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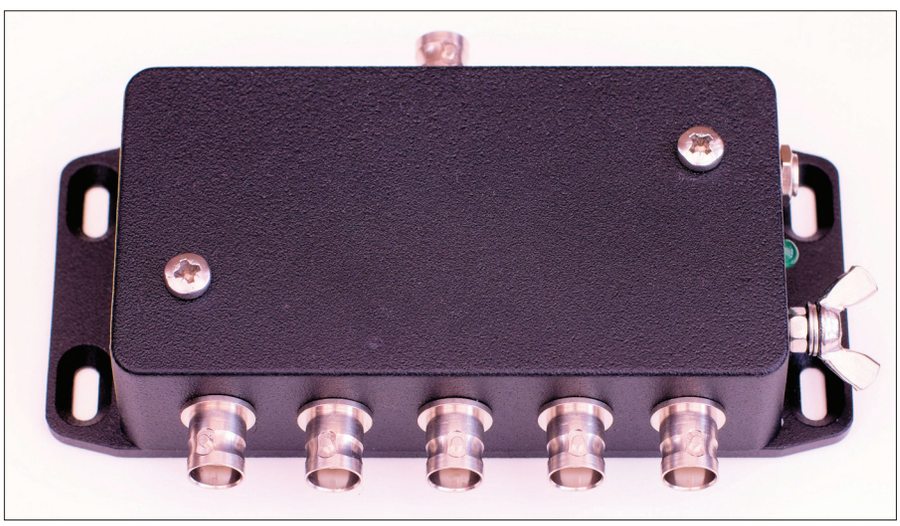
Mike Richards reviews the Cross Country Wireless Multicoupler

Cross Country Wireless Multicoupler

Mike Richards looks at a device that allows you to connect multiple receivers to a single antenna in such a way that all the receivers can be used simultaneously on the same or different frequencies with no interaction.



The Cross Country Wireless Multicoupler.

Splitting a single antenna feed to multiple receivers might sound straightforward but there are a number of things to consider when choosing a multicoupler. The first is the insertion loss, while it's relatively easy to cobble together a network of resistors to divide a signal, the splitting process will incur a signal loss and you could lose 10dB or more of valuable signal strength. Obviously, you could compensate for that with an RF amplifier but that opens up more problems because you might well compromise your receiver's intermodulation performance or introduce more noise into the signal. Another important aspect of splitter design is making sure the antenna and all the receivers are always presented with a 50Ω terminating impedance. Therefore, you can see that this seemingly simple task is not so simple after all!

Inside

The Cross Country Wireless (CCW) Multicoupler employs an Owen resistive network to provide the splitting function. The original design for the Owen splitter was developed by **Chris Owen** and was first published on the Microwaves101 website.

www.microwaves101.com

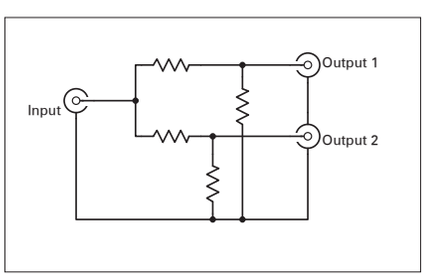


Fig. 1: An example of a simple two-way Owen splitter.

The Owen splitter design is particularly appropriate for this application because it provides the highest isolation between ports of any of the resistive splitter systems and can handle any number of output ports. I've shown an example of a simple two-port Owen splitter in **Fig. 1** and this basic design provides about 10dB of power loss between the antenna and each receiver with approximately 20dB of isolation between receiver ports. One of the beauties of a resistive splitter configuration is the lack of frequency conscious components, so it becomes relatively easy to obtain wide operating bandwidths. The Owen network also provides the all-important 50Ω impedance match at all its ports.

To compensate for the insertion loss of the Owen network, the CCW Multicoupler employs a military grade enhancement-mode pseudomorphic high electron mobility transistor (E-pHEMT) low noise amplifier. These devices are mainly employed in power amplifier circuits but they also make excellent low noise preamplifiers. In addition to providing high gain and low noise, E-pHEMTs can operate linearly under very strong signal conditions and tolerate overload very well. These characteristics make the E-pHEMT ideal for use in this wideband multicoupler device.

The combination of the low noise amplifier and Owen network give the CCW Multicoupler an insertion loss close to 0dB and a 3rd order intercept figure of +40dBm. In addition, lightning and overload protection have been incorporated and the multicoupler can even handle 100 watts of RF on any port for up to five seconds without damage!

Setting Up

The CCW Multicoupler is supplied ready to go and you only need to add a power supply to complete the installation. The power requirement is 7 to 24V DC at approximately 100mA and is fed via a standard 2.5 mm coaxial power jack. Antenna and receiver connections all used standard 50Ω BNC female connectors, which was handy. The case was a die-cast metal unit with substantial flanges along each end allowing for secure fixing. The case also has a separate earth connector for use with a protective earth to provide the lightning protection – see **Fig. 2**.

Fig. 2: A side view showing the 2.5 mm coaxial power socket and earth connection.

summary

The Cross Country Wireless HF/VHF/UHF Multicoupler does exactly what it says and provides high quality antenna sharing. The construction quality and performance were excellent and the in-built protection gives some reassurance that your receivers will be well protected.

The Cross Country Wireless HF/VHF/UHF Multicoupler costs £119.95 plus shipping and is available directly from Cross Country Wireless. **www.crosscountrywireless.net**

My thanks to **Chris Moulding** for the loan of the review model.

Performance

I tried the CCW Multicoupler with a number of receiver and antenna combinations with excellent results. There was no detectable difference between monitoring directly or via the CCW Multicoupler.

Most products from Cross Country Wireless are supplied with individual test sheets, which is very reassuring because you can see the detailed, measured, performance of your unit. The test sheet supplied with the review model showed a slight 1 or 2dB gain through most of the frequency range with a small drop off at the extremes. The reverse isolation ranged between 48 and 72dB over the frequency range, while the port to port isolation ranged from 42 to 70dB. The product's specification is shown in **Table 1**. The performance is excellent, which makes the CCW Multicoupler suitable for any station. ●

Table 1: Specification for the Cross Country Wireless Multicoupler

Frequency range	500kHz to 500MHz
Input and output impedance	50Ω
Bandwidth (-3dB)	1MHz to 450MHz
Bandwidth (-6dB)	500kHz to 500MHz
Output IPS:	+40dBm
Reverse isolation	Better then 40dB full range (better than 60dB below 30MHz)
Receiver port isolation	Better than 40dB
Supply voltage	7 to 25V DC
Supply current	100mA
Connectors	50Ω BNC female plus 2.5 mm DC power socket
Dimensions	140 (L) x 90 (W) x 35 (H) mm