

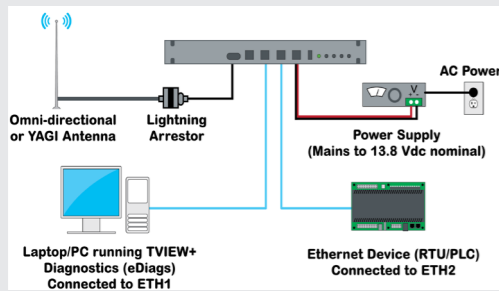


Trio QB Quick Reference Guide Full Duplex - Q Data Radio

1.0 Introduction

Welcome to the Trio™ Quick Reference Guide for the QB full duplex data radio. This guide provides step-by-step instructions, with simple explanations to get your radio link operating. Before proceeding, ensure that you have read the product warning sheet for safety information. For further product information, refer to the Q Data Radio user manual, or for information on accessories, refer to the wireless accessories data sheet.

1.1 Typical Radio Setup



2.0 Mounting Guidelines

Mount the radio in a clean and dry location, protected from water, excessive dust, corrosive fumes, extremes of temperature and direct sunlight. Provide sufficient passive or active ventilation to allow the radio modem's heat sink to operate efficiently. Antenna connections, Power connections and Digital I/O are all at the rear of the unit. All User ports, including Serial Com ports, Ethernet ports, and Aux port are located on the front panel to provide easy access.

1

2.1 Mounting Brackets

The QB full duplex radio is housed in a 1 RU 19 in. rack enclosure. Each unit is supplied with two 1 RU mounting brackets, which can be fitted to either side of the unit to allow installation into a 19 in. rack. The mounting brackets can be fitted on the side of the base in 3 different locations: Front Mount, Proud Mount or Center Mount. For further details, refer to the user manual.

3.0 Physical Dimensions

Body: - 436 x 45 x 405 mm (17.16 x 1.77 x 15.94 in.)

Note: The dimensions above do not include mounting brackets or RF ports. For detailed information, refer to the user manual.

4.0 Power Supply Requirements

Rated Operating Voltage: 11...30 Vdc (Dual Input)

Input Power (Rx typical): 14 Watts

Input Power (Tx typical): (See table below)

Tx Power (dBm)	Typical Input Power (Watts)	
	QB150	QB450
30	26	34
37	38	46
40	46	59

Note: In high ambient temperature situations, the internal fans may operate, resulting in an increase of input power of up to 28 Watts.

Typical receive/standby input power is 14 Watts. The input power will vary in transmit mode according to RF output power level.

The QB is supplied with a lock-in mating DC power connector which should be installed with the locking screws done up tightly (0.5 - 0.6 Nm / 4.42 - 5.31 ftin). Replacement parts available from Schneider Electric, part number TBUMPWR-PLUG-QB.

The radio is designed to limit damage if the voltage exceeds the operating voltage or if reverse polarity is applied. The field-replaceable internal fuse has a 12 Amp rating. Replacement fuses available from Schneider Electric, part TBUMPWR-FUSE-QB.

Before connecting any wiring, ensure that all components are earthed to a common ground point.

Connect and secure the Antenna, Ethernet and Serial connectors BEFORE applying power to the unit. Lastly, before inserting the power connector, re-check that the polarity and voltage are correct using a multimeter and check the power cable against the +/- label printed on the rear panel of the radio.

2

5.0 LED Indicators

Indicated State	Pwr/Tx
No power, or ShutDown	
Power on	
Transmitter On	

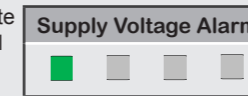
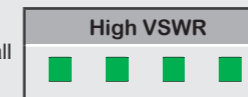
Indicated State	Synch/RxSig
No received signal	
Receiver in SYNC state	
RSSI over mute level and no sync	

Indicated State	COM1/2
No Activity	
RxD Data Output	
TxD Data Input	
RxD & TxD Data Active	

Indicated State	ETH port
Ethernet port inactive, no cable connected	
Ethernet port active @ 10Mbps	
Ethernet port active @ 100Mbps	

Alarm LED indications:

In some circumstances the radio will indicate an alarm state. This is shown by all LEDs illuminating RED for 1 sec, followed by a pattern of GREEN LEDs for 1 sec. The pattern of GREEN LEDs indicate the type of alarm. Consult the user manual for further information. See the examples to the right for, high VSWR and supply voltage alarms.



