BSR100N™

VHF Base-Station Radio Transceiver

Installation Manual

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BSR100N™ General Description

The BSR100N™ VHF transceiver operates as a two-way base-station radio in half duplex mode at remote central stations and repeaters. It is modulated by an MFSK signal.

Functions:

- **Receives and transmits:**
  - MFSK (frequency shift keying) modulated signals
  - FM Frequency Modulation
- **Performs receiving and transmitting**
- **Synthesized frequency**
- **RSSI output**
- **Measurement analog output**
- **Status indication LED's**
- **Channel monitor control**
- **PTT control**

BSR100N™ has five sets of connectors: **J1**, **J6**, **J3**, **J4**, **J5** *(see Figure 1).*

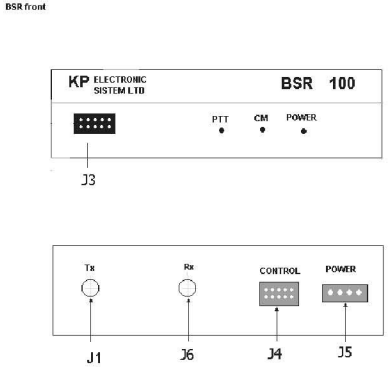

Figure 1: BSR100N™ Connectors

- **J1: BNC connector connects an Rx\Tx VHF antenna**
- **J6: BNC optional connector connects an Rx VHF antenna**
- **J5: 12.5 VDC power supply**

- **J3: A 10-pin contact connector connects the following:**

Connector	Pin
+VB	1
GND	2, 10
RS232 RX	3
RS232 TX	4
PTT1	5
VCC	6
WP	7
PSEN	8
RST	9
GND	10

**See Table 1: Self-Test LEDs*

- **J4: A D-type 15-pin rear panel connector connects the following:**

Connector	Pin
PTT	1
NC	2
RS232 RX	3
RS232 TX	4
GND	5, 6, 10, 13, 15
RSSI	7
AUDIO IN	8
CM	9
RSSI TO METER	11
RSSI TO AI	12
AUDIO OUT	14

Preparing for Operation

The BSR100N is not a standalone unit, this device always combined in to products like the SMR, EXR or DTRCI. While installing the BSR100N™, perform the following steps:

a. Connecting Assembly Cables

1. Connect one end of the coax cable to J1, the Rx/Tx BNC connector or J6, the Optional RX connector.
2. Connect the other end of the coax cable according to its application wiring diagram.
3. Connect the DC plug to the J5 DC Power Connector:
4. Connect one end of the data cable to J4, the D-type 15-pin rear panel connector.
5. Connect the other end of the cable, according to its application wiring diagram.

b. Setting Communication Parameters

(See BSR100N™ Programming Guide.)

c. Self Test

1. Connect the 12.5 VDC power supply to the DC current wires.
2. Observe the Self-Test LEDs *(see Figure 2).*

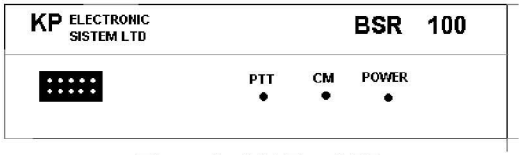

Figure 2: Self-Test LEDs

Table 1: Self-Test LEDs

LED Indicator	Status
LED PTT	
ON (red)	Tx mode
OFF	Rx mode
2 Flashes 5V –sense (Tx Mode)	
3 Flashes Vr sense	Rx mode
1 Flash	Time out timer
4 Flashes	Lock Detect
4 Flashes	Vv-Sen. , Vs_Sen.
Power LED	
Green / Red Fuse FU1Fail* (TX mode only)	
CM LED	
Green	Free
Red	Carrier Detected
Flashes red/-green	RF/IF Amplifiers
ALL LEDs	If all LEDs are flashing it's means that there is PTT FAILURE at transmitter start

In addition to the signals in Table 1, there is an error-status word in the GUP5000™ Utility Program.

BSR100N™ Programming Guide

Using KP's GUP5000™ Utility Program, the BSR100N™ parameter values listed below can be programmed or modified. An RSINT001 adapter connects between BSR100 and a PC *(see Figure 3)*.

