



# System 3 Installation Guide

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**System 3 Installation Guide**

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**System 3** is a modular system controlled by a Windows®-based computer.

The PC handles:

- Configuring the hardware and software.
- Communicating with the TDT hardware and transferring data across a fiber optic interface.
- Displaying and working with data during and after acquisition.

## Unpack your equipment and identify your system components.



AC Power Cable



RZ2 Processor (Optibit)



Fiber Optic Cable



AC Power Cable



WS Computer Workstation



DVI Cables



USB Ext Cable



Keyboard



Mouse



USB Ext Cable

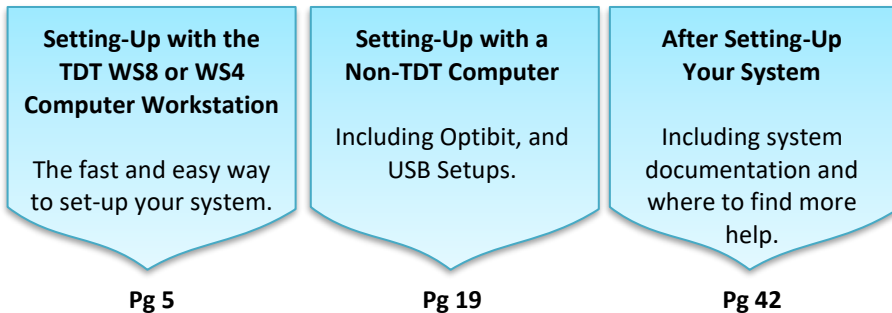
**Not shown:** monitors and other items such as stimulators, preamplifiers and headstages.

**The image above shows the most common elements found in a TDT system:**

- WS Computer Workstation with Keyboard and Mouse
- USB Extension and DVI Cables
- Processor(s)
- Fiber optic cables
- Power cords

When setting-up your system, we recommend starting with just the devices listed above. You can connect additional devices—such as amplifiers, headstages, and stimulators—after these devices are set-up.

The System 3 platform includes several options for interfacing with the PC and which interface you use will determine your system setup. This guide provides installation instructions for each setup. It's divided into three sections, one for systems that include the TDT WS8 or WS4 computer workstation, one for systems that will be used with a user-supplied computer, and one that provides information all users will need after setting-up their system.



## Setting-Up with the TDT WS8 or WS4 Computer Workstation

The WS computer workstation is rack-mountable and purpose-built for TDT System 3 and your demanding research applications. It's shipped with your TDT software and an Optibit TDT interface card pre-installed to make setting-up your system as streamlined as possible.

The diagram below illustrates the steps you'll take during set-up.



1. Unpack your equipment, identify your system components.
2. Connect the WS keyboard, mouse, and monitor(s).
3. Power on the WS and monitor(s).
4. Connect the fiber optic interface between the WS and processor.
5. Power on the processor.
6. Test the system.

The rest of this section will cover each step in more detail with step-by-step instructions and illustrations.

## *Identifying your processor(s) and interface-dependent device(s)*

The digital signal processor is the workhorse at the center of any TDT system. System 3 processors share a common operating system/language and come in several different form factors, each optimized for a particular type of research or set of tasks. These devices rely on communication with the computer, via a PC interface card or USB 3.0 port, for command and control. They may have a built-in interface (such as the RZ processors) or they may mount in a ZB1 chassis, housing an interface module (for example RX processors).

Most other devices that connect to the system do so via the processor (such as the biological preamplifiers, video tracker, stimulators, and so forth). As a result, these devices do not have need to be directly connected to the interface card or communications loop with the computer.

Less commonly, some other programmable devices, like the PA5 Attenuator, RA8GA amplifier, and HT13 head tracker interface, must also be mounted in a ZB1 chassis with an interface. Non-programmable devices (such as speaker and microphone amplifiers, signal mixers, and so forth) may be mounted in a ZB1 chassis for power, but do not need to interface with the computer.

For now, you will only need to identify your processors and other interface devices that must be directly in the communications interface loop with the PC or laptop.

### **Processors and other interface-dependent devices include:**



**RZ processors (RZ2, RZ5D, RZ6, RZ10x).** The most commonly used processors for new systems; includes an onboard PC interface.



**Non RZ processors (RX8), rack-mounted amplifiers (RA8GA), and Attenuators (PA5).** Devices that must be mounted in a ZB1 device chassis (rack) with a PC interface module (FO5) in the rear bay.

If your system includes more than one processor/attenuator, you must interconnect (daisy-chain) them during setup.

## Connect the WS input/output peripherals.

### Keyboard and Mouse

The WS is supplied with a keyboard and optical mouse. USB connections are provided on the WS back panel and two 10 ft. USB extension cables are provided to allow the WS to be rack-mounted with other equipment while the mouse and keyboard are positioned in a nearby work area.

### Monitors

**WS8** - A high-performance video card supports up to three monitors.

**WS4** - A high-quality video card supports two monitors.

**Note:** While there are alternate video connectors on the back panel (DP, VGA, DVI-D), they are disabled.



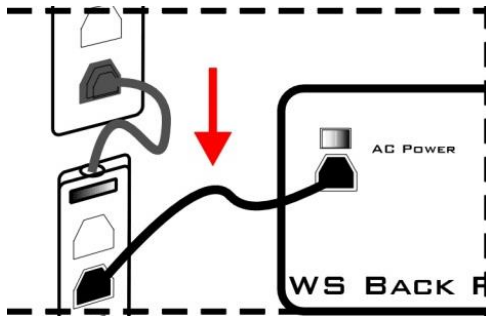
Back Panel Connections

1. AC Power Cord Input
2. Power Supply On/Off Switch
3. USB Inputs, used for provided Mouse and Keyboard
4. Video Card with DVI, HDMI, or mini-Display port inputs
5. PO5e Optical Card
6. Unavailable
7. Open PCIe x4, Half-Length Slot

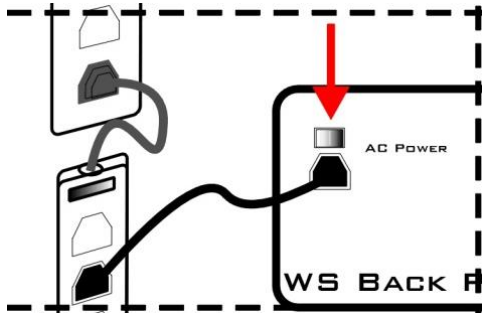
## Power on the WS.

The power supply is auto-switching for 110 V or 220 V. A soft on/off button is provided on the front panel and a hard power cutoff switch is provided on the back panel.