6.0 Connecting Antennas

The RF antenna system should be installed in accordance with the manufacturer's instructions and local regulatory requirements. The QB antenna connectors are N-type female connectors. Always use good quality low-loss feeder cable, selected according to the length of the cable run. Also, use a flexible patch cable between the radio and lightning arrestor or flange mount of the radio cabinet/enclosure. Ensure that all external connections are waterproofed.

3

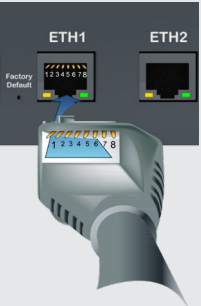
7.0 Communication Ports

7.1 Ethernet Ports - ETH1/2/3

The ETH ports are 10/100 Base-T compliant, using RJ-45 sockets. These sockets support both TIA/EIA-568-A & B wiring as they have Auto MDI/MDIX Auto Sensing. This means you can use both straight-through and cross-over type CAT-5 or better patch cables. All RJ45 connectors must utilize mating plugs that include an integral locking tab.

Note: If termination of a cable is required, then please refer to the Q Data radio user manual.

Note: Maximum differential voltage: 5 Vdc, 50 mA max through each differential pair.



7.2 Serial Ports - COM1/COM2

The QB features a 9-pin miniature D-Shell (DE-9) Female connector that supports two individual serial port connections. Each serial port is associated with an embedded serial terminal server that provides Serial-to-TCP/UDP IP connectivity. Refer to the user manual for more information on the serial terminal servers.

Refer to the pin-out table for RS-232 pin allocations. For RS-485, refer to the Q data radio user manual.

An RSSI output is available on pin 9 which is useful for antenna alignment. See following page for details.

RS-232 Mode		
Pin	Name	Input/Output
1	COM 1 DCD	Output
2	COM 1 RxD	Output
3	COM 1 TxD	Input
4	COM 2 TxD	Input
5	GND	-
6	COM 2 RxD	Output
7	COM 1 RTS	Input
8	COM 1 CTS	Output
9	RSSI	Output

Notes:

- (1) Pins 1, 2, 6 & 8 are outputs rated at +/- 6 Vdc, 65 mA max.
- (2) Pins 3, 4 & 7 are inputs rated at +/- 15 Vdc, 5 mA max.
- (3) Pin 9 is a multipurpose IO pin with 120 mA max input / 5 mA max output.
- (4) Connecting wires should be #26 AWG (0.14 mm²) or larger.



4

8.0 Activating the Transmitter

Data sent to either of the radio's communication ports (Ethernet or Serial port) can cause the radio to activate its transmitter and send the data over the air. However, to test the transmitter with external test equipment (Tx power, VSWR or Frequency), or to test another radio's receiver, the Q data radio provides a tool to manually control the activation of the transmitter, which can be controlled via direct connection, or over the air.

Access to this tool is via the web user interface and browse to: Maintenance -> Transmit Test. This will display the transmit test tool page.



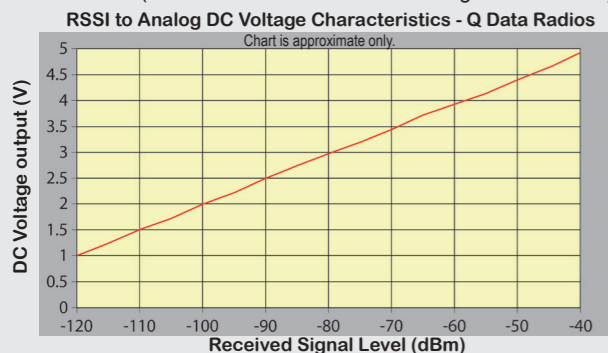
The transmitter can now be controlled via this page. To activate the transmitter, press the 'Turn ON' button. By default this will enable a Modulated Carrier for 60 seconds. During this time, the Tx LED should illuminate solid RED to indicate the transmitter is active.

