



Broad band/ Selective band Mini Repeater

USER'S MANUAL

3G-500
3G Repeater

DCS-500
DCS Repeater



Broad band/ Selective band Mini Repeater

USER'S MANUAL

Thank you for choosing **SIGNAL** series CDMA/GSM/DCS/PCS/WCDMA Mini Repeater. **SIGNAL** series Repeater can amplify the signal for mobile phone. Making you keep in touch with others freely even in the place with very weak signal.

To make you quickly be familiar with the operations of this repeater, we offer detailed user manual going with repeater. And you can get information including product presentation, using method, system setting and safety notice, etc.

We carefully and cautiously write this user manual, and believe the information provided in the manual is correct and reliable. While there may some error or omission, we beg to be excused and warmly welcome correction.

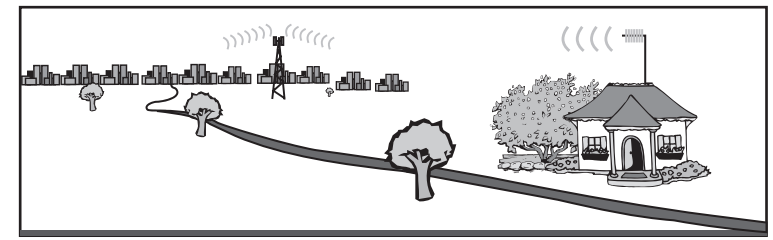
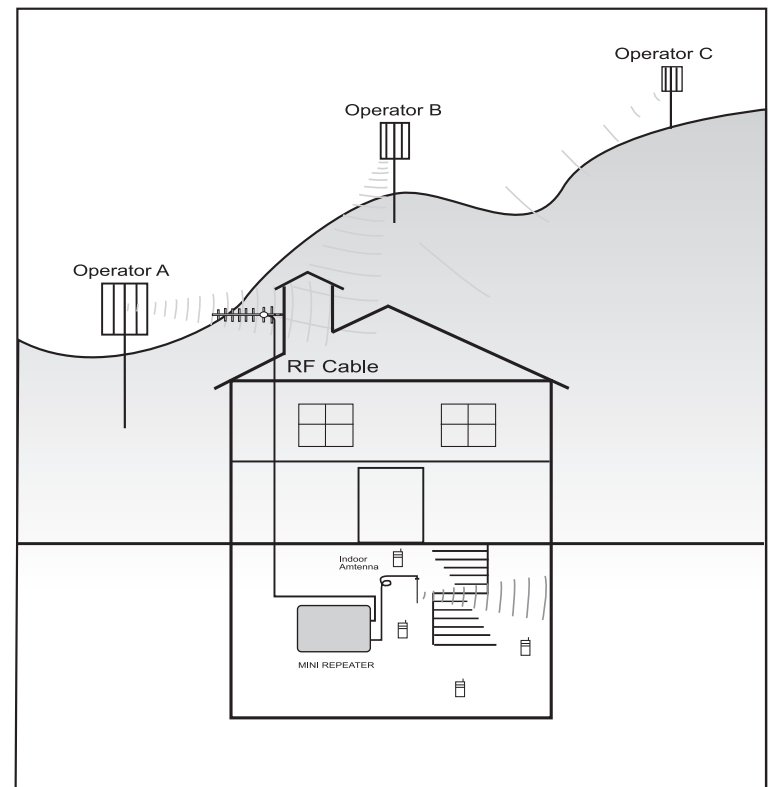


NOTE

The repeater meets the uplink and downlink isolation degree index; since the link isolation degree is influenced by the isolation degree of antenna feeder system (between donor antenna and service antenna). When the isolation degree of antenna feeder system is smaller than the one of Mini Repeater link, it will cause mini repeater have self-excitation and interfere base station or even destroy the mini repeater. That is why when installing the mini repeater, you should ensure the isolation degree between donor antenna and service antenna is larger than 80dB, otherwise our company will take no responsibility on any aftereffect caused by improper installation.

