CITRON -

MWIR LASER THREAT SIMULATOR

ARIEL Photonics Assembly LTD.

Applications

- Airborne Protection Testing
- Testing of detectors/MAWS
- Training of crew

Features

- Long range testing
- Automatic track of airborne platforms
- Fast preparation and change of threats signatures
- Proven in field use.
- Two man portable, one operator
- Affordable cost. Cost effective
- Low Maintenance. Passive cooled
- Withstands field environmental conditions
- Build in test for in field power and pattern profile verification

Introduction

The CITRON is a short to long range electro-optical missile threat simulator for testing missile approach warning systems (MAWS) and for training crew in the operation of these systems.

CITRON provides fast and safe testing against various types of missiles. It simulates the MWIR radiation profile of an approaching missile, based on input parameters such as: missile signature, missile speed, missile range, atmospheric conditions and more.

CITRON includes video tracker with motorized pedestal, laser rangefinder, MWIR programmable laser simulator, computer, tripod and a portable battery.

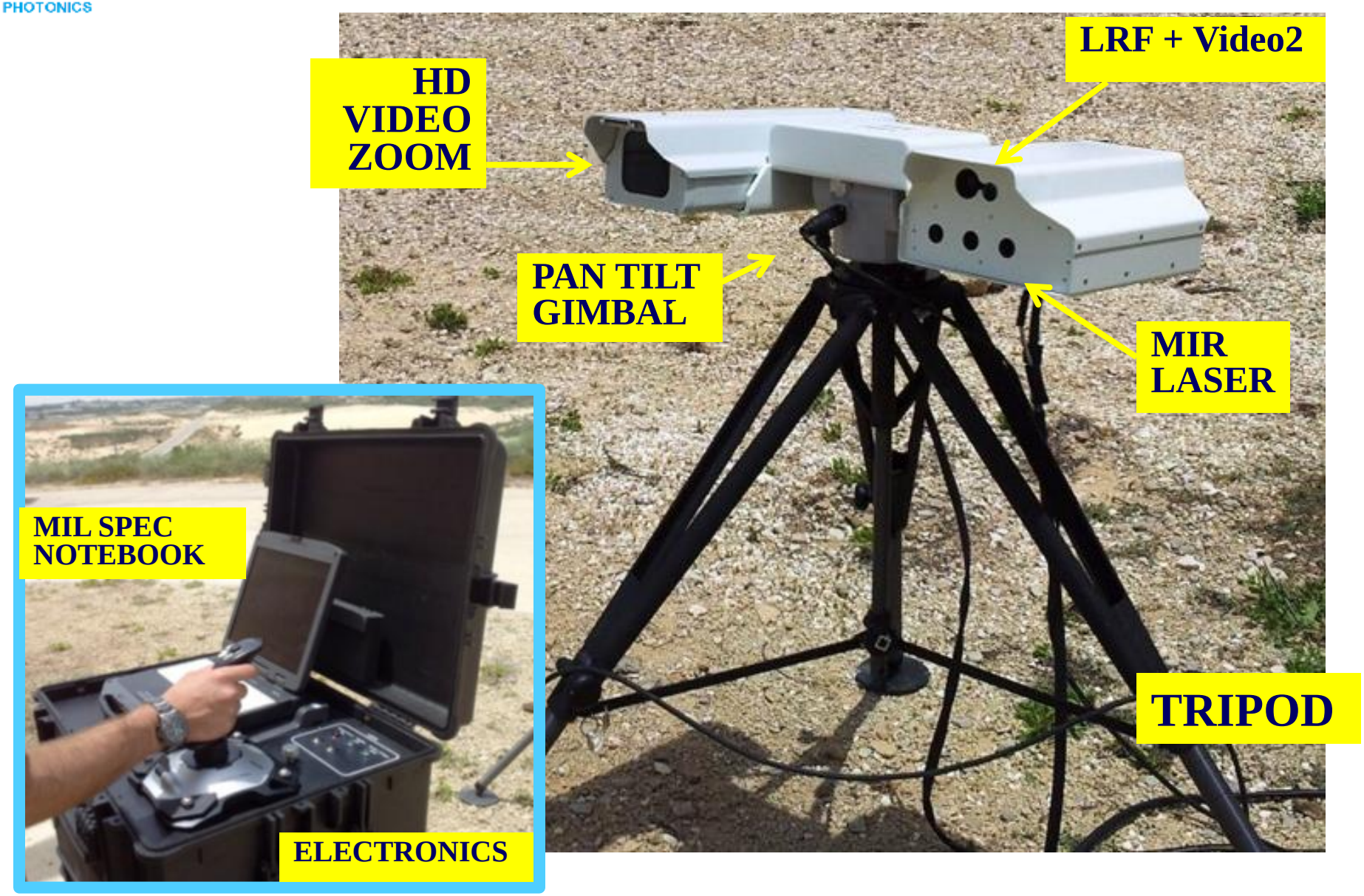
CITRON records data and video backlog of events for post analysis.

