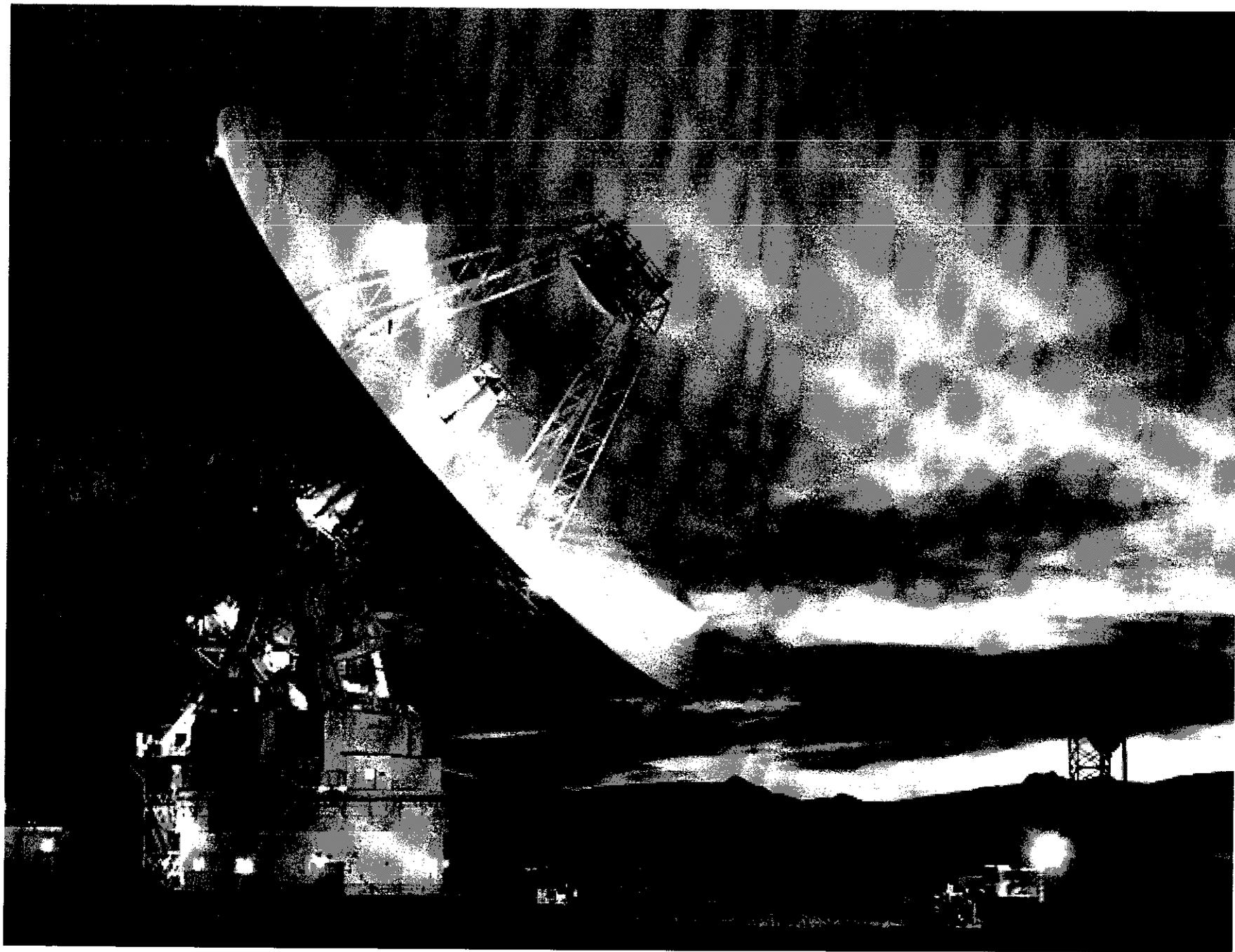


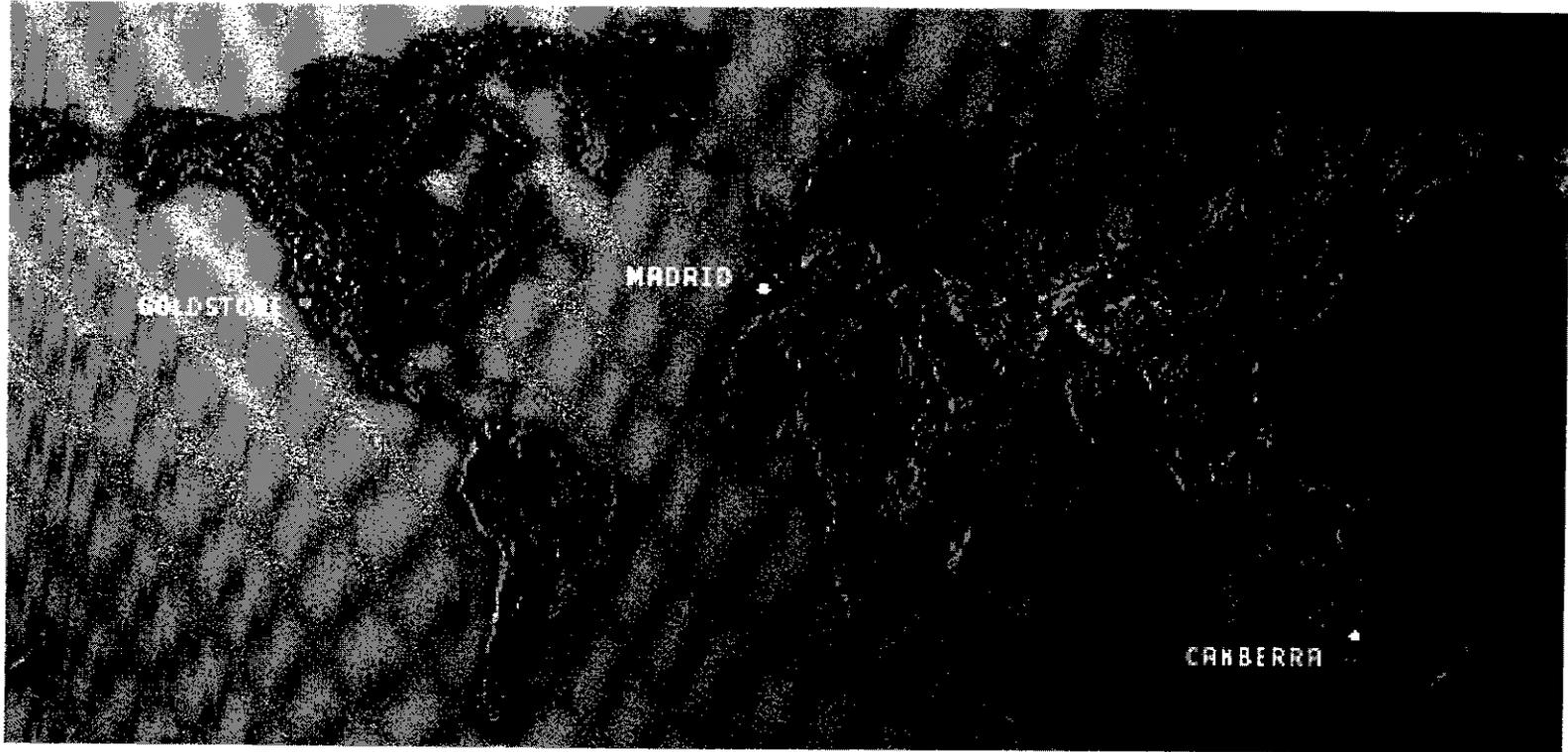
THE DEEP SPACE NETWORK



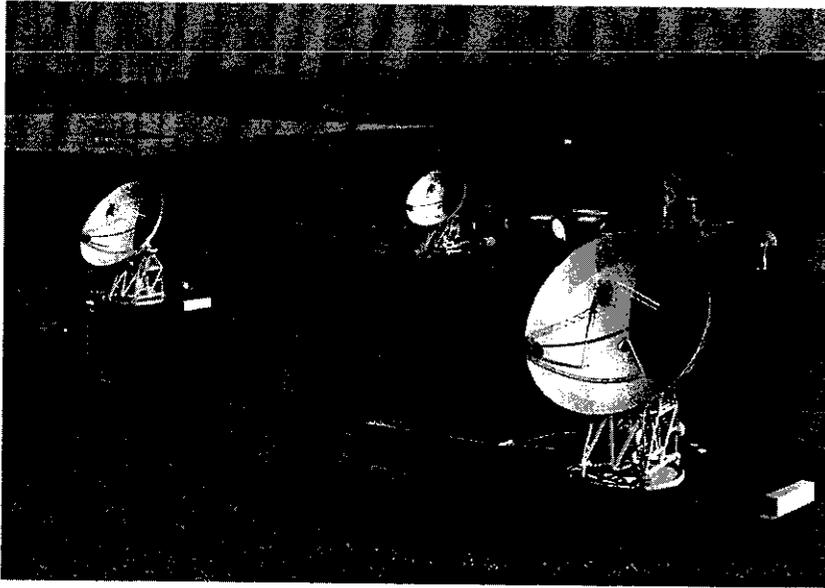
JPL



The Deep Space Network has sites in three locations around the world that hand off to each other allowing continuous contact