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**18 MONTHS  
WARRANTY**

We offer an **Eighteen-Month Manufacturers' Defect Warranty** on all our products.



## Technical User Manual Mobile Communication Repeater

### JD55-PR Series

Model: JD55-PR



**JDTECK.COM**

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## FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.



**Terminology****Meaning**

BTS	Base Transmitting Station
CDMA	Code Division Multiple Access
DL	Downlink
GSM	Global System for Mobile Communications
iDEN	Integrated Digital Enhanced Network
MS	Mobile Station
PCS	Personal Communication System
RF	Radio Frequency signals
UL	Uplink ( <i>Communication channel from mobile device to cell tower</i> )
DL	Downlink ( <i>Communication channel from cell tower to mobile device</i> )
Donor	Outdoor Antenna
LED	Light Emitting Diode

**User Warnings – MUST READ!**

1. This repeater must **ONLY** be used for the purpose it was intended for. Making any alternations to the design layout without first consulting with a trained technician can result in interference to the operator's network and liability by the end user.



2. Please read this entire manual carefully before using this product!



3. Only the power supply that came with the repeater should be used at all times. It is highly recommended that the repeater is grounded and lightning protection used.



4. Do not attempt to open any part of the repeater. This will void the warranty and can cause an electric shock. Electrostatic can also cause damage to the internal components.



5. Please keep away from any heating-equipment, because the repeater will dissipate heat when working. Do not cover the repeater with anything that influences heat-dissipation.



6. Do not place or mount the repeater in a location that is exposed to the elements. This will void the warranty and can cause an electric shock.

## 1. Preface

### Application 1

1. Blind or weak signal areas are formed if the building is too far away from BTS, or the building itself shield or absorb the signals.
2. There are too many complicated signals in the higher part of the buildings, ping-pong switching effect has been formed, the signals fluctuate a lot thus there are annoying noises during phone calls and there are dropped phone calls.
3. Elevators and basements are well-known blink areas
4. Downtown areas of the cities, congested with many high-rise buildings are usually the weak or blind areas.

### Application 2

The remote villages, mountains, hills, valleys, etc. are mostly scarcely populated areas with quite few mobile users, so the main target is to send coverage to these areas, and it will not be cost effect to install a BTS tower, therefore a repeater is a quite good option.

Can we not use mobile phones? The answer is definitely NO. But it might be much more miserable that the communication can't be achieved due to no or weak signals though there is a mobile phone.

Will your customers stay comfortable when there is no smooth communication in your shops or restaurants?  
Will your business be influenced if your clients couldn't call you through due to weak signals in offices?  
Will your life be influenced if your mobile is always "out of service" at home when your friends call you?

How to solve the problems

Best Solution:

Plug & play: Purchase a set of repeater solution and install it at your home, offices, and plug on the power and immediately you would be able to enjoy the full bar and high quality signals!

## Specifications

1、Electrical specification		Uplink	Downlink
Frequency Range	AWS Band	1710 ~ 1755 MHz	2110 ~ 2155 MHz
Max. Gain		65dB	
Max. Output Power		15dBm	15dBm
Band width ( -3dB )		Wide band	
MGC ( Step Attenuation )		$\geq 15\text{dB}$ 5 , 10 and 15dB with two DIP switches	
Automatic Level Control		$\geq 15\text{dB}$	
Noise Figure		$\leq 6\text{dB}$	
Spurious Emission Mask		Comply with 3GPP TS 25.106	
Spurious Emission		Comply with 3GPP TS 25.106	
Modulation Accuracy		$\pm 12.5\%$	
Peak Code Domain Error		$\leq -35\text{dB}$ @Spreading Factor 256	
Input inter-modulation		Comply with 3GPP TS 25.106	
Output inter-modulation		Comply with 3GPP TS 25.106	
V.S.W.R		$\leq 2.0$	
Group Delay		$\leq 1.5\mu\text{s}$	
Frequency stability		$\leq 0.01\text{ppm}$	
2.LED Alarm		Standard	
Power LED		Power Indicator	
AGC LED		Orange @ AGC 1~5dB, Red @ AGC 15dB~20dB, LED off after 5 seconds red color	
3、Mechanical Specifications		Standard	
I/O Port		SMA-Female	
Impedance		50 ohm	
Operating Temperature		$-30^{\circ}\text{C} \sim +55^{\circ}\text{C}$	
Environment Conditions		IP40	
Dimensions		190x 128 x 56mm	
Weight		$\leq 0.85\text{KG}$	
Power Supply		Input AC90~265V,output DC 9V /3A	