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SYSTEM WORKING SKETCH MAP



SUMMARIZATION

With rising level of communication consumption, people's inquiry about mobile communication is increasing day by day, as well as mobile communication service quality. It requires telecommunication service suppliers to improve telecommunication network quality, and extends coverage. How to improve mobile communication quality and extend coverage has become an important topic for each service supplier. Electromagnetic wave sent by mobile telecommunication base station is affected by all kinds of objective factor, such as landform, building, so it could not cover each corner where people may reach. If it only depends on increasing the quantity of expensive base station to solve the problem, it will surely increase the operating cost of the service supplier. Especially for the areas with little traffic, it will have detrimental effects on service supplier's competitive ability. Mini repeater is a relay amplifying device which is designed and produced to eliminate small-scale blind area or weak signal area existing in mobile telecommunication network. It is used diffusely in small-scale blind areas where the signal of base station can not reach, such as underground emporium, parking lot, metro, tunnel, high building, entertainment place, elevator, private house, etc.

FEATURES AND FUNCTIONS

- Cabinet and Smart, lightweight, easy installation and competitive price.
- With high Q medium duplexer, medium filter and SAW surface filter, ensure the system isolation degree.
- With ALC automatic control and reflection protection circuit, avoid accidentally damage.
- Full-duplex, double-ports design, internal power supply, safe and reliable
- Clear mode display, easy operation and expedient maintenance

STANDARD ACCESSORIES



A. Mini Repeater



B. 13dBi high gain donor antenna
(with 10 m cable)



C. Service antenna (2.5 dBi)



D. 5M cable to connect service antenna

OPTIONAL ACCESSORIES



A. 2 way power splitter



B. Combiner



C. Microstrip coupling



D. QX-007B
5-Meter cable (SYWV-50-5)



E. QX-002B
ST-XG-9-300/2500VYB
Gain 7 dBi(824-960MHz)
9 dBi (1710-2500MHz)



F. QX-003B
ST-XD-3-800/2500VYB-2
Gain 3 dBi



G. QX-004B
ST-XG-9-800/2500V6
Gain 7 dBi(824-960MHz)
9 dBi (1710-2500MHz)



H. QX-001B
ST-XD-2-900/2500V4
Gain 3 dBi



I. QX-003H
GSM+DCS/CDMA+PCS
Outdoor antenna with cable
9dBi 800-2500MHz

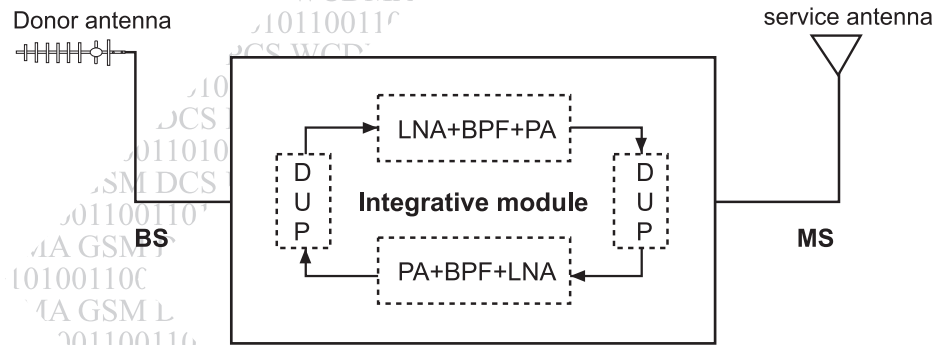


J. QX-002W
ST-PS-17-900V 824-960MHz
ST-PS-20-1500V 1.4-1.6GHz
ST-PS-22-1800V 1.71-1.9GHz

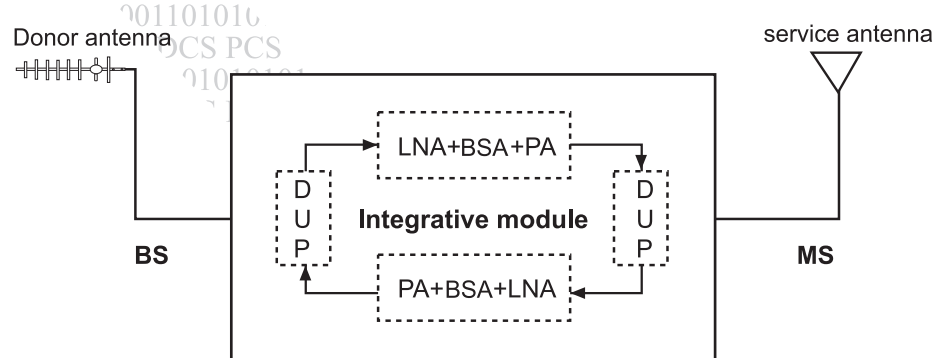
Note: Choose to buy low-waste cable and high gain indoor antenna to strengthen the signal.

