



# JI-43CP

US PSC  
ICS Repeater

## OPERATION MANUAL

**<Interference Cancellation System for Mobile WiMAX 20 Watt>**

**Version 0.01** December 2008

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## Important Safety Precautions



The JI-43CP Repeater unit is powered by 110VAC (or 220VAC). Only personnel who have received relevant training from Juni America are authorized to open any part or section of the JI-43CP. To prevent electrical shock when installing or maintaining the equipment, **ENSURE THE SUPPLY OF AC IS REMOVED** by switching off the AC from the AC power source before accessing any section of the equipment.



Place a protective cap/cover to prevent accidental exposure and eliminate dirt particles contaminating the connection ports.



Wet locations and conditions will increase the risk of electrical shock when installing or using electrical powered equipment. To prevent electrical shock, never install or use electrical equipment in wet locations or during lightning storms.



Static electricity means no risk of personal injury but it can severely damage and corrupt essential circuitry within the equipment, if not handled carefully. Parts on the printed circuit boards as well as other parts in the equipment are sensitive to electrostatic discharge.

Never touch the printed circuit boards or un-insulated conductor surfaces unless absolutely necessary.

If the printed circuit boards must be handled, always use ESD protective devices.



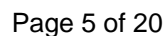
Always observe the warning labels and markings present on the equipment. If unsure, contact Juni America on **+1 800 216 0466** for advice.



The JI-43W2.5G-U/L may weigh up to 100 lbs. and present a lifting hazard. Ensure the correct procedures are used in moving or lifting the equipment.

## Repeater Operation Manual

**Model:** JI-43CP



Version 0.1  
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## 1.1 Downlink

In the downlink path, a signal originating from the BTS is forwarded to the ICU (interference cancellation unit) through the Duplexer. The ICU down-converts the signal to base-band, digital filters, amplifies and up-converts the signal. In addition, the interference cancellation system algorithm (ICS algorithm) is implemented in the ICU.

Finally, the signal is sent to the final power amplifier.

## 1.2 Uplink

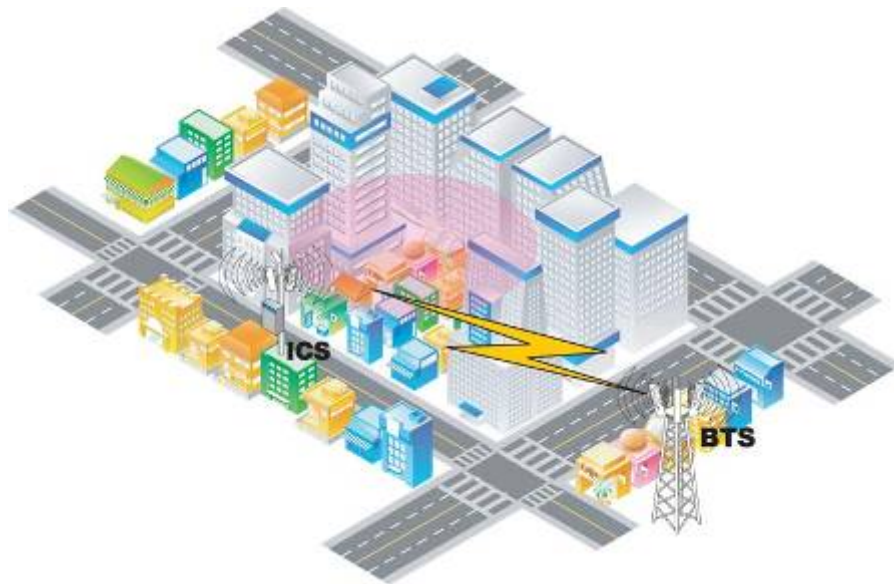
In the uplink path, a signal originating from the Mobile Station is forwarded to the ICU (interference cancellation unit). The ICU down-converts the signal to base-band, digital filters, amplifies and up-converts the signal. In addition, the interference cancellation system algorithm (ICS algorithm) is implemented in the ICU.

