Ritec 2:
Operation Manual

Updated: 11/15/2012
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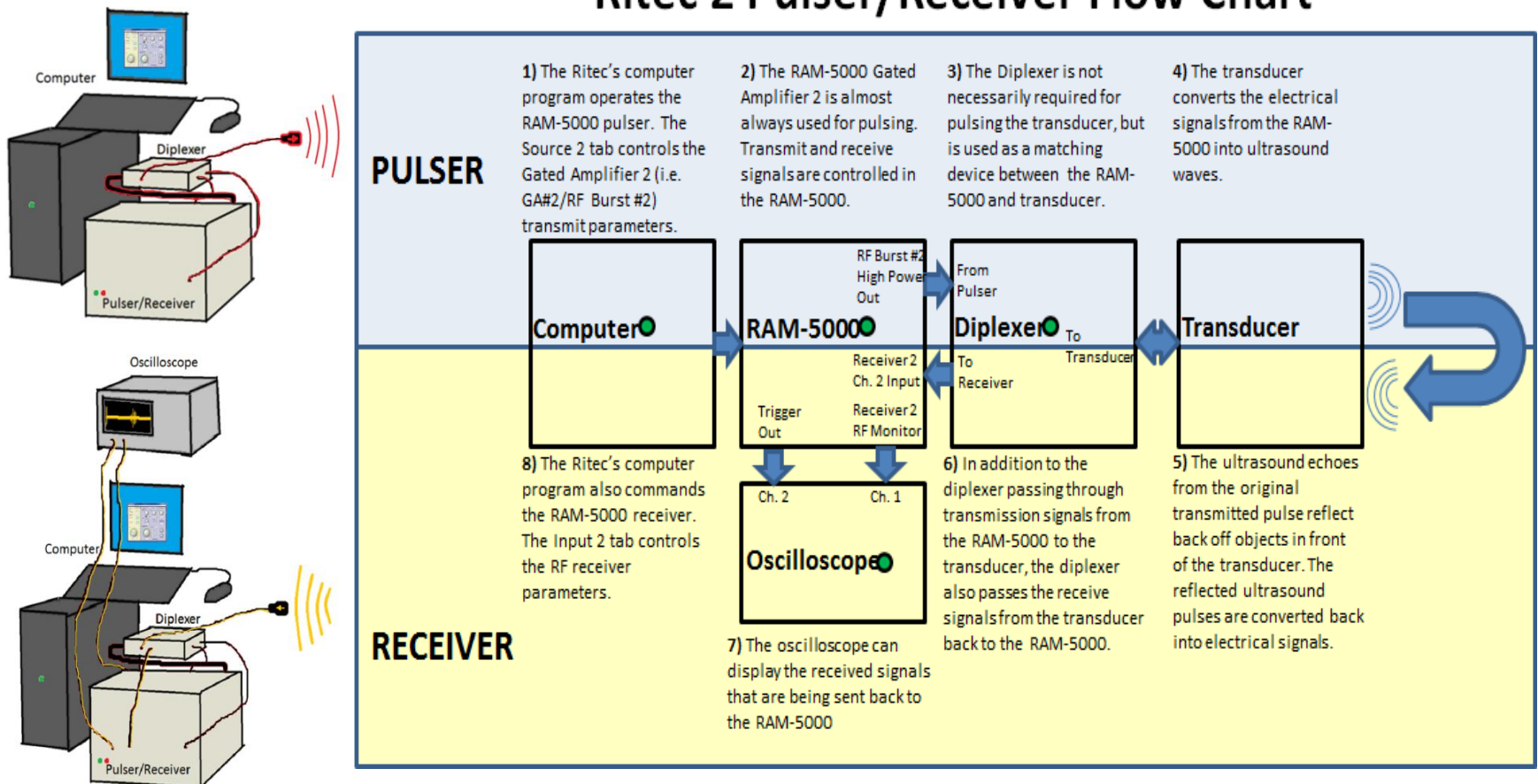
1 : System Overview

The Ritec 2 system is a computer controlled high power ultrasonic pulser/receiver operated during BRL experiments. It is designed to excite a single element transducer to emit RF bursts of ultrasound and receive reflected echoes. The output signals are finely controlled via the computer and the received input signals can be monitored on an oscilloscope.

