

BR 01 Repeater

Unication Two-Way Radio System



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A SPECIFICATION

General electrical specification

TX01 Unit General Specifications									
Function or Feature	Description								
Main Function	Modulation of digital signal from CR01 by using exciter and RF power amplification of the transmitted signal to be transmitted into antenna at 100Watts (maximum power).								
Key Components inside TX01	<table border="0"> <tr> <td>1. RF exciter,</td> <td>5. RF power detector,</td> </tr> <tr> <td>2. RF PA,</td> <td>6. Transmitted signal harmonic filter</td> </tr> <tr> <td>3. PA controller and alarming monitor,</td> <td>7. Power supply</td> </tr> <tr> <td>4. TX / RX switch,</td> <td></td> </tr> </table>	1. RF exciter,	5. RF power detector,	2. RF PA,	6. Transmitted signal harmonic filter	3. PA controller and alarming monitor,	7. Power supply	4. TX / RX switch,	
1. RF exciter,	5. RF power detector,								
2. RF PA,	6. Transmitted signal harmonic filter								
3. PA controller and alarming monitor,	7. Power supply								
4. TX / RX switch,									
Connections to CR01	<ol style="list-style-type: none"> 1. TX Interface cable. 2. TX01 is controlled by CR01, TX01 sends alarms to CR01 for processing via this cable. 3. PS and Fan control cable 4. CR01 controls the TX01 PS. Alarms from TX01 PS and fan sent to CR01 via this cable. 5. 13 MHz Reference oscillator input cable from CR01. 6. 12VDC output cable to supply power the CR01 								
Transmitter Duty Cycle	100%, continuous transmission at full power								
Cooling Method	<p>Integrated variable speed cooling fan on rear face of unit. Fresh air intake is via vent on front face plate, exhaust is via rear of unit. Fan speed is a function of the internal PA temperature. CR01 reads the PA temperature and sends speed adjust commands to TX01 fan. The fan also sends the alarm status if fan is rotating or not to CR01</p>								
RF Isolator	Integrated single stage transmitter Isolator								
Power Supply	<ol style="list-style-type: none"> 1. Standard power supply is +48VDC input from battery: 2. Optional power supplies are: <ul style="list-style-type: none"> Option 1: 120/240VAC Main input option: 85 to 264 VAC, 47 to 63 Hz (no DC input) Option 2: +/- 40 to +/- 60VDC, -48VDC nominal (no 120/240 VAC) Option 3: 120VAC with +/-48 VDC automatic switchover backup during AC mains power loss. Switch over from AC main to battery is automatic and does not interrupt operation during loss of AC main power. 3. Indicator signal when TX01 is operating from battery is sent to CR01 via PS & Fan control cable. 4. 120/VAC Main Power Supply option has power factor correction included 5. The DC Battery Power Supply connects to a dedicated or shared external battery. Multiple TX01, CR01, multiple TX01's, CR01's and 3rd party repeaters can connect to same battery (at battery terminal directly). 								
Front Face	<ol style="list-style-type: none"> 1. Air Intake Vent grill 2. AC Power ON / Battery backup LED 3. PA Fault LED 4. Carrying handles on left and right sides 5. Unication logo 								

TX01 Unit General Specifications

Function or Feature	Description
Rear Face	<ol style="list-style-type: none"> 1. Power Supply Fan exhaust 2. Earth Ground screw. Capable of supporting 8 gauge wire to earth ground copper bar. 3. 120/240VAC plug standard plug 4. Battery connectors (+ and -) terminal plug for +48VDC or +/-48VDC option 5. Power Supply and Fan Control: DB9 female connector 6. Auxiliary 12VDC/3amp power output: Barrel style connector. 7. TX Interface: High density DB 25 Shell, 44 pin connector. Connects to CR01 8. RX Out. SMA connector. 9. Connects to CR01 RX Input for single channel repeater operation. 10. PA fan exhaust. Externally mounted for easy replacement. 11. RF TX Out: Type N. 12. This connector supports two modes of operation: 13. Traditional Repeater 14. Connects to transmitter cavity RF pre-filter and duplexer for traditional dual frequency repeater operation. 15. Unication Proprietary Single Channel Repeater 16. Connects to RF pre-filter and antenna for Unication proprietary single channel repeater operation. 17. Reference Input: 13 MHz reference input from CR01.

CR01 Unit General Specifications

Power Supply Input	1. +12VDC, supplied from TX01 rear panel 12VDC power supply output.
Current Drain	4 amp at +12VDC battery voltage input
Temperature	<ol style="list-style-type: none"> 1. Ambient Operating: -30 to +60° C. 2. Storage Temperature: -45 to +85° C.
Humidity	Operating units are subjected to 50°C at 95% Non-condensing.
Vibration	<p>MIL-STD-810E</p> <p>The device shall be capable of withstanding a 30 to 500 Hz acceleration limited oscillation with 0.25G rms for 40 minutes on vibration table. After test, the unit shall be fully functional with no impairments and shall show no signs of physical degradation including all fastening screws.</p>
Electrostatic discharge	discharge Reference IEC 6100-4-2.: 5KV, 10KV and 15KV on all planes applied to any point on the R01 unit, including all contacts and connectors.
Altitude	30,000 feet for storage and shipping.
MTBF	<p>Greater than 45,000 hours (5 years), with following assumptions:</p> <ol style="list-style-type: none"> 1. Ambient temperature = +30°C, 2. 0.1G continuous sinusoidal 30 to 500 Hz vibrations

GPS Receiver Specifications

Function or Feature	Description
GPS Receiver Antenna port	<ol style="list-style-type: none"> 1. Performance: SIRF or equivalent 2. 50 ohm impedance, 3. Provides DC power to power external GPS antenna LNA. The GPS port shall provide 5VDC +/- 10%, 27mA power for the external GPS LNA. 4. Provide 1 Hz time mark output for reference oscillator and timing synchronization.

Alarm Reporting to Console

Alarms and information reported to console CR01

1. TX01 Alarms and information include these:

- a. TX01 Temperature
- b. VSWR
- c. Forward power after isolator
- d. Reverse power after isolator
- e. DC input voltage (at Transmitter DC terminals)
- f. Synthesizer
- g. Fan rotation
- h. PA currents
- i. Battery voltage
- j. Power supply voltage
- k. AC main failure / running on battery backup
- l. MSN
- m. Hardware revision

2. CR01 Alarms and information

- a. CR01 temperature
- b. Loss of GPS signal
- c. Loss of external time mark signal
- d. DSP failures
- e. Loss of communications to TX01
- f. Receiver alarms including synthesizer
- g. Power supply voltage
- h. Battery voltage
- i. MSN
- j. Hardware revision
- k. Software revision of DSPs and ARM
- l. Intrusion alarm – front door
- m. Intrusion alarm – rear door
- n. GPIO – telemetry ports
- o. ADC port
- p. DAC port
- q. Serial port

RF Specifications

TX01 Transmitter RF specifications					
Power Output	VHF/UHF: 10 to 100 watts in steps of 1 watt increments, selectable under CR01 software control. WLB: 10 to 75 watts in steps of 1 watt increments, selectable under CR01 software control.				
Power Output accuracy	1. VHF/UHF: 10 to 100 watts: +/- 0.6 dB over temperature, AC & DC input voltage, after PA calibration. 2. WLB: 10 to 75 watts: +/- 0.6 dB over temperature, AC & DC input voltage, after PA calibration				
Power Supply Input	1. Standard: +40 to +60VDC, + 48VDC nominal (no 120/240 VAC) 2. Option 1: AC Main input option: 85 to 264 VAC, 47 to 63 Hz (no DC input) Option 2: +/- 40 to +/- 60VDC, -48VDC nominal (no 120/240 VAC) Option 3: 120VAC with +/-48 VDC automatic switchover backup				
Frequency bands (electronic bandwidth)	30 to 88 MHz	136 to 174 MHz	400 to 470 MHz	300 to 400 MHz	450 to 520 MHz
Transmitter noise at 1 MHz from carrier	<-148 dB/Hz	<-148 dB/Hz	<-142 dB/Hz	<-142 dB/Hz	<-142 dB/Hz
Channel Switch time	8.75 ms				
TX01 Current Drain	1. Transmit: 10 amp at 48 VDC battery voltage input, at 100 watt TX power, 12VDC regulated 3 amp current limited auxiliary out, Fan running at maximum speed. 2. PA Standby (Idle): 1 amp at 48 VDC battery voltage input, fan is running at low speed.				
CR01 Current Drain	1. 2 amp at 48VDC.				
Temperature	1. Ambient Operating: -30 to +60° C. 2. Storage Temperature: -45 to +85°C.				
Channel Bandwidths	12.5 kHz and 25 kHz. Selected dynamically via software control from the CR01.				
Output Impedance	50 Ohms				
Reference Oscillator	Uses external reference oscillator input from CR01 reference module, 50 ohms, 13MHz				
TX Intermodulation Attenuation at antenna connector	VHF/UHF: > 55 dBc (includes integrated isolator) WLB: > 40 dBc				
Modulation	1. Analog: FM TIA603C 2. Digital: CFSK (DMR, P25 Phase I, etc.).				
Modulation limiting	1. +/- 2.5 kHz for 12.5 kHz channel bandwidth 2. +/- 5.0 kHz for 25 kHz channel bandwidth				
FM Hum and Noise	1. Better than -40 dB for 12.5kHz channel bandwidth 2. Better than -45 dB for 25kHz channel bandwidth				
Isolation requirement	VHF/UHF: 20 dB typical, 18 dB minimum WLB: no isolator				
Single Channel Repeater Output	TX01 includes a TX/RX switch to switch the TX output to go to the CR01 receiver in order to provide the Unication proprietary single channel repeater function("R&R"). The TX/RX switch must be very fast switching and must not degrade the IMD, spurious and antenna matching. The RX output is provided on the "RX OUT" port on the rear face of the TX01. This port is connected to the CR01 RX Input.				

