



XM SATELLITE RADIO

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VIA HAND DELIVERY

Federal Communications Commission
Office of the Secretary

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January 4, 2008

COPY

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

**Re: XM Radio Inc.
Amendment of Request for 180 Day Special Temporary Authority to
Operate Very Low Power Repeater in Vienna, Virginia
FCC File Number SAT-STA-20071219-00178**

Dear Ms. Dortch:

On December 19, 2007, XM Radio Inc. ("XM") filed a request for 180 day Special Temporary Authority ("STA") for a new very low power repeater to be located on an office building in Vienna, VA, to which XM is relocating some employees (the "Application").¹ On December 20, 2007, the WCS Coalition filed a letter raising questions concerning the technical showings in the Application and whether they are adequate to protect the interests of WCS band licensees.

XM herein amends and clarifies several aspects of the Application to address each of the concerns raised in the WCS Coalition's letter. As an initial matter, XM restates the certification in its Application that it will operate "subject to the conditions and certifications set forth in the *XM STA Order* [16 FCC Rcd. 16781 ¶18 (2001)] granting XM's September 2001 request for STA to operate terrestrial repeaters." Application, Narrative Exhibit, p. 4. Specifically, pursuant to the conditions and certifications in that decision, XM certifies as follows:

¹ On December 14, 2007, XM filed a similar application for 30 day (later amended to 60 day) STA for the same facility, FCC File Number SAT-STA-20071214-00175. XM is filing a similar letter amending that application.

- (1) XM will operate the very low power repeaters and signal boosters at its own risk, and such operation shall not prejudice the outcome of the final rules adopted by the Commission in GEN Docket 95-91;
- (2) XM will operate this facility on a non-interference basis with respect to all permanently authorized radiocommunication facilities;
- (3) The facility will be restricted to the simultaneous retransmission of the complete programming, and only that programming, transmitted by the satellite directly to SDARS receivers;
- (4) Where applicable, coordination of the facility will be completed with all affected Administrations prior to operation, in accordance with all applicable international agreements including those with Canada and Mexico;
- (5) The facility will comply with Part 17 of the Commission's rules – Construction, Marking, and Lighting of Antenna Structures;
- (6) The facility will comply with Part 1 of the Commission's rules, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969, including the guidelines for human exposure to radio frequency electromagnetic fields as defined in Sections 1.1307(b) and 1.1310 of the Commission's rules; and
- (7) The out-of-band emissions of the facility will be limited to $75 + \log(\text{EIRP})$ dB less than the transmitter EIRP.

XM also clarifies that it will use input and output filters with this very low power repeater for out-of-band signal removal, to ensure compliance with the last specification above. The input band-pass filter will be used to remove Sirius-band and XM-band satellite signals. A 10 dB coupler is incorporated into the input band-pass filter for input signal monitoring purposes. In addition, an output band-pass filter will be used to remove spurious signal, Sirius-band signal, and XM-band satellite signal. A 20 dB coupler is also incorporated into the output band-pass filter for output signal monitoring. Attachment 1 hereto is a block diagram showing the design of this repeater, including these two filters.

As to the WCS Coalition's concern whether XM will use "some sort of anti feedback mechanism to assure it will not become a broadband noise source if the coupling between the receiver and retransmit antennas is not sufficient to avoid oscillation," XM clarifies that it will use such a mechanism. Attachment 3 hereto provides the instructions that XM will follow in installing this repeater, which includes a section directing the installer to optimize the antenna placement to avoid any feedback that may create oscillation. See Attachment 2, "Final installation steps."

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Finally, XM amends the application to state that if prohibited interference does occur, XM will cease operation of this facility until any such interference can be eliminated. XM's Repeater Control Center (202-380-4725) is available on a continuous basis to receive such reports of any suspected interference and take immediate corrective action.

This amendment should be responsive to each of the WCS Coalition's concerns. Should any questions arise in connection with this filing, please communicate directly with the undersigned.

