DECam Installation & Commissioning Schedule

Alistair Walker CTIO/NOAO

Contents



- Integration Installation
- Commissioning
- Post-Commissioning

Top level Gantt chart



Task Marea	Duration	01	Pi-i-k	12 Dat 112 Dat	
Task Name	Duration 🚽			11 18 25 02 09 16 23 30 06 13 20 27 04 11 18 25 01 08 15 22 29 05 12 19 26 04 11 18 25 01 08 15 22 29 06 13 20 27 03 10 17 24 01 08 15 22 29 05 12 192	
G-floor crane installed	0 wks	'11 Sep 16	'11 Sep 16	6 09/16	
5 G-floor cage lifting tool complete	0 days	'11 Sep 30	'11 Sep 30	0 09/30	
DECam minus Imager Assembly & Test on G floor	57 days?	'11 Oct 03	'11 Dec 20		
7 Subsystems assembly & integration	52 days?	'11 Oct 03	'11 Dec 13		
8 Component count & visual inspection	2 days	'11 Oct 03	'11 Oct 04	4 Ken Schultz Cheryl Jackson	
9 Practice with 2nd barrel	8 days	'11 Oct 05	'11 Oct 14	4 Ken Schultz, Cheryl Jackson	
00 Instrument controller	2 wks?	'11 Nov 30	'11 Dec 13		
Ecorrector assembly and checkout	19 days	'11 Nov 15	'11 Dec 09		
2 Assemble cage, hexapod & corrector	2 wks	'11 Nov 30	'11 Dec 13	3 Ken Schultz, Cheryl Jackson, Steve Chappa, Brenna Flaugher	
3 CONTINGENCY	1 wk	'11 Dec 14	'11 Dec 20		
4 E Imager work in Coudé room	161.56 days?	'11 Oct 17	'12 Jun 01		
5 Cables & fibers to Coudé & computer rooms	1.67 wks	'11 Oct 17	'11 Oct 27	7 Steve Chappa,Terri Shaw,Lee Scott	
6 + Inspect, assemble, pump	7 days?	'11 Oct 27	'11 Nov 07		
2 Cool imager	3 days?	'11 Nov 07	'11 Nov 10		
5 Hager tests	15 days	'11 Nov 10	'11 Dec 01		
0 Ready for C5	0 days	'11 Dec 01	'11 Dec 01	1	
31 SISPI verification tests	1 wk?	'12 Jan 30	'12 Feb 03	3 🖕 Klaus Honscheid,Liz Buckley,Jon Thaler,Inga Karliner,Ann Eliot	
Tests with C5	10 days?	'12 May 18	'12 Jun 01		
9 Imager Ready for installation	0 days	'12 Jun 01	'12 Jun 01	1 • • • • • • • • • • • • • • • • • • •	
0 Calibration system installation	5 days	'11 Oct 03	'11 Oct 07	7 Darren Depoy, TAMU1, TAMU2, Doug Tucker	
DECam installation shutdown	82.56 days?	'12 Jan 04	'12 Apr 27		
2 ECam cage installation	71.19 days?	'12 Jan 04	'12 Apr 12	2	
3 • Telescope at NW station	8.56 days	'12 Jan 04	'12 Jan 16		
Dismantle telescope	7.13 days	'12 Jan 16	'12 Jan 25	5	
8 • Remove Existing PFC	5.88 days	'12 Jan 24	'12 Feb 01		
6	1.13 days	'12 Feb 01	'12 Feb 02		
4	7.63 days?	'12 Feb 02	'12 Feb 13		
7 Modify NW station	1 wk?	'12 Jan 16	'12 Jan 23		
8 Install Strain Gauges	3.5 days	'12 Feb 01	'12 Feb 07		
3	28 days?	'12 Jan 18	'12 Feb 27		
9 • Run feeds to top ring	12 days?	'12 Feb 13	'12 Feb 29		
7 E Reinstall M1	5.38 days?	'12 Feb 29	'12 Mar 08		
3	4.13 days	'12 Mar 08	'12 Mar 14	4	
1 • Remove Scaffolding	3.5 days	'12 Mar 14	'12 Mar 19		
5 • Rebalance Telescope	7.25 days	'12 Mar 19	'12 Mar 29		
0 CONTINGENCY	2 wks	'12 Mar 29	'12 Apr 12		
Functional shakedown with telescope mobile	5 days?	'12 Apr 12	'12 Apr 19		
5 • Verify f/8 handling	6.38 days?	'12 Apr 19	'12 Apr 27		
1 E Commissioning Phase 1 (f/8 commissioning)	5 days	'12 Apr 27	'12 May 04		
3 Contingency / Observe with f/8	1 wk?	'12 May 04	'12 May 11		
Commissioning Phase 2 (Optical testing with SBIGs)	5 days	'12 May 11	'12 May 18		
6 Observe with f/8	2 wks?	'12 May 18	'12 Jun 01		
7 ± Complete DECam at NW station	19 days?	'12 Jun 01	'12 Jun 28		
5 Commissioning Phase 3A	2 wks	'12 Jun 27	'12 Jul 11		
6 Observe with f/8 (?)	2 wks?	'12 Jul 11	'12 Jul 25		
7 Commissioning Phase 3B	2 wks?	'12 Jul 25	'12 Aug 08	8	
8 Observe with f/8	1 wk?	'12 Aug 08	'12 Aug 15		
9 Short engineering block	0.5 wks?	'12 Aug 15	'12 Aug 20		
0 Science Verification	2.5 wks?	'12 Aug 20	'12 Sep 05	si 🛛 🔹 👘 👘 👘 👘 👘 👘	لط

