

**RS-5180 CDMA800/1900
INDOOR DUAL BAND
FIBER-OPTIC REPEATER
USERS MANUAL**

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1. System Introduction

1.1 System Application

RS-5180 CDMA800/1900 dual band indoor fiber-optic repeater combines signals from CDMA800/1900 BTSs, then transmits them to Remote Units which are finally transmitted by antenna so as to expand signal coverage area.

RS-5180 CDMA800/1900 dual band indoor fiber-optic repeater is applicable to the indoor signal coverage at areas such as large scale office building, high-rise hotels, large department stores, exhibition halls, underground buildings, tunnels, airport etc.. Its application is shown in figure 1.1-1.

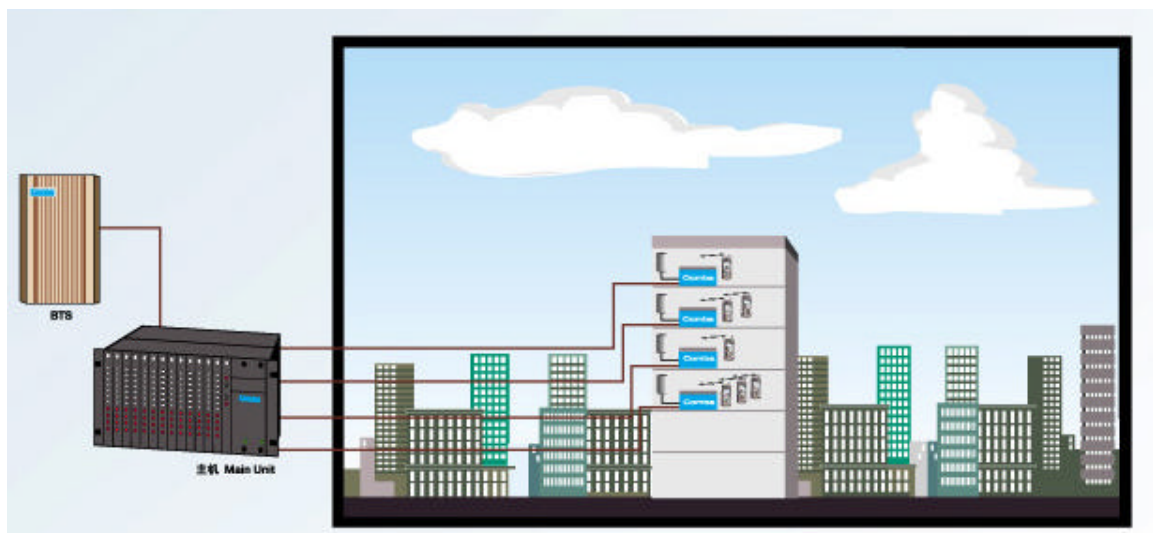


Figure 1.1-1 Application of RS-5180

1.2 System Composition

RS 5180 CDMA800/1900 dual band indoor fiber-optic repeater is composed of master unit (RS-5180-M) and Remote Unit (RS-5180-R).

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1.2.1 Master Unit (RS-5180-M)

- 1 Master Unit RS-5180-S
- 1~4 Interface Units RS-5180-F . Quantity is determined by users.
- 1 power supply unit RS-5180-P
- A 19"6U cabinet. The above units are inserted into the cabinet.
- Options: chosen by users according to their needs

Alarm Unit (inserted into 19"6U cabinet)

19" portable frame 800mm high Tail fiber tray Master unit cover

1.2.2 Remote Unit (RS-5180-R)

A master unit can support up to 16 Remote Units.

1.3 System Configuration

The Master Unit can be connected with at most 4 Interface Units. A Interface Unit can be connected with 4 Remote Units. The whole system thus can be connected with 16 Remote Units at most.

Each Remote Unit has 4 antenna ports. 16 Remote Units have 64 antenna ports. Each antenna port can connect 2 antennas through a 2way power splitters as needed. Therefore, the whole system can connect up to 128 antennas.

1.4 System Appearance

1.4.1 Master Unit (RS-5180-M)

The appearance of master unit is shown in figure 1.4.1. External dimensions (h×w×d) are 267×442×364 mm³.

All units are in plug-and-play cabinet structure. 6U cabinet and panels of all units are made of aluminum alloy with the surface conduction and oxidation finished.