1. Use the provided AC power cord to connect the WS to a power strip or battery back-up connected to mains power.

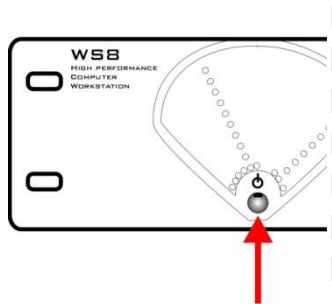


2. Use the back panel power switch to power on the WS.

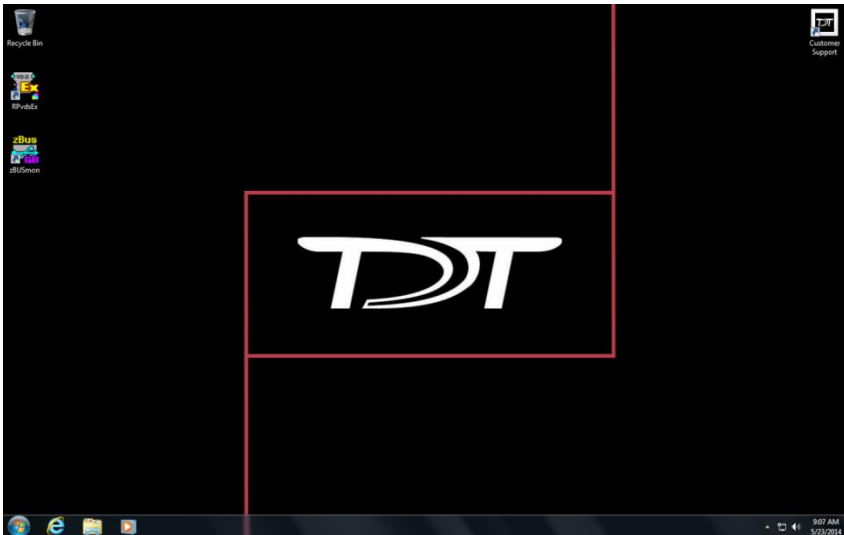




3. Use the front panel power button to start the device.



The WS is shipped with the 64-bit Windows® 10 operating system. When Windows® launches, you can set up user accounts and customize your desktop as you would with any computer. Your TDT software has already been installed and is available from the Start menu or on your desktop. Your desktop includes a link to the zBUSmon utility that you will use later in this section and a shortcut to our online support page.



## Connect the WS optical interface to interface dependent System 3 devices.

Processors and other interface-dependent devices mounted in a zBus chassis (rack) must connect to the WS's Optibit interface to form a communication loop between the PC and the TDT hardware.



The WS's Optibit interface port is located on the **back panel**.



The RZ processor's access to the Optibit interface is located on the **back panel**.

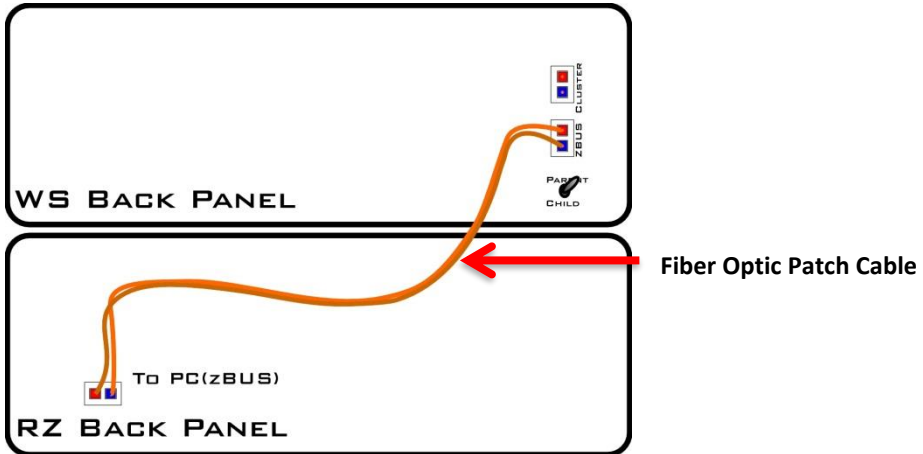


The zBus chassis' FO5 Optibit interface module is **mounted in a rear bay**.

Use the provided fiber optic cables to make the connections described in the step-by-step instructions below. Be sure to remove the clear plastic protective plugs from the ends of the cables first.

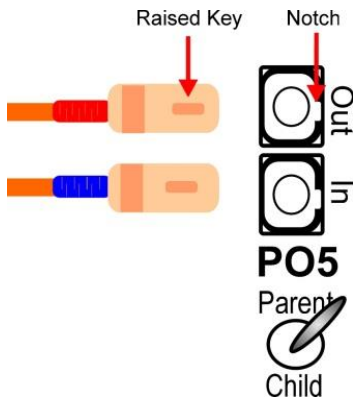
Use the provided duplex fiber optic patch cables (orange) to connect the WS's factory installed, Optibit optical interface card to the processor(s). The fiber optic ports on each device and the patch cables are color-coded and use key and notch connectors to ensure correct wiring.

## Connecting the WS to a Single RZ Device

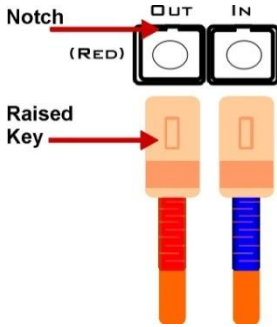


1. Remove the protective caps covering the ferrules on the fiber optic patch cable and fiber optic ports.

2. Connect one end of the duplex cable to the fiber optic port on the WS's factory-installed, Optibit optical interface card.
  - a. Match the strand with a **red collar** to the **Out** port connector as shown to the left.
  - b. Line up the raised **key** on the boot with the keyway **notch** on the interface port connector.
  - c. Grasp the strand by the **boot** and push the end firmly into the **port**. You will hear a **click** when the strand is connected securely.



**Note:** When disconnecting, grasp the boot and pull straight out. You will first notice the connector sliding backward slightly. This unlocks the strand and allows it to be removed. This locking

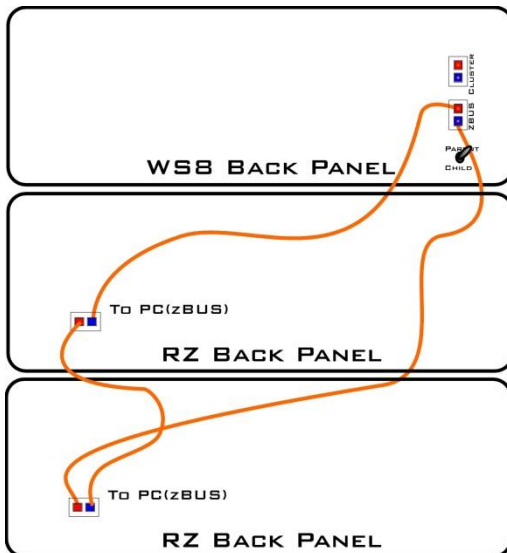


connection prevents accidental disconnects.

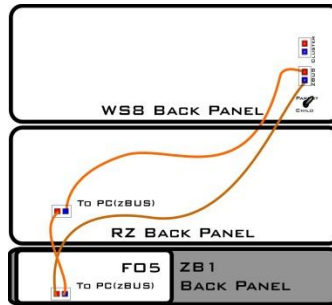
- d. If your interface card has a 'Parent/Child' switch, set it to **Parent**. **Child** is only used for Cluster Computing.
  - e. Connect the strand with the **blue collar** to the **In** connector on the port.
3. Repeat the steps to connect the other end of the duplex cable to the **To PC (zBUS)** port on the processor's back panel.

### Connecting Multiple Devices

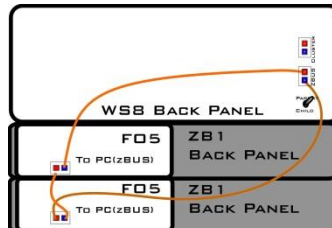
Multiple processors (or other interface-dependent devices mounted in a zBUS chassis) can be connected to the WS's Optibit interface. See connection diagrams below for common configurations.



