

Application of Airborne Video Imagery to the Transmission Line Route Selection and Approval Process: The Ontario Hydro and Alberta Power Experience

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Airborne videos have proved to be a useful planning tool at both Ontario Hydro and Alberta Power. Various types of video systems have been used in a variety of route location projects for the inventory and update of existing data and for illustrating sensitive areas to public groups and approval bodies. The nature of video imaging lends itself to numerous applications with advantages of flexibility, versatility, and economy. Based on the observations from past studies, it is evident that this tool will continue to contribute to transmission line route selection projects.

The use of airborne video imagery in transmission line route selection and approval projects is a relatively new process in Canada. This simple technology has proved cost-effective as an interpretive and illustrative tool. Ontario Hydro and Al-

berta Power are two utilities that have recently applied this technology to specific projects with encouraging results.

Ontario Hydro was one of the first utilities in Canada to use airborne video imagery for transmission line route selection. In 1983, the Land Use and Environmental Planning Department of Ontario Hydro produced an aerial video to assist in identifying alternative routes for a major line location between Kingston and Ottawa in eastern Ontario. These data proved useful for the update and assessment of environmental and land use data within broad

corridors. As well, they were used for illustrating specific concerns to approval bodies during assessment hearings. Based on the success of this project, numerous videos have been produced for subsequent studies.

Alberta Power first used video imagery in 1985 to supplement corridor data for a 240-kV transmission line route location study in the northeastern part of the province. The Transmission Applications Department used these data to compare alternative routes within a defined corridor and to review specific situations along each route segment. Alberta Power has since produced an airborne video for a landowner hearing to illustrate a controversial situation along a proposed route for a 240-kV transmission line east of Edmonton.

Utilities such as Ontario Hydro and Alberta Power have found aerial video data to be an increasingly useful tool in an ever changing environment. As rapid development and land use change take place, it becomes even more critical to update existing base data when assessing transmission line routes. Airborne videos fill this need for supplemental data by providing a current continuous record of the environment being assessed. Conventional means for acquiring environmental data such as published reports and maps, aerial photography, and field investigation cannot be replaced by aerial video—the key, however, to this technology is its roll in supplementing these sources and providing an excellent illustrative tool.

Experience is gained with every application of aerial video data. As each new project is undertaken, improvements are made in image quality and processing, because of the use of the latest in camera and recording equipment. As well, flight patterns, angle of view, and installation criteria are constantly being revised to improve the quality and applicability.

As projects progress through the various stages of planning, the type of application of the video data can also change. It has been found now that the applications can run the full length of the project—not only from the route location aspect but also for the purposes of alignment specifics, approval hearing evidence, public meetings, property acquisition, briefing survey crews, and for monitoring changes to the environment after construction. The following sections will deal with the technical factors of the systems used at Ontario Hydro and Alberta Power and illustrate several of their more recent applications.

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Features

There are certain features of airborne videos that provide advantages over other more conventional data sources. These include the adaptability, flexibility, and portability of the recording systems, as well as the acceptability of the medium and the enhanced ability to provide current information.

Adaptability

Video cameras, in general, can be used in a wide range of exterior lighting conditions, ranging from overcast to bright sun. The nature of the sensor and automatic iris controls make the cameras very adaptable for filming through changing weather and daylight situations.

The size and portability of most camera systems (including the new CCD cameras) make them relatively easy to adapt to most aircraft installations.

