

FLEX-6000 GPSDO Installation Guide

October 15, 2013

Thank you for purchasing the FLEX-6000 GPSDO Kit. The following guide will provide the necessary step-by-step procedure for installing the FLEX-6000 GPSDO module.

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Obtaining Technical Support

If you encounter any issues installing your FLEX-6000 accessory, please contact FlexRadio Systems technical support by opening a HelpDesk ticket on-line at <http://helpdesk.flexradio.com> or by phone at +1 (512) 535-4713 extension #2. Please leave a voice mail message if you don't get an answer as all of our engineers are probably busy on existing calls.

Hours of Operation: Our Technical Support engineers are available Monday – Friday from 8:00am-5:30pm Central Time. If you call after business hours, on a holiday or weekend, please leave a detailed message and we will return your call during regular business hours in the order it was received.

You may always submit a HelpDesk support ticket at any time.

If you need assistance opening a HelpDesk ticket, please refer to the [HelpDesk Assistance Center](#) home page for step-by-step instructions.

Getting Started

Required Tools

- A number 2 (#2) Phillips Screwdriver
- A 5/32" (4mm) nut driver or socket wrench
- A 5/16" (8mm) open-ended wrench, nut driver or socket wrench

(The tools above are not supplied with the FLEX-6000 GPSDO module kit.)

- TORX wrench (included)

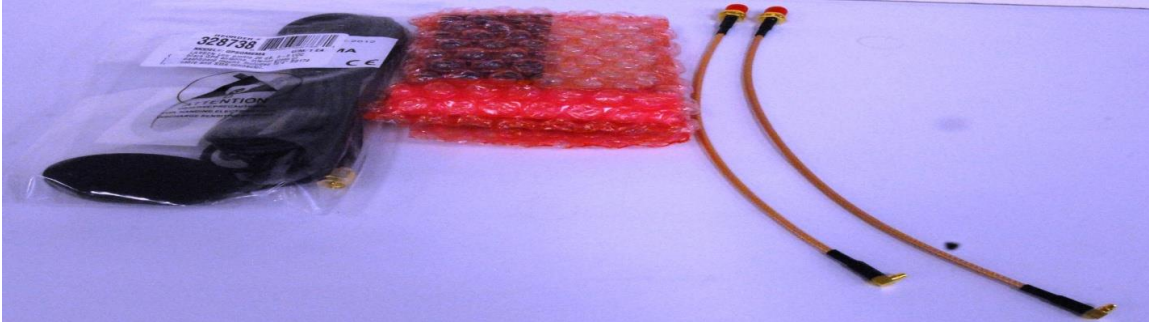
Packaging and GPSDO Kit Contents

Your FLEX-6000 GPSDO will arrive in anti-static packaging similar to the one shown below.



Remove the contents of and verify that the following items are included before proceeding. Refer to the image below.

- One (1) GPS patch antenna
- One (1) GPSDO assembly
- Two (2) coax assembly cables (one cable may be shorter)
- Two (2) threaded 5/32" (4mm) spacers



Preparing to Install the GPSDO Module

The back panel plugs and bottom cover must be removed before the GPSDO can be installed.

Removing the Back Panel Metal Plugs

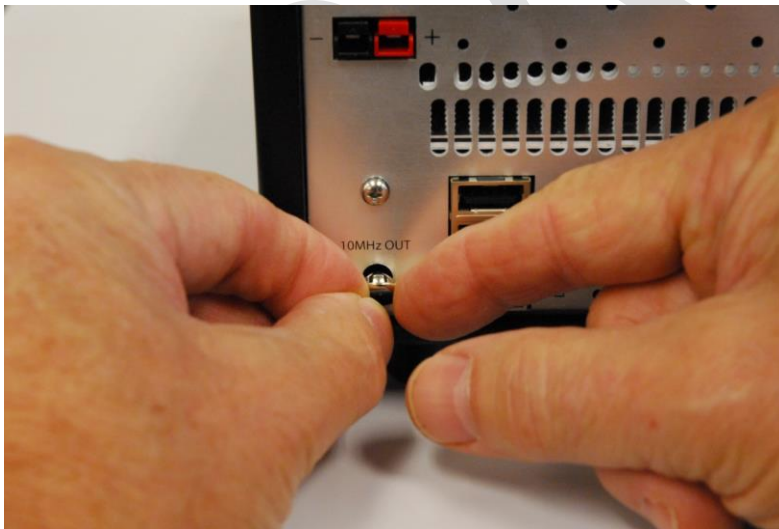
Place the FLEX-6000 on its feet with the back facing towards to as show in the image below.



