



Transducer Testing

RVTEC - 20 November 2013

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Procedure



CHIRP 3260 HARBOR / SEA ACCEPTANCE TEST (HAT / SAT)

Part Number:	D229-04331
Serial Number:	

D101-04819-Rev4.0
October 2013

Equipment Required

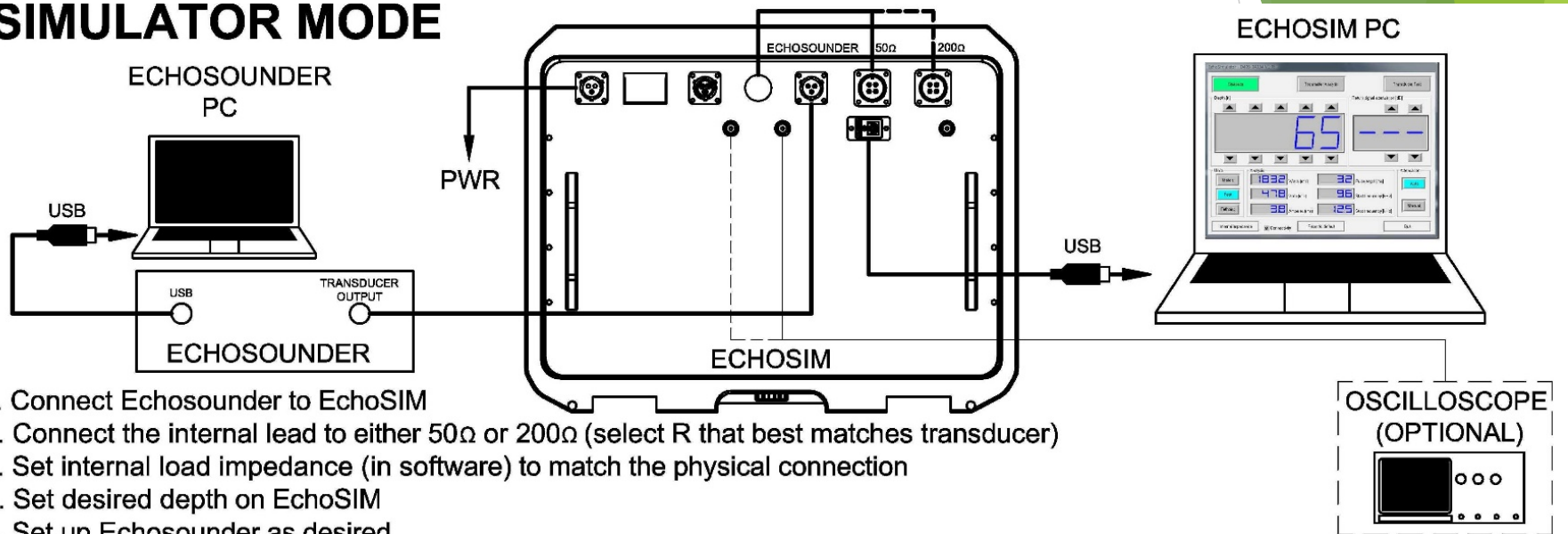
The suggested equipment used in this test is detailed below:

Equipment Type	Model Details
Knudsen EchoSIM Sonar Signal Simulator	
EchoSIM to Echosounder Communication Cable	
EchoSIM USB Cable	
EchoSIM Power Cable	
EchoSIM Control Software	
Digital Multimeter	

