



Time Server



COAX Seal  
(for thread joints)  
760-905-000



M/M Type N to SMA  
RG58 Cable  
760-940-XXX



Lightning Arrestor  
760-910-000



GPS Antenna  
"L" Mast Mount  
760-907-000  
(See Page 3)



M/M Type N to Type N  
RG58 Cable  
760-950-XXX



GPS Antenna Collar Mount  
760-908-000  
(See Page 3)

Choose a  
Mount



Outdoor Antenna  
760-906-000

Up to 250ft of RG58 Cable can be used without additional hardware.

Time Server



Time Server



M/M SMA to SMA  
RG316 Cable  
760-920-XXX



M/M SMA to SMA  
RG316 Cable  
760-920-XXX



COAX Seal  
(for thread joints)  
760-905-000



GPS Splitter  
SMA Female  
760-602-000



M/M Type N to SMA  
RG58 Cable  
760-940-XXX



Lightning Arrestor  
760-910-000



GPS Antenna  
"L" Mast Mount  
760-907-000  
(See Page 3)



M/M Type N to Type N  
RG58 Cable  
760-950-XXX



GPS Antenna Collar Mount  
760-908-000  
(See Page 3)

Choose a  
Mount



Outdoor Antenna  
760-906-000

Up to 250ft of RG58 Cable can be used without additional hardware.



**Collar Mount:**  
Goes on Top of up to  
1.5" OD pole. Held  
in place with two set  
screws. Cable is  
contained inside of  
pole.



**L-Bracket Mount:**  
Supports adjustable  
hose clamps which  
can be purchased at  
local hardware store.  
Can also be screwed  
to surface.

### **Why only 250ft of cable?**

The previous pages of this product overview document list 250ft as the maximum cable length supported by the TimeMachines time servers with the cables on the website. This is a safe limit when using TimeMachines time servers, splitters and cables. It includes a factor of safety that makes the setup work reliably in most weather conditions.

### **What if the antenna needs to be more than 250ft from the server?**

There are two factors that limit the length of the cable between the time server and antenna.

#### **First Factor: Signal loss in the cable**

Antennas used with most GPS receivers have a gain rating. This gain rating has nothing to do with helping a GPS receiver obtain signal lock in a given location. A higher gain rating will not make up for an antenna location that can't see the GPS satellites well. What is for, is to overcome the signal loss in a cable. The GPS L1 frequency, which is the primary frequency we are interested in for our time servers, is 1575.42 MHz.

The RG58/LMR195 cable that TimeMachines sells loses about 13dB per 100 ft of cable at the GPS L1 frequency. If the antenna amplifier is 40dB, and there is 250ft of cable, the loss is approximately 30dB, leaving about 10dB of margin. If a splitter is added to the signal path, then another 4-7dB can be lost, plus all the cable connectors add a bit more loss. If the total loss in the cable path exceed the antennas 40dB gain by very much, then the GPS likely will not be able to lock and obtain the timing information required to operate.

Overcoming the signal loss can be done by changing to a higher grade cable, such as LMR400. LMR400 has roughly half the loss of LMR195. It is more expensive and larger, but enables longer cable runs. TimeMachines does not sell LMR400, but an internet search will reveal many sellers.

#### **Second Factor: DC Loss to the Antenna**

The second factor that must be overcome is the DC loss from the time server to the antenna. The TimeMachine's servers can put out a maximum of 5V DC. This is required by the antenna to power the internal amplifier circuit. If this voltage is not present, or below a minimum value, then the antenna doesn't work, period. When the cable runs become longer than 250ft, there is more voltage lost in the cable between the time server and the antenna. If the cable becomes long enough, the voltage will droop enough to degrade or eliminate function.

This is more easily overcome than GPS signal loss. Using a TimeMachines powered splitter, allows putting a higher voltage onto the antenna cable such that more voltage gets to the antenna. The Tallysman antennas that TimeMachines resells are capable of working from 2.7 to 16 Vdc. The power injectors come with a 9V supply. This will overcome a longer cable runs' DC loss. The powered splitter has no gain of its own, it simply functions as a way to inject a higher voltage on to the antenna cable.

#### **The Result:**

Both the signal loss from the antenna to the time server AND the DC voltage loss from the time server to the antenna must be overcome to extend the cable length much beyond 250ft. If both are not addressed, then signal issues will be a problem and the time server may not function.