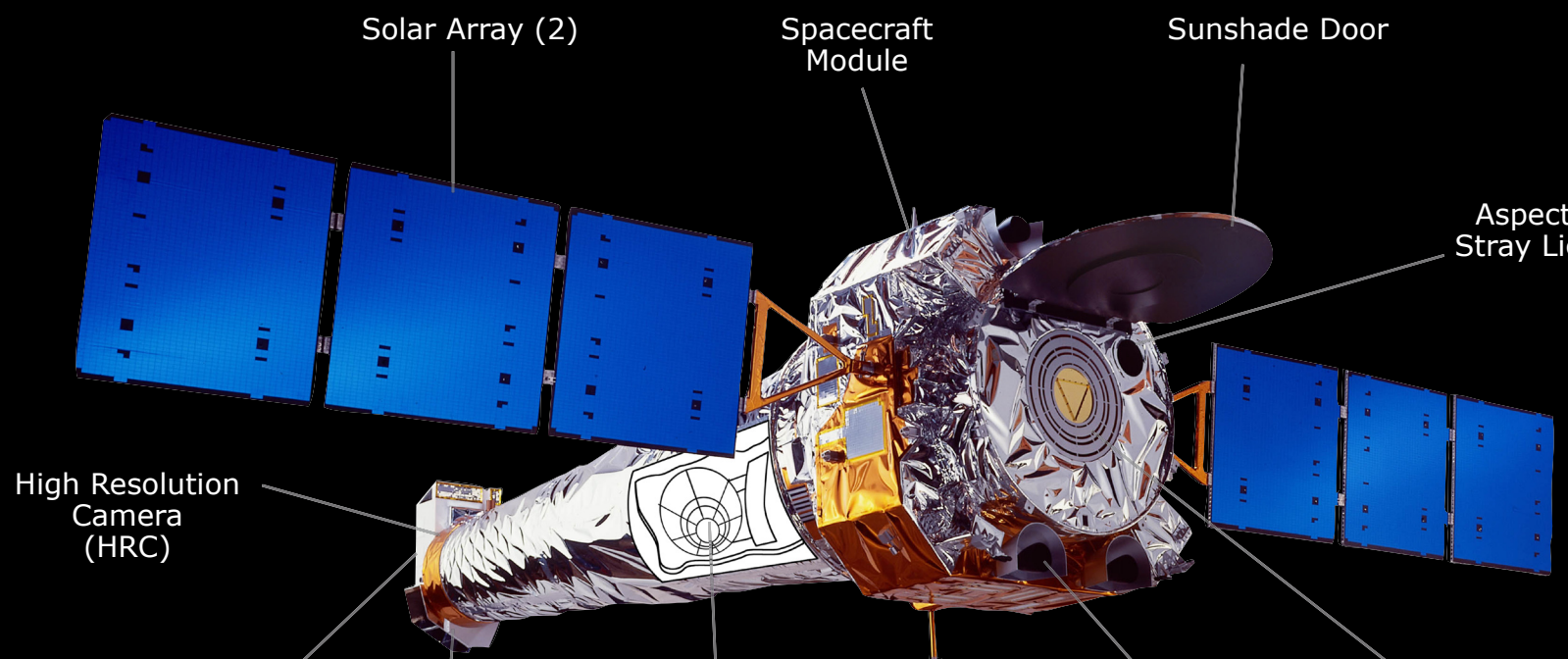
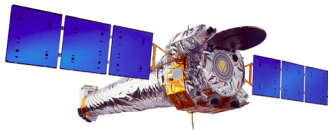
CHANDRA SPECIFICATIONS



CHANDRA SPECIFICATIONS

CHANDRA X-RAY CENTER



An X-ray telescope is the only way astronomers can observe the hot regions of the Universe. The most powerful optical telescopes, such as the Hubble Space Telescope, cannot see the vast clouds of hot gas that stretch millions of light years across and contain enough matter to make hundreds of trillions of stars. X-ray telescopes allow us to image matter swirling as close as 90 kilometers from the event horizon of a stellar black hole or to track the expansion of a hot gas bubble produced by an exploding star.

Chandra is the third of NASA's Great Observatories. The mirrors on Chandra are the largest, most precisely shaped and aligned, and smoothest mirrors ever constructed. The images Chandra makes are twenty-five times sharper than the best previous X-ray telescope. Chandra, which was launched by the Space Shuttle on July 23, 1999, is helping scientists to better understand the hot, turbulent regions of space and answer fundamental questions about the origin, evolution, and destiny of the Universe.

Overall Specifications

Size (solar arrays deployed):	13.8 m x 19.5 m (45.3 ft x 64.0 ft)
Weight:	4,800 kg (10,560 pounds)
Orbit:	10,000 km x 140,161 km (6,200 x 86,900 miles); 28.5 degree inclination
Ascending node:	200 degrees
Argument of perigee:	270 degrees
Life:	expected 10 years

Spacecraft Specifications

Power:	two 3-panel silicon solar arrays (2350 W) three 40 amp-hour nickel hydrogen batteries
Antennas:	two low-gain, conical log spiral antennas
Frequencies:	transmit 2250 MHz, receive 2071.8 MHz
Command Link:	2 kilobits per second (kbps)
Data Recording:	solid state recorder; 1.8 gigabits (16.8 hours) recording capability
Downlink Operations:	downloaded typically every 8 hours
Contingency Mode:	32 kbps
Safing:	autonomous operation

Science Instruments

Advanced Charged Couple Imaging Spectrometer (ACIS):	Ten CCD chips in 2 arrays provide imaging and spectroscopy; imaging resolution is 0.5 arc-sec over the energy range 0.2 - 10 keV; sensitivity: $4x10^{-15}$ ergs-cm^{-2} sec^{-1} in 10^5 s
High Resolution Camera (HRC):	Uses large field-of-view micro-channel plates to make X-ray images: ang. resolution < 0.5 arc-sec over field-of-view 31x31 arc-min; time resolution: 16 micro-sec. sensitivity: $4x10^{-15}$ ergs-cm^{-2} sec $^{-1}$ in 10^5 s
High Energy Transmission Grating (HETG):	To be inserted into focused X-ray beam; provides spectral resolution of 60-1000 over the energy range 0.4 - 10 keV
Low Energy Transmission Grating (LETG):	To be inserted into focused X-ray beam; provides spectral resolution of 40-2000 over the energy range 0.09 - 3 keV

Telescope System

High Resolution Mirror Assembly:	4 nested pairs of grazing incidence paraboloid and hyperboloid mirrors
Length of Mirrors:	each 83.3 cm (32.8 in) long
Weight of Mirrors:	956.4 kg (2,104 pounds) total
Focal Length:	10 meters (32.8 ft)
Outer Diameter:	1.2 meters (3.9 ft)
Field of View:	1.0 degree diameter
Ang. Resolution:	0.5 arc-sec
Altitude Control:	6 reaction wheel control 2 inertial reference units
Aspect Camera:	1.40 deg x 1.40 deg field-of-view
Pointing Stability:	0.25 arc-sec (RMS) radius over 95% of all 10 second periods
Pointing Accuracy:	30 arc-sec 99% of viewing time
Remarks:	Mirrors have an effective area of 400 sq. cm. @1 keV; 600 A iridium coating

The Chandra program is managed by the Marshall Spaceflight Center for NASA's Science Mission Directorate. Northrop Grumman (formerly TRW), the prime contractor, assembled and tested the observatory for NASA. The Chandra X-ray Center is operated for NASA by the Smithsonian Astrophysical Observatory.