Using your fingernail or other non-metal prying device, remove the two (2) metal plugs from the back panel below the labels:

- 10MHz OUT
- GPS ANT

The removal process is shown in the images below for the **10MHz OUT** plug. Repeat for the **GPS ANT** plug.



The image below shows both back panel chassis plugs removed.



Removing the Chassis Feet

Remove the four (4) feet from the chassis using a #2 Phillips screwdriver as shown in the image below. Retain the chassis feet and screws for re-installation later.



The image below show all four (4) chassis feet removed.



Removing the Bottom Cover

The bottom chassis cover for the FLEX-6000 must be removed before the GPSDO can be installed.

Using the long portion of the “L” TORX wrench remove the three (3) short **Bottom Cover Side screws** from the **left** side of the FLEX-6000.

Then remove the remaining three (3) short Bottom Cover Side screws from the **right** side of the FLEX-6000. Retain the Bottom Cover Side screws for re-installation. The image below shows the removal of the left side bottom Cover Side screws.



After removing the bottom cover side screws remove the six (6) stainless steel (silver) **Bottom Cover screws** using the long portion of the “L” TORX wrench. Retain the bottom Cover screws for re-installation. The image below shows the removal of the Bottom Cover screws.



Once the bottom cover retaining screws have been removed, gently pull the Bottom Cover upwards to remove it from the FLEX-6000. The image below shows the removal of the Bottom Cover.

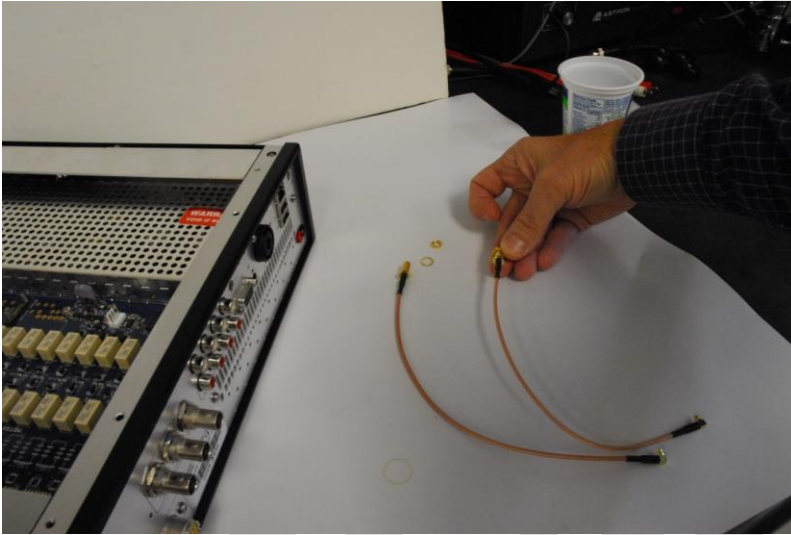


Installing the FLEX-6000 GPSDO Assembly

Once the bottom cover and chassis plugs have been removed, the GPSDO module can be installed onto the FLEX-6000.

Installing the Internal Coax Cabling

Locate the *long* coax cable assembly (if there is a longer one in the kit) and remove the SMA connector cap, hex nut and lock washer. See the image below.



Slightly bend the coax at the SMA connector end of the assembly to facilitate inserting the threaded end of the coax cable assembly through the back chassis hole labeled **10MHZ OUT**. This is the hole located in the far right hand corner of the back panel chassis.



While firmly holding the long cable assembly in place with one hand, insert the lock washer on the threaded SMA connector. Carefully install the SMA connector 5/16" (8 mm) hex nut on the threaded SMA connector being careful not to cross thread the SMA connector. Tighten hex nut with your fingers so that the coax cable assembly will freely rotate.