The CITRON is available for MWIR, SWIR, LWIR, UV or newer generation dual-band MW MAWS systems. Integrated detectors to measure the IR countermeasure of the threatened platforms, ability to sync between several units to create a true “missile – field” simulations are optional.

Description

- Primarily use is for testing and evaluation of MAWS, in addition to have an advanced Pilots practice against MANPADS.
- The simulator CITRON is based on a MIR laser at Band IV emitting accurate MANPADS signature profile.
- It includes HD CCD zoom camera for pointing, automatic tracking and recording the events for after event learning.
- The CITRON includes a Laser Range Finder, a GPS (and a compass/inclinometer-optional)
- The CITRON includes a power meter and a pulse detector for self calibration
- The CITRON is controlled via a water proof rigid laptop PC and a joystick.
- The simulator includes unique software which allowed to insert a variety of profiles, automatic tracking, image processing, auto range (LRF) and recording of the events.

Main components



Building blocks

The system includes 3 main building blocks:

1. **Optical Head**
    1. MIR Laser system, power meter, fast photo detector;
    2. HD CCD camera with zoom,
    3. Laser Range Finder, CCD camera,
    4. Automatic gimbal (including orientation recording), accuracy of ~ 0.2…0.5 mrad
    5. Bridge and protective enclosures
    6. Compass/inclinometer (optional)
2. **Electronics Module**
    1. Control unit, off gimbal electronics for optical head
    2. Rigid waterproof Laptop PC with Video adapter and Power Meter adapter, GPS (including absolute time recording), integrated into PC
    3. Joystick
3. **Tripod**
4. Cables
5. Transportation case for optical module
6. Portable Batteries and AC/DC converter (optional)