The Ritec 2 functions identically as the Ritec 1 system. The only operational difference between Ritec 1 and Ritec 2 is that Ritec 2 has a new LabVIEW user interface. All DPCD bubble experiment should be done using only the Ritec 1 system.

Ritec 2 Pulser/Receiver Flow Chart

PULSER

1) The Ritec's computer program operates the RAM-5000 pulser. The Source 2 tab controls the Gated Amplifier 2 (i.e. GA#2/RF Burst #2) transmit parameters.

2) The RAM-5000 Gated Amplifier 2 is almost always used for pulsing. Transmit and receive signals are controlled in the RAM-5000.

3) The Diplexer is not necessarily required for pulsing the transducer, but is used as a matching device between the RAM-5000 and transducer.

4) The transducer converts the electrical signals from the RAM-5000 into ultrasound waves.

Computer → **RAM-5000** — RF Burst #2 High Power Out → From Pulser — **Diplexer** To Transducer → **Transducer**

Receiver 2 Ch. 2 Input ← To Receiver

Trigger Out — Receiver 2 RF Monitor

Ch. 2 — Ch. 1

Oscilloscope

RECEIVER

8) The Ritec's computer program also commands the RAM-5000 receiver. The Input 2 tab controls the RF receiver parameters.

6) In addition to the diplexer passing through transmission signals from the RAM-5000 to the transducer, the diplexer also passes the receive signals from the transducer back to the RAM-5000.

5) The ultrasound echoes from the original transmitted pulse reflect back off objects in front of the transducer. The reflected ultrasound pulses are converted back into electrical signals.

7) The oscilloscope can display the received signals that are being sent back to the RAM-5000

Computer

Diplexer

Oscilloscope

Computer

Pulser/Receiver

2 : System Location & Components

The Ritec 2 is stored in the Bioeffects Room.
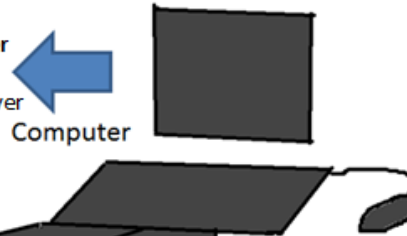
The Ritec 2 System

The **Oscilloscope** can be used as a display device.

Oscilloscope

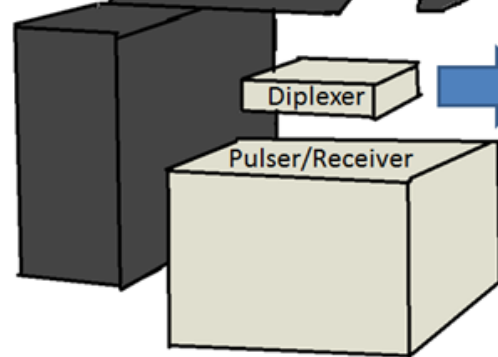The **Computer** controls the Pulser/Receiver via the Ritec software program.