INITIAL SETUP

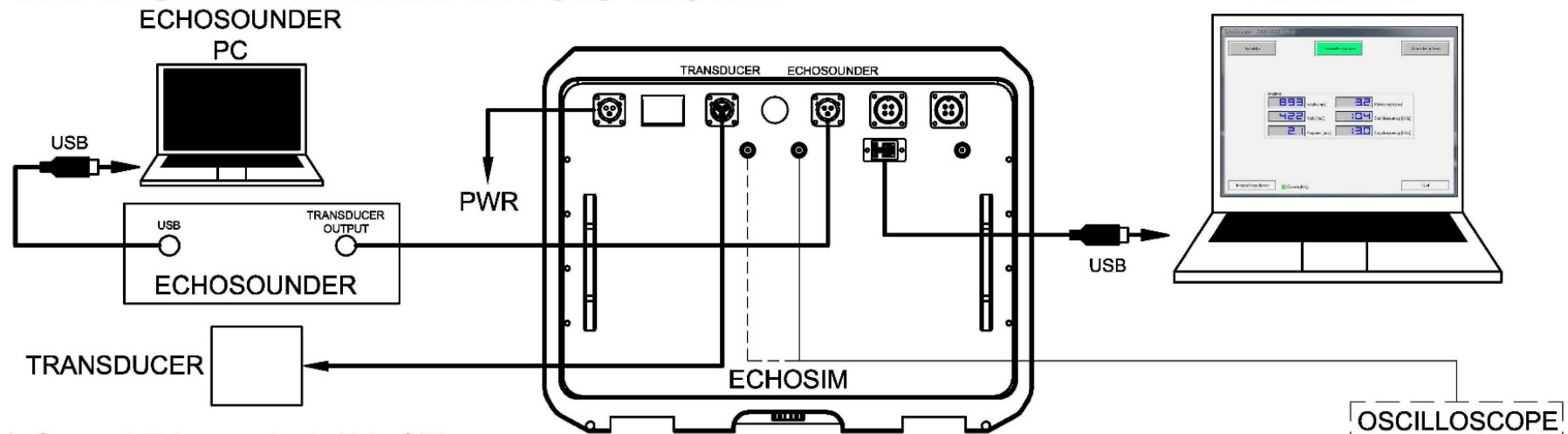
1. Run Setup CD
2. Connect EchoSIM to PC with USB cable
3. Power EchoSIM. PC should recognize a new USB device
4. Install Drivers (located in EchoSimulator/Class folder)
5. Run EchoSimulator executable. Verify that green connectivity light on the GUI is flashing

SIMULATOR MODE

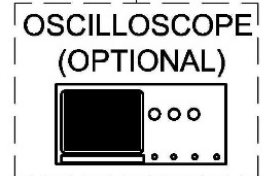


1. Connect Echosounder to EchoSIM
 2. Connect the internal lead to either 50Ω or 200Ω (select R that best matches transducer)
 3. Set internal load impedance (in software) to match the physical connection
 4. Set desired depth on EchoSIM
 5. Set up Echosounder as desired
 6. Start transmitting on Echosounder (this will transmit into the internal load)
 7. Verify measured pulse characteristics
- Note: Accuracy degraded at short pulses

