From: Gary Andrews [mailto:gary.andrews@detect-inc.com]
Sent: Thursday, February 21, 2013 5:00 PM
To: dekker@eclectic-eng.com
Cc: Ron Merritt; Carol Fuqua
Subject: Eclectic Engineering - HARRIER VWS // information & discussion recap
Importance: High

Mr. Dekker,

Per our recent call, I have attached general information on DeTect's HARRIER Visual Warning System for automatic wind turbine obstruction lighting activation.

The HARRIER VWS provides continuous 360 degree surveillance of the airspace around a wind farm from the ground level to above aircraft flight altitudes, automatically activating obstruction lighting when aircraft are detected at a defined outer perimeter.

Advantages of the HARRIER VWS for wind farms lighting include:

- Longer range detection (out to 20 miles) provides greater safety margin
- Secondary TCAS for detection backup of transponder equipped aircraft
- Detects and tracks small aircraft such as ultralights
- Fewer sensors required for complete coverage
- Ground-based sensors with lower acquisition, installation & O&M costs
- Based on FAA tested, military-grade radar technology
- Advanced solid-state radars with Doppler technology
- Meets or exceeds all expected FAA requirements

• Multi-functional capable and upgradeable to add perimeter security & bird detection/mortality risk mitigation

• Fully compatible with existing wind farm SCADA systems for lighting control with all turbine models and lighting systems

The first HARRIER VWS in the US (also the first obstruction lighting radar system in the US) was installed at NExtEra's Perrin Ranch wind farm in Arizona in early 2012. We have orders pending for several more systems as well as will be installing a system for a power line in the northeast in March.

As I noted, the FAA will not approve or certify any system (the FAA only certifies systems that go into aircraft or are used for active air traffic control). All other systems, included VWS, fall under the Advisory Circular (AC) process which sets design and performance standards that the system must meet in the form of an Advisory Circular (AC). It is incumbent on the manufacturer and owner to ensure that the system meets the AC requirements. The FAA may conduct on-site tests of a

system however, again, will not issue a certification or approval (the FAA has indicted that it intends to do this at Perrin Ranch on DeTect's HARRIER VWS).

The FAA is currently in the process of amending the current obstruction lighting AC. The manufacturers we allowed to review the pre-draft in late 2012 and we expect the final draft to be available for public comment within the next 90 days with the final AC released mid-year or early Q3. DeTect is selling VWS systems to its customers in the interim with a guarantee that our system will meet the AC when released.

Hope this helps. Feel free to call or email us if you have any questions or need additional information.

Regards,

Gary

Gary W. Andrews General Manager **DeTect, Inc.**

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[see attached file: Paper - DeTect's Visual Warning System (VWS) for Automatic Activation of Obstruction, Lighting at Wind Farms; Voltura et al, EWEA Austria 130204.pdf] [see attached file: Technical Data Sheet -HARRIER Visual Warning System - Wind Energy 1110.pdf] OCAS Press release:

FAA Announces OCAS as the First Audio Visual Warning System Installed, Tested and Approved for Use in the National Airspace

via PRNewswire Created: July 27, 2009

LinkedIn Comments Print

VIENNA, Va., July 27 /PRNewswire/ -- The Federal Aviation Administration (FAA) recently published a memo announcing the approved use of Audio Visual Warning Systems (AVWS) in the National Airspace System (NAS) and the administration's intentions to update Advisory Circular 70/7460-1K, Obstruction Marking and Lighting, the recommended marking standards for obstacles that penetrate the NAS.

An AVWS is described by the FAA as 'a system that activates obstruction lighting and audio signals to alert the pilot of potential collisions with obstacles.' The FAA memo goes on to state 'OCAS(R) is the first AVWS to be installed, tested, and approved in the National Airspace System (NAS).'

An AVWS is designed to significantly reduce the potential for a wire strike or obstacle collision for low flying aircraft. There are over 5000 such incidents/accidents in the National Transportation Safety Board database.

About the OCAS System

The Obstacle Collision Avoidance System (OCAS) uses a small radar to detect and track an aircraft's proximity to an obstacle. Two warning zones are defined. The first warning is the activation of medium intensity strobe lights to allow the pilots to visually identify the obstacle. If the pilot does not take avoidance action and the aircraft enters the second warning zone, a VHF broadcast is transmitted to the pilot's radio. The message includes warning tones and a description such as "POWER LINES. . .POWER LINES." The OCAS system has the ability to simultaneously broadcast on several frequencies within the VHF range of 118-136 MHz. The FAA/FCC will determine acceptable broadcast plans based on the geographical location of the system.

No additional equipment is required on the aircraft thus making the solution available to almost all aircraft. The audio warning is the most powerful aspect of the OCAS solution as it provides a warning in any type of visibility or weather conditions.

OCAS is currently operational in the US, Canada, and Europe and is dramatically improving air safety for both aviators and the owners of NAS obstructions.

