

2.1 The basic testing, adjustment and maintenance procedures

This document outlines the basic testing, adjustment and maintenance procedures required for initialization BSRU100D wireless radio modem in manufacture condition.

2.2 Equipment Requirement

- 12.5VDC (nominal) 5A regulated power supply's
- Radio Service Monitor (IFR COM-120A or equivalent)
- Digital oscilloscope
- RF Signal generator
- Spectrum analyzer
- Sinadder
- Multimeter
- The BSR100D external repair adapter
- Assembly cables
- RF attenuators kit.
- T-96SR digital modem module
- 486 PC or better (with two RS-232 port COM)
- T-96SR Radio Service Software
- BSRU100 GUP10 Software
- Normal radio shop tools.

2.3 BSRU100D Testing

2.3.1 GENERAL

This section of the instruction is intended for testing, adjustment and maintenance BSRU100D modem procedures in manufacture conditions.

Only the qualified personnel given examination and past training can be admitted to performance of works specified in this instruction.

The deviation from the given instruction can result in damage of the verifying equipment and to infringement of a BSRU100D function.

2.3.2 Basic testing maintenance and adjustments

- 1.The BSRU100D preparing for the first voltage power feeding.
- 2.Tx mode transmitter alignment procedure.
- 3.Rx mode receiver alignment procedure
- 4.Tx mode modem alignment procedure
- 5.Rx mode modem alignment procedure
- 6.Final Tx/Rx BSRU100D modem testing
- 7.The modem results testing form completion.

2.3.2.1 The BSRU100D preparing for the first voltage power feeding.

- Connect the measuring and auxiliary equipment for the Tx mode BSRU100 transceiver alignment procedure in accordance with the manufacture testing setup diagram.
- Prepare the BSRU100D transceiver for the first voltage power feeding, as follows:
 - a) Visually inspect the PS and CS sides of the BSRU100D board to eliminate short circuits, breaks, and other defects.
- Power ON the 12.95 VDC power supply, as follows:
 - a) Check the current consumption of the BSRU100D transceiver.
It must be near 80 mA DC.
 - b) Power OFF the 12.5 VDC power supply.
 - c) Insert the micro-controller chip in its circuit.
 - d) Power ON the 12.95 VDC power supply.
 - e) Check the following:
 1. Current consumption of the BSR100D transceiver (it must be 140mA).
 2. Self-test LEDs diagnostic.
 - g) Power OFF the 12.95 VDC power supply.

2.3.2.1 The Tx mode transmitter alignment procedure:

- a) Connect the plug of the T96SR module to the BSRU100D on board connector.

- b) Power ON the 12.5 VDC power supply.
- c) Check the following:
- Current consumption of the BSRU100D transceiver must be 180mA. +/- 10%
 - Self-test T-96SR module LEDs diagnostic.
- d) Using the modem setup cable, connect the T-96SR to PC
***Do not use this cable to connect a user application**
The green modem's LED flashes to indicate the unit in setup mode.
- e) By PC T96SR Lab Setup Software program to write necessary parameters to T-96SR module.
- f) Using the radio setup cable, connect the BSR100D to PC and by Use the Gup10 utility program to write the Rx/Tx frequency of the BSR100D transceiver to middle frequency band.
- g) Connect the measuring and auxiliary equipment for the Tx mode BSR100D transceiver alignment procedure in accordance with manufacture Tx mode testing setup diagram.
- h) Screw on cooling radiator to output power transistors
- l) Power ON the 12.95V DC power supply.
- i) Short for 10 sec. and release the self-test external PTT button.
- k) Check DC voltage +2.5V +/- .01V (fulfill a requirement i.) on Tp VC by DVM and adjust it by P3 potentiometer.
- l) Measure the output power of the BSR100D transceiver. Maximum power reading 10W+15/-10%. *(See m.)
- m) Adjust trimmer capacitor C168 to receive equal output power on the low and high frequency's of a working band. Nominal power reading is 10W+15/-10%.
- n) Check Tx mode current consumption. Current should be 2.6A ±5% on the middle frequency of the working band and ±15 %, accordingly on the low and high frequency's of a working band.
- o) Using the modem PC DATA cable, connect the BSRU100D Data port to COM PC
- p) By PC SIMPTERMINAL Software program (previously having determined all COM ports parameters) send RTS (PTT) command to BSR100D.
- r) Check DC voltage +2.5V +/- .01V on Tp VC by DVM and adjust it by P3 potentiometer.
- s) Adjust by P2 for the desired modulation, 2.2 kHz +/-10% carrier deviation

t) Check the synthesizer output frequency (fulfill a requirement r.). It should be ± 0.1 ppm. Using a trimmer capacitor on the body of the VCTCXO-5DSL, adjust the synthesizer output frequency.

u) Check the spurious/harmonics, requirements: Power $50 + 10 \log(P_{out})$ or 70 dB, whichever is less.

v) Observe by digital oscilloscope the audio signal on "DEMODO OUT" IFR COM-120A CON. It must be look enough clear and do not have a pattern sensitivity effect, in case of need if ,necessary repeat § r,s and t.

w) Power OFF the 12.95 VDC power supply.