TRANSMITTER ANALYSIS MODE

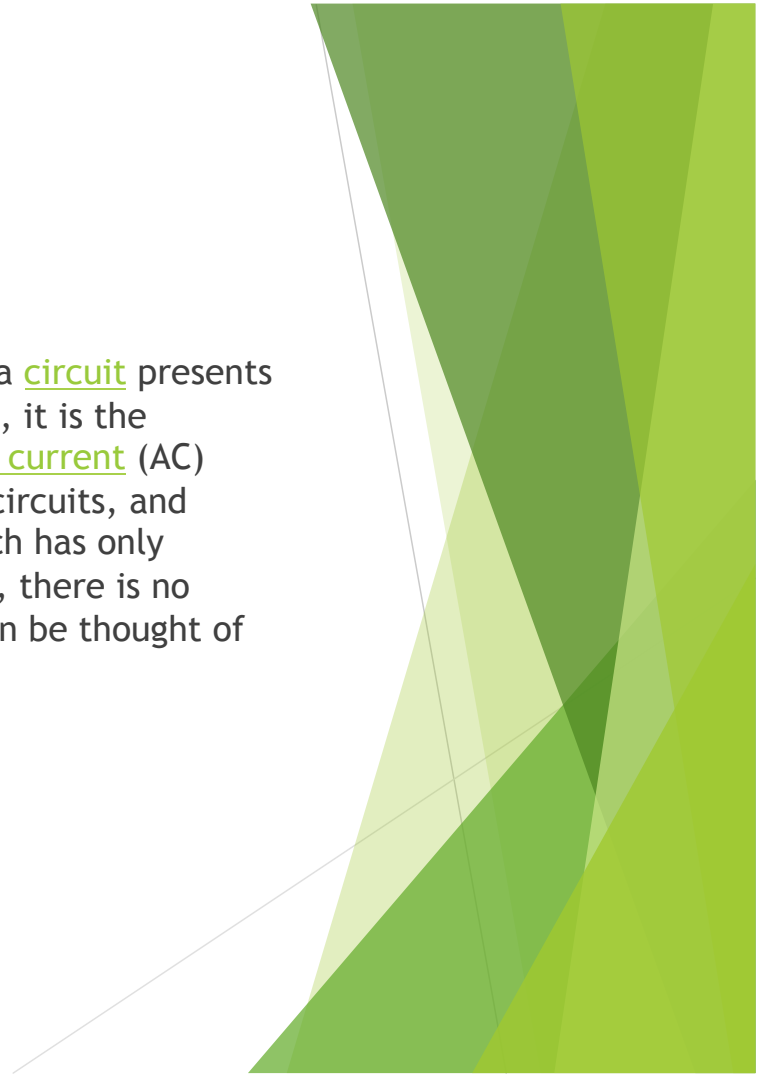


1. Connect Echosounder to EchoSIM
 2. Connect Transducer to EchoSIM
 3. Set up Echosounder as desired
 4. Start transmitting on Echosounder (this will transmit into the transducer)
 5. Verify measured pulse characteristics
- Note: Accuracy degraded at short pulses

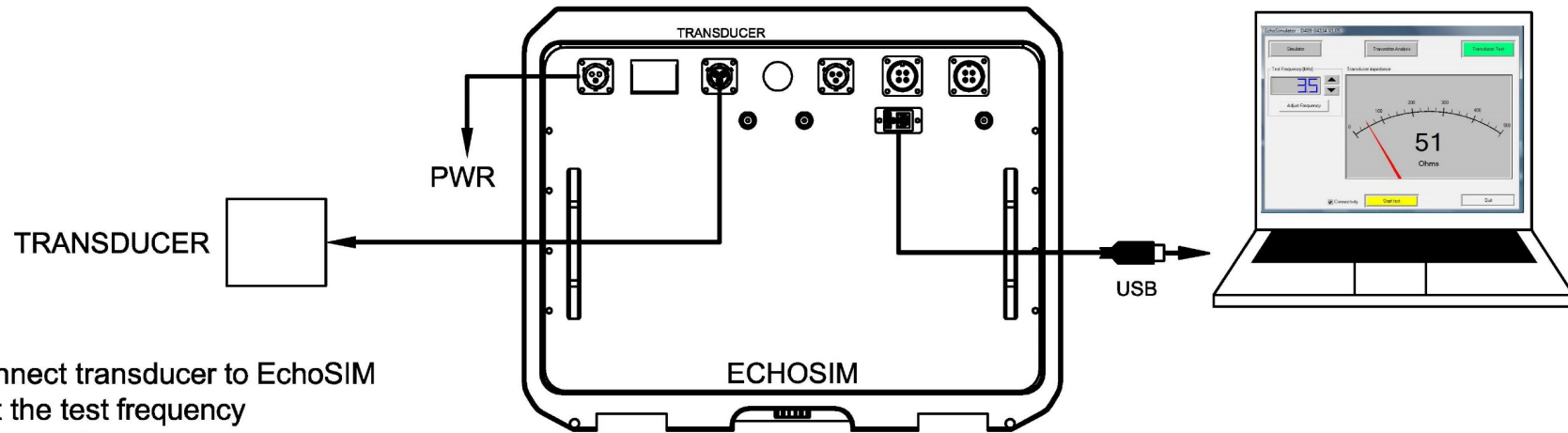


What is impedance?

- ▶ **Electrical impedance** is the measure of the opposition that a circuit presents to a current when a voltage is applied. In quantitative terms, it is the complex ratio of the voltage to the current in an alternating current (AC) circuit. Impedance extends the concept of resistance to AC circuits, and possesses both magnitude and phase, unlike resistance, which has only magnitude. When a circuit is driven with direct current (DC), there is no distinction between impedance and resistance; the latter can be thought of as impedance with zero phase angle.