### 3.5 Troubleshooting

#### Q1. Why is there still no signal after installing the equipment?

##### Answer:

1. Check the power on repeater and power supply.
2. Check the connector of outdoor antenna is tight or not.
3. Check the connectors of RF cable are tight or not.
4. Check the outdoor signal is strong enough or not.
5. Check to make sure the antenna is installed correctly.
6. Check the connector of indoor antenna is tight or not.
7. Check the cable type is suitable or not.

#### Q2. Why the signal strength is too weak on the edge of area?

##### Answer:

1. Check the outdoor signal and antenna direction.
2. Check repeater is full gain or not.
3. Check all of the connectors are tight.
4. Change the location of outdoor/indoor antenna.
5. Check the cable type is suitable or not.
6. Deploy more indoor antennas.

#### Q3. Why can't I make a call after installation, even though I can detect a signal?

##### Answer:

1. Check LED status of repeater to make sure alarms are green.
2. Change the location of outdoor / indoor antenna.
3. Reduce the repeater gain.

#### Q4. The signal is not stable after turning on the repeater power.

##### Answer:

1. Check to see if the outdoor signal is stable or not.
2. Check the location of the donor antenna. Too close to other antennas.
3. Check the RF cable is broken or not.
4. Confirm direction of donor antenna in relation to cell tower.

#### Q5. Why is the LED on the front of the repeater not lit?

##### Answer:

1. Check the power source is normal or not.
2. MUTE feature is active. Attenuate gain of repeater and cycle power.

In such a background, JDTECK has successfully developed advanced repeaters that are applicable to any mobile network and indoor distributed antenna system. (DAS) Repeaters are available to support any technology or frequency used today.

Because a large amount of BTS or Node B devices are deployed in densely populated urban areas, there is usually no large blind area. Repeaters are simply used to cover small blind areas and provide signal coverage inside buildings or sub-ground locations. Typically, radio frequency (RF) repeaters are used when optical fibers are not available in buildings or when using a fiber solution is not cost effective.

Since the number of repeaters on a cellular network usually increases with the number of buildings to be covered in a specific sector, multiple repeaters may end up feeding from one BTS or Node B. In view of this, only low powered repeaters (below 1 W) should be deployed in densely populated areas.

Repeaters adopt an integrated module concept. It is compact in structure and combines the RF module and the monitoring mode in one unit. Owing to its high selectivity, stability and reliability, repeaters are widely applied to indoor signal distribution in small areas such as office buildings, meeting rooms, hotels, tea shops, night clubs, and cafes where signals are shielded. They are also used to cover shadow areas outdoors. Such repeaters are very suitable to signal optimization in densely populated urban areas.

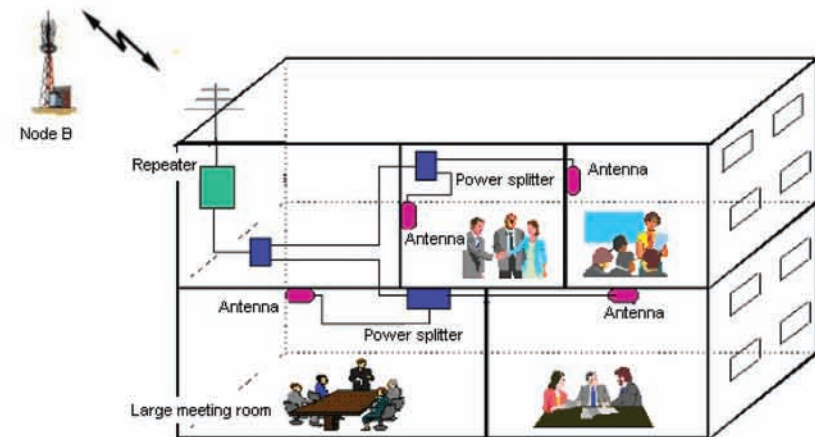


Figure 1 shows the applications of the repeaters.