- Transmit frequency (MHz)
- Receiver frequency (MHz)
- TX time out (0-240 sec.)

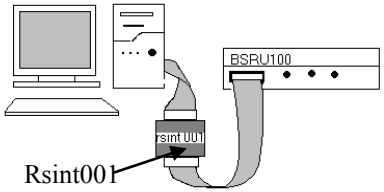

Figure 3: BSR100N™ PC Connection Configuration

Operating Instructions

- Connecting BSR100N™ to GUP5000™ (utility program)
- Loading Parameter Values
- Changing Parameter Values
- Updating Parameter Value Changes
- Confirming Parameter Value Changes
- Activating Self Test

Connecting BSR100N™ to GUP5000™

1. Connect BSR100N™ to a PC using the RSINT001 adapter *(see Figure 3)*.
2. Click **Start➢Programs➢ KP Utilities➢GUP5000**.

   *The **GUP5000** main screen displays, showing the device type, version, Status device diagnostic, and parameters.*

   See Example in figure 4.

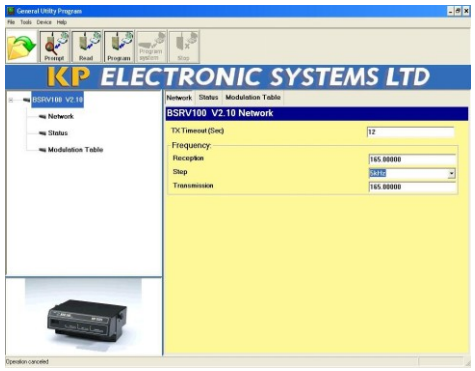

Figure 4: Gup5000™ Main Screen

Loading Parameter Values

Parameter values must be loaded after connecting the GUP5000™ utility software.

To Load Parameter Values

1. From the GUP5000 main screen, click **Prompt ?** (Alt P).
2. Click Read (Alt R). The name of the device type, version, and suitable parameters are displayed.

Changing Parameter Values

Parameter values can be changed, as required:

- Type the new parameter value in the designated parameter text box.

Updating Parameter Value Changes

1. Click **Send** (Alt S).
   The **Send Warning** dialog box displays **"Are you sure?"**
2. Choose one:

- Click **Yes**, to update parameter changes.

OR

- Click **No**, to return to the GUP5000 main screen without updating changes.

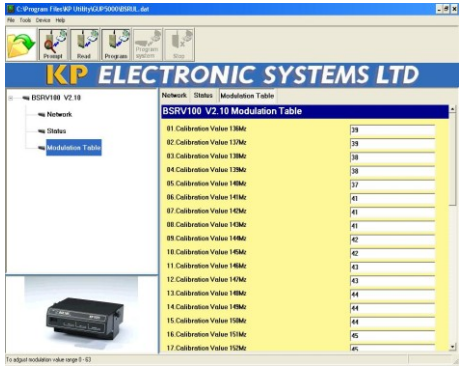

Figure 5: Gup5000™ Modulation Table

Confirming Parameter Changes

Ensure that any parameter value changes made are updated.

To Confirm Parameter Changes

From the GUP5000 main screen, click **Read** (Alt R).
The GUP5000 main screen displays the updated parameter values.

Performing SELF TEST

After parameter values are loaded, Perform SELF TEST:

1. Disconnect BSR100N™ from the PC
2. Press the Self- Test button.
3. Observe the Self-Test Led.

(*Refer to Table 2 for SELF-TEST results.)*

On-Screen HELP

To view a brief explanation of any BSR100N™ parameter, click the required parameter text box. The cursor will appear in the designated text box, and the valid parameter range, with a brief explanation, displays at the bottom of the screen.