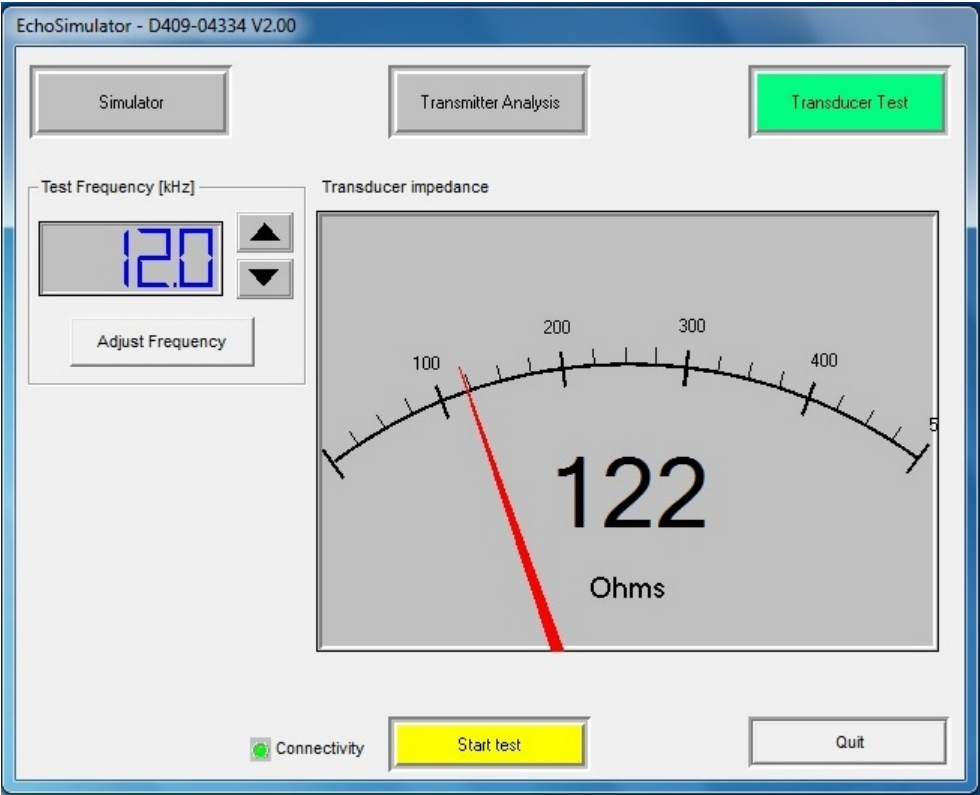


TRANSDUCER TEST MODE



1. Connect transducer to EchoSIM
2. Set the test frequency
3. Click on Start test
4. Repeat steps 2 and 3 over the desired frequency range.