TX01 Transmitter RF specifications

Conducted spurious and harmonic emissions attenuation at antenna connector	VHF/UHF: <ol style="list-style-type: none"> 1. Less than -36dBm for below 1 GHz 2. Less than -30dBm for above 1 GHz WLB: less than -20 dBm
Operating VSWR	<ol style="list-style-type: none"> 1. The PA shall also be used in the future simple M01 mobile with power level set to 50 watts maximum, voltage = 13.8 VCD, without an isolator (simple mobile). In the mobile application the typical operating VSWR is 3:1. The PA shall tolerate up to a 6:1 VSWR. <p>The output power shall be reduced gracefully under software control as a function of VSWR when the VSWR is > 3:1.</p> <p>Use the TIA specifications, if applicable, for operation when the VSWR > 3:1.</p>
Audio Response	TIA603C
Audio Distortion	< 2 %
Emission Designators	<ol style="list-style-type: none"> 1. Analog Voice Call, 12.5 KHz channel: 11K0F3E 2. Analog Voice Call, 25kHz channel: 16K0F3E 3. Uni2TDMA voice: 7K8FXE 4. Uni2TDMA data: 7K8FXD 5. Uni2TDMA voice and data: 7K8FXW 6. P25 Phase I voice: 8K2F1E 7. P25 Phase I voice and data: 8K2F1D
Humidity	50° C at 95% Non-condensing.
Vibration	MIL-STD-810E <p>The device shall be capable of withstanding a 30 to 500 Hz acceleration limited oscillation with 0.25G rms for 40 minutes on vibration table. After test, the unit shall be fully functional with no impairments and shall show no signs of physical degradation including all fastening screws.</p>
Electrostatic discharge	Reference IEC 6100-4-2.: +/- 15KV air, +/8KV contact on all planes applied to any point on the TX01 unit, including all contacts and connectors.
Altitude	30,000 feet for storage and shipping.
MTBF	Greater than 45,000 hours (5 years), with following assumptions: <ol style="list-style-type: none"> 1. 100% transmission duty cycle, 2. 100 watts output, 3. Ambient temperature = +30°C, 4. 0.1G continuous sinusoidal 30 to 500 Hz vibrations
TX01 Protection	<p>Thermal, VSWR, power reduction followed by shut off, reset upon return to normal temperature and VSWR.</p> <ol style="list-style-type: none"> 1. Power falls back 6 dB on: <ol style="list-style-type: none"> a. High Reverse power or b. PA high temperature <p>CR01 reads the alarms periodically with period less than or equal to 1 second and when the alarms start to get into the warning ("yellow") level, the CR01 will start to reduce the PA output power.</p>

TX01 Transmitter RF specifications

TX01 Protection	<ol style="list-style-type: none"> 2. TX01 has self-protection in case that CR01 communications is lost or cable disconnected In this case TX01 will power off. TX01 will stay in off condition until CR01 communications is restored and instructed to turn on by CR01. 3. TX01 will self-power off when reference signal is lost. 4. TX01 reports immediately to the CR01 with the fan failure in the event that the fan stops working. 5. When alarms approach serious level, such as PA temperature or synthesizer lock problem (i.e., "RED"), the TX01 shall automatically cut power to the RF PA via hardware method (self protect). 6. If the PA power has been cut off due alarms or via CR01 command, the TX01 digital interface to CR01 shall continue to be powered up and function so that the CR01 can continue to communicate to the TX01.
Alarms and information reported to CR01	<ol style="list-style-type: none"> 1. TX01 Temperature (PA, Driver, & PA), ambient temperature on fan controller, heatsink, power supply 2. Forward power after isolator 3. Reverse power after isolator 4. PA DC input voltage & current 5. AC & DC input voltage at TX01 AC & DC terminal 6. Synthesizer (LO & modulator) 7. Fan rotation 8. PA driver currents 9. AC main failure / running on battery backup 10. Power supply voltage 11. Battery voltage 12. MSN of all boards. 13. PCB revisions stored in EEPROM

CR01 Receiver RF specifications

Frequency bands (electronic bandwidth)	30 to 88 MHz	136 to 174 MHz	400 to 470 MHz	300 to 400 MHz	450 to 520 MHz
Conducted termodulation (TIA603C)	70 dB	78 dB	75 dB	75 dB	75 dB
Conducted Spurious Rejection (TIA603C)	70 dB	80 dB	75 dB	75 dB	75 dB
Maximum Received power at receiver port	<ol style="list-style-type: none"> 1. Operates up to : +27 dBm 2. Does not damage receiver for signals up to +30 dBm for 1 minute duration. 				
RF Input impedance	50 ohms				
Temperature	<ol style="list-style-type: none"> 1. Ambient Operating: -30 to +60° C. 2. Storage Temperature: -45 to +85° C. 				
Channel bandwidths	12.5 kHz and 25 kHz. Selected via PPS software control				

CR01 Receiver RF specifications

Channel switch time	8.75 ms
Sensitivity	1. Analog, 12.5 kHz bandwidth, at 12dB Sinad: 122 dBm 2. Analog, 25.0 kHz bandwidth, at 12 dB Sinad: 122 dBm 3. Digital (C4FSK): < 5% BER at 122 dBm (12.5kHz bandwidth)
Reference Oscillator	External reference oscillator input from CR01 reference module, 50 ohms, 13MHz, 50 ohms
Adjacent Channel Selectivity (TIA603C)	VHF/UHF: WLB: 12.5 kHz: > 55 dB 12.5 kHz: > 55 dB 25.0 kHz: > 80 dB 25.0 kHz: > 64 dB
Rated Audio (using basic Speaker mic)	0.5 W
Audio Distortion (using basic Speaker mic) at rated audio	< 2%
Audio Response	TIA603C
FM Hum and Noise	12.5 kHz: > 40 dB 25.0 kHz: > 45 dB
Blocking	100 dB

Reference Oscillator Module

Frequency	13 MHz, ovenized, low phase noise oscillator
Stability over temperature and aging, free-running mode.	1. 1 year aging +/- 0.1 ppm 2. 10 year aging: +/- 0.5 ppm.
Stability over emperature and aging, locked mode: locked to GPS or external 1Hz pulse. External pulse is locked to GPS.	1. Over temperature: +/- 0.05 ppm 2. Over temperature and 10 year aging: +/- 0.05 ppm
Output references	Three 13 MHz output references: 1. Low phase noise sinusoidal output for TX01, 2. Low phase noise sinusoidal output for Receiver module, 3. Output for Baseband processor board
Control	Reference oscillator is frequency is adjusted by DSP processor on CPCU using digital interface

