Electro-Resales

# RF Sampling Port/Tap

## Toroid Transformer Version

### Product details

The RF Sampler or sampling port is designed to sit in-line with the transmitter and other components of the transmission line before the antenna. Its purpose is to allow a small, safe pick off voltage of the transmitted RF to be used to feed an oscilloscope or other monitoring instrument. This allows the transmitted RF to be examined and measured as required. The RF envelope of AM, CW or SSB transmissions can be viewed real time using this sampling port.

### Precautions & Warnings

Whenever dealing with RF energy the user should make sure that they do not come into contact with the RF signal to avoid RF burns or shorting the RF signal and causing damage to the transmitting equipment or other items in the transmission line.

The Sampling Port is built into a rugged die-cast box, this reduces the chances of coming in contact with terminals or components that are RF energized.

When using this port for sampling RF energy use the lowest power that gives good usable results, although tested to 100 Watts, we recommend starting all testing with around 10 Watts of power

Please ensure that as the user of this product, you exercise due care and attention to the above warning at all times.

### Circuit Details

The port is built around a Transmission Line Transformer that allows the RF voltage generated by the transmitter to be tapped off to provide a safe usable voltage at the sampling port BNC.

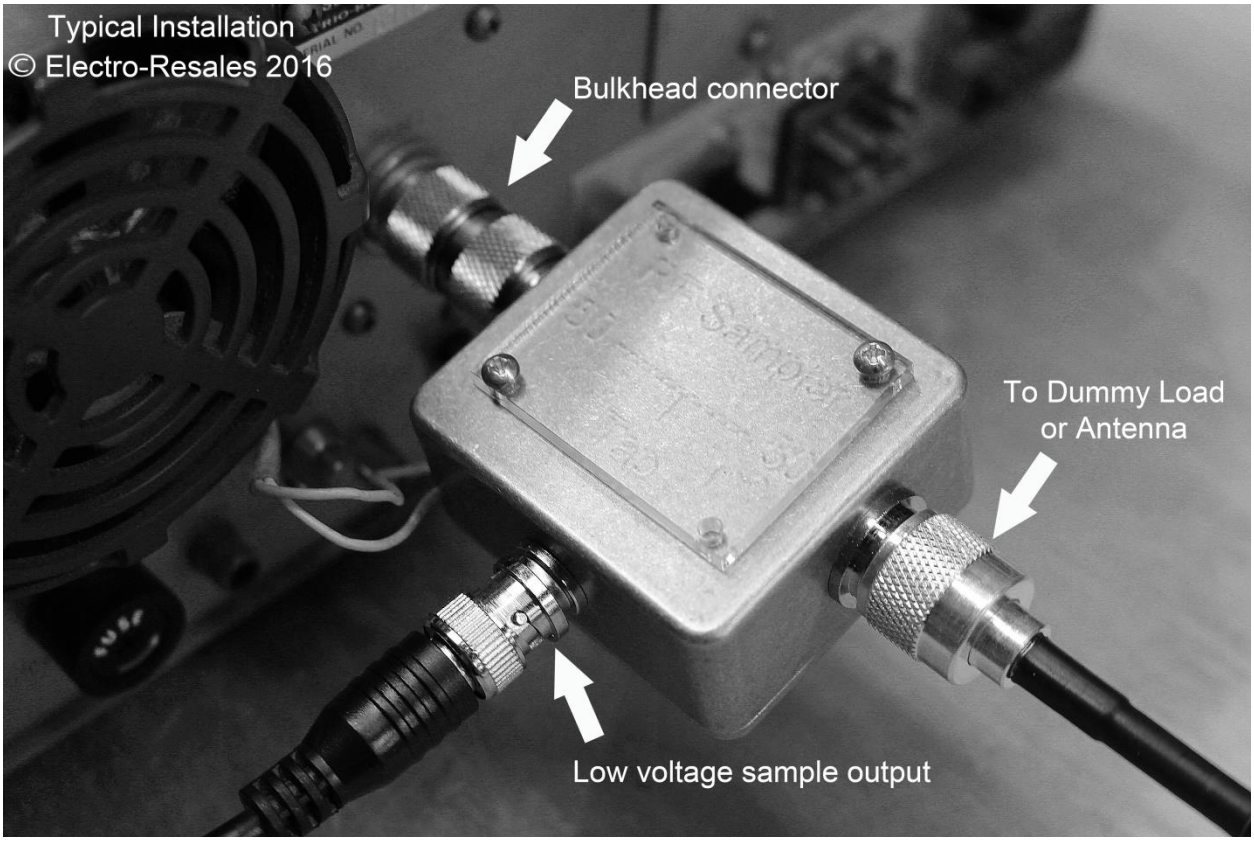
The sampler is suitable for transmitted RF monitoring from 1 – 100 Watts in all modes.