About OCAS Inc

OCAS Inc, a wholly owned subsidiary of Norwegian based OCAS AS, is setting new standards for safety and environmental compliance in Obstacle Marking and Lighting. OCAS is committed to providing the highest safety standards available and puts the safety of pilots and asset owners first. *www.ocasinc.com*.

Media Contact

Melissa McCarthy, General Manager, +1.703.752.6212 *melissa.mccarthy@ocasinc.com*

SOURCE OCAS, Inc

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Web Site: <u>http://www.ocasinc.com/</u> COPYRIGHT 2009 PR Newswire Association LLC From: Greg Erdmann <u>[mailto:greg.erdmann@ocas-as.no]</u> Sent: Friday, October 21, 2011 4:48 PM To: <u>dekker@eclectic-eng.com</u> Subject: OCAS

Ed,

Attached is our spec sheet for the OCAS radar system. Please let me know if you have further questions regarding the system.

Municipalities that have mandated or recommended the use of Audio Visual Warning Systems (AVWS) include:

Coconino County, AZ Ellis County, KS Albany County, WY Recommended by the Town of Hammond, NY Several districts throughout the Bureau of Land Management And the Public Utility Commission of the State of Vermont as a condition for the Lowell Community Wind Project that has just begun construction.

I hope this helps. Greg

Gregory S. Erdmann Sales and Marketing Director, North America



OCAS, Inc. 1934 Old Gallows Rd. Vienna, VA 22182 USA Office: (703) 752-6212 Direct: (802) 878-8356 Mobile: (802) 922-6482 greg.erdmann@ocasinc.com www.ocasinc.com

The Obstacle Collision Avoidance System (OCAS) reduces the visual impact of wind farms by keeping constantly flashing turbine lights off. Community acceptance of wind power is greatly increased by reducing the visual impact of wind turbines.





VWS 200d Model number:

- Application: High resolution, airspace surveillance with automatic activation of windfarm obstruction lighting when aircraft are detected approaching to within defined perimeters
- **Configuration:** Fully self-contained fixed or mobile system designs for terrestrial & offshore wind farms

200 watt solid state S- or X-band radar Sensors: sensors with Frequency Diversity & Doppler processing; secondary TCAS (Traffic Collision Avoidance System) receiver for cooperative aircraft

- **Operation:** Extended range detection of cooperative (transponder equipped) & noncooperative aircraft & ultralights with automatic activation of obstruction warning lights at user-defined perimeters (10 mile minimum recommended)
- Range: Full 360 degree 3D coverage with detection to 28 miles
- 110/220 vAC, 60/30 amps service with Power: UPS back-up & power conditioning (30 minutes) & optional auto-start single or dual 6 kW diesel generator & fuel tank to support 10-20 days 24-7 operation
- Network: TCPIP supports multi-user web remote real-time system display, control & data access via fiber optic, wireless or cellular



Obstruction Lighting Activation

for Windfarm Automatic

TOP: The HARRIER VWS is typically supplied as a fixed, self-contained skid mounted system for ground or tower-based installation.

BOTTOM: For windfarm airspace monitoring & obstruction lighting activation, 1-3 HARRIER unit sensors are typically installed around the perimeter of the windfarm to ensure full 360 degree detection of approaching aircraft.



Advantages of the HARRIER VWS for windfarms:

- · Longer range detection provides greater safety margin · Secondary TCAS for detection backup
- · Fewer sensors required for complete coverage
- · Ground-based sensors with lower installation & O&M costs
- · Based on FAA tested, military-grade technology
- · Advanced solid-state Doppler technology
- · Meets or exceeds all FAA requirements
- Multi-functional capable for VWS, site security & bird
- detection fully compatible with existing SCADA systems

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DeTect's radar processing technology developed specifically for detection and tracking of small, low radarcross section, non-linearly moving targets make it one of the most sensitive, affordable security radar technologies on the market today for locating and monitoring a wide range of targets including aircraft, UAVs, ultralights, ships, boats, vehicles and pedestrians. The HARRIER security and surveillance radar provides full surveillance coverage ground level to altitudes up to 20,000 feet with ranges out to 30+ miles and allows the system to function as a multi-purpose sensor for simultaneous detection, alerting and tracking of aircraft, vessels and ground targets. HARRIER is an ideal, cost-effective solution for many force protection and homeland security applications. HARRIER functions include:

- 3D Airspace monitoring & surveillance
- Aircraft detection & tracking
- Marine and coastal surveillance •
- Airspace see-and-avoid .
- Intrusion detection •
- Collision & obstruction avoidance
- Perimeter & shoreline security •

Applications:

HARRIER applications include a wide range of sites. types, sizes and configurations from single facilities to largearea or linear radar networks for force protection and facility security, including:

- Commercial airports, civil aviation airports & military airfields & ranges
- Unmanned aerial vehicle (UAV) operations support •
- Government installations •
- Industrial plants, refineries & power plants ٠
- Ports, waterways & coastlines
- Border control areas •
- High security facilities
- Gap filler radars •

Interoperability:

HARRIER systems can operate as a standalone security/force protection radar system detecting and alerting perimeter intrusions on land, by air and on water. The system can be programmed to detect intruders crossing a user-defined site perimeter, providing automated notifications to security forces. Alarm functionality can provide notification of security events via pager or cellular

TECHNICAL DATA SHEET

phone or direct to remote monitoring stations. HARRIER ASR systems can also be used as coverage gap filler radars to provide data for large-scale navigation and military surveillance radars in areas blocked by terrain or structures



Integrated Technology:

including wind turbine farms.