Computer

The **RAM-500 Pulser/Receiver** is the excitation source for a single element transducer. In conjunction with the **Diplexer**, the RAM-500 can enable the Ritec system to both transmit and receive from a transducer.
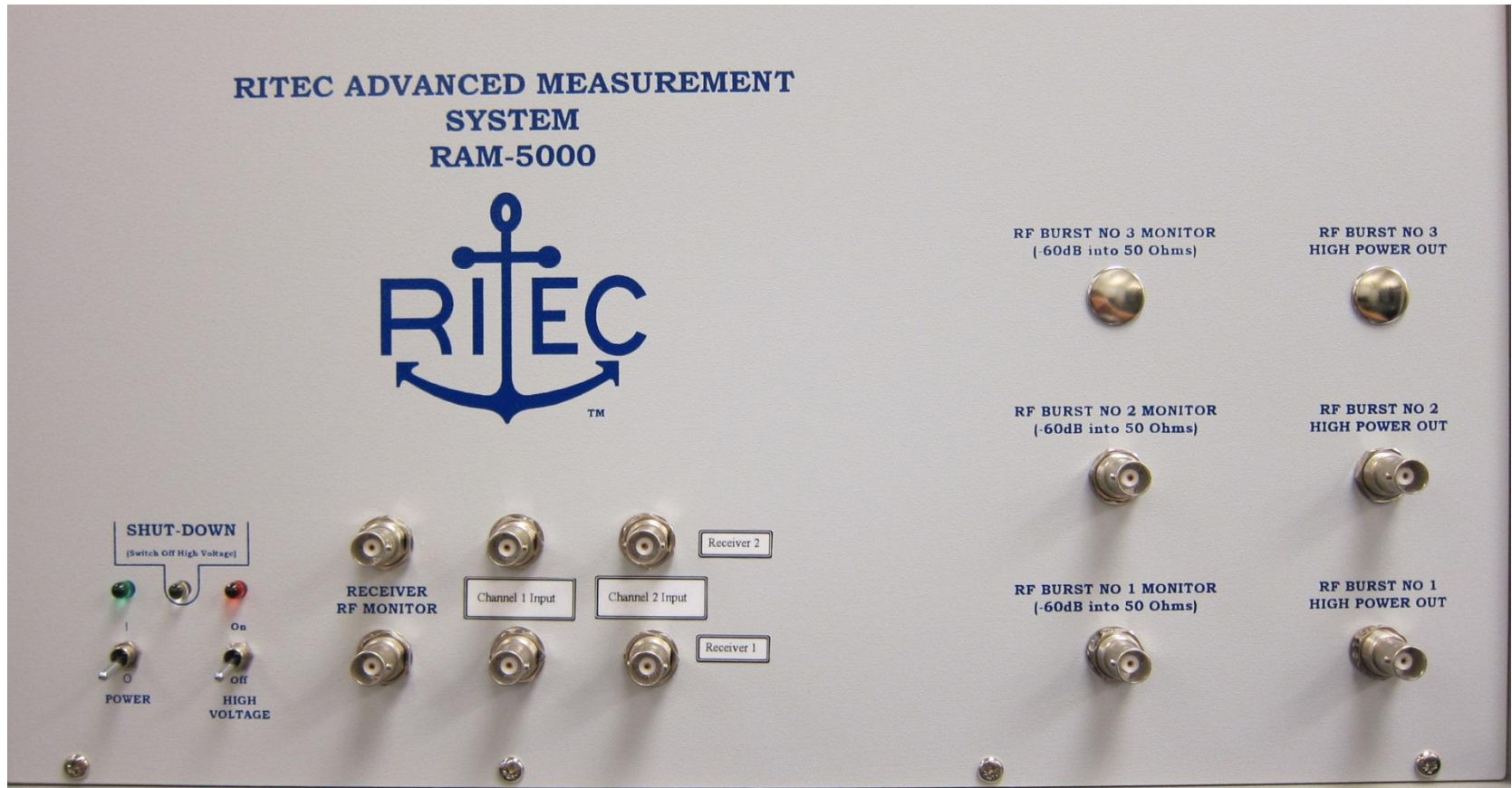
Diplexer

Pulser/Receiver

The Ritec 2 system has three main components:
1) **RAM-5000 Pulser/Receiver & Diplexer**
2) **Dell Computer**
3) **LeCroy Oscilloscope** (Optional – used only for receiving)

2 : System Components (Continued)

RAM-5000: Front Panel

2 : System Components (Continued)