with a distant spacecraft as Earth rotates.



The three Deep Space Network Sites



GOLDSTONE, CALIFORNIA

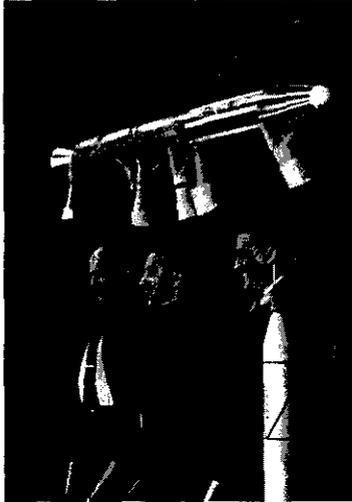
QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.

MADRID, SPAIN



CANBERRA, AUSTRALIA

History - celebrating over 40 years of space communications



The first tracking was for U.S. satellite Explorer 1 in 1958, before the Deep Space Network was officially formed.

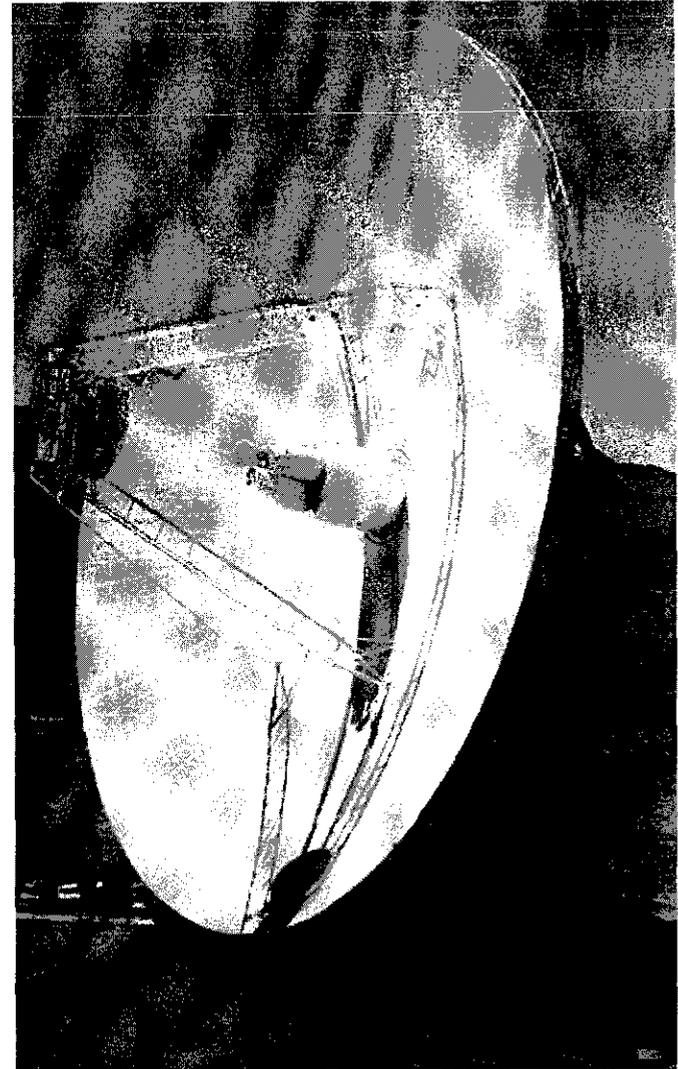
In December 1963, the Deep Space Network was formally founded by merging three existing services.

