

How I Installed an Onyx Plus XM Receiver in my Piper Warrior

For long trips, music and news is a nice option and makes the trip more enjoyable. So I decided to see if I could install an XM radio in my Piper Warrior.



Prerequisites. Before considering this project, you want to make sure that your audio panel has a music input jack or has Bluetooth capabilities. It is even better if your audio panel has a stereo output. Most of the audio panels made in the last 10 years or so have these options. If you plan to use stereo, you may need to verify that headsets are switched to stereo. Some of my Bose headsets had a series of dip-switches where you could turn on the stereo capability. My PS Engineering audio panel has automatic muting on the music so that it does not disrupt ATC or Tower communications or intercom communication.

About the Onyx Plus Receiver. I bought the Onyx Plus with the vehicle kit. The vehicle kit comes with the satellite antenna, a power cord, and a PowerConnect Vehicle Dock. There are some other things in the kit that you will not need for an airplane installation. The receiver runs on 12-15 volt input, has backlighting on the front buttons and displays full color album art of the album being played. The receiver weighs 3.4 oz. and 4.5 in (wide) x 2.4 in (height) x 0.7 in (depth). The rear of the dock has a 1/8 in (3.5 mm) female jack plus a power jack and a jack for the satellite antenna. The receiver with the vehicle kit is available on Amazon for under \$50.



Optional and Mandatory Equipment Needed. If you are connecting the Onyx Plus with an audio cable, you need a ground loop isolator: <https://www.amazon.com/Mpow-Ground-Isolator-Stereo-System/dp/B019393MV2> Without it, the noise level on the receiver is fairly high. With it, the sound is excellent. I stuck mine behind the bracket using high strength Velcro.

Remotes. Since changing XM channels could get awkward with the receiver mounted below the panel (especially for back seat passengers), I ordered two remote controls (XM part XDPR2). These are fairly cheap and small. The guide for the Onyx Plus does not mention remotes but they work fine with the receiver. I bought mine from XMFans, which is a discounter for XM radios and accessories. Avoid buying these through EBay. They are cheaper there because they are knockoffs of the original remote. They sometimes do not work at all but more often, some of the buttons just do not work as described in the Onyx manual.



Antenna Modification. The satellite antenna that comes with the receiver was designed to fit on the trunk of a car or on the roof so it comes with about a 30-foot cord. Some people have been able to shorten the cable and solder the jack to the antenna but it requires special skills because the wire and shielding are just so small. Instead, I bought a replacement antenna with a four-foot cable. You may be able to find one with a three-foot cable but most online retailers have discontinued them. There is a magnet built into the GPS antenna so locate it away from your compass. I could not find a way to remove the magnet. I just placed my GPS antenna on the glare shield away from the compass.

Audio Cable. The car kit comes with a four-foot shielded male to male 3.5mm audio cable with one end using a 90-degree jack. You can order shorter cables from My Cable Mart. Measure the length of cable you would need.

Bluetooth Docking Station. XM recently starting selling a Bluetooth Docking Station for the Onyx Plus receiver (XM Bluetooth Docking Cradle model SXBTD1V1). <https://www.xm-radio-satellite.com/bluetooth-siriusxm-satellite-radio-vehicle-dock-sxbtd1v1/> To use one, you will need an audio panel with Bluetooth capability. The Bluetooth Docking Station was designed to pair with a car radio and most aircraft audio panels do not have displays or a way to acknowledge pairing. XM's aviation support suggested these three ways to pair with my PS Engineering 8000G and the first option worked fine:

“The Bluetooth dock is also designed to use 0000 as the default PIN and will support both discovery modes where it finds nearby devices and it will also pair when it is discovered by nearby devices. The dock does this automatically. Without a display on the 8000G, it can be a bit tricky for this as there may be some timing issues that get in the way, the 8000G might give up before the Bluetooth Dock switch pairing modes or vis versa. Or there might be other Bluetooth devices nearby that are competing during the pairing process.

The first thing to do is make sure that NO other nearby device have their Bluetooth transceivers turned on. Regardless of whether these other devices are in pairing mode or not their Bluetooth must be turned off to prevent interference during the pairing process. These can be turned back on AFTER the Bluetooth dock has successfully paired to the 8000G.

Also, we recommend experimenting with the timing sequence of which device is placed in pairing mode when. Apparently, the 8000G goes into discovery pairing mode as soon as it is turned on but it probably has some boot up time delay. So, after verifying that all other Bluetooth devices are turned off, turn off the 8000G, turn off the Bluetooth dock, and then try these three scenarios:

- 1) Start the 8000G wait 30 seconds to a minute, then press the button on the Bluetooth dock for 4 seconds to place it in Automatic pairing mode: LED flashing Red/Blue
- 2) Press the button on the Bluetooth dock for 4 seconds to place it in Automatic pairing mode, wait 30 seconds and turn on the 8000G.
- 3) Start the 8000G and as soon as it is on, press the button on the Bluetooth dock for 4 seconds to place it in automatic pairing mode.”

Installing the Onyx Plus. I explored several mounting options but decided to mount it underneath the throttle/mixture quadrant using the same holes as the microphone bracket. First, I needed a bracket to mount the receiver. I decided to fabricate the bracket from .064-inch Kydex plastic. Kydex has some unique properties: it is commonly used for aircraft interiors

for commercial aircraft so it would pass all the burn tests, it can be molded or bent with very low heat, and it retains its shape once it has cooled. I ordered two small sheets through EBay. To make the bracket, you have to bend the Kydex about 90 degrees. I improvised a cheap brake by first cutting a two-inch wide Kydex strip from the sheet, sandwiched the strip between two pieces of plywood, which I clamped together. About half the strip needs to stick out above the plywood. You also need to make a heat shield out of another piece of wood with a notch on the bottom about ½ inch tall and about 2 inches wide. This limits heat from the heat gun to only your bending point. As you heat the Kydex, apply slight pressure at the top until it starts bending. At about a 90-degree bend, remove the heat and hold the part until it cools.

To attach the Onyx Plus dock to my fabricated bracket, I used four metric stainless M4-.70x20 pan head screws, and four stainless 4mm flat washers. Before drilling the holes for the docking station, make sure you provide sufficient clearance so that you can remove the receiver from the docking station. If you do that, you can use the same receiver when you are at home (with a with a home kit), in another car (with another docking station), or at a campsite (with the XM portable boom box).

Legalities. The FAA rules for using a portable electronic device (PED) are less restrictive on a private plane versus a commercial plane and the FAA is exploring relaxation of the rules associated with use of PEDs. The FAA defines a PED “as any piece of lightweight, electrically powered equipment. These devices are typically consumer electronics devices functionally capable of communications, data processing, and/or utility.” The regulations permit the unrestricted use of portable voice recorders, hearing aids, heart pacemakers, and electric shavers. Additionally, the regulations permit the use of any other portable electronic device that the operator of the aircraft has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.

Additional FAA references on use of PEDs:

- Title 14 of the Code of Federal Regulations (14 CFR) §§ 91.21.
- FAA Advisory Circular 91-21.1B, “Use of Portable Electronic Devices Aboard Aircraft,” August 25, 2006.
- FAA Information for Operators 13010, “Expanding Use of Portable Electronic Devices,” October 31, 2013.

-Kent Shaw