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Integration-Installation



• This has started already



F/8 Handler

SISPI Computers

RASICAM

LN2 cooling system

Hexapod, Filter Changer, Shutter

Prime focus cage

Flat field screen

Trucks and Boxes...





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DECam Early Arrivals: f/8 handling fixture



- DECam Prime Focus Cage
 - Fixed, no 180° flip possible
- f/8 secondary
 - Mounted in front of DECam
- f/8 handling fixture
 - Arrived & installed at Blanco
 - Shown here in yellow,
 with telescope in position



RASICAM



 RASICAM 10µm all-sky camera

provides

- 320x240 pixel images every 90s (average of 5400 exposures)
- 14-90 deg from zenith, equiresolution
- Publishes to web
- Photometricity indices



What happens next?



- Flat field System Arrives installed October 3-7
- Imager Arrives connected to cooling system and data system starts October 17
- Telescope Cooling System Final Pieces Arrive install in February
- Rest of Calibration System Arrives install in October, test with Mosaic during November-December
- Assembled Optical Corrector Arrives tested on rotary table starts November 15
- Assemble Cage, Corrector, Hexapod starts November 30 August 24, 2011 DECam Community Workshop, Tucson

Installation



- Installation leader is Tim Abbott, combined teams of CTIO and DECam Project staff install DECam. The detailed schedule is an MPP file (DESdoc 5238)
- We are already in the preceding phases of *shipping* and *check-out after arrival*.
- Lots of planning, discussions, documentation.
- *All systems operating correctly* gates the start of installation of the new Prime Focus Cage,
- The installation procedure design is being led by CTIO's DECam installation engineer Freddy Muñoz.

DECam cage installation – gross phases



- Remove f/8 cell and stow
- Install scaffold mounts
- Telescope to zenith
- Measure current telescope alignment
- Remove & stow primary mirror ٠
- Remove old cage .
 - Remove with spider fins/vanes/legs attached
 - Lower to telescope ring girder
 - Remove spider fins
- Install new cage (with cage, hexapod, corrector & SBIG cameras)
 - Raise to telescope ring girder
 - Install spider fins
 - Raise to top ring, attach spider fins
 - Preliminary mechanical alignment
- Reinstall primary mirror ٠
- Preliminary optical alignment
 - Tune spider fin tension
- Rebalance telescope .
- Check out f/8
- \rightarrow Image quality checks with SBIG cameras
- Install remaining DECam components at NW station

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Cage alignment



- Cage alignment is a critical process.
- The F/8 mirror is mounted onto the cage, there are operational adjustments, but they are limited
- DECam is mounted via the hexapod, but we want to start with the hexapod positions nominal. Especially tilt.
- Roberto Tighe (CTIO Optical Engineer) is in charge of this stage.