Multiple RZ Processors



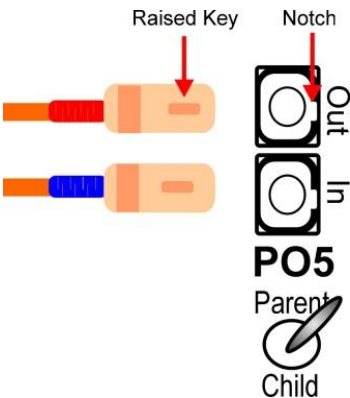
Mixed RZ and RX or RP.1 Processors



Multiple ZB1 mounted Devices (RX, RP.1, PA5)

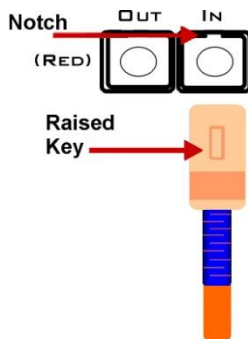


1. Remove the protective caps covering the ferrules on the patch cable and fiber optic ports.
2. Connect the end of a **single strand 5-meter cable** to the fiber optic port on the **WS's** factory-installed Optibit optical interface card. **Note:** The strands of the supplied 5-meter duplex patch cables pull apart for simplex use.

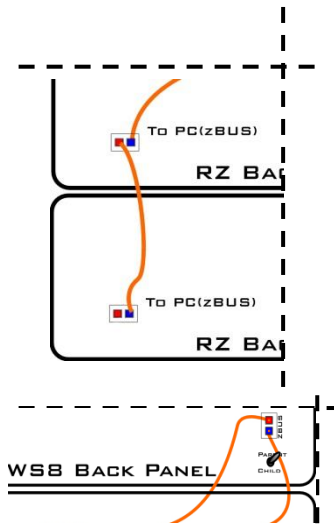


- a. Match the strand with a **red collar** to the **Out** port connector as shown to the left.
- b. Line up the raised **key** on the boot with the keyway **notch** on the interface connector.
- c. Grasp the strand by the **boot** and push the end firmly into the **port**. You will hear a **click** when the strand is connected securely.

**Note:** When disconnecting, grasp the boot and pull straight out. You will first notice the boot sliding backward slightly. This unlocks the strand and allows it to be removed. This locking connection prevents accidental disconnects.



- d. Set the Parent/Child switch to **Parent**. Child is only used for Synapse Cluster Computing.
- e. Connect the strand with the **blue collar** to the **In** connector on the port.

- 
- The diagram illustrates the connection of a 30-cm single strand cable from an RZ BA interface to a PC(zBUS) port, and a 5-meter cable from a WS interface to a PC(zBUS) port. The RZ BA interface is shown with a red end connected to the output (OUT) and a blue end connected to the input (IN). The WS interface is shown with a red end connected to the output (OUT) and a blue end connected to the input (IN). The PC(zBUS) port is shown with a red end connected to the output (OUT) and a blue end connected to the input (IN).
3. Repeat the steps to connect the **blue end** of the strand to the **To PC(zBus)** port on the first processor's back panel.
  4. Connect the **red end** of a **30-cm single strand cable** to the output of the **first processor's interface (OUT)**.
  5. Connect the other end (**blue**) of the 30-cm cable to the input on the interface port's second connector (**IN**).
  6. Repeat with 30-cm cables for each additional device with a PC-to-zBUS interface.
  7. Connect the **red end** of the second strand of the **5-meter** cable to the output of the last processor's interface (**OUT**).
  8. Connect the other end of this strand (**blue**) to the input on the **WS** interface (**In**).

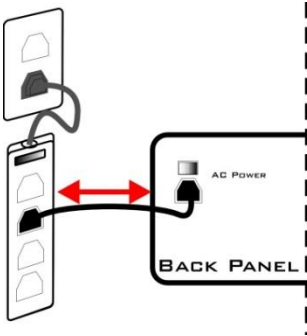
These connections are sufficient to get your system powered on and tested. You can add other components; such as preamplifiers, video trackers, and data streamers after you complete the installation guide. Connection information for these devices may be found in two places: the corresponding section of the *System 3 Manual* or the corresponding *Fast Facts* sheets provided with your system.

## Power on the connected components.

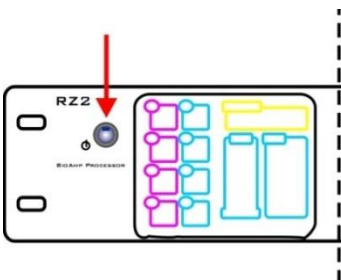
Earlier in the guide, you powered on the WS and set-up your processor(s). Now you can power on the newly connected System 3 devices.

The power supplies for these devices are shipped from the factory configured for the desired voltage setting (110 V or 220 V). If you need to change the voltage setting, please contact TDT support at +1.386.462.9622 or email [support@tdt.com](mailto:support@tdt.com).

**Important!** The RZs and ZB1 Device Chassis are UL compliant, see the Operator's Manual booklet or section in the back of the System 3 Manual Binder for power and safety information.



1. Plug the RZ or zBus device chassis power cable into a surge strip or battery backup connected to an AC power outlet. The power plug connector is located on the back panel of each devices.
2. Switch on the power button for each device. The TDT System 3 devices can be powered on in any order.



The **RZ devices** have a **blue** indicator light to show that the device is powered on.

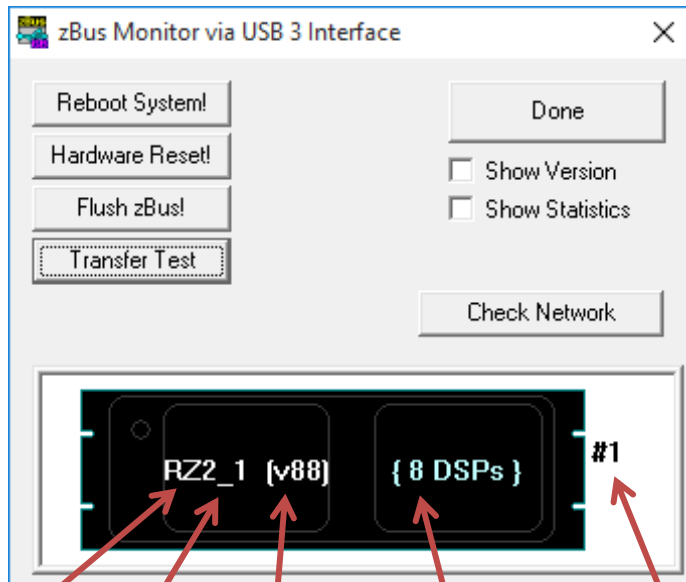
The **zBus chassis** power switch has a **green** indicator light and will flash regularly (~1 Hz) until communication is initiated by TDT software, such as zBUSmon. After this initial communication, the green indicator light will glow steadily. The green indicator light also pulses when data is being transferred to or from the zBus chassis.

## Test the system.

The zBUSmon utility is used to test the connection between the computer and your processor. When all devices are connected correctly, open the zBUSmon program.

### To open zBUSmon:

- Click the **zBUSmon** shortcut on the Desktop.



Device Part Number	Device Index	Microcode Version	Number of DSPs (RZ devices only)	zBus chassis (rack) number
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This program allows you to test the connection from the PC to the System 3 hardware. The hardware diagram displays all zBus chassis and programmable devices, such as the RP2.1, RX6, RZ2 and PA5, connected to the PC. The hardware diagram will not show most non-programmable devices, such as the HB7 or SM5, however, non-programmable devices that require a connection to the PC, such as the RA8GA and HTI3, will appear as an empty zBus chassis.



**Microcode.** The microcode running on each processor should match the driver version number. If you update your TDT drivers in the future, you must also manually update the microcode for each of your real-time processors by clicking the 'Update Drivers' button in zBUSmon. Note that the interface version number (v10 or v15) is fixed and cannot be changed by the user

**Logical Index.** The programmable devices are given a logical index starting with 1 so that multiple devices of the same type can be distinguished in software. This is the number in the device name after the underscore. The logical number displayed to the right of the device. When multiple devices are connected, this number reflects the order of the connections between chassis.

