Mini Gregorian History

Fall, 1985	1.	Proposed concept of Mini Gregorian
	2.	Initial planning of fabrication methods, investigate Large Optical Generator in Tucson.
	3.	Initial planning of test methods, decide that spherical near field scanning is only practical method.
Winter c Spring, 1986	1.	Shaping and diffraction analysis of reflectors, discovery and resolution of dip problem.
	2.	Decision to use LOG for machining of molds to then fabricate reflectors.
	3.	Investigation of geodesic dome for support structure, fabricate small model of dome and reflectors.
	4.	Investigate the use of inflatable structures for housing the spherical near field range.
May, 1986	1.	Approval of Mini Gregorian design and construction at Upgrading meeting.
Summer, 1986	1.	Design, build, and test sample structures for molds and reflector panels.
	2.	Development of software for machining of molds on LOG, construction of mounting jigs and cutting tools.
	3.	Start construction of mold blanks and prepare for transport to Tucson.
	4.	Site preparation and foundation construction for inflatable building.
	5.	Purchase and installation of inflatable building.
Fall, 1986	1.	Finish mold blanks and transport to Tucson. Machine molds in Tucson. Further software development for machining process. Return molds to Ithaca.
	2.	Build temporary enclosure inside inflatable building to house reflector fabrication process.
	3.	Fabricate of component parts of geodesic dome.
	4.	Purchase positioner table for spherical near field range, install shaft encoders and drive motors. Start positioning and control software.
Winter, 1987	1.	Move molds to temporary enclosure and surface polish. Check shape of molds with theodolite. Test molding methods on sample pieces.
	2.	Assemble geodesic dome in inflatable building.
	3.	Fabricate arch support structure for probe horns in near field range.
	4.	Further development of positioning and control software for near field range. Initial investigation of data reduction techniques.

Spring, 1987

1. Fabricate tertiary reflector with carbon fiber/foam core composites.
2. Design and start fabrication of corrugated feed horn for reflector system.
3. Design, build and test the microwave synthesizer for the near field range.
4. Further investigation of data reduction techniques.
5. Fabricate base plate and other mounting hardware for mounting Mini on positioner table.

Summer, 1987

1. Fabricate secondary reflector with carbon fiber/ foam core composites.
2. Build climate controlled control room in inflatable building to house the near field range electronics.
3. Raise, guy, and align the arch for supporting the probe horns.
4. Test spray surface metallization for low noise properties, metal lize both ref lectors.
5. Purchase, install and test A/D data collection electronics. Start data collection software.

Fall, 1987

1. Install secondary and tertiary in geodesic dome. Align the reflectors relative to each other.
2. Install the positioner table in the bubble building, install the probe horn base on the arch, alignment of the near field range. Survey monuments on geodesic dome.
3. Move all near field electronics to control room and begin testing of hardware and software.

Winter, 1988

1. Install base plate on table, fabricate lifting jigs, mount Mini on positioner table. Align Mini relative to table and probe horn.
2. Test and modify positioning software, test microwave receiver and data collection system.
3. Further investigation and initial software for data reduction. Begin collaboration with workers at NBS.

Spring, 1988

1. Finish assembly of corrugated horn, attach to 5 GHz. receiver and test for noise temperature and bandwidth performance. Mount receiver and horn in Mini.
2. Final testing of overall near field range system and initial data collection of MiniCGregorian near field patterns.
3. Further development of data reduction software.

Summer, 1988

1. Remove corrugated horn from Mini and send to Norway for testing. Reinstall upon return.
2. Study of near field data reveals excessive sag in struts supporting the Mini on the positioner table. Modify the base plate to provide extra support. Redo all alignments. Laser used to verify alignment.
3. Development and testing of data reduction software. Continue collaboration with workers at NBS.
4. Repair of lightening damage to near field range electronics.
5. Several new data sets collected on near field range.

Fall, 1988

1. Comparison of predicted and measured near field data Shows questionable results.
2. Test and debug near field software, obtain several more data sets on range.
3. Disassembly of Mini, package for shipment and transit to Arecibo. Assembly on site and initial testing in actual operation
4. Initial performance poor, further testing reveals reflector misalignment.
5. Repair misalignment, performance much improved but still below expectations.

Winter, 1989

1. Continued testing reveals some illumination blockage from “spider” bottom closure.
2. Replace bottom closure with perimeter frame. Performance now matches predictions.

The Mini Gregorian was operated as a regularly scheduled astronomy instrument for three winter seasons after installation. Receivers at 3 GHz and 8 GHz were later installed and used regularly. The high frequency systems revealed grating lobes in the main beam related to scalloping errors in the main reflector. The Mini also revealed standing waves between the platform and primary for the first time. The Mini provided much data for the design the full size Gregorian and verified the viability of the reflector feed concept.