



**RC801/803/805-240B
8E1 Fiber-Optic Multiplexer
(Rev. M)**

User Manual

1. Cautions



Please read the following notices carefully before installing and using the device, Raisecom does not respond to any loss that caused by violating safety notice.



RC800-240B series optical multiplexer provides two types of power supply: AC and DC. When using DC power supply, please plug the power supply connectors according to this manual strictly and avoid contrary connecting.



RC800-240B series fiber-optic multiplexer is integrated device that has precise elements, please avoid violent shakes and impacts, and do not disassemble or maintain the device yourself. If it is required, please do it under the guide of our technical staff following in the steps of anti static. Please contact us if there is any need.



There must be grounding protection for the sake of safety; do not disassemble the device yourself, we regard it as you waiver your rights of repair guarantee.

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2. Overview

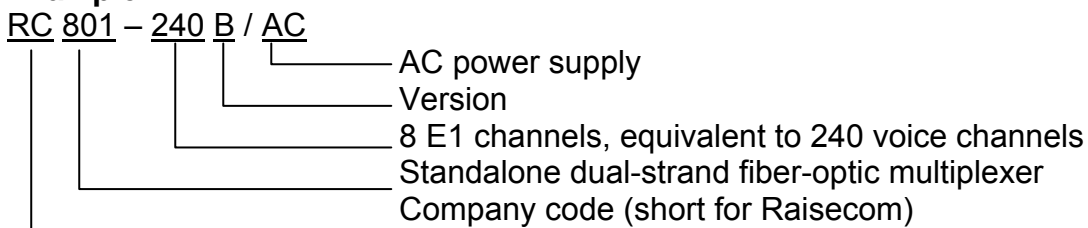
RC801/803/805-240B series fiber-optic multiplexers are ideal fiber-optic transmission devices for point-to-point networks, medium-sized and small capacity networks, such as wireless communication base stations, private communication networks, and switching networks. The basic transmission capacity of RC800-240B is 4 E1 channels, and the max is 8 E1 channels (equivalent to 240 voice channels).

2.1. Main Features

- Very large scale ASIC chips ensures low power consumption; 4-layer PCB ensures high reliability
- Complete alarm indication that can display local and remote alarms simultaneously
- Alarm lock memory and E1 channel loop-back test capabilities implements convenient operation and maintenance
- Capable of local and remote network management, providing 4-bit address switch
- RC800-240B series provides 2 expansion slots, which can be used to accommodate V.35 and Ethernet service expansion modules to implement various solutions.
 - Basic capacity: 4 E1 multiplexer, compatible with RC800-120B series
 - Max capacity: 4 E1 plus one 4 E1 expansion module, totally 8 E1 multiplexer
 - Multi-service configuration: 4 E1 plus two expansion modules, providing V.35 and 10M Ethernet service interfaces

2.2. Part Number Introduction

Example:



First section head:

RC — short form of Raisecom

First section end:

801 — standalone dual-strand fiber-optic multiplexer

803 — standalone 1310 TX wavelength single strand fiber-optic multiplexer

805 — standalone 1550 TX wavelength single strand fiber-optic multiplexer

Second section head:

240 — 8 E1 channels, equivalent to 240 voice channels

Second section end:

B — version B

Suffix:

AC — AC 220V power supply

DC — DC -48V power supply

Note: RC801 standalone fiber-optic multiplexer shall work in pairs

RC803 and RC805 must cooperate in pairs. One RC803 must work with one RC805.

