

GPS ANTENNA SYSTEMS

Quick Configuration Guide

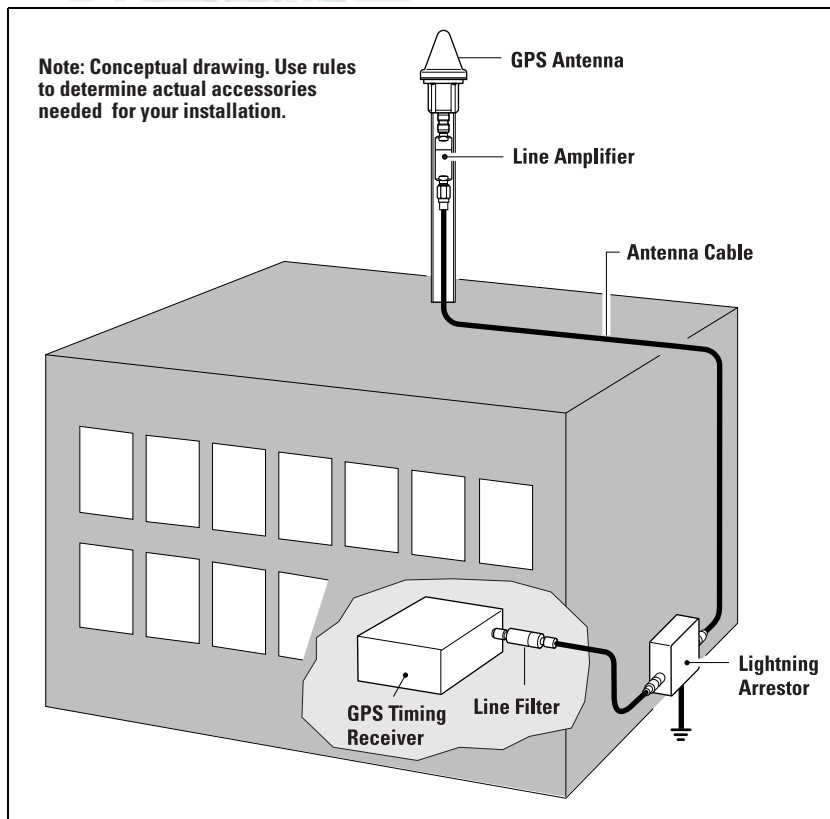


Figure 1. Key GPS antenna system components.

For use with 58503B, 55300A, and 59551A GPS timing receivers only

Use this quick configuration guide to easily configure your GPS antenna system. The simplified antenna component selection procedure will work very well for the majority of antenna systems. Figure 1 shows the key components which may be used in an antenna installation.

Please note that this quick configuration guide works only for 58503B, 55300A, 59551A, and custom GPS timing receivers which have a type-N antenna input connector. The 58533A and 58540A GPS timing receivers are covered in a separate document, Symmetricom publication number QCG/58533A-540A.

Simple rules for placing or using the various elements of an antenna system are given beginning on page four. These rules will be referenced in each section where they apply. Additional help with your antenna system configuration and installation is also available. You can simply fax or call Symmetricom's Customer Technical Assistance Center. Please see the back page of this document for complete contact information.

Elements of a typical GPS antenna system

The following elements will be used in most GPS antenna systems:

- A GPS antenna (required)
- Cable(s) to interconnect the elements (required)
- Lightning arrestor(s)
- Amplifiers or filters: The rules will help determine if these are needed.

Getting started

First, determine the following:

- Where to place the antenna (see Rule 1)
- Where to place the lightning arrestor if used (see Rule 3)
- Where to place the GPS receiver
- The lengths of cable(s) needed to interconnect these elements. Be sure to consider the length of the cable route, not the direct point-to-point distance.
- The total length of all cables determined above

Once this information is known, your GPS antenna system can be easily configured by selecting the necessary components on the checklist.

Checklist

GPS antenna

Every GPS receiver needs an antenna in order to operate. See Rule 1 for information on antenna placement, and optional mounting hardware.

- 58532A GPS L1 reference antenna. Quantity: 1
- Option AUB, antenna mast. Quantity: 1

Select one of the following as needed:

- SDI8101G, antenna wall mount.
- SDI8106G, antenna pipe mount.

