How To Guide

Connecting your Communications equipment

• Do I need an RF cable?

If you want to wire an aerial to a TV or Hi-Fi tuner, interconnect satellite, video or TV equipment, run extension TV or video wiring to another room, add a second TV aerial or wire up a CB or Amateur radio transceiver, then you will need the correct type of RF cable to do the job.

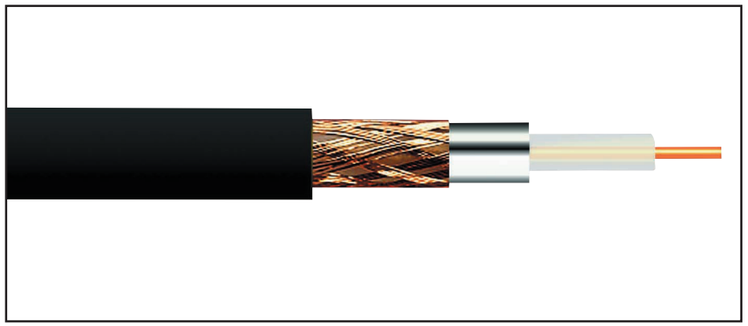
You can't just use any piece of wire or cable to carry high frequency radio or TV signals, because the higher the frequency of the signal to be carried, the more critical it is to use the right type of cable to avoid losses in the signal and to prevent the wire acting as an aerial that may either transmit your signal away to cause interference elsewhere, or receive unwanted RF signals from elsewhere.

RF cables are similar in construction to audio cables, having an inner core or conductor that carries the RF signal, surrounded by a round insulating layer that is in turn wrapped in a braid or mesh of fine shielding wires that are connected to ground and prevent the signal being affected by external interference or radiated to cause interference to other equipment. An overall protective and insulating sheath completes the cable. This composite is called co-axial cable.

All RF cables have two important specifications that need to be considered to best fit the job in hand. These are the cables design impedance and its attenuation loss.

Impedance is a complex mix of DC resistance and the loading effects that capacitive and inductive properties of the cable will have on the RF signal you want the cable to carry from one end to the other. It is measured in Ohms, just as DC resistance is, and all RF cables will have an Impedance specification quoted.

As a rule of thumb, all TV, Video and Satellite signal wiring will need 75 Ohm co-axial cable, whereas almost all Amateur radio and CB or other radio wiring will use 50 Ohm cable. The only notable exception to this is in some internal FM radio wiring, which uses a special flat two conductor non-screened cable designed to present an impedance of 300 Ohms (order as XR31J).



Almost all test equipment connections potentially carrying RF signals also use 50 Ohm cable, for example, the BNC to BNC cables used to join a signal generator to an oscilloscope, or to Equipment under test. Some computer networks are also connected by 50 Ohm RF cable such as AP16S.

Attenuation loss is simply a measure of how much of your signal you will lose from one end to the other, and is dependent on the frequency of the signal and the length of cable used. Short runs of a couple of metres need not use the highest specification cable in most cases, but long runs from room to room, or within studio or large commercial buildings will need a far higher grade of cable, as will any cabling for RF transmitters of any type, or cables carrying very weak RF signals, in fringe signal areas perhaps.

Loss is quoted in decibels or dB, which is a ratio based measuring system to indicate the proportion of signal remaining compared with a known input. Suffice it to say that the higher the number quoted, the more loss will occur in the cable.

Because of the complex combinations of different design elements that go to make up an RF cable of any given RF Impedance, loss and other RF characteristics, a number of standard cables have been developed over the years and have been given type numbers. As you might expect, there have been more than one set of type numbers developed in different parts of the world and so you might expect to see equipment specifications requiring one of a number of different types. Maplin stock a number of different cables and quote RG numbers, URM numbers and some MIL numbers, as appropriate. If your equipment requires one of these and you can match it in the catalogue, you need look no further.

We will now look at some typical applications for RF cables and recommend some example cables for each application.

