From rprestag@gb.nrao.edu Tue Sep 3 20:06:28 2002
Date: Tue, 3 Sep 2002 19:27:41 -0400 (EDT)
From: Richard Prestage <rprestag@gb.nrao.edu>
To: David Hogg <dhogg@NRAO.EDU>
Subject: manual Spectrometer balancing (fwd)

Dave -

these ratios are inverted c.f. Rick's memo, M&C may display these **or** 1/these (I'll explain more later).

R.

---------- Forwarded message ----------
Date: Fri, 23 Aug 2002 11:38:08 -0400 (EDT)
From: Mark H. Clark <mclark@gb.nrao.edu>
To: gbt@sadira.gb.nrao.edu
Subject: manual Spectrometer balancing

The spectrometer has a bug (#585) that can cause the PORT table to become corrupted when balancing is performed at the beginning of a scan ("Scan Start"). In addition, balancing in general is **not** always reliable. The most common problem is a **false** alarm, i.e., a message indicating that balancing has failed when it has **not**.

To set the levels manually by adjusting the attenuators in the ConverterModule, one should measure the resultant power levels by using the "duty cycles ratios" in the Spectrometer rather than the power readings in the AnalogFilterRack. Whether manually setting the attenuators **or** using the balance mode, the duty cycle ratio readings should be checked. These readings **for** all 40 ports on the Spectrometer can be read from the Spectrometer Cleo screen, under the "General" tab by pressing the "Duty Cycles ..." button located next to the "Quit" button. The levels are read every 10 seconds **while** in the Ready state.

The optimal levels are:

For three level sampling: R = 0.84813

For nine level sampling: R = 1.37578

Since the attenuators have a .125 dB resolution **and** the signal varies over time, an exact match should **not** be expected. As an example, some power readings **for** different attenuator settings using Rcvr1_2 on spectrometer port J9 yielded:

attenuator	duty cycle ratio
16.375	1.355291
16.250	1.364938
16.125	1.392207
16.000	1.420839
15.875	1.412545
15.750	1.438787

The mapping from samplers (0-7 1.6 GHz, 0-31 100 MHz) to ports (1-40) is:

1.6 GHz sampler: port = sampler + 1

100 MHz sampler: port = sampler + 9

If the levels are optimal then lag 0 **for** each spectrum will yield:

For three level sampling: P = 0.5405

For nine level sampling: P = 0.2126

For a full explanation see:

http://www.gb.nrao.edu/~rfisher/SamplerXferFn/sampler_xfer_fn.ps

Mark