Finally, the signal is sent to the final power amplifier

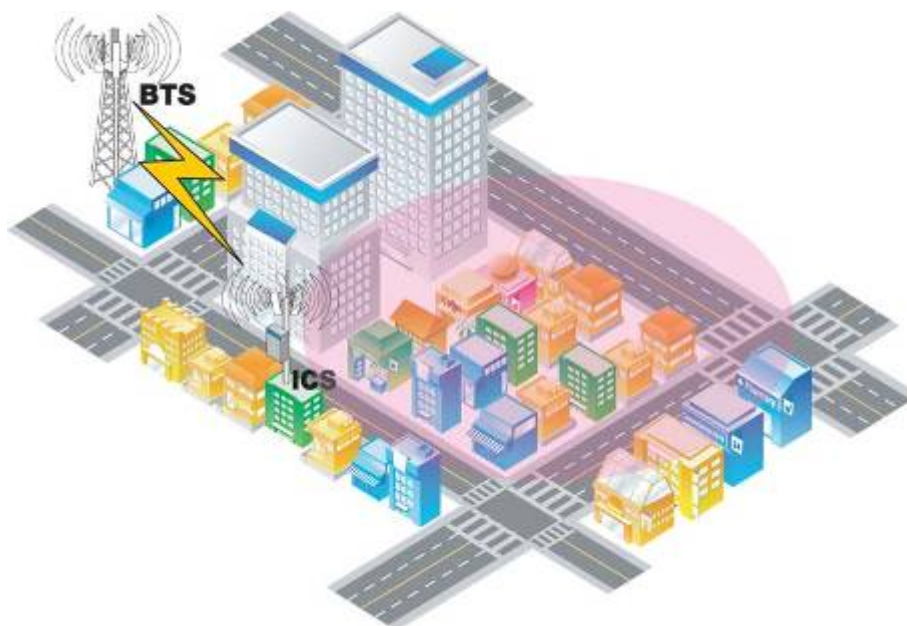
## 2. ICS Application

### 2.1 ICS Repeater Application

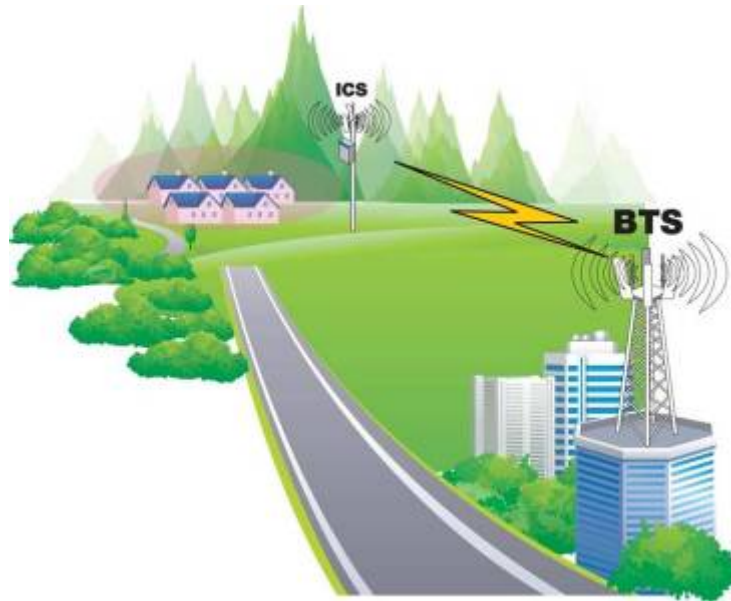
*The following figure illustrates the ICS repeater application.*



[Figure 2- 1] Shadow Zones caused by tall buildings



[Figure 2- 2] Shadow Zones caused by construction of new buildings



**[Figure 2- 3] Coverage expansion in the low traffic rural area**

Wireless communication systems provide a two-way information transfer (voice and data) between a base station and multiple mobiles (MS) within a given area.

Environmental variables such as physical structures both man-made (buildings) and natural (mountains) attenuate signals in the transmission path, which reduce the transport signal's strength. This attenuation leads to a reduction in quality and data rate and eventually prohibits the system's use entirely. JI-43CP is specifically designed to extend coverage, enhance quality, and increase air-interface capacity.

In the downlink (DL), JI-43CP picks up signals coming from the Base Station, filters, amplifies, and retransmits them to the MS. In the uplink (UL), it picks up signals from the MS, filters, amplifies, and retransmits them to the Base Station. JI-43CP constantly monitors the quality of the signals passing through it, while simultaneously, electronically decreasing isolation requirements.



