

The Official Journal of the Airborne Law Enforcement Association

AIR BEAT

September/October 2014



Hi-Tech Tools:

Technology Continues to Change the Way We Fly

Valuable Video: HOW TO MAKE EVERY PIXEL COUNT

By Dr. Kevin Moore, General Dynamics Mediaware, Chief Technology Officer



The imagery collected by law enforcement agencies provides a huge tactical advantage during a mission. However, extracting actionable intelligence from airborne surveillance video is challenging and time consuming.

How agencies use the imagery collected by airborne platforms depends on their mission. Data collected from cameras for crowd control or hostage situations must be reviewed quickly to support real-time decision making in the field, while data collected to support activities such as covert tactical or drug surveillance operations can usually be analyzed in more depth and over longer periods of time.

While many airborne law enforcement agencies have made significant investments in their aerial platforms and high-definition gimbal sensors, without proven video analysis and data management tools, critical pieces of information can be overlooked and buried in the archives. The challenge for many agencies of accessing this mission-critical data in near real-time will endure as long as the practice of recording and storing imagery on a DVD in a filing cabinet remains.

Investing in the right tools to search,

"For law enforcement agencies looking to validate expenditures and the complexity of running a modern airborne surveillance wing, next-generation video exploitation and archive solutions that stream full-motion video alongside geo-location information, in near real-time, can greatly assist in fast-tracking a return on that investment."

process, analyze and archive full-motion video imagery can truly transform the way airborne surveillance units operate. Next-generation video exploitation systems, known as processing, exploitation and dissemination (PED) software, can accurately index the video by location, enabling platform operators to instantly retrieve video imagery from a specific location and/or date and time range. Questions, such as "was this trail here last time we flew over" or "is that car parked in the

same spot as last week," can be answered in seconds with just a few mouse clicks.

Discovering the Value in Metadata

The key to unlocking the value contained in large volumes of video is metadata. Metadata, or data about data, contains information like geo-coordinates where the sensor is directed, time and date of the image captured and distance to objects. Metadata provides key contextual information that significantly increases the value and overall intelligence of the imagery. By embedding metadata with the video, PED software operators can easily process the video and conduct specific searches to extract more value.

Importantly, metadata from HD gimbal sensors is usually encoded in a binary key-length-value (KLV) format, which means it doesn't chew up significant bandwidth or storage. KLV metadata is also supported by many airborne video sensor manufacturers.

Leveraging the power of metadata, the intuitive search filters within PED software can quickly and efficiently advance users from a global to granular view of the thousands of video hours stored in a video library. Operators can select a portion of

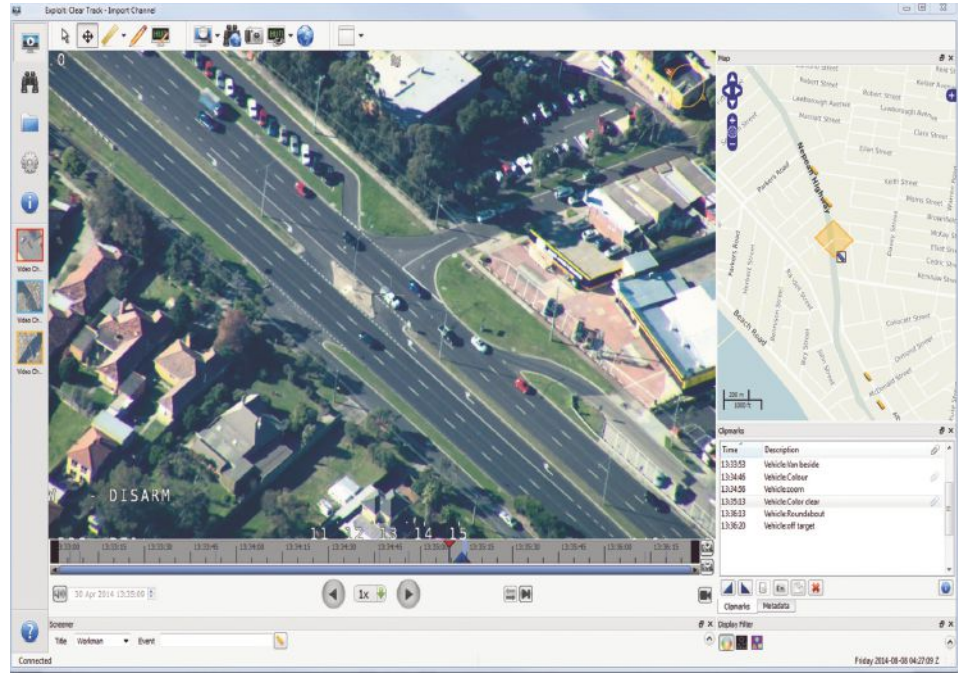
archived video (rather than an entire mission) for playback based on any of the following criteria:

- Geographical bounds and location.
- Date and time.
- Keywords and annotations created from previous missions.

All results that lie within the chosen search criteria are quickly retrieved, helping the operator review what was there last time and assess whether anything has changed. Multiple results from a particular location and time can aid with the detection of changes in patterns, unlocking the hidden value in footage already collected.

Modern Software for Modern Law Enforcement

Originally developed for military applications to allow expeditionary forces to capture and exploit multiple live video feeds from unmanned aircraft systems, PED software is currently in use around the world by the U.S. Special Forces, Australian Defense Force and forces in South America and Malaysia. The software is currently being integrated into the civilian and law enforcement markets, with the Victoria Police in Australia one of



the first law enforcement customers to take advantage of the latest generation of PED solutions.

