Status Antonio Cooled Feed Fab & Testing

2015-08-13, Matt Fleming

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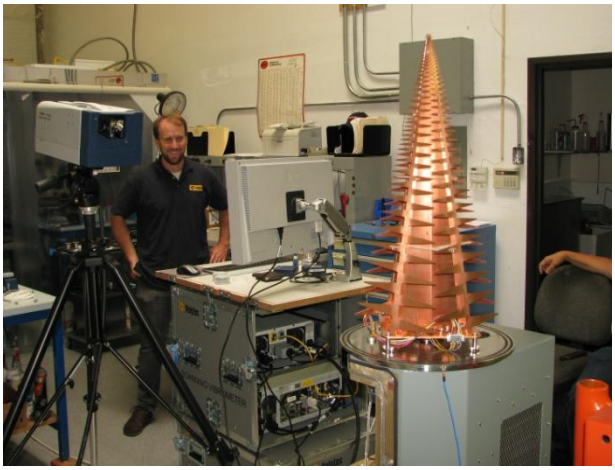
Summary:

This document will be prepared periodically to communicate progress on design, fabrication and testing of the Antonio Feed also called the ATA Cooled Feed. Although we have begun the production of 44 feeds we still have the some lingering design issues as well as continual testing of various features. Little progress in Feed production has been made since the last report of 2015-07-08. Initial testing of Feed SN-001 showed the tip circuit fails in a very short time. Differential thermal expansion during cooldown and or vibration have been identified as the source of the trouble. The new Beryllium Copper tip circuit design has now been implemented and both thermal and vibration testing has been performed. We now believe the design is sufficiently robust to continue production. Tests will continue on SN-001, but Feeds SN-002 & 003 are being prepared for delivery to Hat Creek. Due to delays and continuing engineering development activity, Minex is still short of deliverables to bill against. SETI has paid Minex for a portion of the extra engineering development time required to solve various problems and this has given Minex the necessary funds to resolve most of the dept accrued. SETI is at working to amendment or reorganize the contract in order to correct total cost and cash flow issues as the project progresses. Minex has prepared a proposal outlining anticipated costs and schedule from the end of July forward. It is clear additional engineering time is still needed and it is clear that the unit cost parts and labor has increased from original estimates.



Feed 001 during vibration testing

SN-002 & SN-003 on stands.

Status of Production, Grouped by Section:

Administrative Activities: (no changes in this section)

- Contract: (changes) Minex and SETI are operating under a contract, extending through Oct 31, 2015. This contract is no longer adequate to the known activities and projected costs. Minex has been paid for efforts through the end of July. Minex has presented a proposal to guide SETI in the preparation of an amended or restructured contract.
- Staffing: (no changes) Matt Fleming, Peter McMann & Rob Spencer are primary full time staff working on the feed. No other major subcontractors are engaged at this time. Chris Munson is providing project oversight and reviewing daily progress approximately 4 times a week.
- Schedule: (slippage)All delivery dates have slipped. Two feeds are on scheduled for delivery to Hat Creek on August 18th.
- Financial: (changes) SETI has paid Minex the necessary funds to resolve most of the dept accrued while technical design problems have delayed deliveries. Some sort of amendment will have to be made to the contract in order to correct total cost and cash flow problems.

Kit Parts Vacuum Chamber Section:

- Base Plates: About 30% complete. (up from 15%) Fabrication of twenty stainless base plate assemblies is in progress. The design was modified. Material for 23 more is in stock. This includes cooler and turbo mounting flanges.
- Flex Plates: About 65% complete. (no change) The Flex Plate Assy connects the end of the Cryo-cooler to the base of the pyramid. Each soldered unit has about 60 copper sheet components in the design. All parts are complete and cleaned and two fixtures for soldering the assemblies have been completed. The soldering process has been used 3 times now.
- Pyramid: About 75% complete. (no change) All Pyramid base and all pyramid wall parts have been completed. Pyramid soldering is 55% complete. Pyramid tip parts are 60 % complete and pyramid tip final soldering remains. All items require extensive cleaning.
- Arm Assemblies: About 60% complete (up from 55%) All component parts are complete. Cleaning and deburring is 25% complete. Soldering is 12% complete with improvements to fixtures and techniques. This activity may be done in conjunction with Feed final assembly.
- LNA Mount Group: About 58% complete. (no change) About 95% of all component parts are complete. All parts have been cleaned. Only tip guide parts remain for fabrication. This activity may be done in conjunction with Feed final assembly.
- Dewar Glass Domes: About 12% complete. (up from 6%) We have 3 borosilicate glass domes from H. S. Martin in stock and all 3 will are installed on feeds. We have ordered 8 more units.
- Lens: About 5% complete. (no change) Jack completed the new lens design. Final drawings and vendor selection and fabrication remain to be done. Previous lens cannot be used.
- Foam & Fabric Covers: About 25% complete. (no change) About 10 covers are complete. More cover clamps need to be made.

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Kit Parts Housing Chassis Section:

- Welded Housings: About 70% complete. (up from 68 %) Three aluminum chassis housings have been welded, pained and used. Six more are fully welded and have just returned from the paint shop. All parts needed for housing fabrication have been completed and are ready for welding. Welding will continue for some time.
- Other Housing Parts: About 95% complete. (no change) Most all internal housing related parts have been fabricated. Some require anodizing. Tube covers, vent screens and dust filter parts are the only remaining parts needing attention.
- Vacuum System: About 90% complete. (no change) Low vacuum system parts are detailed some additional parts must be ordered.
- Cryo-Cooler System: About 70% complete. (down from 85%) Modifications to the heat rejection disc is 10% complete and will be ongoing. A new low vibration mounting systems has been designed and about half the necessary parts have been made.
- Blower System: About 70% complete. (up from 50%) All Mount plates are complete, About 60% of blowers are now in stock.
- Electronics Module: About 50% complete. (no change) Only assembly remains.
- Wiring Harnesses: About 25% complete. (up from 15%) Additional connectors and wiring components have been identified & 80% have been ordered. Assembly continues.
- Pax Case Modifications: About 5 % complete. (no change) Three units are modified. Others will be addressed during feed final assembly.