## 3. System Specification

### 3.1 Electrical Specifications

Description		Unit	Specifications	Comment
Frequency Band	DL	MHz	1930.625 ~ 1994.375	
	UL	MHz	1850.625 ~ 1914.375	
Bandwidth	Total BW	MHz	63.75	
DL Power Out (Per Band)		dBm	43dBm (20W)	
UL Power Out (Per Band)		dBm	27dBm (0.5W)	
Gain		dB	DL = 105dB / UL = 100dB	
Gain Range		dB	35	
Gain Accuracy		± dB	2	
Ripple		± dB	2	
AGC Range		dB	35	
Noise Figure		dB	6 / 12	UL Max. Gain / Min. Gain
Total System Delay		us	≥ 12	
VSWR			1.5 : 1	
Antenna Port Impedance		Ohms	50	
DL Input Range		dBm	-62~ -27	
UL Input Range		dBm	-73 ~ -38	
Number of FA(MAX)			7FA	
ACP		30kHz BW	@885 kHz ≥ 45 dBc	
		30kHz BW	@1.125 MHz ≥ 45 dBc	
		30kHz BW	@1.980 MHz ≥ 45 dBc	
		30kHz BW	@2.250 MHz ≥ 50 dBc	
		1MHz BW	@≥ 4MHz ≤ -13 dBm	
Frequency Error		Hz	≤ ± 0.05ppm	''
RHO			≥ 0.912	

[Table 2- 1] Electrical Specifications

### 3.2 Cancellation Performance

Description		Specifications	Comments
Feedback Signal Detecting Range	DL	0 ~ 6us	
	UL	0 ~ 6us	
Static Feedback Cancellation Capacity		Gain = Isolation + 8dB	Direct Feedback
Dynamic Feedback Cancellation Capacity		Gain = Isolation + 5dB	Doppler Frquency = 5Hz

[Table 2- 2] Cancellation Performance

### 3.3 Mechanical Specification

Description	Specifications	Comments
Size	430mm x 625mm x 330mm	
Weight	44Kg	
Mounting	Wall or Pole	
RF Connector	7/16" DIN Female	
CDMA Modem Port	N-Type Female	
Power Connector	MS 3102A-22-2P	
Battery Connector	MS 3102A-20-23P	

