

GPS-704-X

USER GUIDE

The GPS-704-X is a wide band passive antenna designed to operate at the following frequencies (in MHz):



GPS L1 (1575.42), L2 (1227.60) and L5 (1176.45)

Galileo L1 (1575.42), E5a and E5b (1164-1215) and E6 (1215-1300)

Glonass L1 (1598 - 1611.5) and L2 (1242.5 - 1254.3)

OmniSTAR/CDGPS differential correction services (1525 - 1559)

This guide provides the basic information you need to install and begin using your new antenna.

ADDITIONAL EQUIPMENT REQUIRED

The equipment listed below is required to set up the GPS-704-X:

- A mount, such as a range pole, tribrach, or tripod, with a 5/8" x 11 thread that extends between 3/8" and 7/8" (9 mm and 22 mm)
- A 1" open-end wrench
- 1 short coaxial cable with a male TNC connector for the antenna
- An external Low Noise Amplifier (LNA)
- 1 coaxial cable between the receiver and the LNA
- Power supply and power cable (dependant on LNA)

SITE SELECTION GUIDELINES

Before installing the antenna, select a site that as closely as possible meets the following conditions for optimal performance:

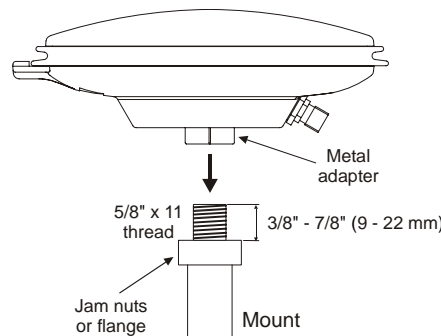
- An unobstructed line-of-sight from horizon to horizon and at all bearings and elevation angles
- As far as possible from reflective objects, especially those that are above the antenna and any water bodies, which can be a strong source of multipath reflections

- If obstructions and reflective surfaces are within 30 m, ensure the site is as high as possible. Otherwise, mount the antenna as low as possible.

INSTALLING THE ANTENNA

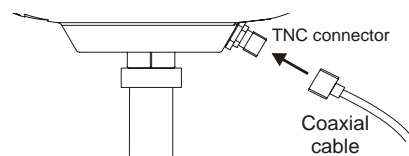
After a site has been selected, install the antenna as follows.

1. Verify that the thread on the mount does not extend more than 7/8" (22 mm) to ensure the plastic inside the antenna receptacle is not damaged when the mount is inserted. If it extends further than 7/8" (22 mm), add two jam nuts to shorten the exposed thread, ensuring the nuts are well-tightened.
2. Align the mount thread with the metal adapter on the bottom of the antenna and rotate the antenna clockwise until it is securely screwed to the mount. Using a wrench, tighten the adapter to the mount.

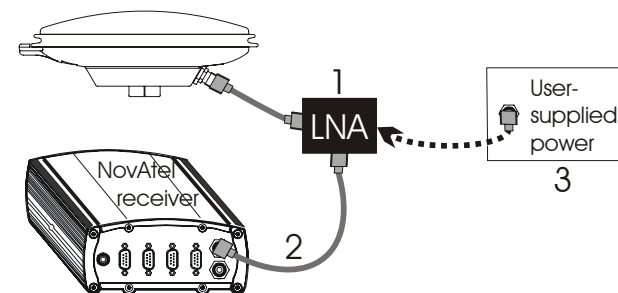


- The metal adapter on the bottom of the antenna is fixed in place. Do not attempt to remove it.

3. Remove the dust cap from the antenna's TNC connector.
4. Attach the male TNC connector of the coaxial cable to the antenna's TNC connector. Mount an LNA close to the RF output of the antenna, see *LNA Setup* later in this guide.



5. Attach the other end of the coaxial cable to an LNA (1 below), see the *LNA Setup* section of this guide. All NovAtel GPS receivers provide a 5 V power source for the LNA through their antenna RF connectors (2).

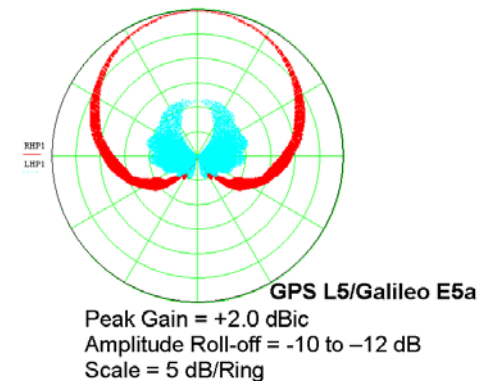
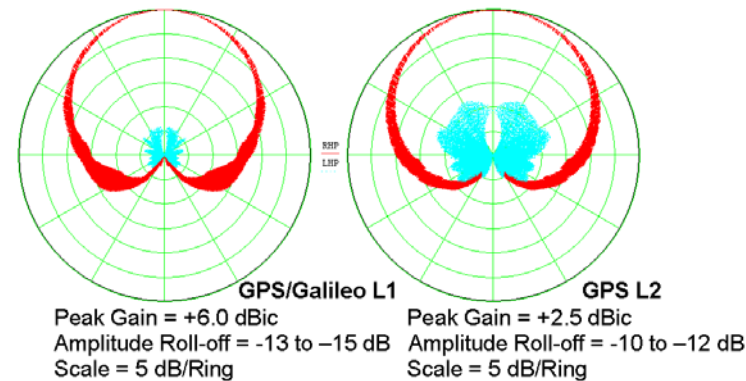