Order these parts through Talley at 1-800-223-4949.

Line amplifier/filter

If used, the line amplifier should be attached directly to the antenna. See Rule 2 to determine if an amplifier is needed.

- 58529A GPS L1 line amplifier/filter. Quantity: ____
(Quantity: 0, 1, or 2) See Rule 2

Interconnect cables

Use these cables to connect between elements of the antenna system and the GPS receiver. See Rule 5 for more information. Select an option for each length of cable needed. For example, you might need a 58521A Option 010 to connect between the GPS antenna and a lightning arrester, and a 58521A Option 002 to connect the lightning arrester to the GPS receiver.

Note. A cable is not needed to connect between the antenna and a line amplifier/filter.

- 58521A interconnect cable (LMR-400, Type-N connectors).
 - Option 001 - 1 meter length. Quantity: ____
 - Option 002 - 2 meter length. Quantity: ____
 - Option 005 - 5 meter length. Quantity: ____
 - Option 010 - 10 meter length. Quantity: ____
 - Option 015 - 15 meter length. Quantity: ____
 - Option 030 - 30 meter length. Quantity: ____
 - Option 060 - 60 meter length. Quantity: ____
 - Option 110 - 110 meter length. Quantity: ____
 - Option 220 - 220 meter length. Quantity: ____
 - Option 330 - 330 meter length. Quantity: ____

Lightning arrestors

Lightning arrestors will protect your system from lightning damage. Some systems may require more than one lightning arrester for full protection. See Rule 3 for more information on selecting a lightning arrester and its options.

- 58539A lightning arrester(s). Quantity: (usually 1 or more) See Rule 3 ____
 - Extra gas capsule, Option 001. Quantity: ____
 - Grounding strap, Option 002. Quantity: ____

L1 bandpass filter

See Rule 4 to determine the need for a line filter.

- 58530A GPS L1 filter.
- Option AUB, mounting bracket

GPS Antenna System Rules

Rule 1. Antenna placement.

A. View of the sky

Select an area where the GPS antenna will have an unobstructed view of the sky. An ideal position has no obstructions above a point 10 degrees above the horizon. The total blockage of the sky (due to buildings, mountains, etc.) should be less than 50%. If less than 50% of the sky is visible to the antenna, please call or send a fax describing the problem to Symmetricom's Customer Technical Assistance Center. Please see the back page of this document for complete contact information.

B. Lightning considerations

Locate the antenna at least 15 meters away from lightning rods, towers, or structures that attract lightning. GPS antenna damage is usually not the result of a direct lightning strike, but the effects of a lightning strike on a nearby structure. Locate the GPS antenna lower than any structures that will attract a strike.

C. Maintenance considerations

If the GPS antenna fails or must be checked, having the antenna positioned in an easily accessible location will facilitate maintenance. Avoid installing the antenna on a tower, which requires a specialist to maintain.

D. Interference consideration

Avoid the direct radiation from transmitting antennas (such as TV or Cellular). Symmetricom has filters to minimize this problem. See Rule 4.

E. Mounting brackets

All brackets are designed to attach to the 58532A antenna mast (Option AUB).

1. Wall mount—attaches the antenna to a wall with 4 fasteners.
2. Pipe mount—attaches the antenna to either a vertical pipe or rod. The pipe or rod must have a diameter between 20 and 50 mm.

Rule 2. Is a GPS line amplifier/filter needed?

A. Cable length

Add up the total length of all the cables determined in the Getting Started section. If this length is 115 meters or less, no amplifier is needed. If the total length is between 115 meters and 240 meters, you must use a line amplifier. If the length is between 240 meters and 360 meters, use two line amplifiers. If the total length is greater than 360 meters, contact Symmetricom for further assistance.

B. Placement

Mount line amplifiers as close to the antenna as possible. Connect one amplifier directly to the antenna using the hardware that is included. If using two line amplifiers, connect the second line amplifier directly to the first line amplifier using included hardware. The line amplifiers fit nicely inside the antenna mast where they are protected from the weather.

Note. The 58529A GPS line amplifier also filters the GPS signal. For systems that need filtering but not signal amplification, use the 58530A GPS L1 filter described in Rule 4.