## 2. Introduction

This full duplex mobile communications repeater from JDTECK is the perfect solution for providing a wireless improvement in the cellular reception of a home, office, restaurant, VIP Room, apartment, building or shopping mall, in the quickest time possible.

It is designed to improve the call quality of an area by receiving, amplifying and re-transmitting signals of the base station into a specified area via the service antenna of the repeater.

To maintain safe and specific output signal levels, this repeater has a built-in signal oscillation detection circuit with color changing LEDs to indicate its environmental status. The Alarm LEDs located on the front of the unit (Alarm Low & Alarm High) will change color from green to orange or red, (depending on the intensity) if the system detects signal oscillation in either band or, if the input signal is beyond a safe limit so as to avoid interference to the cellular network.

This repeater also has an automatic gain control (AGC) feature that will reduce the output power of the repeater if oscillation is detected. This range can vary from 15-20dB depending on the model of your repeater. If the range of the AGC is less than the value of the gain the repeater needs to be reduced by, then the end user can make use of yet another feature of manual gain control to further reduce the gain by using the dip switches to manually attenuate (reduce) the repeater's output gain of either the uplink or downlink individually.

JDTECK's repeaters also feature a Network Safe / MUTE feature that automatically shuts off the transmission side of the repeater to protect the cellular network if no adjustments are made to eliminate alarm readings on the repeater's LEDs. You will want to make sure the LEDs remain green at all times for optimum system performance.

The main cause of signal oscillation is when the indoor antenna is too close in proximity to the outdoor antenna on the roof.

Alarm LED status chart and recommended action:

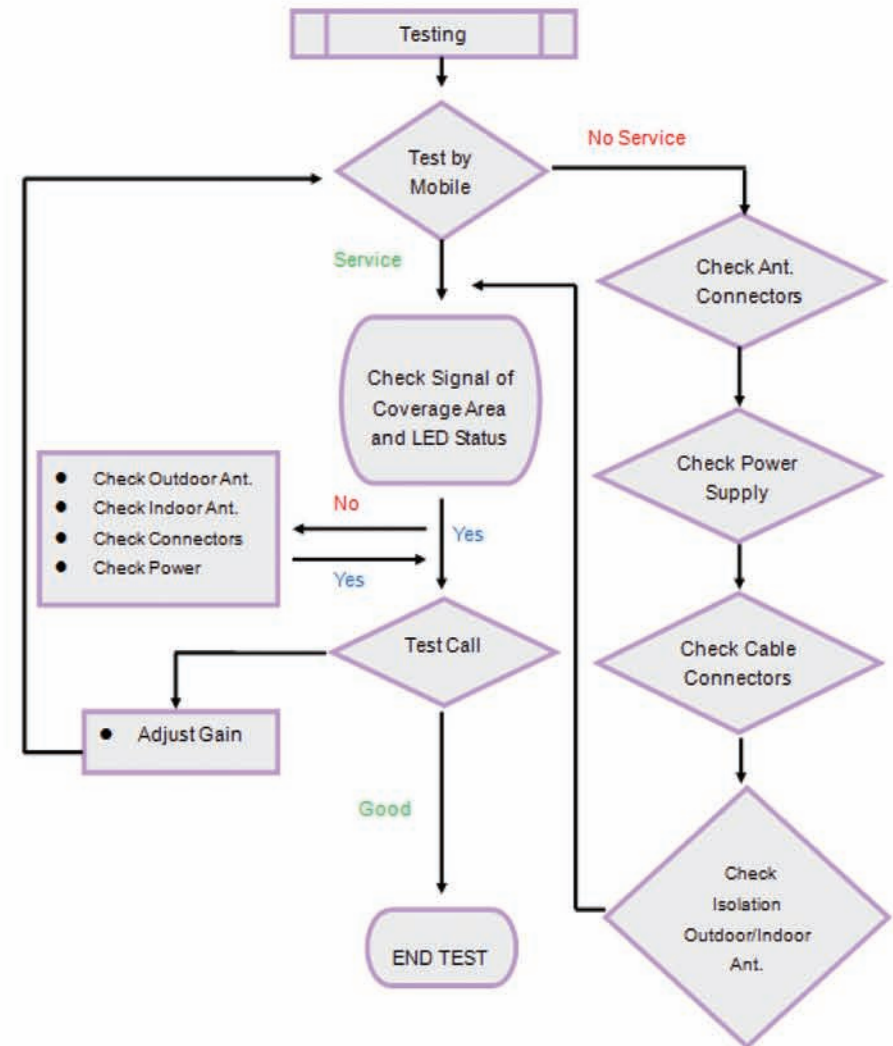
**Green** - System functioning well.