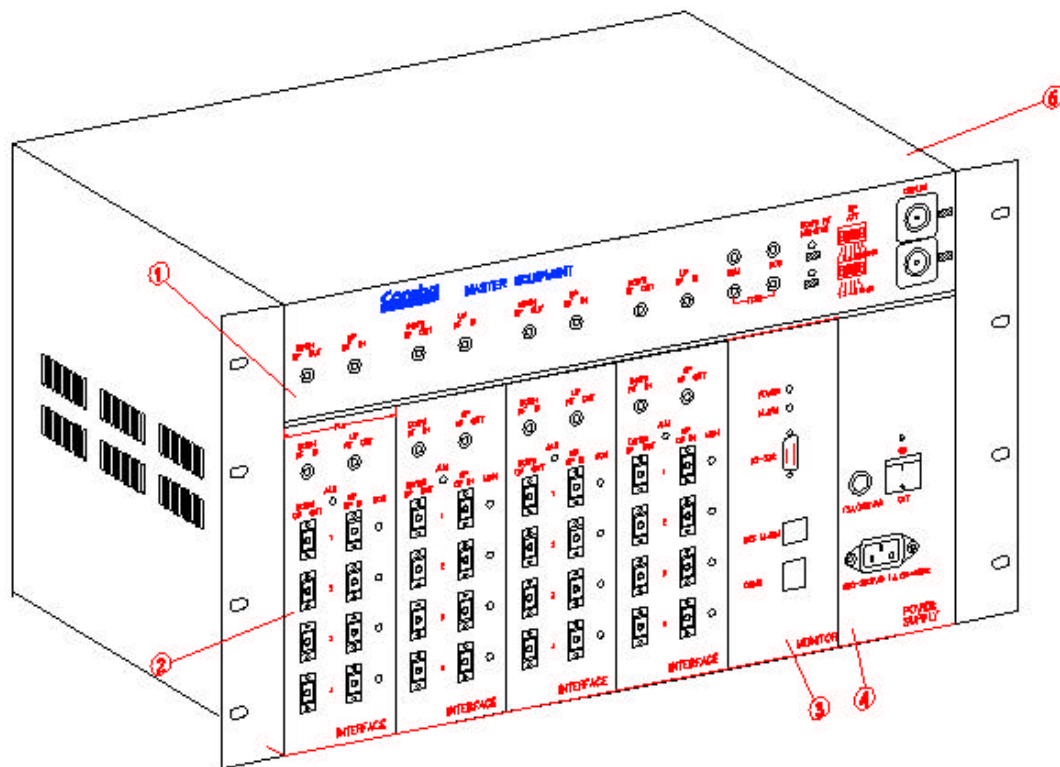



Figure 1.4-1 Appearance of Master Unit

Master Unit Interface Unit Alarm Unit

Power Supply Unit 6U Cabinet

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1.4.2 Remote Unit (RS-5180-M)

The appearance of Remote Unit is shown in figure 1.4-2.

The cabinet is made of aluminum alloy with the surface conduction and oxidation finished.

External dimensions (h×w×d) are 368×220×60 mm³.

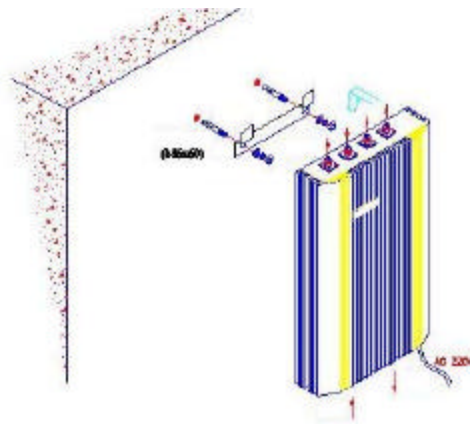


Figure 1.4-2 Appearance of Remote Unit

2. Technical Explanations

2.1 System Composition

See figure 2.1-1.