The LNA may either receive power from a NovAtel receiver or a separate power source. If you provide separate power (3) to the LNA, you must insert a DC block between the LNA and the receiver.

ANTENNA CARE

The GPS-704-X is designed to withstand the elements, including rain, snow, and dust. However, to ensure your antenna performs optimally, keep the radome (the top surface of the antenna) clean and brush off any ice and snow. In addition, ensure the TNC connector remains clean and dry and replace the dust cap when a cable is not connected.

ELEVATION GAIN PATTERNS

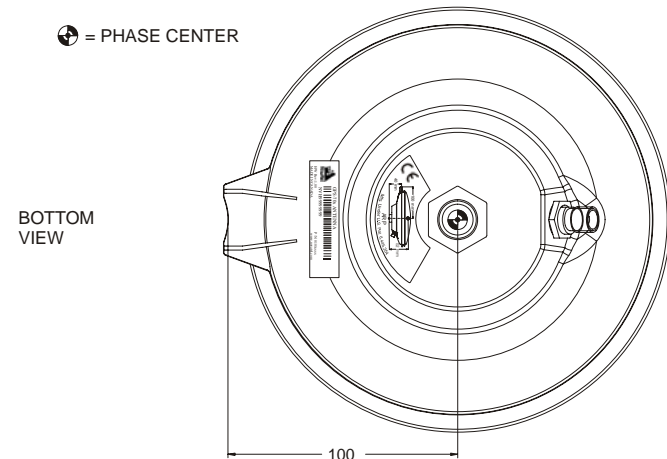
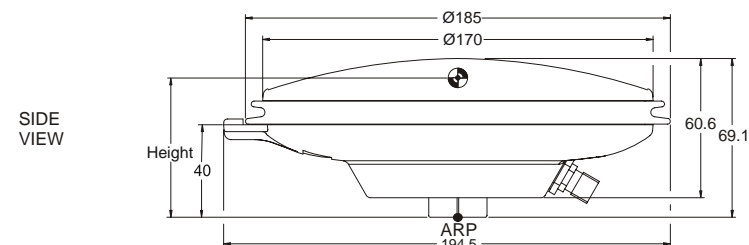
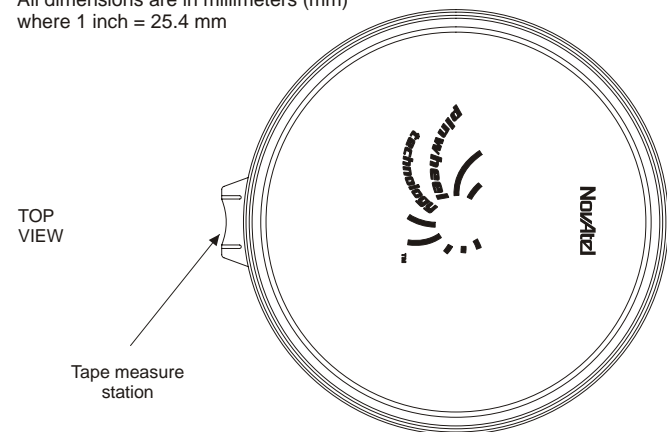


SPECIFICATIONS

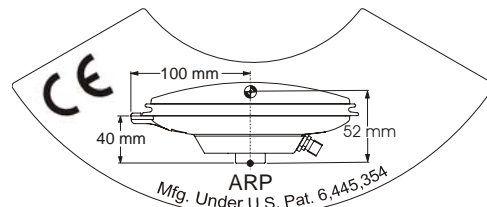
RF	
3 dB pass band (typical)	1150-1650 MHz
Gain at zenith ($\theta = 90^\circ$) (min)	L1: +6 L2: +2.5 L5: +2 (dBic)
Gain roll-off (zenith to horizon)	L1: 14 L2: 11 L5: 11 (dB)
Polarization	Right-hand circular
Nominal impedance	50 Ω
VSWR	$\leq 2.0 : 1$
POWER	
See the <i>LNA Setup</i> section of this guide.	
PHYSICAL	
Diameter	185 mm (7.28")
Weight	468 g (16.5 oz)
ENVIRONMENTAL	
Maximum altitude	9000 m (29527.5 ft)
Operating temperature	-40°C to +85°C (-40°F to +185°F)
Storage temperature	-55°C to +85°C (-67°F to +185°F)
Salt spray	MIL-STD-810F Method 509.4
Ingress protection	IPX6 and IPX7

MECHANICAL DRAWINGS

All dimensions are in millimeters (mm)
where 1 inch = 25.4 mm



PHASE CENTER



Height = Vertical phase center offset from the antenna reference point or antenna reference plane (ARP)

LNA SETUP RECOMMENDATIONS:

It is recommended that an external Low Noise Amplifier (LNA) and cables are used with the GPS-704-X antenna. Cable lengths are determined by their loss. A short cable should be connected between the antenna and the LNA with a maximum loss of 1 dB. A longer cable with a maximum loss of 10 dB is permitted between the LNA and the receiver.

