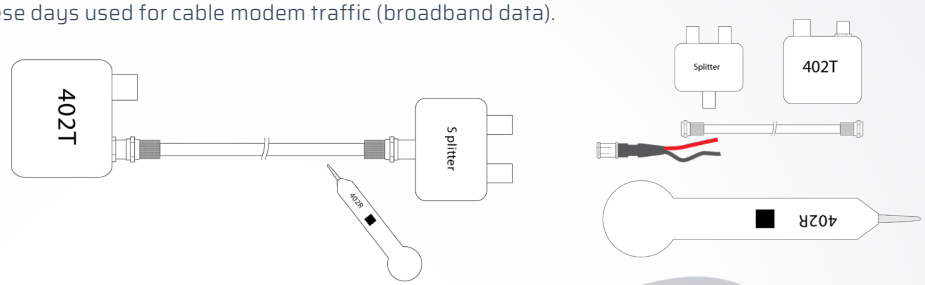
APPLICATION NOTE

TRACING THROUGH MODERN SPLITTERS WITH 402K

Many newer splitters now fitted to cable TV systems have improved filtering to remove all possible noise. The problem with using 402K with these is that its signal carrier at about 447 kHz is classified as “noise” by these filters and blocked by more than 80 dB compared to earlier splitters.
This application note suggests an alternate connection scheme that can increase the level of signal detectable in the cable to which the 402T is connected and, in some cases, those on the other side of the splitter.
We cannot change the tracing carrier frequency as this may then interfere with all subscribers connected to that node who are making use of the lower channels, usually these days used for cable modem traffic (broadband data).

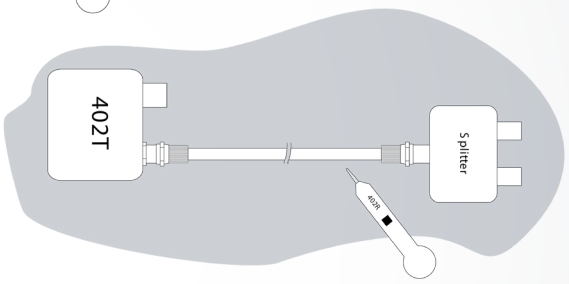
BASIC CONNECTION OF 402T AND SPLITTER

Here the oscillator and splitter are “floating” relative to ground. Current flows from the oscillator to the splitter and returns along the cable. Therefore the two magnetic fields cancel and there is no net field detectable by the probes coil. However, there is some electrostatic field detectable.



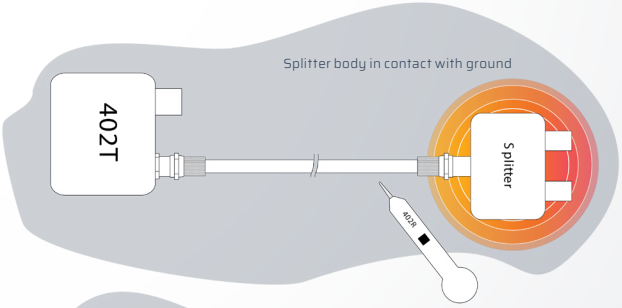
BASIC CONNECTION OF 402T AND SPLITTER ON GROUND PLANE

Here the oscillator and splitter are still “floating” relative to ground – but capacitive coupling to ground is greater. Current flows from the oscillator to the splitter and returns along the cable. Therefore the two magnetic fields cancel and there is no net field detectable by the probes coil. However, there is still some electrostatic field detectable – but noticeably less than the Basic Connection of 402T and Splitter test.



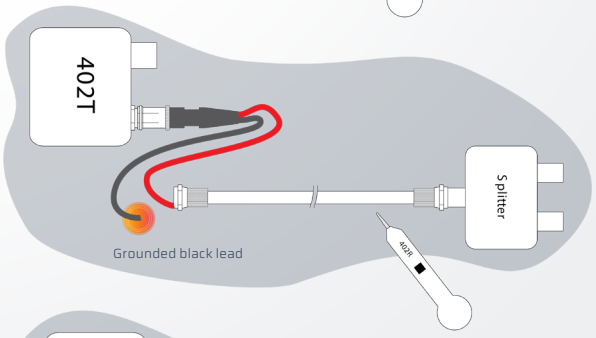
CONNECTION OF 402T AND GROUNDED SPLITTER ON GROUND PLANE

Here the oscillator and splitter are grounded by the screen of the coaxial cable and body of the splitter sitting on the ground plane. So current flows from the oscillator to the splitter and returns along the cable. Therefore the two magnetic fields cancel and there is no net field detectable by the probes coil. But now the coaxial screen is also at ground potential therefore there is also no electrostatic field detectable.
However, if further cable and splitters are in the system beyond what is shown here then detection by direct connection still works fine.