## How to use

Installing the sampler is very easy, to assist in setting up a diagram, How to connect the RF Sampler in the transmit chain; is provided at the end of this document. The diagram illustrates a typical set up.

It is common to leave the sampler connected to the antenna port directly using a PL259 coupler between the antenna port and one of the sampler Pass thru ports. Alternatively; a suitably terminated coax cable can be connected to one of the ‘pass thru’ sockets on the sampler and then on to the antenna port. Another suitably terminated coax is connected to the other ‘Pass Thru’ socket. This coax continues the transmission path to the antenna or dummy load.

**Never connect the ‘Pass Thru’ sockets to the monitoring device, as full RF load is on these sockets!**

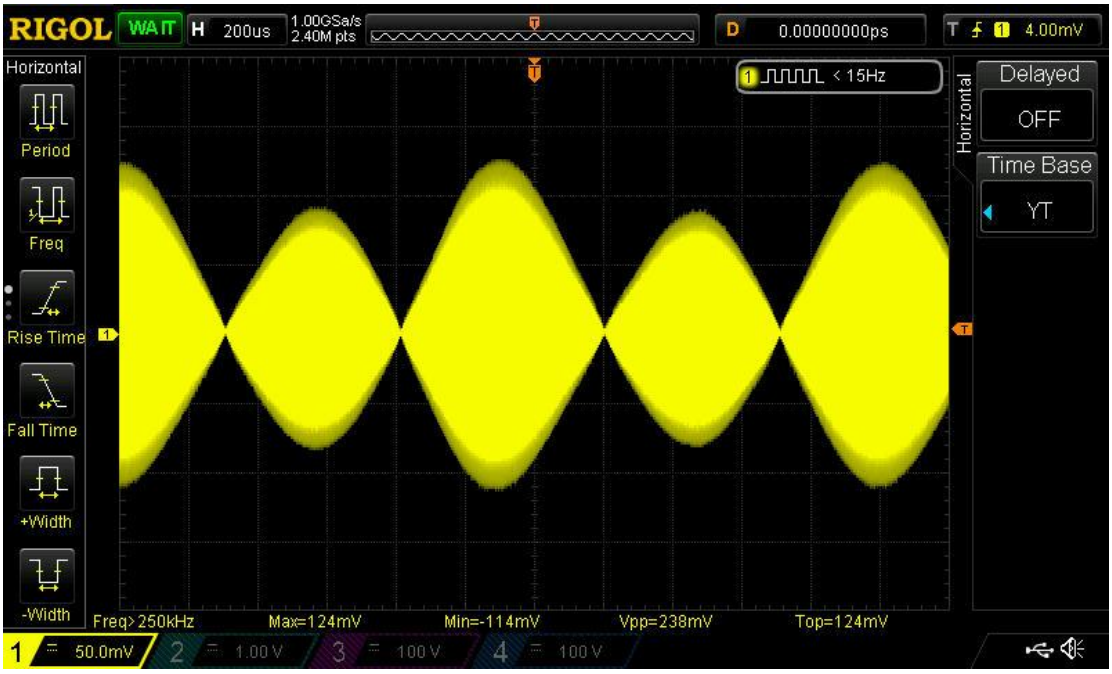



A BNC connector is provided for tapping off the sampled RF, connect this socket using a suitably terminated coax cable to the monitoring device. With the sampled RF connected to the oscilloscope for instance, it is usual to set the scope timebase to 2uS, and adjust the other controls to allow the signal to be viewed. For initial testing set the transmit power level to about 10 Watts and the mode to AM. Keying the transmitter will show the AM carrier signal as a sine

wave and by speaking into the microphone the audio should also be seen impressed on the carrier, see photo 1 below.