[Table 2- 3] Mechanical Specification

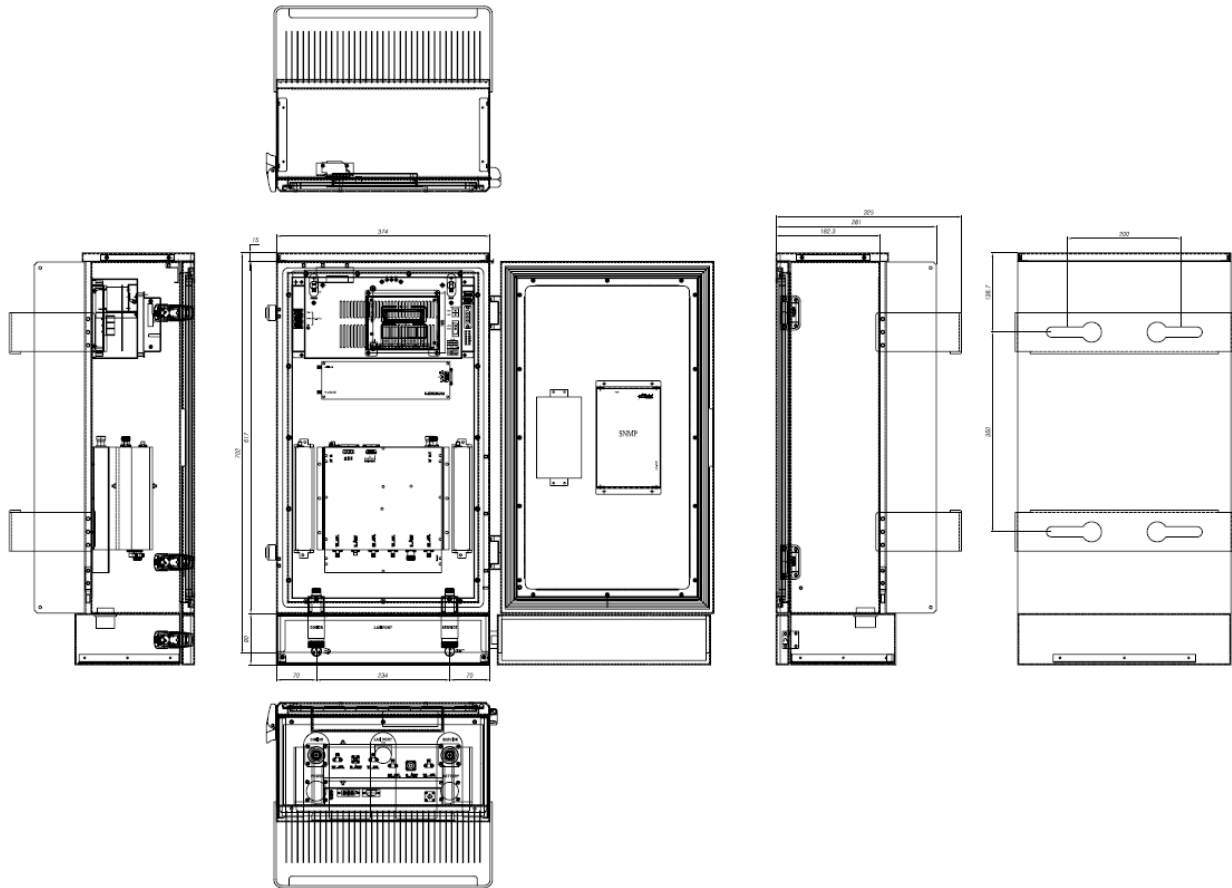
### 3.4 Environmental Specification

Description	Specifications	Comments
Operating Temperature	-40~ +55 °C	
Humidity	5 ~ 95%	
Ingress Protection	IP55	

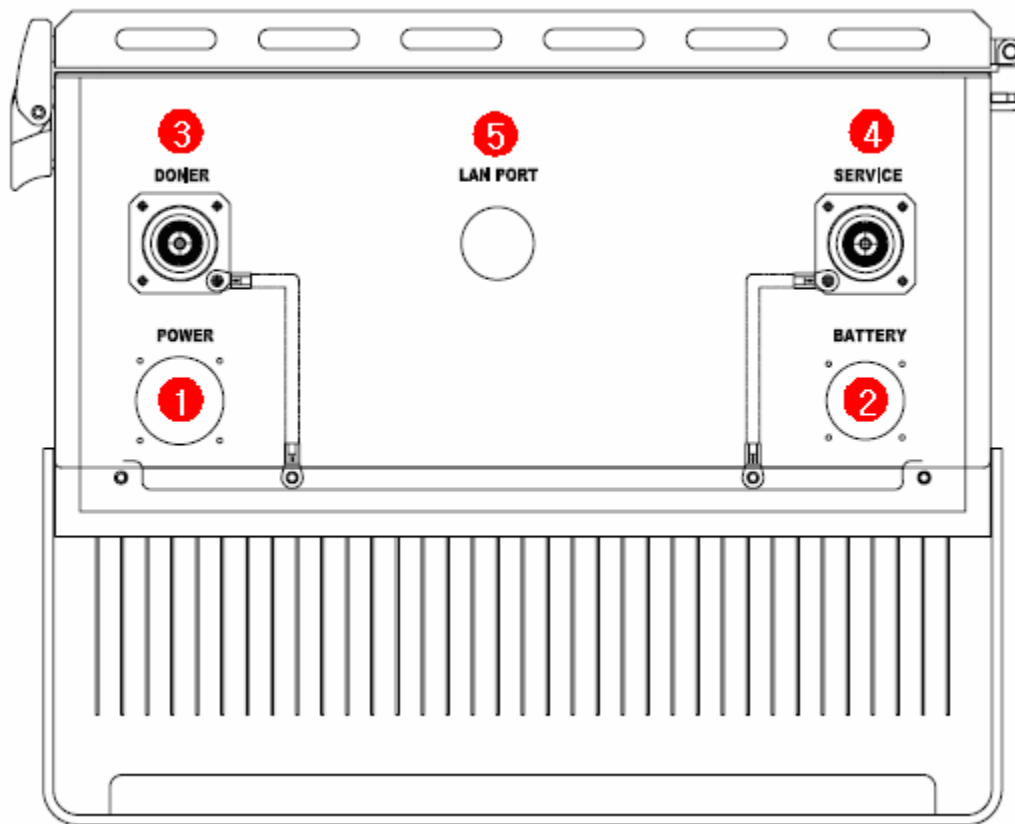
[Table 2- 4] Environmental Specification

