



## M12+/M12M Connector and Installation Options

The following note will hopefully help you choose mating connectors for the M12+/M12M data and antenna connectors, and show a couple of the configurations we have used for making interface boards for these receivers. This note will be by no means all-inclusive, but it should save you some time in identifying applicable parts and possible vendors.

In order to minimize the size of the original M12 receiver as much as possible, Motorola went to a .050" center connector for the data header and an MMCX coax connector for the antenna, both much smaller than the parts used on the previous Oncore receivers. The new M12+ and M12M receivers use the same connectors so don't worry about hardware compatibility. Although rather hard to source when the M12 was first released, these connectors are now commonplace as long as you know where to look.....

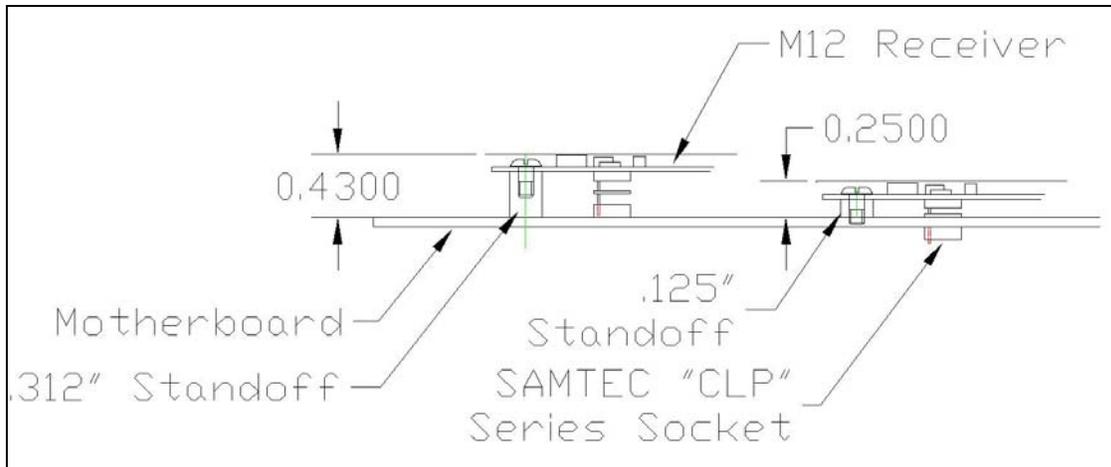
### DATA HEADER

The M12+/M12M comes with two types of 10 pin data headers: straight or right angle. Both connectors are 10 pin, .050" center parts - the only difference being that the "Straight" version has pins that are perpendicular to the surface of the receiver board, while the "Right Angle" version has pins that are parallel to the board surface. I bring this up because we have had several customers accidentally order the incorrect receiver configuration. If you are unsure of what type of connector you desire, I would recommend a quick look at Figures 3.4 and 3.5 in the M12+ User's Guide, Synergy Doc STRMM12+. The "Straight" option is by far the most popular, and will be the main subject of this note.

The connector used on the "Straight" version of the M12+/M12M receiver is a Samtec ([www.samtec.com](http://www.samtec.com)) .050" "Board Stacker", P/N FW-05-03-L-D-156-156. Samtec offers several different styles of mating connectors. Thru-hole types include their **SFM** and **SFMC** series. Surface mount options include **SFM**, **SFMC**, and also the low profile **CLP** series. I have also successfully used several versions of the Harwin ([www.harwin.com](http://www.harwin.com)) **M50** connector series and the Oupiin ([www.oupiin.com](http://www.oupiin.com)) **2241**, **2242**, and **2243** connectors. I'm sure there are many other vendors of .050" pitch connectors, but these are the three I have the most experience with. The connector type you end up with will naturally depend on your end product's physical and electrical configuration, but you should be able to find a usable part from one of these vendors.

Due to physical characteristics, I settled on the Samtec **CLP** part for our internal designs that required a surface mount mating connector. The Samtec part number we use is: **CLP-105-02-G-D-BE-TR**. I know it looks like alphabet soup, but there are reasons for all the dashes, letters, and numbers. CLP is the base series designator, "-105" specifies a connector that is 5 contacts long, "-02" means something to somebody....., "-G" indicates a gold flashed contact, "-D" indicates a dual row connector, "-BE" indicates that the connector will accept pins from the back side (bottom entry), and "-TR" indicates that we buy them on tape-and-reel for machine assembly.

The reason I settled on the "-BE" option is that it allows me to mount the connector either on the same side of the motherboard as the receiver, or on the back side, allowing the receiver to sit much closer to the motherboard.. This is best illustrated by the drawing on the next page:



On the left, you can see that the **CLP** connector is on the top side of the motherboard. If a .312" high standoff is used the receiver pins just clear the top surface of the motherboard, and the total installed height is about 0.43". If you prefer a thru-hole connector, the Harwin **M50-3000522** fits just fine when used in this stack-up, although you might need to go to a .375" long standoff to keep the pins from bottoming out in the connector.

On the right side is a rather sneaky way to get the receiver much closer to the motherboard by mounting the Samtec **CLP** connector on the backside and passing the data header pins through 10 unplated holes in the motherboard in order to get to the connector. Note that this just about cuts the installed height in half. This is the arrangement I used on our M12 series of adapter boards that allows the receiver to plug into an existing VP/UT/GT receiver spot without exceeding the old receiver physical envelope.

### RIBBON CABLE CONNECTORS

If you want a ten pin female header with a ribbon cable that will mate to the receiver for prototyping or experimentation purposes, Samtec makes a number of parts under their **FFSD** series that will do just that. As an example, Samtec P/N **FFSD-05-D-12-01-N** will get you a 12" long piece of ribbon cable with 10 pin female headers on each end. Cut the cable in half and you instantly have two 6" long pigtailed....

### MMCX COAX CONNECTOR

As mentioned previously, mating connectors were a little difficult to find when the M12 was first introduced, but are becoming commonplace. The M12+/M12M is only available with one antenna connector option, that being a straight, or "end launch" jack. Mating connectors are available from just about all of the major distributors. We have successfully used connectors from Johnson Components, RF Industries, Connex, and Telegartner. If you need small quantities fast I would suggest Digi-Key ([www.digikey.com](http://www.digikey.com)) as they stock a good selection of the Johnson Components MMCX connectors. The standard straight plug that mates with the M12/M12+ is their P/N **J590-ND**, while the right angle version is their P/N **J594-ND**.

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