With SSB (USB or LSB) the carrier will not be seen (suppressed) with audio seen when the microphone is spoken into.

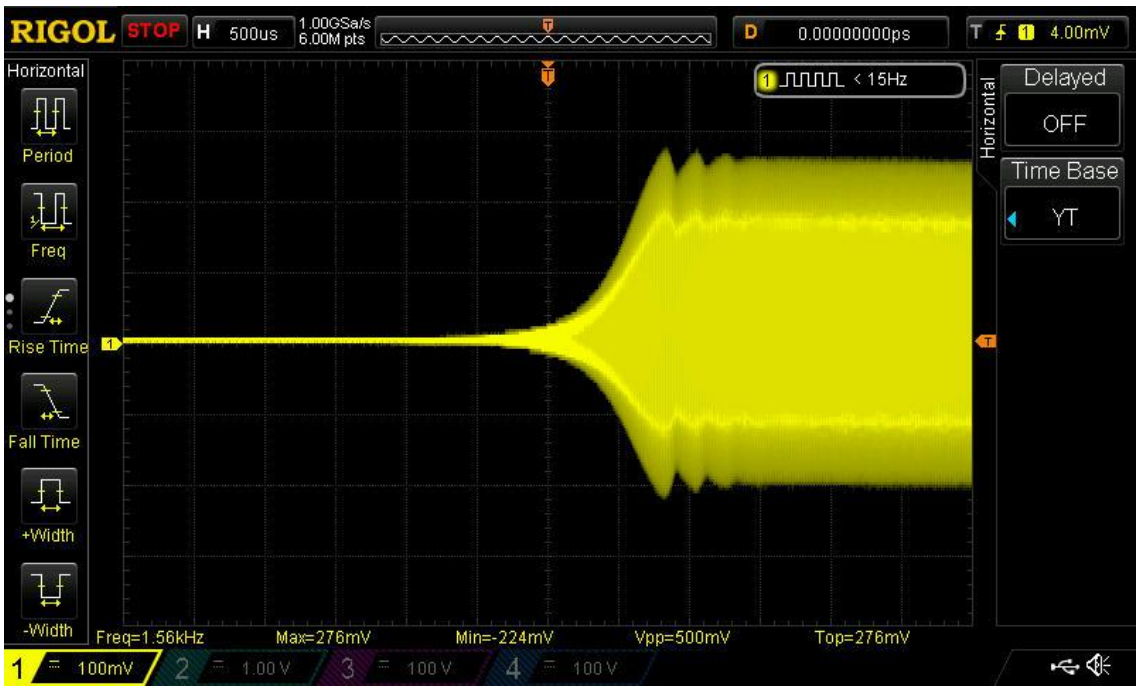
## Photo 1 - AM Transmit Audio




Please note, this image was obtained using a digital scope, while digital scopes are great for this application, analog scopes can in some instances display more relevant ‘real time’ information.

The sampler is suitable for use with AM, SSB, FM & CW modes, and can be used to both observe the signal quality and to make measurements if needed of the transmitted signal. Photo 2 shows a typical CW waveform captured at 100 Watts, during a Dah key down.

## Photo 2 – CW Keying waveform




## What's inside the box?

A number of sampling ports are for sale on the web; some are sealed or potted units that don't encourage you to find out what's inside.

We believe you should know what you are buying and have provided the following disclosure photo of our unit. It can be seen that the sampler has a pass thru connection that is essentially the transformer primary winding and a toroid with multiple windings that is the secondary winding.

RF that passes through the primary is sensed by the secondary and the sensed power transferred to the sampling BNC. The BNC is also terminated with a 50 Ohm resistor that ensures the sampled output is properly terminated and you do not need to provide 50 Ohm termination.