The Victoria Police has reported its new PED software reduces the time it takes to process the hours of video the department gathers on a daily basis. Additionally, the New South Wales Rural Fire Service in

Australia recently conducted a trial where PED software was used with a UAS to monitor and report on the movement of a fire front at night.

Video exploitation software packages deliver significant productivity and intelligence benefits by enabling operators to distill hours of surveillance operations



It's more than a window
it's a point of view.

For 45 years, Tech-Tool Plastics has focused all its efforts on manufacturing replacement windows that fit better, last longer and far exceed OEM standards. It's a philosophy that's reflected in everything we do and every window we make. Contact Tech-Tool Plastics today and see for yourself.

1.800.433.2210 | www.tech-tool.com



Value of Metadata to Law Enforcement Operators

A police helicopter typically burns about \$200 an hour in jet fuel. If you factor in the cost of a gyro-stabilized camera, the helicopter and all the maintenance it requires, aircrew salaries, hangar space and everything else it takes to run an air support unit, it's clear we spend a lot of money to get airborne. But at the end of the shift, what do we have to show for it?

While many airborne law enforcement units have a vast archive of video footage from surveillance missions, the files typically lack important information that would support further exploitation or post-mission analysis. This information, known as metadata (i.e. data about data), includes such things as where the aircraft was located, what the camera was looking at, which camera (IR or daylight) was in use, and when the video was recorded. What's more, metadata is already contained within the video signal of many new gimbals.

Modern mapping and mission management systems can capture this data from a camera's HD-SDI signals and save it, along with the video. If video is the content, then metadata is the context, and the context of the video is what allows us to answer questions about it.

Fortunately, law enforcement agencies do not need to purchase a new camera system to take advantage of metadata; it can be generated from any camera, including long-time favorites of the airborne law enforcement community. Because high-level mission management systems provide a global high-resolution database of the earth's terrain, they can generate highly accurate metadata, along with additional data such as search terms and marker information that may prove invaluable later on.

-Tom Churchill, CEO, Churchill Navigation

Metadata refers to non-visual information that is embedded in a video signal. It's encoded by the camera for later decoding by video processing equipment. In a SMPTE292M uncompressed HD digital video stream, metadata can be embedded on a frame-by-frame basis. The dataset can be defined by the application, but typically it would include information such as time, aircraft geo-location, altitude and heading, target geo-location range and sensor information, such as spectral band and field-of-view. In addition, operator specified information from an external source, such as a mission ID, may also be embedded. The metadata can be viewed when playing the video on equipment that is designed to decode and display it. Because the data is encoded as data fields, as opposed to a video overlay, it can be used for automated video searching when looking for a specific time or location of interest. Commercial consoles are available on the open market to support the handling of metadata

This capability is invaluable in airborne law enforcement and persistent surveillance applications where the imagery may be used as evidence in legal proceedings and an accurate record of information such as time and location is required. This removes much of the burden of recording such information from the operators. This results in more accurate data recording and allows the operators to focus on the task at hand. It also helps with the organization and cataloging of large amounts of recorded imagery after the fact.


-Paul Jennison, Vice President of Government Sales, L-3 WESCAM

into simple, clear reports, mark key events for later review and extract clips for evidentiary or training purposes. Event locations can be geo-registered and visualized on a map to provide enhanced situational awareness or enable users to interpret and convert the raw data into actionable intelligence.

Regardless of whether a unit is in the planning or operational phase, investing in next generation PED software can:

- 1 Significantly reduce amount of time spent looking at video.
- 2 Increase understanding of the immediate situation.
- 3 Enhance situational awareness by providing on-demand access to critical video imagery.
- 4 Help enhance imagery taken in bad weather by applying a suite of video filters.
- 5 Be used to quickly identify locations of interest using geo-coordinates.
- 6 Enable informed decision making with advanced data analytics that easily extracts information from video imagery.
- 7 Strengthen collaboration by providing all networked users with access to mission-sensitive information.
- 8 Support superior forensic analysis as a result of viewing the video with maps providing context.

PED software can be carried or installed on a platform in a laptop configuration or used via a networked server post-mission to ingest footage captured by on-board recorder systems. This allows immediate retrieval of footage compared to video stored on a DVD, which takes vital and mission-critical knowledge offline.

The ability to access intelligent imagery can significantly speed the tempo of your operations. For law enforcement agencies looking to validate expenditures and the complexity of running a modern airborne surveillance wing, next-generation video exploitation and archive solutions that stream full-motion video alongside geo-location information in near real-time can greatly assist in fast-tracking a return on that investment. Modern airborne law enforcement platforms are creating valuable footage with HD-stabilized cameras, and by leveraging real-time PED solutions, agencies will be able to truly harness the power of, and intelligence derived from, aerial surveillance. 



Paravion[®] Technology Inc.

STC Approved Fixed Wing & Rotorcraft Accessories

- Operators Stations
- Monitor Mounts
- Engine Relight
- Blade Folding
- Mapping
- Heliporters[®]
- Camera Mounts
- Searchlight Mounts
- Primary Flight Controls
- Door Opener Kits
- Seat Belt Kits
- Heater Systems
- Air Conditioning
- Synthetic Long Lines
- Tooling
- Instrument Panels
- Blade Tie Downs
- M/R Tab Tool Kits

STC/PMA Services, Custom Projects, and Much More

ONE-STOP SERVICE, INSTALLATIONS, COMPLETIONS, ACCESSORIES, AND SUPPORT

www.paravion.com

Phone: (970) 224-3898
Fax: (970) 224-3899