2.3. Dimensions

Compact 19-inch standard 1U-high chassis, 440mm (W) x 43.6mm (H) x 235mm (D)

3. Parameters

3.1. E1 Interface Specification

Bit rate: 2048Kbps±50ppm
 Line code: HDB3
 Impedance of interface: 75Ω (unbalanced) or 120Ω (balanced)
 Electrical characteristics: complies with ITU-T G.703
 Transfer characteristics: complies with ITU-T G.823
 Input jitter tolerance: complies with ITU-T G.823

3.2. Optical interface characteristic

Bit rate: 100Mbps
 Line code: 4B5B
 Fiber connector: SC

| Part Number | Connector Type | Wavelength (nm) | Launch Power (dBmW) | Receiving Sensitivity (dBmW) | Over load point (dBmW) | Transmission Distance (Km) | Link Loss (dB/Km) |
|---------------|----------------|-----------------|---------------------|------------------------------|------------------------|----------------------------|-------------------|
| RC801-240B-S1 | DSC | 1310 | -15 ~ -8 | < -34 | -8 | 0 ~ 25 | 0.5 |
| RC801-240B-S2 | DSC | 1310 | -5 ~ 0 | < -34 | -8 | 10 ~ 60 | 0.5 |
| RC801-240B-S3 | DSC | 1550/DFB | -5 ~ 0 | < -36 | -10 | 15 ~ 120 | 0.25 |
| RC803-240B-S1 | SC/PC | 1310 | -12 ~ -3 | < -30 | -8 | 0 ~ 25 | 0.5 |
| RC803-240B-S2 | SC/PC | 1310 | -5 ~ 0 | < -32 | -8 | 10 ~ 50 | 0.5 |
| RC805-240B-S1 | SC/PC | 1550 | -12 ~ -3 | < -30 | -8 | 0 ~ 25 | 0.5 |
| RC805-240B-S2 | SC/PC | 1550 | -5 ~ 0 | < -32 | -8 | 10 ~ 50 | 0.5 |

3.3. Power Supply

DC: -48V, range from -36V to -72V
 AC: 220V, range from 165V to 265V
 Power consumption: ≤15W

3.4. Ambience

Working temperature: 0 ~ 45
 Relative humidity: ≤ 90% (25)

4. How to use

4.1. Introduction of the Front Panel

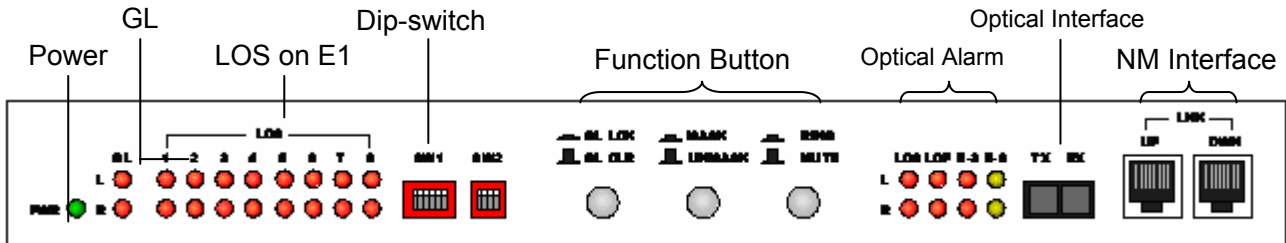


Figure1: Sketch of the front panel of RC800-240B

4.1.1. Power indicator

PWR (green): On, when built-in power is working properly

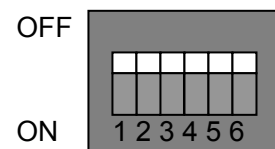
4.1.2. Alarm indicator

Alarm indicators of both local and remote side can be displayed. The L row indicates “local”. The R row indicates “Remote”.

- General alarm:
GL general alarm indicator (red): Any of alarm generated will make GL general alarm indicator “on”.
- LOS for E1 link
LOS1~ 8 E1 link (red): when receiving signals of any E1 channel is lost, alarm indicator turns red.
- Alarm of optical port:
LOS link loss alarm (red): When receiving signals are lost, the alarm indicator turns on.
LOF frame synchronization loss alarm (red): When optical receiving frames lose synchronization, the alarm indicator turns on.
E-3 bit error alarm (red): ON, when the receiving bit error rate exceeds 10^{-3} .
E-6 bit error alarm (yellow): ON, when the receiving bit error rate exceeds 10^{-6} .

