

IC-7300 TechNote

CI-V Controls: The Big Picture

By Ian Wade, G3NRW

g3nrw@g3nrw.net

| > FEFE94E003FD

Version 1.0

2 December 2017

Introduction

This TechNote summarizes the functions and interconnections between the five CI-V controls in the Icom IC-7300 transceiver, namely:

- CI-V USB Echo Back
- CI-V USB Port
- CI-V Remote Transceive Address
- CI-V Transceive
- CI-V Output (for Ant)





The overall “Big” picture is described first, then the individual controls are described in more detail.

Conventions

This TechNote makes extensive use of color coding to differentiate between in/out data paths via the USB port and via the REMOTE port.

[If you decide to print a hardcopy of this document, use a color printer if you can].

Data Path Color Coding

Color Coding	Data Path
 > FEFE94E003FD	Transmit Data from PC to IC-7300, via USB port
 < FEFEE094030000000700FD	Receive Data from IC-7300 to PC, via USB port
 > FEFE94E003FD	Transmit Data from PC to IC-7300, via REMOTE port
 < FEFE0094002000000700FD	Receive Data from IC-7300 to PC, via REMOTE port

The format of CI-V Commands and Responses is described in detail in Section 19 of the IC-7300 Full Manual [1].

As a general comment, be sure to read the CI-V Responses in the examples carefully, as they may not always be as expected.