## 4. Configurations & Appearance

### 4.1 General Appearance



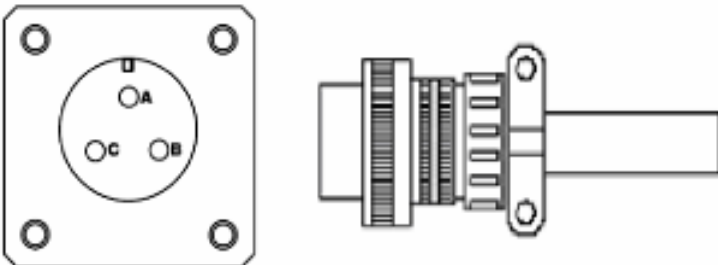
[Figure 4- 1] General Appearance of the Repeater (Front, Side, Top, Bottom)

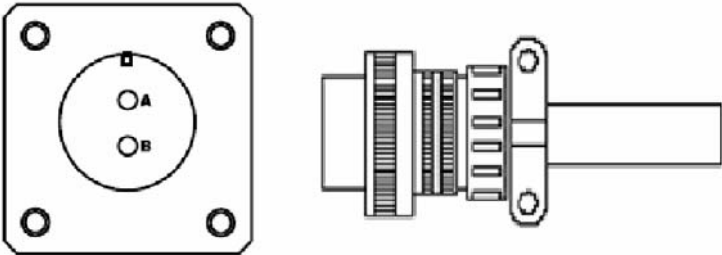


**[Figure 4- 2] Bottom view of the repeater**

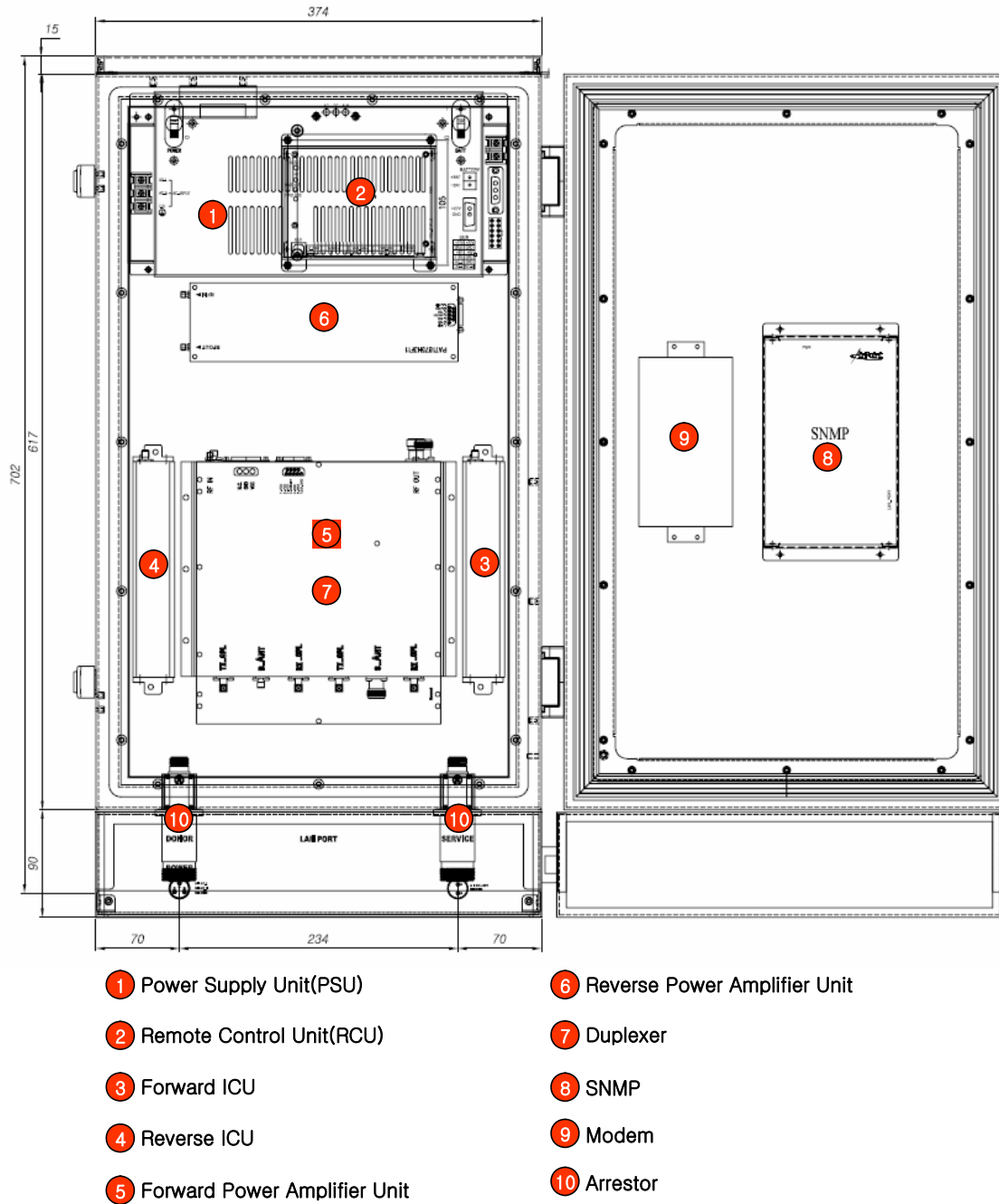
\* The LAN connection is not always necessary as remote access would be the primary method of interface. If used, it will only be used for local monitoring. LAN port is available so that UTP cables can be threaded out while enclosure lid is shut.