RAM-5000: Rear Panel
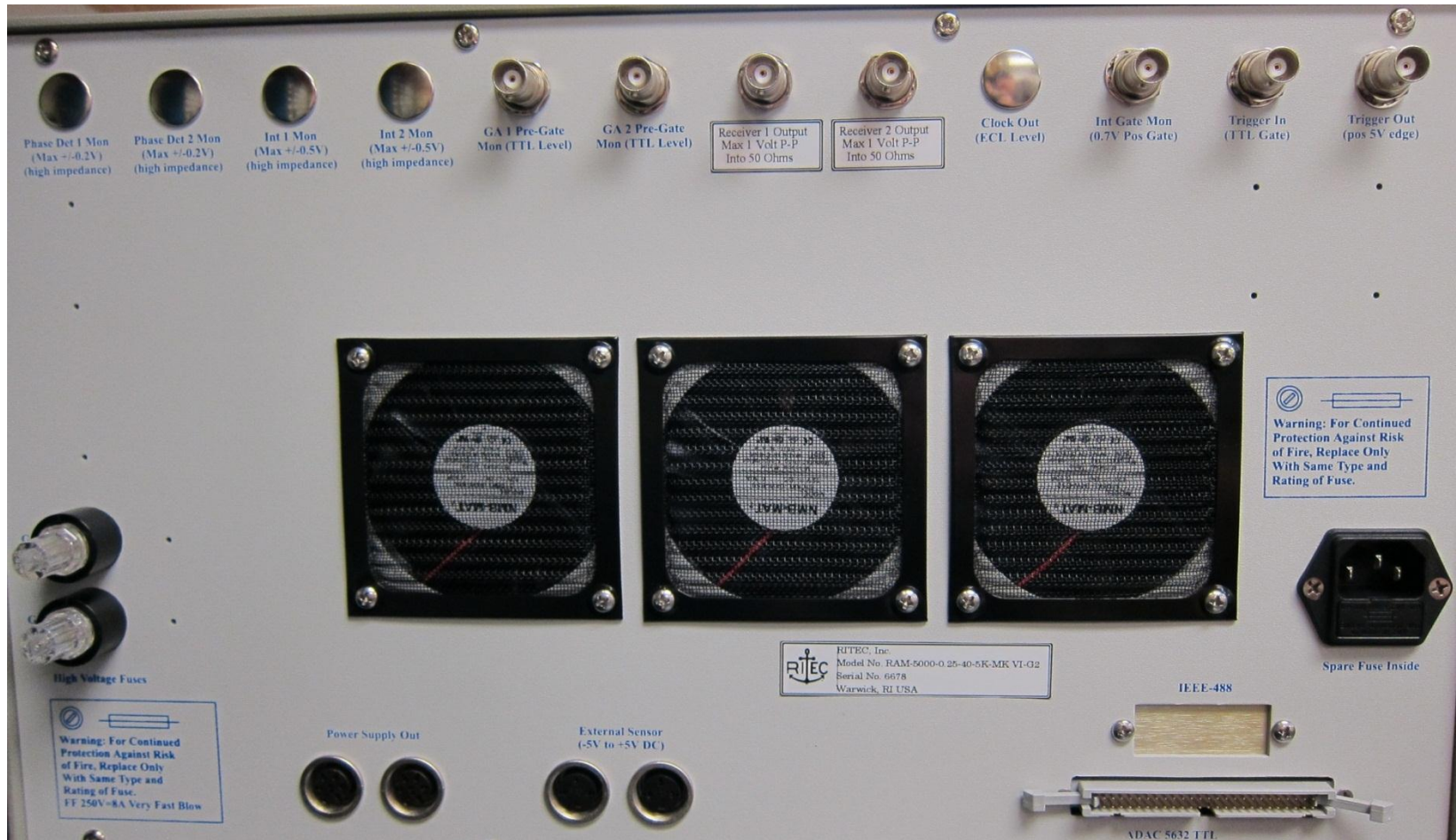
Diplexer

3 : System Start-Up/Shutdown

Power on the Computer | Flip up the RAM-5000 POWER switch. | Wait 30 seconds | Flip up the RAM-5000 HIGH VOLTAGE switch | Open the RAM-5000 program
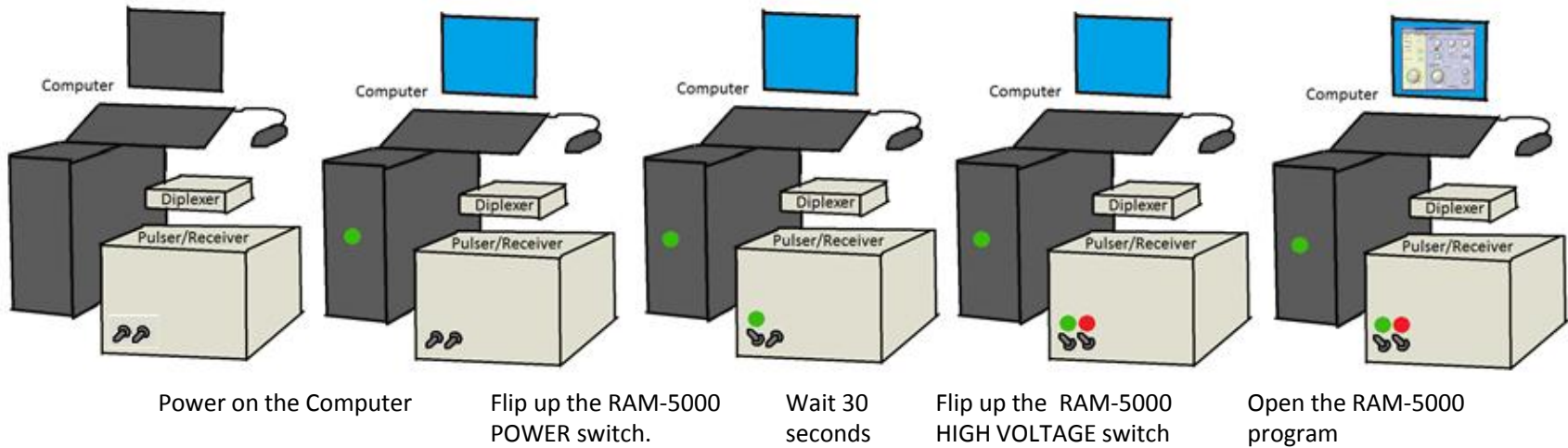