**Statistics.** When the Show Statistics box is checked, the amount of data transferred from the TDT modules to the PC and from the PC to the TDT modules and error status is displayed. If you see an error value other than 0, click Hardware Reset! to reset all connected hardware.

**Test.** A Transfer Test can be used to test data transfer both to and from the PC.

**To perform a transfer test:**

1. Ensure the **Show Statistics** check box is selected.
2. Click the **Transfer Test** button in zBUSmon.

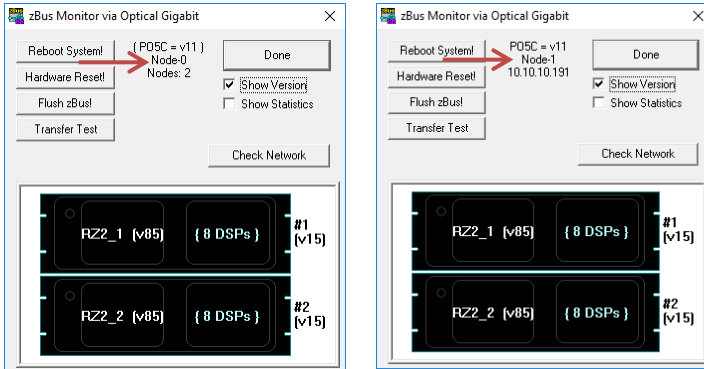
If successful, you should see a test passed message. The amount of data transferred to and from the PC will be displayed with no errors.

Now that the WS and your new processor(s) are setup and functioning, you can connect the rest of the system components; such as preamplifiers, video trackers, and data streamers. Connection information for these devices may be found in two places: the corresponding section of the System 3 Manual or the corresponding *Fast Facts* sheets with your system.

## Cluster Computing

If you are setting up a system for cluster computing—combining several WS8 + System 3 devices into a synchronized system—set up the individual systems first then connect them as shown in the *Synapse Manual, Cluster Processing* chapter.

In zBUSmon, cluster information is displayed when you select **Show Version**.



If the PO5C card is set to *Parent*, “Node 0” is displayed along with the number of nodes (WS8s) connected. If the PO5C is set to *Child*, the node position in the cluster (1+) is displayed along with the IP address of the connected *Parent* node. See the *Synapse Manual* for more information.

## Where to now?

Please skip to the end of this guide for information about the TDT documentation, the TDT warranty, and getting help with your system, page 42.

## Setting-Up with a Non-TDT Computer

System 3 is a flexible platform. Part of that flexibility is the ability to interface with a user selected, Windows®-based desktop or laptop computer. To support these options, the platform includes two versions of the high-speed interface and some products that can be run via USB. Before you begin setting-up your system, you'll need to determine what type of interface your system uses and check your PC to ensure it meets the requirements for TDT software and your interface. The steps you will take to set-up your system will depend on the components and interface you have selected.

The basic steps you'll take to set-up your system:

1. Unpack your equipment and identify your system interface, components and connection cables.
2. Install TDT Drivers on your computer.
3. Install the interface card in your PC. (PO5e and PO5C only)
4. Connect your computer to the processor(s).
5. Power on the system.
6. Test the system.

The rest of this section will go into each step in more detail with set-by-step instructions and illustrations.

### Unpack your equipment and identify your system components.

As you unpack you will need to identify your processor devices and other programmable devices (such as the PA5). These devices connect to the interface for programmable command and control.

The **RZ** processor form factor (shown below) uses an onboard Optibit interface that connects to either the PO5, PO5e, or PO5c installed in your computer. It

may also use the UZ3, a version of the Optibit that can be used with a laptop via a USB 3.0 port. All three connect using a fiber optic cable.



**RZ2 Processor (Optibit)**



**PO5e (PCIe)**



**UZ3 (USB 3.0 Interface)**

The **RX** processors are typically shipped pre-installed in a ZB1PS zBus device chassis (shown below with no modules installed). The device chassis includes a bus system that distributes communication and power throughout the system. One or two modular devices can be mounted in the chassis' front bays and an interface module must be mounted in the rear bay of any chassis housing a programmable device. This chassis may be used with both the Optibit and USB interfaces.



**ZB1 Chassis**



**FO5 (Optibit)**



**UZ2 (USB 2.0)**

The **RM** form factor uses an onboard USB interface.



**RM1 (USB 1.0)**

All the accessory cables you will need to connect your system are included in the shipping box. These may include fiber optic, power and USB cables.



**Fiber Optic Cable**



**AC Power Cable**



**USB Cable**

Other non-processor devices not shown might include a preamplifier, headstage, data streamer and more. These modules are shipped loose.

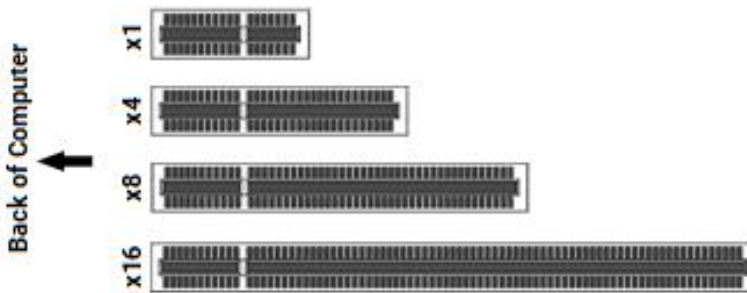
When setting-up your system, we recommend starting with just the processors. You can connect additional devices—such as preamplifiers—after the processors and interfaces are set-up.

For more information about each device in your system, see the *System 3 Manual*.

## Check system requirements.

**Operating system:** TDT Software and the Optibit and USB interfaces require Windows® 7 or Windows® 10.

**Expansion slots:** **The PO5e and PO5c Optibit PCI express interface cards** must be installed in a PCI Express slot. The PO5e and PO5c cards use a single lane (x1) but may be used in any PCIe slot size (x1, x4, x8 or x16).



The **UZ3 USB 3.0 Optibit Interface** requires a USB 3.0 compatible port on your laptop or computer.

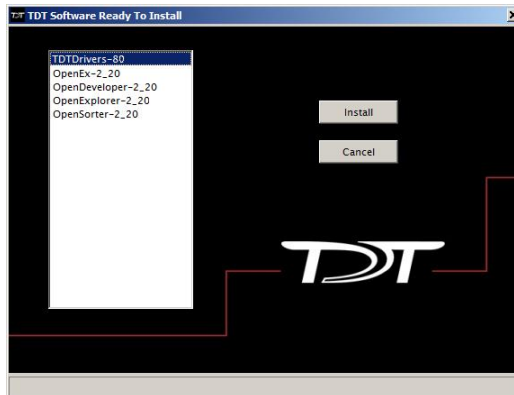


**Note:** The interface type must be selected during driver installation and TDT Drivers must be installed before connecting any TDT hardware to your PC.

### Install the TDT drivers.

The TDT Drivers are required for all programmable devices under computer control. They can be found on the TDT CD supplied with your system or may be downloaded from our website.

1. Insert the TDT CD in your computer's primary CD or CD/DVD Drive. The TDT CD will start automatically.



2. Click **TDTDrivers** in the software list then click the **Install** button to run the TDT Driver and RPvdsEx installation.