Technical Specification

General	
Band	VHF
Frequency Range	136-174 MHz
Channel Spacing	12.5 KHz
Programming	Fully PC programming
FCC rules and reg. under	Part 15.109 Subpart (B) radiated spurious emissions. Part 90
Operating Voltage	10-15 VDC
Diagnostics	Tx/Rx mod, Tx timer, power trouble, LD, Low Bat, Ovrl., CM, RSSI
Receiver	
Sensitivity analogy	-116dBm @ 12 dB SINAD
MDS sensitivity	-119dBm
Adj. Ch. Selectivity	60 dB for 12.5 KHz
Intermodulation response	>60dB
Spurious and image rejection	70dB
Audio out signal	250 mV p-p
RX current consumption	120ma
Transmitter	
Nominal output power	10w
Spurious/Harmonics requirements	Power 50+10log (Pout)= 60dB or 70 dB whichever is less
Deviation for input audio signal	2.2 kHz, (0.7V p-p 1kHz signal)
Frequency stability at operating temp. range	±2.5 ppm @ -30ºC to 60ºC
Tx Current consumption max	2.8A+-10%
Physical dimension	
Size	169x150x44 mm (6.6"x5.9"x1.7)
Weight	0.65 Kg (1.44 Lbs)

RF Exposure Requirements

General information:

Device category: Fixed per description in Part 2.1091
Environment: Uncontrolled Exposure

Fixed devices that operate under Part 90 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use.

Antenna:

The transceiver is designed to be installed only in sites where the antenna installation sites are outdoor fixed mounted locations. The manufacturer does not specify an antenna, but in fix mounted antenna sites they typically have gains to 3 dBi.

This device has provisions for operation only as a fixed mounted device, or a fixed location.

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Fixed	Any	omni	3

Operating configuration and exposure conditions:

The base stations conducted output power is 10 Watts. In base station operation the duty cycle can reach near 100 %. The manufacturer also markets this device only for occupation use. But, some installations may not control exposure other than separation distance.

- A typical fixed installation consists of an antenna system with a coaxial cable of the type RG-213U which has a loss of 1 dB for a length of 50 feet at VHF frequencies.

MPE Calculation:

The minimum separation distance is calculated as follows:

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power density: } P_d(mW/cm^2) = \frac{E^2}{3770}$$

The limit for uncontrolled exposure environment below 300 MHz is f in 0.2 = mW/cm^2.

Frequency: 150- 174 MHz
The conducted power output is 10 Watts.
The coax loss was taken as 1.0 dB.
Antenna gain was taken as 3 dBi
100% Duty Factor
Power Density = S= 0.2 mW/cm^2

$W := 10$ power in Watts

$D := 1$ Duty Factor in decimal % (1=100%)

1 for FM
0.6 for SSB

$E := 30$ exposure time in minutes

$U := 30$ (use 6 for controlled and 30 for uncontrolled

$Wexp := W \cdot D \cdot \left(\frac{E}{U}\right)$

$PC := \left(\frac{E}{U}\right) \cdot 100$

$Wexp = 10$ Watts

$PC = 100$ % on time

$Po := 10000$ mWatts

$dBd := 0.85$ antenna gain in dBd

$G1 := dBd + 2.15$ gain in dBi

$G1 = 3$ dBi

$CL := 1.0$ dB coax loss

$G := G1 - CL$

$Gn := 10^{\frac{G}{10}}$ gain numeric

$Gn = 1.585$

$R := \sqrt{\frac{(Po \cdot Gn)}{4 \cdot \pi \cdot S}}$

$R = 79.411$ distance in centimeters required for compliance

$f := 300$ Frequency in MHz

$S := \frac{f}{1500}$ power density limit for uncontrolled exposure

$S = 0.2 \quad \frac{mW}{cm^2}$

General population
S is 1 between 1500 and 100k MHz
S is f/1500 for 300 to 1500 MHz
S is 0.2 between 30 and 300 MHz

Occupational
S is 1 between 30 and 300 MHz
S is f/300 between 300 and 1500 MHz
S is 5 between 1500 and 100k MHz
(See 47 CFR 1.1310)

$inches := \frac{R}{2.54}$

$inches = 31.264$

$ft := \frac{inches}{12}$

$ft = 2.605$

Conclusion:

For a transmitter operating with the above criteria the separation distance should be no less than 80 cm or 2.6 ft between the antenna, including any radiating structure, and any persons when normally operated. Other operating conditions should follow a procedure like that shown above and following the guidelines such as those in FCC document OET-65.