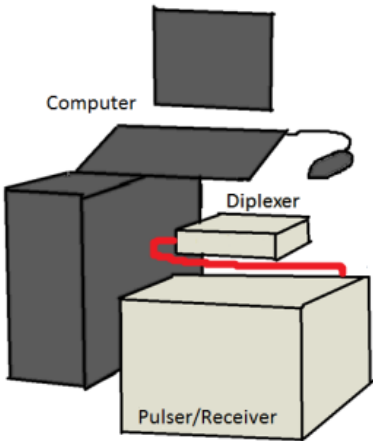To **start up** Ritec 2, these actions must be done in order.
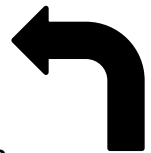
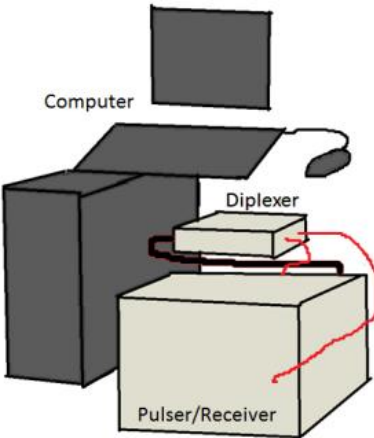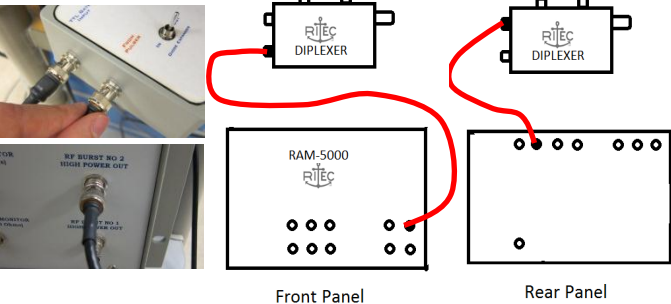To **shutdown** Ritec 2, the *opposite* actions are done in *reverse* order.

