CT-133 Research Aircraft

The CT-133 research aircraft at the NRC Institute for Aerospace Research (NRC Aerospace) is a 1950s vintage military jet trainer, licence-manufactured by Canadair with an increased thrust Rolls-Royce Nene turbojet engine. The rugged, high-performance aircraft is capable of low to high-altitude operations in harsh environments. It is used by NRC Aerospace for studies of aircraft wakes and vortices; atmospheric boundary layer and convective turbulence; avionics systems developments, including Reduced Vertical Separation Minima (RVSM) to improve the capacity of the airspace system and the Traffic Collision and Avoidance System (TCAS); and CT-133 specific handling qualities anomalies. The aircraft also serves as a platform to support microgravity research.

The NRC CT-133 is currently configured to carry a crew of one or two and is fitted with extensive internally and externally mounted instrumentation, as detailed under Technical Specifications.

Capabilities
This high-speed (to 500 KIAS), high G (-3.0 to +7.33), fully instrumented T-33 research aircraft is equipped for adverse environment atmospheric research, such as:

- pressure standard calibrations
- in-flight turbulence and wake vortex measurements
- air chemistry/greenhouse gas measurements, and
- flight microgravity research mechanics research.

Expert support
The NRC CT-133 is supported by a research team experienced in designing and implementing airborne field experiments of an international calibre. Clients can count on the knowledge and expertise provided by NRC Aerospace for responsive and focussed research that meets all their needs.

NRC T-33

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Technical specifications

Research aircraft:	• Canadair CT-133 single engine military jet trainer
On-board installations:	• Standard navigation sensors: VOR, ILS, GPS • Data acquisition system • NRC Aerospace-integrated very-fast response inertial reference and navigation system, consisting of a Honeywell laser gyro (RLG) inertial measurement unit (IMU) and a NovAtel GPS with a data recorder processor computer (DRP), using Kalman filtering for inertial error-bounding • Air-data noseboom with NRC Aerospace-designed very fast-response AoA, sideslip, pressure and temperature sensors • Control positions • Underwing pylon mounted sensors (configurable)
Data acquisition and analysis:	• DRP controls data acquisition, processing and storage of air and inertial data at sampling frequencies up to 600 samples per sec (enabling at high altitude flight speed a Nyquist eddy scale size of 0.7 m), as well as role sensor parameter data • Aircraft has rear-cockpit data and flight-plan navigation monitoring computer and display, with a front cockpit flight-plan display
Measurement capabilities:	• 3-axis attitudes, rates, and accelerations • Flight control positions • Angles of attack and sideslip • Static and dynamic pressures • Air temperature • Air chemistry gaseous sensors, including CO_2, H_2O and NO_x analyzers • Aerosol and black carbon particle counters • KT 19.99 air temperature sensing pyrometer • Cloud microphysical measurements, including TWC/LWC and PMS-type probes
Special configurations:	• As required