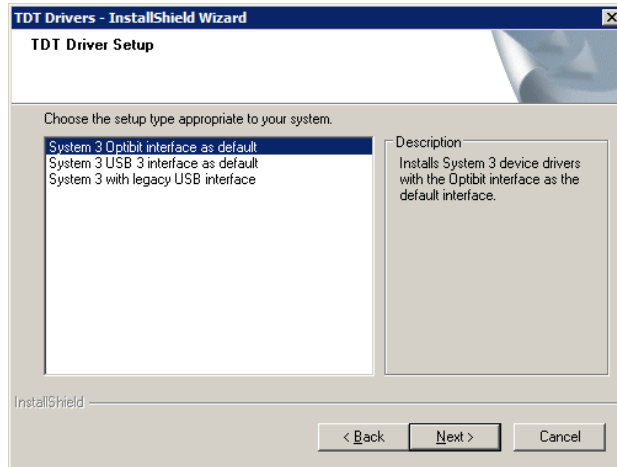
If you are prompted to answer a security question such as, *do you want to allow the following program to make changes to*

*this computer*, click **Yes**.

The InstallShield Wizard opens and will guide you through the installation.

3. On the version information page, click **Next**.
4. On the welcome page, click **Next**.

The TDT Driver Setup page is displayed.



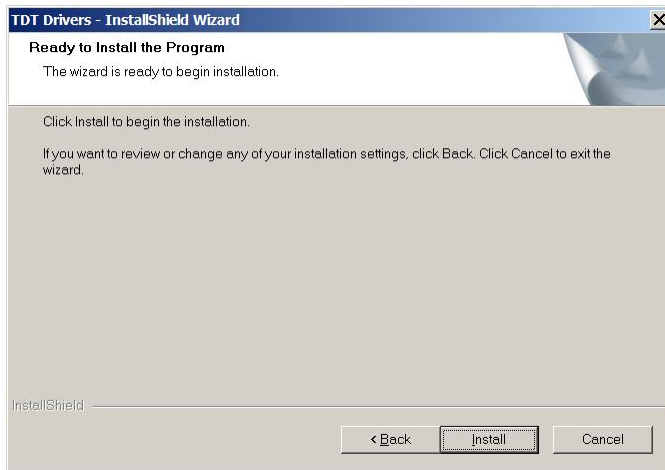
5. Click to choose one of the following setup types:

**System 3 with Optibit interface as default** - Choose this if your system uses an Optical interface (PO5/PO5e/PO5c).

**System 3 with USB 3 interface** - Choose this option if your system uses only the USB 3.0 interface (UZ3).

**System 3 with legacy USB interface** - Choose this option if your system uses only the USB interface (UZ2).

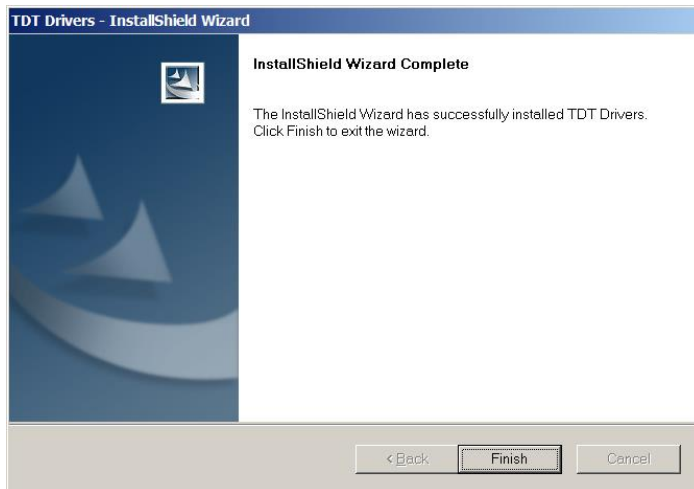
6. Click **Next**.



7. Click **Install**.

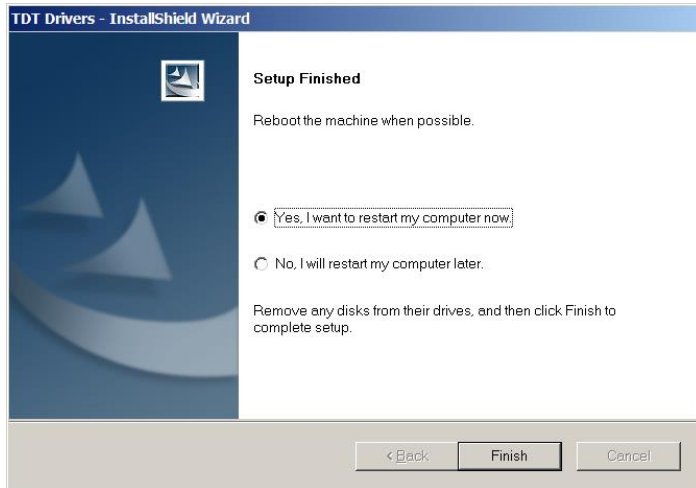
If you are asked, *would you like to install the device software*, click **Install**.

8. Click **OK**.





9. Click **Finish**.



10. To restart the computer and complete the driver installation, select the **Yes** option and click **Finish**.

After the TDT Drivers have been installed, the system interface and hardware should be setup and tested. After you have installed your hardware you can return to the TDT CD and install any other software included with your system.

## Setting-up the TDT equipment.

Most systems are comprised of an RZ device with a built-in Optibit interface and/or devices shipped in a ZB1PS zBus device chassis with an interface module mounted in the back slot. Systems may also connect to a laptop using the UZ3 interface. Finally, some systems will use a USB 2.0 interface (less common). The steps to install/connect, power on, and test your system will differ depending on how the system interfaces to your computer or laptop. From here you can go directly to the section for your interface type and work through the relevant sections in order.

For systems using an Optibit interface card (PO5/PO5e/PO5c), go to:  
**Install and connect to the Optibit Interface.**

**Pg 27**

For systems using an UZ3 Optibit interface, go to:  
**Connect to the UZ3 Optibit Interface.**

**Pg 29**

For systems using a UZ2 USB interface, go to:  
**Connect to the USB Interface.**

**Pg 38**

## Install and connect to the Optibit interface.

Desktop based systems using the Optibit interface (built into the RZ processor and/or FO5 zBus modules pre-installed in the ZB1PS device chassis) ship with fiber optic connector cables and a PCI Express (PO5e or PO5c) card. Cable might include a 5-meter duplex cable to connect the PO5e/PO5c to the TDT modules and possibly one or more 30 cm cables to connect multiple TDT chassis. Before connecting the rest of your system, you must install the interface card in your computer.

### *Install the PCI card in the computer.*



**PO5e**

1. Turn off the PC and open the cover.

**⚠ WARNING!** To prevent damage to the PO5e/PO5c card and computer, turn off the computer before installing the PO5e/PO5c card. Leave the computer plugged into a surge strip or battery backup so that it remains grounded.

2. Install the interface card. The diagram to the right shows compatible PCIe slots used with the PO5e and PO5c Optibit Interface cards.

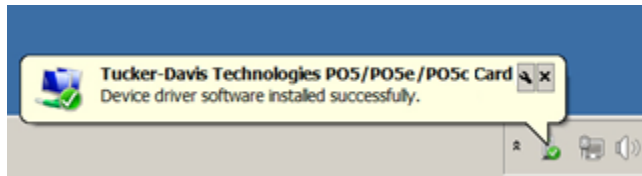
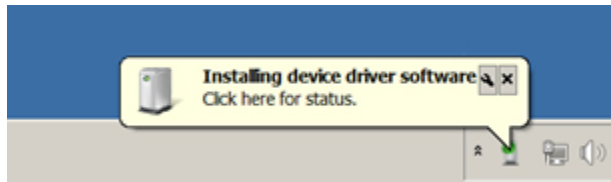
Do not attempt to install in low-profile PCI slots. While low profile and standard cards maintain the same electrical, protocols, PC signals, and software; the low-profile bracket is not compatible with standard cards.



3. Reconnect hardware devices such as a monitor, mouse, and keyboard; as needed.
4. Restart the PC.
5. **If the PC is running the Windows® 7 operating system or greater**, the PO5e/PO5c card will be automatically detected and the drivers will install.