Display



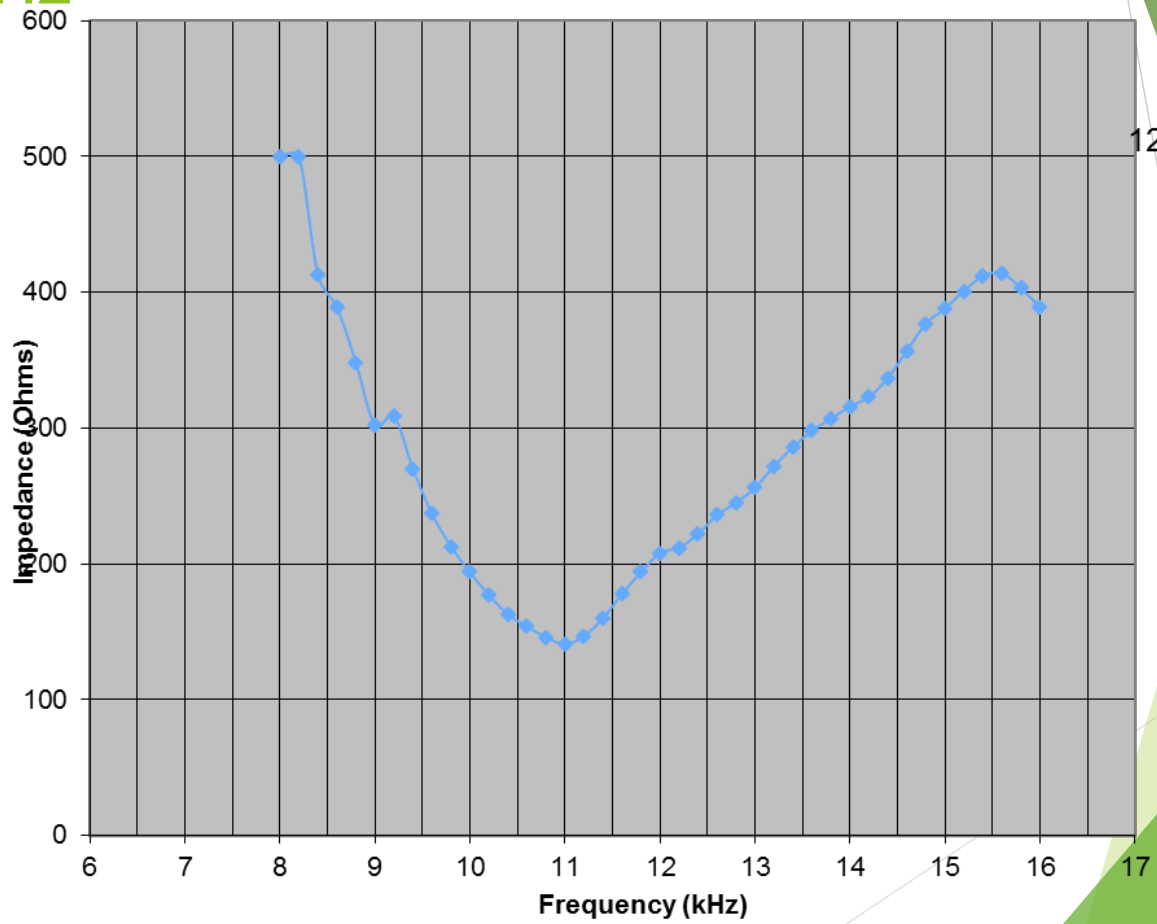
Test Form 3.5 kHz

	Pass/Fail	Sign
Set the EchoSim to Transducer Test Mode. Connect the transducer cable to the marked Transducer connector on the EchoSim. Using the Adjust Frequency keypad, enter frequency of 2.0kHz. Press Start test button. Record measured impedance value. Repeat steps in 500Hz increments up to 10.0kHz. Confirm that impedance at resonance matches expected value based on array configuration.		
Simulator Frequency	Measured Impedance	
2.0 kHz		
2.5 kHz		
3.0 kHz		
3.5 kHz		
4.0 kHz		
4.5 kHz		
5.0 kHz		
5.5 kHz		
6.0 kHz		
6.5 kHz		
7.0 kHz		
7.5 kHz		
8.0 kHz		
8.5 kHz		
9.0 kHz		
9.5 kHz		
10.0 kHz		

Test Form, 12 kHz

	Pass/Fail	Sign
Set the EchoSim to Transducer Test Mode. Connect the transducer cable to the marked Transducer connector on the EchoSim. Using the Adjust Frequency keypad, enter frequency of 8.0kHz. Press Start test button. Record measured impedance value. Repeat steps in 500Hz increments up to 16.0kHz. Confirm impedance at resonance.		
Simulator Frequency	Measured Impedance	
8.0 kHz		
8.5 kHz		
9.0 kHz		
9.5 kHz		
10.0 kHz		
10.5 kHz		
11.0 kHz		
11.5 kHz		
12.0 kHz		
12.5 kHz		
13.0 kHz		
13.5 kHz		
14.0 kHz		
14.5 kHz		
15.0 kHz		
15.5 kHz		
16.0 kHz		