HARRIER systems use electronically variable high speed scanning (up to 48 rpm) for enhanced small target detection in high clutter environments such as developed areas, terrain and high sea states. Systems are optimized for detection of small targets that includes low-profile manually propelled watercraft, small motorized high-speed watercraft, low flying aircraft and ultralights. Automatic detection and tracking includes user-defined monitoring and alarm zones. Systems are offered in fixed and mobile configurations and can be linearly networked to cover large areas such as border crossings, coastlines and large facilities. DeTect's HARRIER technology is highly customizable providing radar, video, and thermal detection and acoustic deterrent through a single user interface display with advanced alerting and response features all controllable remotely.

Features include:

- Microsoft Windows-based operating software
- Integrated radar, thermal, video, acoustic, sonar & . deterrents
- Display activated "point-and-click" video zoom & deterrent activation
- Compatible with other security & display systems
- Site-specific underlay maps includes mobile mapping technology
- Identifies & tracks each target by size, position, . speed & heading
- Audible & visual intrusion alarms with optional notification by email & radio pager

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DCAS

Turn the Lights Off.

Visual Impact Mitigation Solution for Wind Farms

On-Demand Lighting Control for Wind Turbines

Wind Turbine Collision Avoidance System

- Turbine obstruction lights remain OFF at all times and are only activated when aircraft are operating in the vicinity of wind farm.
- Radar mounted on turbine tower detects aircraft and turns on all wind farm obstruction lights for immediate primary visual warning.
- Secondary audio warning via VHF radio to aircraft in proximity.
- Always monitored and fully redundant OCAS Control Center (OCC).

Overall Benefits for Wind Industry and Local Communities

Turbine obstruction lights are always OFF - unless an aircraft is detected

- Lower visual impact of the wind farm.
- Increase public acceptance in nearby communities due to decreased visual impact especially at night.
- Reduce developmental carrying costs due to improved permitting cycles.
- Improve nocturnal habitat for wildlife.

Financial Benefits for Wind Developers

Improve ROI of wind farm development

- Faster Permitting: Increasing public acceptance facilitates a faster permitting process that saves costs associated with delayed and longer project timelines.
- Additional Opportunities: Potentially permitting at sites previously not possible.
- Increase Energy Output: Potential for taller, higher power-yielding turbine hub heights where local regulations may restrict heights due to nearby flight safety risks or light intensity requirements.
- Lower Maintenance Costs: Fewer light "on" hours increases light life and requires fewer maintenance visits to site.

DCAS[®]

Audio Visual Warning System (AVWS)

OCAS Overview

At the heart of the OCAS solution is a low-power, continuous wave radar that scans for aircraft in the proximity of the wind farm. The radar not only identifies, but also tracks the aircraft's heading, speed, and altitude and determines if the aircraft is following a course which may bring it within dangerous proximity of the wind turbines. Thirty (30) seconds prior to any calculated impact with a turbine, the OCAS system immediately initiates the primary visual warning by turning on all wind farm strobe lights per FAA and Transport Canada guidelines. If the pilot does not alter course, then the OCAS solution broadcasts a secondary audio alarm to the pilot via a VHF radio in the general aviation band. When the aircraft no longer poses a threat, the wind farm lights are turned off.

10.5 ft (with VHF antenna affixed)

1 ft

25W

2W

1.44W

5 km

17dBm

11-625 mph

1 square meter

118-136 MHz

1307.5 - 1342.5 MHz

265 lbs 110 - 240 VAC

OCAS Radar Technical Specifications

OCAS Radar Unit

Height: Diameter: Weight: Power Input:

Average Power Consumption: Radar Power Output (Peak): VHF Power Output:

Scanning Capabilities

View: Target Range: Target Speed: Target Size: Antenna Gain (W): Radar Frequency: VHF Band: Connectivity:

Lighting

Medium Intensity 2000cd Red Strobe Lights:

Uses Existing LAN Infrastructure

360° horizontal, +/- 40° vertical

Environmental Operating Temperature: Ingress Protection: Standard FAA and ICAO certified lights

-40°F - 149°F IP54 (approximately NEMA 4)

OCAS Control Center (OCC)

- The OCC provides real-time monitoring of the system 24/7/365
- Provides instant alerts to technicians via SMS text or eMail
- Automated uploads, log downloads and status checks
- Real-time reporting ensures NOTAM compliance is maintained in the event of system degradation or extended power outage



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