Insert the threaded end of the *short* coax cable assembly (if there is a shorted one in the kit) through the back chassis hole labeled **GPS ANT** in the center of the back panel chassis as shown below.



While firmly holding the cable assembly in place with one hand, insert the lock washer on the threaded SMA connector. Carefully install the SMA connector 5/16" (8 mm) hex nut on the threaded SMA connector being careful not to cross thread the SMA connector. Tighten hex nut with your fingers so that the coax cable assembly will freely rotate.

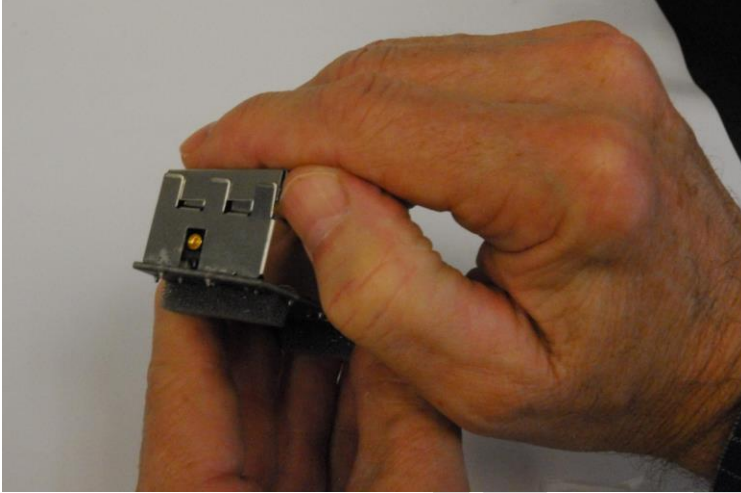
The image below is the completed installation of the **GPS ANT** coax assembly with lock washer and retaining nut installed.



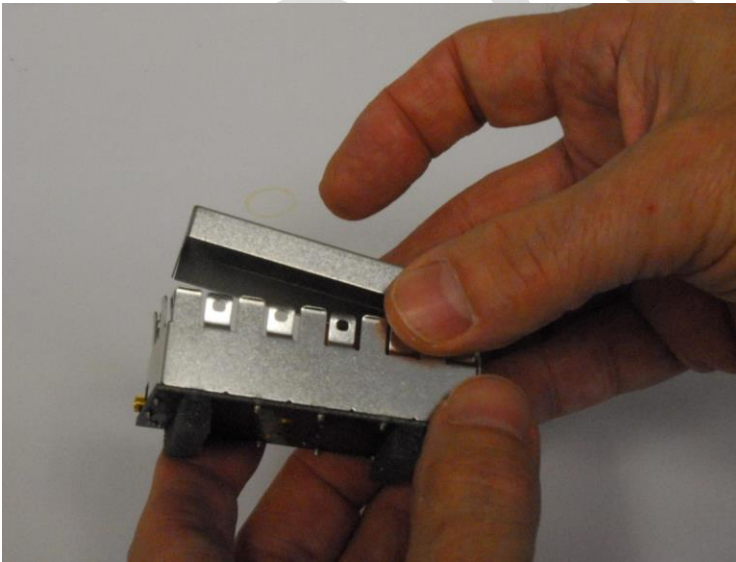
Installing the GPSDO Module Assembly

The next step is to install the actual GPSDO module assembly into the FLEX-6000.

If installed, remove the GPSDO cover from the module housing by gently prying it upwards on all four sides evenly as shown below. Be careful not to bend the retaining teeth by prying up one side more than another.