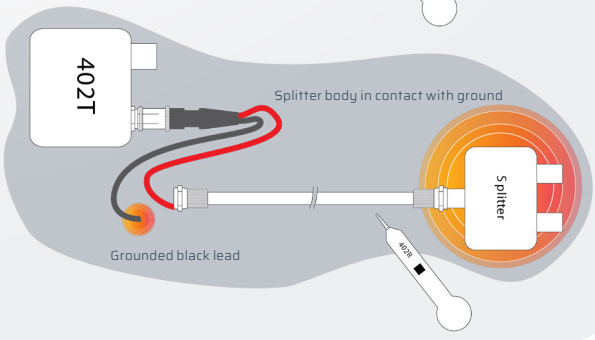
CONNECTION OF 402T AND SPLITTER BY DISCRETE CONNECTION ON GROUND PLANE

Here the oscillator is grounded by connection to a local ground point and body of the splitter is sitting, isolated above the ground plane. So current flows from the oscillator to the splitter through the coaxial cable screen and returns via the leakage capacitance to the ground plane. This current is relatively small and difficult to identify with the coil. This is especially true as the electrostatic field radiated from the coaxial cable is as large as possible.
Also, if further cable and splitters are in the system beyond what is shown here then detection with the electrostatic probe or direct connection still works fine.
Despite the impression that the user’s guide gives it is entirely irrelevant whether the red or black lead is the one that is grounded when connecting like this. The oscillator is floating relative to ground and the two leads are largely balanced with respect to ground (though not perfectly).



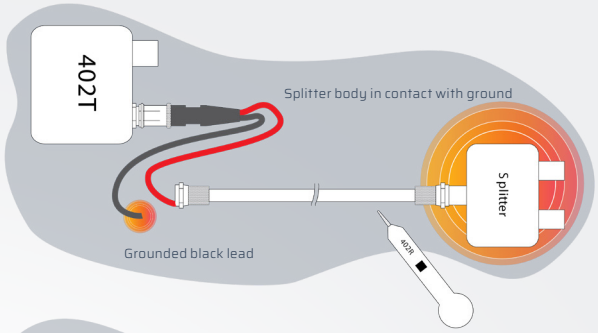
CONNECTION OF 402T AND GROUNDED SPLITTER BY DISCRETE CONNECTION ON GROUND PLANE

Here the oscillator is grounded by connection to a local ground point and body of the splitter is sitting, connected to this ground plane. So current flows from the oscillator to the splitter through the coaxial cable screen and returns directly through the ground plane.
This current is as large as possible and very easy to identify with the coil. But now in this case there is no electrostatic field detectable in the “null” of the magnetic field as everything is grounded.
Now, if further cable and splitters are in the system beyond what is shown here then detection with any method, magnetic, electrostatic or direct connection is impossible as no current flows beyond the first ground connection at the first splitter.



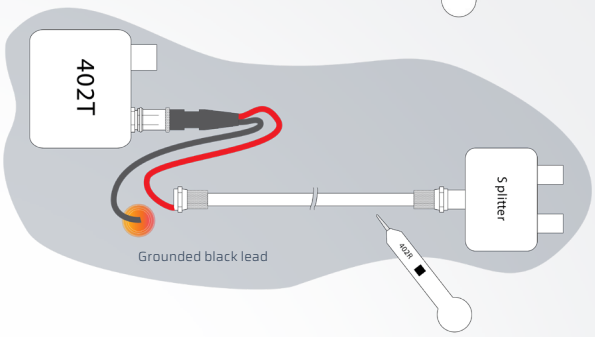
CONNECTION OF 402T AND GROUNDED SPLITTER BY DISCRETE CONNECTION OF CENTRE CONDUCTOR ON GROUND PLANE

Here the oscillator is grounded by connection to a local ground point and body of the splitter is sitting, connected to this ground plane. So current flows from the oscillator to the splitter through the coaxial cable core and returns through splitter terminating impedance (depends on splitter type) and the ground plane. This current is large enough to generate a magnetic field effect and easy to identify with the coil. But now in this case there is no electrostatic field detectable in the "null" of the magnetic field as everything remains grounded.
Now, if further cable and splitters are in the system beyond what is shown here then detection is only possible by direct connection as no significant current flows beyond the grounded splitter.