1.3.2.2 Rx mode receiver alignment procedure

a) Power ON the 12.95 VDC power supply.

b) Using the radio setup cable, connect the BSRU100D to PC and by Use the Gup10 utility program to write the Rx frequency of the BSRU100D transceiver to the middle frequency band.

c) Power OFF the 12.95 VDC power supply.

d) Connect the measuring and auxiliary equipment for the Rx mode BSRU100D transceiver alignment procedure in accordance with manufacture Rx mode testing setup diagram and execute (a).

e) Set the IFR COM 120A RF generator output to frequency that was written in b), to signal level -80 dBm with 2.2 kHz-frequency deviation and internal sine wave modulation 1kHz.

f) Observe by digital oscilloscope and sinadder audio signal DATA OUT on he BSRU100D external repair adapter.

g) Adjust trimmer capacitors C56, C57 and L41 tunable RF discriminator and try to get audio **sine** wave 1 kHz distortion 3 %. $\pm 1.5\%$

h) Set the RF generator output to signal level -117 dBm with 2.2 kHz-frequency deviation and internal **sine** wave modulation 1 kHz.

i) If necessary, adjust trimmer capacitors C56, C57 and L41 until that sensitivity run up < -117 dBm (12 dB SINAD)

j) Repeat § e, f, g so long as it necessary to obtain audio sine wave 1 kHz distortion 3 % $\pm 1.5\%$ at signal level -80 dBm and sensitivity < -117 dBm (12 dB SINAD).

k) Set the RF generator output to signal level -80 dBm with 2.2 kHz-frequency deviation and internal **square** wave modulation 1kHz.

l) Observe by digital oscilloscope square wave audio signal DATA OUT. If necessary, adjust trimmer capacitors C56, C57 and L41 until that square wave will have enough steep slope front and rear with minimum roof ripple.

m) Repeat § e, f, g, h, i, j.

n) The modem PC DATA cable connect to the BSRU100D Data port (DCE1) and to COM PC (DTE1).

o) Audio in signal from T-96SR module connect up to RF signal generator to “CON MOD INP/OUT” (DCE2) and set the external AC signal for the RF frequency FM modulation level 2.2kHz . RF signal generator set to amplitude level -113 dBm.

p) PC “SIMPTEMINAL” Software program (previously having determined all COM ports parameters) ON for the DTE1 and DTE2.

From DTE2 PC by “SIMPTEMINAL” Software program send massive data file by DCE2 to DCE1,DTE1

q) Adjust red/green light CM. LED response with help of the P2 potentiometer by RF generator output level variation from -113 dBm to -114 dBm.

r) Observe on DTE1 PC display receive digital massive file on -108 dBm (0.89μV) RF signal level. It must be clear and have not noisy characters.

BER must be better than $1 \cdot 10^{-6}$ (-107dBm) at 1μV at 9600 b/s half channel

s) Power OFF the 12.95 VDC power supply.

t) Assemble all mechanical parts and power ON the 12.95 VDC power supply.

u) Repeat § n, p, q, r and execute § s.

1.3.2.3 Final Tx/Rx BSRU100D modem testing

a) Assemble testing equipment for the Final Tx/Rx BSRU100D modem testing accordance with manufacture Rx mode testing setup diagram.

b) To install “RF modem tester” Software program (previously having determined all COM ports and other parameters) for the DTE1 and DTE2.

From DTE2 PC by “RF modem tester” Software program send testimage.jpg file by DCE2 to DCE1, DTE1

The testimage.jpg file must be received without video distortion on DTE1.

c) From DTE1 PC by “RF modem tester” Software program send testimage.jpg file by DCE1 to DCE2, DTE2.

The testimage.jpg file must be received without video distortion on DTE2.

2.3.3 The modem final testing results form completion.

On the ending 2.3.2.1 ... 2.3.2.4 to fill in the form given below

BSRU100D

Final testing results form

BSRU100D
V1.0

Serial #Ä...
Cust. name:
Order mber:

Micro 11 OS2ms

Tx mode						
#	Electrical test	Result			Notes	
1.0	The Tx V and I Consumption	U DC (V)		I load on (A)		DC Power Supply
		12.95				
1.1	The output power Pout	F low	F middle	F high		IFR COM-120A
		MHz				
		Watt				
1.2	Spurious harmonics max K (dBc)					Spectrum analyzer
1.3	Modulation level (KHz)					IFR COM-120A
1.4	The transm. freq (MHz)					GUP10 IFR COM-120A
	Pout					
	Tx frequency error ΔF(KHz)					
	Modulation level (KHz)					
Rx mode						
2.0	The Rx mode V and I Consumption	U DC (V)		I (mA)		DC Power Supply
		12.95				
2.1	Receiver sensitivity (12db sinadd)	Flow	F middle	F high		RF Signal Generator, 1kHz sine internal sig.
		MHz				
		(dBm)				
	Audio distortion	%				
2.2	Receiver input level sensitivity -108dBm pattern +/-					RF Signal Generator, Ext.modul. signal (digital massive)
2.3	The receiver working frequency FTX (MHz)					GUP10
2.4	Channel monitor K dBm	ON		OFF		RF Signal Generator, Ext.modul. Signal (digital massive)
3.0 Final Tx/Rx BSRU100D modem testing						
3.1	DTE1 to DTE2 Transfer testimage.jpg file		+/-			BSR100D (DCE1) BSR100D (DCE2)
3.2	DTE2 to DTE1 Transfer testimage.jpg file		+/-			

Engineer:

Date :