WORKING PRINCIPLE

The basic principle of broadband mini repeater or selective band mini repeater is that donor antenna receives the downlink signal from mobile communications base station, through high selectivity band-pass filter to well isolate the passband signal, after amplifying by integrative power amplifier, then transferred by service antenna; meanwhile, on the way of uplink path, signal of mobile phone in the coverage area is transmitted to the relevant base station after disposing by uplink amplifying link path by same working mode. It achieves seamless connection between mobile telecommunication base stations and mobile phone, thus extends the covering range. Sketch map as below:



Broad band Mini Repeater System Principle Diagram



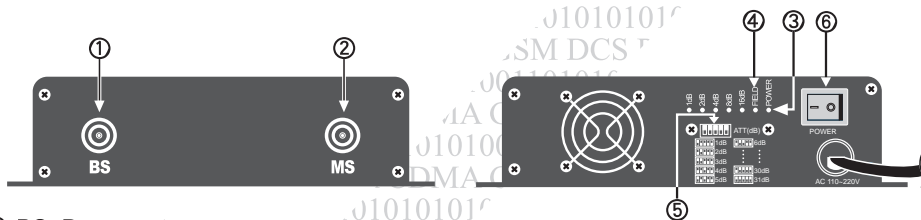
Selective band Mini Repeater System Principle Diagram

TECHNOLOGICAL INDEX

TETRA/CDMA/GSM/DCS/PCS/WCDMA Mini Repeater Technical Index

Test item	Test item	Specification		Remark
		uplink	downlink	
DCS1800	MHz	1710~1785	1805~1880	Notice: Selective band working frequency depend on customer's need
WCDMA	MHz	1920~1980	2110~2170	
Rated power	dBm	≤27	≤27	
		≤23	≤23	
ALC control range	dB	≥20	≥20	Output varies ± 1.5 or close and resume
Gain	dB	≥65	≥70	
Max input power	dBm	≤-25	≤-30	
DCS1800 band		dBc	≤-40	Dual-band Spacing:0.6MHz
WCDMA band		dBc	≤-40	Dual-band Spacing:5MHz
In-band Fluctuation		dB	≤5.0	
Gain adjustment	Adjustment range	dB	31/1dB stepping	
	Adjustment error	dB	≤ ± 1.5	Maximum gain
Noise Figure		dB	≤5	Electrify test
Port VSWR			≤2.0	
Group Delay		μs	≤1	
Voltage	DC	V	9	Customer inquiry
	AC	V	220 or 110	
Working current(DC)		A	1.6	
working temperature		°C	-25~+55	
Impedance		Ω	50	
RF Connector			NK	

GETTING ACQUAINTED



- ① BS: Donor antenna
- ② MS: Service antenna
- ③ Power: indicator of power (green)
- ④ FIELD: Field intensity indicator (yellow)
- ⑤ ATT: DIP switch, Gain adjustment (For example: when dial up 1 and 4 dB, it indicates reducing 5Db. Synchronously the corresponding red indicators of 1 and 4 dB light.
- ⑥ Power switch.



ATT (dB)

Dial switch up as 1, dial switch down as 0.

Gain adjustment truth table:

attenuation of dB value	1	2	3	4	5	attenuation of dB value	1	2	3	4	5	attenuation of dB value	1	2	3	4	5
1dB	1	0	0	0	0	12dB	0	0	1	1	0	23dB	1	1	1	0	1
2dB	0	1	0	0	0	13dB	1	0	1	1	0	24dB	0	0	0	1	1
3dB	1	1	0	0	0	14dB	0	1	1	1	0	25dB	1	0	0	1	1
4dB	0	0	1	0	0	15dB	1	1	1	1	0	26dB	0	1	0	1	1
5dB	1	0	1	0	0	16dB	0	0	0	0	1	27dB	1	1	0	1	1
6dB	0	1	1	0	0	17dB	1	0	0	0	1	28dB	0	0	1	1	1
7dB	1	1	1	0	0	18dB	0	1	0	0	1	29dB	1	0	1	1	1
8dB	0	0	0	1	0	19dB	1	1	0	0	1	30dB	0	1	1	1	1
9dB	1	0	0	1	0	20dB	0	0	1	0	1	31dB	1	1	1	1	1
10dB	0	1	0	1	0	21dB	1	0	1	0	1						
11dB	1	1	0	1	0	22dB	0	1	1	0	1						

INSTALLATION AND DEBUGGING

Preparation before installation

◆ Project Reconnaissance Design

- a. Confirm the coverage area of mini repeater
- b. Forecast coverage effect and confirm project

By reconnaissance on the spot, you can confirm the antenna distributing locations.