**Orange** - Slight detection of Oscillation.

**Red** - Strong Signal Oscillation.

**Off** - Repeater is not transmitting (MUTE Activated)

## 3.4 Testing





### 3.3 Manual Gain Adjustment ~ UL / DL – Con't.

If after connecting back the indoor antenna or service line, the LED changes back to amber or red then signal oscillation is taking place. This is the result of your indoor and outdoor antennas being too close to each other and should be separated more. You could also attenuate the DL DIP Switches by 1dB increments till the LEDs turn green again then you must match the same attenuation value to UL DIP switches.

Try making some test calls throughout the desired area of coverage while monitoring the LEDs to see if it changes color. If you are showing strong signal strength but your calls are not going through, it could be that you need to attenuate your Uplink a bit more. Keep in mind however that you do not want to have more than a 5dB difference between the uplink and downlink values for optimum system performance.

We encourage you to call us when commissioning your repeater system to make sure you have seamless integration to the cellular network. We are always happy to help. **1-866-4-JDTECK (53-8325).**

### Features & Functions

- ✓ Sleek attractive housing.
- ✓ LED indicators to monitor environmental status.
- ✓ Low power consumption.
- ✓ ALC function. (Auto Limit Control)
- ✓ AGC function. (Automatic Gain Control)
- ✓ MGC function. (Manual Gain Control)
- ✓ MUTE function. (Shuts down if no change in environmental conditions)
- ✓ Heat Sink cooling fins to dissipate heat quickly and efficiently



### 3. Installation

1. The repeater's main function is to improve weak RF signals to an area.
2. Selecting the appropriate accessories that are compatible with the frequency of the repeater is very important for optimal system performance. An 850Mhz Repeater needs to be used with accessories that supports the 850Mhz band. In the same way, choosing accessories in the 1900Mhz Band needs to go with a 1900Mhz Repeater etc. For dual band or multi-band repeaters, please ensure the peripheral components used supports all the frequencies needed.
3. The signal strength from the outdoor antenna directly affects the efficiency of the indoor coverage. It is very important to choose the location of the outdoor antenna carefully. With this in mind, it is not recommended that the donor antenna be installed in an attic.
4. The repeater is a two-way (full duplex) signal amplifier. Therefore there needs to be proper isolation between the outdoor antenna and indoor antenna in order to avoid signal oscillation on the repeater. (Interference) There needs to be more than 15dB of isolation above the repeater gain. For example, if the repeater gain is 60dB, then you need 75dB of isolation between outdoor antenna and indoor antenna.
5. The equipment is gain adjustable for both the uplink / downlink. Depending on the environment the end-user may need to adjust the gain to achieve optimum performance.
6. The equipment is designed to amplify the outdoor signal to indoor coverage. In order to reach the best performance, the outdoor signal should be greater than -80dBm, and not over +10dBm. If the outdoor signal is very weak, then a pre-amplifier may be used.
7. Calculating the Link budget before setting a repeater gain.