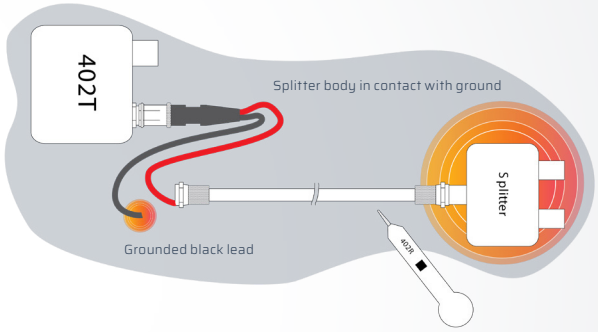
CONNECTION OF 402T AND SPLITTER BY DISCRETE CONNECTION OF CENTRE CONDUCTOR ON GROUND PLANE

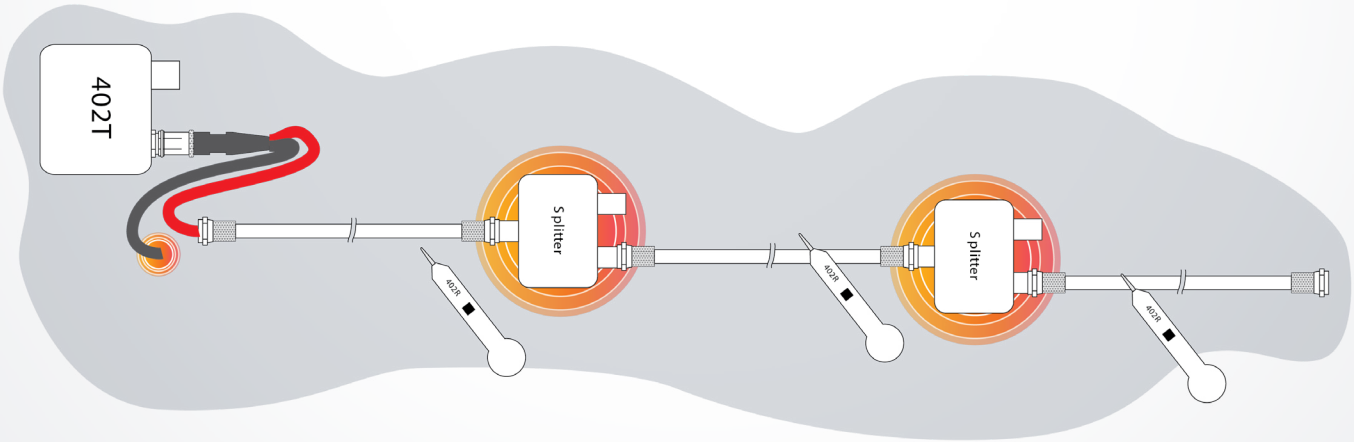
Here the oscillator is grounded by connection to a local ground point and body of the splitter is floating, isolated from this ground plane. So current flows from the oscillator to the splitter through the coaxial cable core and returns through stray capacitance to the ground plane. This current is small and the magnetic field is not easy to identify with the coil. But now in this case there is large electrostatic field detectable as the shield is not grounded and the signal is well coupled from the core to the screen.
Also, if further cable and splitters are in the system beyond what is shown here then detection is possible by electrostatic means and direct connection.



CONNECTION OF 402T AND GROUNDED SPLITTER BY DISCRETE CONNECTION OF CENTRE CONDUCTOR ON GROUND PLANE

Here the oscillator is grounded by connection to a local ground point and body of the splitter is sitting, connected to this ground plane. So current flows from the oscillator to the splitter through the coaxial cable core and returns through splitter terminating impedance (depends on splitter type) and the ground plane. This current is large enough to generate a magnetic field effect and easy to identify with the coil. But now in this case there is no electrostatic field detectable in the "null" of the magnetic field as everything remains grounded.
Now, if further cable and splitters are in the system beyond what is shown here then detection is only possible if those devices or those beyond that also have a ground connection as then current flows beyond the first grounded splitter. But at each splitter the signal is attenuated.





CONNECTION OF 402T AND GROUNDED SPLITTER BY DISCRETE CONNECTION OF CENTRE CONDUCTOR ON GROUND PLANE

Here the oscillator is grounded by connection to a local ground point and body of the splitter is sitting, connected to this ground plane. So current flows from the oscillator to the splitter through the coaxial cable core and returns through splitter terminating impedance (depends on splitter type) and the ground plane. This current is large enough to generate a strong magnetic field effect and easy to identify with the search coil of the 402R. For detection try placing the coil marking arrows along the route of the coaxial cable being checked - to confirm, rotate by 90 degrees to that the arrows are across the path of the coaxial cable - you should get a distinct null. In this case there is no electrostatic field detectable in the "null" of the magnetic field beyond the first splitter as the screen of the coaxial cable remains grounded.
Now, if further cable and splitters are in the system beyond what is shown here then detection is only possible if those devices or those beyond that also have a good ground connection as then current flows beyond the first grounded splitter. But at each splitter the signal is obviously attenuated.

1390 Aspen Way Vista, CA • 92081 02/21

Latin America Phone : 1.760.510.0558 | EMEA Phone: +44 (0) 1633 927050

EMEA Office: Tempo Europe Limited
Brecon House, William Brown Close, Cwmbran • NP44 3AB, UK

TempoCom.com | tel 800.642.2155 | sales@tempocom.com

TEMPO COMMUNICATIONS

Renewed Vision. Innovation Forward.

Follow us on Social Media
@TempoComms