Main Parameters

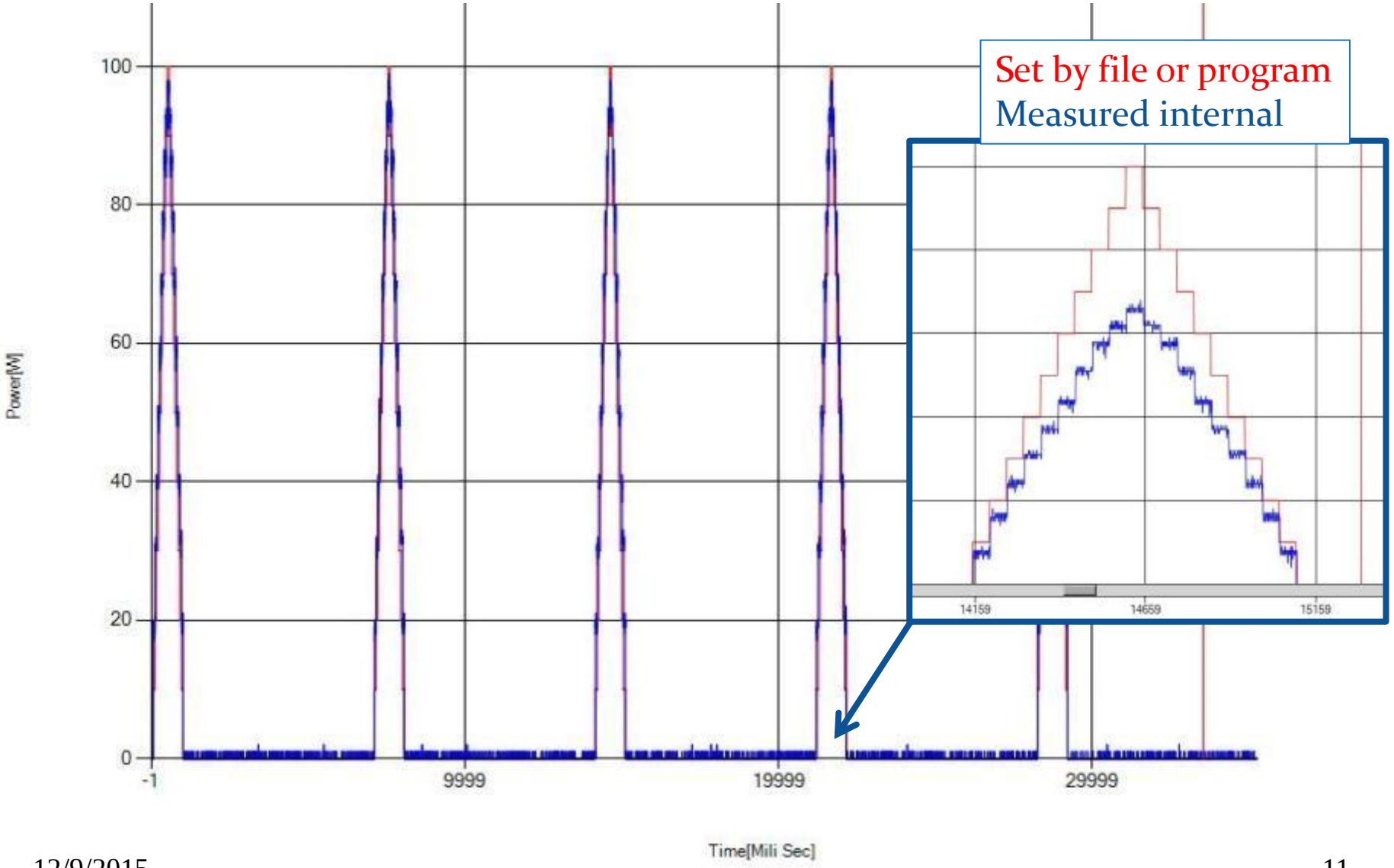
Wavelength range	MWIR (UV, NIR, SWIR, LWIR – optional)
Beam divergence (deg)	1-2
On-Axis Radiant Intensity (Watt/str) max	500 - 1,000
IR rise/fall time (msec)	0.1
IR programming step (msec)	1
Single engagement dynamic range	> 800
Standoff range (m)	5 - 6,000
Gimbal Travel Range Azimuth / Elevation	360° (+/-180°) / 60° (+50°/-10°)
Gimbal Travel Rate / Follow Aim Rate (°/sec)	30 / 15
Gimbal Position Resolution, mrad	0.1
Tracker Camera	Color 2/3 CCD HD 1920 x 1080, 60 fps
Tracker Zoom, FOV horizontal	x30 optical, (x3 digital)
FOV horizontal	45° – 1.5° (15° - 0.5°)
Rangefinder Repetition rate	1pps
Rangefinder Range, m	100 – 10,000
Rangefinder Eye safety category	Class 1M IEC 825-1 2001-08
Clear aperture, mm	Laser transmitter < 30 x 150 Rangefinder < 40 x 100 Tracker camera < 70 x 70
Warm-up time (min)	< 2
Environmental	5 - 45°C
Weight (kg)	Optical assembly – 20 Tripod – 10 Control unit – 10
Power input from Battery or AC/DC adapter	DC 24V (3 - 10A)