#### Link budget calculation:

Outdoor signal strength – Loss of accessories (cable, connector, splitters)  
+ Antenna gain (outdoor antenna, indoor antenna) + Repeater gain =  
Indoor signal strength

8. For all cellular applications, you need to use 50 Ohm coax. Besides affecting the system performance, using any other impedance of coax will put an extra load on your repeater and shorten its life span.

### 3.3 Manual Gain Adjustment ~ UL / DL – Con't.



**N.B.** – Before you make any dip switch adjustments in order to get both Alarm LED's (High & Low) showing green, it is recommended you first try to increase the distance between the indoor unit and the donor antenna. This will ensure you get the maximum power output of the repeater. If you have already done this or relocating the indoor unit is not possible or convenient, then your next adjustment would be to reduce the downlink power (DL1 or DL2) of the repeater, starting with the lesser value first. In most cases, after these adjustments are made, this would usually be enough to get the Alarm LED to show green.

Color Changing Alarm LEDs



#### How does this Alarm Feature work?

The alarm feature your repeater is equipped with monitors the input gain. If the input gain is too high, the Alarm LED will change color from green to either, orange or red indicating the intensity of the error. High input gain can occur if the donor antenna is in a location where the receive signal strength from the cell tower is extremely good (-50 or better) or if signal oscillation is taking place. Signal Oscillation is when the amplified signal from the indoor service antenna is feeding back to the donor antenna outside.

To determine what is the cause of your Alarm LED changing color you can disconnect the indoor antenna / service line from the "Indoor" port of the repeater. If the LED does not change to green, then your input signal from the cell tower is very strong and you need to attenuate (Turn ON) the DL DIP Switches till the LEDs turn green again. Then you must match the same attenuation value to the UL, after which you can connect the indoor antenna / service line again.



### 3.3 Manual Gain Adjustment ~ UL / DL

In order to meet safe environmental requirements for seamless network integration, this repeater is equipped with a dip switch assembly that allows you to manually control the Uplink / Downlink gain individually. The UL / DL attenuator control range is from 0dB to -15dB by 5dB increments.

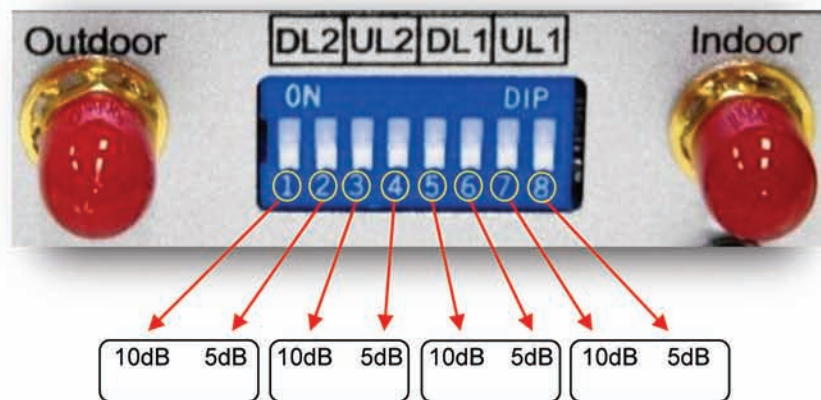


*System default is 0dB Attenuation (Full Power) unless supplied with a pre-amp.*

Depending on the frequency band of your repeater, it will determine the dip switches you will need to adjust and the corresponding LED that will show the status of the adjustments made.