The first antenna was the 26-m 'Pioneer' built in 1958.

The first big antenna was 64-meters built in 1966.

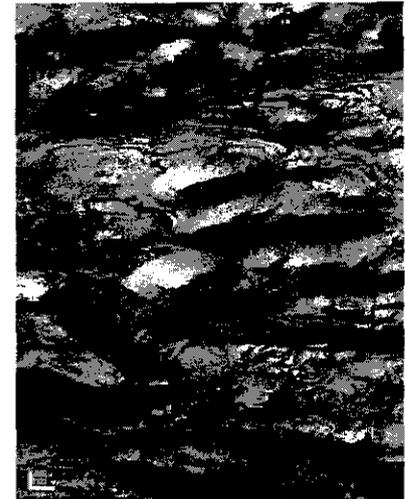
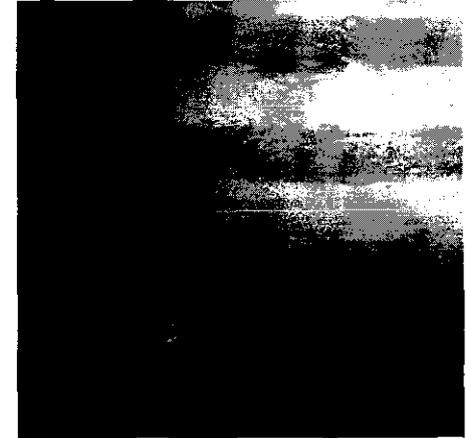
This was upgraded to 70-meters in 1986.

The Deep Space Network continually improves and upgrades as new technology is developed.

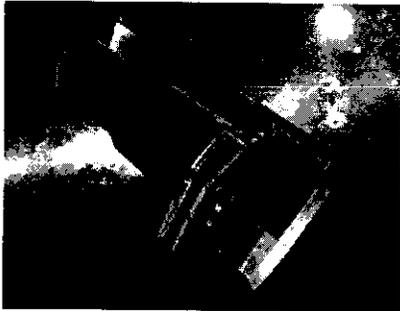


What does the DSN do?

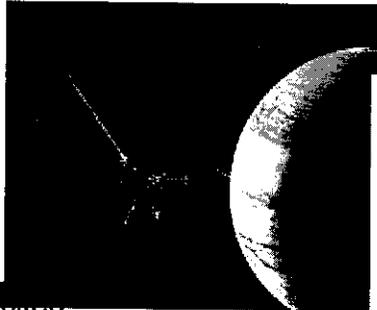
- **Spacecraft Telemetry (downlink)**
 - Collecting the data transmitted by spacecraft
 - Images
 - Data from science instruments
 - Spacecraft health information
- **Spacecraft Commanding (uplink)**
 - Transmitting sequences of instructions from mission controllers to the spacecraft
 - science observations
 - trajectory maneuvers
 - orbit insertions
 - descents and landings
- **Spacecraft Tracking**
 - Calculating predictions as to the position and velocity of a spacecraft based on doppler, range, and interferometry measurements.
- **Navigation**
 - Determining where the spacecraft needs to be and planning necessary trajectory correction maneuvers or orbit trim maneuvers.



A plethora of critical operations

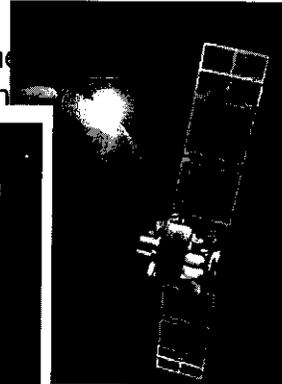
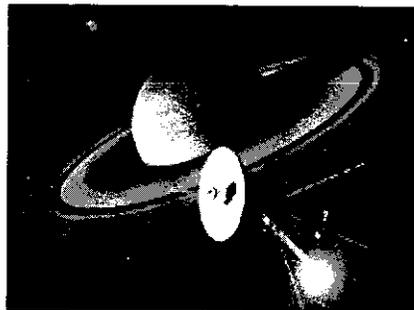


