
TSN04001 - Technical Support Notice – Communicating with BR20 via Trio K-Series



Figure 1: Accutech BR20 Base Radio

Introduction:

The Accutech BR20 base station radio has a Modbus data port, allowing an external Modbus Master to poll information from the base radio about its own status and the status and process values of its associated field units. It also has a diagnostics port, allowing the connection of the Accutech Manager software for sensor configuration and diagnostics. Both of these data streams can be sent simultaneously through a Trio K-Series (serial) radio network.

This document describes the suggested system configuration for a BR20 equipped with an integrated Trio K-Series data radio. Please note that directions contained in this document can also be applied to the BR10 base radio, however its connectors differ from the BR20 and requires an external K-Series radio.

Accutech Configuration:

The BR20 contains an Accutech base radio and optionally a Trio K-Series radio. This section discusses the configuration of the Accutech equipment.

- The Accutech base radio and all field units use identical RF Channel and Baud Rate. In this system, RF Channel is set to 3 and Baud Rate to 19.2 kbps, but any available choice is acceptable.
- Each field unit's RF ID is set to a unique value. Note this value as it is used later for Modbus polling of the data.
- The base radio's Hi RFID value is set to match the number of field units expected in the system.
- The base radio's Modbus serial port baud rate is set to 19.2 kbps. This data rate is also set in the K-Series radio during that part of the process.
- The base radio's Device ID is set to 1. Note this value as it is required later for Modbus polling of the system.

Trio K-Series Configuration:

The BR20 used in this exercise contains both an Accutech base radio and a Trio K-Series radio. This section discusses the configuration of the Trio radio system.

The K-Series radio in the BR20 is configured as a Remote type. A second radio is required and configured as the system Master. This document discusses key configuration parameters. Other parameters may be set as required by the user, or left at their defaults.

Remote radio configuration:

- The K-Series radio in the BR20 is configured using a programming cable (Schneider Electric part number TBUM297217). Connect it to the Long Haul Diag port (P2) and a PC running the TView+ K-Series Configuration Programmer.
- Set the serial port as required then click the Read button to begin a programming session.
- Port A is used for Modbus data. Set Port A to a Custom value of 19200 N81 (as set earlier in the Accutech base radio) with a Packet Layer of Modbus, and with Handshaking set to None.
- Port B is be used for diagnostics data. The Accutech Manager software uses a data rate of 38400 bps. Enable port B then set it to a Custom value of 38400 N81. Packet layer may remain at Standard, and set Handshaking to None.
- Set the Radio Type to Remote in the BR20. This disables certain configuration choices.
- Set Tx PWR Ant 1 to 10 dBm if running a bench test, or 30 dBm if installing in the field.
- Set the Radio Data Rate as required, considering that a higher data rate reduces receiver signal strength. **At least 64 kbps** is recommended to handle the heavy traffic generated by both diagnostic data and Modbus polling.
- Set the SubNet ID (Network Name) to any phrase 20 characters or less. E.g. use "Accutech".
- In Stream Setup ensure that Port A is set to Rx SID and Tx SID of 3, and Port B to 5 & 5.
- Save the radio configuration file, and then click Write to configure the radio.

Master radio configuration:



Trio KR900



Trio KP900



Trio KB900

Several choices of radio are available. A KR900 was used in this exercise, though a KP900 or KB900 may also be used. A programming cable (Schneider Electric part number TBUM297816) is used with the KR900, or a TBUM297217 cable with the KP900 or KB900.

- Connect the programming cable to the Master radio's System / Diag port and to a pc running the TView+ K-Series Configuration Programmer.
- Set the serial port as required then click the Read button to begin a programming session.
- Port A is used for Modbus data. Set Port A to a Custom value of 19200 N81 (as set earlier in the Accutech base radio) with a Packet Layer of Modbus, and with Handshaking set to None.
- Port B is used for diagnostics data. The Accutech Manager software uses a data rate of 38400 bps. Enable port B then set it to a Custom value of 38400 N81. Packet layer may remain at Standard, and set Handshaking to None.
- Set the Radio Type to Master. This enables configuration choices not available in a Remote.
- Set Tx PWR Ant 1 to 10 dBm if running a bench test, or 30 dBm if installing in the field.
- Set the Radio Data Rate as required, considering that a higher data rate reduces receiver signal strength. **At least 64 kbps** is recommended to handle the heavy traffic generated by both diagnostic data and Modbus polling. Ensure it is set the same as in the Remote radio.
- Set the Network Type to Point to Multipoint. This is commonly used for SCADA systems.
- Set the SubNet ID (Network Name) to any phrase 20 characters or less. E.g. use "Accutech" Ensure this is set the same as in the Remote radio.
- There are several optional configuration choices in the Advanced Setup area. The defaults work for this exercise, although they may need to be changed for a field installation.
- In Stream Setup ensure that Port A is set to Rx SID and Tx SID of 3, and Port B to 5 & 5.
- Save the radio configuration file, and then click Write to configure the radio.
- Ensure the Remote radio's Sync/NoRx LED (on the BR20) is flashing green, indicating that it has synchronised with the Master radio.