9.0 Antenna Azimuth Alignment for Rx Signal

When using a directional antenna, azimuth alignment may be required to achieve optimum received signal. Receiver signal strength can be read from TVIEW+ Diagnostics, which can provide the RSSI value after a poll/response, or, by measuring the DC voltage between pin 9 (RSSI) and pin 5 (GND) of the serial COM port which can output a live (2 second peak hold), RSSI to analog DC voltage, where 2.5 Vdc represents approx. -90 dBm. Indicated signal strength is equal to ~20 dB/volt. As the RSSI-to-analog DC voltage output indicates 'live' receiver signal strength, the radio must be listening to a permanently active transmitter, otherwise, only low levels of background noise will be indicated. (see 8.0 for instructions on activating the transmitter).

RSSI to Analog DC Voltage Characteristics - Q Data Radios

Chart is approximate only.



5

10.0 Factory Default

The factory default IP address of every Q data radio is 192.168.2.15. If you want to perform configuration changes on your Q data radio and do not know the IP address, you will need to activate a factory reset.

A factory reset will cause all previous configuration settings to be erased and returned to their factory default values. A factory reset can be initiated by applying DC power to the radio (allowing up to 3 minutes for the unit to fully boot up, indicated by a solid GREEN Power LED), pressing and holding the factory default switch, using a paper clip or similar object, for 6 seconds or until all four LEDs begin flashing GREEN, indicating the radio will return to the factory default settings. Wait for up to 4 minutes for the factory default reset process to complete.



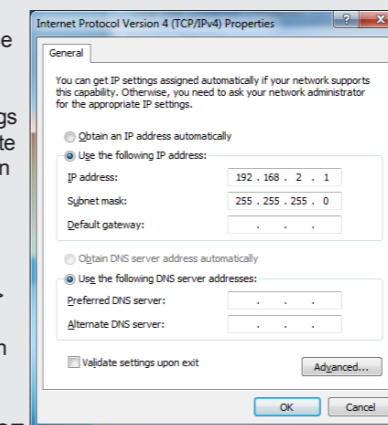
11.0 Connecting to the Web User Interface

The QB contains an embedded web server which provides access to the Web User Interface (WUI). The WUI can be used to perform configuration changes on the radio. To change a configuration parameter in a Q data radio, connect your PC to one of the Ethernet ports (ETH1, 2 or 3) and direct your browser to the IP address of the Q data radio. It is strongly recommended that you follow these guidelines for successful connection to the radio:

- (1) Ensure that the Q data radio is powered up and has fully booted. This is indicated by a solid GREEN power LED and takes approximately 2 minutes from applying DC power to the Q data radio. Note that the radio may be in a fully booted state, but indicating a user alarm. For example, if the radio's antenna port is incorrectly terminated, the radio will indicate a high VSWR alarm. Regardless of this user alarm, the radio can still be browsed to.
- (2) Disconnect your PC from any other Internet/LAN networks. Failure to do so may create a conflict in IP addresses or the Q data radio IP might not fall within the subnet mask specified by your network.
- (3) Connect your PC's Ethernet port to one of the Ethernet ports (ETH1, 2 or 3) using an RJ-45 patch cable. Cross over cables will also work (Ethernet ports support MDI/MDIX). An active connection is indicated on the radio by solid GREEN and AMBER illumination on the LEDs which are fixed to the physical Ethernet port you are connected to.

6

(4) Ensure that your PC LAN port is configured for a suitable IP address. If you are using Windows 7, this can be done by configuring the LAN settings via the Control Panel. Navigate to your Windows "Start" button and open Control Panel -> Network and Sharing Center -> Change adapter setting -> Double click on the LAN port you are using -> Properties -> Double click "TCP/IPv4". You should see the window shown to the right.



