home into the slot until it can go no further, and ensure that it is not inclined at an angle before applying lever action on the handles to secure it. Such problems as poor contact of boards, blue lamp always on which implies the board abnormality, or damages on connecting parts of the PBX may be caused if:

(I) Handles are used too early
(II) Handles are used while the board is inclined
(III) Force on handles is not applied evenly.

② Board is allowed to be inserted when the computer is at power on. However, as strong static electricity may lead to damages, the operator should touch a grounded conductor to discharge the static electricity on him before inserting the board.

Step 3: Connect the outlet board to digital trunks.

Among these four models of outlet boards illustrated in Figure 2-17, RSD043 provides L9 connectors especially for users to connect with L9 coaxial line; RSD081 and RSD041 provide common RJ48C connectors to support direct connections to other boards, the pin layout being shown below in Figure 2-18; RSD082 provides special RJ48C connectors, the pin layout being unfolded below in Figure 2-19.

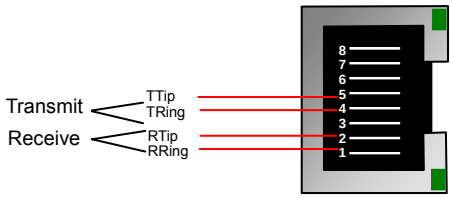

Figure 2-18 Pin Layout for Common RJ48C

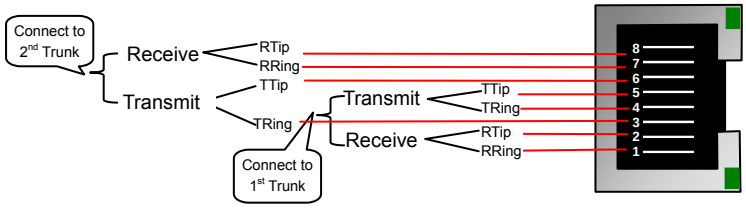

Figure 2-19 Pin Layout for Special RJ48C

You can use the 2-way hub for RJ48C to convert each special RJ48C connector into 2 common RJ48C connectors as shown in Figure 2-20: connect the 1st, 2nd, 4th, 5th pins of the special 8-pin RJ48C connector to the 1st, 2nd, 4th, 5th pins of the first common RJ48C connector, and the 3rd, 6th, 7th, 8th pins to the 1st, 2nd, 4th, 5th pins of the second common RJ48C connector. Besides, you are allowed to construct lines for conversion by yourself, but must follow the order in pin connection as specified above.

Figure 2-20 2-way Hub for RJ48C

If the input line has a BNC coaxial interface, for boards with common RJ48C connectors, use the RJ48C-to-BNC adapter as shown in Figure 2-21 to convert the RJ48C connector to the BNC connector; for boards with special RJ48C connectors, use the 2-way Hub for RJ48C to convert a special RJ48C connector to two common RJ48C before using the RJ48C-to-BNC adapter.

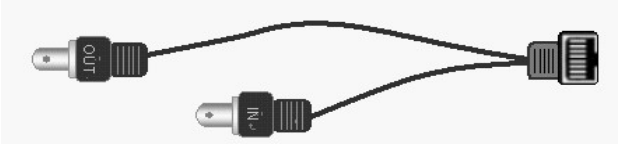

Figure 2-21 RJ48C-to-BNC Adapter

If you would like to construct lines for BNC or L9 conversion by yourself, you should not only make the line match the on-board interface, but also ensure the correct connection of receive and transmit lines as shown in Figure 2-18.

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 cannot be checked 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: Boot your computer and install the driver.

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

Step 5: Configure parameters for the digital trunk board.

Refer to *SynCTI Programmer's Manual* for details.

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 (excluding L-bracket)

Mainboard: 218.6×174.5mm²

Full-length outlet board: 180×115.1mm²

Half-length outlet board: 90×115.1mm²

Weight

Main board: ≈250g

Full-length outlet board: ≈175g

Half-length outlet board: ≈75g

Environment

Operating temperature: 0℃—55℃

Storage temperature: -20℃—85℃

Humidity: 8%—90% non-condensing

Storage humidity: 8%—90% non-condensing

Input/output Interface

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

T1 /J1 physical ports：DSX-1 and CSU line build-outs available for different extents of signal losses, including 100Ω and 110Ω balanced interfaces

Audio Specifications

CODEC: CCITT A/μ-Law 64kbps,

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 240 channels per board

Echo Cancellation

SHD-30E/60E-CT/PCI/EC(SSW): 64ms

SHD-30E/60E-CT/PCI/FAX(SSW): 64ms

SHD-120E/240E-CT/PCI/EC(SSW): 64ms

SHD-120E-CT/PCI/FAX(SSW): 64ms

Power Requirements

Maximum power consumption: ≤10W

Signaling

SS1: compliant with DL and MFC standards stipulated in GF002-9002; supports D4 and ESF framing

SS7: compliant with Q771-Q795

DSS1: compliant with Q.933

Audio Encoding & Decoding

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

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.

Headquarters

Synway Information Engineering Co., Ltd

http://www.synway.net/

9F, Synway D&R Center, No.3756, Nanhuan Road, Binjiang District, Hangzhou, P.R.China, 310053

Tel: +86-571-88860561

Fax: +86-571-88850923

Technical Support

Tel: +86-571-88864579

Mobile: +86-13735549651

Email: techsupport@sanhuid.com

Email: techsupport@synway.net

MSN: scycindy_sh@hotmail.com

Sales Department

Tel: +86-571-88860561

Tel: +86-571-88864579

Fax: +86-571-88850923

Email: sales@synway.net