EDO 12 kHz

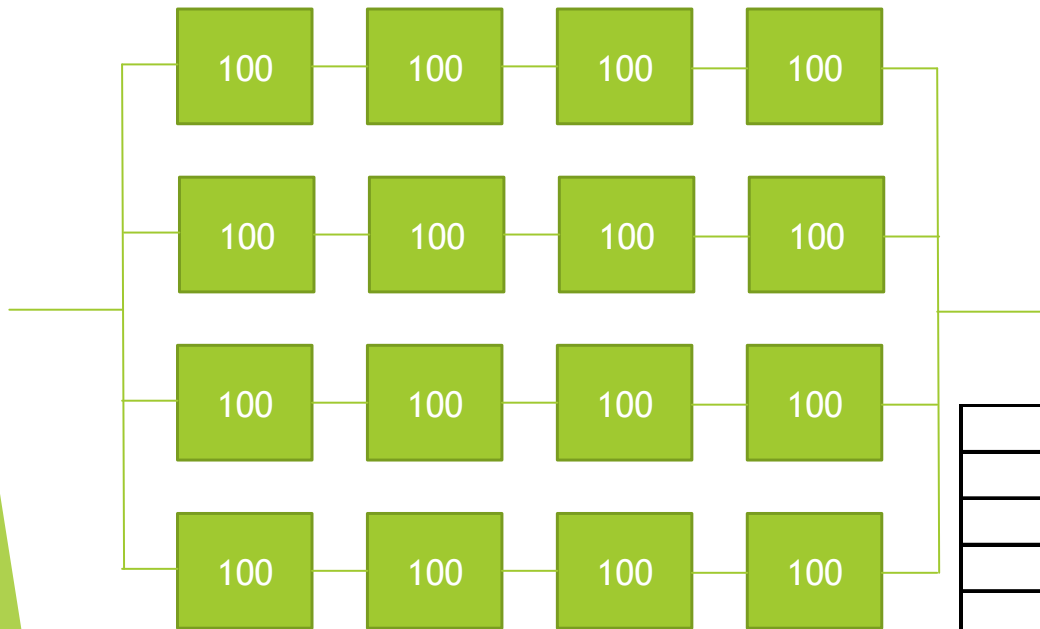


12k - 2012-05-21





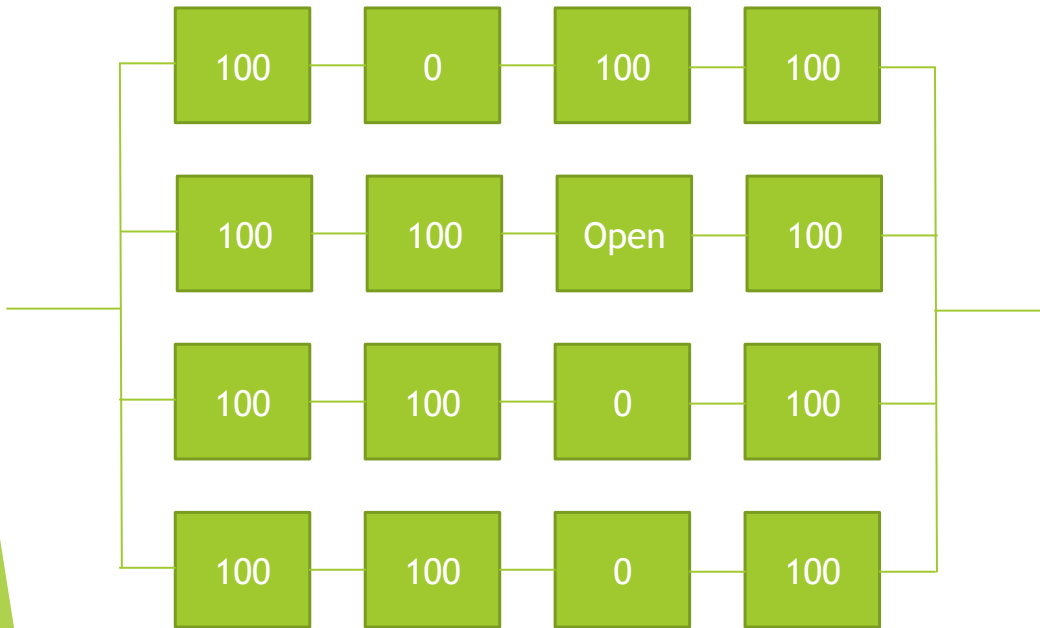
Test Individual Transducers in an Array



Impedance 100 ohms

100	100	100	100	400	0.0025
100	100	100	100	400	0.0025
100	100	100	100	400	0.0025
100	100	100	100	400	0.0025
					0.01
Total Impedance					100