Repeater Product Feature List

Function	Details of Function	BR01	BR02	FR01	TR01	SR01	IC01
A. Repeater Hardware Operation & Software Configuration							
Protocols supported for Repeat and amplification	Analog voice	•	•	•	–	•	–
	Analog voice with CTCSS or CDCSS	•	•	•	–	•	–
	(configurable separately between RX & TX)	•	•	•	–	•	–
	DTMF followed by Analog Voice	•	•	•	–	•	–
	DTMF with CTCSS or CDCSS followed by Analog Voice	•	•	•	–	•	–
	2Tone followed by Analog Voice	•	•	•	–	•	–
	2Tone with CTCSS or CDCSS followed by Analog Voice	•	•	•	–	•	–
	5/6Tone followed by Analog Voice	•	•	•	–	•	–
	5/6Tone with CTCSS or CDCSS followed by Analog Voice	•	•	•	–	•	–
	MDC1200 control followed by Analog Voice or MDC1200 Data	•	•	•	–	•	–
	MDC1200 control with CTCSS or CDCSS followed by Analog Voice or MDC1200 Data	•	•	•	–	•	–
	UDC2400 control followed by DVOA digital voice or data	•	•	•	–	•	–
	UDC2400 control with CTCSS or CDCSS followed by DVOA digital voice or data	•	•	•	–	•	–
	Pocsag Transmitter (512, 1200, 2400 bps)	–	–	•	–	•	–
	FM P25 Phase 1 control followed by P25 Digital Voice or P25 Data	•	•	•	•	•	–
	Linear P25 Phase 1 control followed by P25 Digital Voice or P25 Data	–	•	•	•	•	–
	DMR control followed by Unication 2400 bps digital voice (“UniDMR”) or DMR data	•	•	•	•	•	–
	MPT1327	–	–	–	•	–	–
P25 phase 2 Linear outbound (with TX02- 100w)	–	–	•	–	•	–	
Tetra (with TX02-100W)	–	–	•	–	•	–	
Multi-protocol Demodulation and Transmission of above protocols. This feature is also known as “Simultaneous detection”	•	•	•	–	•	–	
Repeater Access Method Parameters (RAMP)	Carrier	•	•	•	–	–	–
	CTCSS/CDCSS	•	•	•	–	–	–
	Carrier and CTCSS/CDCSS	•	•	•	–	–	–
	Singletone (in band)	•	•	•	–	–	–
	DTMF	•	•	•	–	–	–
	MDC1200 Repeater ID	•	•	•	–	–	–
	MDC1200 Repeater ID + CTCSS/CDCSS	•	•	•	–	–	–
	UniDMR Basestation ID.	•	•	•	–	•	–
P25 NAC	•	•	•	–	–	–	

Function	Details of Function	BR01	BR02	FR01	TR01	SR01	IC01
A. Repeater Hardware Operation & Software Configuration							
Morse Code	Station ID sent periodically during periods of no user traffic (required by site license)	•	•	•	–	•	–
Transmitter Modes	Transmitting	•	•	•	–	–	–
	Ready to Transmit.	•	•	•	–	–	–
	Transmitter fully powered up and can transmit immediately upon receipt of data from controller	•	•	•	–	–	–
	Sleep						
	Transmitter enters sleep after hang time expires. Transmitter will exit sleep mode in 10 ms after TX request from controller	•	•	•	–	–	–
	Sleep with periodic IDLE transmission for U3 portable signal strength information. After the transmitter enters the sleep mode, the repeater transmits the P25 IDLE message periodically. The IDLE message is not transmitted when the R01 is not in Sleep mode.	•	•	•	•	•	–
OFF							
Local and Remote connectivity functions All functions are password protected and accessed with console	Remote configuration using PPS,	•	•	•	–	•	•
	Urgent alarm automatic reporting and alarm gather, console communications and other communication needs shall be done via the following connectivity methods	•	•	•	–	•	•
	Software Download to CR01	•	•	•	–	•	•
Remote connectivity Methods. All functions are password protected and accessed with console.	Ethernet Port A	•	•	•	–	•	•
	Ethernet Port B (for redundant linking)	•	•	•	–	•	•
	GSM 3G/4G radio GSM radio connects to R0X's via Ethernet	option	option	option	–	•	–
	Satellite or Microwave link radio Satellite or Microwave link radio connects to BR01's via Ethernet Port A Redundant Satellite or Microwave link radio connects to BR01 via Ethernet Port B.	option	option	option	–	–	–
Local connectivity Methods (on CR01 box). Accessed with Console	USB	•	•	•	–	•	•
	BlueTooth (optional)	•	•	•	–	–	–
	WIFI (optional)	•	•	•	–	–	–
Repeater Type	Traditional dual frequency into duplexor	•	•	•	–	–	–
	Unication Proprietary single channel repeater using very fast switching TDMA radio ("R&R")	•	•	•	–	–	–

Function	Details of Function	BR01	BR02	FR01	TR01	SR01	IC01
B. Repeater Configuration via PPS							
Repeater Access Method Parameters	One or more of the above access Methods can be configured to operate simultaneously.						
	The ability to support multiple access methods simultaneously permits a mixture of existing 3rd party portables to access the repeater.	•	•	-	-	-	-
	Up to 12 different CTCSS tone and CDCSS code combinations. For CTCSS, the SINAD threshold range = 6 to 20 dB	•	•	-	-	-	-
	Sequence of four (4) DTMF tone pairs. Spacing between tone pairs is 300 ms +/- 200 ms.	•	•	-	-	-	-
	One inbound SingleTone frequency of duration 500 ms	•	•	-	-	-	-
	One MDC1200 Repeater ID.	•	•	-	-	-	-
	One UniDMR Basestation ID.	•	•	-	-	-	-
	One UDC2400 Repeater ID.	•	•	-	-	-	-
	One P25 Network Access Code ("NAC") IDs.	•	•	-	-	-	-
	Hang time of the repeater Transmitter in millisecond increments	•	•	-	-	-	-
Transmitter Morse Code Station ID parameters	Repeater Station ID	•	•	-	-	-	-
	Morse code speed in words per second	•	•	-	-	-	-
	Period of transmission (including OFF)						
	Period of Repeater ID transmission (Off, transmission rate, 1 to 120 minutes in steps of 1 minute increments).	•	•	-	-	-	-
Signal Strength Idle message (transmitted when repeater is in sleep mode)	Period of transmission: OFF, 1 to 10 seconds in steps of 1 second increments.	•	•	•	•	•	-
	NAC	•	•	•	•	•	-
	Color code	•	•	•	•	•	-
Repeater Parameters	Protocol modes (P25, Uni2TDMA, Analog, automatic detection combinations, etc.)	•	•	•	-	-	-
	All TX and RX protocol and parameter settings listed in section A. This includes the specific protocols, simultaneous detection and pre-key times.	•	•	•	-	-	-
	TX frequency in minimum step size	•	•	•	-	-	-
	RX frequency in minimum step size	•	•	•	-	-	-
	TX Power level in step of 1 watt from 10 to 100 Watts for the TX01-100 or TX02-100 units	•	•	•	-	-	-
	RX and RX Channel bandwidth: 12.5 v.s. 25 KHz	•	•	•	-	-	-
	Color Code for DMR	•	•	•	-	-	-

Function	Details of Function	BR01	BR02	FR01	TR01	SR01	IC01
B. Repeater Configuration via PPS							
Network parameters	IP address of authorized console to which the BR01 connects	•	•	•	–	–	–
	Network configuration (static IP address of the R01 and any optional accessory such as GSM radio, satellite radio etc.)	•	•	•	–	•	•
	Ethernet IP and routing parameters for all boxes including 3G/4G GSM radio, satellite radio etc.	•	•	•	–	•	–
	Bluetooth link configuration	•	•	•	–	–	–
	Set password for repeater access using the console for configuration, software download and status via Ethernet access, USB, or WIFI access. Password is set using USB.	•	•	•	•	•	•
	Set password to allow local and remote PC download Utility access. This password is additional to the repeater access password which provides an additional level of security. This password is additional to the repeater access password which provides an additional level of security.	•	•	•	–	•	•
	PPS password. This password is configured via USB. The user must enter the PPS password in order for the user to use the PPS.	–	–	–	–	–	–
Synchronization of reference oscillator and TDMA Options configured via PPS	Free running	•	•	•	•	–	–
	GPS radio (phase 2, optional)	•	•	•	•	•	•
	External 1 Hz signal from another BR01 on auxiliary port (phase 2)	•	•	•	•	•	•
Repeater mode and Repeater Type	Traditional 2 frequency pair into duplexor	•	•	•	–	–	–
	Unication proprietary single channel repeater (no duplexor).	•	•	•	–	–	–
	Normal Operational mode	•	•	•	•	•	•
	Repeater is put offline. non-functional mode (TX = OFF). Note the default condition is the repeater is fully functional, even after a reset. In this mode the RX and the Ethernet links is still functional but it only processes over the air commands.	•	•	•	•	•	•
	Test Modes: a. Test modes including: Transmit Test tone for 1 minute then stop. The frequency of the tone shall be settable in steps of 1 Hz in the range of 300 to 3000 1 Hz. b. Transmit BER pattern for field testing. Pattern follows protocol specifications. Pattern continues for a programmable period of time up to a maximum of 10 minutes. c. Receiver BER (sources of BER pattern is from inbound portable)	•	•	•	•	•	•

