Bell 412 HP Advanced Systems Research Aircraft

The Bell 412 HP Advanced Systems Research Aircraft (ASRA) of the NRC Institute for Aerospace Research (NRC Aerospace) is specially configured with on-board research equipment for the development and testing of advanced flight systems and various modern cockpit technologies. NRC Aerospace developed and installed the research systems in the ASRA with financial support from various part-ners, including the Department of National Defence and the Natural Sciences and Engineering Research Council.

Looking ahead

ASRA is outfitted with advanced technology that makes it an ideal platform for research into digital fly-by-wire and fly-by-light control systems, precise guidance and navigation, and active control systems. Advanced fly-by-wire features give it a powerful variable stability and control capability, and an airborne simulation capability for air vehicle design and operational R & D.

As a sophisticated research test bed, ASRA allows researchers to investigate the impact on situational awareness, safety and mission performance of new control, guidance, navigation, and communication technologies. The aircraft also serves to test advanced pilot vehicle interfaces such as smart displays, helmet-mounted displays, synthetic vision systems, integrated hand controllers, and direct voice input.

Unique expertise

NRC Aerospace has acquired an international reputation in rotorcraft flight mechanics research, with many years of in-depth experience in the field. ASRA is the third generation of NRC Aerospace helicopter based airborne simulators. The solid experience of the Bell 412 team means clients can count on responsive, flexible research that meets the challenges posed by the growing need for advanced flight control and cockpit technologies.

NRC Bell 412

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Technical specifications

Research aircraft:	• Bell 412 HP medium sized twin engine helicopter
On-board installations:	• PC-based engineering workstation • Ring Laser Gyro Inertial Reference System (IRS) • Differential GPS satellite based positioning system • Selectable project derived HSI and ADI display cueing • Additional project derived, programmable displays mounted on instrument panel • Research fly-by-wire system • Programmable pilot inceptors, including conventional controls and active sidestick
Project power:	• 200-A project bus distributed as: – 100 A 28 V dc – Two 110 V ac/60 Hz single phase 1 kVA static inverters – One dual output 110 V ac/26 V ac 400 Hz single phase 1 kVA static inverter
Data analysis:	• PC-based data playback and analysis system (including time- and frequency-based software)
Measurement capabilities:	• High-accuracy inertial data (3-axis attitudes, angular rates, accelerations, velocities and positions) • GPS high-precision differential mode positioning • Static and dynamic pressures • Outside air temperature • Compass heading • Radio and laser altitude • Control inputs (lateral cyclic, longitudinal cyclic, pedals and collective positions) • Actuator positions • Angle of attack and sideslip • Engine parameters
Special configurations:	• As required