Operation in urban area

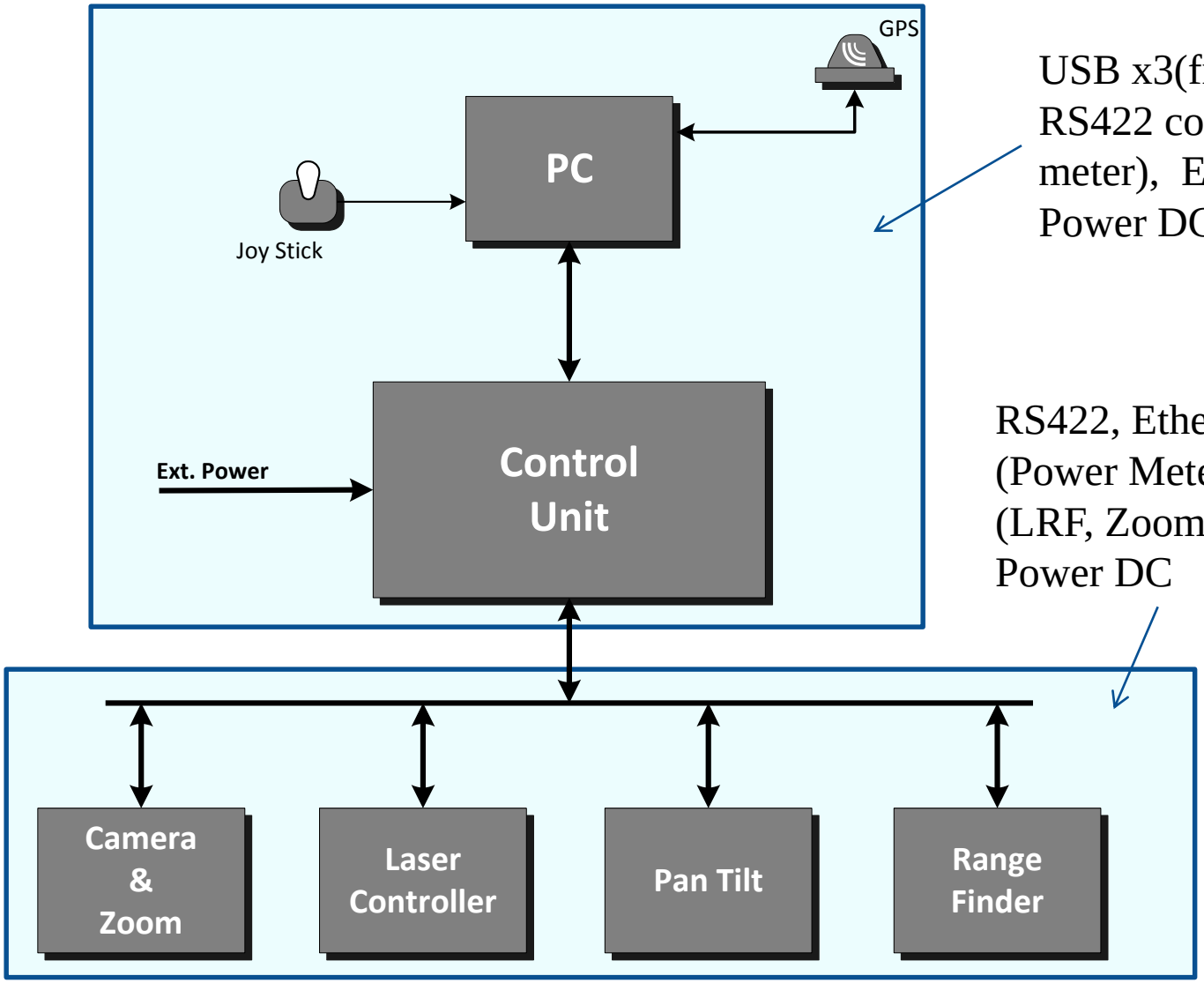
Long range (5km) urban conditions

Registration sensors

An example of optical pattern generation (screen shot)