4.1.3. DIP-switch SW1 Setup: All OFF by Default

DIP-Switch SW1 on the front panel is used for setting of loop-back test and saving the configurations



- 1st ~ 4th: Loop-back

| 1 st bit | 2 nd bit | 3 rd bit | 4 th bit | Loop-back |
|---------------------|---------------------|---------------------|---------------------|--------------|
| OFF | OFF | OFF | OFF | No loop-back |

| | | | | |
|-----|-----|-----|-----|--------------------|
| OFF | OFF | OFF | ON | 1 st E1 |
| OFF | OFF | ON | OFF | 2 nd E1 |
| OFF | OFF | ON | ON | 3 rd E1 |
| OFF | ON | OFF | OFF | 4 th E1 |
| OFF | ON | OFF | ON | 5 th E1 |
| OFF | ON | ON | OFF | 6 th E1 |
| OFF | ON | ON | ON | 7 th E1 |
| ON | OFF | OFF | OFF | 8 th E1 |
| ON | ON | ON | ON | All E1 links |

Note: Only two test method can be set: single E1 channel loop-back or all E1 channels loop-back. When single E1 channel loop-back is testing, the other channels are working without disturbance.

- 5th bit: loop-back type options

This switch is used to choose “remote loop-back” or “local loop-back” when performing the E1 loop-back operations.

| 5 th bit | Loop-back type option |
|---------------------|-------------------------|
| OFF | Remote loop-back enable |
| ON | Local loop-back enable |

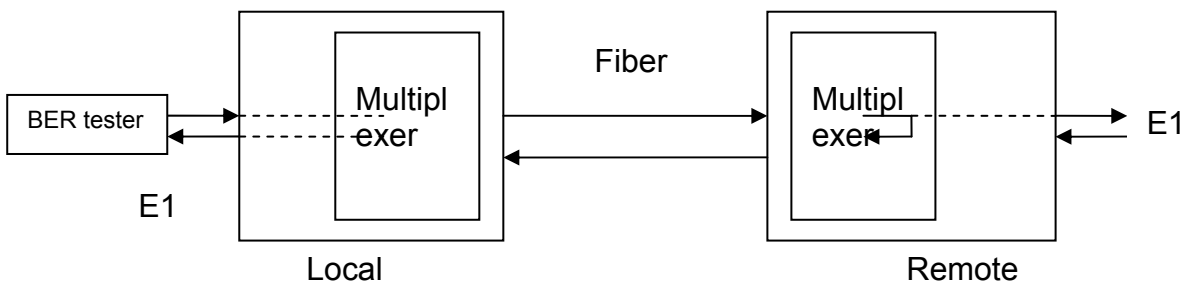


Figure2: sketch map of setting remote loop-back on local site

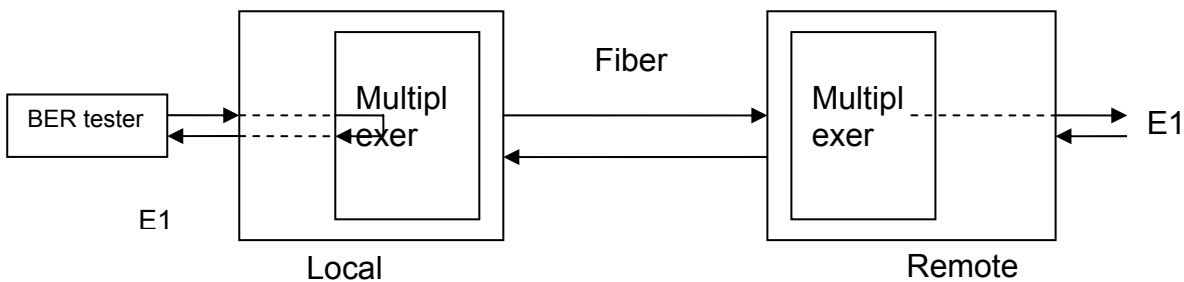


Figure3: sketch map of setting local loop-back on local site

Note: When any loop-back is set on local site, 1st ~ 4th loop-back DIP-switch of remote site must be all off (not loop-back).