**Note:** On 64-bit operating systems the card will be identified as *Tucker-Davis Technologies PO5 Card (64-bit driver)*.

Messages balloons will be displayed during this process.



When the driver installation is complete, go to **Assembling the zBus Chassis with Optibit Interface** on page 30.

If the PO5e/PO5c card is not detected automatically, you can scan for new hardware in the *Device Manager* or contact TDT support for assistance.

Now you can connect the Optibit interface to the zBus connection on the back of your RZ processor or to the FO5 modules in the zBus device chassis. See **Assembling the zBus Chassis with Optibit Interface** on page 30.

## Connect to the UZ3 Optibit interface.

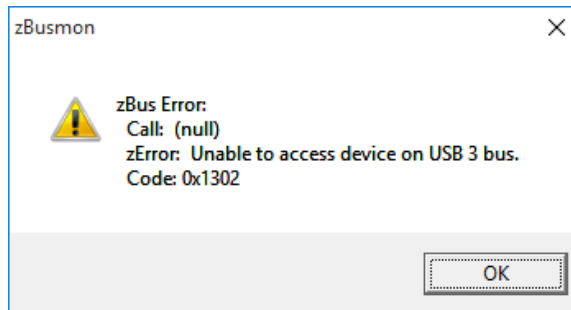


Laptop-based (or any system using a USB 3.0 interface) systems with TDT processors using the Optibit interface (FO5 zBus modules pre-installed in the ZB1PS device chassis and/or built into the RZ processor) ship with fiber optic connector cables, a UZ3 interface adapter, a USB C-C cable, and a C-A adapter.

Connect the UZ3 to your laptop/PC USB 3.0 port. Windows should automatically install the driver for it. Once the driver installation is complete, you can connect the UZ3 interface to the RZ or FO5 modules in the zBus device chassis.

See **Assembling the zBus Chassis with Optibit Interface** on page 30.

If the drivers failed to install correctly, or the UZ3 is not connected properly, then the following error message will appear when you open zBusMon:



### *Assemble the zBus chassis with Optibit interface.*



The RZ or zBus chassis (racks) connect to the PO5/PO5e/PO5c/UZ3 through the Optibit interface to form a communication loop between the PC and the TDT hardware. With the RZ, access to the Optibit interface is found on the back panel. In a zBus chassis, the Optibit interface is an FO5 module mounted in a rear bay. Use the provided fiber optic cables to make the connections described in the step-by-step instructions below.

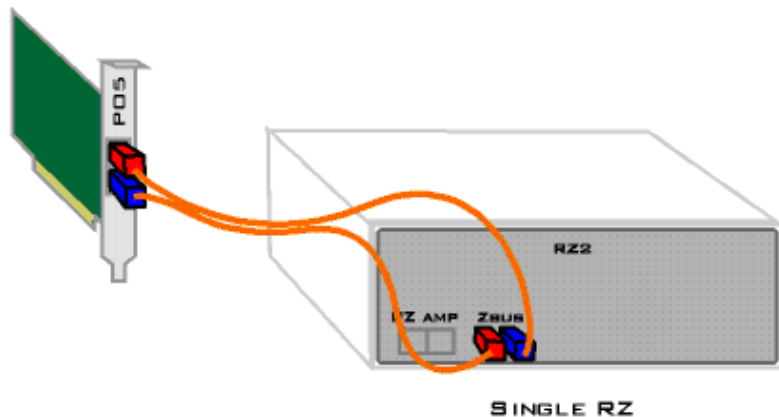
Be sure to remove the clear plastic protective plugs from the ends of the cables first. The fiber-optic cables have raised keys on one side of the connector. There are also keyway notches on the inside of the connectors on the RZ or FO5 module and the PO5/PO5e/PO5c/UZ3 interface. The fiber-optic cable should be oriented so that the keys on the cable connectors line up with the keyway notches on the modules.

When connecting the fiber optic cable, grasp the cable by the cap and push firmly. You will hear a click when the cable is connected securely. When disconnecting, grasp the cap and pull straight out. You will first notice the cap sliding backward slightly. This unlocks the cable and allows it to be removed. This locking connection prevents accidental disconnects.



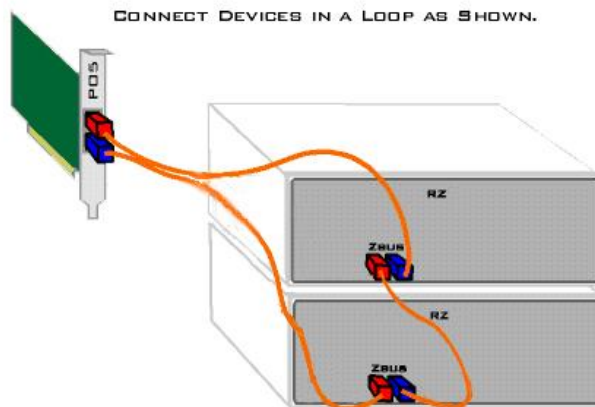
**To connect one Optibit interface:**

1. Connect the red end of a 5-meter cable to the output of the PO5/PO5e/PO5c/UZ3. The PO5/PO5e/PO5c is marked with a red dot labeled *OUT*. The UZ3 has the text (*RED*).
2. Connect the other end of this cable (blue) to the input on the Optibit interface (labeled *IN*).
3. Connect the red end of the second 5-meter cable to the output of the Optibit interface (labeled *OUT*).
4. Connect the other end of the second cable to the input of the PO5/PO5e/PO5c/UZ3 (not labeled).

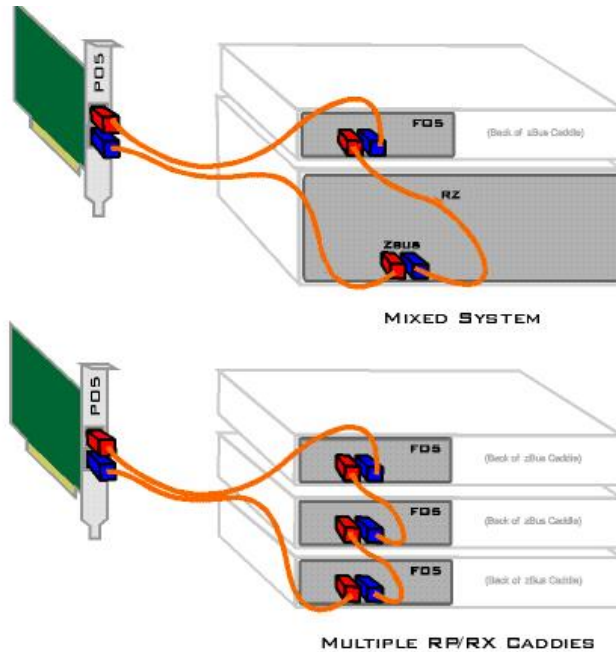


**To connect multiple Optibit interfaces (see image on page 14 for complete diagram):**

1. Connect the red end of a 5-meter cable to the output of the PO5/PO5e/PO5c/UZ3 (marked with a red dot labeled *OUT*).
2. Connect the other end of this cable (blue) to the input on the first Optibit interface (labeled *IN*).
3. Connect the red end of a 30 cm cable to the output of the first Optibit interface (labeled *OUT*).
4. Connect the other end of the first 30 cm cable (blue) to the input on the second Optibit interface (labeled *IN*).
5. Repeat with 30 cm cables for each additional Optibit interface.
6. Connect the red end of the second 5-meter cable to the output of the last Optibit interface (labeled *OUT*).
7. Connect the other end of this cable (blue) to the input on the PO5/PO5e/ PO5c/UZ3 (not labeled).