SIRTF launched and tracked

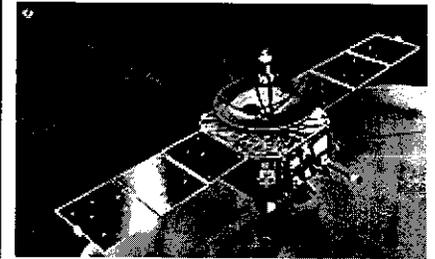


Galileo plunges into Jupiter to end mission

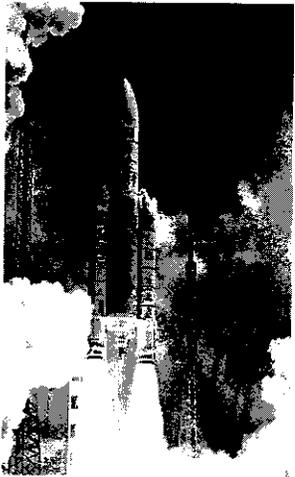
Cassini Gravity Wave experiment
then the approach to Saturn



Mars Global Surveyor trajectory maneuvers



Japanese Nozomi, trajectory maneuvers and orbit insertion



ESA's Rosetta launches

From September 2003 through February 2004 there are more missions requiring DSN support for critical events than at any other time in the history of the communications network.

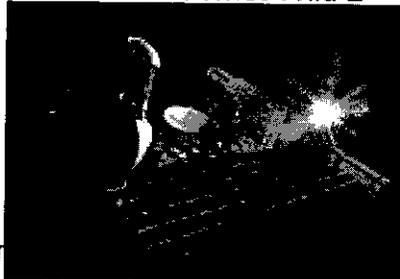


Ulysses flies by Jupiter



Mars Express orbit insertion

Stardust encounter with Comet Wild 2



Great Britain's Beagle 2 lands on Mars

Mars Odyssey relays for Beagle operations



Two Mars Exploration Rovers land at different sites on Mars

QuickTime™ and a Photo - JPEG decompressor are needed to see this picture.

DSN preparations for '03/'04

Accelerated a scheduled upgrade to telemetry, command, and tracking systems.

Developed a new software system to more reliably allow one antenna to track multiple spacecraft.

Built a new 34-meter antenna at the Madrid complex.

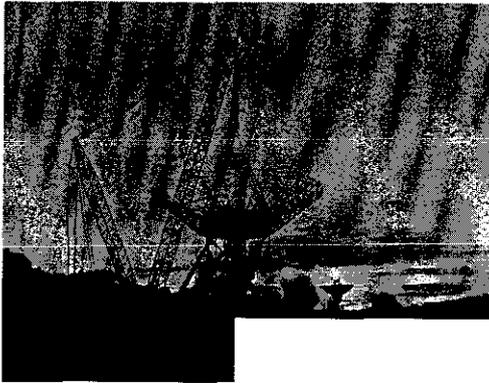
Upgrades developed by CSIRO and NASA were installed at the Parkes Radio Telescope to extend its data reception capability.

Agreed with ESA to use their new 35-meter New Norcia antenna in Western Australia as back up for both command and receive functions.

More powerful transmitters were installed on all of the 34-meter beam-wave guide antennas.

Extended to Canberra and Madrid the ability to array multiple antennas for more sensitive reception.

Enhanced navigation capability by developing hardware and software that provides an additional angular measurement for accurately tracking a spacecraft.



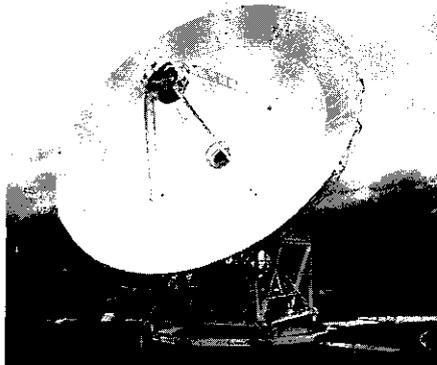
Deep Space Station 55 in Madrid - the dish is lifted into position

ESA/ESRO



ESA's new 35-meter antenna in Norcia, Western Australia.

New panels are added to the dish of the Parkes Radio Telescope, Australia



A 34-meter beam waveguide antenna

Deep Space Operations Control Center – Data hub at JPL

- The destination point for data received by the antennas at any of the three complexes is the Deep Space Operations Center at JPL.
- Data is processed for distribution to Scientists around the world, and archived for future use.
- Commands to spacecraft are transmitted through the operation center.

