

DON HAENICHER, July 26, '01

Re: KP-VLBA RFI at 610.75 MHz in Radio Astronomy primary allocated band.

Raul, Ray (KP site tech), Jim (VLBA operator) and I tried some experiments to determine the direction of the 610.75 MHz interference. This was done by setting up the KP-VLBA electronics to observe at 610.75 MHz +/- 1 MHz, moving the KP antenna through Az/EL, plugging a spectrum analyzer (SA) into the IF distributor outputs B and D, and watching the SA screen to see if the RFI was dependent on direction. The SA was set to a 2 MHz total span, and then a 500 kHz span, with a 10 kHz RBW, 30 dB internal attenuation, scan time < 1 sec.

First, we observed the signal on the SA with the antenna pointing at AZ=38 deg from true north, EL= 63 deg above horizon. 38 degrees east of true north points in the direction lying midway between Phoenix and Tucson. The signal was strong at about 20 dB peak above the SA noise floor. The signal varied in strength at a somewhat periodic rate over a range of ~ 20 dB, on for ~ 10s, then off, then 5 dB weaker, then off, etc. The signal was seen in both polarizations.

Pointing at various AZ/EL combinations was inconclusive. The signal was observed from many directions. However, when the antenna was at 2deg. EL the signal dropped into the noise. At 90 deg. (straight up), the signal was observed, but not as strong as before (63 deg.). At about 270 deg. (westward) the signal rapidly grew very strong to ~ 40 dB above the noise floor, then off the display, and the SA noise floor jumped out of range with excessive spikes over the entire 2 MHz span; this is representative of overdriving an amplifier which then causes the amp to produce intermodulation spikes over a large frequency range. We revisited this angular position 2 hours later and there was no signal at all at 610.75 MHz, and no intermodulation or heavy RFI to be seen.

The next experiment involved disconnecting the feedline from the dipole which connects to the Front End. The signal was absent and the noise floor was clean. This more or less ruled out an internally generated signal confined to the VLBA electronics. Next we had the site tech connect a 5 inch (approx. 1/4 wave) wire to to the center conductor of the feedline (in place of the dipole), to act as an omni-directional "sniffer antenna." No signal was observed. This may rule out an internally generated signal which propogates into the air and finds its way back into the dipole feed.

The site tech reconnected the feedline to the dipole and the signal was immediately observed again, but then dissapeared. More pointing did not reveal anything conclusive. The signal was intermittent in time, strength, and direction.

Our experiments did confirm the presence of the interference, however we were unable to determine a direction of the source. Its presence as recorded by the SA is intermittent in time, strength, and direction. It appears to be externally generated (i.e. not VLBA electronics), possibly from somewhere on the mountain or possibly from somewhere off the mountain; one might infer that the variance in its strength as a function of pointing suggests different antenna sidelobe entry; however, the strength varied over 20 dB even for a single pointing direction, which makes the sidelobe argument inconclusive.

I will be sending a handheld directional antenna to the site tech so that he may attempt to DF the signal by hand pointing the small antenna. A

receiver with an FM demodulator will also be sent along, and a LNA. In the event that the signal direction is found, the receiver could be used to determine what type of modulation is on the signal, and we can tape record it.

Suggestions are welcome.

Don Haenichen

From wbrundag@zia.aoc.NRAO.EDU Thu Jul 26 10:15 MDT 2001
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Subject: Re: KP RFI
Date: Thu, 26 Jul 2001 10:15:41 -0600

Don,
Your plan to use a hand-held receiver and directional antenna is very good.

I suggest that the search include sub-harmonics of 610.75 MHz, especially the fourth. 610.75 MHz / 4 equals 152.69 MHz, which is in the 152.495 - 152.855 MHz band allocated to domestic land mobile for public mobile paging and radiotelephone service. Someone on Kitt Peak, including the local telephone service provider, may be using this band.

Dewey Ross kept data on all transmitters, including HTs, on Kitt Peak and surroundings. Someone in the NRAO-Tucson office should have the records.
...Bill

Don Haenichen wrote:

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> Name: KP RFI.doc
> KP RFI.doc Type: Microsoft Word Document (application/msword)
> Encoding: base64

Re: KP RFI