Block Diagram of CITRON



USB x3(frame grabber, RS422 converter, Power meter), Ethernet (laser), Power DC

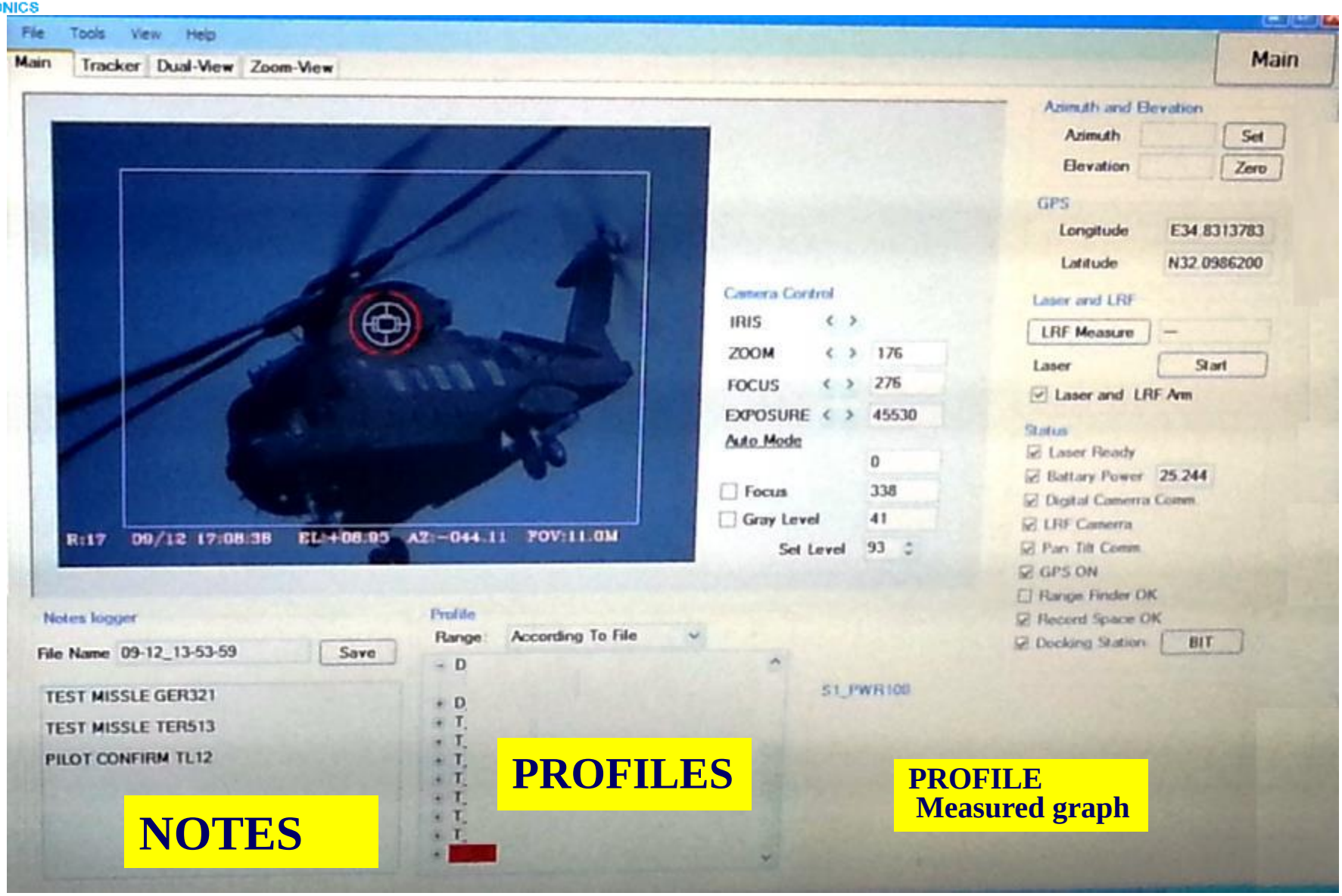
RS422, Ethernet (laser), USB (Power Meter) Video x3 (LRF, Zoom, tracking layer, Power DC