Function	Details of Function	BR01	BR02	FR01	TR01	SR01	IC01
C. Repeater Information and Control accessed with Uni Console							
Control, Alarm and Status and Commands which are Accessed Locally or Remotely with Uni Console	Fan status (rotating or not rotating)	-	•	-	-	-	-
	Current TX Activity Status	-	•	-	-	-	-
	TX log of % transmitting over past 1 week.	-	•	-	-	-	-
	Current RX Activity Status	•	•	•	-	•	-
	RX log of % use over past 1week.(time, ID, message duration etc.)	•	•	•	-	•	•
	RX Busy status	•	•	•	-	•	•
	RX signal strength of received signal in dBm	•	•	•	•	•	•
	RX average BER for digital messages	-	-	-	-	-	-
	TX and RX protocol and parameter settings	•	•	•	-	•	-
	TX frequency in Hz	•	•	•	•	•	•
	RX frequency in Hz.	•	•	•	•	•	•
	TX Power in watts (0 watts = PA serious alarm and PA is in idle state)	•	•	•	•	•	-
	TX activity profile information of duty cycle and RX activity profile information of duty cycle for the past 72 hour period.	•	•	•	•	•	-
	Read current alarm status reporting (all alarms status can be viewed).	•	•	•	-	•	•
	Read GPS time and location	•	•	•	-	-	-
	Alarm history (event, time stamp) for 5000 records stored in flash	•	•	•	-	•	•
	Equipment Information including Software version, MSNs, Hardware versions.	•	•	•	-	•	•
	GPS location and time	•	•	•	-	-	-
	Software reset boxes (individually reset (this command shall not clear the alarm states)	•	•	•	•	•	•
	Cabinet front door Intrusion alarm status	•	•	•	•	•	•
	Cabinet rear door intrusion alarm status	•	•	•	•	•	•
	PA Temperature	•	•	-	-	-	-
	CR01 Temperature	•	•	•	•	•	•
	PA Alarms (VSWR, currents, synthesizer etc.)	•	•	-	-	-	-
	TX01 unit main power loss, unit is operating on battery backup	•	•	•	•	•	•
	CR01 unit main power loss, unit is operating on battery backup	•	•	•	•	•	•
Loss of communications to TX01 unit	•	•	•	•	•	-	
Loss of communications to receiver module	•	•	•	•	•	-	

Function	Details of Function	BR01	BR02	FR01	TR01	SR01	IC01
C. Repeater Information and Control accessed with Uni Console							
Control, Alarm and Status and Commands which are Accessed Locally or Remotely with Uni Console	Internet cable communications delay – ping command from console to CR01 unit	•	•	•	•	•	–
	Status of Ethernet cable, GSM modem or satellite modem communications (Functional/Non functional)	•	•	•	•	•	•
Built-in-Test (BIT) Accessed on CR01 box	BIT shall be accessible via only the USB port. The BIT commands include all of the U3 ones plus additional ones required for the R01. BIT is used for R&D development and for FCC certification.	•	•	–	–	–	–
Visual LED User Interface Definition located on CR01 box	LEDs on the CR01 unit. a. LED#1: Power/Battery Backup Alarm (Green, flashing Green) b. LED#2: Alarm (RED) c. LED#3: TXA in process (Green, flashing Green) d. LED#4: TXB in process (Green, flashing Green) e. LED#5: RXA in process (Green, flashing Green) f. LED#6: RXB in process (Green, flashing Green) g. LED#7: Ethernet Activity (Green, Amber)	•	•	•	•	•	•
Visual LED User Interface Definition located on the TX01	LEDs on the TX01 unit. a. LED#1: AC Power b. LED#2: Alarm c. LED#3: TX in process	•	•	•	•	•	–
General purpose IO from CR01 Auxilliary port	General Purpose I/O is on the CR01 unit rear panel: I/O list includes (# pin, description): a. 2 - audio line output b. 2 - audio line input c. 2 - DAC out d. 2 - ADC e. 2 - Uart serial port f. 2 - time mark output g. 2 - time mark input h. 4 - PCM i. 6 - general purpose IO	•	•	•	–	–	–
BT Speaker mic Support (on CR01 box)	BT Speaker mic is connected to the CR01 via the front face BT radio. Used for testing during installation & maintenance	•	•	•	–	–	–

Function	Details of Function	BR01	BR02	FR01	TR01	SR01	IC01
D. Repeater Network Interconnection Operation. These operations are provided by MCPE (FR01)							
RF Cross Banding of Conventional Portables	Portable on one repeater band can send a call to a portable which is on a different band on a different Repeater	●	●	●	–	–	–
	Portable on one repeater band can receive a call from a portable which is on a different band which is on a different Repeater	–	–	●	–	–	–
Protocol Conversion of Conventional Portables	A portable which uses a particular protocol can make a call to another portable which uses a different protocol which is on the same repeater.	–	–	●	–	–	–
	A portable which uses a particular protocol can receive a call from another portable which uses a different protocol which is on the same repeater.	–	–	●	–	–	–
	A portable which uses a particular protocol can make a call to another portable which uses a different protocol which is on a different repeater.	–	–	–	–	–	–
	A portable which uses a particular protocol can receive a call from another portable which uses a different protocol which is on a different repeater	–	–	●	–	–	–
PSTN Interconnection Note: MCPE has	A portable can place a call to a PSTN number. MCPE provides data base of approved numbers	–	–	●	–	–	–
PSTN interface card.	A portable can receive a call from a PSTN number.	–	–	●	–	–	–
GSM Interconnection Note: MCPE routes the traffic to/from the 3G/4G interface radio via Ethernet connection.	A portable can place a call to a 3G/4G GSM number. MCPE provides data base of approved numbers.	–	–	●	–	–	–
	A portable can receive a call to a 3G/4G GSM number. MCPE provides data base of approved numbers.	–	–	●	–	–	–
Satellite or Microwave link Radio Interconnection Note: MCPE routes the traffic to/from the 3G/4G interface radio via Ethernet connection.	A portable can place a call to a telephone number via a satellite radio box. MCPE contains the data base of approved numbers.	–	–	●	–	–	–
	A portable can receive a call from a telephone number via the satellite radio box.	–	–	●	–	–	–

Function	Details of Function	BR01	BR02	FR01	TR01	SR01	IC01
E. Remote PC Console Functions							
Software Download	Software download to processors from Console.	•	•	•	-	•	•
Control, Alarm & Status GUI	View and reset PA & CR01 alarms (Provided by CR01)	•	•	•	-	-	-
	View and reset MCPE alarms	-	-	•	-	-	-
	View and reset CM01 alarms	-	-	-	-	-	-
	View and reset SM01 alarms	-	-	-	-	•	-
	View and reset RXS01 alarms	-	-	-	-	-	•
	View PA & CR01 Status	•	•	-	-	-	-
	View MCPE status	-	-	-	-	-	-
	View LED status	•	-	-	-	-	-
	View software and h/w versions, MSN etc for all products connected on the network. Products include the TX01, CR01 etc.	•	•	•	-	•	•
	View and/or set general purpose I/O status	•	•	•	-	-	-
Configuration	Read and set repeater Access parameters	•	•	-	-	-	-
	Read and set Transmitter Morse code Station ID parameters	•	•	-	-	-	-
	Read and set PPS parameters	•	•	-	-	-	-
	Read and set data base in MCPE (crossbanding, protocol conversion matrix, authorized telephone numbers etc.)	-	-	•	-	-	-
	Read and set database in CM01	-	-	-	-	-	-
	Set the 13 MHz reference (Transmitter Frequency)	•	•	•	•	•	•
	Read and set network Network parameters and routing configuration	•	-	•	-	•	•

Hardware specification for each standard accessory

Item	Description	Notes
Power cord (option)	120/220VAC power cord (customized for each region).	Standard 2 meter length
Battery backup cable	8 gauge wire with screw lugs Connects directly to battery terminals or distribution bar	Standard 3 meter length.
TX01 rear support bars	Metal support bar to prevent the TX01 unit rear end from tilting down due to weight.	Connects between rear of TX01 to standard 19" cabinet, two bars supplied, for left and right sides
RX01 rear support bars	Metal support bar to prevent the CR01 unit rear end from tilting down due to weight.	Connects between rear of RX01 to standard 19" cabinet, two bars supplied, for left and right sides.
Earth ground cable	8 gauge, multi-strand wire with screw lugs, Length: 60 cm standard length Color of insulation: Green	One earth ground cable supplied for every unit, one for TX01, one for CR01.