### *Power on the Optibit system.*

To test the Optibit interface, turn on the PC, plug the RZ or zBus device chassis power cable(s) into a surge strip or battery backup, then power on. The zBus chassis can be powered on in any order.

The RZ devices have a blue indicator light to show that the device is powered on. The RZ2 LCD screen will display interface connection information, however, other RZ devices do not display this information. The zBUSmon utility can be used to test the device connection. See **Testing the Optibit Interface** below.

Once a zBus chassis is powered on, the green indicator light on the power switch will flash regularly (~1 Hz) until communication is initiated by TDT

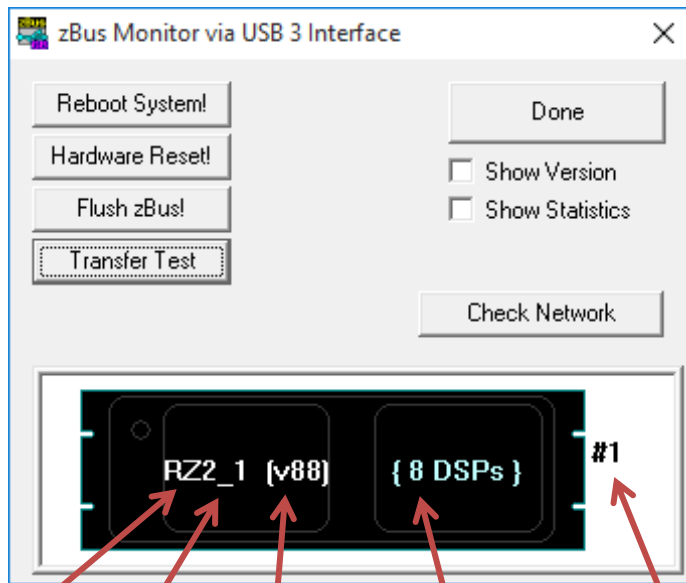
software, such as zBUSmon, RpvdsEx or OpenEx. After this initial communication, the green indicator light will glow steadily. You will also notice the green indicator light pulsing when data is being transferred to or from the zBus chassis.

### *Test the Optibit interface.*

When all devices are connected correctly, open the zBUSmon program.

#### To run zBUSmon:

- Click the **Start** button on the Windows® taskbar, point to **Programs**, point to **TDT Sys3**, and click **zBUSmon**. Alternatively, **double-click** the **zBUSmon** shortcut that installs to the Desktop.



Device Part  
Number

Device  
Index

Microcode  
Version

Number of DSPs  
(RZ devices only)

zBus chassis  
(rack) number

This program allows you to test the connection from the PC to the System 3 hardware. The hardware diagram displays all zBus chassis and programmable devices, such as the RZ2, RX6, RP2.1, and PA5, connected to the PC. The hardware diagram will not show non-programmable devices, such as the HB7, SM5, SA1, SA8, ED1, MA3, PM2r, FD1, or MS2. It also won't show peripheral devices that connect directly to the RZ processors, such as the PZ5 or IZ2. However, non-programmable devices that require a connection to the PC, such as the RA8GA and HTI3, will appear as an empty zBus chassis.

The microcode version of each processor device is shown in parentheses after the device type and index. If you have an RZ device in your configuration the number of DSPs installed on that RZ device will also be displayed.

The programmable devices are given a logical index starting with 1 so that multiple devices of the same type can be distinguished in software. This is the number in the device name after the underscore. The logical number of the zBus chassis, displayed to the right of the chassis, reflects the order of the connections between chassis.

If you installed the drivers that came with your system, then your devices were preprogrammed with the correct microcode. The device name of any device programmed with outdated microcode will appear in red in the diagram.

The microcode running on each processor should match the driver version number. If you update your TDT drivers in the future, you must also manually update the microcode for each of your real-time processors. See **Updating Your System** on page 25 for more information.

When the **Show Version** check box is selected, the microcode version of the interface and of each programmable device is displayed.

Note that the interface version number (v10 or v15) is fixed and cannot be changed by the user. The microcode on the PA5 programmable attenuators (v30) is also fixed.

When the **Show Statistics** box is checked, the amount of data transferred from the TDT System 3 modules to the PC and from the PC to the TDT System 3

modules and error status is displayed. If you see an error value other than 0, click **Hardware Reset!** to reset all connected hardware.

A Transfer Test can be used to test data transfer both to and from the PC.

### To perform a transfer test:

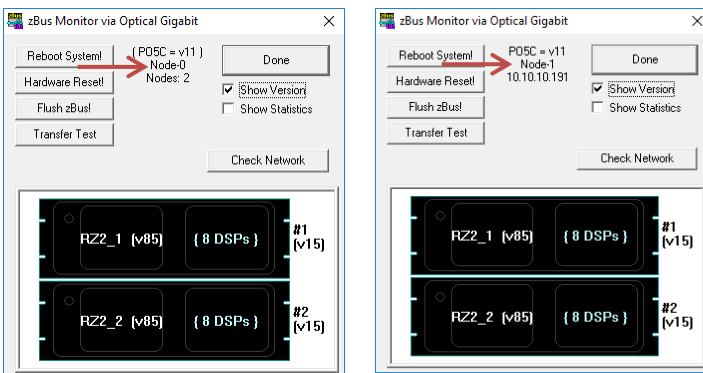
1. Ensure the **Show Statistics** check box is selected.
2. Click the **Transfer Test** button in zBUSmon.

If successful, you will see a *Test Passed* message. The amount of data transferred to and from the PC will be displayed with no errors.

## Cluster Computing

If you are setting up a system for cluster computing—combining several WS8 + System 3 devices into a synchronized system—set up the individual systems first then connect them as shown in the *Synapse Manual, Cluster Processing* chapter.

In ZBUSmon, cluster information is displayed when you select **Show Version**.



If the PO5c card is set to *Parent*, “Node 0” is displayed along with the number of nodes (WS8s) connected. If the PO5c is set to *Child*, the node position in the cluster (1+) is displayed along with the IP address of the connected *Parent* node. See the *Synapse Manual* for more information.

## Connect to the USB Interface.

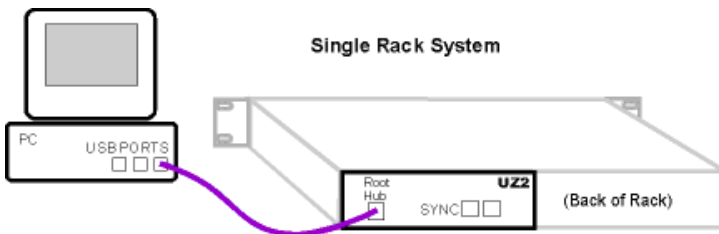
**Important!:** The TDT drivers must be installed before connecting the zBus chassis to your PC (see page 19).

When using the USB interface, a UZ2 interface module is required for every chassis which houses a programmable module such as the RX Multiprocessor modules or the PA5 Programmable Attenuator. The UZ2 is installed in the back bay of the chassis and should be connected to the PC USB port. If you have multiple chassis housing programmable modules you will need an available USB 2.0 port on the host PC for each UZ2 in a multi-chassis system. We typically recommend upgrading to an Optibit interface if a system requires more than three chassis.

**Note:** The UZ2 is designed for USB 2.0 ports. Some systems might use the UZ1 and UB4 interfaces designed for USB 1.1 ports. Connections for 2.0 and 1.1 compatible devices are similar; however, each system should use EITHER the UZ2 OR the UZ1/UB4 configuration. The two groups of devices should not be combined. If you are unsure how your system should be configured, contact TDT technical support staff for assistance. Also note that the UB4/UZ1 USB interfaces should not be used with the high-performance processors, such as RX5, RX6, RX7 and RX8.