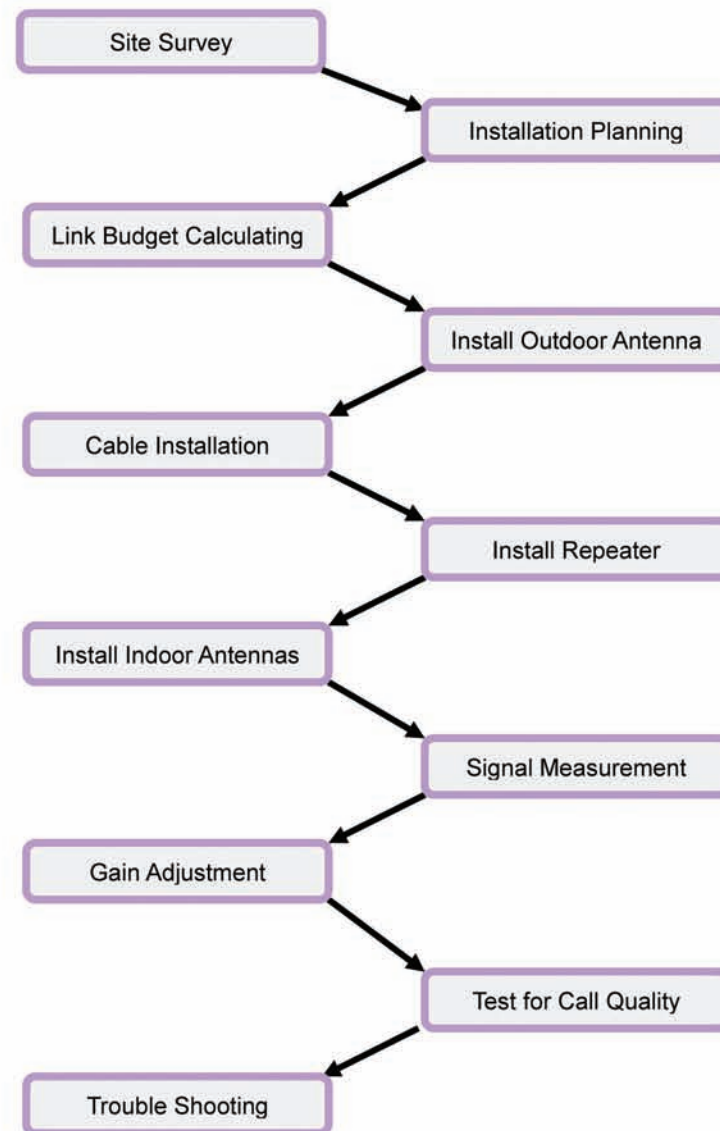
(DL1 & UL1 – Alarm Low) ·  
(DL2 & UL2 – Alarm High)

Turn **ON** the dip switches to reduce power as follows:



Put **ON** a pair of switches for a total of 15dB reduction in gain.

### 3.1 Installation Procedure



### 3.2 Installation Procedure – Cont.

- Check the contents supplied.
- Identify a suitable location where you would like to mount the donor antenna on your roof. Confirm this location has the best input signal from the cell tower.
- Ensure the location is properly isolated from the indoor antenna and at the same time, ensure the cable length supplied is sufficient to complete your installation.
- Install the donor antenna and route the coax to the proposed location for the indoor base unit. **DO NOT COIL UP** any excess coax you may have.
- Connect the indoor service antennas, coax and power supply. Power up the unit and monitor the LED status for errors.
- Rotate the donor antenna until the best signal strength or call quality is achieved on your mobile device, while making sure the LEDs stay green on the repeater.

*We suggest getting someone to help rotate the donor antenna while you monitor both your mobile device (Phone or PC Card) and the LEDs on the repeater at the same time.*

- If signal oscillation is between 1~4dB then the Alarm LED for the relevant band will turn orange. Please adjust the dip switches till the LEDs turn green. (See dip switch adjustment)
- If the signal oscillation is between 15-18dB then the Alarm LED for the relevant band will turn red, and the repeater will then shut down. This is as a result of not having enough isolation between the donor and service antennas. In this case attenuate the dip switches on the repeater. (See dip switch settings for adjustments)

### 3.3 Antenna Installing and Cable Wiring

We do not recommend installing the donor antenna of your repeater system in the attic or at the side of a single story building. Doing so will reduce the quality of the input signal from the cell tower. Also you increase the risk of signal oscillation taking place, thus having to attenuate the output power of your repeater.



- Do not install the donor antenna near high voltage power lines.
- Please take the necessary safety measures when working on heights.
- Do not mount near or in the path of other antennas or satellite dishes.



It is recommended that you mount your donor antenna in a spot that is free of any immediate obstructions. Making use of a pole or mounting bracket is recommended for optimum antenna performance.