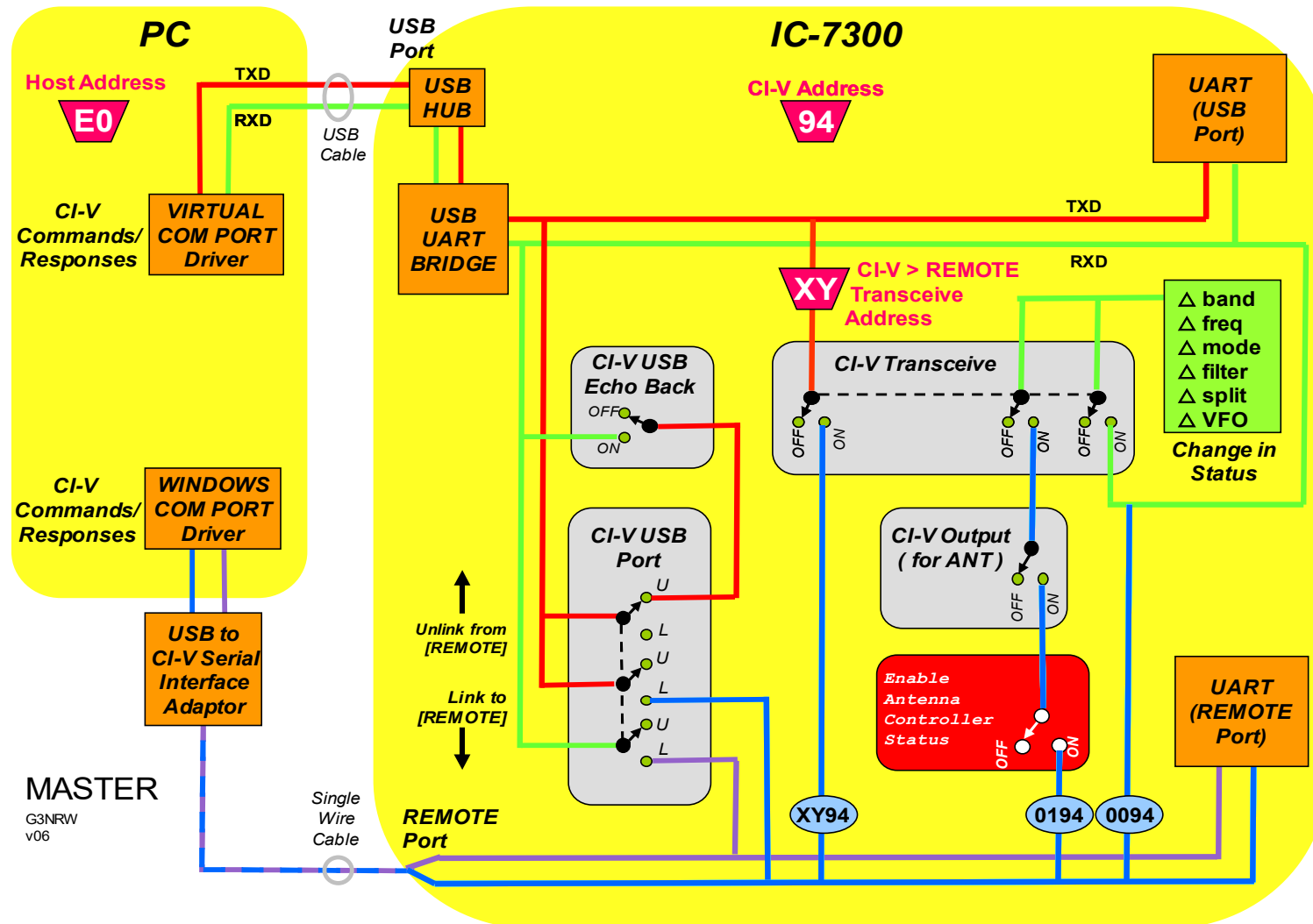


Figure 1: The Big Picture, showing all five CI-V Controls

The Big Picture

Figure 1 shows the five CI-V Controls. Starting in the PC at the top left-hand corner:

The Host PC

- The CI-V address of the host PC is **E0** hexadecimal.
- The Virtual COM Port (VCP) driver, from Silicon Laboratories, handles the Transmit Data (TXD) and Receive Data (RXD) via the USB cable.
- The built-in Windows COM port driver handles the Transmit Data (TXD) and Receive Data (RXD) via the single-wire REMOTE cable.

The IC-7300

- The CI-V address of the IC-7300 is **94** hexadecimal.
- The USB Hub and the USB UART Bridge route the CI-V Commands and Responses to/from the USB port UART.
- The REMOTE port CI-V Commands and Responses pass directly to/from the REMOTE port UART.

The CI-V Echo Back Control

When the CI-V Echo Back Switch is **ON**, and the CI-V USB port is **UNLINKED** (that is, disconnected) from the REMOTE port, TXD Commands from the PC are echoed back as Responses to the PC.

The CI-V USB Port Control

When the CI-V USB Port switch is set to **LINKED**, the USB port and the REMOTE port are in effect connected together. That is, CI-V

Commands and Responses pass through both ports. In this case, both ports must be set to the same baud rate.

The Remote Transceiver Address