4 : Pulser Setup

CONNECT…

Power Supply Out
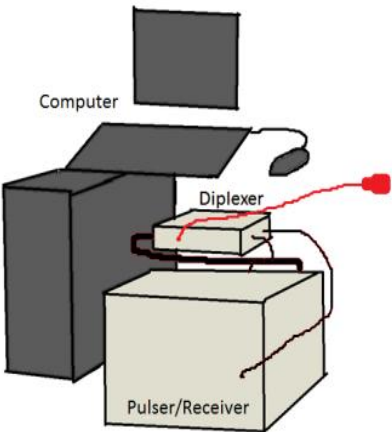(Ritec Rear Panel)
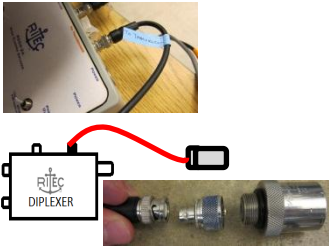To
POWER
(Diplexer Right Side)

Rear Panel
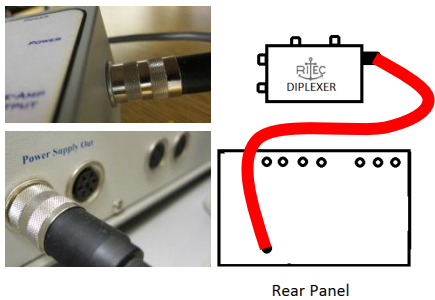
FROM PULSER
(Diplexer Left Side)
To
RF BURST NO 2
HIGH POWER OUT (Ritec Front Panel)

Front Panel

GA-2 Pre-Gate Mon (TTL Level)
(Ritec Back Panel)
To
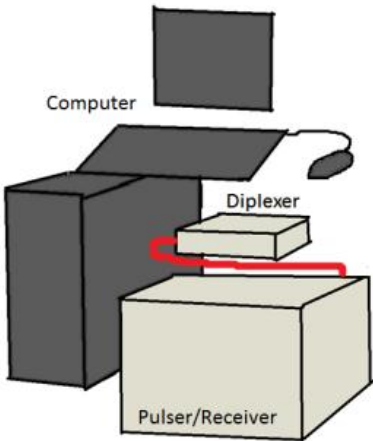**TTL GATE INPUT** (Diplexer Left Side)
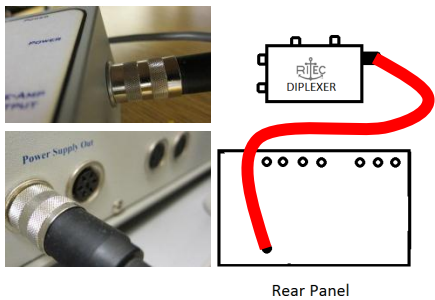

Rear Panel

TO TRANSDUCER
(Diplexer Top Side)
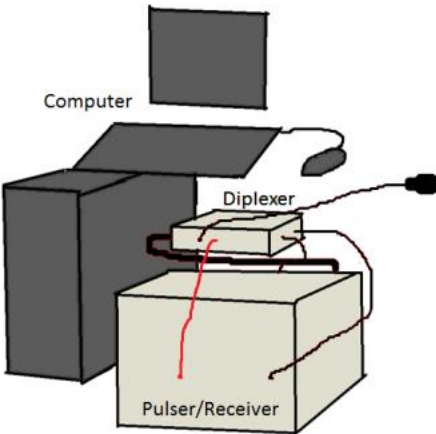To
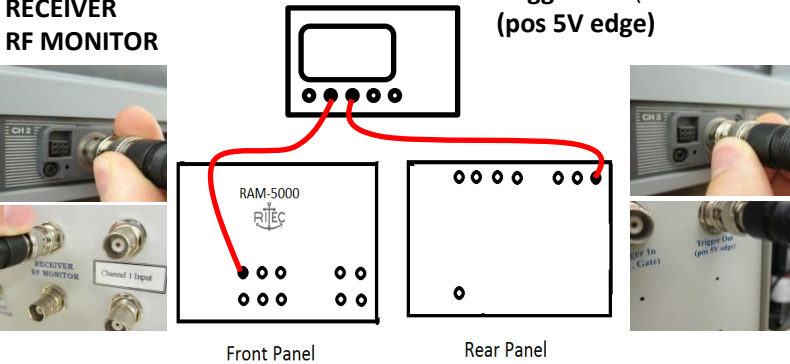Single Element Transducer

