



SMT IF Upgrade 2006

Engineering Minutes

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An engineering meeting was held Thursday, 15 Jun 2006 to discuss performance and implementation issues concerning the SMT IF upgrade to support the new receivers incorporating wide-band IF side-band separating mixers. Attending the meeting were Dr. Lucy Ziurys, Tom Folkers, David Forbes, Gene Lauria, Martin McColl, George Reiland, and Robert Freund. The topics discussed were:

1. performance requirements
2. draft implementation
3. draft schedule.

Bob presented a draft list of requirements for the IF system. The list contained 4 system performance requirements, desired environmental conditions and detailed engineering requirements derived from the 4 system requirements. He ask everyone to review the list especially the system requirements and to provide comments.

At first inspection, there were no objections to the any of the performance requirements. The desired fourth floor temperature gradient was the one area of concern. Tom Folkers will analyze his temperature records and provide an historical perspective.

A discussion was held on the merits of two different implementation options. The different approaches addressed how the four IF receiver signals could be interfaced to the various spectrometers. One approach proposed a configuration that required manual intervention for change while the other approach proposed a dynamical configuration controller by computer. The decision was taken to implement the computer controlled method. This approach is more costly than the manual method but provides a high degree of flexibility with the least operational risk.

The computer controlled configuration design enables interfacing the two wide-band AOS units to any two of the receiver IF signals at any center frequency within the full 4 GHz wide IF passband. Each quarter of the filter bank spectrometer would be interfaced to a receiver IF signal providing 512 MHz coverage to each of the four IF receiver signals. For the two AOS units, the frequencies selected for the IF bands would also apply to two of the filter bank quarters. The remaining two filter bank quarters would be tunable to any frequency within the full IF passband.

Page 2 of 4	SMT IF Upgrade 2006	Doc: Engineering Minutes Date: Thursday June 15, 2006
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A more classical configuration is also provided by this design. Here, only two IF signal channels are provided to the spectrometers. The IF frequency coverage is now increased from before, supporting about 2 GHz in both channels. Again, the two spectrometers channels can be separately tuned anywhere within the full IF band. For example, the upper-sideband port from both polarization channels could be routed to the spectrometers configured to provide coverage over two 2-GHz wide bands.

Dave proposed that the narrow band spectrometers, the two 64 MHz wide filter bank units with 250 KHz resolution, one 250 MHz wide AOS unit and a 200 Mhz wide chirp transform spectrometer with about 40 KHz resolution be fixed tuned in relation with the four wide-band spectrometers sections. He proposed that the narrow-band filter bank sections be associated with the wide-band filter bank sections and that the narrow-band AOS and the chirp unit be associated with the wide-band AOS units. This proposal was accepted.

To lighten the project's burden this summer, Dave presented two proposals that would be used in the short term. He proposed using existing or absolutely essential new IF hardware to provide capabilities that would otherwise have to be designed and fabricated. His first proposal would use the present facility total power detector that is located in the left receiver room to support only those receivers located there and the new 4-channel total power monitor system associated with the side-band separating receiver system for only that receiver. This proposal would postpone the need to design, assembly, and test a precision 4-channel facility total power system.

His second proposal addressed the handling of the IF frequency range of the vintage 345 GHz and 490 GHz receivers. He proposed directly cascading the existing converter and total power chassis to the 3.5 GHz to 5 GHz converter chassis presently used to interface the filter banks. This interim solution would produce a consistent IF frequency range for all receiver systems but with unnecessary additional hardware. Both proposals were accepted.

Dave also proposed a plan to interface the new 345 GHz receiver with its 4 GHz to 6 GHz IF into the IF system. His proposal would however, require the facility total power detector system. This facility instrument has 2 sets of 4 IF input, one set for

each receiver room. Since the receivers located in the left room only provide 2 IF channels, 2 channels are free and could be connected to the 345 GHz receiver.

Dave's proposals were described in a draft note that he distributed to all, "IF System upgrade for the SMT V.5".

To help clarify the configuration planned for October introduction, Bob will provide a block diagram of the system.

Gene presented a preliminary receiver schedule containing 96 activities. He was concerned with the number of tasks and the limited time.