- 6th bit: Saving the configurations

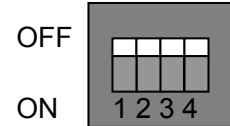
OFF: when rebooted, the equipment will read from the saved configurations.

ON: when rebooted, the equipment will not read from the saved configurations.

| 6 th bit | Switch for saving configurations |
|---------------------|---|
| OFF | Read from the saved configurations when booting |
| ON | Not read from the saved configurations when booting |

4.1.4. DIP-switch SW2 Setup: All OFF by Default

SW2 is the switch for address code setting. When all OFF, the equipment can be remote managed; otherwise, it can be managed locally through LNK-UP port. The addresses shall not be the same for the equipment cascaded at one serial port. There are 4 bits of this switch, so that the max number of local cascade equipment is 15.



4.1.5. Function Buttons: All “High Position” by Default

- GL LCK / GL CLR Global alarm lock/ Global alarm clear button:
When button is “low”, the GL is on Global alarm lock mode. The GL indicator will not off once turned on until alarms are cleared.
When button is “high”, the GL is on Global alarm clear mode.
- MASK / NO MASK
“Low”: Mask unused E1’s alarm
“High”: No mask unused E1’s alarm
- EN RING / DIS RING Alarm ring enable/disable button
“Low”: Enable alarm ring. When there is alarm, the “zi...zi...” alarm rings.
“High”: Disable alarm ring, but the service phone still rings.

4.1.6. Optical Port

- The fiber connector is DSC/PC for dual-strand models, TX for signal output and RX for signal input
- The fiber connector is SC/PC for single strand models.

4.1.7. Network Management Port

- LNK-UP shall be connected to the serial port of computer or LNK-DWN port of up-level equipment when cascading. The RJ45 socket complies with RS-232 standard with bit rate of 9600bps
- LNK-DWN shall be connected to the LNK-UP port of low-level equipment. The RJ45 socket complies with RS-232 standard with bit rate of 9600bps

Please refer to Appendix B.2 for the sequence of serial cable between LNK-UP and computer serial port.

Please use RJ45-RJ45 straight-through cable to connect LNK-DWN and LNK-UP ports.

4.2. Introduction of the Rear Panel

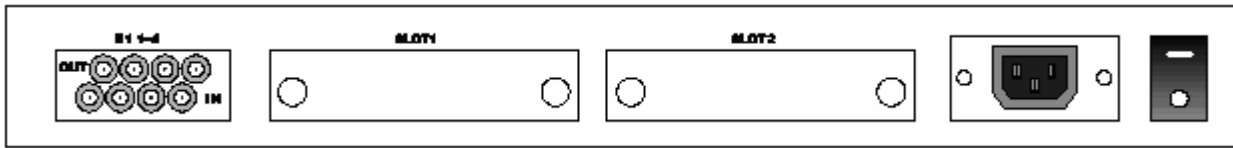


Figure 4. RC800-240B standalone PDH multiplexer

4.2.1. Power Switch

This switch is used to turn on/off the power supply.

4.2.2. Power Socket

AC: 220V standard triple-phase power socket

DC: -48V power interface. Left pin for -48V, right pin for 0, and the middle pin for ground

4.2.3. E1 Interface

There is a DB37 male connector at the rear panel, providing the 1st – 4th E1 channels interfaces. Please refer to Appendix B for cable making.

- When adopting 75 Ohm connector, it is required to plug a DB37 to 8 CC3 coaxial adapter, which is of CC4B-8G type. From the left is the 1st – 4th E1 channel. The upper row is for OUT signals and the lower row is for IN signals.
- It is not required to plug adapters when adopting 120 Ohm connector.