5 : Receiver Setup

CONNECT…

Power Supply Out
(Ritec Rear Panel)
To
POWER
(Diplexer Right Side)

Rear Panel

TO RECEIVER (Diplexer Top Side)
To
Receiver 2
Channel 1 Input (Ritec Front Panel)
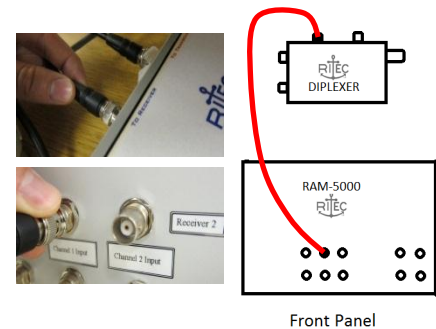
Front Panel

Ch. 2 (Oscilloscope)
To
Receiver 2 (Ritec Front Panel)
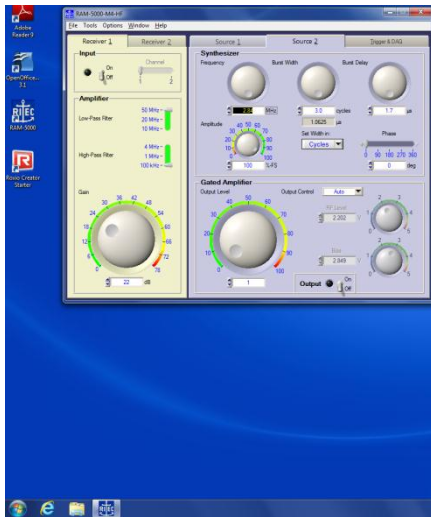**RECEIVER**
RF MONITOR

Front Panel   Rear Panel
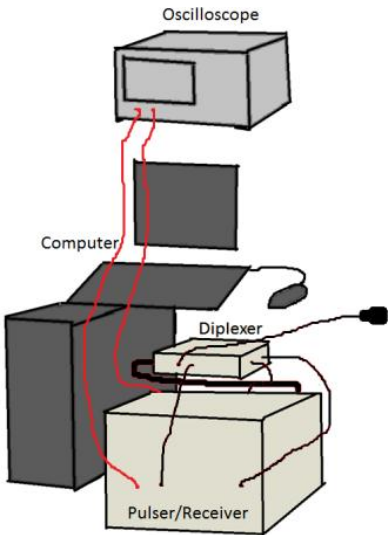
Ch. 3 (Oscilloscope)
To
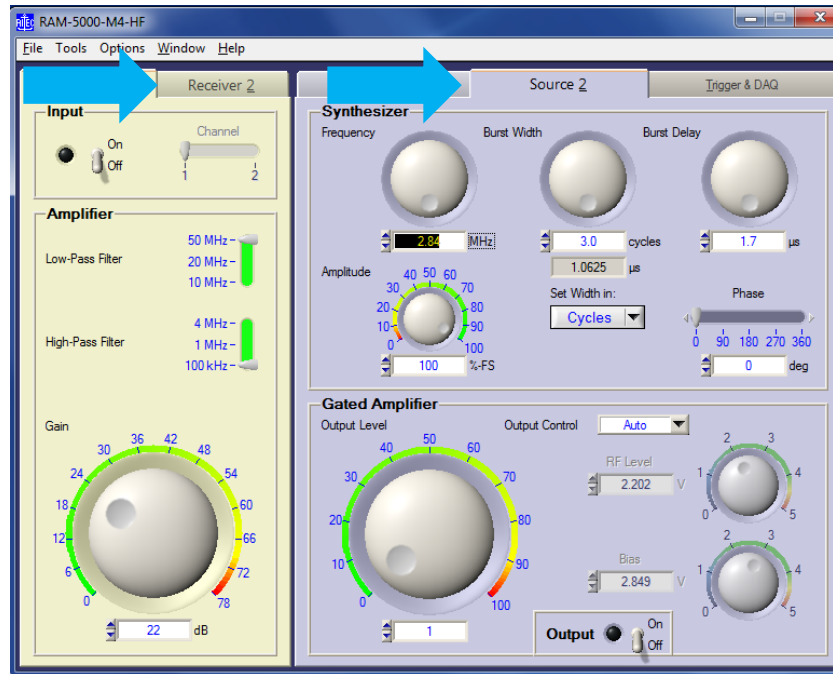**Trigger Out** (Ritec Rear Panel)
(pos 5V edge)

