



SMT IF Upgrade 2006

Engineering Minutes

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An engineering meeting was held Thursday afternoon, 13 Jul 2006 to discuss three technical topics, project status and schedules involving the SMT IF upgrade and the 1.3 mm side-band separating receiver. Attending the meeting were Tom Folkers, Gene Lauria, George Reiland, and Robert Freund.

The topics discussed were:

1. IF channel-to-channel isolation issues
2. Reference frequency range for the "JT" receiver Gunn oscillators
3. IF converter controller hardware
4. Current project status and schedule.

Bob started the meeting by distributing draft meeting summaries from June 29. Included was a corrected version of the system capabilities list for the early phases of the project.

Tom indicated that meeting summaries and supporting documentation would be archived on the ARO WEB site.

A technical discussion followed on the need to eliminate signal coupling between the four IF converter modules. An unintentional signal path exists through the common LO distribution power divider and each IF converter modules. This path also exists on the 12-Meter system. A resulting baseline issue was resolved by using bandpass filters on the LO line to break up the coupling path. A decision was taken to purchase 15.4 GHz bandpass filters to place on each second LO line in the IF converter system.

The frequency of the current Gunn reference signal falls within the upper end of the new 4 - 8 GHz IF passband. This caused problems during the evaluation tests. A new Gunn reference frequency is proposed to lie in the range of 9.5 to 11.5 GHz. This change places the lowest frequency about 1.5 GHz above the high end of the IF. George volunteered to analyze the 4 - 8 GHz filter response for sufficient rejection. Bill Peters will be contacted as to whether there is a problem with this range. Recently the control system was changed from a similar band to a lower one. If the frequency change is accepted, two new filters will be needed instead of one and two

Page 2 of 4	SMT IF Upgrade 2006	Doc: Engineering Minutes Date: Thursday July 13, 2006
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high frequency high power amplifiers will be needed instead of one lower frequency unit at the same power for the dual Gunn phase lock system. A quick decision is necessary because a long lead time filter purchase will affect the schedule.

Tom proposed a radical design for the microprocessor controller portion of the IF converter system. Because a duplicate of the current controller board or its layout plans has not yet been found, he proposed using a commercially available Ethernet to serial line adapter coupled to a low end microprocessor. His plan would eliminate the need to duplicate old technology and could be designed with enhanced capabilities especially in the area of frequency switching. Both hardware and software engineering resources would be required to complete this project.

Bob proposed an alternative approach. Since engineering time is at a premium, full schematics of the current design exist, one working version of the controller PC board exists, and since this board isn't needed until the September time frame, a new version of the existing PC layout plans could easily be produced by a technician. This approach eliminates the need for engineering resources but requires the project to find and pay an outside technician.

Tom volunteered to contact the Steward management about the availability of a suitable technician from within the ETS. Ernie Kemp and Frank Gacon, both formerly of NRAO, will be contacted for their knowledge about PC board layout plans.

Gene summarizes the current status of the project. He indicated that work on cryogenic aspects of the cartridge was late and the wiring harness was slightly behind schedule. Gene was concerned that approved long lead-time filter purchases hadn't yet been order. George indicated that quotes from Penn Engineering for waveguide sections were over due and that he hadn't yet received quotes for the 15.4 GHz DRO and 100 MHz phase locked crystal oscillator.

There was a short discussion on ways of acquiring additional technical assistance. Tom volunteered to contact John Fitzner to determine his availability to work part-time on the project.

Page 3 of 4	SMT IF Upgrade 2006	Doc: Engineering Minutes Date: Thursday July 13, 2006
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The 6 action items are summarized below:

1. George will analyze the filter response of the 4 - 8 GHz filters for sufficient rejection at 9.5 GHz to permit moving the Gunn reference frequency.
2. Dr. William Peters will be contacted as to the cause for the recent Gunn reference frequency change at the SMT.
3. The search for the IF converter microprocessor controller card PC board layout plans will continue.
4. Ernie Kemp and Frank Gacon will be contacted for information on the location of PC board layouts for the IF converter microprocessor controller card,
5. Tom will contact the Steward management to determine the availability of Frank Gacon.
6. Tom will contact John Fitzner to determine his interest in working part-time with us on electronic assembly.

The 2 decisions taken are described below:

1. Eliminate the cross-channel signal coupling through the second LO power splitter in the IF converter system. This requires the purchase of four narrow bandpass filters centered at 15.4 GHz.
2. Move the Gunn oscillator reference frequency range higher to a possible range of 9.5 GHz to 11.5 GHz.

Robert

Page 4 of 4	SMT IF Upgrade 2006	Doc: Engineering Minutes Date: Thursday July 13, 2006
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