



SMT IF Upgrade 2006

Engineering Minutes

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An engineering meeting was held Thursday afternoon, 31 Aug 2006, to discuss the SMT IF upgrade and the 1.3 mm side-band separating receiver. Attending the meeting were Dr. Lucy Ziurys, Tom Folkers, David Forbes, Gene Lauria, George Reiland, and Robert Freund. Project status, schedules, and task allocations were discussed.

Mixer/LNA Cartridge -

Gene started the meeting by describing the recent annealing failure of the 0.005" thick OFHC copper thermal straps. The straps had been placed in the URIC oven last Friday but URIC personnel forgot to turn off the oven. When discovered Monday morning, the damage had been done. During the week, attempts were made to remove the oxidation, but none were successful. Gene has ordered additional material to remake the straps with delivery expected by the middle of next week, about 6 Sep. Mark will fabricate new straps before they will be annealed and gold plated. Gene estimated that this part of the project would be delayed by about one week. There was a short discussion as how this delay will effect the overall schedule and what adjustments could be made. The conclusions were that it was an unfortunate accident and that the final deadline would probably not suffer.

Support electronics -

Gene requested a progress update on the support electronics; fabricating the LO waveguide components, and modifying the electronic card cage. Currently, John Fitzner is involved with both tasks. George described the LO waveguide situation and John's involvement in fabricating and plumbing custom waveguide sections. A decision was taken to have George purchase all the straight waveguide sections to minimize the number of specially shaped waveguide pieces that John needs to make.

George reported that the second Gunn oscillator mounting bracket assembly will be his next design task. He is expecting that the design and drawings will be finished Tuesday and that then fabrication will begin. He reported that a special 0.062" diameter reamer required to fabricate waveguide flanges had been received. He also reported that he had finished evaluating the performance of the harmonic mixer. He indicated that the 8.7 - 13 GHz medium power amplifier had been ordered. He will determine the status of the 2-way 8.7 - 13 GHz Gunn PLL reference signal (X-band) power divider by next meeting.

Gene reported that John will still modify the card cage. The modifications will support a new SIS junction electromagnet driver PCB and a second LO PLL control PCB. Gene will collaborate with others to document the wiring of the modified card cage so that John is not delayed.

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IF Converter System -

Dave stated that the IF Converter crate was being fabricated by the Steward Shop. He didn't have a completion date.

George reported that Tag Engineering and Precision Tool and Machine have been asked to provide quotes on fabricating the parts for the central section of the IF Converter, the Steward Shop had previously quoted a 3 week delivery.

Gene reported that Dave had finished populating 3 - IF Converter controller boards and that Tom had programmed 3 copies of its PROM. One board is needed, but now there will be two spares, one for Mount Graham and one for Kitt Peak. These boards have yet to be tested. A decision was taken to monitor the phase lock status of the two oscillators in the IF Converter's central section. Dave volunteered to design a small add-on board to provide a SAMbus status signal and to interface with the existing controller board to report more detailed status to the telescope control system.

George stated that the expected delivery date of the Jersey Microwave 100 MHz PLL oscillator would be Sep. 26.

Receiver IF Processor -

Gene reported that MicroTronics had been contacted and that they are on schedule for the delivery of the 4 - 8 GHz and the 10.4 GHz bandpass filters. Tom volunteered SMT operators for "gopher" activities when the bulk of the component deliveries arrive in mid-September.

George reported that the order for the Ciao Wireless 4 - 8 GHz IF amplifiers had been submitted to the U/A purchasing department. He expects delivery on Sep. 18.

Interim Receiver Selector -

Gene stated that he had contacted Dow-Key Microwave Corporation for delivery status. He was told that the transfer switches were to be shipped today. The delivery of Dave's filter bank switches were still scheduled for Sep. 25.

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Task Allocation -

The last portion of the meeting addressed task allocation. Bob proposed that Dave finish the IF Converter controller board task before starting on the PLL oscillator status add-on board or filter bank modifications. This would then finish one of the major IF Converter System tasks. His proposal was accepted.

There was concern that John Fitzner might not be able to provide as much assistance as expected. Gene volunteered to create a task schedule and to discuss it with John. He also observed that with our small size, the re-commissioning activities at the 12-meter could redirect resources and slow progress on the IF upgrade and the sideband separating 1.3 mm receiver.

The 3 high priority tasks for John were identified as:

1. Finish the refrigerator sensor wiring clean-up,
2. Fabricate the specially shaped LO waveguide pieces, and
3. Modify the card cage wiring to accept the two new boards.

It was estimated that these activities would take all of September.

The 4 high priority tasks for Mark were identified as:

1. Re-assemble the test Dewar for 12-meter insert evaluations,
2. Fabricate 0.005" OFHC copper thermal straps,
3. Complete assembly of 1.3 mm cartridges, and
4. Assemble Gunn phase lock chassis.

George needs to get the Gunn PLL chassis central mounting plate fabricated by the middle of the month so that Mark's fourth task isn't delayed.

Bob discussed current results of the IF signal level budgets with respect to the "second stage" contribution to the overall noise performance. The current analysis indicated that the second stage may conservatively contribute as much as 4K to the receiver temperature. Gene proposed an evaluation scheme to determine performance levels and the degradation due to the second stage. The main thrust was to measure noise performance with and without a low-noise IF amplifier mounted directly to the bottom of the cartridge outside the Dewar.

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Gene was concerned that no choice of the building interconnecting coaxial cable type had been made. He wanted to hold a technical discussion on this topic soon but at some later time.

The 5 action items are summarized below:

1. George will determine the status of the 2-way Gunn PLL reference signal power divider.
2. Dave will design an add-on board to monitor the PLL oscillator status
3. Dave will modify the IF Converter computer controller software to monitor the PLL oscillator status
4. Tom will install a white board to track priority purchase orders.
5. Bob will finish the IF power level and VSWR budget.

The 4 decisions taken are described below:

1. George will purchase non-standard length straight waveguide sections.
2. The phase lock status of the two oscillators in the IF Converter's central section will be monitored by the SAMbus and through the telescope control system.
3. Dave will design and implement the IF Converter phase lock monitor circuits.
4. Dave would test the IF Converter microprocessor controller card to complete this task.

Robert

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