6 : Running the Application

The RAM-5000 program can be opened via the desktop icon or through the Windows Program Menu. The receiver tabs control the receiver settings. The Source tabs control the pulser settings

Pull up a tab by clicking on it.

MODIFY THE CORRECTLY NUMBERED TABS ACCORDING TO THE RECEIVER/SOURCES IN USE.


In the "**Receiver 2**" tab

-Set the Input Channel

-Set Low/High Pass Filter settings

-Set the Receiver gain (dB) with the Dial, increment/decrement buttons, or by typing in the entry field

Enable/Disable the receiver by switching the "Receiver 2" Input On/Off

In the "**Source 2**" tab

-Set the center frequency and cycles

-Set Burst Delay to 1.7 us, Amplitude to 100%, Phase to 0 deg, Output Control to Auto

-Set the Gated Amplifier Output Level with the Dial, increment/decrement buttons, or by typing in the entry field

Enable/Disable the GA-2 Output by switching the "Source 2" Output On/Off
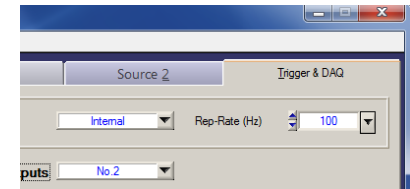
In the "**Trigger and DAQ**" tab

-Set the Trigger Source to Internal

-Set the Rep. Rate (Hz) with increment/decrement buttons or by typing in the entry field

The "Trigger & DAQ" tab can be popped out by dragging it outside of Ritec window frame

7 : Troubleshooting

1) The proper Source and Receiver tabs and channels need to be used in the RAM-5000 program depending on the connections. If you are using GA-2 and Receiver 2 - channel 1, make sure to enable and change settings in tabs Source 2 and Receiver 2 - channel 1.
2) Check the fuse lights on the front and rear panel. They are only on if a fuse is blown. Only if the yellow fuse lights are on, should the fuse be replaced.
3) Check proper cable connections. Cables should only be replaced as a last resort.
4) Shutdown the system and re-perform the Start-Up by following the steps exactly.

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Pulser Considerations

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The Ritec RAM-5000 needs power and high voltage.
Make sure the power strip that the Ritec plugs into is on.
The Ritec Diplexer needs power from the RAM-5000
Make sure the power cable from the Diplexer is connected to the RAM-5000. The Diplexer sends and receives signals from the transducer.
The Diplexer needs connections to GA-2
All Ritec 2 applications primarily use GA-2.   Two cable connections from the RAM-5000 to the Diplexer must exist. Also the computer strip ribbon cable from the rear port of the RAM-5000 to the computer must be intact.

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Receiver Considerations

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The Ritec Diplexer needs to be connected to a Receiver channel of the RAM-5000.
The Oscilloscope needs to be connected to the RF monitor of the RAM-5000 to receive RF data from the single element transducer and it needs to be connected to the Trigger Out of the RAM-5000 to synchronous signal acquisition (it defines a starting point, otherwise the signal would constantly move on the time axis of the oscilloscope screen).
The switch between TO TRANSDUCER and TO RECEIVER on the DIPLEXER must be flipped up to RECEIVER OUTPUT

If the Ritec still does not work, immediately notify a lab staff member.