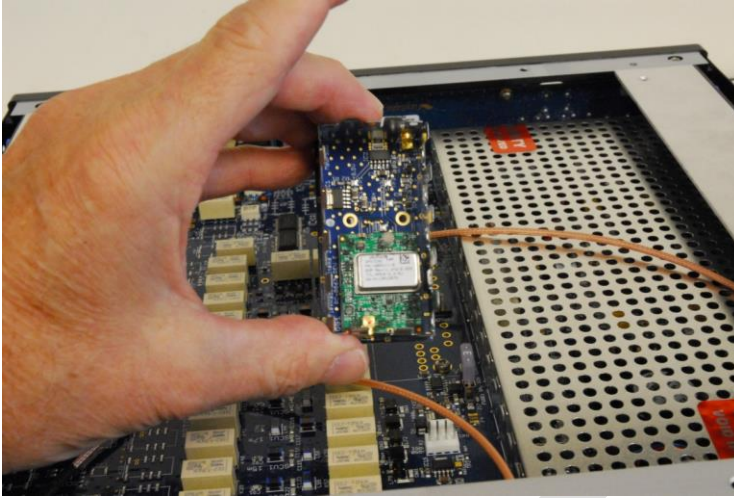


Gently lift off the cover as shown below.

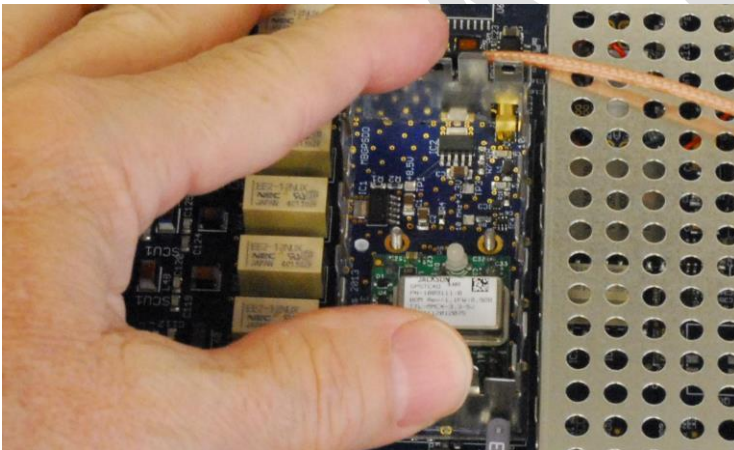


In the center of the FLEX-6000 TRX board, locate the area near the center of the FLEX-6000 PC board where the GPSDO module will be installed. It is adjacent to the large RF shield.

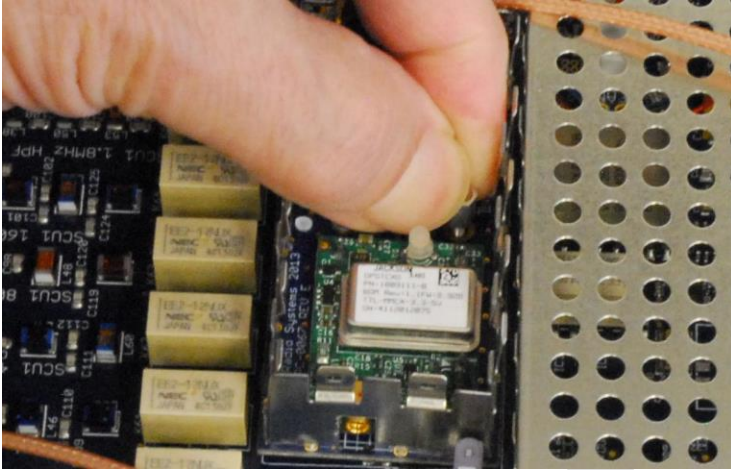
Orient the GPSDO module assembly so that the TCXO (large rectangular silver component on the PC board) is facing the rear of the FLEX-6000 as shown below.