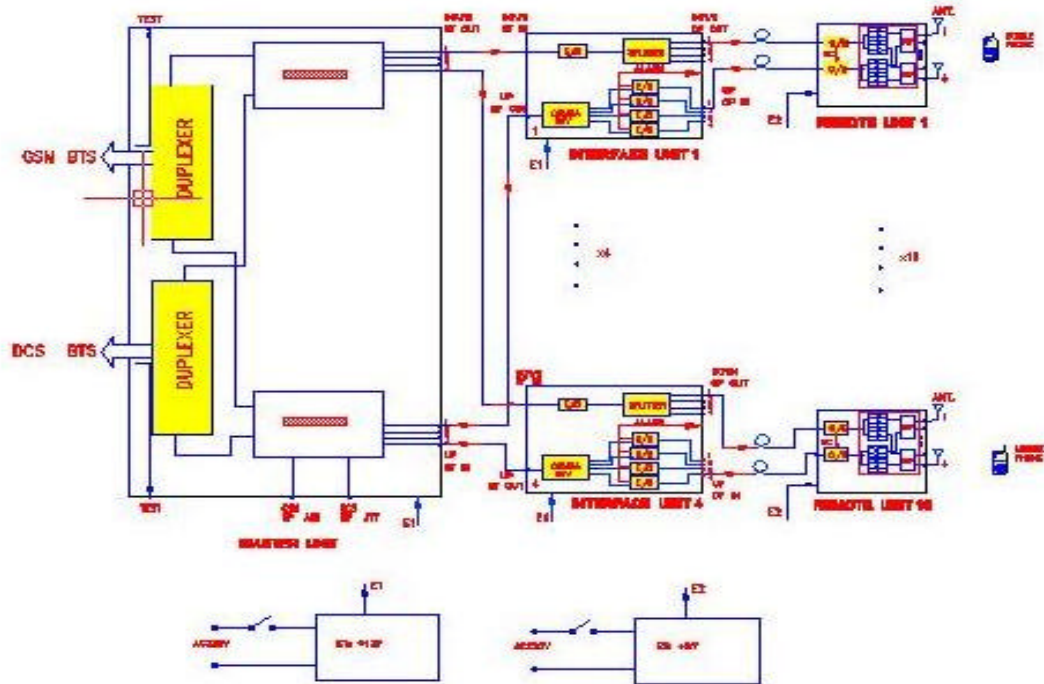


Figure 2.1-1 System Composition of RS-5180

Transmission of uplink and downlink signals: RF Master Unit receives the downlink signal from the BTSs of CDMA800 and CDMA1900. After combines, they are then changed to optical signals through the optical interface unit and transmitted to the Remote Unit through optical fiber. After changed to RF signals through Remote Unit, they are finally transmitted to Mobile handsets by antenna. Vice versa, the uplink signal from user mobile is received by antenna. The RF signals is then changed to optical signal by Remote Unit and transmitted to the master unit through optical fiber. The optical signal then is changed to RF signals by the optical interface unit of the master unit. Finally, after the CDMA800 and CDMA1900 dual band signals are

divided by the master unit, they are transmitted to CDMA800 and CDMA1900 BTSs.

2.2 System Features


- CDMA800/1900 dual band indoor optical fiber distribution coverage.
- Since optical fiber is the transmission media, it overcomes the drawbacks of indoor RF routing difficulty and high loss.
- Plug and play system structure and flexible volume configuration can satisfy different coverage requirements.
- Coverage end unit is small in size. Wall-hanging structure makes it easy to install, flexible and concealed well, not affect indoor decoration and coverage area.
- Applicable to the indoor signal coverage of large-scale office buildings, high-rise hotels, large-scale department stores, exhibition halls, underground buildings, tunnels and airport.
- It has complete alarm function to monitor system working status. Alarm signal can be sent to mobile network administration center through wire or wireless modem.

2.3 System Functions

2.3.1 Master Unit

Master Unit (RS-5180-M)

Main functions of the Master Unit include the level adjustment of the transmission and received signals of BTS and the distribution of Interface Units. Master Unit can adjust the CDMA800 uplink or CDMA1900 uplink RF signal level in the range of over 30dB for GSM with step of 2dB and over 25dB for 1800 with step of 1dB. The uplink attenuation adjustment dip switches are on the front panel. ALC function is to control the downlink signal level to ensure the normal operation of Master Unit with downlink input signal level in the range of +5dBm ~ +20dBm

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There are 4 downlink RF output ports and 4 uplink RF input ports on the front panel of the Master Unit. Downlink and uplink are connected with 4 Interface Units through RF cable as shown in figure 2.3-1.

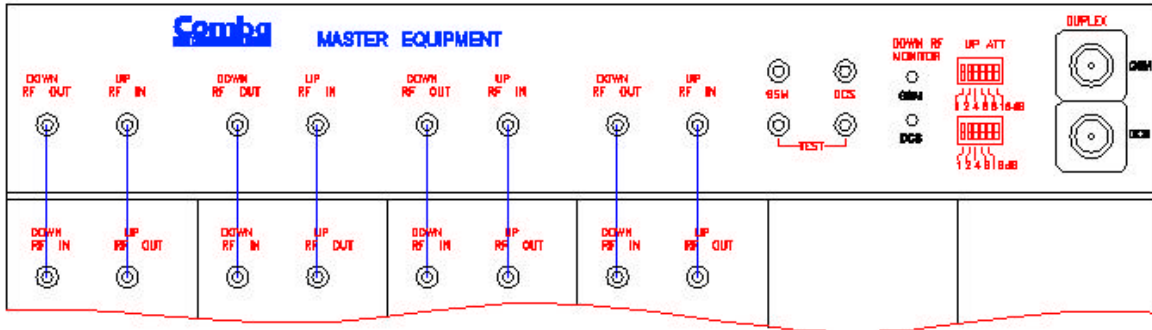


Figure 2.3-1 Master Unit Panel Diagram

(1) Interface Unit (RS-5180-F)

Functions of Interface Unit include: uplink optical and electric conversion, showing the alarm signal from Remote Unit and downlink optical dividing output.

1 Interface Unit has 4 couples of uplink optical input /downlink optical output ports to connect with 4 Remote Units through optical fiber (figure 2.3-2).

Alarm function:

1. Each Interface Unit has a Optical Signal Transmitting Detection module. If no Optical signals are sent, the red indicator on the panel will be on.
2. There is a Optical signal Receiving Detection module corresponding to each Remote Unit. If no Optical signals are received, the correspondent will be off. When any Remote Unit or

Optical connection has trouble, the Remote Unit's indicator light will automatically goes off. Then the correspondent indicator on the panel of Interface Unit will be off. The indicators next to the uplink optical signal in port on the panel correspond to the Remote Unit connecting with.