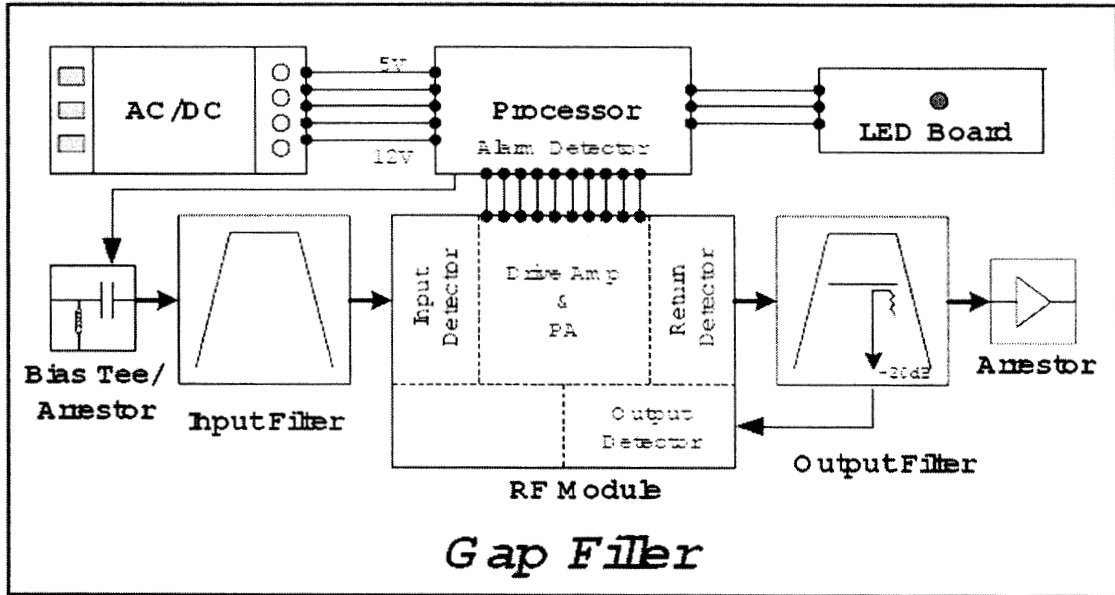
Respectfully submitted,



James S. Blitz
Vice President, Regulatory Counsel

cc: Paul Sinderbrand, Wilkinson Barker Knauer (by e-mail)
Stephen Duall, FCC International Bureau (by e-mail)
Alyssa Roberts, FCC International Bureau (by e-mail)
Shabnam Javid, FCC International Bureau (by e-mail)