The Remote Transceiver Address is the hexadecimal address of a separate peripheral device (for example, a power amplifier) that is connected to the REMOTE port. Then, when the CI-V Transceiver switch is set to **ON**, the PC can issue certain CI-V commands to the peripheral device via the USB port. In effect, the IC-7300 acts as a command relay.

The CI-V Transceiver Control

The main function of the CI-V Transceiver Switch is to allow any changes in IC-7300 status to be sent from the rig to the PC as unsolicited CI-V Responses. When the switch is set to **ON**, any changes in band, frequency, mode, filter, split setting or VFO A/B selection will immediately be sent to the PC.

Note also that any changes in status are sent to external devices connected to the REMOTE port, using the broadcast address **00** hexadecimal.

The CI-V Output (for ANT) Control

When this switch is set to **ON**, and the CI-V Transceiver Switch is also set to **ON**, any changes in IC-7300 status are sent to an external antenna system tuner connected to the REMOTE port, using the broadcast address **01** hexadecimal.

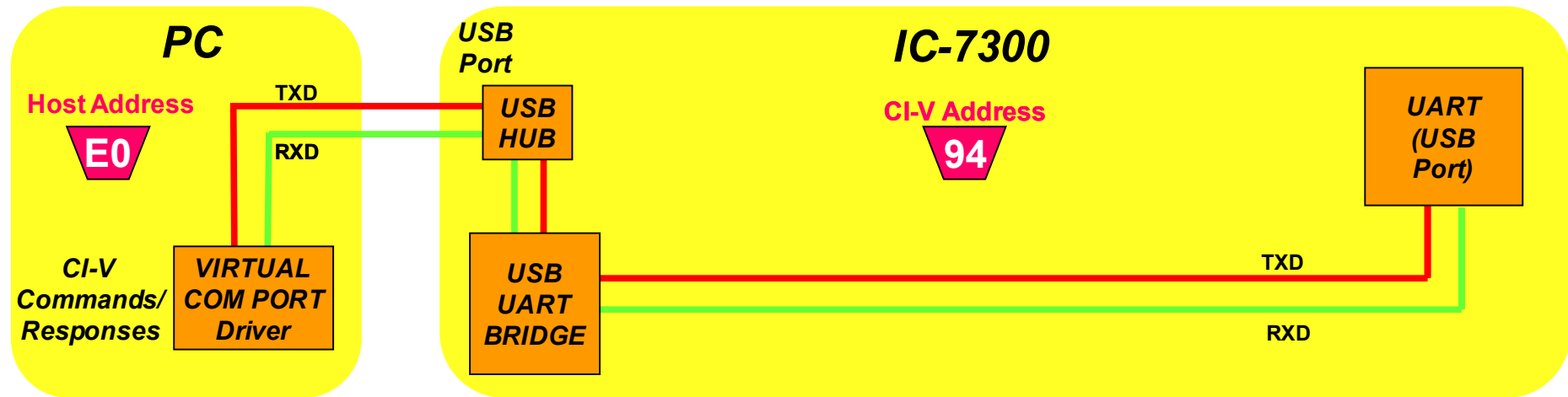


Figure 2: The Data Path from the PC to the IC-7300 via the USB port

Figure 2 shows the data path between the IC-7300 and the PC, via the USB port.