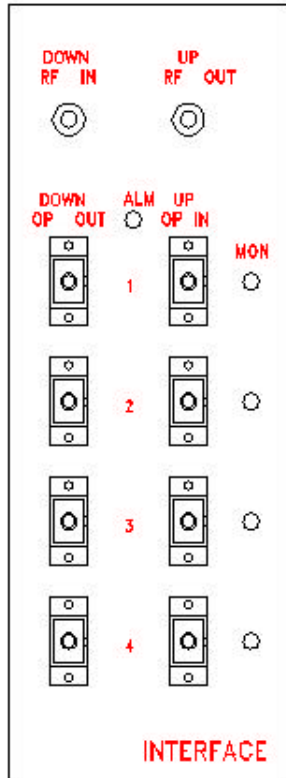


Figure 2.3-3 Alarm Unit Panel

(2) Alarm Unit (RS-5180-MC)

When any Remote Unit (Interface Unit) has trouble, it will be indicated in LED and BTS external alarm. It can also be checked through RS 232 interface. When communication unit (MCC-001) is used, remote monitoring will be possible. Alarm unit is for occasional use only.

Panel explanations: As shown in figure 2.3-3.

RS-232 (BD9): standard RS232 port, used to connect notebook computer. Set and read parameters, status check. The accompany digital port is designed for using in set up only, not for daily operation and after set up no cable will be attached to this port.

COMM (RJ45, 8-pin): communication unit port, used to connect communication unit to actualize remote monitor. The accompany digital port is designed for using in set up only, not for daily operation and after set up no cable will be attached to this port.

BTS-ALARM (RJ45, 4-pin): BTS external alarm port, normal when the two pins in the middle is opened, alarm when the two pins in the middle contact with each other. (occasionally used only)

ALARM (LED): overall alarm indication. When any Remote Unit (Interface Unit) being monitored has trouble, LED will turn to red, or it will be off.

2.3.2 Remote Unit (RS-5180-R)

Remote Unit receives the uplink signal from mobile handset in coverage area and amplifying it, then converts it into optical signal and transmit to Interface Unit. At downlink direction, it converts the optical signal sent from Interface Unit into RF signal and transmits it after amplifying the power. RF receiving and transmitting module in Remote Unit has 4 duplex ports to be connected with 4 antenna ports. Uplink and down link amplifiers have ALC function. When duplex receiving and transmitting amplifier has trouble, the alarm circuit will automatically turn the indicator off.

2.4 Specifications

2.4.1 RF Features

Operating system	CDMA800/CDMA1900Hz
Frequency range	Uplink 824~849/1850~1910MHz
	Downlink 869~894/1930~1960MHz
Gain	Uplink 15dB (typical)
	Downlink 15dB (typical)
Gain adjustable range	Uplink 30dB(GSM) step 2dB 25dB(1800), step 1dB
	Downlink ALC control 30dB
Maximum input signal level	Uplink: -25dBm
	Downlink +13dBm
Output power	15dBm CDMA 800MHz.21dBm CDMA 1900MHz 16dBm TDMA 1900MHz (typical)
Spurious and intermodulation output	< -13dBm Downlink
	>26dBc Uplink
Noise figure	15dB
Antenna port number	4 per Remote Unit
Flatness within band	±2dB

2.4.2 Optical Features

Transmission bandwidth	800~2000MHz
Output optical power	0~3dBm
Input IP3	25dBm
Input noise	-134dBm/Hz

2.4.3 Operating Conditions

Power supply AC100~250V

Rated frequency range 50~60Hz

Maximum rated current: 1A

Power supply power loss master unit about 35W Remote Unit about 30W

Environment temperature: 0~+40°C

Relative humidity: ≤ 85%

3. System Installation

3.1. Installation of Master Unit

3.1.1 Dimensions

Master unit rack is a standard 19" "portable frame". Its external dimensions are as follows:

W	H	D
564mm	800mm	380mm

Distance between screw fixing holes on the base of the rack are:

Left to right: 524 mm Front to back: 322 mm

3.1.2 Space Requirements

Master unit should be located indoor so that the space for maintenance and ventilation is ensured. Hence, it is suggested that the back and side of rack should be at least 80~100cm away from wall or other System.

The place should have good ventilation, with ambient temperature of 0 ~40 and relative humidity $\leq 85\%$. Direct sunlight on the master unit should be avoided.

3.1.3 Installation Method

When shipped out of factory, the Master Unit is put into the cabinet 19" 6U standard rack while Interface Unit and power supply unit are put

separately in boxes. The “portable rack” for installation of master unit cabinet (standard 19" portable frame 800mm high) is put after disassembled. Therefore, before install master unit, first assemble portable rack.

Assembly of Portable Rack

It is quite simple to assemble portable rack as shown in figure 3.1-1. The followings should be noted:

- (1) For the convenience of installation, all the assembly holes on all the components have sufficient room. Hence, in fixing the last two columns, ensure to keep the distance between them as long as possible for the placing of master unit’s cabinet.
- (2) Both of the two columns have front and rear sides as well as upper and lower sides.. There is ground copper slip or many holes on the back side. The upper end has a hole and the lower end has two holes. The front side has the trademark of Comba on the upper beam.
- (3) All components are steel made and heavy. Pay attention to safety in assembly and prevent any injury.

