PRODUCT OVERVIEW

FOR THE

**Corona 350 II**

FLIR SYSTEMS POLYTECH AB

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# Introduction

## Overview

The FLIR Systems Polytech AB's Corona 350 II is dedicated to the airborne survey and inspection of transmission towers, lines and asset infrastructure.

## Purpose

This document provides only the high-level descriptions required to clearly identify the core functional capabilities of the Corona 350 II.

# Airborne Data Acquisition and Management Software (ADAMS)

The mission system software is used for mission planning, inspection flight definition, and operator control, and the aerial recording for fault/ maintenance management of transmission assets.

Imagery captured by ADAMS includes motion video and high-resolution still images captured in the visible, thermal, and ultraviolet spectrums. Operators are provided with the tools necessary to view this imagery to rapidly identify faults and defects in transmission assets, record critical mission data and imagery data, and save imagery in the MMC hard disk drive for post-mission review and report generation.

In addition to imagery captured from the camera system, operator annotation, asset database entries, and geo-positional metadata associated will also be recorded. All mission data captured by ADAMS may be used for the post-mission generation of defect reports that result in targeted maintenance action—increasing productivity, and reducing instances of unscheduled outage.

ADAMS Features include:

- Import customer asset databases and in-built database management tools
- User-configurable Moving Map Display (MMD)
- Display of geo-spatial asset data on the digital MMD
- Sensor management and data recording capabilities
- Continuous recording of aircraft and camera boresight positions
- Post-mission analysis & review of captured mission data
- Export still images, video, and metadata for post-mission reporting/ archive
- PDF report generation (using FLIR Reporter Pro, or representative software applications).

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ADAMS applications include:

- Asset survey for unknown faults
- Inventory inspections of existing assets
- Right-of-way inspections
- Fire, flood, or storm damage assessment

## System Overview

The FLIR Systems Polytech Corona 350 II camera system provides outstanding stability and intuitive controls during airborne inspection operations.

To achieve simplicity, ADAMS consists of only two hardware components:

1. **Corona 350 II Camera System** - Gyro-stabilized turret housing state-of-the-art IR, UV, HD TV, and Frame-grabbing sensors developed for transmission line inspection.

2. **Mission Management Computer (MMC)** - ADAMS loaded on a Getac X500 Ruggedized Laptop.
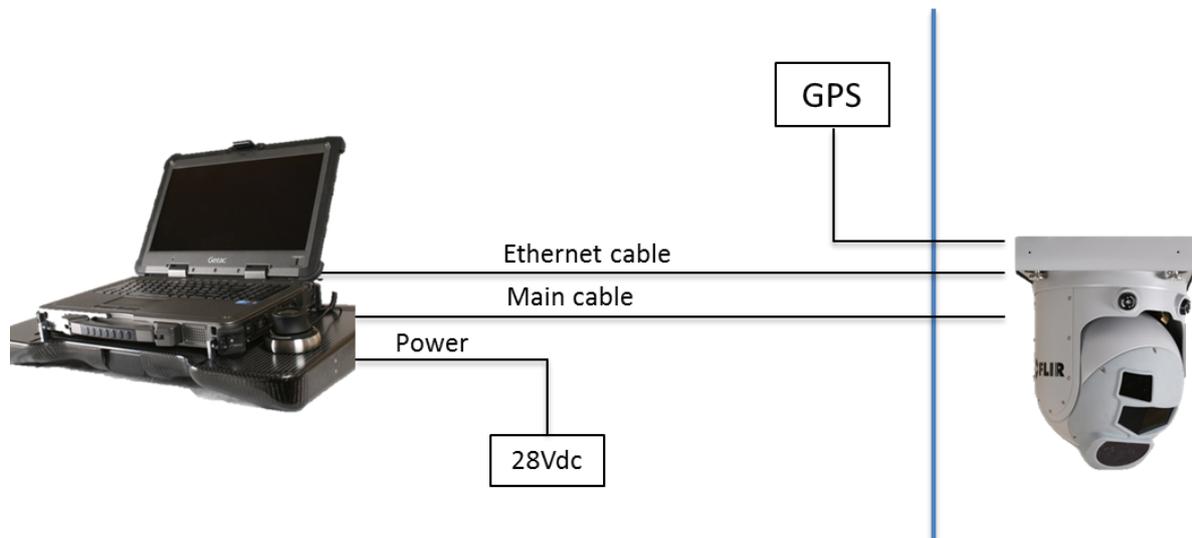


*Figure 1 - ADAMS System Illustrated Block Diagram*

## Corona 350 II Gyro-stabilized Gimbal

The Corona 350 II gimbal compensates for aircraft movement and vibration, and is capable of capturing high resolution imagery required for accurate fault detection at safe detection ranges.



*Figure 2 - Corona 350 Gyro-stabilized Gimbal*

## Gimbal Specifications

| Requirement | Specifications |
|---|---|
| Turret size | 13.8" dia. x 18.8" h (35 dia. x 47.8 h cm) |
| Number of stabilized axis | 4 axis, 2 inner and 2 outer |
| Weight | 29 kg |
| Environmental | RTCA-DO-160E |
| AZ coverage | 360 degrees continuous |
| EL coverage | +20° to -120° |
| Slew rate | Up to 60°/s |
| Acceleration | $> 300°/s^2$ |
| Temperature (functional) | -20°C to +40°C |
| Altitude (functional) | 25 000 feet |
| Aircraft speed (VNE) | 160 knots |

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## Cameras

For airborne inspection applications, the Corona 350 II contains the following cameras, critical for effective transmission line survey and inspection:

- **FLIR radiometric infrared camera (IR)** - the high resolution detector produces accurate temperature measurement information for the detection of faults that are current dependent. The 7° optic allows close up inspections from a safe distance.