Example of a CI-V Command and Response

Command	03	Read frequency
TXD	> FEFE94E003FD	CI-V Command
RXD	< FEFEE094030000000700FD	CI-V Response

Here the command is **03** hex, which means “Read the operating frequency of the currently selected VFO”.

The outgoing CI-V command complete with leading and trailing bytes indicating the start and finish of the command, is **FEFE94E003FD**. This means the command is addressed to **94** (the IC-7300) from address **E0** (the PC).

The incoming response is **FEFEE0940300000007**, which means the current frequency is 7.000000 MHz. In this case the response is addressed to **E0** and is from address **94**.



[This page intentionally left blank].

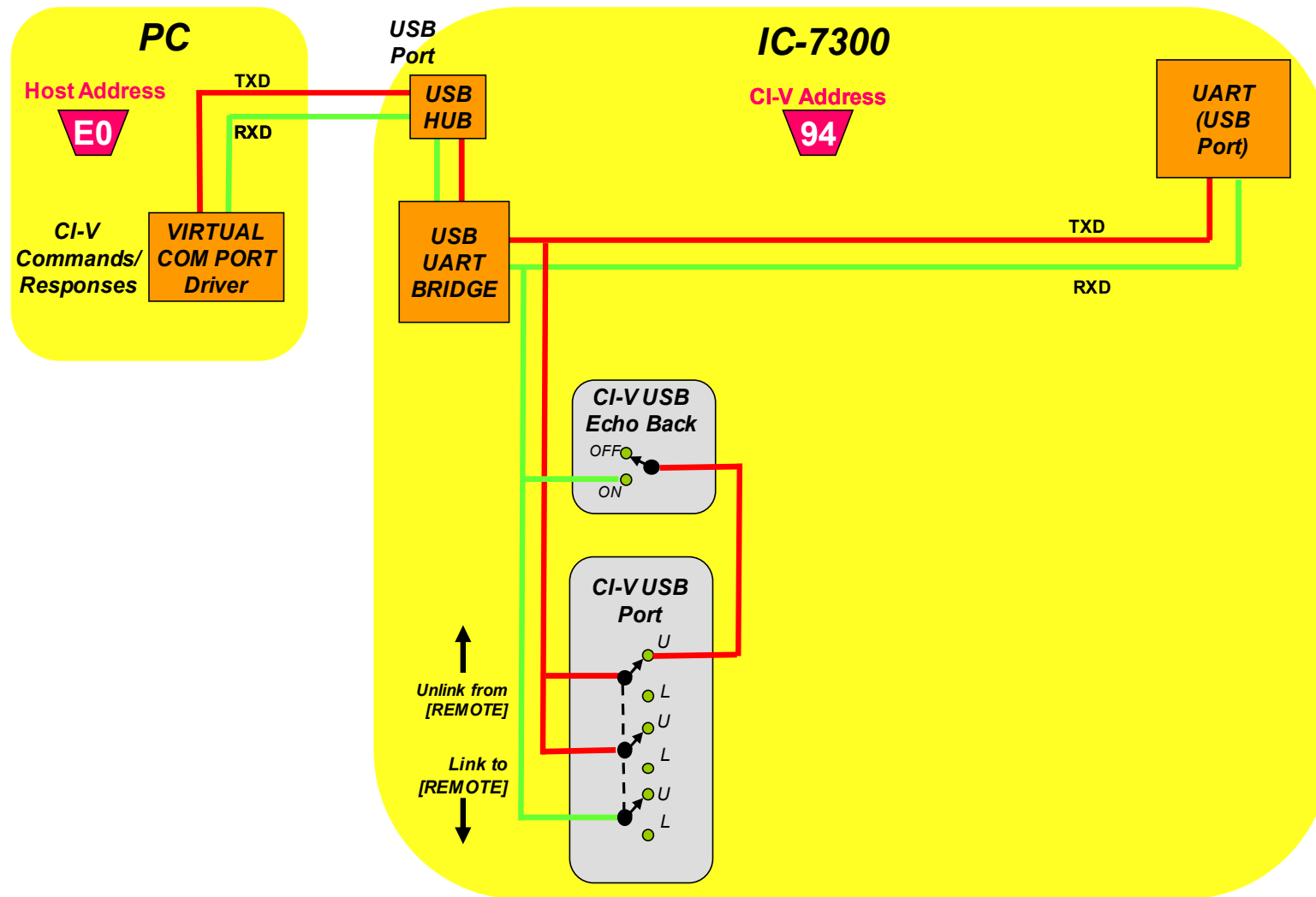


Figure 2: CI-V USB Echo Back Control

CI-V USB Echo Back Control

Some software packages running in the PC may require outgoing TXD commands to be echoed back to the PC for correct operation. In this case you can set the CI-V Echo Back Control to **ON**.