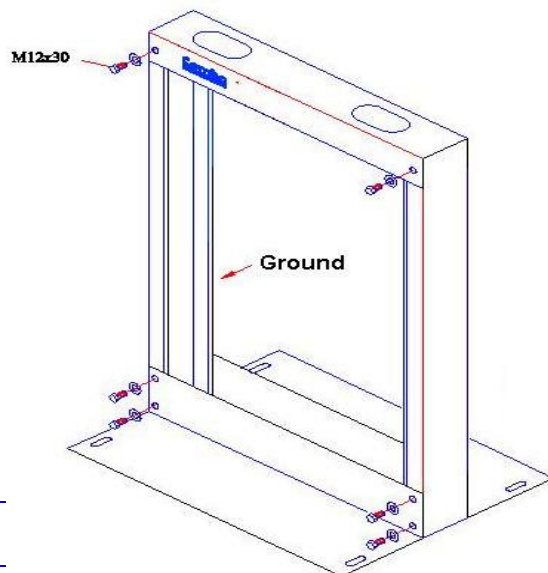


Figure3.1-1 Assembly Diagram of Portable Frame

Insertion of M5 Nut Cramp

In order to fix the master unit cabinet, master unit cabinet supports and tail fiber tray, M5 nut cramps should be pre-inserted onto the two columns of portable frame. Figure 3.1-2 shows the inserting points-small black square holes, symmetrical on each column. At the back of the columns (i.e. the side with ground copper slip or many round holes), 2 nut cramps should also be inserted into hole 15 and 16 separately since master unit cabinet support should be fixed at both sides of columns. No nut cramps need to be inserted into other holes at the rear sides of the columns. Nut cramps are inserted from inside to outside as shown in figure 3.1-3. After nut cramps are inserted, fix the two master unit supports onto the two columns with M5 nuts at hole 15 and 16. Nuts should be tightened at both sides of the columns.

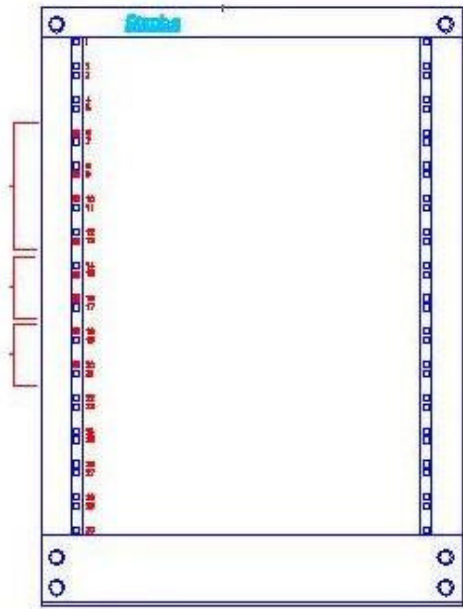


Figure 3.1-2

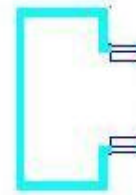


Figure 3.1-3

Installation of Portable Frame

Well-assembled portable frame can be installed vertically on the ground. Portable frame can be installed in three ways:

- A Vertically fixed on the ground;
- B Vertically fixed on the wall support;
- C Vertically fixed on table.

A Installed on the ground:

- (1) Choose the appropriate position indoors. Place the portal frame vertically on the ground. Mark down the points of four $\phi 13$ holes.
- (2) Drill 4 holes with electric impact drill and embed four $\phi 10 \times 80$ mm expansion screws.
- (3) Lift the portal frame. Place it vertically on the ground through the 4 holes. Sleeve on flat gasket and spring washer. Tighten screw nut. Portal frame is installed well (figure 3.1-4).

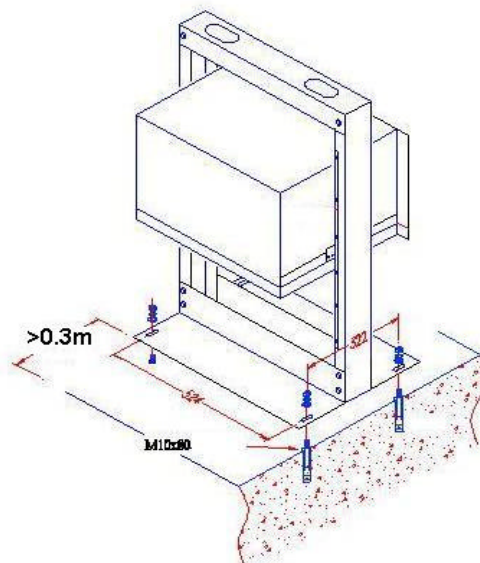


Figure 4 Master Unit Installation Schematic Diagram (A)

B Installed on the wall support:

- 1 For the convenience of marking the fixing holes on wall, first assemble a baseplate and two wall support as shown in the Repeating End Installation Schematic Diagram (B) (figure 3.1-5) to form the baseplate-wall support component. The baseplate should be removed from the well-assembled portable frame.
Note: Put the portable frame with baseplate removed horizontally on the ground, not vertically, to ensure safety.
- 2 Choose an appropriate place on wall. Move the above mentioned baseplate-wall support component to the place and mark the positions of 2 ϕ 14 holes at both sides.
- 3 Drill 4 holes at the four positions with electric impact drill and embed four ϕ 10x80mm expansion screws.
- 4 Lift the baseplate-wall support component. Place it stably on the wall through the 4 holes using flat gasket, spring washer and nuts.
- 5 Remove the baseplate of the baseplate-wall support component.
- 6 Assemble the portable frame as the description about the assembly of portable frame.
- 7 Lift the portal frame. Place it stably on the wall support through the 4 holes on two baseplates and 2 wall supports with hexagonal M10 screws, flat gasket, spring washer and nuts. Portal frame is installed well.