In order to make the project much more precise, you usually can make field intensity coverage test on the area. Confirm mini repeater working parameter, such as gain, output power and antenna model and so on to supply theory basis for system adjustment and testing.

Installation process

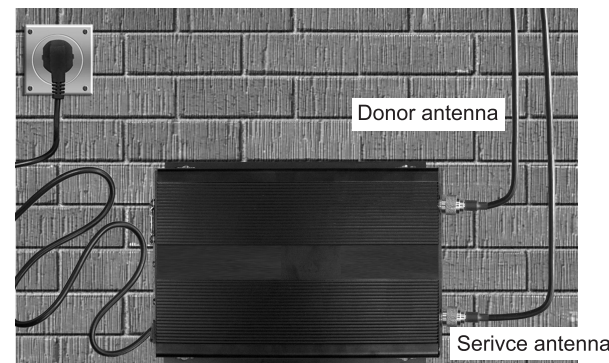
◆ Installing well the grounding system, the grounding resistance less than 5Ω

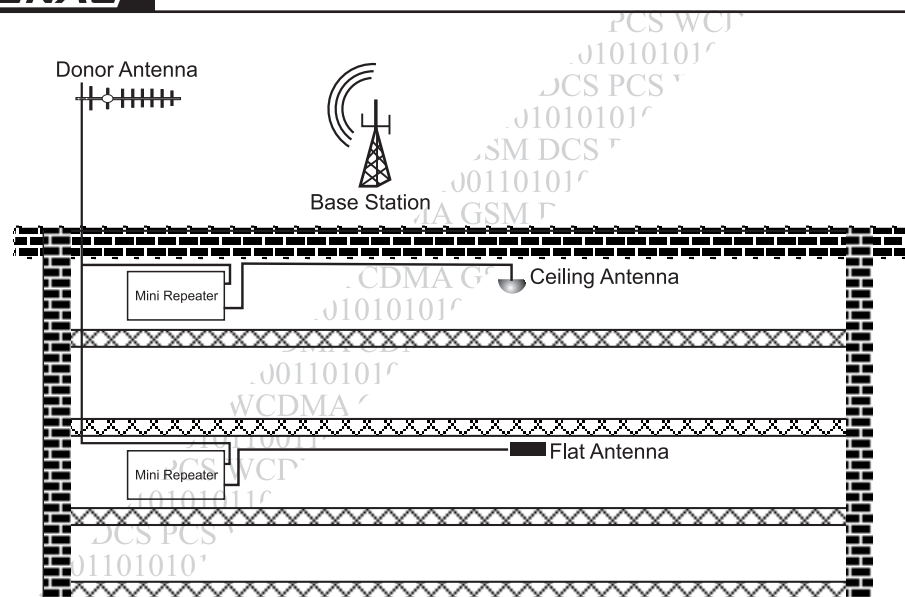
◆ Design, install and debug antenna feeder system

The design and installation of antenna feeder system is a very important part of mini repeater project, which directly related to using affection of mini repeater. Please do pay more attention on isolation degree between donor antenna and service antenna and port SWR when design. The shielding net of cable should connect into the grounding system. After the total system has been installed, please use some testing instrument such as spectrum analyzer to test whether the parameters have comply with design requirement, especially to test SWR, antenna isolation degree, downlink receiving field intensity and so on. If the receiving field intensity is too weak, please adjust donor antenna's angle or direction. If it is too strong, please consider to add fixed coaxial attenuator at BS port or adjust antenna angle to reduce receiving level; or attenuate gain adjustment to decrease the amplifying function of repeater.

◆ Installation of mini repeater

Our mini repeater is easy to install, which can be hung on pole or wall. To install mini repeater please fix it by the hole location showing as below





Sketch map of mini repeater application

Connect RF cable and power supply as per the remarks on Mini repeater panels, at the same time earth the case of repeater. Connect Service antenna to MS port, Donor antenna to BS port. Seal the RF cable joint to avoid rust caused by water leakage, which resulted SWR in be-coming bad and influence using. Note whether there are any eyewinker falling into min repeater before turning on the switch.