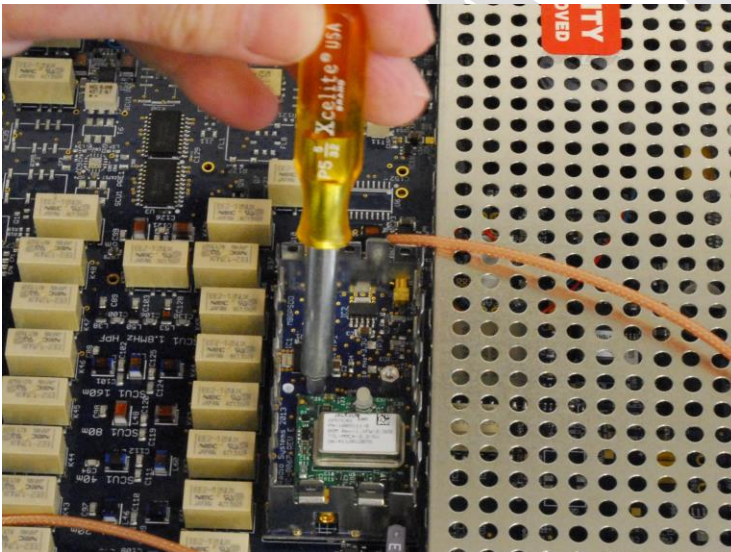
Insert the GPSDO module assembly onto the PC board so that the two (2) threaded screw studs are visible inside the GPSDO assembly as shown below. When oriented correctly, press down firmly to properly seat the GPSDO assembly module.



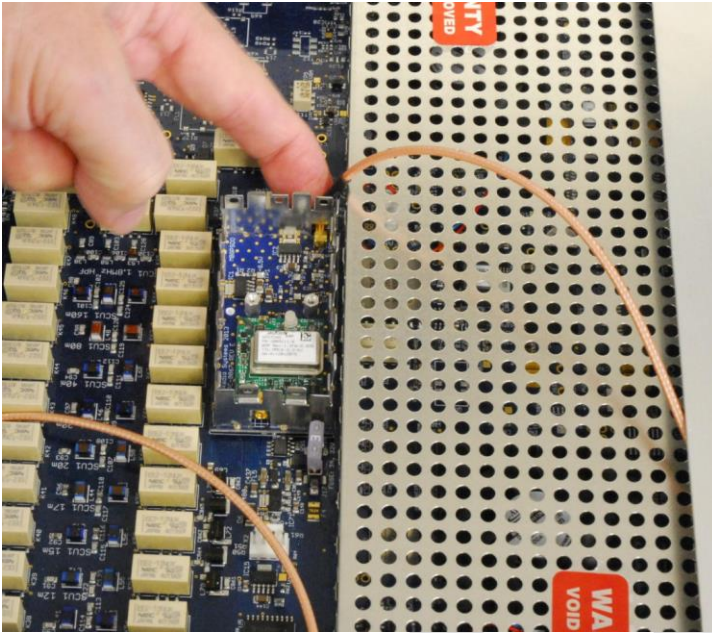
Carefully thread a 5/32" (4mm) spacer onto each threaded stud making sure not to cross thread the stud as shown in the image below.



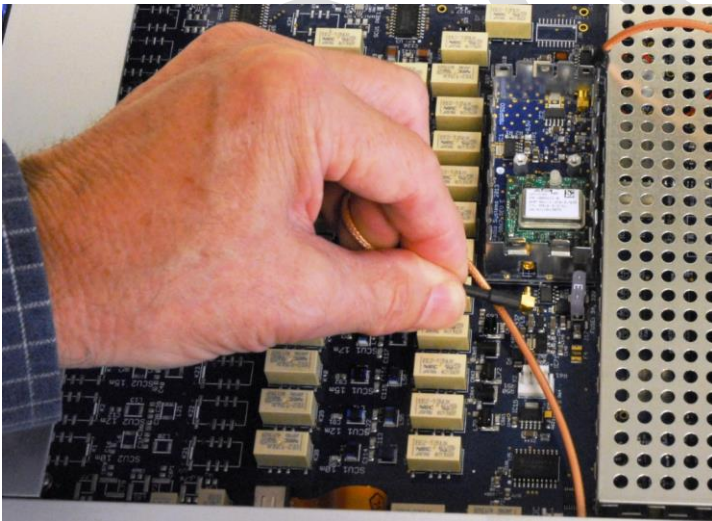
Using a 5/32" (4mm) socket wrench or nut driver gently tighten the spacers on the threaded stud to firmly attach the GPSDO assembly module to the PC board. *Do not over tighten the threaded spacer.*



