# Fact Sheet
# Civil Air Patrol ARCHER System
## Technical Specifications

**ARCHER: Airborne Real-time Cueing Hyperspectral Enhanced Reconnaissance**

### HARDWARE

ARCHER contains an advanced hyperspectral imaging (HSI) system and a panchromatic high-resolution imaging (HRI) camera. At a standard mission altitude of 2500 feet AGL and 100 knot groundspeed, the HIS system resolution is one square meter per pixel.

The HRI camera resolution is about 8 cm x 8 cm (3 in x 3 in) per pixel. ARCHER also contains a global positioning system (GPS) and inertial navigation system (INS).

Together, these components provide aircraft location, altitude, pitch, yaw, and roll so that each image pixel can be accurately positioned (geo-registered) on a virtual map, in real time, during a mission.


**ARCHER system installed with custom-designed rack and protective hood in the Gippsland GA-8 Airvan**

### ALGORITHMS

ARCHER executes three separate algorithms for target acquisition and identification.

- **Spectral signature matching:** ARCHER compares reflected electromagnetic radiation (EMR) against a library of spectral signatures to identify specifically-targeted objects.

- **Anomaly detection:** ARCHER compares reflected EMR against a continuously calculated background spectrum. Spectral anomalies are flagged as potential targets for further evaluation.

- **Change detection:** Using reflected EMR, ARCHER executes a pixel-by-pixel comparison of current ground conditions against ground conditions that were obtained in a previous mission over the same area. Scene changes are identified: new targets, departed targets, and moved targets are highlighted for evaluation.

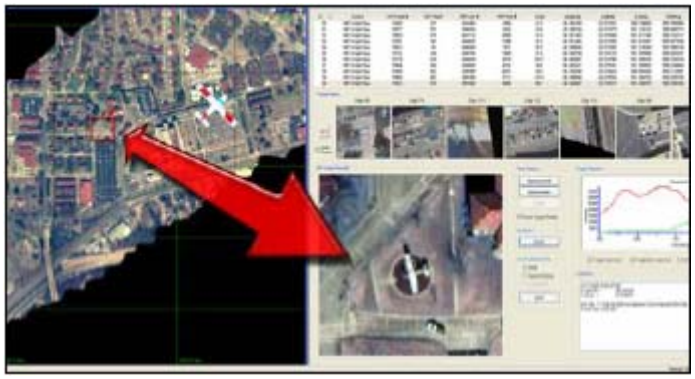

**HSI operators collect the spectral signature of an aircraft on static display outside the CAP National Headquarters building at Maxwell AFB, Ala. The signature is then entered into the ARCHER airborne system and used in a test to determine if the HIS equipment will pinpoint the static display plane from the air.**

**(over)**

## PROCESS

As the mission is flown, the geo-registered digital image is plotted on the airborne station monitor in real time. Identified targets are highlighted with yellow or red circumscribed squares.

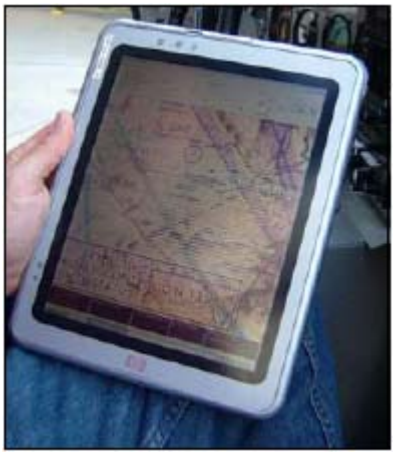
Simultaneously, a high-resolution image chip of the newly identified target is displayed in a separate window. The target location is recorded in latitude, longitude, and elevation.



**This is the ARCHER chip viewer window, with the image of the static display plane selected. The airborne operator can transmit the image to the ground from the aircraft via SDIS.**

## TRANSMISSION VIA SDIS

At any time during the flight, target image chips with their location information can be transmitted to ground observers using the satellite-transmitted digital imaging system (SDIS) modem.



**The TRAC display shows the path flown by the aircraft and the exact ground area covered by the sensor as the flight progresses.**

## TRAC DISPLAY

To help the pilot and copilot follow a precise search grid, ARCHER incorporates the ARCHER TRAC situation display.

This display receives data from the ARCHER flight system. It shows the path flown by the aircraft, and the exact ground area covered by the sensor as the flight progresses. The flight and coverage information are superimposed over an image of the current sectional map, so the crew can see both the details and the larger context of the current flight.

## POST-FLIGHT ANALYSIS

Data collected during the flight is stored on removable hard drives.

After landing, the hard drives are installed in the ARCHER ground station for further post-mission analysis of the data collected.

**The information collected by the airborne ARCHER system can be analyzed further at the ARCHER ground station.**

**For more information on the Civil Air Patrol ARCHER system, contact:**

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