The toroid secondary is wound to provide a 30dB reduction in signal strength per the following formula;

**Turns (T) = √Coupling Ratio**

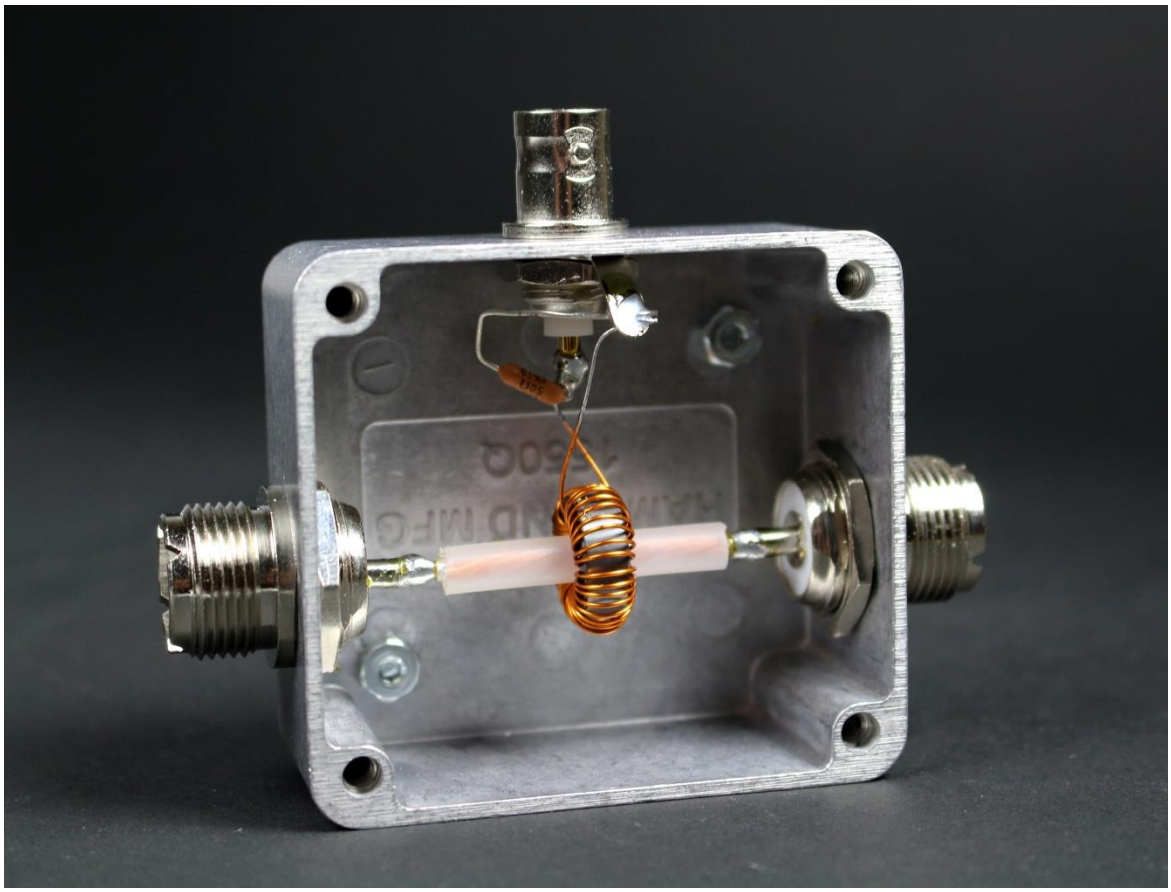
**Coupling Ratio for 30 dB is 1:1000**

**T = √1000 = 31.6 (~32)**

**Turns (T) = 32 Turns**

The photo below shows the transformer, pass through connectors, sampling BNC and termination resistor.

## Photo 3 – Sampler inside View



## Final Words

The sampling port is designed to provide an easy way to monitor the signal coming from a transmitter to either a dummy load or antenna, as damage to delicate equipment front ends is possible through the incorrect use of this sampling port, it should always be checked for correct connection to the equipment in use/test, and the port itself should be periodically examined to make sure it is in good working condition.