- **Corona detection Camera (UV)** - Developed specifically for the electrical inspection industry, the UV Camera that visualizes Corona discharge. The UV camera consists of 2 imaging channels, a UV sensitive channel to image the corona and a visible channel to image the surrounding scene.

- **High Definition Color Video Camera (HD TV)** - The continuous zoom color camera provides exceptional color images in full high definition detail.

- **High Definition Still Photo Camera (Photo)** - The digital still frame camera is equipped with a 36.3 megapixel detector that captures high resolution photos used for insertion into maintenance reports for visual clarification of faults.



*Figure 3 - Corona 350 II Sensor Layout*

All sensors are securely housed in FLIR's gyro-stabilized Corona 350 gimbal, for rapid cueing during repetitive inspection operations, and protection of sensors from the damaging environmental effects of moisture, dust, and foreign debris.

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## Camera Specifications

### HD Color TV Camera

| Requirements | Specifications |
|---|---|
| Sensor type | 1 / 2.8" Exmor CMOS |
| Number of Pixels | Approx. 3.27 Mega pixels |
| Signal to Noise Ratio | >50 dB |
| Zoom | 20X continuous optical zoom |
| Horizontal Field of view | 55.4° to 2.9° (1080p) or 37.6° to 1.95° (720p)[1] |
| Digital zoom | 12X |
| Aperture | F1.6 to F3.5 |
| Focus | Motorized - Auto and manual |
| Gain – Brightness | automatic or manual through electronic shutter speed |
| Minimum Illumination | 1.7 lux (typical) at 50 IRE |

**Note 1: Camera is set to factory default of 720p.**

### Infrared Camera

| ITEM | Specifications |
|---|---|
| Detector size | 640x480 pixels |
| Detector technology | Focal plane array, uncooled microbolometer |
| Spectral wavelength | 7.5-14µm |
| Temperature ranges | −40°C to 2000°C (−40°F to 3632°F) |
| Accuracy | ±2°C or ±2% of reading |
| Sensitivity | <50mK @ 30°C |
| Fields of view | 7° × 5.3° |
| Spatial Resolution | 0.19 mrad |
| F-number | 1.3 |
| Focus | Manual and Automatic |

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**UV Detection Camera**

| ITEM | Specifications |
|------|----------------|
| **UV Channel** | |
| Effective Pixels | 640 x 480 |
| UV sensitivity | $3 \times 10^{-18}$ watt/cm$^2$ |
| Solar blind Spectrum | 240 – 280 nm |
| Field of view | 16° x 12°  /8° x 6° / 4° x 3° |
| Focus | Slaved to visible channel and manual |
| **Visible Channel** | |
| UV/Visible overlay accuracy | Better than 1 milliradian |
| Minimum Sensitivity | 0.25 lux (typical) |
| Field of view | Synchronized with UV channel |
| Focus | Automatic and manual |

**Digital Still Frame Camera**

| ITEM | Specifications |
|------|----------------|
| Camera Type | Single-lens reflex digital camera |
| Image Capture Device | 35.9 × 24 mm CMOS sensor |
| Number of effective Pixels | 36.3 Megapixels |
| Focus | automatic |
| Focus System | autofocus sensor module with TTL phase detection |
| Maximum aperture | f/2.8 |
| Focal length | 70-200mm |
| Fields-of-view (Horizontal) | 28°51' to 10°17' |

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## Mission Management Computer (MMC)

The MMC consists of the Mission System Software installed on a Getac X500 Ultra Rugged Notebook (laptop).



*Figure 4 - Getac X500 Ultra-rugged Laptop*

The introduction of a laptop enables walk-on walk-off capabilities that readily connect to the Corona 350 II mounted on the aircraft, simplifying system operation, and eliminating the need for an internal equipment rack.

This configuration ensures the ADAMS operator workstation is an all-in-one solution for the conduct of effective Airborne Inspection operations.

## MMC Configuration Options

The ADAMS MMC is a ruggedized walk-on walk-off unit that allows for the effective planning and conduct of aerial asset inspection operations, either in the air or on the ground.

The MMC may be operated in two configurations:

- **AIRBORNE WORKSTATION** - As an Airborne Sensor Management & Data Recording System for controlling the Corona 350 II EO/IR Camera System.

- **GROUND-BASED WORKSTATION** - As a Ground-based Asset Management and Report Generation System for pre-mission planning, and post-mission analysis.

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While ADAMS can only control the Corona 350 II in the airborne configuration, a number of software features are available in the ground configuration. These features enable the operator to:

- Load pre-flight map and asset data, and plan inspection runs

- Replay a mission or review captured imagery or data during post-mission analysis, and

- Generate post-activity reports.

**MMC Docking Station**

The Mission Management Computer (MMC) and an integrated hand controller (for gimbal steering) is integrated onto a docking station.



*Figure 5 – Illustration of MMC Docking Station*

The docking station contains the power supplies and on/off switches to the Corona 350 II Camera System.

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