4.2.4. The Expansion Slot 1 and Slot 2

RC800-240B series provide two expansion slots for accommodating various kinds of expansion sub-modules. Thus they can provide great configuration flexibility to satisfy users' requirements. The typical configurations are as follows.

| Configuration Type | SLOT 1 | SLOT 2 | Transmission Capacity |
|-----------------------------|---|---|-----------------------------------|
| Basic Capacity | Empty | Empty | 4 E1 |
| Max Capacity | SUBM-4E1 sub-module (5 th – 8 th E1 channels) | Empty | 8 E1 |
| Multi-service Configuration | Ethernet or V.35 sub-module (occupy 5 th E1 channel) | Ethernet or V.35 sub-module (occupy 8 th E1 channel) | 4 E1 plus multi-service interface |
| | Fast Ethernet sub-module (occupy 5 th – 8 th E1 channels) | Empty | |

- RC800-240B basic capacity configuration (4 E1)

Both Slot 1 and 2 are empty. There is no interface for the 5th – 8th E1 channels.

- RC800-240B max capacity configuration (8 E1)

SUBM-4E1 sub-module is installed into Slot 1. It provides a DB37 male connector for the 5th – 8th E1 channels. It can be connected with an adapter as the 1st – 4th channels. Slot 2 must be empty.

- RC800-240B expanded configuration

When Slot 1 is installed with a 1 E1 interface sub-module (e.g. Ethernet to 1 E1 converter sub-module, V.35 to E1 converter sub-module), it is actually the 5th E1 channel that be occupied. If installing a two-channel sub-module, it is actually the 5th and 6th channels that be occupied.

When Slot 2 is installed with a 1 E1 interface sub-module, it is actually the 8th E1 channel that be occupied. If installing a two-channel sub-module, it is actually the 7th and 8th channels that be occupied. Slot 2 does not support 4-channel sub-modules.

4.3. DIP-switch on the Bottom Panel

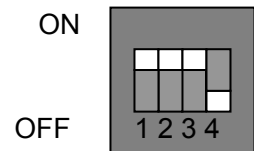
The DIP-switch can be set by small flat screw-driver.
Each group of dip-switch corresponds to one E1 interface.

Definition as shown below

| 1 st | 2 nd | 3 rd | 4 th |
|---------------------------------|-----------------|-----------------|-----------------|
| ON | ON | ON | OFF |
| 75Ω unbalanced signal effective | | | |

Or

| 1 st | 2 nd | 3 rd | 4 th |
|--------------------------------|-----------------|-----------------|-----------------|
| OFF | OFF | OFF | ON |
| 120Ω balanced signal effective | | | |



As shown in figure above, the default status is set as “75Ω unbalanced signal BNC interface effective”.

It is suggested that users should use BNC connector for 75 Ohm unbalanced signal and RJ45 connector for 120 Ohm balanced signal.

5. Installation and Test

5.1. Inspect after Opening

Please first check if the models and part numbers are in consistence, and also check if the equipments are damaged.

5.2. Preparation before Installation

- Carefully read this manual
- Prepare all kinds of the cable. Ensure that they are not short-circuited. Refer to Appendix A for cable making.
- Ensure the pressure of power supply is in the tolerance range, the chassis is well connected with the ground.
- Prepare the BERT and optical power meter for test of line quality.
- Change the dip-switch setting on the bottom panel if 120 Ohm balanced signal interface is required.
- Fix the equipment on to 19-inch rack or place the equipment at stable and secure environment. Pay attention to the requirements of the ambience.

5.3. Installation Procedure

5.3.1. Connecting Cables

- E1 port
It is suggested that users use SYV75-2-2 coaxial cables to connect the BNC connector. Or use twisted-pair to connect the DB37 connector.
- Optical interface
Plug the SC fiber tail into optical interface (push hard until to the deep end). If not sure about transmission direction, it's advised first to turn on the power of device and then plug in the fiber cable.
- Network management port
Connect the serial port of computer to LNK-UP port. If several multiplexers have been cascaded, the LNK-DWN port shall be connected to the LNK-UP port of lower-level multiplexers. The LNK-DWN port of last multiplexer shall be left. Afterwards, equipment address codes must be set in order to identify each equipment. Please refer to the instruction of setting SW2. The address codes must be different from each other.