### KEY

No.	Name	Function
1	POWER (AC 120V)	 <p>A : AC_L, B : AC_N, C : GND</p>

2	BATTERY (DC 27V)	 <p>A: +27V, B: GND</p>
3	DONOR	<p>Connects to the Donor Ant.</p> <p>(DIN Type female connector)</p>
4	SERVICE	<p>Connects to the Service Ant.</p> <p>(DIN Type female connector)</p>
5	LAN PORT	<p>Connects to the External LAN port</p> <p>(RJ-45 Type)</p>

## 4.2 Components of the Repeater



[Figure 4- 3] System Arrangement Plan

### 4.2.1. Power Supply Unit (PSU)

Figure 1: Dimensions of the device. The figure includes three views: a top view, a side view, and a front view. The top view shows a rectangular device with dimensions 320mm (width) and 286mm (depth). Key features include a power jack (AC IN), a battery compartment (BAT1), a D-SUB 3W35 (FEMALE) connector, and a 5566-12A (MOLEX) connector. The side view shows a height of 80mm. The front view shows a width of 320mm and a depth of 286mm. Various mounting holes and a removal hole (W4) are also indicated.

#### 4.2.2. Remote Control Unit (RCU)

The front panel of the AP-RCU features the following components:

- Top Left:** "RMA" label.
- Top Right:** "AirPoint" logo.
- Left Side (Vertical Labels):** "BATT", "JTAG", "PWR", "PSU\_STATUS".
- Center:** Large "AP-RCU" label.
- Bottom Left:** "GUI" label above a square button with a trapezoidal icon.
- Bottom Center:** A status table with the following structure:
 

SNMP	S_PWR	DL_ICU	UL_ICU
UL_PAU	DL_PAU	DOOR	DEBUG
- Right Side (Vertical Labels):** "PWR", "PSU\_STATUS".

## Repeater Operation Manual

#### 4.2.3. Interference Cancellation Unit (ICU)

The task of the interference cancellation unit (ICU) is to filter and amplify any signals passing through it. Its main function is to perform interference cancellation algorithms, which eliminate the normal problems associated with isolation.