C Installed on table:

The table on which portable frame will be installed on must be quite stable. The installation procedures are the same as those of installation on the ground.

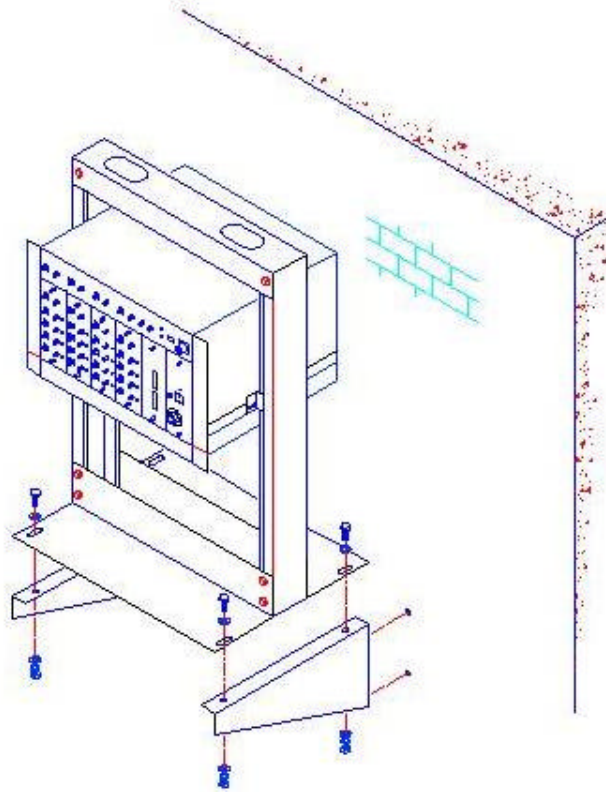


Figure 3.1-5 Master Unit Installation Schematic Diagram (B)

Installation of Master Unit:

Master unit should be installed as follows:

- 1 Master Unit is in the master unit cabinet (19" 6U standard cabinet). Check whether the fixing screws on the panel of Master Unit has loosened in the transportation. If so, tighten

them.

- 2 Place the well-assembled master unit into portable frame onto the master unit cabinet support. Fix the master unit stably on the portable frame with M5 screws through the fixing holes on the ears of the master unit cabinet.
- 3 Put the tail fiber tray (2U sliding cabinet) (used to put tail fiber) under the master unit cabinet. Also fix it with M5 screws through the fixing holes on the ears of the cabinet. Fixing holes are hole 18 and 20.
- 4 Then connect cables in turn.

3.2. Installation of Remote Unit

3.2.1 Installation Dimensions

Remote Unit is installed in the way of wall-hanging. External dimensions are (h×w×d) 368mm×220mm×60mm. In installation, drill according to the distance between the two 8mm holes of the U-shaped hanging hook attached with the System.

3.2.2 Space Requirements

Remote Unit should be fixed at a suitable position and height on the wall for the convenience of maintenance. Ambient temperature should be in the range of 0 ~40 and relative humidity ≤85%. Avoid direct sunlight.

3.2.3 Installation Method

Remote Unit cabinet should be hung on wall as shown in figure 3.2-1.

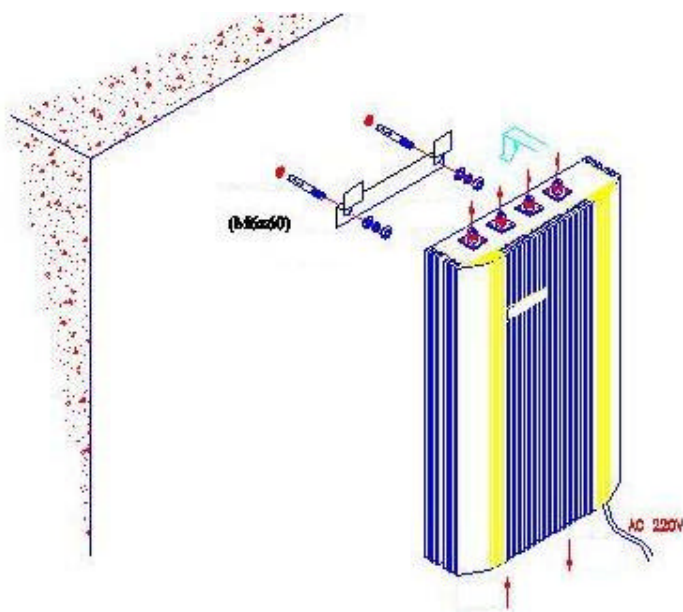


Figure 3.2-1 RS-5180 Remote Unit Installation Schematic
Diagram

4. System Connection and Debut

4.1. Master Unit

Refer to master unit panel composition diagram (figure4.1-1).

