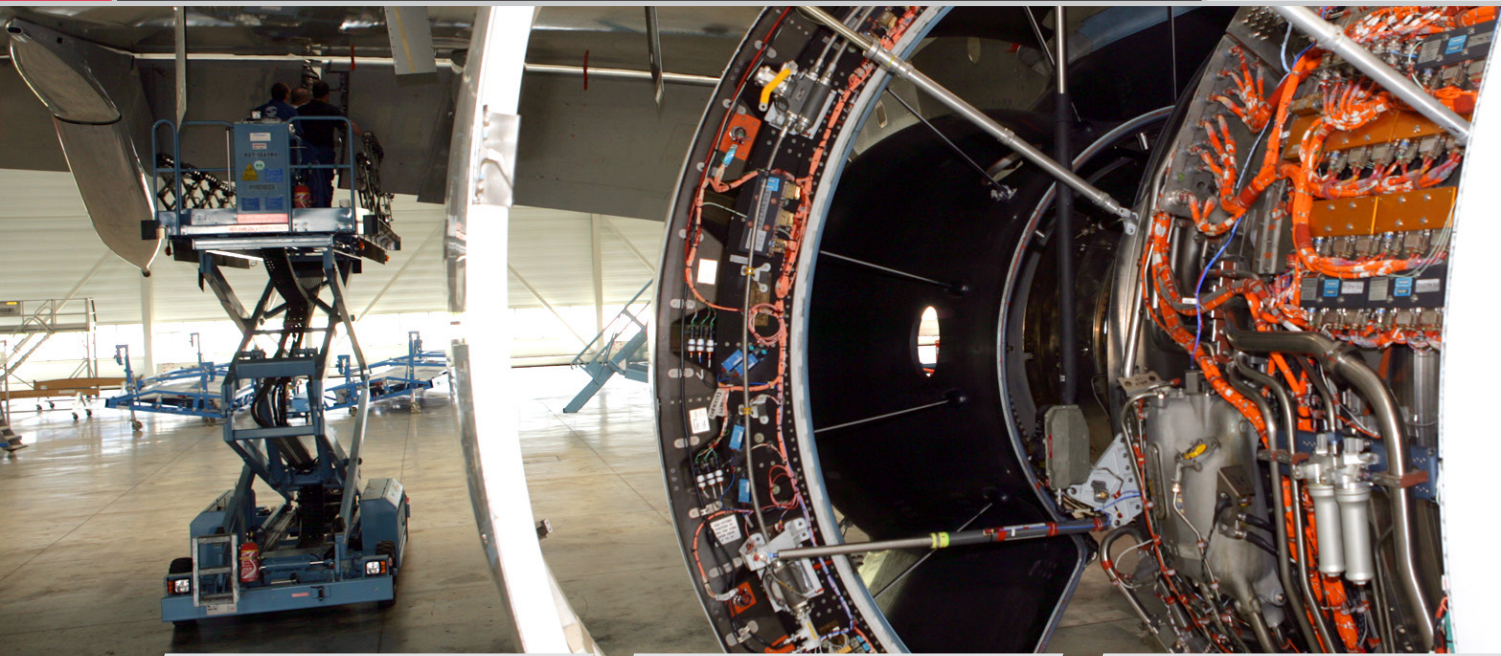


# Rugged Data Acquisition for Engine Test Applications

**CURTISS -  
WRIGHT**

DEFENSE SOLUTIONS



## Challenge

- High temperature, high vibration environment
- Demanding space requirements
- Synchronization over 100s of channels
- High accuracy, low noise

## Solution

- Extended temperature range modules
- Thermocouple concentrator for ground test
- Various chassis form factors

## Results

- Rugged Data Acquisition System
- Synchronization across large channel volume
- Successful data collection for Engine Test Programs

## Challenge

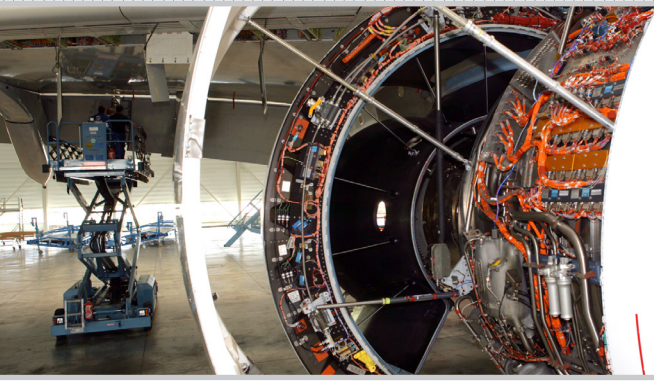
Engine testing, both on the ground and in the air, is a very demanding environment for test instrumentation. Equipment must withstand extremes of temperature and vibration in order for a test to be successful and for the data to be reliable.

In ground tests particularly, the wiring and sheer volume of channels can make it difficult to integrate a test system that is located both on and off the test article. Thermocouples in particular present the largest number of measurement channels. This represents a challenge for wiring both to external Data Acquisition Systems (DAS) and for the thermocouple sensor itself. Synchronization across these various test systems is also not a trivial task.

It is difficult to have a Commercial Off-The-Shelf (COTS) DAS that fulfills both the robustness and channel density criteria - the Curtiss-Wright Acra KAM-500 fulfills both of these criteria using COTS equipment.



Rugged chassis for engine mounting applications



A 180 channel thermocouple concentrator unit with cold junction compensation

## Solution

In order to provide a DAS that can operate in a high temperature environment, Curtiss-Wright provides extended temperature versions of a selection of modules from the KAM-500 product line which operate at an extended temperature range of -55 to +105°C. This includes modules for strain sensors, RTD and thermocouples. This, together with our environmentally qualified chassis (with vibration levels up to 100g tested) provides a vibration and temperature resistant data acquisition system. A wide range of chassis types offer a form factor for every application - the 4L chassis was designed to fit between the fan case and the engine cover, for instance.

Curtiss-Wright has also developed a thermocouple concentrator box which has 180 cold junction compensated inputs. Each row is divided into three groups, with each group sharing a PT100 cold junction compensation sensor through a thick copper bar. Groups are insulated from each other and can be replaced if connectors become damaged or worn. Every parameter is time-tagged at acquisition which means data correlation with other systems can be done with confidence. The concentrator can be synchronized to an external IEEE 1588 PTP V1 or V2 grandmaster, providing microsecond accuracy for every acquired parameter.

The KAM-500 is also available in a number of form factors to facilitate installation of a DAS in small spaces from the engine cowl to the pylon. These chassis can accept any of the KAM-500 modules currently available, so that acquisition capabilities in a small space is not compromised.

## Results

The KAM-500 provides a rugged data acquisition system for all aspects of engine testing from on-stand acquisition to engine flight testing. Furthermore, it offers high accuracy, high density data acquisition with extended temperature operation - even in the most challenging environments. With various chassis sizes, finding the right housing for your acquisition system is easy with all chassis qualified to the same environmental levels.

The KAM-500 can also be integrated into large concentrator units which provide a highly accurate, very maintainable method of high-channel measurement. Each channel is sampled at the same time in the acquisition cycle and synchronization of each system is achieved using external grandmasters. The KAM-500 continues to provide data acquisition to ensure the successful completion of engine testing programs.