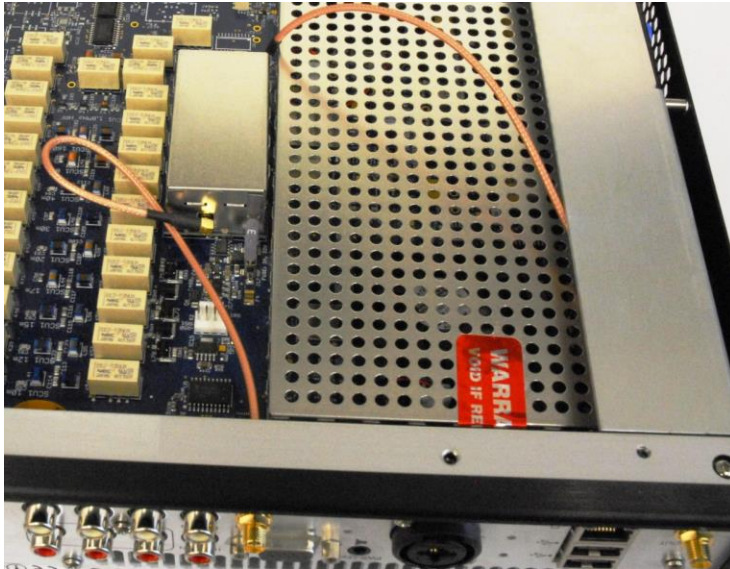
Press the **10MHZ OUT** coax assembly onto the MMCX connector on the GPSDO assembly module that faces the *front* of the FLEX-6000 as shown below.



Press the **GPS ANT** coax assembly onto the MMCX connector on the GPSDO assembly module that faces the *back* of the FLEX-6000 as shown below.

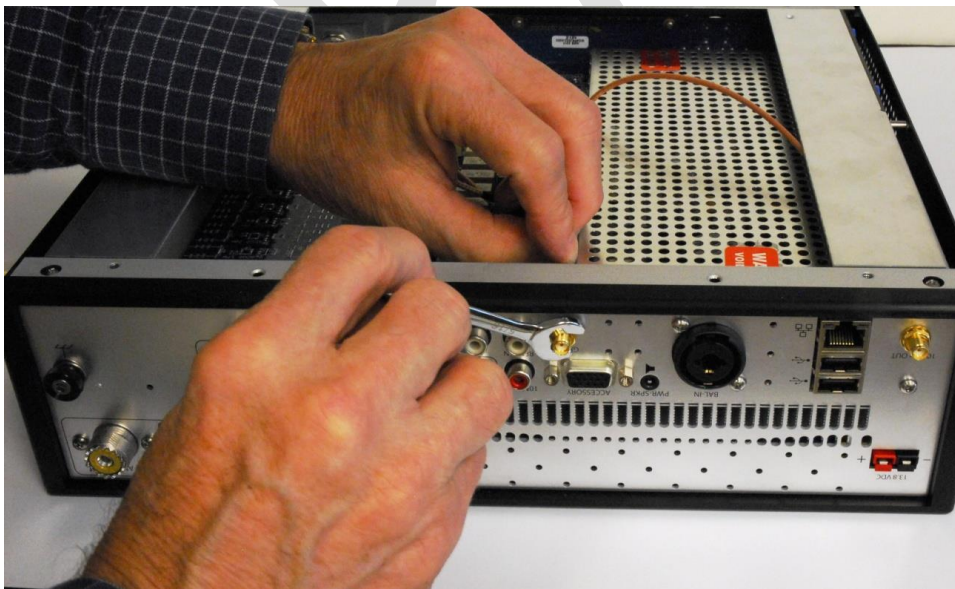


Replace the RF Shield in top of the GPSDO assembly module making sure that it is pressed down firmly to prevent EMI leakage as shown below.



Orient the coax assemblies as show above, lying flat as possible. While holding the coax assembly in one hand, use either a 5/16" (4mm) open-ended wrench, socket or nut driver to slightly tighten the SMA connector hex nut to prevent the SMA connector from rotating as shown below.

Tighten the SMA retaining nut on both coax assemblies. Be careful not to scratch the back panel of the FLEX-6000 when tightening the SMA connector hex nuts.



