

Comments on Orion Switchable Bandwidth Feature

This document attempts to explain and put into one document the facts dealing with the switchable bandwidth Orion radios and configuration for narrow bandwidth operation. (The MRK personal radio has similar requirements.) This document is intended for distribution to the Yahoo GE-Orion group, but it can be used by anyone needing the information.

The switchable bandwidth refers to the ability to switch between a 25 kHz bandwidth channel and a 12.5 kHz bandwidth channel. The switchable bandwidth option only applies to the VHF High (2 meter) and UHF (.75 meter) radios. Radios meeting hardware and software requirements can be configured to switch bandwidth per channel within a system for conventional (non-trunking) systems. Configuration is by programming a personality and is not controlled by the user except by selecting the channel of operation. Narrowband operation is programmable per system for EDACS trunking operation. Hardware and software requirements are described in Technical Service Memo Volume: 26, Number: 46 November 12, 2004. (See summary at the end of this document.)

There is no guaranteed external observation method of identifying a radio that can be configured to operate in narrow bandwidth mode. This is because the labels are the only external identifying method and they can be changed easily by mistake or on purpose. The FCC or DOC (IC) number can be used to identify the hardware requirements for the option. Radios with the following FCC type acceptance numbers were shipped with the hardware requirements.

VHF High (Dual Bandwidth)

AXATR - 340-A2 (30/50W)

AXATR - 341-A2 (110W)

UHF (Dual Bandwidth)

AXATR-342-A2 403-440 MHz 20/40 Watts

AXATR-342-A2 440-470 MHz 30/40 Watts

AXATR-342-A2 470-512 MHz 35 Watts

AXATR-343-A2 403-440 MHz 100 Watts

AXATR-343-A2 440-470 MHz 100 Watts

AXATR-343-A2 470-512 MHz 80 Watts

The model number can identify a radio that meets the hardware and software requirements for only conventional radios shipped from 1996 to 1999. The sixth digit will be a 7 or 8. The use of the model number does not exclude a radio from meeting the requirements and should not be used to say a radio does not meet the requirements.

Verifying a radio meets the requirements can only be guaranteed by observing the display of the radio or actually programming the radio and testing. If the radio has MENU items of REVISION and FEATURES programmed, do the following on the control unit.

- Press MENU.
- Scroll to REVISION and press MENU.
- FLSH VER must be above G23-4?? (The 4 indicates the radio is a 512k board) double check this by verifying that RCP VER is G00-0.08. All -4 codes should work, but use codes above OG32400 to be safe.)
- Press CLR to exit MENU.
- Press MENU.
- Scroll to FEATURES and press MENU.
- Scroll up six times until a grouping of numbers exist that show 01 02 03 on the top row of the display. Press scroll again while looking for the number 23. If 23 exist, the radio is featured to allow programming of narrow bandwidth. If it does not exist, the feature will have to be purchased.

A quick check for verifying the operation of the feature can be done by programming the radio with two identical channels except one is wide bandwidth and the other is narrow bandwidth. Use the receiver audio to verify the options works. Select the wide channel and press the CLR button on the control unit and listen to the noise of the receiver. Make a mental note of the tone and level. Select the narrow channel and again press the CLR button and listen to the noise. (Do not change the volume control during the test.) The noise should be different. Usually the narrow channel has more noise in the lower frequencies and a little loader. This is caused by the reduction of higher frequency noise by the narrow filters and a difference in the gain of the audio circuits. Don't over analyze the difference, just note that

the noise is different. One can verify the transmitter by transmitting and speaking into the Orion's microphone in a normal voice and have someone else listen to the audio on another receiver configured for the wide bandwidth channel. Test the wide bandwidth channel of the Orion and then select the narrow bandwidth channel and repeat the test. The channel with narrow bandwidth enabled will be heard at a lower level.

The radio is calibrated and data stored in the tracking data memory for the correct deviation for wide bandwidth operation. Because of the difference of the reduced IF noise when operating in a 12.5 kHz bandwidth channel compared to a 25 kHz channel, the squelch calibration is also performed for wide and narrow bandwidth. The transmission of data such as EDACS and digital voice requires different filters and calibration to fit within the channel bandwidth for different governing entities. The simplified result is the deviation of the radio is cut in half for a 12.5 kHz (narrow) bandwidth channel compared to that of a 25 kHz (wideband) channel. The receiver IF bandwidth is also reduced by selecting narrow filters when a narrow bandwidth channel is selected.

Technical Service Memo (TSM) Volume: 26, Number: 46 November 12, 2004 Summary

The TSM document may be acquired from Harris Corp or downloaded from the file section of the GE-Orion group.

1. *Radio Hardware* - The radio must have a switchable (*sw*) RF board, *512K Flash Size*, and a *0x08 RCP revision* (Rom Type 8) on the controller board to support narrowband operation. Use Radio Maintenance in Programmer to display the data as shown below and verify narrowband support.
2. *Radio operating (FLASH) code* – Narrowband operation is supported in Group 28a or higher Flash code (Mx28400 or OG28400 or higher, where x= 1 for M-RK1 and x=2 for M-RK SCAN or M-RK II). (Any code with the fifth character 4 should support dual bandwidth operation, but one should use newer codes to cover other possible problems.)
3. Verify this by connecting the radio to a computer running the RF MAINTENACE program, get status and observe the Radio Status Information.
4. Verify the feature enabling by having "Features" programmed as a menu item. Power on the radio and select "Features" observe the feature numbers displayed and verify the number 23 is available. This is detailed in the Orion (LBI-38888) operator manuals

Respectfully submitted,

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Rick