

# ATC SIMULATOR

LETVIS® SIM system – is designed to simulate a wide range of civil and military ATM environment. The system fully substitutes real ATM data processing and the simulated air traffic situation (entire radar and flight information) is displayed at the Controller (Student) Working Positions (WPs). It can be used for training of civil/ military radar and procedural controllers for en-route or approach control of flights.

LETVIS® SIM system serves for:

- on-the-job training of ATS personnel
- ab-initio courses (basic skills training and familiarization with the ATC system)
- advanced (re-validation) training

It is also designed to support many of development tasks such as:

- testing of data processing functionality after SW modification or dataset parameters adjustment – before RDP and FDP systems putting into operation
- CWP MMI testing during user environment development or modification; testing of new ATC procedures
- testing of the system capacity and reliability, and HW components functionality and reliability, as well.

LETVIS SIM system configuration is composed of:

- Student WP(s) - includes Controller Positions and Assistant Positions for Executive Controller and Planner respectively  
- Airspace and Scenario Development WP incl. Pseudo-Pilot Position and Instructor/Supervisor Position.

This HW + SW configuration, when integrated with such equipment as voice communication system (intercom basis), recording & replay system, etc. is capable of reliable ATC operator training. ATC Simulator is delivered as custom-tailored turn-key solution incl. related support equipment and services (consoles/cabinets, cabling, etc.).

A core of LETVIS SIM system represents Generator of Radar Data (SIM/GEN) and Generator of FPL Data (SIM/FDS). The core system enables to generate data matching, physically and logically, with those of real operational sources. Student WPs are, at the same time, running in operational mode what enables a simulation of any air traffic situation that can occur in real environment.

**SIM/GEN - Generator of Radar Data** is capable of simulating the air traffic situation based on:

- o prepared scenarios
- o records of real air traffic
- o commands entered by Pseudo-pilot / Instructor

SIM/GEN output can be derived from multi-radar or mono-radar (capacity of up to 16 radars) data processing. Multi-radar data output enables the information to be distributed directly to Student WPs via LAN in ASTERIX data format. Mono-radar output is generated through splitting the multi-radar data to individual radar outputs. User can specify the radar characteristics such as:

- o radar position in WGS84
- o radar data update rate
- o type and protocol of output interface (ASTERIX, AIRCAT 500, RDIF, PIT, etc.)
- o type of radar (PSR/SSR/combined/PAR)

SIM/GEN output is fully controlled by Instructor who is provided with a capability to modify the exercise characteristics in order to train the system degradation through radar switching-off or output data quality reducing. This SIM/GEN functionality enables to test the systems of multi-radar data processing, as well. SIM/GEN is capable of generating the raw-video output of a selected PSR or PAR incl. radar jamming simulation.

Mathematical model, implemented in SIM/GEN, uses aircraft characteristics as specified in BADA database (EUROCONTROL) for simulation of aircraft behaviour, incl. change of aircraft weight when airborne (aircraft load factor). Through its database of technical parameters and performance limits the modifications or refining of aircraft characteristics and entries of new aircraft models can be done.

**SIM/FDS - Generator of Flight Plan Data** – generates all planning information from prepared scenarios and multi-radar data.

Supported formats of FPL data outputs:

AFTN, OLDI, MIL, Airport System (AS), Airport Administration (ADM), Master Clock

Supported protocols:

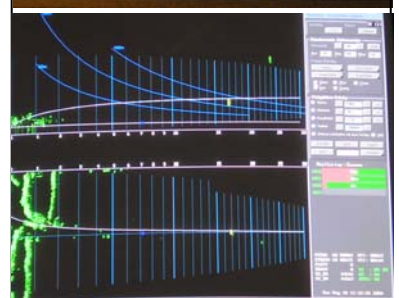
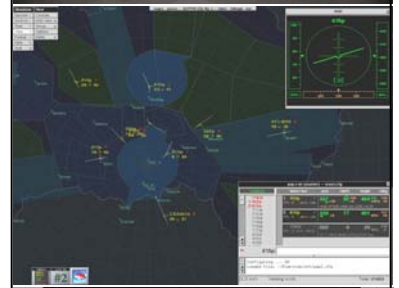
X.25, X.21, RS 232, HDLC

**LETVIS SIM/PSP - Pseudo-Pilot Work Position (PSP WP)** - is equipped with radar data display for simulated air traffic observance and controlled flight selection via label. It enables to control the flight parameters via command line or graphical interface. The number of controlled flights is limited by operator skills only (skilled operator can be capable of controlling up to 10 flights simultaneously). The simulated flights co-ordination and hand-over between PSP WPs is enabled.