Ensure that "Obtain IP Address Automatically" is NOT selected. It is recommended that you manually specify a compatible IP Address. In this example, a factory default radio is being configured. The IP address of that radio is 192.168.2.15 and a compatible IP address for the PC would be 192.168.2.1. Click OK to accept the changes.

Note: Check with your Network Administrator before allocating IP addresses as each LAN/WAN network is different.

(5) Now open your web browser and enter the IP address of the Q data radio into the URL. In this case, we type "192.168.2.15", the browser should now display the home page of your radio. (Shown below).

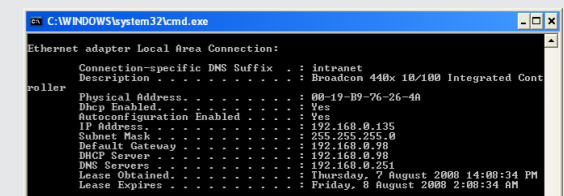
Note: You may need to disable a web proxy (if in use) or disable or modify your local fire wall to help ensure that the security rules allow access to the Q data radio's IP address.



7

Resolving Ethernet Configuration Issues

Here are some basic tips to help you resolve any Ethernet configuration issues that you may encounter. The Windows operating system (and others) comes complete with many useful tools. First, you need to open a command window. This can be done by clicking on "Start" then "Run" and entering "CMD" and clicking OK.



Obtaining IP information about your PC

If you need to find out more information about your computer's Ethernet IP configuration, network gateways and DNS servers, you can use a tool called "IPConfig". Simply type "IPconfig /all" into your command window.

Checking IP connectivity

The simplest way to check IP connectivity to a device is using the "Ping" utility. Type "ping x.x.x.x" where x.x.x.x is the complete IP address of the destination device you want to check. Ping will either respond with latency results (as shown) or display "timed out" if no connection was possible.

Repeated connections to multiple devices with same IP address

This is a common issue experienced when attempting to configure multiple radios with the same IP address (such as factory default radios) and is due to invalid MAC table entries. If you change your Ethernet connection between two devices with the same IP address quickly, you may need to reset the MAC look up table in your PC. You can do this by typing "arp -d 192.168.2.15" in the command window.

8

Trio QB Quick Start Guide Q Data Radios

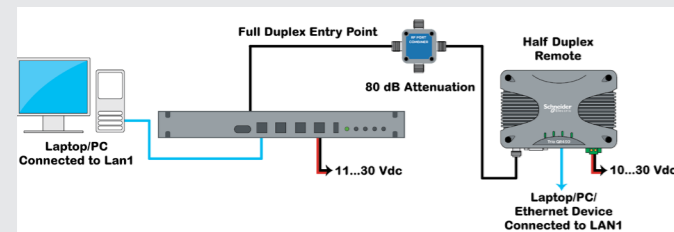
Step-by-Step Bench Test Setup

Introduction

- This document describes the 10 key steps required for:
- Connecting and configuring a Full Duplex Q Data Radio to a Half Duplex Q Data radio.
 - Performing basic diagnostics and health checks
 - Connecting user equipment such as Host Software and/or RTUs

For more information consult the Q Data Radio User Manual.

Typical Bench Test Setup



9

Step 1 - RF and DC power connection

RF Connection

Bench testing is typically performed over short distances, so RF signals must be significantly attenuated. Using dummy loads or whip antennas is not recommended.

A suitable method for attenuation of RF signals is to use a 4-Port RF Attenuator (Part Number TBUM4PORTATTEN). An attenuator accurately reduces RF signal level, simulating a real world, long distance RF link. Other types of RF attenuators can be used providing the total attenuation is approximately 90 dB. Power ratings must be checked (depending on configured Tx power).

If the TX power of each radio is set to 20 dBm (100 mW) then, low power, low cost attenuators can be used.

DC Power Connection

Ensure that each radio is wired using the correct polarity and that the power supply is regulated and has adequate current-delivering capacity.

Step 2 - Power Up Radios

For power supply requirements, refer to section 4.0

Apply DC power to the radios. The radio will begin a boot up process. This process can take up to 2 minutes (during this time frame, the 'Pwr' LED will periodically flash GREEN, indicating that the boot up process is still in progress).