Reinstalling the Bottom Cover

Replace the bottom chassis cover on the FLEX-6000. Orient the cover so that the row of vent holes on the bottom cover are on top of the side fans towards the front of the FLEX-6000 as shown below.



After reinstalling the bottom cover install the six (6) stainless steel (silver) **Bottom Cover screws** using the long portion of the "L" TORX wrench. The image below shows the installation of the Bottom Cover screws.



Using the long portion of the “L” TORX wrench install the three (3) short **Bottom Cover Side screws** on the **left** side of the FLEX-6000. Then install the remaining three (3) short Bottom Cover Side screws on the **right** side of the FLEX-6000. The image below shows the installation of the left side bottom Cover Side screws.

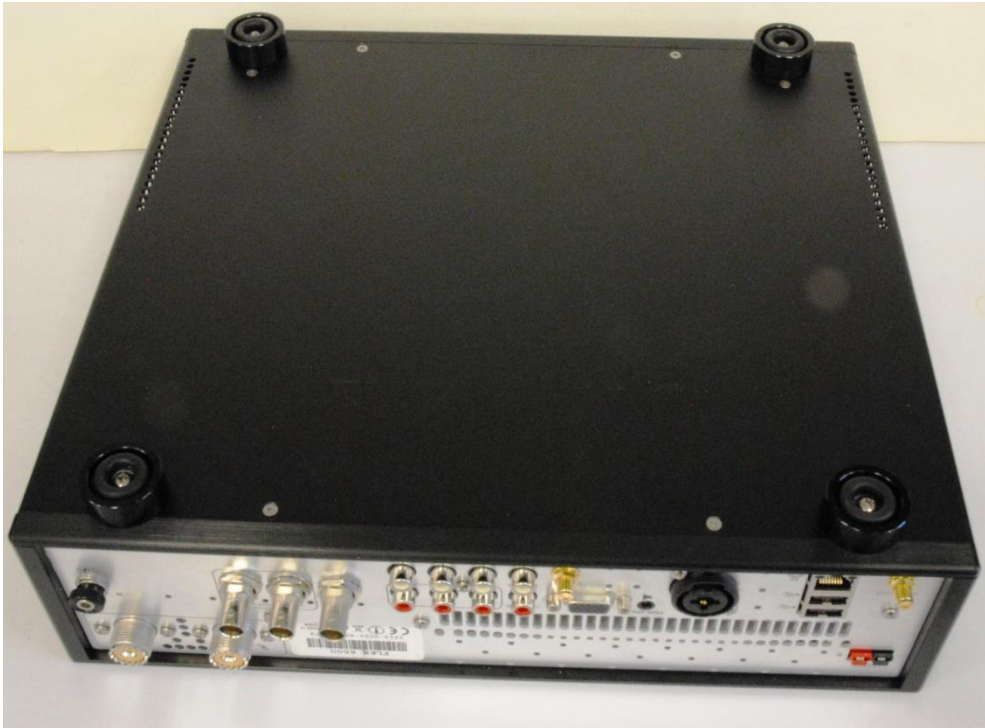


Reinstalling the Chassis Feet

Reinstall the four (4) feet on the chassis using a #2 Phillips screwdriver as shown in the image below.



The finished re-installation of the bottom cover and chassis feet should look like the image shown below.



Turn the FLEX-6000 over and place it on its feet. The FLEX-6000 back panel should look like the image shown below with the two (2) gold SMA connectors for the GPSDO module installed.



Preparing the GPSDO for First Use

Before using the GPSDO for the first time, the FLEX-6000 must be put back into its operating position and the GPS patch antenna installed.