Attachment 1
Repeater Block Diagram



Attachment 2
Installation Information

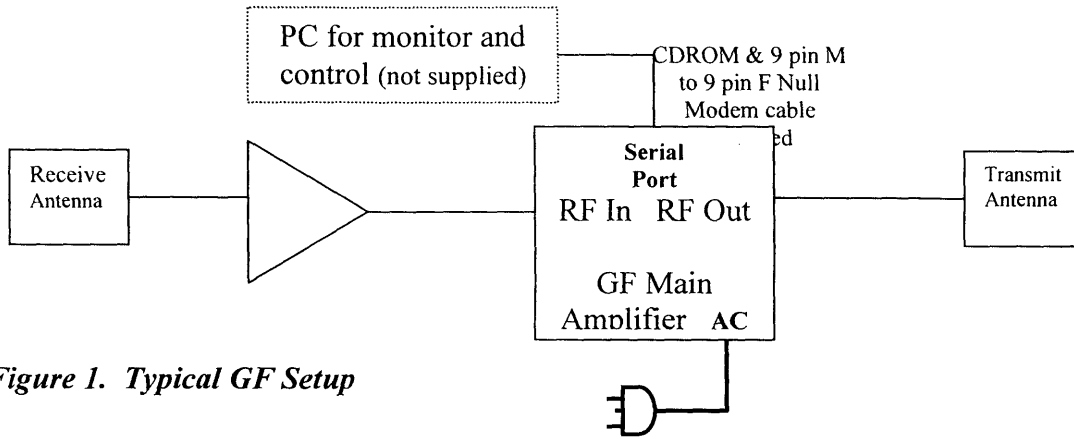


Figure 1. Typical GF Setup

Receive antenna Vertically Polarized can be Flat Panel or Yagi, not a stick	Short length N-N coax cable from Rx antenna to LNA INPUT (3 to 6 feet)	IN OUT GF LNA	Long length N-N coax cable from LNA OUTPUT to GF Main Amp Input (50 to 150 feet)	Connect RF In & Out, PC with GF software running, and 110 to 120 volts three prong AC power (extension cords not supplied)	Medium length N-N coax cable from GF Main Amp OUTPUT to Transmit Antenna (10 to 30 feet)	Transmit antenna Vertically Polarized can be Flat Panel, Yagi, stick or various splitter to panel antennae combos
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Table 1. Installation notes all apply to Figure 1. above

If >150 foot cable length is needed, an SSIPA (External Amp) can be added between the GF Main Amp and the transmit antenna. Usually paired with a stick (Omni) antenna for transmitting, the SSIPA allows longer cable runs from GF Main Amp to the transmit antenna. See Figure 2 below. Table above applies to adding SSIPA, with additional concern of Table 2, at the end of this document.

Installation Tips:

Coax cables going to either antenna should be as short as possible, one extra short and one extra medium length cable are provided to help adapt to site-specific conditions. Try to locate the GF as close as possible to the Tx antenna.

Situate the GF equipment and antennas away from the general public as much as possible. There is no radiation hazard, we're just trying to minimize signal blockage and equipment vandalism.

Get the Tx antenna as high up as possible, with only five to ten degrees of downtilt.

Try to place the Rx antenna outdoors. XM signal can be received through a window if near enough to a repeater, yet tinting in windows attenuates the signal dramatically and also causes worse indoor reflection scenarios for the transmit signal to get fed back into the receive antenna.

If receiving outdoors, use supplied electrical tape to completely cover N connectors on LNA and Receive antenna. If GF is a permanent installation use a weather proofing kit. If Rx antenna and LNA are indoors and protected from weather, no need to tape.

There should be no reason to open the GF equipment. Key may not be provided for main amp. Simply plug in the three prong AC cable into the socket, the internal AC switch is left ON inside the GF main amp. Plug in AC AFTER making all connections.

Laptop must have Windows with a CD-Rom drive and a serial 9-pin communications connector. The PC doesn't need to be modern, just Windows 95 or more recent.

The CD-Rom with operating software as well as the serial cable with null modem adapter are in the kit. There is often a manual in the box, but this document should suffice. Install HFGF software onto your PC with simple installation program on CD-ROM. The PC is only used for monitoring and control of GF system, this cable can be disconnected from the GF main amp without affecting operation. There is no save button or exit menu to deal with, simply unplug the serial cable and leave it with GF.

When software is communicating with the GF, the square Tx and Rx indicators in the lower right corner of the window will flash to indicate digital data talking properly.

Please provide AC extension cords, and bring hand tools for installing antennas. Extra cable ties could come in handy.

If antenna mounting brackets are not flexible enough, improvise. A flat panel antenna can be mounted against a wall, but it is better to provide a few feet of clearance from being flat against the wall if this is at all possible. The Transmit stick antennas should point directly downwards if mounted high above the floor.

Installation Process:

If a red alarm indicates for no good apparent reason, press F3 and a hidden window will appear. For example, the DC supply current upper limit may need to be raised slightly. DO NOT LOWER the Input Power Level minimum signal level from -60 dBm.