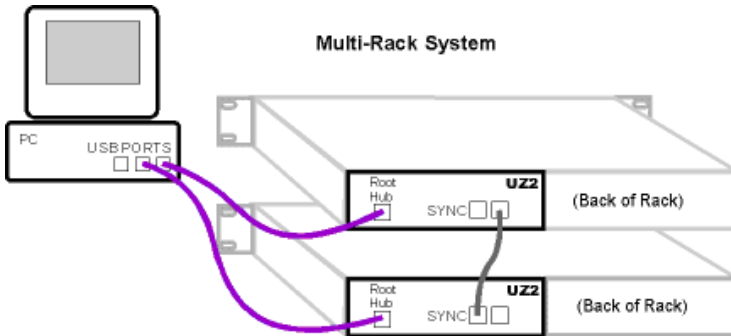
## Connect the Interface to the Host PC.

To connect a device chassis (with UZ2 connector on the back of the chassis), use the supplied A-to-B type USB cable to connect the UZ2 chassis to the USB port on your computer.



## Using the UZ2 Sync

Each USB module has its own clock which will drift relative to each other. The Sync (see diagram below) allows users to synchronize several modules that are mounted in different device chassis. The Sync line uses the clock from one USB module, the parent, to synchronize the clocks across all zBus device chassis.



Connect the *Sync Out* of the parent clock to the *Sync In* of the child with a short patch cable.

To connect several device chassis, daisy-chain the connections between the child chassis. When the Sync lines are connected correctly the LED to the left of the Sync connectors should be lit on each child devices. The LED on the parent will remain unlit. The LED should only flash when the Sync lines are not connected.

Sync LEDs	Indicates ...
Flashing (on child)	Connected incorrectly
Parent device not lit and child devices lit	Connected correctly
No devices lit	Not synced to any device

## Start the zBus hardware.

After connecting the zBus chassis, plug the power cable(s) into a surge strip or battery back-up and turn on each chassis. When the chassis are turned on for the first time, the computer recognizes the TDT hardware as a new device and searches for and loads the USB driver for TDT System 3. An installing drivers message or *Found New Hardware* wizard may appear twice for each zBus chassis in your system. It is important that you allow Windows® to install the driver both times.

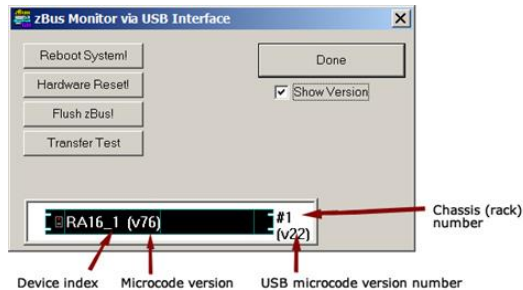
Once powered, the green indicator light on the power switch of the zBus chassis will flash regularly (~1 Hz) until communication is initiated by TDT software such as zBUSmon or RPvdsEx. After this initial communication, the green light will glow steadily. You will also notice the power indicator light pulsing when data is being transferred to or from the zBus chassis.

## Test the USB interface.

When all devices are connected correctly run the zBUSmon program.

### To run zBUSmon:

- Double-click the **zBUSmon** shortcut that installs to the Desktop. Alternatively, click the **Start** button on the Windows® taskbar, point to **Programs**, point to **TDT Sys3**, and click **zBUSmon**.



This program allows you to test the USB connection from the PC to the System 3 hardware. The hardware diagram displays all zBus chassis and programmable devices, such as the RP2.1, RX6 and PA5. The hardware diagram will not show



most non-programmable devices, such as the HB7 or SM5, however non-programmable devices that require a connection to the PC (for example RA8GA, HTI3) will appear as an empty zBus chassis.

The programmable devices are given a logical index starting with 1 so that multiple devices of the same type can be distinguished in software.

**Important!:** The device indices are dependent on the order in which the devices were powered on and recognized by the PC. Software applications connect to the devices by name and index value. If you have multiple devices of the same type it is very important that you power on the devices in the same order every time so that the device indices will be consistent in software. The number of the zBus chassis, displayed to the right of the chassis in the diagram, reflects the order in which the USB devices were powered on.

The microcode version of all real-time processors (RXn, RPx and so forth) is displayed in parentheses to the right of the part number in the diagram. They must match the current version of TDT Drivers installed on the PC. If you installed the drivers that came with your system, then your devices were preprogrammed with the correct microcode. If you update your TDT Drivers in the future, you must also manually update the microcode for each of your real-time processors. See **Updating Your System** at the end of this guide for more information.

When the **Show Version** check box is selected, the microcode version of the interface and of each programmable device is displayed. Note that the USB microcode version number (v22) is fixed and cannot be changed by the user. The microcode on the PA5 programmable attenuators (v30) is also fixed. A Transfer Test can be used to test data transfer both to and from the PC.

#### **To perform a transfer test:**

- Click the **Transfer Test** button in zBUSmon.

**Note:** When using the UZ2 USB 2.0 interfaces, clicking the *Hardware Reset* button in zBUSmon will change the version numbers to 6543 and a transfer test will fail. After using the *Hardware Reset* button, wait 20 seconds then close and reopen zBUSmon. The correct version numbers should be displayed.

## After Setting Up Your System

### Hardware Warranty

TDT System 3 hardware carries a five-year warranty on parts and labor. Custom hardware carries a one-year warranty on parts and labor. All headstages, the ES1 and the EC1 carry a two-year warranty. Contact TDT to obtain an RMA (return merchandise authorization) number before returning any hardware. Repairs are usually completed within one week of receipt.

### PDF Manuals and Electronic Documents

The TDT manuals include technical details about your system.

The latest electronic documents and PDF versions of all manuals are always available on the TDT website at <http://www.tdt.com/user-manuals.html>.

This page includes links to all application software, such as Synapse and BioSigRZ.

For information about your equipment, see the **System 3 Manual**.

For information on real-time circuit design, see the **RPvdsEx Manual**.

If you cannot connect to the internet, you can view the version available at the time of the last software release.

- After installation, TDT Manuals are stored in the default help directory:  
C:\TDT\TDTHelp\

### Updating Your System

Typically, when adding new modules to an existing system, you will need to update the microcode on existing programmable devices to match the latest version of drivers supplied with your new modules.

## *About the Microcode*

The microcode is low-level software that resides in flash memory on the System 3 processor devices. The microcode contains the DSP instructions for the RVPdsEx processing components. Because the System 3 design allows you to update this software quickly and efficiently, you can take advantage of the latest software tools available without purchasing new equipment or sending devices to our manufacturing facility for upgrades.

### *When should the microcode be updated?*

Every time a new version of TDT Drivers is installed on the host PC, the microcode should be updated on all processors in the system. This includes programmable devices that may have been purchased prior to your new system. New versions of the files needed to update the microcode are always included in the TDT Drivers installation.

### *How is the microcode updated?*

Users must update the microcode using the zBUSmon utility (zBusmon.exe). This program is copied to the host PC during TDT Drivers installation and is stored in the following directory: C:\TDT\zDrv3. Click the 'Update Devices' button to run the update. For more detailed instructions on how the microcode is updated for specific TDT processors, check the **System 3 Manual** or the **Updating Microcode FastFacts** guide available on the TDT website.

## **Installation Anomalies and Tech Notes**

A complete listing of anomalies is maintained in the Support area of the TDT Website. It can be found at: <http://www.tdt.com/technotes/>,

## **Troubleshooting**

Contact TDT at [support@tdt.com](mailto:support@tdt.com) or (+1) 386.462.9622 if you have any installation issues.