System debugging

- Before connecting power supply, please reconfirm whether the input AC power supply voltage is nominal value, antenna cable and mini repeater connect correctly and input electric level of mini repeater is less than -30dBm.
- Switch on repeater, indicator green on the panel lights and the repeater starts working.
- fix on the installing position of donor antenna, and adjust the orientation and incline of donor antenna, until the field intensity indicator lights yellow, it shows repeater gets good signal.

Attention Items of Installation

- Donor antenna should be installed away from the service antenna, at least 5M; and the position where is 2M higher than the ground.
- Service antenna is whiplike antenna which can be installed in ceiling and directed the axis vertically to the ground. Please select the proper position to make the signals distributed equally to every corner.
- After all the RF cable has been disposed, should have an overall inspection to prevent open-circuit and short-circuit.
- To prevent affecting signal coverage range caused by oxyqenation resulting from wateriness,all joints should be sealed by water-resistant adhesive tape, avoiding water leakage to Mini repeater through cable causing short circuit.

FREQUENTLY ASKED QUESTIONS

Mini repeater system self-excitation

- The reason of Self-excitation phenomena: The isolation degree of antenna is not enough.
- There are two methods to overcome the self-excitation phenomena. One is to enlarge the isolation degree between donor and service antenna; the other is to reduce mini repeater's gain. When the desired coverage area is smaller, you can just use the second method.

When the desired coverage area is larger, you should adopt the first method. It mainly adopts the following methods to enlarge isolation degree in project:

- Enlarge the horizontal and vertical distance between donor and service antennas.
- Add barriers, such as shielding net.
- Enhance the direction of donor antenna. Such as paraboloid antenna.
- Utilize landform and building to enhance isolation degree.

In addition, device trouble and poor contact of cable joints, which cause high SWR, it also will cause self-excitation. But generally the situation occurs barely, in the installation project, self-excitation is mainly caused by small isolation degree of antenna feeder system.

The simple way to judge whether the device has self-excitation: Connect dummy load to MS or BS port of repeater, when the power indicator light is on, you can judge that the device itself exists self-excitation.

Frequent soft handoff (namely ping-pong phenomenon)

It mainly indicates that in the mini repeater coverage area, mobile phone users have been switched ceaselessly among two or more pilot frequencies of base station, and usually connect into many base stations at the same time. The reason is the mini repeater antennas are installed improperly; Donor antenna has been installed in the area where the coverage of base stations overlaps, and receives pilot frequency signals from many base stations. These signals have similar intensity and alternately reign. The signal intensities of pilot frequency are still similar after relayed by mini repeater, and it causes mobile phone to frequently switch among many base stations in the coverage areas, it named "Ping-Pong" Phenomena.

When the difference of signal intensity of each pilot frequency is less than 3dB, mobile phone connects to two or more base stations at the same time, which makes system control load to excess or causes over loading. It will increase the possibility of communication cutting of and decrease the capacity of base station system. This kind of situation usually presents to mountainous areas, highlands and the city zone where buildings crowd. In order to avoid the "Ping-Pong" phenomena, mainly adopt the following measures in project:

- a. Change the installation location of donor antenna and direct donor antennas at a base station until get a stable pilot frequency with strong field intensity.
- b. Change the installation position of mini repeater; do not select the spot in coverage boundary of a certain base station to avoid interference from the adjacent base station!
- c. Select strong directional donor antenna, such as high gain & big caliber paraboloid antenna.

Mini Repeater with low gain

The reason why Mini repeater has low gain mainly is setting gain attenuation. To have reset will work.

The serial number of this product can be found on its body.

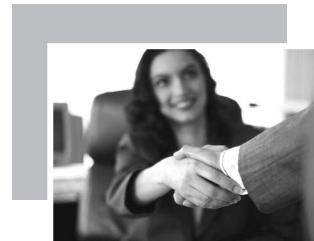
You should note this serial number in the space provided below and retain this book plus your purchase receipt as a permanent record of your purchase to aid an identification in the event of theft of lose, and for warranty service purposes.

MODEL NUMBER: _____

SERIAL NUMBER: _____

Please contact the local authorized dealer if you have any questions.

We are not responsible for any typographical errors that may be in this manual. Standard accessories may change without notice, getting your understanding for any inconveniences.



*Your need
is our service purpose!*