Once the boot up process has completed, the 'Pwr' LED should be solid GREEN. If there is no LED indication, re-check the DC polarity and ensure that the DC voltage is between operating voltages.

Note: If these checks are not correct then you may need to inspect the internal fuse. Consult the user manual for further information.

10

Step 3 - Setup for Radio Configuration

IP Address and Factory Default

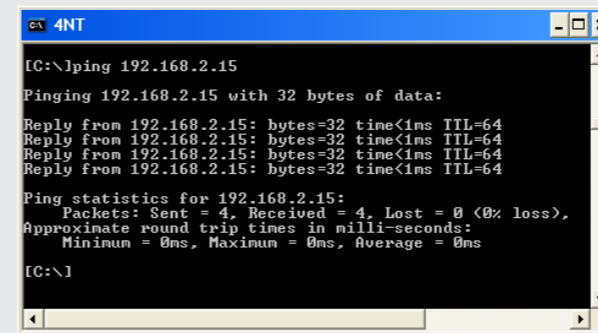
The default IP address of the radio is 192.168.2.15. To configure the radio, you must know the IP address. If you are uncertain of the current IP address programmed into the radio you will need to reset the radio configuration to factory default.

A factory reset can be initiated by applying DC power to the radio (allowing up to 3 minutes for the unit to fully boot up, indicated by a solid GREEN Power LED), pressing and holding the factory default switch, using a paper clip or similar object, for 6 seconds or until four LEDs begin flashing GREEN, indicating the radio will return to the factory default settings. Wait for the 4 LEDs to stop flashing GREEN, indicating that the factory default process has been completed.

Connection to Embedded Web User Interface (WUI) - HTTP

Connect your PC Ethernet port to one of the Ethernet ports (ETH1, ETH2 or ETH3). To verify you can communicate with the QB you should first ping the radio.

Open up a command window on your PC by going to the "Start" -> Run and typing "CMD" then OK. Then type "ping 192.168.2.15" which is the default address of the radio. The radio should respond to the ping as shown below. If this is not the case, check you network settings as described within the Quick Reference Guide - Section 11.0.



11

Q Data Radios can also be configured via a Text User Interface (TUI). Console protocols such as Telnet, SSH or a serial connection may be used. For further details on making configuration changes via the TUI, refer to the user manual.

Step 4 - Start Web Browser on your PC

Start your web browser and enter the IP address of the radio into the URL. In this case, type "192.168.2.15", press the <enter> key and the configuration page is now displayed in the browser.



Browse to the "Wizards" section of the WUI by clicking: -> Setup -> Wizards.

Step 5 - Activate Entry Point - PTMP Wizard

You will now see a variety of wizards available for selection.

- Within the 'Different Tx/Rx Frequencies' section, find:
- Full Duplex - Point to Multi-Point.
 - Then select the 'Full Duplex Entry Point' button

The wizard will now prompt for important configuration items. For each configuration item, help text is provided on the HTML programmer interface. If you are manually specifying IP addresses, record them for future reference. You will need to know the IP address of each radio in future steps.

At the bottom of the wizard page, the pre-configured options are shown. After configuration is complete, activate the configuration by clicking on the "Activate Configuration" button in the top right corner of the page.

Step 6 - Activate Remote - PTP Wizard

Repeat steps (3) to (5) for the Remote radio. When at Step 5, select the 'Remote radio' button and click on the 'Start The Wizard' button.

12

Step 7 - Verify Modem Operation

The radio configuration & RF link can now be verified for correct operation. First, check that the remote radio can correctly decode a transmitted signal. This is done by energizing the transmitter (modulated carrier) of the entry point radio. Refer to the instruction about this in section 8.0 of the Quick Reference Guide.

With the transmitter energized, inspect the LED status on each radio. The entry point radio should have a solid RED 'Pwr/Tx' LED. The remote radio should display a solid GREEN 'Sync/RxSig' LED. If this LED is not solid GREEN it may indicate incorrect configuration or inadequate signal strength and the setup should be checked. Repeat this test with the Remote radio transmitting.