Serial Port Cabling:

A total of four serial cables are required to complete this exercise. One pair of cables is used for the Modbus field unit data and the other pair for the Accutech Manager diagnostics data.

- The base radio is connected to the K-Series (long haul) radio to allow polling of Modbus data. A 3-wire null modem cable with RJ45 connectors on both ends is required and is included with the BR20. The Short Haul Data port (P6) is connected to Long Haul Port A. (P4)

- The base radio's Short Haul Diag port is connected to the K-Series radio's Port B to send diagnostics data. A second 3-wire null modem cable (same type as used above) is required. Connect the Short Haul Diag port (P3) to Long Haul Port B. (P5)
- The Master radio's Port A is connected to the pc running the Modbus master. On a KR900 this requires a TBUM297824 modem cable. (3-wire RJ45-DE9F); a KP900 or KB900 requires a TBUM297217 3-wire null modem cable.
- The Master radio's Port B is connected to the pc running the Accutech Manager software. On a KR900 this requires a standard DE9M-DE9F modem cable; a KP900 requires a TBUM297488 cable; a KB900 requires a TBUM297217 cable.

Modbus Data Polling:

The Accutech BR20 has a large number of Modbus holding registers which may be polled. Refer to the Modbus Communications section of the Wireless Base Radios user manual for a complete list of registers. These registers include such items as BR20 Device Status and Number of Field Units Communicating.

By reading from offset Modbus addresses (if in Device ID Mapping mode) it is also possible to read the status and process values of each of the wireless sensors reporting to the base radio. The BR20's Device ID was set to 001, and the first field unit's RF ID was set to 001. Simply add the BR20 Device ID value to the desired field unit's RF ID value and use the resulting value as the Modbus slave address. (2 in this example)

For this exercise a simple Modbus Master simulator package was used. (Mdbus) However any Modbus Master may be used E.g. a SCADAPack running TelePACE or ISaGRAF.

- Set the Mode to Master, and enter the Modbus Slave number calculated above. (2)
- Select the pc's comm. port, then set it for Modbus RTU, 19200, No parity.
- Configure the software to poll for (E.g.) a block of 10 holding registers starting at 40001. This includes Device Type, Device Status, plus three field unit sensor values.
- Set No Response Timeout to at least 500 ms and the Poll Delay to 1 second or more.
- Enable display of the desired holding registers, then turn on polling. In the Display area the live values are displayed.
- The Port A LED's on both the BR20 and Master radio alternate red and green as Tx and Rx data is detected.
- Be aware that the holding registers Display of Mdbus (and most other software packages) will show the values as 16-bit integers. In fact the values being polled by this example are 32-bit floats. They must be converted to 32-bit floating point before they can be used.
- Alternately, the status registers of the BR20 itself may be polled by using Modbus Slave address 1. Holding registers 40001 – 40009 contain base radio status information. See the Modbus Communications section of the user manual for register contents.

Accutech Manager Diagnostics:

As soon as the BR20 is powered up and configured, it begins to send diagnostic data. Once the Short Haul Diags port is connected to the Long Haul radio this data is transmitted to the Master radio and then to Accutech Manager.

- Start Accutech Manager and connect. The default password is the word “password.”
- The Port B LED on the Master radio flashes green (RxD), indicating that the BR20 is sending diagnostic messages. Once Accutech Manager’s RF Server comes online an occasional red flash indicates that Accutech Manager is replying.
- In the Field Units view, the tree view at the top is populated in a short time with a list showing the Base Radio and the field units.
- Open the list of field units, then double click on the tag name of one of the field units.
- Live data and status information for that field unit is displayed in the data window.
- If desired, click the Config... button to view the field unit’s current configuration. Make any required changes and then click Ok.
- Close the data window for the unit and go to the Tasks window to monitor the current status of the configuration synchronisation operation.

Summary:

Using a Trio K-Series (serial) “long haul” data radio system, it is possible to poll an Accutech base radio for its Modbus status and field unit sensor data, and to perform diagnostics & configuration of the Accutech system at the same time. The K-Series radio, using Multistream™ technology, is fully capable of managing both data streams.

This capability is highly valuable to an Accutech system manager who desires to gather field unit data remotely and manage the system, all without needing to leave the office.

Note that due primarily to the high data rate of the Accutech Manager diagnostics traffic it is recommended that a K-Series radio data rate of at least 64 kbps be used.

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June, 2012

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