If an XM Skyfi boombox or equivalent cannot be used to optimize the receive antenna location, it is suggested that the entire GF kit (less the transmit antenna) get taken to the roof or outdoors. Temporarily connect everything (including AC power) with the exception of Tx antenna and coax which are replaced by a N connector 50 ohm load that is provided. Mount the Rx antenna and point it in the azimuth direction of the closest repeater. Only a few degrees of uptilt on a receive panel antenna should be

necessary. Repeak the antenna to maximize the Input Power Level reported on the laptop. Do this with the PA control enabled and the ALC control disabled, and transmit at full power which is very close to +10 dBm. Use the long N-N coax to go from LNA to GF main amp to best test the system, then use this same cable to run indoors to the proper (permanent) location of the GF main amp.

Peak or relocate the Rx antenna to get -55 dBm or greater Input Power level. -58 dBm is marginal and -60 dBm is unacceptable. An 18 dB flat panel may be provided to increase Rx Input Power if 12 dB flat panel cannot get enough signal. Tighten down Rx antenna however possible after peaking the input power.

Final installation steps:

Bring equipment indoors to the proper (permanent) location of the GF main amp, disconnect 50 ohm load and connect transmit antenna which should be pointed towards the intended area of coverage. GF main amp can lay flat on the ground or lean against a wall, just make it as secure and out of the way as possible.

Use as short as possible N-N coax cable to connect GF main amp to Tx antenna.

With GF On at around +10 dBm Output Power with the PA control enabled and ALC control disabled, confirm the VSWR is less than 2.0 to indicate acceptable Tx antenna and coax cable. The transmit level is set via the Attenuation control when ALC is Not Enabled, set this to 0.0 dB of attenuation to get around +10 dBm Output Power Level.

Check for similar Input Power (in negative dBm units) as obtained with system when peaking the Rx antenna, if Input Power level is nearly the same then nothing needs to be done. If Input Power level is much lower, check all coax N connectors for proper threading and tightness. IF INPUT POWER INCREASES from when tested with the 50 ohm load then a Tx to Rx antenna situation is likely and must be assessed. IF the increase is only one to three dB (for example: -57 dBm goes up to -54 dBm, then this level of feedback should be handled by the ALC circuitry. IF there is much greater than a three dB difference, then the Rx and/or Tx antenna must be repositioned to lessen the feedback scenario. IF Rx antenna is outdoors and Tx antenna is indoors then there should be no feedback. If both antennas are indoors then at least 50 feet of separation is needed with no line-of-sight between Tx and Rx.

To help combat some feedback, set ALC control to Enable and set max output level to +10 dBm. This will help suppress some reflections due to reflective surfaces changing (such as people walking near the antennas).

A very high level of feedback could cause corrupted data to be transmitted from the GF so the Tx and Rx antennas must be well situated, both for their own purposes and to not be too close to one another. Check transmitted signal with SkyFi in the 207 XM Display mode or via some other means with an XM radio to ensure low bit error ratios on terrestrial (less than 5% BER should provide solid reception).

If transmit antenna coverage is not acceptable, try another transmit antenna configuration and/or position, verify little feedback via input power level, & try again.

Hand retighten all connectors and use cable ties to make cables secure. Cover up the bright green LEDs if they attract too much attention and tape up AC cord to keep it from getting unplugged.

Check intended coverage area with 207 XM Display mode or some other means to confirm XM terrestrial signal is acceptable.

When using an XM SSIPA to boost the RF signal from a Gap Filler (GF), adjust the Output ALC Limit control on the GF to the value in the table below based upon the length of LMR240 coax (1/4 inch dia) from GF output to SSIPA input:

<u>Approximate Length of Coax:</u>	<u>Output ALC Limit Setting</u>
10 feet or less	0 dBm (or less)
25 feet	+2 dBm (or less)
50 feet	+5 dBm (or less)
100 feet	+8 dBm (or less)
150 feet	+10 dBm

Table 2. Installation notes apply to Figure 2, when using SSIPA External Amp

Figure 2. Typical Gap Filler installation with use of an external amp:

