Project Overview

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Project Manager

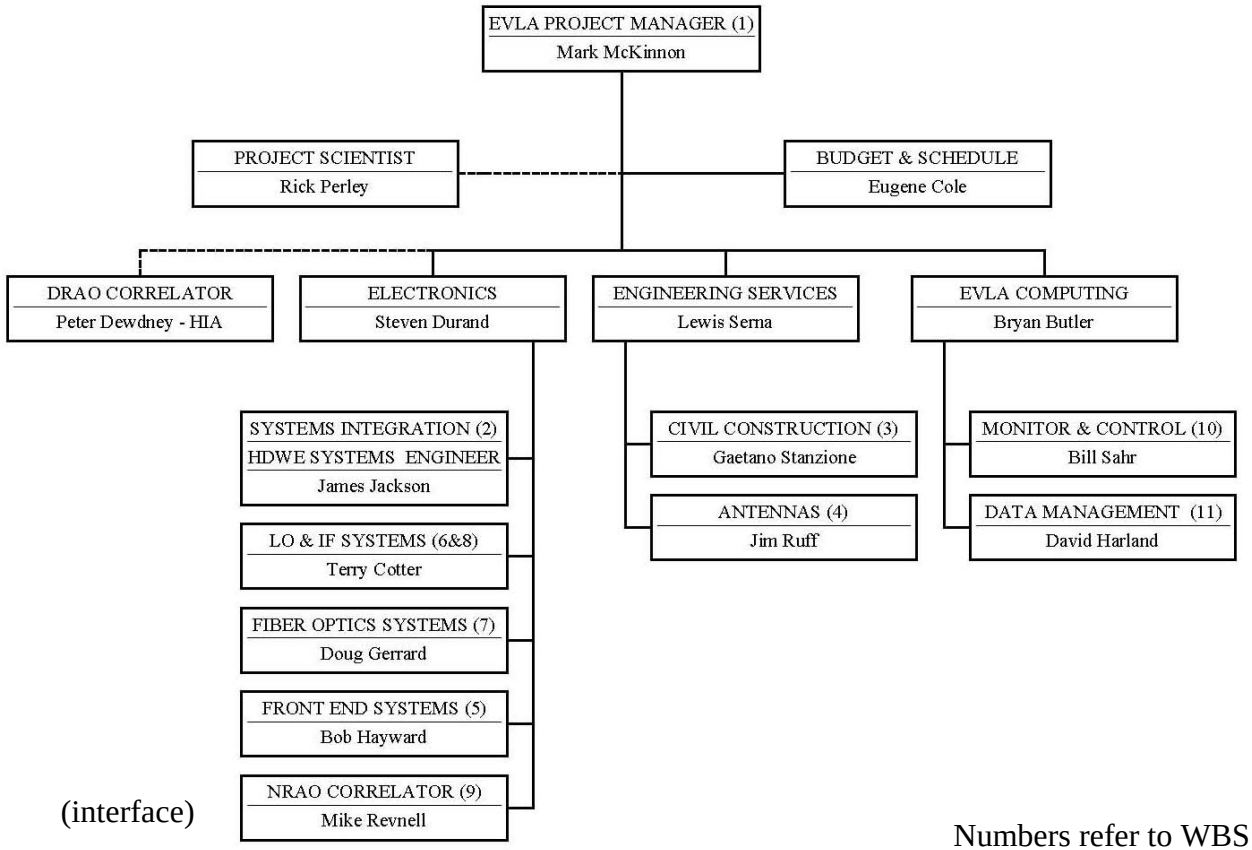
Outline

- Overall Project Goals
- Organization
- Budget
- Accomplishments in FY 2007
- Schedule
- Project Goals for FY 2008

Project Goals

- Key goal: Improve the observational capabilities of the VLA (except for angular resolution) by a factor of ten or more. Achieve by:
  - Adding new, wide bandwidth receivers
  - Upgrading or replacing current receivers
  - Replacing the data transmission system
  - Replacing the correlator
- Provide a new monitor and control (M&C) system, which must also allow operation of new and old antennas in transition.
- Perform careful astronomical observations to verify that EVLA hardware and software function properly.
- Provide new data management software, to include data post processing, for better access to array data products (a deliverable for NRAO, not the project specifically).
- Contribute to EPO to advance public science education (descoped).

Project Organization



(interface)

Numbers refer to WBS level 2 tasks.

Budget

- Funding = $93.8M (FY06)
  - NSF project funds $58.7M
  - NRAO contributed effort $16.3M
  - Canadian partner $17.0M
  - Mexican partner $1.8M

NSF Funding Profile

Year	Initial ($K)	Current ($K)
2001	1,106	3,000
2002	6,900	5,000
2003	5,322	5,322
2004	5,434	9,340
2005	5,548	5,340
2006	5,665	5,440
2007	5,835	5,835
2008	6,010	6,010
2009	6,190	6,190
2010	6,376	6,376
2011	4,597	1,130
Total	58,983	58,983

Finalized August 31, 2006

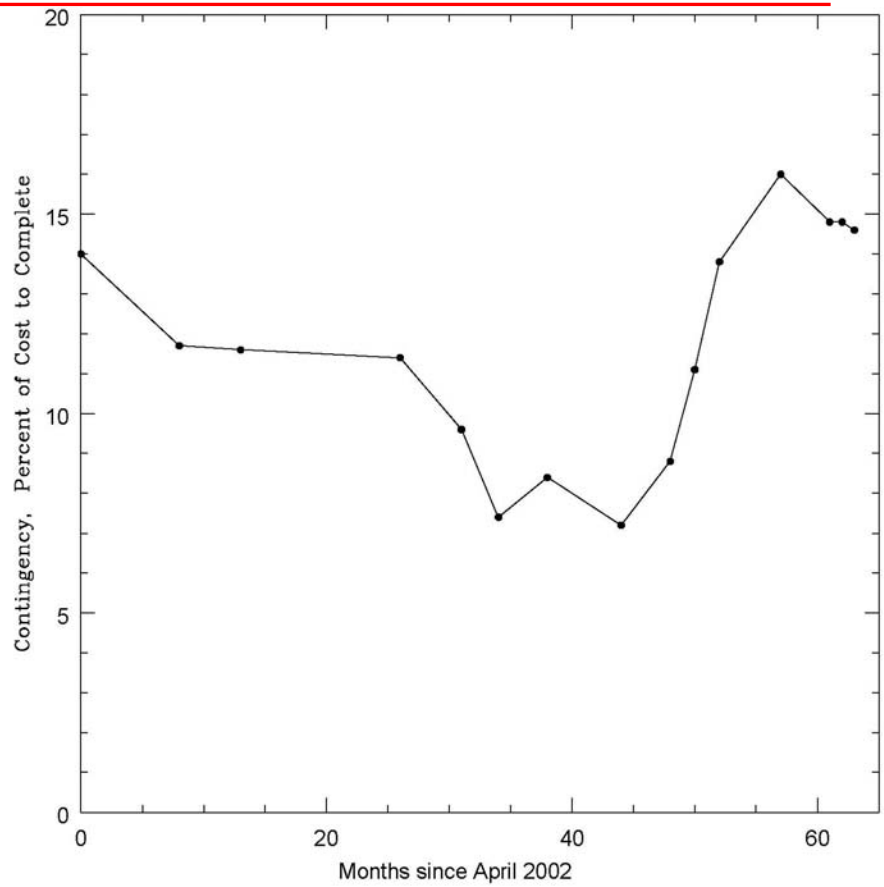
Table entries in dollars of year

Budget: Distribution by WBS Element

WBS Element	Description	% of Total Cost
601	Project Management	4.7
602	Systems Integration	6.6
603	Civil Construction	2.7
604	Antennas	4.9
605	Front End Systems	20.7
606	LO Systems	6.0
607	Fiber Optic Systems	10.8
608	IF Systems	6.0
609	Correlator	17.5
610	Monitor & Control	12.6
611	Data Mgt. & Computing	7.5
612	Education & Outreach	0.0

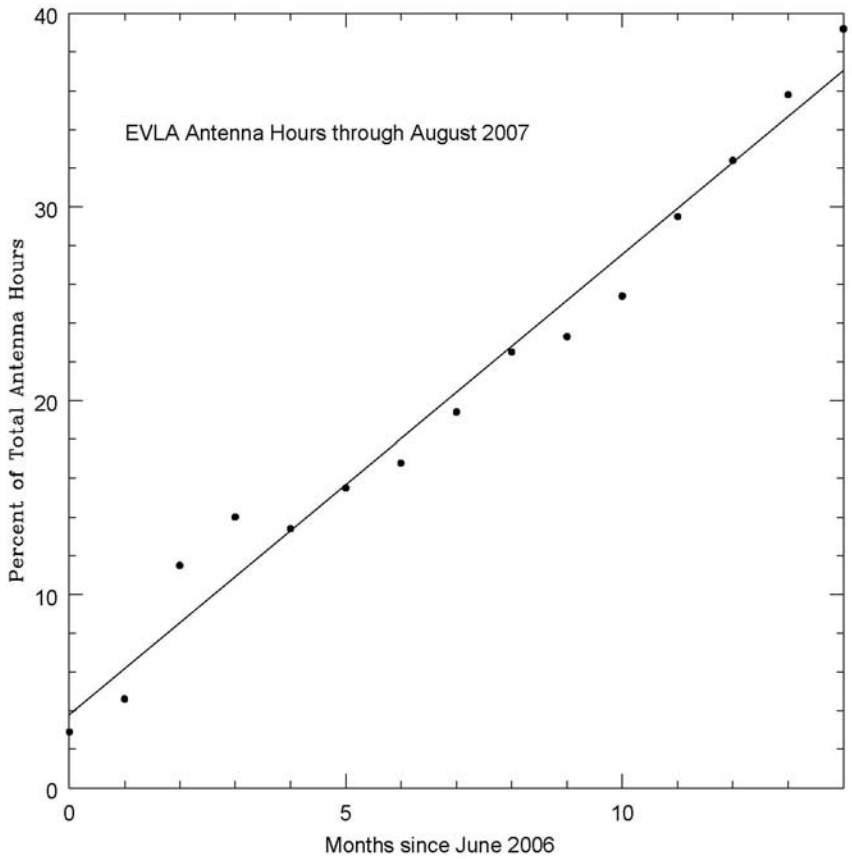
Budget: Contingency Status

- Financial health of project is good
- Project contingency, measured as percent of cost to complete, has improved in past year
  - Cost savings through bulk purchases
  - Better understanding of actual costs
  - Efficiency in antenna retrofitting
- Current contingency: $3.40M (14.6%)
  - Does not include work on the correlator, which is supported by Canadian funds
- Sum of weighted risks: $2.75M (McKinnon management talk)



Accomplishments: Antennas

- Original project plan called for antenna retrofit rate of 5 per year
- In August 2006, started antenna retrofits at rate of 6 per year as a schedule recovery measure
- On track to achieve project goal of retrofitting a total of 12 antennas to the EVLA design by September 30, 2007
  - 11 antennas used in routine scientific observations
    - Account for 39.2% of total antenna hours
  - 12th antenna in electronics outfitting
  - 13th antenna in mechanical overhaul



Accomplishments: M&C Software

- Achieved goal of retiring VLA Modcomp control computers by June 27, 2007.
  - Replaced suite of M&C software
  - Built new correlator controller so EVLA M&C system could control correlator
  - Developed hardware and software for a “visibility pipeline” that allows EVLA M&C to write correlator data to archive
  - Reduces operations cost and minimizes reliability risks
  - Allows M&C staff to focus on system integration and testing of prototype WIDAR correlator
- Conducted critical design review of EVLA transition M&C system on December 5-6, 2006 (Sahr/Butler)

Accomplishments: Civil

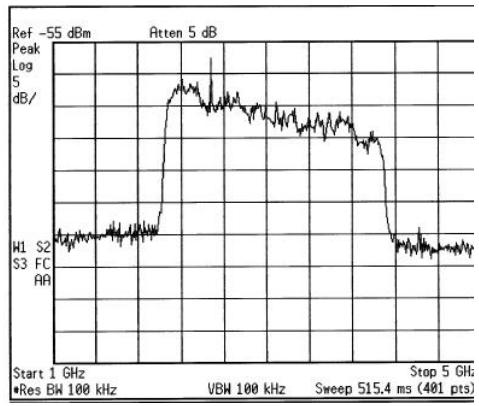
- Civil construction WBS element is basically complete
  - First WBS element in project to be completed
  - Installed -48 VDC power plant in new correlator room
  - Installed new uninterruptible power supply in EVLA operations area

Correlator power plant

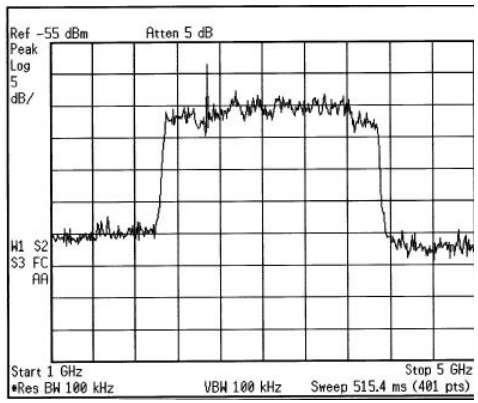
Accomplishments: Electronics & Sys. Int.

- All modules for local oscillator, intermediate frequency, and data transmission systems are in full production, except for:
  - round-trip phase module
  - some power supplies
  - 3-bit digitizer (Jackson)
- Wideband (2GHz) signal path, including new gain slope equalizer, shown to meet project specifications.

Gain slope equalizer
Before



After



Accomplishments: Electronics & Sys. Int.

- Completed installation of fiber pads at all 72 antenna stations
  - Allows antennas to be connected to array optical fibers
  - Provides complete flexibility in locating antennas on the array
- 3-bit, 4Gsps sampler shown to meet performance specifications
  - Will be an EVLA board designed around a commercially-available digitizer chip (Jackson)

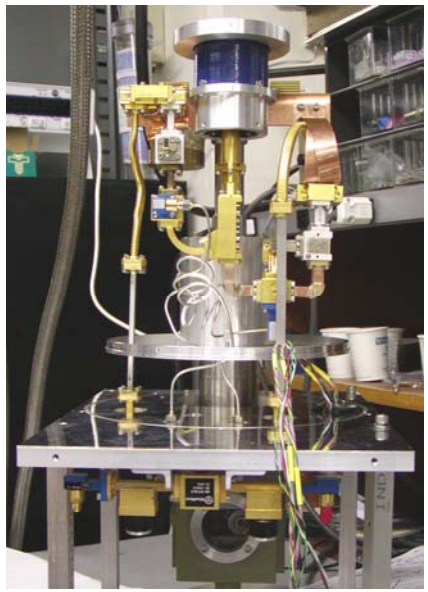
Antenna fiber pad box

Prototype 3-bit, 4Gsps sampler

Accomplishments: Receivers

- Excellent progress on fabrication of receiver feed horns (Hayward)
  - 22 L-band (1-2 GHz) horns fabricated (goal for FY 2007 was 20)
  - All Ka-band (26.5-40 GHz) and C-band (4-8 GHz) horns fabricated
  - Prototype S-band (2-4 GHz) horn fabricated and tested.
    - Will initiate production procurement in early FY 2008, one year ahead of schedule
- Prototype Ka-band receiver assembled.
  - Undergoing cryogenic RF tests

L-band feed horns

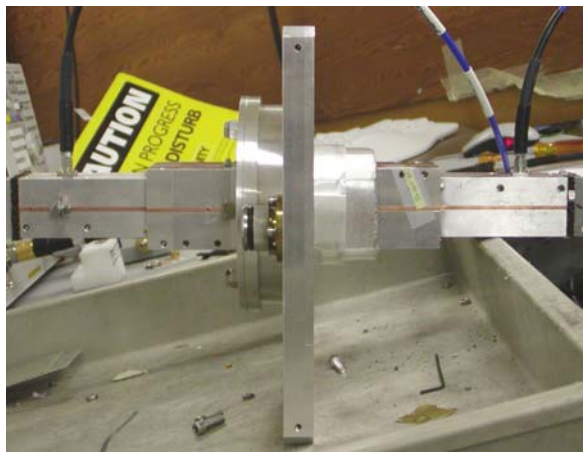


Ka-band receiver

Accomplishments: Receivers

- Good progress on design and fabrication of orthomode transducers (OMT)
  - Resolved cool-down issues with L-band OMT and selected fabrication method
  - C-band OMT expected to meet design specifications
  - RF design of S-band OMT completed recently at Green Bank
- Adjusted approach to OMT design & development for schedule recovery
  - L, C and S design & development now proceeding in parallel instead of sequentially
- Addressed staffing shortage

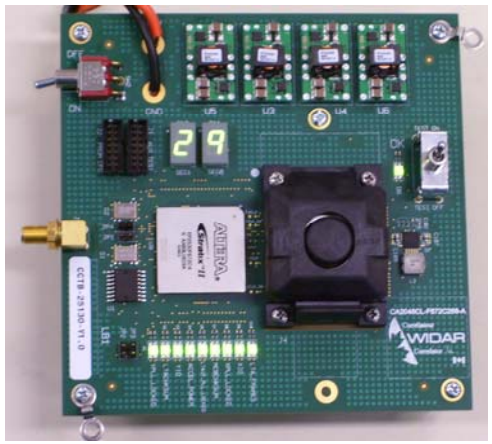
L-band OMT



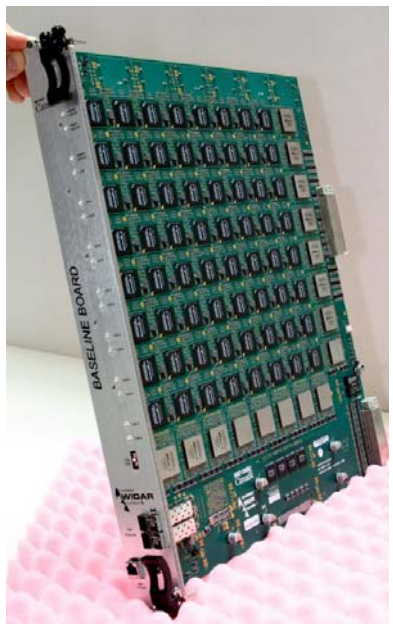
C-band OMTs under test

Accomplishments: Correlator

- Resolved problems with board fabrication and chip testing (Dewdney)
- Conducted critical design review for chip production on June 6, 2007.
  - Chip order placed



Test board for WIDAR correlator chip



Correlator baseline board

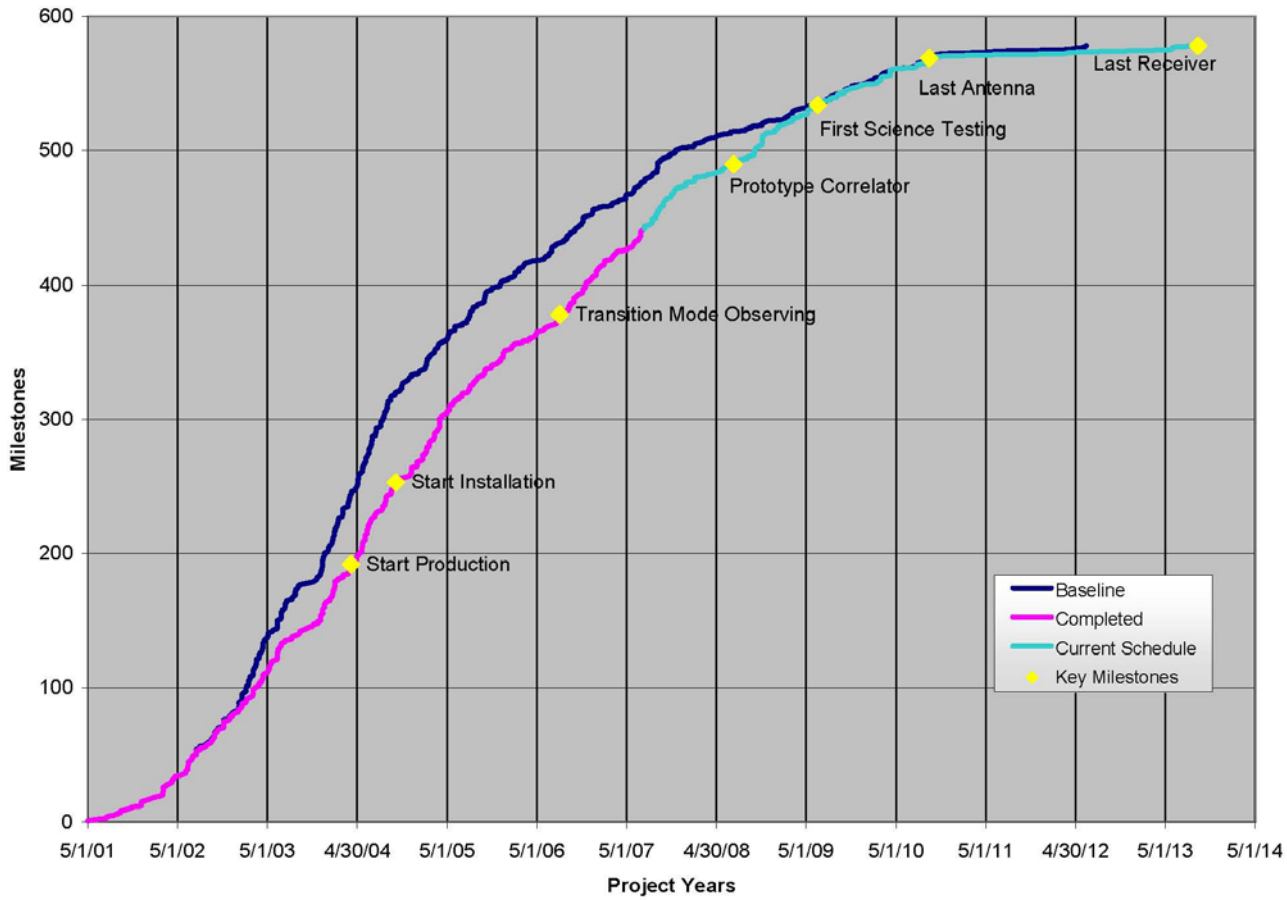
Accomplishments: Software for Science Support Systems

- Proposal submission tool (PST)
  - Used for all VLA and GBT proposals for last two proposal deadlines
  - Maintenance and further development undertaken by E2E Operations Division (EOD)
- Developed observation preparation tool (OPT)
  - Replacement for VLA JObserve
  - Tested by NRAO staff in AOC and Charlottesville (Butler demo)
  - Supplemented with tool that accesses calibrator data bases
- Observation scheduling tool (OST) under development
  - Demonstrated to ALMA software group
  - Alpha release in June 2008
- Archive access tool (AAT) will be common with ALMA's
  - Working with ALMA to standardize binary data format and science data model
  - Development managed by EOD
- CASA (McMullin)
  - Extensive user testing underway
  - Beta release scheduled for September 30, 2007

Accomplishments: Management & Operations

- Developed plans for risk management and earned value
  - Updates conducted with semi-annual updates of WBS cost data sheets. (McKinnon)
- Held inaugural meeting of the Science Advisory Group for the EVLA (SAGE) on May 22-23, 2007 (Lo)
- Issued proposal call in April 2007 for new tuning capability at C-band
  - First two EVLA-only papers submitted for publication (Chandler)

Schedule: Milestone Completion



As of July 13, 2007

Schedule

- Increase in antenna retrofit rate has helped to recover schedule. Maintain rate to achieve project goal of completing antenna retrofits by Q3 2010
- Understaffing and delay in OMT designs have extended installation of last receiver (X-band) into 2013
  - Observing capability still available at 8.0-8.8 GHz. Complete X-band coverage (8-12 GHz) is what is delayed into 2013.
- Correlator status improved:
  - Problems with circuit board fabrication and chip testing have been resolved
  - Steps taken by Canadian partner to merge production stages for schedule recovery
  - Delivery dates:
    - Prototype correlator scheduled for July 2008
    - Installation of final correlator begins May 2009
    - Final correlator installation complete April 2010
    - First science with correlator subset, December 2009

Summary

- The EVLA project team has made a number of significant accomplishments in FY 2007.
- Budget
  - Financial health of the project is good
  - Project contingency, as a percent of cost to complete the project, has improved over the past year
- Schedule
  - On track to complete antenna retrofits in July 2010 as originally planned
    - Efforts to recover project schedule have been successful
  - Installation of last X-band receiver delayed into 2013, but still have interim X-band capability
  - Correlator status has improved over last year
    - Will have observing capability with correlator subset in late 2009

Project Goals FY2008

- Start production of M302/303 utility modules, 10/2007
- Start production of gain slope equalizers, 10/2007
- Relocate deformatter racks to new correlator room, 10/2007
- Finalize joint definition of binary data format, 10/2007
- Develop detailed plan for joint software development, 11/2007
- Start production of Ka-band receiver, 11/2007
- Start production of RTP module, 11/2007
- Fabricate prototype S-band OMT, 11/2007
- Fabricate prototype Ku-band feed horn, 12/2007
- Finalize joint definition of Science Data Model, 12/2007
- Start production of C-band OMT, 12/2007

Project Goals FY2008

- Start production of 3-bit, 4Gsps samplers, 1/2008
- Start production of S-band feed horns, 1/2008
- Complete design of X-band OMT, 2/2008
- Complete fabrication of L-band feed horns, 2/2008
- Conduct science support systems design review, 3/2008
- Conduct correlator critical design review, 6/2008
- Make alpha release of observation scheduling tool, 6/2008
- Conduct on-the-sky tests with prototype correlator, 7/2008
- Complete prototype of S-band receiver, 7/2008
- Start production of L-band receiver, 8/2008
- Retrofit a total of 17 antennas to the EVLA design, 8/2008