Hardware specification for each optional accessory

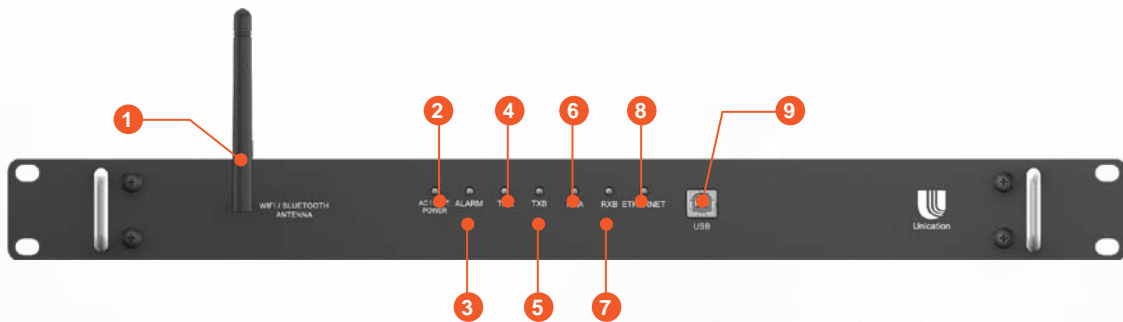
Item	Description	Notes
GPS antenna Roof mount accessories	<p>3rd party GPS antennas with integral LNA housed in a radome.</p> <p>The CR01 unit supplies the necessary DC power to power the antenna LNA.</p> <p>The 3rd party GPS antennas/LNA suitable for external wide temperature range -40 to +85C roof top, complete with mounting kit.</p> <p>Coax cable connection to CR01 using LMR400 coax with Type N connector In order to minimize customer service overhead, only one brand shall be supplied by Unication for roof top and another one for mobile applications.</p>	<p>3rd party antenna vendor qualified by Unication:</p> <p>Roof top antenna: Symmetricom, model 58532A GPS L1 Reference Antenna</p>
GPS Magnetic mount accessory	<p>Magnetic mount GPS antenna with integral LNA housed in a radome.</p> <p>The CR01 unit supplies the necessary DC power to power the antenna LNA.</p> <p>The 3rd party GPS antennas/LNA suitable for external wide temperature range -40 to +85C roof top, complete with mounting kit.</p> <p>Coax cable connection to CR01 using LMR400 coax with Type N connector. Can use thinner RG-58U coax if length is less than 5 meters.</p>	<p>3rd party antenna vendor qualified by Unication:</p> <p>Candidate vendor: Inpaq, GPS03B.</p>
BT Speaker Mic	Unication BT Speaker mic	Use Uni BT speaker mic
Power cord	120/220VAC power cord (customized for each region).	
Battery backup cable	<p>1. gauge wire</p> <p>2. connected directly to battery terminals or distribution bar</p>	
Battery sensor and cable	Battery backup temperature sensor & cable	
Room temperature sensor	Ambient room temperature sensor & cable	

Item	Description	Notes
Hardware specification for each optional accessory		
Earth Quake kit	Kit for cabinet top and bottom kits.	
TX01 rear anchors	Anchors to prevent the TX01 from bending down.	
RX01 rear anchors	Anchors to prevent the CR01 from bending down.	
1:4 Receiver distributor	1. LNA and filter used to supply RX signal for up to 4 CR01 receivers. 2. Designed and manufactured by Unication.	Installed after duplexor.
Time mark cable	Wired used to daisy chain the time mark sign.	Custom cable provide by Unication
Duplexor	1. Low Band 2. VHF 3. UHF 4. 700/800	3rd party, qualified by Unication, tuned to frequency by vendor.
Cabinet	Standard 19" inch wide rack mount cabinet Heights available: 1. 36" 4. 70" 2. 48" 5. 72" 3. 60"	3rd party. Suppliers qualified by Unication in each country.
Duplexor , Combiner and pre-filter cables	N Type Male to N Type Male, 24", LMR400 coax	3rd party. Standard LMR400 specifications
Earth Ground bar	Earth ground metal strip, made of solid copper, vertical orientation, has threaded holes for connecting earth ground cables to repeater boxes, mounted on inside of standard 19" cabinet	Different lengths for each cabinet height.
2:1 Combiner	1. Used to combine two transmitters into one output. 2. Bandwidth, loss and frequency center specified by site design. Pretuned by vendor. 3. Power handling capacity: 100 watts continuous per channel 4. Pretuned by vendor.	3rd party. Suppliers qualified by Unication in each country.
4:1 Combiner	1. Used to combine two transmitters into one output. 2. Bandwidth, loss and frequency center specified by site design. Pretuned by vendor. 3. Power handling capacity: 100 watts continuous per channel 4. Pretuned by vendor.	3rd party. Suppliers qualified by Unication in each country.
GSM radio	3G/4G GSM radio, interface via Ethernet	Monthly service paid by customer. BR01 function is only for alarm and PPS configuration. User voice and data requires MCPE.

Item	Description	Notes
Hardware specification for each optional accessory		
Satellite/Microwave link radio	Iridium satellite radio kit (radio, antenna, coax, power supply), Microwave Link radio Ethernet interface	Monthly service paid by customer. BR01 function is only for alarm and PPS configuration. User voice and data requires MCPE.
4 Wire PSTN Interface	Ethernet to 4 wire interface unit and associated application software in MCPE	Available on MCPE (not BR01)
Internet switch	<ol style="list-style-type: none"> 1. To support networking of multiple BR01's, MCPE, 3G/4G GSM phone, satellite radio, etc. an industrial grade, rack mounted, internet switch is required. In order to minimize customer service overhead, limited number of brands shall be qualified by Unication. 2. Battery backup is necessary and accomplished with a 3rd party UPS 	3rd party. Suppliers qualified by Unication in each country.
Transmitter pre-filter	<ol style="list-style-type: none"> 1. Cavity filter to eliminate transmitter noise. Transmitter noise causes the receiver to de-sense. 2. Bandwidth, loss and frequency center specified by site design. Pre-tuned by vendor. 3. Power handling capacity: 100 watts continuous per channel 4. Pretuned by vendor. 	3rd party. Suppliers qualified by Unication in each country.
Receiver pre-filter	<ol style="list-style-type: none"> 1. Cavity filter to reject nearby high power interferers caused by nearby high power transmitters. 2. Bandwidth, loss and frequency center specified by site design. Pre-tuned by vendor. 3. Power handling capacity: 100 watts continuous per channel 	3rd party. Suppliers qualified by Unication in each country.

B Overview

CR 01

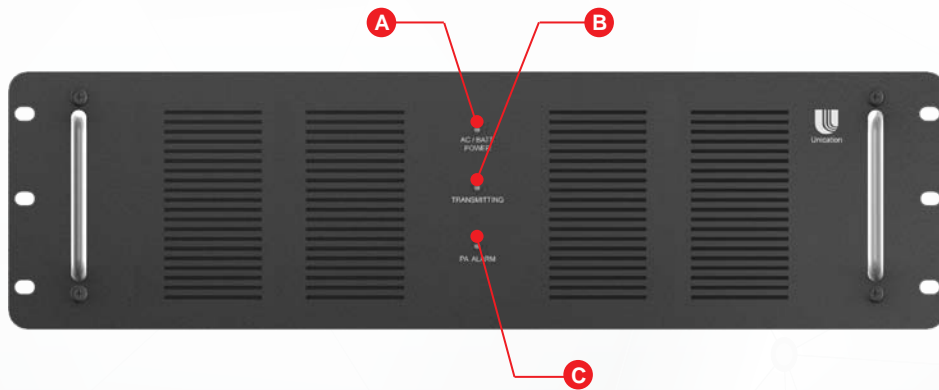


- 1. Bluetooth (Option)
- 2. AC/BAT Power
- 3. ALARM
- 4. TXA
- 5. TXB
- 6. RXA
- 7. RXB
- 8. Ethernet
- 9. USB

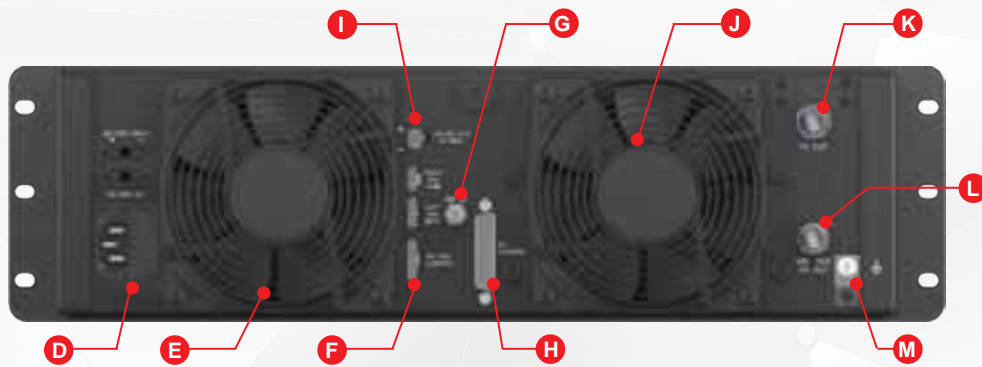


- 10. Ground screw
- 11. CR01 12VDC Power Input
- 12. GPS (Option)
- 13. Reference Out
- 14. Rx Connector
- 15. PA Fan Control
- 16. Accessory Connector
- 17. PA Control
- 18. Ethernet Port A
- 19. Ethernet Port B

TX 01



- A. AC/BAT Power**
- B. Transmitting**
- C. PA Alarm**



- D. AC Input**
- E. Power Supply Fan**
- F. PA Fan Control**
- G. Reference Input**
- H. PA Control**
- I. CR01 12VDC Power**
- J. PA Fan Control**
- K. Tx Connector**
- L. Uni Scr (R&R) Rx Out (Option)**
- M. Ground Screw**

C Installation and Setting

1. Installation

This document briefly describes the cable and coax connections for the standard BR01 Repeater Unit.

