

GlobalEye AEW&C-Intel Aircraft Detailed

Saab introduces gallium-nitride technology to airborne early warning

Aviation Week

Bill Sweetman, Bradley Perrett

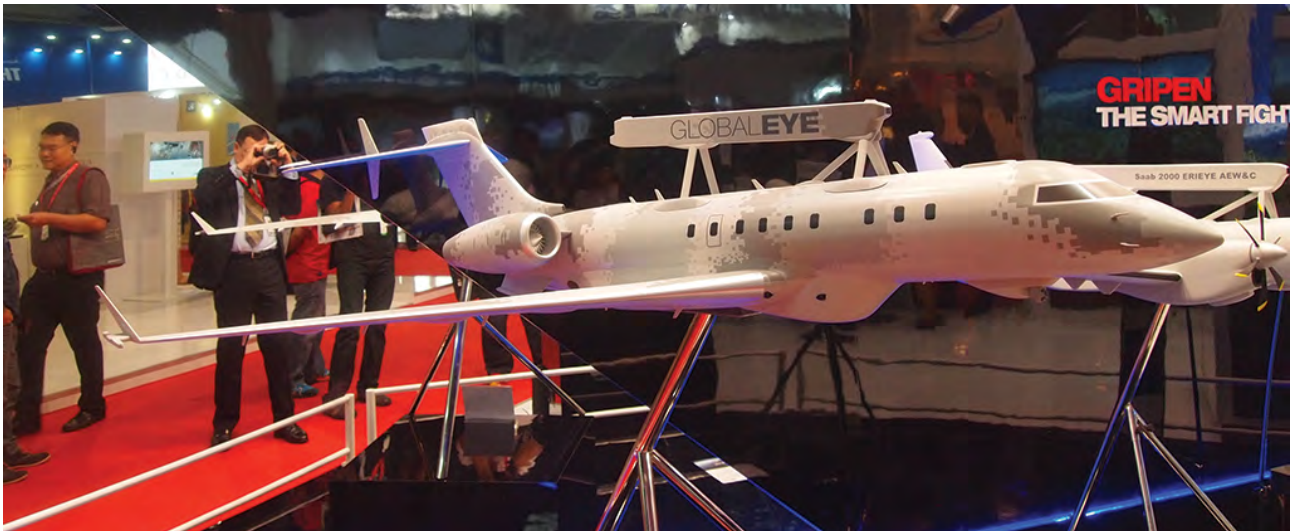
Saab has sold more than 20 airborne-early-warning-and-control (AEW&C) systems to eight customers, a respectable share of a small but lucrative market. The core of the system, the EriEye radar, started development more than 30 years ago. Although it has been upgraded continuously, it was time for a revamp, which has appeared on the GlobalEye, a system based on the Bombardier Global 6000 ordered by the United Arab Emirates (UAE) last year.

The EriEye Extended Range (ER) on the GlobalEye looks like the original, with a dual-sided, air-cooled active, electronically scanned array (AESA) radar operating in the S-band, but the hardware is all new, from the power supply through the transmit-receive modules and receiver-exciter to the processor. The system introduces gallium-nitride (GaN) technology to AEW.

The new radar is undergoing rooftop tests at Saab's Gothenburg, Sweden, site, and the first Global 6000 platform for the UAE is due to arrive in Linköping "shortly" for the start of modifications. The system is due for delivery in 2019.

Two years ago, Saab pulled a rabbit out of its hat by announcing it was on the way to delivering the first production AESA radar based on GaN radio-frequency components, the land-mobile Giraffe 4A. GaN radar modules beat gallium arsenide in many ways, but chiefly they are more efficient (so they can produce more power without overheating) and have a wider bandwidth (good for jamming resistance) and lower noise.

That last attribute is important to Saab's radar development. When the company unveiled the Giraffe 4A, engineers touted the "purity" of the new radar's signal—a measure of how much of the energy is concentrated at the nominal wavelength. With a high-purity signal it is possible to measure very small Doppler shifts and pull smaller echoes out of clutter. The radar can detect targets with very small radar-cross-section measurements, such as microdrones and stealthy aircraft.



The GlobalEye's main radar is new, but Saab has retained a familiar, proven antenna installation. Credit: Bradley Perrett/AW&ST

Other counterstealth technologies in Saab's new radars include multiple-hypothesis tracking, in which weak and ambiguous tracks are analyzed over time and either declared or discarded based on their behavior.

"The ER" in the name of the new radar points to higher performance against stealthy targets, against which it offers a 70% range increase or "the same range against a target one-tenth the size," a Saab engineer says. "That was a major criterion in the design."

The radar also works better against small and relatively slow surface targets, which becomes more important when combined with the GlobalEye's signals intelligence (sigint) suite. Rather than simply being an AEW&C aircraft, it can surveil the entire area—sea, littoral and air—with radar fused with a sigint picture. At the Singapore Airshow, Saab executives said they were offering two versions with additional sensors: One with a belly-mounted, 360-deg.-scan X-band radar—an option selected by the UAE—to add to the surface picture, particularly for maritime targets; and another with greater sigint capability, thanks to a steerable antenna mounted in the belly radome.

In the early 2000s, Israel Aerospace Industries (IAI) took a different approach to multispectral surveillance, developing separate AEW&C, sigint and ground-surveillance systems, mounting them on a common platform and netting them together via a single data link to a central ground command and control system.

Saab's "swing role" philosophy is different, says Micael Johansson, head of business defense systems. The high performance of the Global 6000 platform allows it to carry multiple sensors, quickly reposition itself for optimum use of its sensors for dedicated missions, and still offer long endurance—up to 11 hr.—at a long distance from its base, he notes. For instance, in a counterdrug mission, GlobalEye can maintain both an air and sea pictures as well as monitor a transfer taking place onshore.

That in turn could mean a bigger AEW&C market. Some customers, Saab believes, see the advantage of AEW&C but can't commit that kind of money for a single-mission system. Says Johansson: "With an AEW that has swing-role flexibility, we can capture customers that might be hesitant."

The applicability of the concept will depend on the user. Countries that can keep separate sigint and radar-surveillance aircraft busy will see less value in combining the capabilities in a single type, especially since workstation personnel should be specialists in one role or the other. Indeed, sigint people may well not be members of the air force.

Within a business jet's weight and power limits, specialization can offer other advantages. For example, IAI's AEW&C-only system, based on the Gulfstream G550, has four antennas for 360-deg. coverage, whereas the GlobalEye has two with, Saab says, observation angles of 150 deg. each. So GlobalEye briefly loses sight of its targets when quickly reversing its direction on a racetrack pattern. But the company says the system retains its tracks during the blind period and confirms them as the radar is again brought to bear.