Commissioning Strategy



- Begins after installation and alignment of the prime focus cage, which will contain the optical corrector and dummy imager with SBIG camera system mounted.
- **Phase 1** F/8 mirror optical alignment and test (start Dec 21 2011)
- **Phase 2** DECam optical corrector tests using the SBIG cameras
- Then there is a month of installation and checking out of DECam and other cage contents
- **Phase 3** Full DECam System tests, on the sky
- Science Verification

Phase 1 F/8



- Verify correct operation of F/8 focus and tilt mechanisms
- Analyze optical performance with IMAN, make sky map
- Remove and re-install F/8, check all still OK
- Use the CTIO IR Imager (ISPI) for imaging tests

Phase 2: DECam Optics



• At Zenith

- Focus at center of CCD
- Evaluate and correct for tilt using radial cameras
- Evaluate image symmetry, adjust x-y
- Evaluate image quality
- Over Sky
 - Evaluate image quality over sky, built approximate LUT for top-end deflections
 - Focus stability
 - Image ghosts
 - Test our understanding of the effects of misalignment and defocus

Note - the SBIG cameras have very fine pixel scale

Pre-Phase 3: DECam Installation



- Cabling, LN2 system, install if not already done, check
- DECam install
- Functional tests of DECam and its data system
- SISPI and all interfaces working, alarms work
- Air systems OK
- Initial reliability tests
- Install (and remove) filter, then install all filters

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Phase 3: DECam Imager Commissioning



• Phase 3A

- Monitoring & exercising activities
- Daytime calibrations and CCD tests (some are every day, others less often)
- Telescope & TCS tests pointing, tracking
- Focus map, in-and-out, sky position, filter, temperature
- Donut, Bcams, alignment
- Autofocus
- Crosstalk, ghosts, scattered light
- Guiding
- Calibrations dome flats, star field flats, sky flats
- Photometry, astrometry
- Reliability, efficiency, user interface, tool evaluation

Phase 3 DECam Commissioning



- Phase 3B
 - Community protocols qualification test DECam performance and reliability and the ability of the Community Pipeline to reduce the data.
 - Deep dithered field. Long exposures, high background
 - Low galactic latitude field, multiple filters
 - Variable star density e.g. large globular cluster or resolved nearby galaxy
 - Establish optimal dither patterns
 - etc
 - DES protocol qualification Test DECam performance and reliability and the ability of the DESDM pipeline to reduce the data
 - Test also analysis codes on real DES-like data
 - Test ObsTac
 - Test QuickReduce in the DES context
 - etc

Science Verification



- See Dara & David talk

Schedule



No	Phase	Activity	Time (w)	Elapsed (m)	Nominal Date
1	ONE	F/8 commissioning	1	0.25	27 Apr-3 May
2	Observing	Observe F/8	1	0.5	4 May-10 May
3	TWO	Optics tests - SBIGs	1	0.75	11 May-17 May
4	Observing	Observe with F/8	2	1.25	18 May-31May
5	Installation	Install Imager	2	1.75	1 Jun-14 Jun
6	Installation	Functional tests	2	2.25	15 Jun-26 Jun
7	THREE	DECam Tests (A)	2	2.75	27 Jun-10 Jul
8	Observing	Observe with F/8	2	3.25	11 Jul-24 Jul
9	THREE	DECam Tests (B)	2	3.75	25 Jul-7 Aug
10	Observing	F/8	1	4.00	8 Aug-14 Aug
11	Observing	Science Verification	2	4.6	Late August

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The End