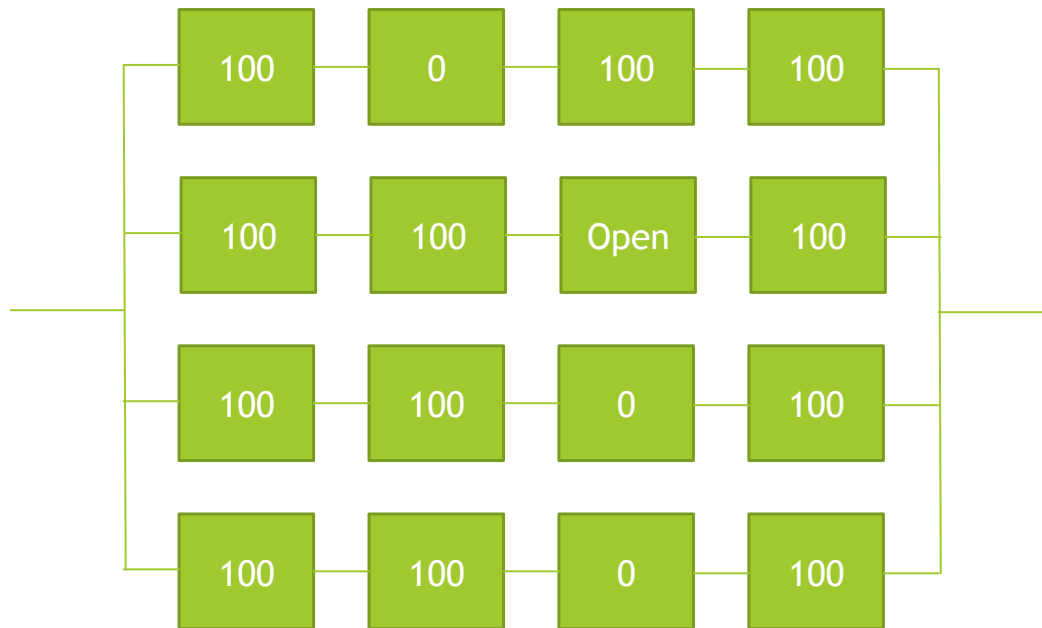
Example 1: Question ?



Impedance ? ohms



Example 1: Answer...

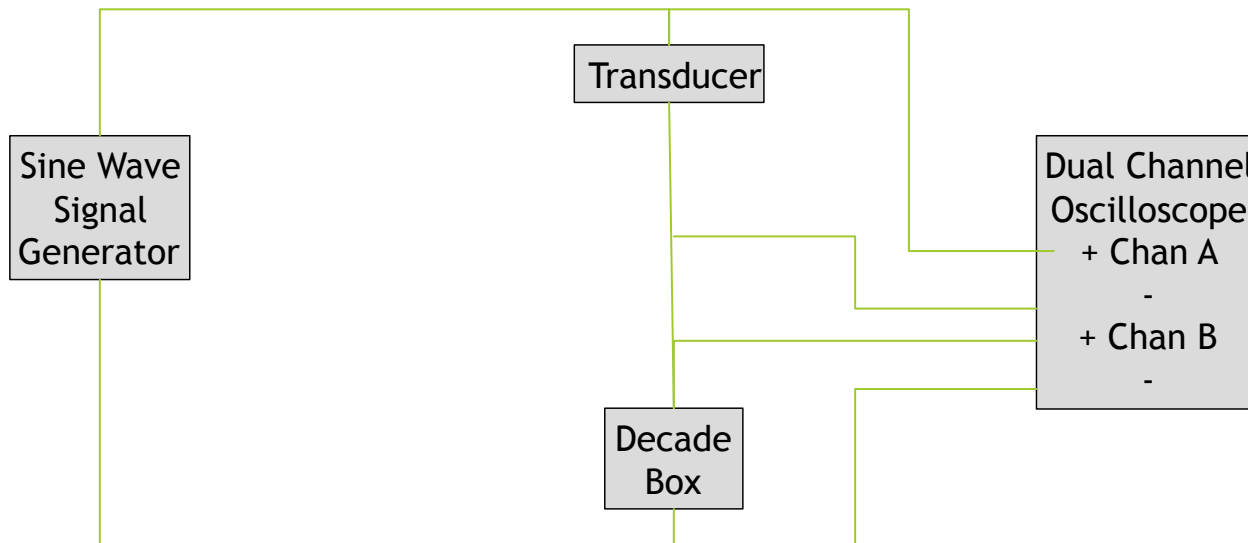


100	0	100	100	300	0.003333
100	100	1E+15	100	1E+15	1E-15
100	100	100	0	300	0.003333
100	100	100	0	300	0.003333
					0.01
Total Impedance					100

Impedance 100 ohms

How to test a transducer without an ECHOSIM

Set Signal Generator to the desired Frequency
Adjust the Decade box until the voltage on
channel A = voltage on channel B
Decade box reading is transduce impedance



Scheduling Contact

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- ▶ avail@rsmas.miami.edu

