

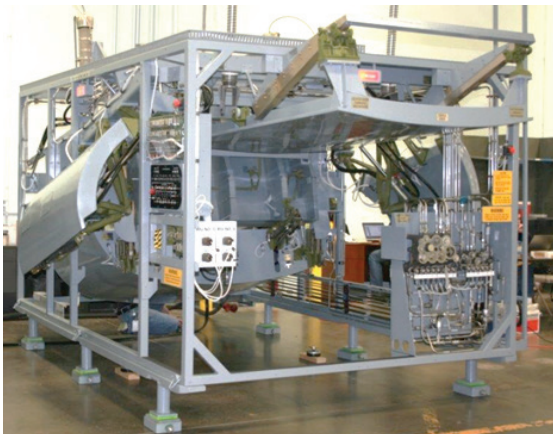
# Eliminating Obsolescence for the C-5 Galaxy Cargo Door & Ramp System Trainer



**Refurbishing trainers for use through 2040.** The U.S. Air Force is now completing a \$22+ million upgrade to its fleet of C-5 Galaxy heavy lift aircraft. This will keep the fleet in service for the next 40 years. One of the aircraft's 22 critical systems, the Fore and Aft Cargo Door and Ramp systems are supported by three trainers—one each at Travis AFB, California, Dover AFB, Delaware and Lackland AFB, Texas.



**Trainer Forward Loading Panel** (Panel 1) includes the Left Hand Forward Loadmaster Control Panel, Flight Station Control Panels, Associated Circuit Breaker Panels and the Air Delivery System.



**Trainer Aft Loading Panel** (Panel 2) includes the Left hand Loadmaster Control Panel, Aft Control Panel and side door. Panel 3 (bottom right corner) provides the necessary hydraulic power to Panels 1 and 2.



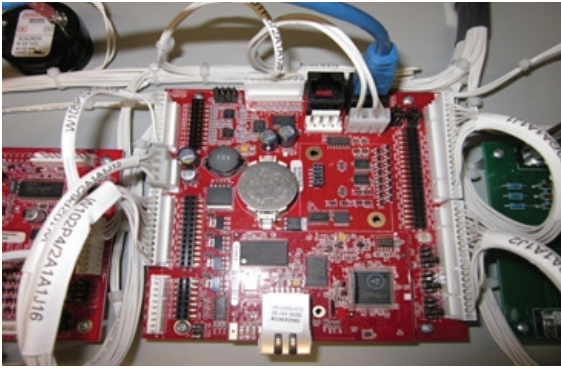
## The Situation

The three Lackland trainer panels (Forward Loading, Aft Loading and Hydraulic) had spent several years in storage and had almost none of the upgrades which occurred on either the aircraft itself or the other two devices at Dover and Travis. It badly leaked hydraulic fluid from its lines and actuators. Its wiring was severely degraded. Its Control Panels, Instructor Panels and Student Station needed refurbishing, as did its frame, fiberglass doors and ramps.

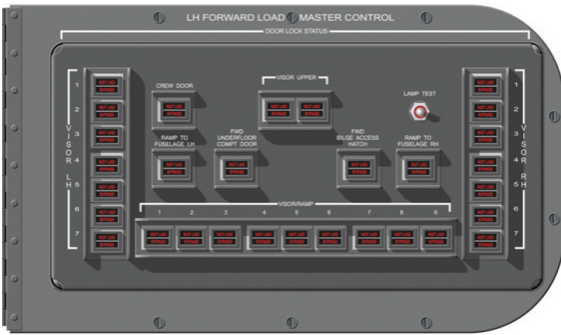
## The Challenge

Nakuuruq will conduct a complete removal and refurbishment of the Lackland trainer's major assemblies, systems and sub-systems at its Tulsa Oklahoma facility. Prior to shipping to Tulsa, Nakuuruq would execute a baseline test and thorough inspection to identify all discrepancies, hydraulic leaks and faulty components.

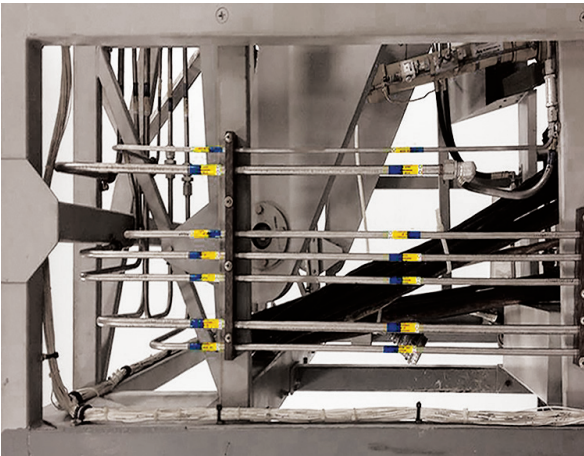
Because of previous upgrades, discrepancies from the current aircraft configurations were not expected to be found in the Dover and Travis trainers. However, baseline tests and thorough inspections of these trainers will be conducted and refurbishments will be made in Tulsa as warranted.



**A single board computer** was added to control the sequence of the 24 new annunciators so that they are congruent with the aircraft.



**24 additional annunciator lights** are added to the Lackland trainer's LH Forward Loadmaster Control Panel. Other control panels upgraded with correct circuit breakers, switches, T-Handles, dimmer knobs and graphics.



**All trainer hydraulic lines and electric wiring** are refurbished and marked with laser wire identifiers to facilitate troubleshooting.

## The Solution

As prime contractor, Nakuuruq managed all program activities, including systems engineering, test engineering, materials, services, equipment, facilities, reviews, audits and tests. At the project's completion, all three trainers would have current and identical configurations.

### Upgrades and refurbishments to the Lackland trainer to ensure concurrency:

- 24 additional annunciator lights.
- A single board computer to control added annunciator lights.
- 6 added malfunctions to Instructor panel for a total of 16.
- Added Remote Interface Unit (RIU) and new pressure door on Panel 2.

### Upgrades and refurbishments to all three trainers:

- Refurbished hydraulic lines and pump, electric wiring and fiberglass of doors and ramps.
- Replaced bad or leaking actuators.
- All new circuit breakers, buttons and panel graphics on Student Station.
- Media blast and painting of frames and all components.
- New non-movable stand for trainers to sit on while in use.
- All electrical and wire diagrams upgraded to current configuration.

## Significant Savings to the Government

Upon completion of the project, the Air Force was able to realize a dollar savings significantly greater than had it utilized a major simulator manufacturer for identical work. Nakuuruq's team efforts and workmanship that went into completing this project on such a narrow schedule caused the customer to noticeably observe that the quality of Nakuuruq's product surpassed anything they had received elsewhere.