MASTER
THE CONDITIONS

Whether you are transporting a special operations team or delivering emergency supplies to a disaster area, the task of mastering the conditions has become an increasingly important part of mission success. Adverse visual conditions can have devastating consequences for crew and equipment, and can prevent vital aid from reaching people in need.

Using our thinking edge, Saab has developed AviGuide, an advanced, multi-function system featuring a simple and open architecture. The solution is easy to install and has a short integration period. Powerful graphic processing enables complex image rendering from multiple sources, providing crew with superior control – in all conditions.

RUNWAY APPROACHES
AviGuide enhances performance and reduces workload for the crew when approaching any type of runway. It can present advisory guidance in the absence of Instrument Landing Systems (ILS) or registered Localizer Performance with Vertical guidance (LPV) approaches. Such advisory guidance is normally presented in lieu with Enhanced Vision Systems (EVS) or Compact Vision Systems (CVS). Where ILS or LPV are available, the Head Up Display (HUD) can be certified as part of systems that will allow descent below official weather minima. In the near future, systems like this are also expected to allow for dispatch even if the forecast weather at destination is below registered minima.

TACTICAL FLIGHTS
Featuring highly intuitive flight symbology, AviGuide provides unrivalled assistance to the pilot. Tactical waypoints and intuitive graphics reduce the risk of Controlled Flight Into Terrain (CFIT) – helping to make loss of spatial awareness a thing of the past. AviGuide substantially increases the benefit of EVS and other similar systems.

TACTICAL DESCENTS
Navigating a steep tactical descent down to nap-of-the-earth flights, calculated release points or improvised runways can be particularly challenging for pilots. AviGuide offers the option to present intuitive advisory guidance and situational awareness where tactical mission management systems provide support.
AIRDROPS

Airdrops are increasingly important for distributing goods, fire retardants or personnel into dangerous areas. AviGuide can provide advisory guidance for increased precision of flights into calculated release points. A key benefit of HUD is the ability to perform safer flights at lower altitudes, as well as steep tactical descents in degraded visual environments and at night.

EV'S, SVS AND CVS

Saab's HUD system is compatible with a range of sensors, providing significantly improved situational awareness for low-level and night-time tactical operations. The EVS imagery can be combined with other types of imagery such as Synthetic Vision Systems (SVS) and CVS. AviGuide is designed to be the display of choice for Enhanced Flight Vision Systems (EFVS) as well as EFVS II, which today are increasingly being supported by authorities.

PREPARED FOR GROWTH

The Saab AviGuide HUD System Processor can support multiple additional capabilities as a general avionics management computer or as a tactical mission computer. Saab has an extensive roadmap for the development and/or integration of:

- Mission-specific symbology
- EVS processing and display
- SVS
- CVS
- Advanced digital map function with high-resolution data
- Ground collision avoidance function
- Integrated audio and video mission recording function
Building on Saab’s extensive experience of ‘in the line of sight’ display systems, AviGuide is an open architecture, modular HUD solution that provides a cost-effective way of enhancing aircraft performance.

It can be used as a traditional HUD to show basic flight information. It is also able to interface and utilise other systems and is designed to be compatible with future technologies. Saab has an extensive roadmap to evolve and improve functions and subsystems to enable safer and more efficient aviation.
AviGuide is the result of Saab’s long and successful history developing HUD systems. The initial breakthrough came during the development of the supersonic fighter aircraft Saab 37 Viggen in the early 1960s. Its design was unique and at the forefront of modern fighters at the time, featuring canard wings, an on-board computer for navigational purposes and a HUD system.

**HISTORY OF HUD**

**VIRTUAL IMAGE DISPLAY**

In the 1970s, the Maverick air-to-ground missile was integrated into the Viggen system. There was no space for the TV rangefinder on the cockpit’s instrument panel, which the pilot needed to view targets. The solution was VID, which is comprised of HUD-related optics without a reflecting glass and 90° prism. The optics present a virtual picture that gives the pilot the impression of a larger screen floating in the air at a comfortable distance.