Feed Final Assembly & Testing:

- Feed 000: About 100% complete. (no changes) Installed on antenna 2e. Special fused quartz radome and preliminary housing. Testing at Minex and Hat Creek has been completed. Feed communication to the main lab is working. This feed has been operating for about 12 months. One pole does not seem to be working. It will be brought back to Minex on August 20th for upgrade to the current 5C4 design.
- Feed 001: About 90% complete. (down from 98%) This feed has been used as a test bed to help with thermal and vibration testing. It is scheduled to stay at Minex for continued testing for the foreseeable future. (quartz dome on this one)
- Feed 002: About 90% complete. (on hold) Unit is mounted on an assembly stand. Most major components are installed. The remaining parts are, feed arms, LNA group, improved tip circuit design, lens. (borosilicate glass on this one)
- Feed 003: About 90% complete. (on hold) Unit is mounted on an assembly stand. Most major components are installed. The remaining parts are, feed arms, LNA group, improved tip circuit design, lens. (borosilicate glass on this one)

Other Tasks:

- Correct Design of Tip Circuit for Durability: (Improvements) A very successful low vibration cooler mount has been designed and prototyped. An improved design which will prevent premature failure of the feed tip circuit has been designed and all parts have been rushed through manufacturing and are now in stock at Minex.
- Improved Screen Room Test Facilities: (no change) Improved lighting is still needed. New coax cables have been identified but the cost is outside our current budget, waiting.
- Feed Tip Assembly Fixture & Testing: About 90% complete. (up from 30%) The assembly fixture is very useful, but a microscope vision system is needed.
- Software: Some final improvements to software are needed. Rob Ackermann is scheduled to complete this soon.

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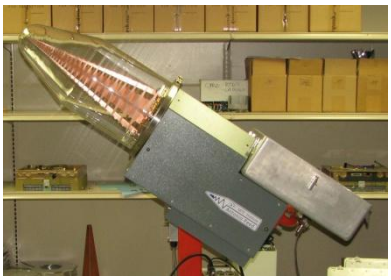
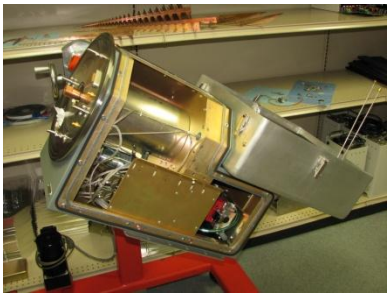
Photos of Production

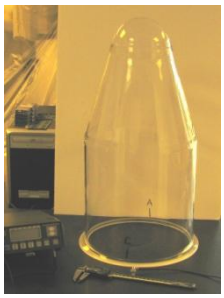


Feed 001 on stand. (testing)



Feed 002 on stand. (hold)

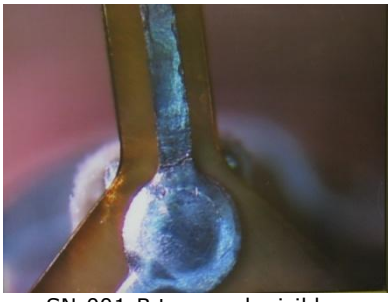
Feed 003 on stand. (hold)



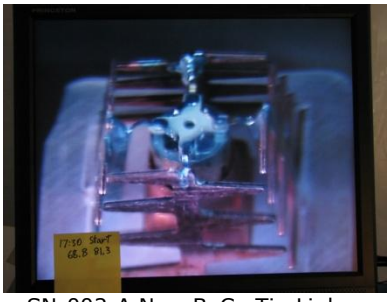
Glass dome Martin 001.

Glass domes Martin 002, 003.

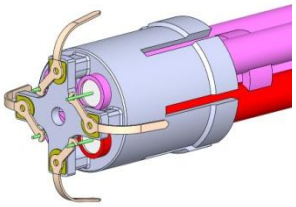
Bake out blanket.



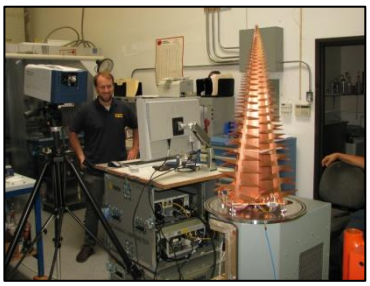
SN-001-B typ crack visible.



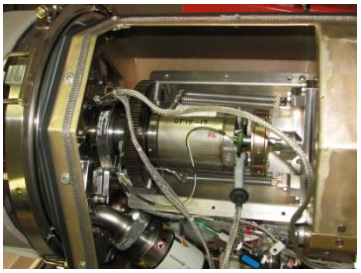
SN-002-A New BeCu Tip Links.



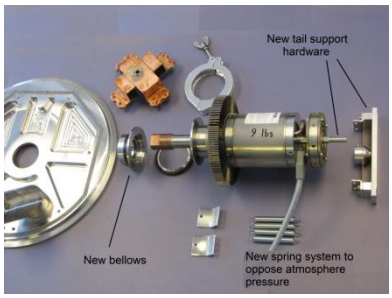
Tip Design with Berylium Copper traces for better fagique resistance.



Laser Vibrometer Testing.



Installed low vibration mount.



Components low vibration mount.

Ratio (3 x 4)(1.5 x 2.0) End.