# The small Print

**DISCLAIMER**

**Any person who constructs or works on electronic equipment may be exposed to hazards, including physical injury, the risk of electric shock or electrocution.. These hazards can result in health problems, injury, or death. Only qualified persons who understand and are willing to bear these risks themselves should attempt the construction of electronic equipment. By purchasing this item, the buyer acknowledges these risks.**

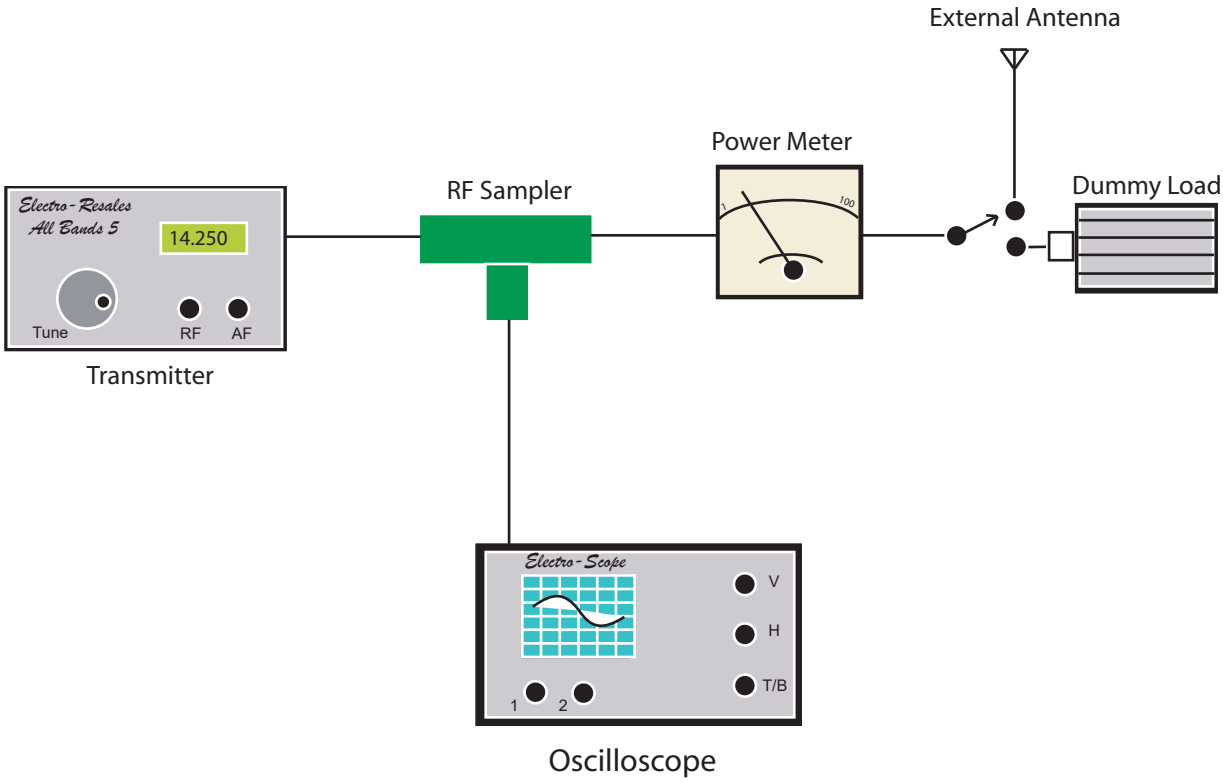
**There is a risk of electric shock, electrocution, burns, or fires that is inherent in the construction and use of electronic equipment. By purchasing this item, the buyer acknowledges these risks.**

**IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE including, but not limited to, property damage, personal injury, death or legal expenses. Buyer's recovery from Seller for any claim shall not exceed the purchase price paid by Buyer for the goods, irrespective of the nature of the claim, whether in warrant, contract or otherwise. By purchasing this item, BUYER AGREES TO INDEMNIFY, DEFEND AND HOLD SELLER HARMLESS FROM ANY CLAIMS BROUGHT BY ANY PARTY REGARDING ITEMS SUPPLIED BY SELLER AND INCORPORATED INTO THE BUYER'S PRODUCT.**

# Notes

# How to connect the RF Sampler in the transmit chain






## Hookup diagram

**As shown in this diagram, the sampler is connected to the antenna port of the transmitter and then the antenna or dummy load.**

**Other items such as  power meter/SWR meter can also be connected prior to the antenna after the sampler.**

**The sampler port is shown connected to an oscilliscope, however, this could be other test equipment such as spectrum analyzer, frequency meter or other test device.**