**LETVIS® SIM - Basic capabilities**

Simulated aircraft control

- o full control of flight characteristics (flight course, FL, groundspeed, ROC, ROD, etc.)
- o entry of heading to any pre-defined navigation point
- o determination of aircraft reference position (navigation calculator)
- o entry of rate of climb/descent, etc.
- o Indication of performed entries/commands



Simulation of special events such as

- o Emergency state
- o Change of SSR Code or Mode
- o Aircraft equipment malfunctions
- o Erroneous set up of QNH
- o Target indication by airborne radar for target tracking
- o Afterburning switch on/off

Procedures of aircraft manoeuvres

- o Automatic SID / STAR procedures
- o Automatic instrumental landing system
- o Holding procedures
- o Alternate route entry
- o Missed approach
- o Circuit pattern

**LETVIS SIM / INS – Instructor Work Position** provides functions of exercise preparation and control in addition to functions of SIM/PSP WP. Very important part in exercise preparation is covered by training environment incl. provision of maps, AIP data, etc. (called **datasets**). Instructor can enter and store several datasets. Selection of dataset is done automatically as well as environment re-configuration of PSP WPs and Student positions.

#### INS WP Mission

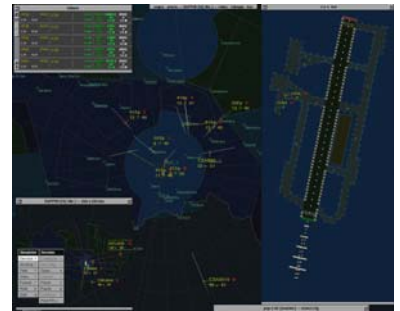
- o Dataset preparation
- o Exercise preparation and refining
  - o Edition, syntax check and distribution of automatic scenarios / procedures using the definition language for flight route description and AIP database, navigation points, standard instrumental procedures for departure, arrival, holding / ILS approach procedures
- Simulation management
  - Start / stop / acceleration (speed-up) of an exercise
  - Transfer of controlled flights between PSP Positions
  - Creation of independent groups of pseudo-pilots or students even during training lessons
  - Simulation of radar jamming or radar data drop-out
- o Pseudo-pilot control
- o System administration and troubleshooting

```
def OMDKB (C172, 3251, 0:15)
init LZSL, "UBARU 5A"
final LZTT, "EPEDA 1A"
route {UBARU,100;EPEDA;BAVAR,80}

def EWG1789 (AT72, 444, 15:15)
init LZPP, "BERVA 5P"
final EDDI, 1:00 (280 2:00)
route {BERVA,80;ODNEM,140;HDO,200}
```

```
sid 131 "BERVA 5X", LZIB, BERVA
{
131 [LZIB-131, OKR_DME--3.2], 46
160 ["-160, JAN-242], 46
088 ["-088, JAN-178], 46
JAN, 46
358 BERVA, 50
}

star 011 "JASOV 5B", JASOV, LZKZ
{
080 KSC, 57/16.4, 52/35.4
090 1:00, 41
225 KSC, 29
[KSC-225-17]
PERIL
}
```



The simplest configuration of simulator is composed of 2 working positions – for controller and pseudo-pilot – equipped with LETVIS SIM/PSP and LETVIS SIM/Server respectively.

#### Extended capabilities:

- Recording of training exercises progress for replay and analysis of student's actions in order to evaluate his performance and skills.

#### LETVIS SIM centre layout :