Location Considerations for the FLEX-6000

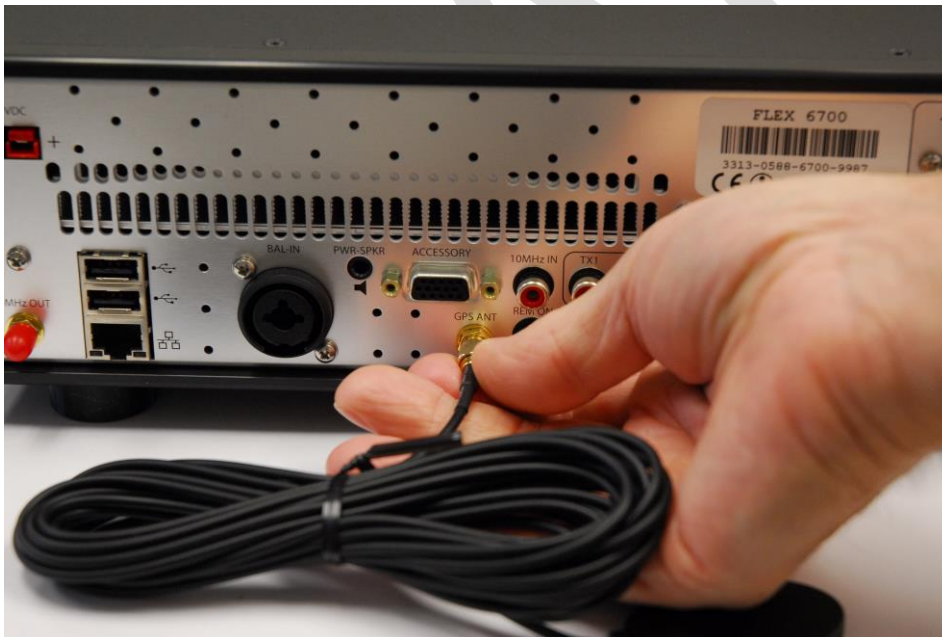
The supplied GPS “patch” antenna needs to be installed inside on a window that has a good view of the horizon in order to receive the GPS signals from the geostationary satellites. This is required to discipline the TCXO.

If the FLEX-6000’s operating position does not facilitate installing the GPS antenna as described above, an external weatherproof GPS antenna will be required for proper operation.

Once a suitable location for the FLEX-6000 is found, install the FLEX-6000 in its operating position and reconnect the Ethernet, DC power, Speaker and/or headphones, antennas and microphone and/or key.

Installing the GPS Patch Antenna

Being careful not to cross-thread the SMA connector, screw in the patch antenna SMA plug into the gold SMA connector labeled **GPS ANT**.



Using the double-sided adhesive oval that was included with the patch antenna, mount the GPS patch antenna on a window with a good view of the horizon.

Enabling the GPSDO Module

Power on the FLEX-6000 and allow it to completely boot up.

Start SmartSDR for Windows, version 1.0.0 or greater.

Select the GPSDO enabled FLEX-6000 from the **Radio Chooser** and start the FLEX-6000

From the SmartSDR for Windows Menu Bar, open the **Settings** menu option. Then select the **Radio Setup** Menu.

Select the GPS tab. Click on the **Install** button as shown below.



Verifying the Operation of the GPSDO Module

When the GPSDO has been properly installed, the following indicators are shown.

The Power Button status LED will turn from Green to either solid Yellow or flashing or sold Blue depending lock state of the GPSDO module.

- Yellow = GPSDO is initializing
- Flashing Blue = GPSDO is initialized, but has not achieved a satellite lock
- Solid Blue = GPSDO is initialized and locked

When the GPSDO has initialized, the GPS installation state will be indicated as “active” and GPS status data will be displayed in the Radio Setup -> GPS tab as shown below.



The screenshot shows a software window for the FLEX-6000. At the top left is a small image of the device. To its right, the text "FLEX-6000" is displayed in a large, bold font. Below this, the text "GPS Installation: GPS is active" is shown, with "GPS is active" in blue. There are two buttons: "Install" and "Uninstall". The "Install" button has a tooltip that says "Clicking install will test for the GPS module in the FLEX-6000 and enable GPS functionality." The "Uninstall" button has a tooltip that says "Clicking uninstall will disable GPS functionality." Below the buttons, there is a table of GPS data:

Latitude: N 35 37.976	Longitude: W 078 51.491
Grid Square: FM05np	Altitude: 124 m
Sat Tracked: 9	Sat Visible: 13
Speed: 0 kts	Freq Error: -1.320000e-11
Status: Locked	UTC Time: 14:29:33Z