

Command Summary

Introduction

RQ devices from Electronic Solutions, Inc. provide two-way communication over a 6-wire phone cable that connects each device together into an RQ Bus. Typically, an RQ Bridge device is connected into the RQ Bus to provide a Serial Interface (RS-232 or RS-422) to a Controller/PC. Normally, there will be a number of RQ motor controls among the devices on the RQ Bus. The RQ Bus uses three wires of the 6-wire cable; the other three wires are used for the legacy RP Bus. The RQ Bus and the RP Bus operate independently from each other. The RQ Bridge utilizes the RP Bus to communicate legacy RP commands to RQ devices as well as to legacy RP devices.

This Command Summary covers the RQ commands associated with the RQ Bridge and assumes a Controller/PC is connected to the serial interface on the RQ Bridge. This document also assumes that a number of RQ devices are attached to the RQ Bridge to form an RQ Bus and that HyperTerminal, or another terminal emulator program, is utilized to enter RQ commands and to display responses from RQ devices.

The RQ communication protocol was developed to provide a powerful interface for Home Automation developers to build broad networks of RQ devices. For more information on the RQ Protocol, including coding examples, see the *RQ Protocol Summary*. For more information on particular RQ devices, such as motor controls, see the appropriate device's *RQ Command Summary*. The Request-Response nature of RQ devices allows a program running on a Controller/PC to continually direct the network and monitor RQ device status.

RQ Message Format — Overview

An RQ message always begins with a Start Character "!" (a.k.a. Bang) and ends with an End Character ";" (semicolon). There will always be an Address (3 ASCII characters) and a Command (1 ASCII character) as shown in the table below. In some cases, the Data field is a variable number of characters or no Data. A "?" (question mark) in the Data field signifies a request message. For Downlink messages, the End Character is ";" or <CR> (both are treated the same). For Uplink messages, the End Character can be set using the RQ Bridge Parameters/Options to be ";" or <CR>.

RQ Addressing is always three ASCII characters composed of only 0-9 and A-Z. For the case where an address is 000 (global command), all nodes are being addressed and for that reason, no node can have 000 as its address. The RQ Bridge is factory addressed at BR1. RQ devices are given random addresses from the factory (first character will be between "C" and "Z").

Uplink — messages from the RQ Bus, relayed to the Controller/PC via the RQ Bridge.

Downlink — messages from the Controller/PC, relayed to the RQ Bus via the RQ Bridge.

The following is an example of a Downlink message from the Controller/PC to the RQ Bridge requesting the RQ Bridge's version.

The literal command string is "!BR1v?;"

Start Character	Address	Command	Data	End Character
!	BR1	v	?	;

Improperly formatted Downlink messages or message content that is out of range will cause the message to be discarded by the RQ Bridge and an Uplink error message generated.

Connections

The RED jacks are the RQ Bus connections. 12V Power from an RQ60xxx is required for the RQ Bridge to work (it can work from a DCPM (5V) if required by adding the center strap). The black RJ11 jack is for the RS-232 connection, the gray spring terminals are for RS-422. The option straps select RS-232 vs. RS-422, and if you want the RS-422 termination resistor.

Serial Connection between RQ Bridge and Controller/PC

Connection is point-to-point between the RQ Bridge and the Controller/PC. The RS-232 connection is via the black 6P4C modular jack, and it has the same pinout as the R2D7 so that adapter will work. The RS-422 connection is via the 4 spring-loaded gray terminals marked A&B and Y&Z along with signal ground. Straps are used to select RS-232 OR RS-422. The RS-422 receive Termination resistor may be selected with the bottom strap. RQ allows unsolicited messages, so half-duplex RS-485 will not work.

Serial Connection Parameters

9600 baud 8N1 (8 data bits, no parity, 1 stop bit).

No sync characters.

Case matters everywhere.

Extended ASCII characters (0x80-0xFF) NOT allowed anywhere.

Flow control: X-off is sent if the RQ Bridge buffer ever exceeds ½ full and then X-on is sent when near empty.

Flow control: X-off sent to the RQ Bridge stops messages to the controller immediately, X-on allows messages again.

RQ Message Format — Details

Start of Message Character = ! (Exclamation point, a.k.a. Bang)

Address = 3 ASCII characters, only **0-9** and **A-Z** are allowed ($36*36*36 - 1 = 46,655$ addresses)
000 = everyone (no node is allowed to have this address)

Command = 1 ASCII char (! ; <control> not allowed)

Data = ASCII characters as needed (! ; <control> not allowed)

End of Message Character = ; (semicolon) or <CR> (carriage return)

Semicolon is assumed to be the end of message character in all discussions in this document.

Every correctly formatted Downlink message has an Uplink response “quickly” unless the message is sent to a nonexistent endpoint which will not respond. There is no timing of messages provided by the RQ Bridge.

Definitions:

Downlink: messages from Controller/PC to RQ Bridge.

Uplink: messages from RQ Bridge to Controller/PC.

Node: a device on the RQ Bus.

<control>: ASCII characters from 0 to 31, which include <X-on>, <X-off>, <CR>, escape, etc.

<X-on>: flow control, ASCII character 17, 0x11 DC1 (control Q), allow transmission.

<X-off>: flow control, ASCII character 19, 0x13 DC3 (control S), stop transmission.

<CR>: carriage return, ASCII character 13, 0x0D.

On power up: The RQ Bridge reports its version (B40), <X-on> character is sent regardless.
The LED blinks: Green Red Green

X-off without X-on “kills” the RQ Bridge; there is no automatic timer to override this.