5.3.2. Applying the Power Supply

If power supply (PS) is DC -48V, first connect middle end to PGND. Turn off PS, connect "-48V" end with the lower electric level cable, "0V" end with higher electric level cable. Make sure no reverse connection, or no short circuited, and then turn on power. If PS is AC 220V, use the PS line in the accessories.

When PS is turned on, the PWR indicator should be on.

5.3.3. Configuring Buttons and Switches

After turning on power of the device, first ensure there is no alarm on optical port. If optical ports are connected properly, there shall be no LOS, LOF, and E-3 alarm. The E-6 (yellow) may be on the moment when the power is just turned on. This is because turning on the power causes jitters which results in a few bit errors. After 10 seconds, E-6 will be off. This indicator refreshes in every 10 seconds.

- Bit error rate test

Using 2M bit error tester as well as loop-back switch of front panel can test the bit error level of E1 channel. See Chapter 3.

- Mask unused E1 channel alarm

If the connected E1 links are working in good condition without any signal loss, while there is still another unused E1 link, the LOS alarm for unused E1 link may occur, which is called “unused E1 alarm”. Press MASK/NO MASK button “on” to clear all the unused E1 alarm and all the E1 LOS alarm indicators will be off.

In the case unused E1 link alarm being masked, if the connected E1 sub-channel is disconnected, the LOS indicator of this sub-channel will still be on.

If power supply is cut off and turned on again, then the mask function will be disabled. Press button to “off” and then pressed to “on” again.

If after a period of operation, a new E1 channel is needed, first disable the mask function and then connect E1 link.

- Turn on the alarm ring

Press the button “ON” of EN RING / DIS RING to make alarm ring available. In this time, if there is any one alarm indicator on, it will ring like “ZI...ZI...”.

- GL alarm indicator lock (optional)

When there is no alarm indicator on, press GL LCK / GL CLR to “ON”, global alarm lock function is configured as enable. If there is any alarm, then the global alarm indicator will keep on. When all other alarm are eliminated, press the button of GL LCK / GL CLR to “OFF” to clear the GL alarm indicator

When the GL LCK / GL CLR button is “OFF”, also called real time display, i.e. if there is other alarm, the global alarm is on; if there is no other alarm, the global alarm is off.

In the unstable voltage environment, there are often instantaneous alarms for voltage waving. In this environment, it is not suitable for operating the GL alarm lock function.

6. Troubleshooting

If there are any problems during installation and using, try the following proposals. If the problems still can not be solved, please contact distributors/agents for help.

The following explanations and solutions for alarms at optical ports and LOS alarms at E1 ports are used to handling local alarm problems. For remote-end alarms, please handle them at remote site.

- Green PWR indicator not on

Answer: PS faults. Check whether PS is working properly and –48 PS connection is not reversed.

- GL global alarm red indicator on

Answer: there are three different cases.

- 1 . If there are other alarms on, please solve corresponding problem and then clear GL.
- 2 . If there is no other alarm indicators but only GL alarm on and GL LCK button is on. This means there was once other alarm on, in this case can clear GL alarm.
- 3 . If all other alarms are “OFF” and the GL LCK button is also “OFF”, but GL alarm indicator still flash or on and there is a HDB3 coding violation alarm in E1 receiving signals. There is problem that E1 link is too long to bring too much disturbance, so the signal attenuation is beyond –6dB. We can test the level of bit rate when this E1 link connecting with RC801-480B.

- LOS red indicator of optical port is on

Answer: Loss of receiving signal occurs at optical port. Check whether the input fiber (RX) is connected well and ensure not reversed. Or check the receiving optical power with optical power test-meter; it should be greater than receiving sensitivity specification.