**HELITOW**

In the 1980s, a new generation of helicopter-borne reconnaissance system integrated with the TOW missile began, called HeliTOW. The high magnification of the direct-view optic, combined with the inherent wide field of view and high performance IR, laser and CCD sensors, ensured excellent situational awareness. Best-in-class sensor stabilisation gave the system outstanding image quality. The Saab HeliTOW system won a number of high profile deals worldwide, including Belgium, Italy and Saudi Arabia.

**FIGHTER HUDS**

The HUD was a huge step forward in aircraft design by making a fighter easier to fly, especially during extreme low-level flights. The development of the HUD resulted in the first wide angle HUD system with holographic diffraction optics, and since then the system has been developed and fine-tuned. This type of HUD has been established since the 1990s, and is in use in most modern fighter jets.

**SAAB RGS 2**

Featuring small dimensions and high accuracy and reliability, the Saab RGS 2 lead computing optical sighting system constituted an efficient solution for air-to-air and air-to-ground weapon aiming in fighters, attack aircraft and advanced trainers. The RGS 2 system was installed in the Saab 105G aircraft, Aermacchi MB-339 and was also used by the Royal Netherland Airforce for Northrop NF-5 during the 1970s.
AviGuide is an advanced, multi-function system with a simple and open architecture. It enables powerful graphics processing and complex image rendering from multiple sources in order to provide the crew with superior control, even in adverse weather conditions.

**AVIGUIDE CAPABILITIES**

**SAFETY FIRST**
- Flight data with eyes out – fly and navigate head up
- Intuitive presentation – faster decisions
- Conformal data – situational awareness
- Enhanced/synthetic vision
- Enhanced control

**CONFORMAL DISPLAY**
- Improved awareness of aircraft state
- Flight Path Vector (FPV) improves energy management
- Head Up guidance display
- Head Up at IFR/VFR transition
- Precision take-off and landing

**OPEN AND COMPACT**
- Lightweight and compact
- Improved cost of ownership
- Compatible with EFVS – reduced minimums
- Compatible with future EFVS systems – SVS, CVS

**MISSION COMPATIBLE**
- Flexible and adaptable display modes
- Night vision goggle compatible
- Enhanced synthetic vision
- Integrated flight mission data
- Picture-In-Picture (PIP)
The AviGuide system consists of a HUD unit chosen from our range of display units, depending on the need for field of view and the custom form factor.

The system also includes a Head Up Display Processor (HDP) for optimal processing of data and graphics based on a modular series, depending on customer needs. The HDP interfaces electrically and mechanically with the aircraft structure sensors and systems. It then runs a variety of algorithms related to data verification and formatting and generates the characters and symbols making up the display.

**TECHNICAL SPECIFICATIONS**

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### HUD SYSTEM (HDU + HDP)
- **Weight:**
  - Typically: 16 kg (35 lbs)
  - HDU: 9 kg (20 lbs)
  - HDP: 7 kg (15 lbs)
- **Power:** 28 VDC, 160 W (typically)
- **Environment:** RTCA/DO160F
- **Software:** RTCA/DO-178B Level A
- **Hardware:** RTCA/DO-254 Level A
- **ETSO C113 authorisation**
- **Modular hardware and software architecture for seamless growth:**
  - Dual video inputs
  - Processing resources for advanced functions
  - Bulk storage for DTED and navigation database

### DISPLAY UNIT (HDU)
- **Total field of view:**
  - 2000 series: 22° x 16.5°
  - 3000 series: 30° x 22°
- **Resolution:** 1400 x 1050
- **Contrast:** >1.3 at 10,000 fL ambient
- **Luminance:** >2,900 fL
- **Accuracy:** <3.0 mRad at boresight
- **Digital image generation**
- **Auto/manual luminance control**
- **Custom form factor**
- **BIT storage and reporting directed to electronics unit**

### ELECTRONICS UNIT (HDP)
- **Size:**
  - ARINC 600 2-4 MCU
- **Power supply:** 28 VDC
- **Comprehensive I/O:**
  - ARINC 429 input
  - ARINC 429 output
  - ARINC 818 (optional)
  - Dual digital video output
  - RS-170 video input
  - RS 422 – RS 232
  - Discretes
  - Ethernet
  - MIL 1553 (optional)
- **Electronic bore-sighting function**
- **Integrated BIT reporting to aircraft diagnostic system**