

> Development

Recently included in the range of mission simulators and tactical trainers, Ellipse offers an original solution for maintaining the expertise of combat pilots in fighter squadrons. The best of Sogitec's teaching know-how and powerful simulation software are provided on a minimal hardware configuration.

ELLIPSE

A "LIGHTWEIGHT" SIMULATOR BUT ALMOST EQUIPPED LIKE A "BIG" ONE!

Initial training to be improved, competence to be easily maintained

From the classroom to the mission simulator (360° visual systems, G-seat, tactical server), the pilot must receive the theoretical and operational training that will allow him to carry out missions in the best safety conditions, from first flight on the aircraft to a tightly defined mission in a complex situation. The allocation of real flight hours is not always sufficient to ensure harmonious progress for the crews and to maintain their expertise at the best level.

The way from the theoretical teaching in the classroom and the sessions on flight trainers or mission simulators is particularly tricky in the process which leads the pilot to the various flight qualifications, from operational pilot to air deployment leader. The knowledge assimilated and the reflexes acquired should be continuously consolidated, within even air and naval squadrons.

Furthermore, during crisis management operations, far from their bases and from the simulation field facilities, pilots hardly have the possibility of refreshing their knowledge, which becomes more essential as flight activity can be very irregular in the theatres of operations. In fact, in addition to the difficulty of

quickly regaining and maintaining the reflexes essential to the correct execution of a mission, there is also the stress due to resumption of flights after a more or less long interruption. This stress may cause accidents.

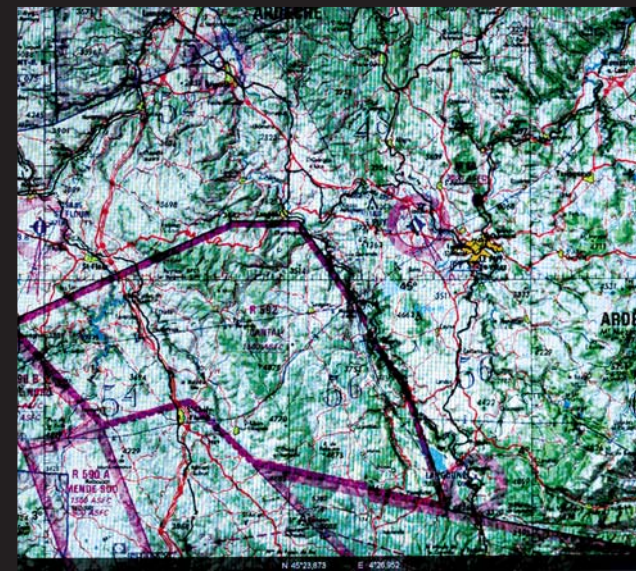
These gaps, both during the initial training phases and then during operational qualification, as well as in the theatres of operation, appeared when the man-machine interface, developed on the most recent combat aircraft and helicopters, was becoming increasingly complex. In this context, training in normal and emergency procedures, management of display screens and training in the use of numerous multiplexed controls ("switchology"), on the joystick and throttle, require a small system in a more user-friendly, interactive teaching environment.

Due to its experience in the whole field of pilot training, from ground courses to first flight and then up to operational training, Sogitec has thus identified a requirement, that has not been met up to now, between the classroom equipped with static facilities and the mission trainer/ mission simulator, installed in restricting facilities: a complementary training tool that is synthetic, small, adaptable and having a high level of realism. →



A COMPLETE SIMULATOR

Views of the cockpit and of its various displays, from head-up display to the consoles, can be configured and displayed on one, two or three screens, depending on the teaching objective.



→ Ellipse, a new concept

The initial need is clearly identified: from the hardware point of view, to design a transportable training tool, usable on request by a pilot alone, but which can possibly be connected to a network provided that there are protected interfaces. From an operational point of view, to provide satisfactory levels of tactical realism in the context of upgradeable teaching scenarios.

At first sight, Sogitec's answer may appear ordinary: the Ellipse trainer consists of three screens, standing on a table, and a Mirage 2000 pilot's hand grip and throttle, two central processing units – i.e a very common configuration, even on the consumer market. Taking a closer look, things are not as simple as they appear! The screens and processors are of course part of the PC world but, although the hardware is conventional, the software is derived from that of trainers and of large mission simulators that has been tested and qualified by many users. Sogitec has provided Ellipse with the best of its know-how offering, in different operational conditions, the same level of realism as that provided by the simulators currently in service on air or naval stations.