If the CI-V USB Port control is set to **UNLINK FROM REMOTE** as well, then TXD commands will be echoed back to the PC as CI-V RXD Responses.

Example of CI-V Commands and Responses

Command	1a05007501	Set echo to ON
TXD	> FEFE94E01A05007501FD	
RXD	< FEFEE094FBFD	OK response
Command	03	Read frequency
TXD	> FEFE94E003FD	
RXD	< FEFE94E003FD	Command echo
RXD	< FEFEE094030000000700FD	Current freq

Note that the description of the “Set echo back setting” in the Command Table in Section 19 of the Full Manual is misleading. The parameter **00** sets the control to **OFF** and the parameter **01** sets it to **ON**.

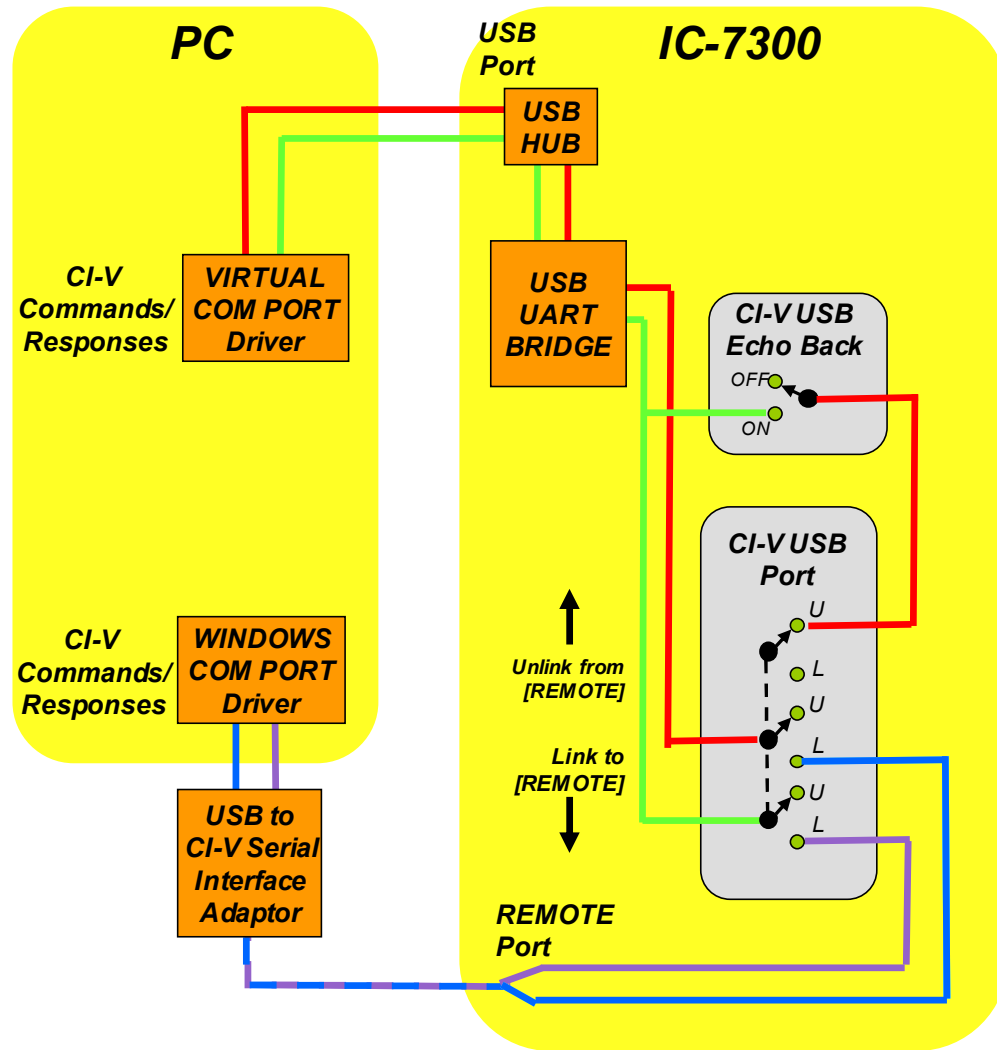


Figure 3: CI-V USB Port Link/Unlink

CI-V USB Port Link/Unlink

Example of CI-V Commands and Responses

In this example the CI-V USB Echo Back control is set to ON, so all CI-V commands are echoed back to the USB port. In addition, the PC interrogates the IC-7300 for the current CI-V USB Port control setting. At this stage the CI-V response shows the port is UNLINKED.