PLEASE READ SAFETY INFORMATION IN PART D BEFORE INSTALL THE BR01 REPEATER.

1.1: BR01 front and rear panels

The below image shows the front and rear panel of the BR01 repeater with no cables installed. The BR01 has been designed to be rack mounted into a standard 19 inch wide equipment rack.

Figure 1: BR01 Front Panel

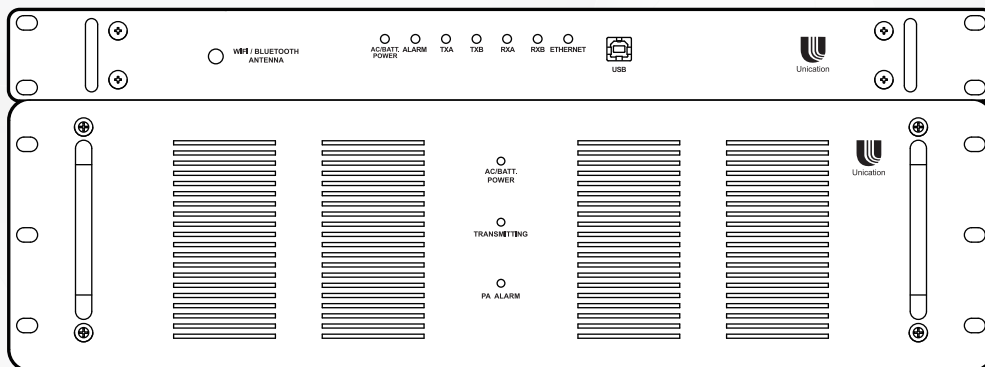
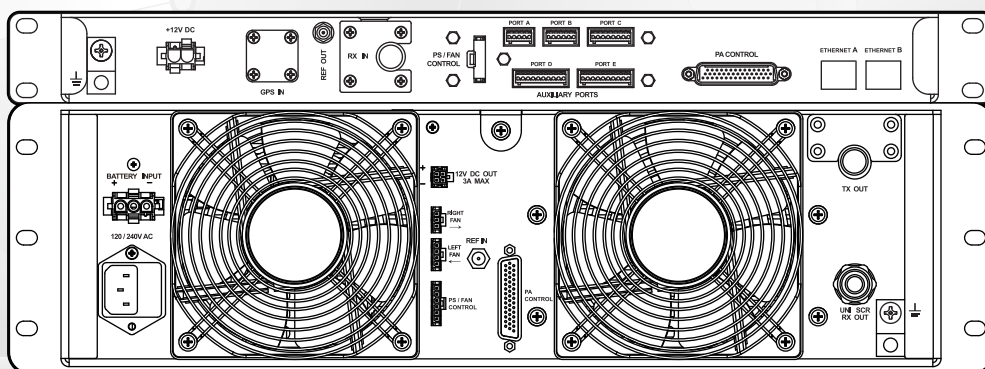


Figure 2: BR01 Rear Panel



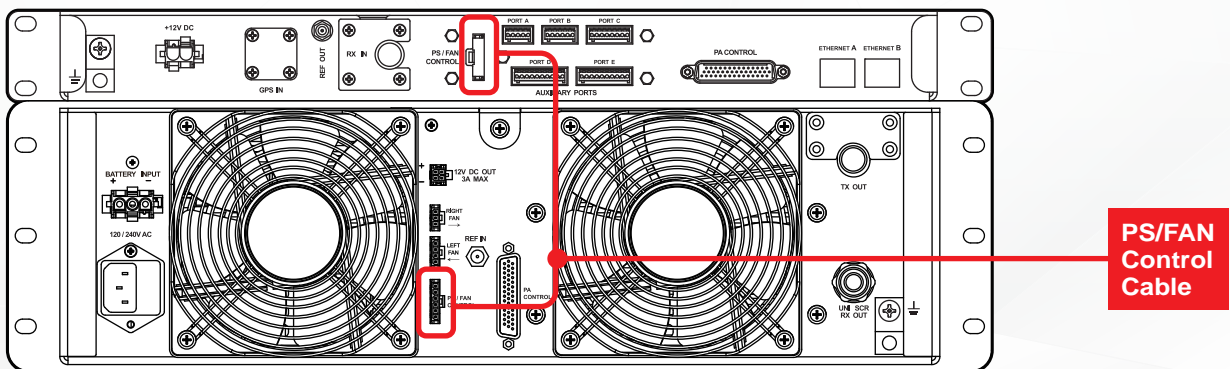
1.2: BR01 Cable and Coax Connections

The following sections document the cable and coaxial connections that are required to be completed for the BR01 repeater to be operational. This includes interconnect, Grounding/Earthing, RF and AC power.

1.2.1: Install the PS/Fan interconnect cable

Connect the PS/Fan cable between the CR01 'PS/Fan Control' to the TX01 'PS/Fan Control' connections.

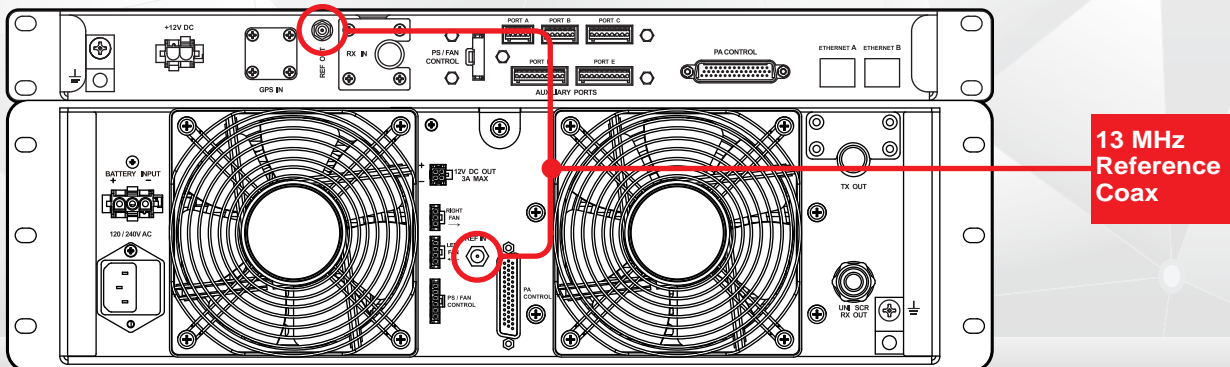
Figure 3: BR01 with PS/FAN Control Cable Installed



1.2.2: Install the 13MHz Reference Coax Cable

Connect the 13MHz reference coax between the CR01 'Ref Out' SMA connector and the TX01 'Ref In' SMA connector. Please remember to use a SMA torque wrench so as not to over tighten the connections.

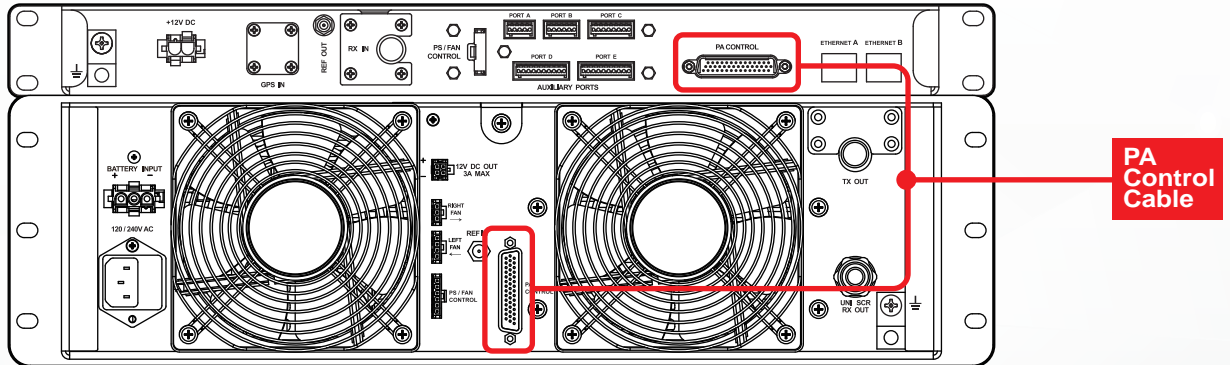
Figure 4: BR01 with Reference Coax Installed



1.2.3: Install the PA Control Cable (DB44)

Connect the PA Control Cable (DB44) between the CR01 'PA Control' and TX01 'PA Control' connections.

