

**Synergy SSR Series Adaptor Boards for
Motorola UT+ Oncore Replacement**

28 September 2019

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Introduction - Synergy’s new, u-Blox based, SSR Series Adaptor Boards surpass the capability of the original M12 Series Adaptor Boards introduced in 2002.



Adaptor Board Shown with standoffs

The original M12 adaptor board was the same size and form factor as the Motorola VP, GT+ and UT+ Oncore GPS receivers. But it required the user to change their interface code from 6 and 8 channel Motorola binary commands to the newer 12 channel format. *That process is not required to use the new SSR Adaptor Board product.*

The most significant feature of the new SSR Series Adaptor Board products is the ability to operate in an emulated Motorola binary mode that produces popular 8 channel UT+ precision timing messages – *i.e. no changes of user application code required!*

The SSR-6Tf\Adaptor Board assembly is designed for use in professional and scientific timing products from various manufacturers produced between 1999 and 2003. This product can also be used for upgrading legacy Motorola and Synergy Eval Kits shipped with UT+ Oncore receivers.

Note: Synergy’s SSR-M8T, Multi-GNSS Adaptor Board version is also available in the same formfactor for users wishing to experiment with alternate GNSS like BeiDou, GLONASS, Galileo and QZSS. Although not supported as a UT+ Oncore replacement, the SSR-M8T also produces 6, 8 and 12 channel emulated Motorola binary messages and is quoted on request.

Electrical Characteristics - The 3.3 Volt SSR receivers appear to the external electronics as a legacy, 5V Motorola receiver. Power and signal pinouts are the same as Motorola’s UT+ Oncore receivers.

The Adaptor Board includes +3.3V regulators for both the main supply and battery back-up to enable SSR Series receivers to function properly with +5V power applied to the Adaptor Board. 5V logic inputs from the host hardware are transformed into 3.3V logic for use by the SSR and the 3.3V outputs from the SSR are converted to 5V levels before being sent to the host.

Message Formats:

In 2014, in anticipation of coming Oncore receiver week roll-over events, Synergy started the firmware design process for emulating the most popular Motorola binary messages used in timing applications. The list of emulated Motorola binary messages is shown in Tech-Note 498 “Motorola Binary Emulation.” The list is expanded as more command\reply messages are added and the latest firmware versions will be available on [Synergy’s website](#) for download.

If the host application is using the Motorola binary protocol for communications, the standard SSR\Adaptor Board product will accept popular 6, 8 and 12 channel commands and produce an emulated binary output message in Motorola format.

Compatibility note – Various manufacturers produced precision timing products using Motorola Oncore products. Each manufacturer initialized these receivers in different ways to produce the desired receiver response for specific instruments. Successful SSR Clone installation depends on several factors: 1) Replicating the manufacturer’s initialization sequence; 2) Knowing what commands are sent to the GPS receiver for status reporting; 3) including the required binary commands in the current SSR firmware release.

It is expected that SSR Clone products may need special updates to work as a Plug & Play solution in some legacy products. An analysis may be needed to determine software initialization processes and on-going status commands. When these are understood, they can be queued for the next SSR firmware release.

Ordering Information (“-x” indicates firmware version):

Part Number	Description
16431715G -x	SSR-6Tf on Adaptor with R/A MCX
16431716G-x	SSR-6Tf on Adaptor with Straight MCX

Part numbers replace 8 channel UT+ Oncore receivers
Dash number (-x) refers to firmware version

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The original Motorola UT+ Oncore OEM GPS precision timing boards were delivered with one of two user specified RF connectors – A right angle connector as shown in Figure 1 and straight as shown in Figure 2.

Figure 1

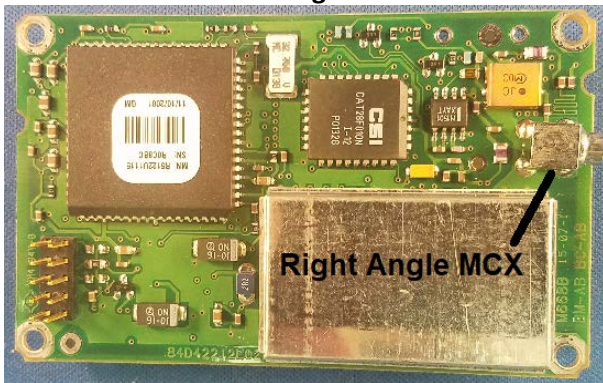
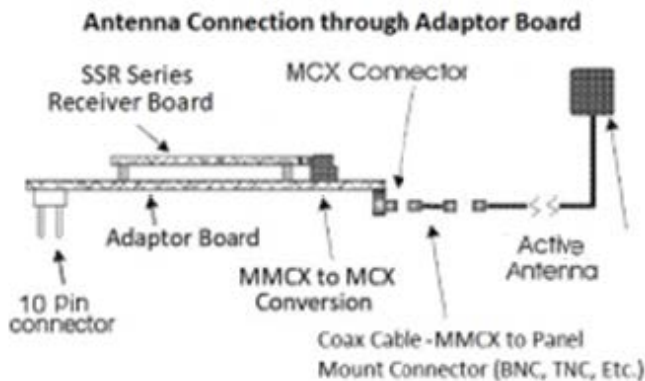


Figure 1-A shows the standard SSR Adaptor Board stack-up. It includes a conversion from the SSR receiver's MMCX RF connector to an MCX connector used on most timing instrumentation products. It requires an RF cable with a mating MCX connector to supply GPS signals to the receiver (use the existing RF cable unless damaged).

Figure 1-A



A Motorola UT+ Oncore board is portrayed above. The part numbers listed above are based on Synergy's u-Blox based SSR-6Tf OEM GPS receiver board.

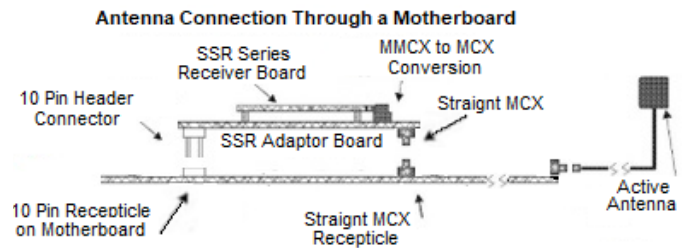
Figure 2



Figure 2-A shows a special Adaptor Board configuration that uses a mating MCX connector on a motherboard to provide GPS signals to the SSR Adaptor Board.

Note: If the SSR connectors are not an exact match with the motherboard connectors, install longer standoffs and supply a short coax extension that connects the two MCX connectors.

Figure 2-A



For up-dating Motorola's Original XT Oncore and Synergy's earlier XTS/II and SynPaQ® products, the SSR-M8T Multi-GNSS Adaptor Board is quoted on request.