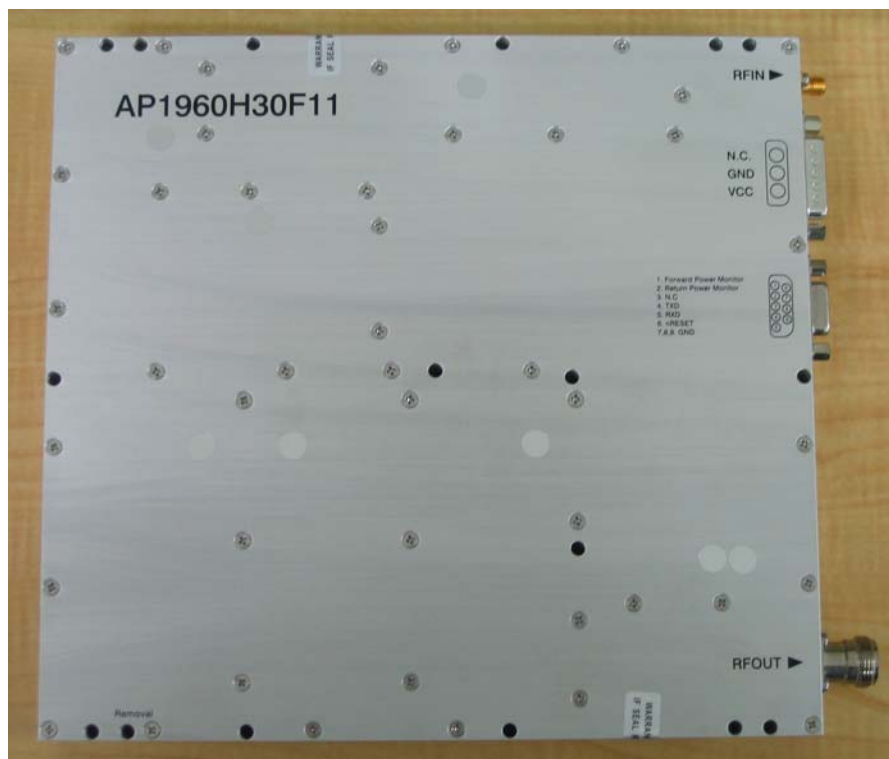


[Figure 4- 6] ICU

#### 4.2.4. Downlink Power Amplifier Unit (DL PAU)

The Downlink path is amplified by a final amplifier for very high output power (30 Watt). In the JI-43CP, power amplifier unit has a very high output power while maintaining superior inter-modulation and linearity performance.





[Figure 4- 7] Downlink PAU

#### 4.2.5. Uplink Power Amplifier Unit (UL PAU)

The Uplink path is amplified by a final amplifier for high output power. In the JI-43CP, 27dBm (0.5W) average power final amplifier is used.



[Figure 4- 8] Reverse PAU

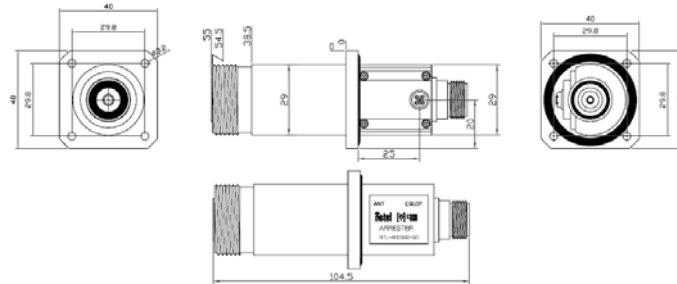
#### 4.2.6. Duplexer Filter

Duplexer filter is placed at the input/output terminal of the repeater. At the input end, limits are set for spurious emissions outside the pass band and at the output end, same limits are set. Up/Downlink paths operate on same frequency and so the unit is connected at the donor and service.

**[Figure 4- 9] Cavity Filter**

#### 4.2.7. Arrestor

Lightning protection.



**[Figure 4- 10] Arrestor**

#### 4.2.8. Modem

## 800/1900MHz North American Cellular Modem



**[Figure 4- 11] Modem**

#### 4.2.9. Simple Network Management Protocol board (SNMP)



*[Figure 4- 12] SNMP*

## **FCC Information**

### User Instructions

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device. Pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interface in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, If not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television receptions, which can be determined by turning the equipment off and on the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.