Joystick commands and controls

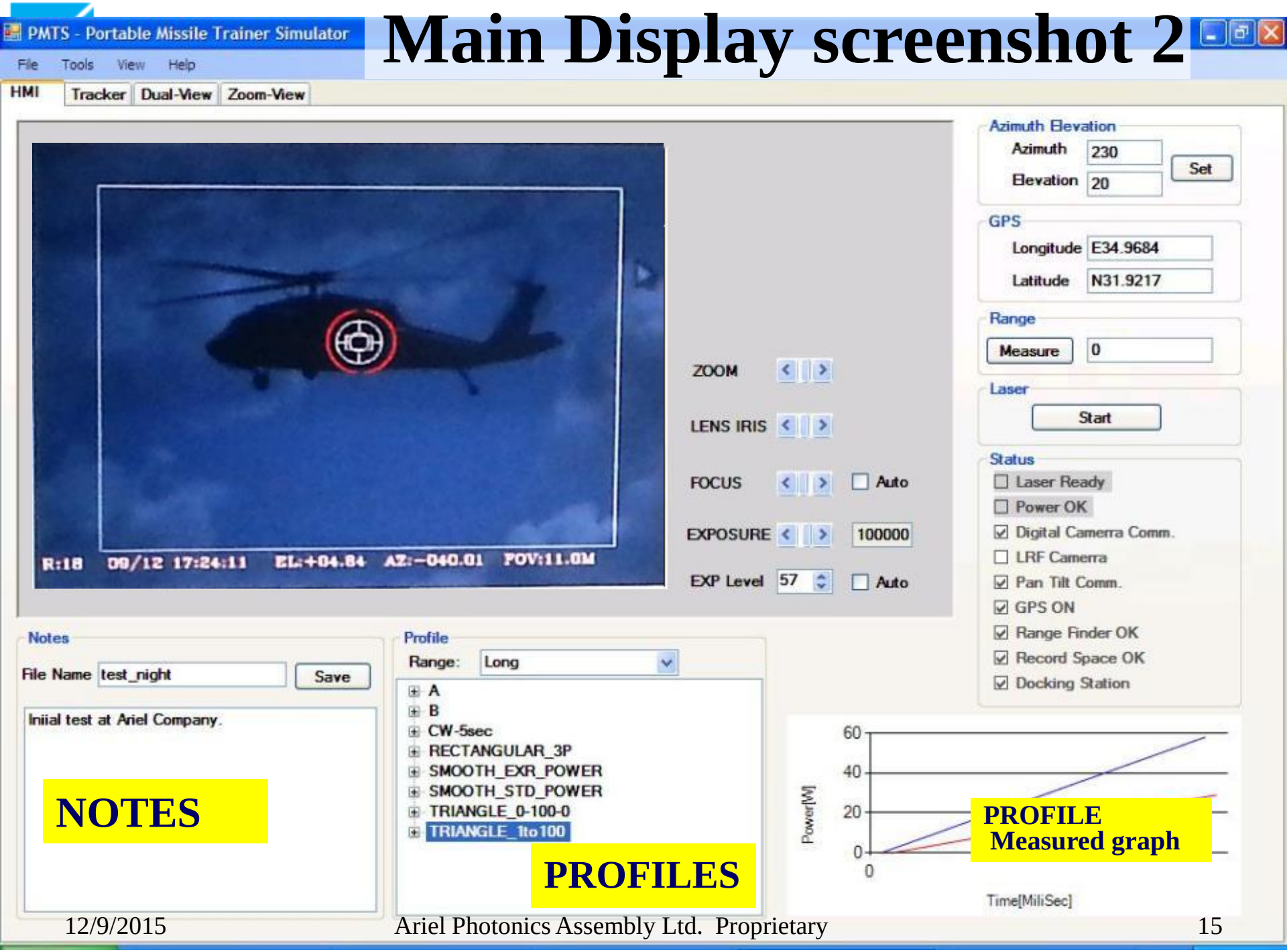
1. Azimuth and Elevation correction manual (Aiming)
2. Lock target and start automatic tracking
3. Take Range (single or 2-3 ranges)
4. Fire (start Simulation and Ranging and Video Recording)
5. Zoom change manual

1. Azimuth and Elevation XY
2. Zoom In - Zoom Out
3. Approve Target (Start tracking, ranging, Video recording)
4. Stop tracking (stop ranging)
5. Manual Ranging
6. Fire (start Simulation and Ranging and Video Recording)
7. Stop Fire (and stop ranging)
8. Stop Video Recording