Taylor-made displays

On the screens, the equipment shows all of its capabilities and offers many options. All flight phases can be carried out in real time: takeoff, execution of the mission with acquisition of targets and firing weapons, letdown, final approach and landing.

Regarding the views of the cockpit and its various displays, of the head-up display (HUD) and of the consoles can be configured and displayed on one, two or three screens depending on the teaching objective.

Regarding the mission control, interception and/or low level attack, "2D" or "3D" tactical views can be displayed on the right-hand or on the left-hand side. The mission is carried out in real time and a "replay" option is available. The "Reds" attack a key point protected by the "Blues". Duration of the interception mission: ten minutes.

On the right-hand side, the head-up display is shown superimposed on the takeoff runway, the latter soon being replaced by a cloudy sky which is reached after selecting after burner. On the left-hand side, a complete display of the cockpit shows all data from the sensors, refreshed in real time, and the multi-function screens display their data on request. The content is not fixed due to the multiple windows mode available depending on the desired utilisation. The third screen can show the tactical situation including up to ten participants, but the latter can be replaced, on request, by the terrain display of the second screen. A tactical server or Computer Generated Forces (CGF), designed by Sogitec and coupled with the system, simultaneously generates the data processing program which defines the behaviour of the virtual participants other than the user.

On-line teaching

A kind of virtual instructor appears on one of the screens to give instructions to the pilot. The principle is simple but indicates an undeniable technological level: an inset label (just like a post-it® sticker) displays in text mode the various actions the pilot must perform and this text changes as he executes them. If this does not happen, the text flashes as a reminder of the immediate command! This principle, which is already applied to Computer Based Training applications, is the fruit of Sogitec's know-how in the initial training field and its software APSIS (Training in specific system interface procedures).

Consolidated expertise and operational training

The Ellipse system is also proving to be a tool perfectly adapted for maintaining acquired knowledge. In the almost saturated market for "big" simulators, derived from large systems from which it takes the essential functions, Ellipse provides new possibilities for maintaining the expertise of pilots at a cost and with an easy use that are incomparable with respect to personnel and facilities.

Ellipse provides air and naval squadrons, for pilots that are already trained, with very flexible operational training tools for use on request in the context of continuous training. Before following a more advanced session on a tactical trainer or undergoing tests on a mission simulator with monitoring instructors, the pilot can use Ellipse to resume WDNS training in "solo" mode.

The lightweight hardware configuration and the low level of maintenance required also allow squadrons to have at hand a simulator easily transportable for detachment, firing training sessions and field operations, thus allowing crews to consolidate their expertise whilst not being subject to local constraints (flight authorisations, aircraft availability, logistic support on site, etc.). ■

A HIGH-LEVEL PRODUCT

The very complete functions of the Ellipse system and the possibility of producing customized "teaching levels" make the offered service a determining element for this type of system, like that which is proposed by computer providers on the consumer market. Sogitec accumulated expertise in training and simulation, as well as its proven knowledge of the needs of the armed forces in France and in foreign countries, guarantee the high level of qualification of the system and of the associated services.

A LIGHTWEIGHT SIMULATOR EQUIPPED WITH THE SAME SOFTWARE AND COMPONENTS AS A FULL SIMULATOR

- **Firstly, the aircraft simulation component**, of course simplified in terms of hardware since it uses off-the-shelf rack-mounted PC architecture but which includes the essential functions of a weapon delivery and navigation system (WDNS): flight instruments, head-up and head-down displays, sensors, weapons, etc.
- **Then, the tactical server** which has accumulated Sogitec know-how in this field and which is derived from the one used in a Combat Training Centre like, for example, the one operated in Mont-de-Marsan (see page 12) or the one designed for the United Arab Emirates network (see page 11).
- **Finally, the teaching component** is also present and constitutes a significant innovation. Unlike a training centre where the instructor is physically present, the Ellipse system uses scenarios, or "teaching levels" that are flexible and replace the instructor. Different scenarios validated by the pilots are available for interception, reconnaissance or bombing. In a complex operational, often multi-party and multi-national environment, where the aircraft take their orders from a C2 Centre and an AWACS, the scenarios have to be open and upgradeable. Due to its know-how, Sogitec offers scenarios that are designed both to update the pilot's abilities and to validate tactics resulting from their experience.