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4.1.1 Connection with RF from BTS

In connecting RF signal from microcellular or BS, first confirm that the downlink signal from BTS is $\leq 20\text{dBm}$, otherwise, System may operate abnormally or circuit may be damaged.

Optimum downlink signal level input into the port connected with GSM BTS or 1800 BTS (14 and 15 in figure 4.1-1): $+5 \sim +20\text{dBm}$. The maximum input should not be greater than 20dBm . $+10\text{dBm}$ is suggested.

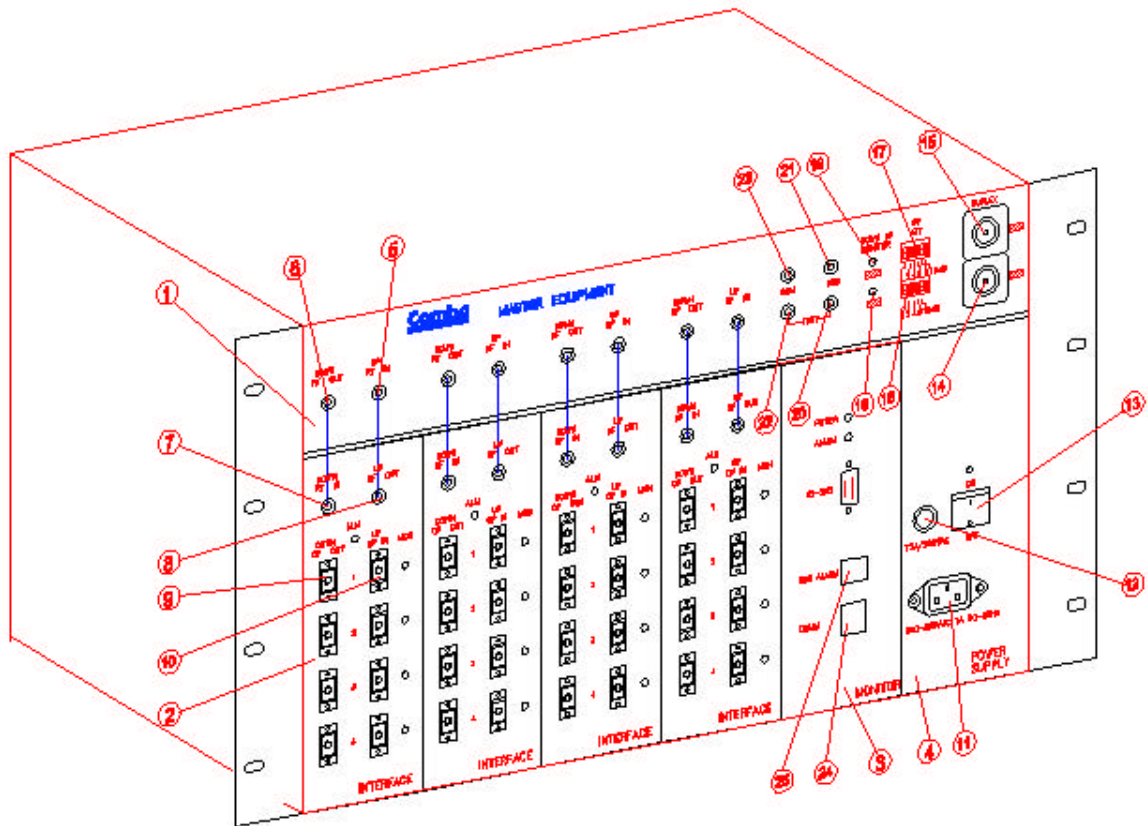


Figure 4-1 Master Unit Panel Composition Diagram

Master Unit	Interface Unit downlink optical output port	16 1800M uplink gain adjustment dip switch
Interface Unit	Interface Unit uplink optical input port	17 900M uplink gain adjustment dip switch
Alarm Unit	11 power supply socket	18 1800M downlink RF power indicator
power supply unit	12 fuse seat	19 900M downlink RF power indicator
Master Unit uplink RF input port	13 power switch	20 1800M downlink input check port (coupling degree 10dB)
Master Unit downlink RF output port	14 1800M 1800 RF connector	21 1800M uplink output check port (coupling degree 10dB)
Interface Unit downlink RF input port	15 900M GSM RF connector	22 900M downlink input check port (coupling degree 10dB)
Interface Unit uplink RF output port		23 1800M uplink output check port (coupling degree 10dB)
	25 BS external alarm port	24 communication unit port

When the two green LED of DOWN RFIN on the front panel of the Master Unit (figure 4.1-1: 18 and 19) are on, it means that input level of GSM and

1800 >0dBm. When one of them is off, it means that the input level of the correspondent one is smaller than this normal value.

If only GSM 900MHz or CDMA1900Hz needs to be opened, 50 standard load should be connected with the RF connector not in use. Then, the correspondent uplink gain adjustment thumb wheel does not function and the correspondent downlink RF power LED indicator is off.