The CI-V USB Port setting is then manually changed from the front panel to LINKED.

With the two ports now LINKED, USB commands are repeated at the REMOTE port (responses shown in blue) and the response to the Read Frequency command also appears at both ports.

<pre>1a050074 > FEFE94E01A050074FD < FEFEE0941A05007401FD</pre>	<p>Read the CI-V USB port setting</p> <p>CI-V USB Port is set to UNLINKED (01)</p>
<p>At this point, manually change to LINKED (this is only possible via the IC-7300 front panel)</p>	
<pre>1a050074 > FEFE94E01A050074FD < FEFE94E01A050074FD < FEFE94E01A050074FD < FEFEE0941A05007400FD < FEFEE0941A05007400FD</pre>	<p>Read the CI-V USB port setting again</p> <p>Echo command to the USB Port The command now appears at the REMOTE port The response arrives at the USB port The response arrives at the REMOTE port</p>
<pre>03 > FEFE94E003FD < FEFE94E003FD < FEFEE094030000000700FD < FEFE94E003FD < FEFEE094030000000700FD</pre>	<p>Read frequency</p> <p>Echo command to the USB Port Response arrives at the USB port Command now appears at the REMOTE port The response now appears at the REMOTE port</p>

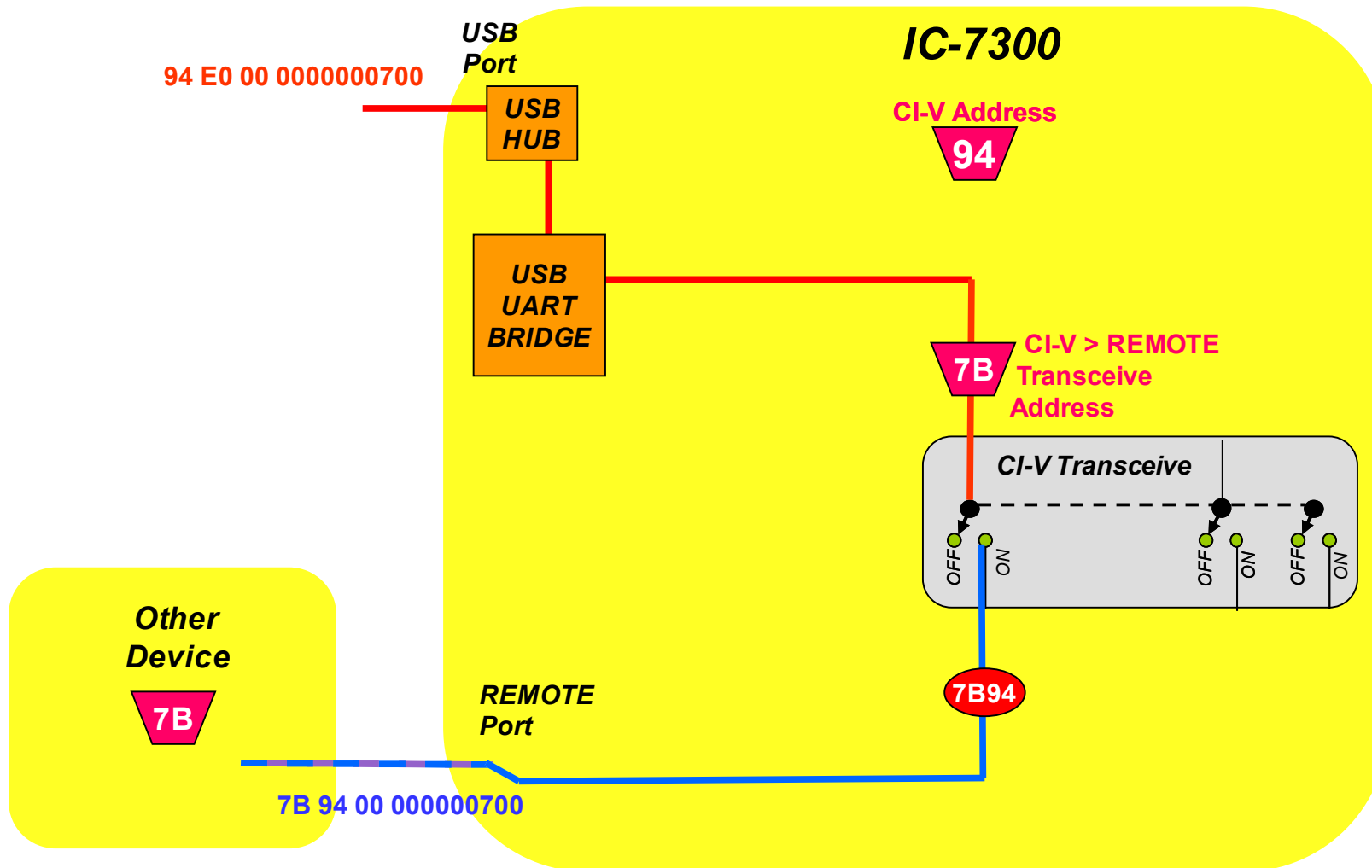


Figure 4: CI-V REMOTE Transceiver Address

CI-V REMOTE Transceive Address

Figure 4 shows how the IC-7300 can forward USB commands to a device such as a power amplifier connected to the REMOTE port.

In Figure 4 the “Other Device” has the address **7B** hex. By setting the CI-V REMOTE Transceive Address to the same value, the IC-7300 will forward USB commands to the device (assuming the CI-V Transceive control is set to **ON**).

In this case the IC-7300 changes the to/from device address to **7B94**. In other words, the device sees commands apparently originating from the IC-7300, not from the PC.

Note that when setting the Transceive Address in the **1a0500720123** command, the address is entered in decimal: **123** decimal = **7B** hex.

Example of setting the REMOTE Transceive Address

<pre>1a0500720123 > FEFE94E01A0500720123FD < FEFEE094FBFD</pre>	<p>Set Transceive Address to 7B</p> <p>OK response</p>
<pre>1a05007101 > FEFE94E01A05007101FD < FEFEE094FBFD</pre>	<p>Set CI-V Transceive to ON</p> <p>OK response</p>
<pre>000000000700 > FEFE94E0000000000700FD < FEFE7B94000000000700FD</pre>	<p>Set frequency to 7.00000 MHz</p> <p>Command repeated with addresses 7B94</p>