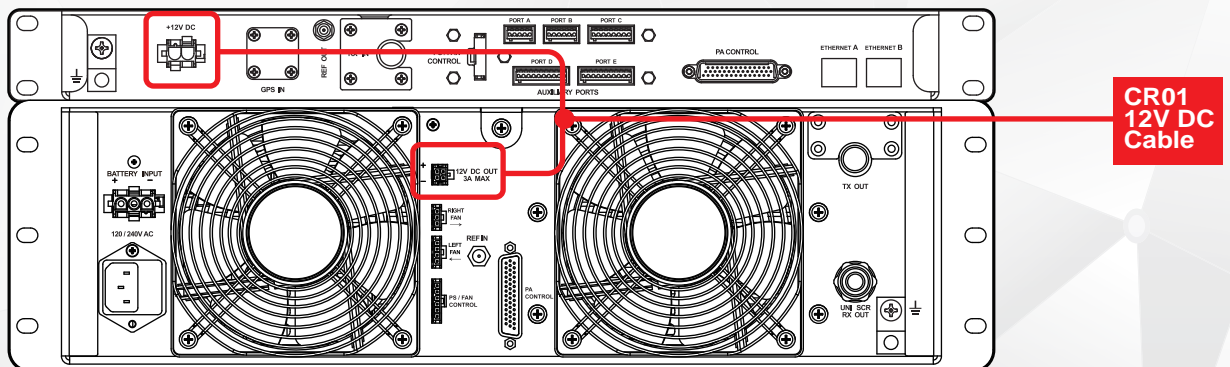
Figure 5: BR01 with PA Control Cable Installed



1.2.4: Install the CR01 12Vdc Power cable

Connect the CR01 12Vdc power cable between the TX01 '12V DC Output' and CR01 '+12V DC' Input connectors

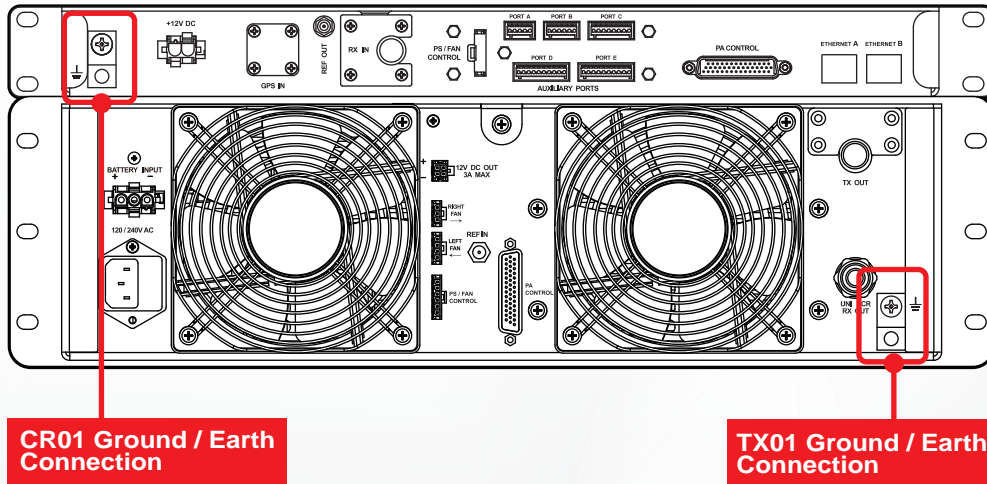
Figure 6: BR01 with CR01 12V DC Power Cable Installed



1.2.5: Install the BR01 Equipment Grounding (Earth)

Install acceptable equipment grounding/earth cables to both the TX01 and CR01 screw terminal connections in accordance with approved equipment grounding standards.

Figure 7: BR01 with two equipment ground connections attached.



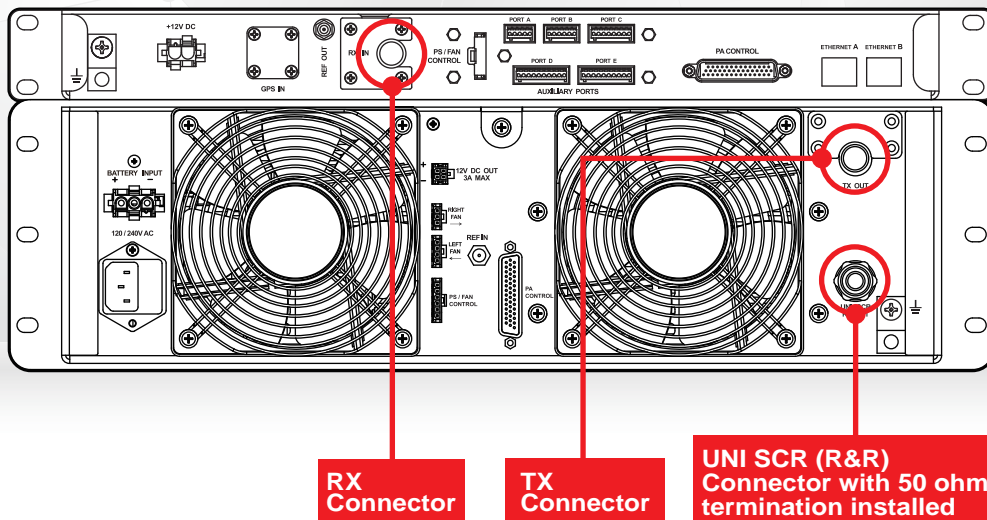
1.2.6: Install RX and TX RF Coax Cables

Connect the receiver antenna coax cable into the CR01 'RX In' N-Type RF connector.

Connect the Transmitter antenna coax cable into the TX01 'TX Out' N-Type RF Connector.

Note: Please make sure the N-type 50 ohm termination is connected to the TX01 'UNI SCR RX Out (R&R)' N-Type RF Connector.

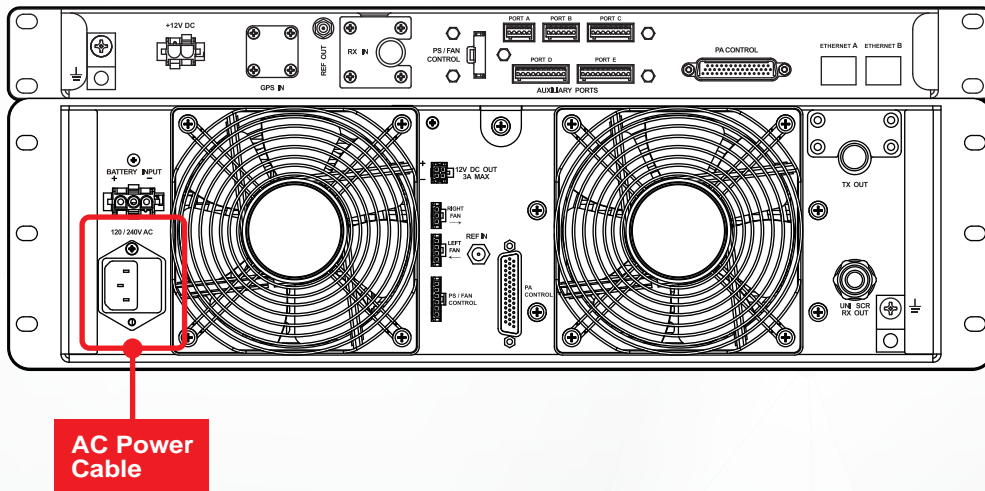
Figure 8: BR01 with RX and TX Coax Cables Installed



1.2.7: Install the AC Power Cable into TX01

Insert AC power cable into the TX01 '120/240V AC' connector.

Figure 9: BR01 AC Power Cable Installed



2. Software Configuration

Please follow steps below to setup the BR01:

Step 1: Power on the CR01 and TX01.

Step 2: Connect the USB cable from the PC with PPS to the front USB port of the CR01.

Step 3: Start the BR01 PPS.



Step 4: Select “Create New Repeater Profile” and “New”.



Step 5: Enter a “Repeater Name” and select “Protocol”. Click “Next”.



Step 6: Enter repeater RX and TX frequencies and click “Next”.



Step 7: Set the “Advanced Settings” if needed and click “Next”.



Step 8: Set the “Access Code Setting” and click “Next”.



Step 9: Enter the “Repeater ID”; set the parameters and click “Save”.



Step 10: Click “Yes” to program the repeater.



Step 11: Click “Connect” to confirm the setting and programming.



D SAFETY INFORMATION

Product Maintenance Philosophy

Due to the high percentage of surface-mount components and multi-layer circuit boards, the maintenance philosophy for this product is one of Field Replaceable Unit (FRU) substitution. The station is comprised of self-contained modules (FRUs) which, when determined to be faulty, may be quickly and easily replaced with a known good module to bring the equipment back to normal operation. The faulty module must then be shipped to the Unication System Support Center for further troubleshooting and repair to the component level.