TV Aerial wiring
TV coax should be of the 75 Ohm type, so this instantly narrows the choice down. For the majority of us who live in fairly strong signal areas, an ordinary low loss coaxial cable such as XR29G (brown) or XR87U (white) will be quite adequate.

Customers living in very poor TV reception areas might like to consider using a higher quality, lower loss cable before investing in expensive masthead amplifiers and so on. The XS16S cable described below for Satellite dish installation is also perfect for use in difficult signal applications for TV use.

Satellite TV
The wiring from a satellite dish (LNB) to the satellite receiver should be made using a 75 Ohm Coax. Ordinary low loss TV coax may be used, but it is far better to use the special very low loss FT100 cable, sold as XS16S (Black) or XS17T. This cable is double screened and offers a lower attenuation loss than standard TV coax.

Those wiring up very long runs of cable between dish and receiver, or wiring shared satellite installations in apartment buildings, should use the uprated specification offered by FT125 coax, sold as XS46A. This ultra low loss cable offers the very best performance for satellite signal distribution, but is thicker than standard cable and will require 6mm F connectors.

Video distribution wiring.
There are two ways to distribute video signals around the home, or between equipment. Most Video recorders allow you to interconnect them using both RF cables, and the raw video and audio signals, usually via SCART (sometimes called Peritel) 21 way connectors.

RF connections are simply made using standard 75 Ohm coax, as for TV aerial wiring above, and Maplin also stock ready made flyleads with the standard TV aerial connectors already fitted, for example GW61R is a black 2 metre cable with a plug at one end and a socket at the other, or JW39N, a 5 metre white lead with a plug at each end.

Direct video connections between equipment are usually use ready made SCART to SCART leads such as the JW36P, or the fully wired RGB SCART to SCART lead JW37S. A gold plated fully wired lead for very low contact resistance (BV34M) is also available, as is a 5 meter SCART to SCART connector lead LN96E.

Various ready made video leads with SCART connectors at one end and combinations of phono (RCA) or BNC connectors at the other may be found in the Audio Video section of the Maplin catalogue.

Professional video connections are made using a full size 75 Ohm coax for the video signal, with any associated audio tracks being carried by separate audio screened cables. Any of the 75 Ohm RF cables mentioned in this guide may also be used to carry high quality video signals, and the Maplin catalogue also contains a useful miniature 75 Ohm cable (XR88V) with a diameter of just 2.8mm that is ideal to run video signals where space is limited, over short runs.

Lastly, there are a number of combined Video / Audio and electrical signal or power wires combined in one round sleeved cable for those who wish to wire their own short combination runs or SCART leads, see XS42V or XS44X for example.

Radio aerial cables
It is very likely that specifications for the connections of radio transmitter or receiving equipment will refer directly to RG or URM cable ratings. Simply choose the correct cable from the matching entry in the Maplin catalogue cable section.

Standard 6mm or 7mm 50 Ohm cables such as XS51F or XR19V will be adequate for most applications, including low power transmitters, but those using the higher power amateur radio equipment will already know that a heavy duty RF cable such as XR63T will be required. Note that this is 10.3mm in diameter and you should bear this in mind when choosing connectors.

Low loss cables are also available for longer cable runs, for example XS61R is equivalent to the standard RG58 cable, but with a far smaller loss figure.

A last note on RF cabling before closing.... Impedance is important.
If you select the wrong impedance for an RF cable, or use a connecter to join the cable that is not also of the correct impedance, you will cause an electrical kink or constriction in the signal path that may result in little or none of your RF signal reaching the far end of the cable.

This will be annoying at the least, but at worst it can result in the output stage of a transmitter frying in its own unreleased energy and burning out. Double check your impedances, check you have the right cable, the right connectors, and that you do not inadvertently short the fine shield braid wires to the central conductor whilst wiring up the connectors.

Please note that many of the cables mentioned here may also be ordered as complete reels with considerable savings over using the "per metre" codes quoted throughout this guide. Please refer to your Maplin catalogue for details.

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