Rule 3. Lightning arrestors.

A. Is a lightning arrestor needed?

Very probably, yes. Lightning does not have to strike the antenna to significantly damage the antenna and GPS receiver. Lightning strikes induce damaging voltages in the antenna system when striking nearby objects.

B. What do I need?

A commonly used configuration is to place a 58539A lightning arrestor where the antenna cable enters the building (either inside or outside), because there is often a good earth ground nearby to connect to.

If the cable between this lightning arrestor and the GPS receiver is longer than four meters, it is good practice to place a second 58539A within four meters of the GPS receiver. The second arrestor reduces any lightning-induced voltages in the cable to the receiver.

These are the simplest forms of lightning protection.

C. Grounding

The 58539A does not need a grounding strap if it is directly bolted to a grounding plate (mounting hardware is included with the product). A 300 mm long grounding strap (Option 002), is available if you cannot connect directly to a grounding plate.

D. Extra gas capsule

Lightning arrestors have replaceable gas capsules. One capsule is included with each unit. The gas capsule should be replaced periodically according to your installation's maintenance code. Order Option 001 for an extra gas capsule.

E. Cautions

If you are not comfortable designing your own lightning protection system, seek professional assistance in this area. This guide cannot make you an expert.

Rule 4. GPS L1 bandpass filter.

Additional antenna line filtering may be necessary if the antenna is in the near field of a radio transmitter. In most installations, a line filter is not required. Since the filter can be easily installed after the antenna system is complete, we recommend the filter be left out of the design unless operational problems are encountered. The symptom of an interfering signal is that the receiver will not lock or lock intermittently to satellites. Be aware that this symptom can be caused by a number of things besides interfering signals. If interfering signals are suspected, connect the filter directly to the antenna connector on the GPS receiver using the hardware that is included. Connect the antenna cable to the filter's input connector. Use option AUB (mounting bracket) if you prefer to mount the filter to a surface or pole.

Rule 5. Interconnect cables.

A. Cable options

The receivers and accessories described in this guide all use type-N connectors. Symmetricom's 58521A N-to-N interconnect cables are available in various lengths.

For ease of pulling antenna system cable through a conduit, or if you wish to cut the cable to an exact length, order the 58521AA. These cables are the same as the “A” cables, but the “AA” cables have a connector installed on only one end. The other connector is packaged with the cable for installation after the cable is installed (or cut). See Note below.

Note. To install the connector, you need the following tools: soldering iron, saw or cable cutter, knife, small scissors, and a crimp tool. The crimp tool must have a 10.7 mm hex die.

B. Multiple antenna site installations

Multiple site installations may be done more efficiently using bulk cable and a connector-installation tool kit. Extra connectors may be obtained by ordering option 800 when you order a 58529A GPS L1 line amplifier, 58530A GPS L1 filter, or 58538A and 58539A lightning arrestors. To order these connectors separately, order Symmetricom part number 1250-2570. For more information about multiple antenna site installations or general questions about GPS antenna system installation, please contact Symmetricom’s Customer Technical Assistance Center. Please see the back page of this document for complete contact information.

Contacting our Customer Technical Assistance Center

Please feel free to contact Symmetricom's Customer Technical Assistance center for support in configuring GPS antenna systems.

North, South, Central Americas and Asia Pacific regions:

Hours: 7:00 a.m. to 5:00 p.m. US-PST
Phone: US +1 408-428-7907
(888-367-7966 toll-free in the US)
Fax: US +1 408-428-7998
E-mail: CTAC@symmetricom.com

Europe, Middle East and Africa regions:

Hours: 9:00 a.m. to 5:00 p.m. GMT
Phone: UK +44 7000-111666
Fax: UK +44 1604-586767
E-mail: emeatech@symmetricom.com

When faxing or e-mailing, please include your name, company name, phone, and fax numbers.



Symmetricom
2300 Orchard Parkway
San Jose, CA 95131, USA
tel: 408-433-0910
fax: 408-428-7897
e-mail: info@symmetricom.com
http://www.symmetricom.com

Symmetricom Limited
2 The Billings
Walnut Tree Close
Guildford, Surrey
GU1 4UL, England
tel: 44-1483-510300
fax: 44-1483-510319

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