Scope of Manual

This manual is intended for use by experienced technicians familiar with similar types of equipment. In keeping with the maintenance philosophy of Field Replaceable Units (FRU), this manual contains functional information sufficient to give service personnel an operational understanding of all FRU modules, allowing faulty FRU modules to be identified and replaced with known good FRU replacements.

The information in this manual is current as of the printing date. Changes which occur after the printing date are incorporated by Instruction are added to the manuals as the engineering changes are incorporated into the equipment.

GENERAL SAFETY INFORMATION

The following general safety precautions must be observed during all phases of operation, service, and repair of the equipment described in this manual.

The safety precautions listed below represent warnings of certain dangers of which we are aware. One must follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

General Safety Precautions

- **Read and follow all warning notices and instructions marked on the product or included in this manual before installing, servicing or operating the equipment. Retain these safety instructions for future reference. Also, all applicable safety procedures, such as Occupational Safety and Health Administration (OSHA) requirements, National Electrical Code (NEC) requirements, local code requirements, safe working practices, and good judgment must be used by personnel.**
- **Refer to appropriate section of the product service manual for additional pertinent safety information.**
- **Because of danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modifications of equipment.**
- **Identify maintenance actions that require two people to perform the repair.**

Two people are required when :
A repair has the risk of injury that would require one person to perform first aid or call for emergency support. An example would be work around high voltage sources. A second person may be required to remove power and call for emergency aid if an accident occurs to the first person.

Note: Use the National Institute of Occupational Safety and Health (NIOSH) lifting equation to determine whether one or two person is required when a system component must be removed and replaced in its rack.
- **If troubleshooting the equipment while power is applied, be aware of the live circuits.**
- **DO NOT operate the transmitter of any radio unless all RF connectors are secure and all connectors are properly terminated.**

- **All equipment must be properly grounded in accordance with Unication Standards and Guideline for Radio Sites and specified installation instructions for safe operation.**
- **Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect from overheating, these slots and openings must not be blocked or covered.**
- **Only a qualified technician familiar with similar electronic equipment should service equipment.**
- **Some equipment components can become extremely hot during operation. Turn off all power to the equipment and wait until sufficiently cool before touching.**

FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) the device may not cause harmful interference, and**
- (2) this device must accept any interference received, including interference that may cause undesired operation.**

Note: Unication Co., Ltd is not responsible for any changes or modifications not expressly approved by the party responsible for Compliance. Such modifications could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference 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 reception, 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.**

IC RSS warning

This device complies with Industry Canada licence-exempt RSS standard (s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and**
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.**

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that, the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Human Exposure Compliance

This equipment is designed to generate and radiate radio frequency (RF) energy by means of an external antenna. When terminated into a non-radiating RF load, the base station equipment is certified to comply with Federal Communications Commission (FCC) regulations pertaining to human exposure to RF radiation in accordance with the FCC Rules Part 1 section 1.1310 as published in title 47 code of federal regulations and procedures established in TIA/EIA TSB92, Report On EME Evaluation for RF Cabinet Emissions Under FCC MPE Guidelines. Compliance to FCC regulations of the final installation should be assessed and take into account site specific characteristics such as type and location of antennas, as well as site accessibility of occupational personnel (controlled environment) and the general public (uncontrolled environment). This equipment should only be installed and maintained by trained technicians. Licensees of the FCC using this equipment are responsible for insuring that its installation and operation comply with FCC regulations Part 1 Section 1.1310 as published in title 47 code of federal regulations.

Whether a given installation meets FCC limits for human exposure to radio frequency radiation may depend not only on this equipment but also on whether the environments being assessed are being affected by radio frequency fields from other equipment, the effects of which may add to the level of exposure. Accordingly the overall exposure may be affected by radio frequency generating facilities that exist at the time the licensee's equipment is being installed or even by equipment installed later. Therefore, the effects of any such facilities must be considered in site selection and in determining whether a particular installation meets the FCC requirements.

Determining the compliance of transmitter sites of various complexities may be accomplished by means of computational methods. For more complex sites direct measurement of the power density may be more expedient. Additional information on the topic of electromagnetic exposure is contained in the Unication Standards and Guideline for Communications Sites publication.

Persons responsible for installation of this equipment are urged to consult the listed reference material to assist in determining whether a given installation complies with the applicable limits.

In general the following guidelines should be observed when working in or around radio transmitter sites :

- All personnel should have electromagnetic energy awareness training
- All personnel entering the site must be authorized
- Obey all posted signs
- Assume all antennas are active
- Before working on antennas, notify owners and disable appropriate transmitters
- Maintain minimum 5.89 meter (19.3 feet) clearance from all antennas
- Do not stop in front of antennas
- Use personal RF monitors while working near antennas
- Never operate transmitters without shields during normal operation
- Do not operate base station antennas in equipment rooms

For installations outside of the U.S., consult with the applicable governing body and standards for RF energy human exposure requirements and take the necessary steps for compliance with local regulations.

Conformité concernant l'exposition de l'homme

Cet équipement est conçu pour générer et émettre l'énergie de la radiofréquence (RF) au moyen d'une antenne extérieure. Après s'être terminé à un charge de RF non-émettant, l'équipement de la station de base est certifié qu'il se conforme aux règlements de la Commission de Communication Fédérale (FCC) appartenant à l'exposition de l'homme aux radiations de RF, conformément à l'article 1.1310 de la première partie des règles FCC publiés dans le titre 47 du code des règlements fédéraux ainsi que les procédures établies dans TIA/EIA TSB92, le Rapport d'EME Évaluation pour Émissions de Cabinets de RF Sous Indications FCC MPE. La conformité aux règlements FCC de l'installation finale doit être estimée, tenant compte des caractéristiques spécifique du site comme le type et la localisation des antennes, ainsi que l'accessibilité du site du personnel du travail (environnement contrôlé) et le public général (environnement incontrôlé). Cet équipement doit seulement être installé et maintenu par des techniciens entraînés. Détenteur d'autorisation de FCC qui utilise cet équipement est responsable d'assurer que son installation et opération se conforment à l'article 1.1310 de la première partie des règles FCC publiés dans le titre 47 du code des règlements fédéraux.

Qu'une installation donnée satisfasse ou non les limites de FCC pour l'exposition de l'homme à la radiation de radiofréquence dépendrait non seulement de cet équipement, mais aussi des environnements déjà estimés influencés ou non par des champs de radiofréquence d'autres équipements. Les effets de ces autres équipements augmenterait le niveau d'exposition. En conséquence, l'exposition totale serait influencée par des installations générant la radiofréquence qui existent au moment où l'équipement du détenteur d'autorisation est en train d'être installé ou même par des équipements installés plus tard. Par conséquent, les effets de toutes ces telles installations doivent être considérés pour la sélection du site et pour déterminer si une installation particulière se conforme aux exigences de FCC.

l'homme à la radiation de RF. La détermination de la conformité des sites d'émetteurs des complexités variées serait accomplie au moyen des méthodes sur ordinateur. Pour des sites plus complexes, le mesurage direct de la densité de pouvoir serait plus opportun. Des informations supplémentaires au sujet de l'exposition électromagnétique sont contenues dans le Standard Unication ainsi que les Indications pour la publication des Sites de Communications. On conseille vivement aux personnes responsables de l'installation de cet équipement de consulter le matériel de référence en liste pour déterminer si une installation donnée se conforme aux limites en application.

En général, les indications ci-dessous doivent être observées pendant le travail dans ou près des sites d'émetteur de radio :

- **Tout le personnel doit être formé à la connaissance de l'énergie électromagnétique**
- **Tout le personnel entrant dans le site doit être autorisé**
- **Respecter toutes les marques affichées**
- **Assumer que toutes les antennes sont actives**
- **Avant travailler sur les antennes, notifier les propriétaires et immobiliser les émetteurs appropriés**
- **Garder au minimum 5.89 mètres (19.3 pieds) d'espace de toutes les antennes**
- **Ne pas s'arrêter devant les antennes**
- **Utiliser les moniteurs de RF personnels pendant le travail près des antennes**
- **Jamais opérer les émetteurs sans protection pendant l'opération normale**
- **Ne pas opérer les antennes de la station de base dans les cabinets d'équipement**

Pour l'installation hors des Etats-Unis, consulter l'établissement administratif en vigueur ainsi que les standards pour les exigences de l'exposition de l'homme à l'énergie RF, et prendre des mesures pour se conformer aux règlements locaux.

References

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<http://www.foc.gov/loet/rtasadetyl> .
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4. IEEE Recommended Practice for the Measure of Potentially Hazadous Electromagnetic Fields- RF and Micro- wave, IEEE Std C95.3-1991, Publication Sales, 445 Hoes Lane, PO, Box 1331, Piscataway, NJ 08855- 1331
5. IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, IEEE C95.1-1991, Publication Sales, 445Hoes Lane, PO Box 1331, Piscataway, NJ 08855-1331



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