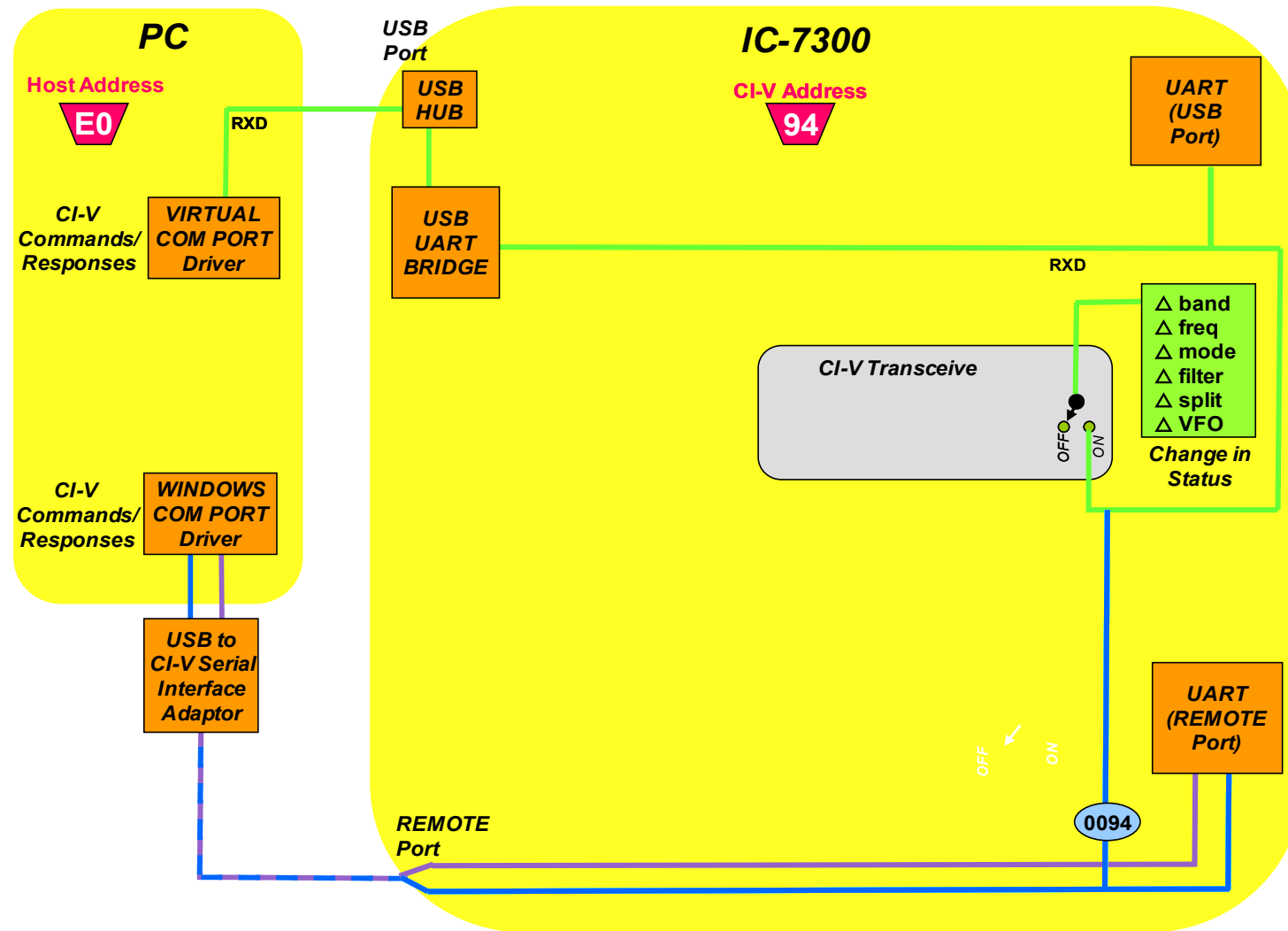


Figure 5: CI-V Transceive Control

CI-V Transceive Control

One of the functions of the CI-V Transceive control is to enable unsolicited CI-V responses, which are then fed back to the USB port and the REMOTE port. Then, whenever there is a change in IC-7300 status -- that is, a change in band, frequency, mode, filter, split setting or VFO selection (VFO A or VFO B) -- the new setting is transferred to the PC.

Example of CI-V Commands and Responses

This example shows what happens when you change the VFO frequency a couple of times.

<pre> 1a05007101 > FEFE94E01A05007101FD < FEFEE094FBFD < FEFE0094001000000700FD < FEFE0094001000000700FD < FEFE0094002000000700FD < FEFE0094002000000700FD </pre>	<p>Set the CI-V Transceive Control to ON</p> <p>OK response</p> <p>At this point, manually change the VFO dial to 7.00001 MHz.</p> <p>New frequency sent to USB port New frequency sent to the REMOTE port *</p> <p>At this point, manually change the VFO dial again, to 7.00002 MHz.</p> <p>New frequency sent to USB port New frequency sent to the REMOTE port *</p>
--	---

* Note that the new frequency settings sent to the REMOTE port are addressed to the CI-V broadcast address **00** (not the PC address **E0**). This means that any other devices connected to the REMOTE port will also see the changes in status.