- LOF red indicator of optical port is on

Answer: Loss of frame synchronization of receiving signal at optical port. In this case, optical signal has been received, but the optical power may be near threshold value of sensitivity. Check RX optical power and ensure whether the sending optical port (TX) of remote-site is connected.

- E-3 red indicator is on at optical port

Answer: The bit error of optical RX signal is greater than 10^{-3} . Check if optical RX port connects well and RX optical power.

- E-6 yellow indicator of optical port is on

Answer: The bit error of optical RX signal is greater than 10^{-6} . It is normal that E-6 alarm occurs for 10 seconds just after turning on the power, after 10 seconds the E-6 indicator will

be off. If E-6 alarm occurs during operation, check whether optical RX port connects well and RX optical power.

- LOS red indicator of E1 sub-channel is on

Answer: Loss alarm of RX signal at E1 sub-channel, no HDB3 signal is received. Check whether all E1 ports are connected well, or whether 75 Ω cables are reversely connected, or whether the wires of 75 Ω cables are in right order. If LOS alarm occurs at unused E1 sub-channel, press “mask” button to “on” to musk the alarm after finishing the configuration of device.

- Mask button is on, but there is still alarm in unused E1 sub-channel.

Answer: probably the mask function is disabled if power supply is cut off and then turned on. To solve is by pressing the mask button to “OFF”, and then pressing to “on” to enable mask function.

7. Appendix A Introduction of SUBM-4E1 Sub-module

The SUBM-4E1 sub-module can be installed into RC800-240B series standalone fiber-optic multiplexers to provide the 5th – 8th E1 interfaces. It is equipped with DB37 male connector. Users can use 120 Ohm twisted-pair cable directly, or use additional adapter to convert the connector to CC3 coaxial connector.

There are 4 groups of 4-bit dip-switches on the front panel. They are used to set the interface type of the 4 E1 channels.

Definition as shown below

| 1 st | 2 nd | 3 rd | 4 th | Or | 1 st | 2 nd | 3 rd | 4 th |
|---------------------------------|-----------------|-----------------|-----------------|----|--------------------------------|-----------------|-----------------|-----------------|
| ON | ON | ON | OFF | | OFF | OFF | OFF | ON |
| 75Ω unbalanced signal effective | | | | | 120Ω balanced signal effective | | | |

The default status is set as “75Ω unbalanced signal CC3 interface effective”.

Note: SUBM-4E1 can only be installed in Slot 1 of RC800-240B; Slot 2 shall be empty. Slowly insert the SUBM-4E1 along the slot and fix it tightly with the screw. Installed adapters as per requirement and connecting cables.

Appendix B Introduction of Cable Making

B.1 E1 Cable

- Rc800-240B E1 cable (including SUBM-4E1)
75 Ohm signal adopts DB37 coaxial adapter:
SYV 75-2-2 coax cable, the distance shall not be longer than 200m.

First pick out the CC3-K3 connector from the accessories, and release the tail protecting jack. Secondly, separate the core from the shield, and put the tail protecting jack on it. Solder the strand with the core of the CC3-K3 connector. Solder the cable shield with the shield of the CC3-K3 connector. Finally, fix the jack at the end of the connector.

120 Ohm signal adopts DB37 male connector:

| DB37 Pin Definition | 1 st Channel | 2 nd Channel | 3 rd Channel | 4 th Channel |
|---------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| OUT | 3, 4 | 7, 8 | 11, 12 | 15, 16 |
| IN | 21, 22 | 25, 26 | 29, 30 | 33, 34 |

Others - GND

B.2 Computer Serial Cable Making

- Computer serial port LNK-UP adopts RJ45 connector. The definition of pins:
3 —RXD 232 signal input

7 — TXD 232 signal output
4, 8 — GND
Others — hang on

The sequence of the cable for connection between LNK-UP port (RJ45) and computer serial port (DB9 female connector) is as follows.

| RJ45 | | DB9F |
|------|---|------|
| 3 | ← | 3 |
| 7 | → | 2 |
| 4, 8 | — | 5 |

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