Flexibility

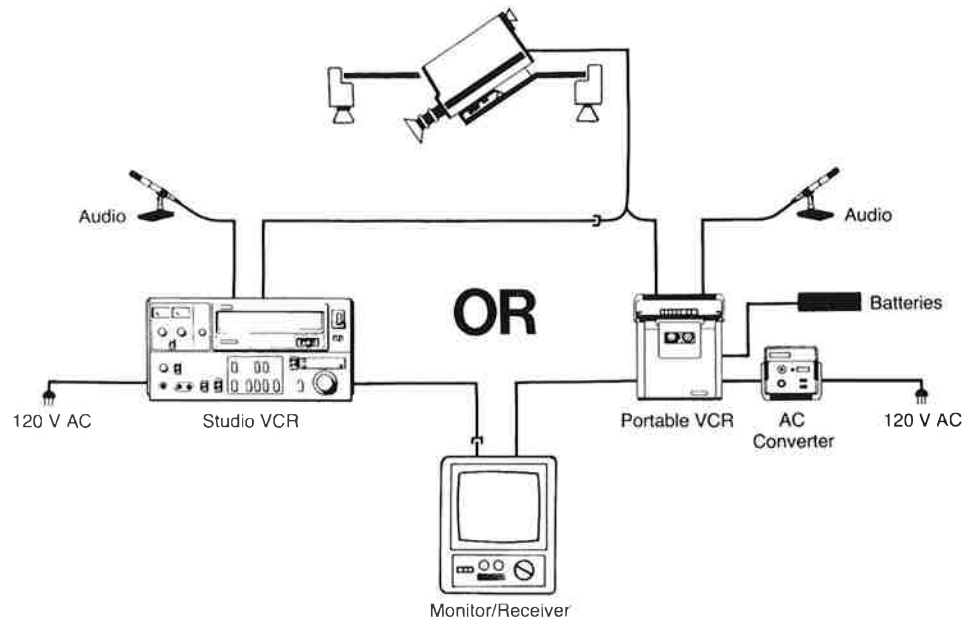
Because video data are recorded in real time (live), it is possible to immediately assess image quality. Errors in aircraft or camera position can be observed on the on-board monitor and rectified as soon as the aircraft can be realigned on the flight line. Annotation in the audio portion of the recording can also be made and reviewed as the images are being recorded. This greatly enhances the applications for field data observation. Hard copy records of the video data can later be acquired if necessary.

The fact that the data are recorded live means that the product is available immediately for analysis. Except for postproduction editing and copy reproduction, there is essentially no processing delay as is experienced with photographic products. This factor alone emphasizes one of the most significant advantages associated with the use of video data. That is, aerial videos can provide the most current source of information for project planning. This can be of great assistance to planners where published data and aerial photography are not up to date—as is often the case because of extended project schedules.

Portability

The compact and lightweight design of video cameras and recorders result in highly portable systems. Videos of short

THE AERIAL VIDEO SYSTEM



duration can easily be recorded by holding the camera with a variety of viewing angles from the aircraft. The entire recording system and special portable color monitors can be transported and used for viewing and analysis in almost any location and environment, from the office to field sites.

Familiarity

The general public's familiarity with television makes video imagery an effective demonstration tool. Videos can be shown in meetings and hearings to demonstrate proposed route locations. Under certain conditions this type of medium tends to be more readily understood than drawings or photographs, as it provides a good overall perspective of the situation.

These are just a few of the main advantages that have been achieved through the use of airborne video data. However, as in any technology, there are disadvantages that go along with the advantages. Some of the characteristics that place limitations on video data relate to lower image quality, as compared to more conventional forms of aerial photography. These include the effects of forward image motion, camera and recorder resolution, and exposure time. Given the state of technology of most portable video systems, it is impossible for these devices to approach the quality of aerial photography. In addition, oblique scenes as viewed on a TV monitor, are geometrically distorted and unprocessed video data (non-digital) cannot be reliably used for planimetric applications. The point to remem-

ber, however, is that this technology has not been used in place of conventional tools but as a valuable supplemental source of data.

Methods

The characteristics of the video system hardware play a significant role in determining the image quality. Decisions affecting the selection of equipment must be based on the knowledge of the capabilities of the various tape formats, cameras, and recording systems. The following describes the systems used for route selection applications at Ontario Hydro and Alberta Power.

Tape Format and Video Recorders

The term "format" in video usually refers to the size (width) of the recording tape. Generally, the larger the format, the better the quality of the recorded image. The most common and readily available portable systems use small format tapes, which include 1/4-inch (8-mm), 1/2-inch, and 3/4-inch systems. Ontario Hydro and Alberta Power normally use the 3/4-inch format for route selection applications, because it provides the best quality and is the most suitable for the editing and reproduction of subsequent tapes.

All U-Matic (3/4-inch) video cassette recorders (VCR) have a standard threading mechanism, so a wide range of makes and models can be used for portable and studio