Step 8 - Packet Error Testing

This tool provides a useful way to test a radio communication link by transmitting data packets between two units in a loop-back mode.

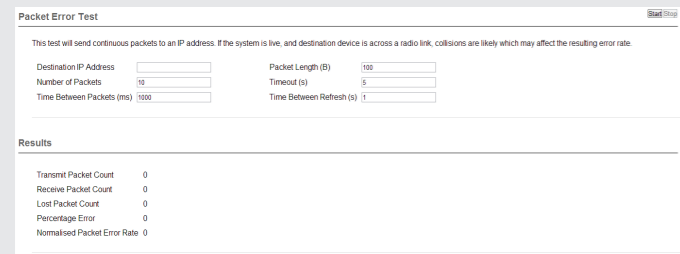
You can find this tool in the "Diagnostics" tab, then click on the "Packet Transmission Test" sub-menu.

Enter the IP address of the target radio that you want to ping in the "Destination IP Address" field. Ensure that the "Number of Packets" is set to a reasonable sample size (i.e. x100). Now click on the "Start Packet Test" button. The radio will indicate the packet test has started and is currently running and both units will have flashing Tx LEDs indicating that data is being transmitted.

This test can be done from any radio to any radio in the same network.

When the test is complete, the test results will be populated and summarized in the "Test Results" section.

The test results show TX & RX Packets, Lost Packets and the Packet Error Rate.



13

Step 9 - Embedded Diagnostics Testing

Review Diagnostics

Connect your web browser to the Entry Point radio using the IP address recorded in Step 5. Once loaded, click on the Diagnostics tab, then select the summary sub-menu. This will display the Diagnostics summary page. Review the diagnostics parameters checking for abnormal items such as high VSWR (high TX reverse power) and lower than expected radio RSSI (Received Signal Strength).

Follow this step again for the Remote radio.

Summary	
Unit	
Date	Mon Nov 24 18:14:28 1975
Up Time (sec)	2565.37
CPU Load (%)	7
Supply Voltage (V)	13.7
Radio Temperature (C)	40.3
Radio Temperature (F)	104.54
LAN	
ETH 1 Rx Packets	317
ETH 1 Rx Bytes	38864
ETH 1 Tx Packets	101
ETH 1 Tx Bytes	27379
ETH 2 Rx Packets	0
ETH 2 Rx Bytes	0
ETH 2 Tx Packets	0
ETH 2 Tx Bytes	0
Radio	
Radio Rx Packets	1
Radio Rx Bytes	21
Radio Tx Packets	195
Radio Tx Bytes	18794
Radio Forward Power (dBm)	30.0
Radio Reverse Power (dBm)	28.5
Radio VSWR	> 10.0:1
Radio RSSI (dBm)	-120.1
Radio Rx Frequency Offset (Hz)	0.3

14

Step 10 - Commissioning Record

After a packet transmission test has been performed, a Commissioning Record can be prepared. This facility is activated by clicking on the "Commissioning Record" button.

It is recommended that the radio is configured to obtain the current date / time from an NTP server, otherwise the date / time shown may not be correct.

The user can enter an appropriate Unit Name and Location for reference purposes. Additionally, a comment may be added noting the type of antenna in use. Once this information has been added, the web page can be printed (using the print facility in your web browser). It may be useful to print the commissioning record to PDF for future reference.

This now completes the requirements for setting up a half duplex, Point-to-Point Q Data Radio Link. The radios are now ready for application testing. The application can be connected to either ETH1, ETH2 or ETH3 or all. For more information on testing, consult the Q Data Radio User Manual.

Contact Details

Technical Support: The Americas, Europe, Middle East, Asia
Available Monday to Friday 8:00am - 6:30pm Eastern Time
Toll free within North America: 1-888-226-6876
Direct Worldwide: +1-613-591-1943
Email: SupportTRSS@se.com

Technical Support: Australia/New Zealand (Pacific)
Available Monday to Friday 8:00am - 5:00pm Australian Eastern Standard Time
Inside Australia: 13 73 28 (13 SEAU)
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