4.1.2 Uplink Level Adjustment

Uplink level adjustment is a quite important step in the optimization of system operation. If uplink level is too high, it may have impact on high drop call rate of BTS (including GSM BTS and 1800 BTS), or even block BTS. If it is too low, it may reduce the uplink sensitivity at the remote coverage area. In practice, uplink attenuation should be determined according to the signal coupling way and coupling degree of BTS. In general, the noise level of signal input into BTS antenna port should be $\leq -125\text{dBm BW}300\text{KHZ}$. On the panel, for GSM, UP ATT manual attenuation adjustment figure 4.1-1: 16 and 17 can provide the maximum adjustment range of over 30dBm with step of 2dB, and the correspondent attenuations are 2, 4, 8, 8, and 16dB when DIP code 1, 2, 3, 4, and 5 are at the “ON” position. For 1800, it provides the maximum adjustment range of over 25dBm with step of 1dB., and the correspondent attenuations are 1, 2, 4, 8, and 16dB when DIP code 1, 2, 3, 4, and 5 are at the “ON” position.

4.1.3 RF Connection Between Master Unit and Interface Unit

RF connection between Master Unit (figure 4.1-1: 1) and Interface Unit (figure 4.1-1: 2) should be done with upper and lower parts corresponding with each other: 6 with 7 and 5 with 8. 4 pairs of fiber-optic connectors (SC optical flange)-EOWN OPOUT (figure 4.1-1: 9)/UP OPIN (figure 4.1-1: 10) are on the panel of the Interface Unit. Connect the uplink and downlink optical fibers from the coverage end with these fiber optic connectors. In connecting fiber optic connector, never face it toward people's eyes and skin since laser beam may hurt people's eyes and skin.

4.1.4 Check Ports

There are two pairs of RF connectors on the panel of the Master Unit: One pair is GSM TEST (figure 4.1-1:23-uplink RF output, 22-downlink RF input) and the other is 1800 TEST (figure 4.1-1:21-uplink RF output, 20-downlink RF input). They are the check ports for GSM and 1800 uplink and downlink RF signal debug.

4.2. Remote Unit

4.2.1 Connection with RF Cable and Optical Fiber figure 3.2-1: Remote Unit Installation Schematic Diagram .

Remote Unit has 4 antenna ports at the top of cabinet for antenna connection. Connect 50 Ω standard load for any additional port; downlink fiber-optic input port (left) and uplink fiber-optic output port (right) are at the bottom of cabinet, fiber-optic connector is SC fiber-optic adapter.

4.2.2 Check of Input and Output Optical Power

Measure the receiving power of downlink optical fiber with optical power meter. The value should be around -5dBm. Actual loss can be taken into account according to the length of cable connecting master unit and Remote Unit. Measure the output power of uplink optical fiber with optical power meter and the value should be around 0-3dBm.

5. User Safety Information

To ensure personal safety and the normal operation of System, please pay attention to the following:

5.1 System Grounding Well

Housings of both master unit and Remote Unit have protective ground terminals. In installation, use yellow and green dual color lead to ground well with building protection ground. Or use ground woven wire.

5.2 Confirming Power Supply

Both master unit and Remote Unit use AC power supply of public electricity. Rated voltage range is 100~250V. Rated frequency range is 50~60Hz. The maximum rated current is 1A.

The ground terminal of the 3-core socket used at the installation site should be connected well with the building protective ground.

5.3 Support With Sufficient Load-bearing Capacity

When System is installed by wall-hanging, the bracket should have sufficient load-bearing capacity.

5.4 Be Aware of Mechanical Damage

Portable frame is made of steel and quite heavy. Be aware of personal safety in installation to avoid any personal hurt. In installation and maintenance, prevent the scratching of skin by cabinet edge or corner.

5.5 Preventing Laser Radiation

In the installation, test and maintenance of the repeater, avoid the exposure of eyes or skin to laser radiation.

5.6 Downlink signal level input from BS +20dBm

When connecting RF signal with microcellular or BS, be sure that the downlink signal level from GSM BTS and 1800 BTS be less than or equal to +20dBm (+10dBm is suggested), or the System may work abnormally

or even the circuit may be destroyed.

6. Service Manual

6.1 Our Promises

6.1.1 Quality Guarantee

For any quality problems of the System provided to customers, the sales contract signed by both seller and buyer should be followed.

6.1.2 Technical Training

Our company can provide training for installation and maintenance staff. The relevant terms and conditions should be laid down in the sales contract signed by seller and buyer.

6.1.3 Engineering Installation

Our company provides engineering installation service for customers. The relevant terms and conditions should be laid down in the sales contract signed by both seller and buyer.

6.2 Contact Details

6.2.1 Company Name

Comba Telecom Systems (Guangzhou) Co., Ltd.

6.2.2 Company Address and Post Code

Address: No. 6, Jinbi Road, Guangzhou Economics and Technology Development District,
Guangdong, China

Post Code: 510730

6.2.3 Contact Department

Marketing Department

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