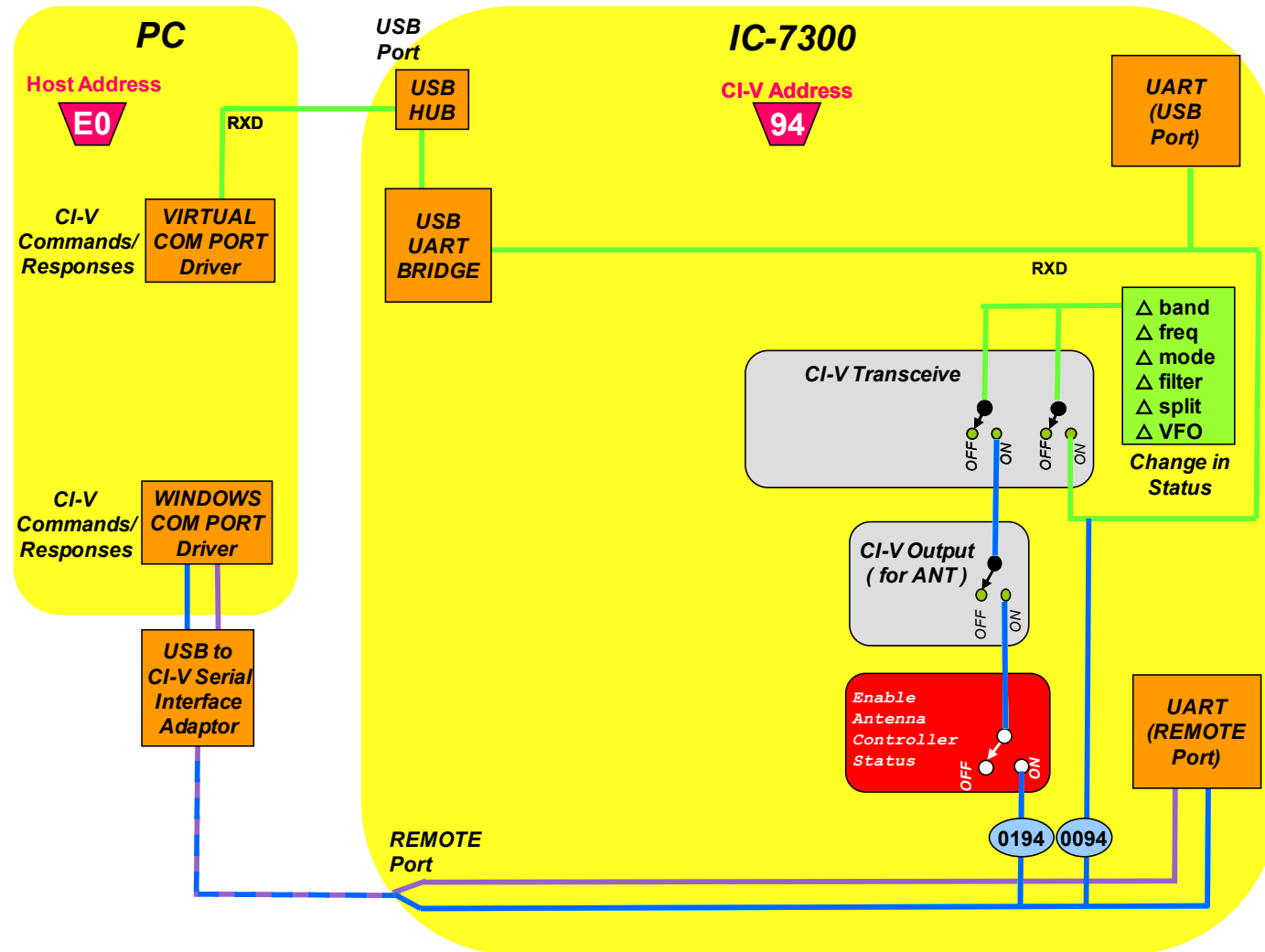


Figure 6: CI-V Output (for ANT) Control

CI-V Output (for ANT) Control

The CI-V Output (for ANT) Control provides an additional way to output changes in IC-7300 status to the REMOTE port, but in addition outputs the changes in frequency as changes to the TX frequency to CI-V broadcast address **01**. (See CI-V command **1C03**).

Example of CI-V Commands and Responses

This example shows what happens when you change the VFO frequency a couple of times.

<pre>1a05007101 > FEFE94E01A05007101FD < FEFEE094FBFD</pre>	<p>Set the CI-V Transceive Control to ON</p> <p>OK response</p>
<pre>1a05007301 > FEFE94E01A05007301FD < FEFEE094FBFD</pre>	<p>Set the CI-V Output (for ANT) Control to ON</p> <p>OK response</p>
<pre>1c0401 > FEFE94E01C0401FD < FEFEE094FBFD < FEFE0094003000000700FD < FEFE01941C033000000700FD < FEFE0094003000000700FD</pre>	<p>At this point, manually change the VFO dial to 7.00003 MHz.</p> <p>Set the Antenna Controller Status to ON</p> <p>OK response</p> <p>New frequency sent to USB port</p> <p>New TX frequency sent to the REMOTE port *</p> <p>New frequency sent to the REMOTE port **</p>
<pre>< FEFE0094004000000700FD < FEFE01941C034000000700FD < FEFE0094004000000700FD</pre>	<p>At this point, manually change the VFO dial again, to 7.00004 MHz.</p> <p>New frequency sent to USB port</p> <p>New TX frequency sent to the REMOTE port *</p> <p>New frequency sent to the REMOTE port **</p>

-
- * Note that the new TX frequency settings sent to the REMOTE port are addressed to the CI-V broadcast address **01** (not the PC address **E0**).
 - ** Note that the new frequency settings sent to the REMOTE port are addressed to the CI-V broadcast address **00** (not the PC address **E0**).

References

	<i>Resource</i>	<i>URL</i>
[1]	IC-7300 Full Manual	Go to g3nrw.net/IC-7300 Click on “Documentation” Scroll down to “IC-7300 Technical Documentation”. Click on Document #4: “IC-7300 Full Manual (English)”
[2]	IC-7300 Resources Page	g3nrw.net/IC-7300

Document Version History

<i>Version</i>	<i>Date</i>	<i>History</i>
1.1	5 December 2017	First public release