RQ Commands supported by RQ Bridge version 4.0:

COMMAND	DATA
p = set RQ Bridge parameter Response: RQ Bridge parameter report	one character for the parameter to set (see below) Note: p? (request RQ Bridge parameters) is not supported
RQ Bridge parameter report: p = parameter report	one character for parameter that was just set
v = request RQ Bridge version Response: RQ Bridge version report	question mark
RQ Bridge version report: v = report version	3 characters (this device reports B40)
N = assign RQ Bridge a name Response: RQ Bridge name report	1-16 characters (name cannot be question mark)
N = request RQ Bridge's name Response: RQ Bridge name report	question mark
RQ Bridge name report: N = report name	1 - 16 characters
@ = re-address RQ Bridge Response: address change report Note: RQ Bridge address cannot be randomized using ~	3 characters (0-9 or A-Z)
Address change report: A = acknowledge address change	3 characters = old address
RQ Bridge error report: E = an error occurred	2 characters describing error do = downlink buffer overflow; message was received and thrown away ml = uplink message lost
RQ Bridge message undefined report: U = undefined or bad message	none

Setting Parameters / Options

COMMAND	DATA	EXAMPLE
Use carriage return (<CR>) as end of message character on Uplink messages (not semicolon)		
p = parameter	C	!BR1pC;
Response: parameter C set		!BR1pC;
Use semicolon (;) as end of message character on Uplink messages (not carriage return)		
p = parameter	S	!BR1pS;
Response: parameter S set		!BR1pS;
Enable Verbose mode (unsolicited messages will be reported and version will report on power up)		
p = parameter	V	!BR1pV;
Response: parameter V set		!BR1pV;

Verbose mode cannot be disabled on V4.0 (newer RQ devices require it).

Verbose means:

!000v?; will generate a response from the RQ Bridge, followed by responses from all the nodes. Also, unsolicited Uplink messages will be reported.

Examples:

Downlink	Uplink	Comments
Re-address:		
!BR1@XYZ;	!XYZABR1;	RQ Bridge reports its new address
!BR1@xyz;	!BR1U;	Complain — address can only contain 0-9, A-Z (no lowercase) and cannot be 000
		The address is unchanged.
!M01@xyz;	!BR1U;	Complain — bad address. The RQ Bridge filters this for all nodes.
		We do NOT allow an RQ message to re-address the RQ Bridge (for example, one RQ Bridge cannot re-address another RQ Bridge).
Assign a name:		
!BR1NSmith's House;	!BR1NSmith's House;	
Request the name:		
!BR1N?;	!BR1NSmith's House;	
Request/report version:		
!BR1v?;	!BR1vB40;	This RQ Bridge is version 4.0
Fault handling:		
!BR1X18;	!BR1U;	X is not a valid RQ Bridge command
Other RQ Bridge messages:		
!M3zr;	!BR1U;	Invalid address (lowercase characters not allowed)
	<X-off>	Downlink buffer is over half full (128 bytes)
<X-off>		RQ Bridge will stop sending characters (a message may be partially sent)
<X-on>		RQ Bridge will resume sending messages
	!BR1Eml;	RQ Bridge Uplink buffer overflowed and at least 1 message was lost

Global RQ Bridge Commands

The RQ Bridge responds to a global version request and then passes the message Downlink. All other messages are just passed to the RQ Bus.

Commands supported:

v = request/report version

Examples:

Downlink	Uplink	Comments
!000v?;	IBR1vB40;	All report (RQ Bridge reports first)
!000@AAA;	IBR1U;	Rename everyone not allowed
!000r?;	...	Get "data" from everyone (RQ Bridge does not respond to "r" command)

Set Up Multiple RQs

Assuming that you have just connected together several RQ devices which are randomly addressed (from the factory, the address will be random and the 1st character will not be less than C):

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!000v?;      IBR1vB40; ...      There may be 2 devices that report the same address in the list
!RND~;       !NXQARND;!KT6ARND;  2 devices at address RND were randomized to NXQ and KT6
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There is no simple way to re-address a bunch of nodes.

Note: A node named the same as the RQ Bridge cannot be re-addressed using the ~ command. The only way out of this situation would be to re-address the RQ Bridge, then tell the offending node(s) to move, then re-address the RQ Bridge back.

Randomize does not give a result less than C00; therefore, randomizing a motor control will not accidentally hit the RQ Bridge address.

One RQ Bridge cannot re-address or rename another RQ Bridge, or ask its version or name.

Factory Defaults

Power Up	The programming LED on the RQ Bridge will blink: GREEN RED GREEN
Verbose	ON
Uplink end of message character	; (semicolon)
Address	BR1 (may be reassigned)
RQ Version	B40
Name	_ (underscore — indicating the name is "blank")

Change History

From v1.1 to v4.0:

- Handle bus noise better in an effort to remove need for RQ Impedance Isolator.
- Default address is BR1.
- Fixed problem that caused ~0.2% of downlink messages to be lost without error report.
- Verbose mode cannot be disabled on the RQ Bridge v4.0, or later, because the new RQ devices require verbose mode.

From v1.0 to v1.1:

- Downlink overflow is handled much better.
- Response to changing Bridge address is ZAP compatible (reports where it moved from).
- LED blinks green during RQ Bus activity (solid green means a Bus fault).
- Typing a ";" by itself does not cause a "U" message anymore (the message never started).
- Don't allow a request to change any node address to 000.

NOTE: Version 2 and Version 3 were skipped (do not exist).