The following table provides some recommended specifications for choosing the external parts.

Components	Specifications
LNA Noise Figure	1.5 dB
LNA Bandwidth	1100-1700 MHz
Group Delay Variation Across LNA Bandwidth	5 ns max
LNA Gain	25 dB min.
LNA VSWR	2:1 max
Cable Loss Between Antenna and LNA	1 dB max
Cable Loss Between LNA and Receiver	10 dB max
Connectors	TNC
LNA and Cable Impedance	50 Ω

WARRANTY POLICY

NovAtel Inc. warrants that its Global Positioning System (GPS) products are free from defects in materials and workmanship, subject to the conditions set forth below, for the following periods of time:

GPSAntenna™ Modules: One (1) Year from date of sale
Cables and Accessories: Ninety (90) Days from date of sale

Date of sale shall mean the date of the invoice to the original customer for the product. NovAtel's responsibility respecting this warranty is limited solely to product repair at an authorized NovAtel location only. Determination of repair will be made by NovAtel personnel or by technical personnel expressly authorized by NovAtel for this purpose.

The foregoing warranties do not extend to

(i) nonconformities, defects or errors in the products due to accident, abuse, misuse or negligent use of the products or use in other than a normal and customary manner, environmental conditions not conforming to NovAtel's specifications, or failure to follow prescribed installation, operating and maintenance procedures, (ii) defects, errors or nonconformities in the products due to modifications, alterations, additions or changes not made in accordance with NovAtel's specifications or authorized by NovAtel, (iii) normal wear and tear, (iv) damage cause by force of nature or act of any third person, (v) shipping damage; or (vi) service or repair of product by the dealer without prior written consent from NovAtel.

In addition, the foregoing warranties shall not apply to products designated by NovAtel as beta site test samples, experimental, developmental, preproduction, sample, incomplete or out of specification products or to returned products if the original identification marks have been removed or altered.

The warranties and remedies are exclusive and all other warranties, express or implied, written or oral, including the implied warranties of merchantability or fitness for any particular purpose are excluded.

NovAtel shall not be liable for any loss, damage or expense arising directly or indirectly out of the purchase, installation, operation, use or licensing or products or services. In no event shall NovAtel be liable for special, indirect, incidental or consequential damages of any kind or nature due to any cause.

There are no user-serviceable parts in the GPSAntenna and no maintenance is required. If the unit is faulty, replace with another unit and return the faulty unit to NovAtel Inc. You must obtain a RETURN MATERIAL AUTHORIZATION (RMA) number by calling NovAtel Customer Service at 1-800-NOVATEL (U.S. and Canada only) or 403-295-4900 before shipping any product to NovAtel or a dealer. Once you have obtained an RMA number, you will be advised of proper shipping procedures to return any defective product. When returning any product to NovAtel, please return the defective product in the original packaging to avoid damage.

Before shipping any material to NovAtel or Dealer, please obtain a Return Material Authorization (RMA) number from the point of purchase. You may also visit our website at <http://www.novatel.com> and select *Support | Repair Request* from the menu.

WEEE NOTICE

If you purchased your 704-X in Europe, please return it to your dealer or supplier at the end of its life. The objectives of the European Community's environment policy are, in particular, to preserve, protect and improve the quality of the environment, protect human health and utilise natural resources prudently and rationally. Sustainable development advocates the reduction of wasteful consumption of natural resources and the prevention of pollution. Waste electrical and electronic equipment (WEEE) is a regulated area. Where the generation of waste cannot be avoided, it should be reused or recovered for its material or energy. WEEE products may be recognised by their wheeled bin label.

RoHS NOTICE

The 704-X is compliant with the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

PATENT NOTICE

The GPS-704-X is manufactured and protected under U.S. Patents #6,445,354 B1, #6,452,560 B2 and (patent pending) File No 16437-0225.

QUESTIONS OR COMMENTS

If you have any questions or comments regarding your GPS-704-X antenna, please contact NovAtel Customer Service using one of methods provided below.

Email: support@novatel.ca

Web: www.novatel.com

Phone: 1-800-NOVATEL (U.S. & Canada)

403-295-4900 (International)

Fax: 403-295-4901



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OM-20000101

Rev 2

April 27, 2006