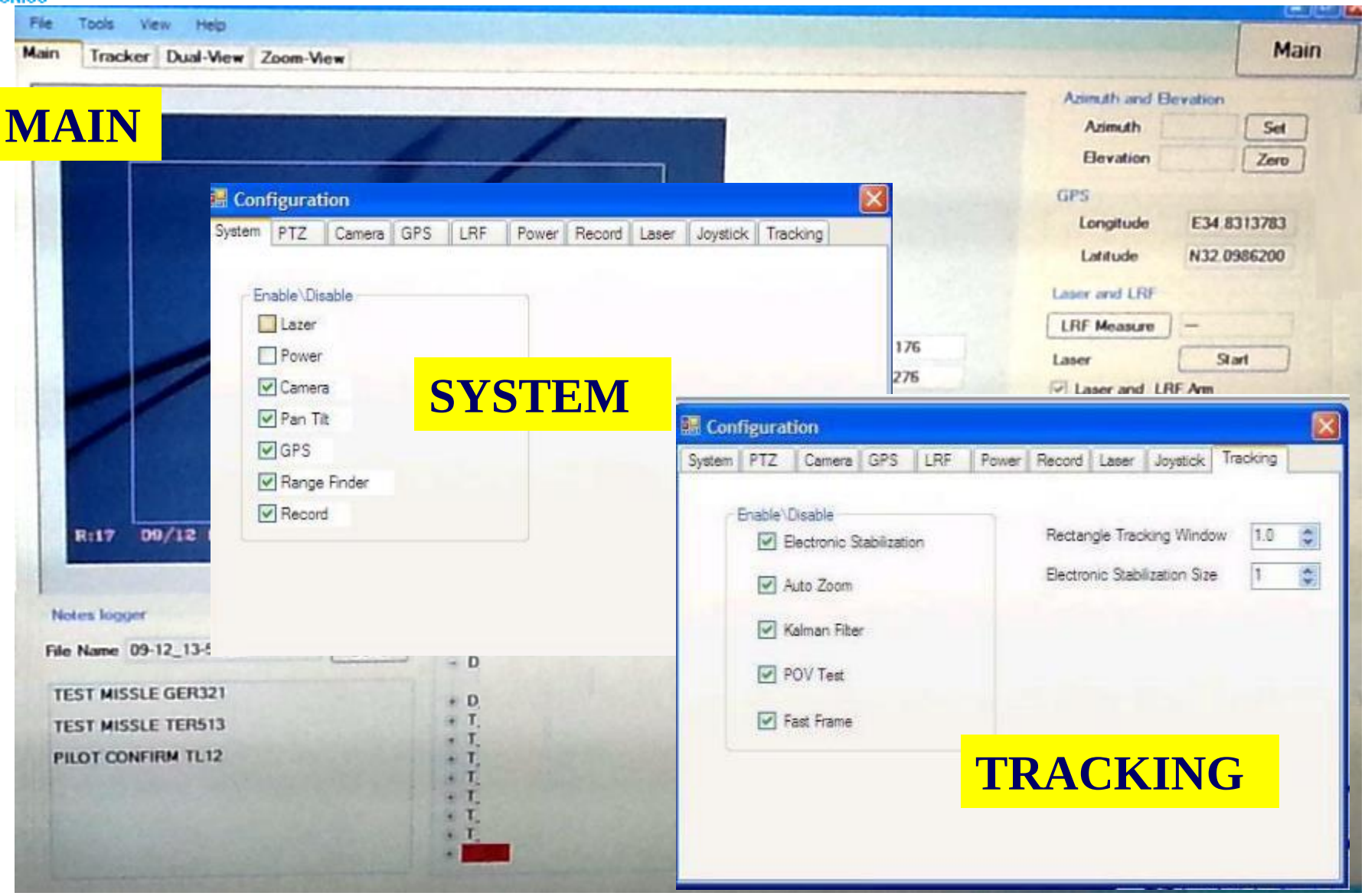
Main Display screenshot



Main Display screenshot 2



Configuration screens



Sequence / Timing of the operation

1. Assembly
2. Initialization - automatic
3. Azimuth and Elevation search for a target – manual
4. Image processing and locking on image of the target – 1 sec
5. Manual approve of target – 1 sec
6. Start of automatic tracking of gimbal – 0 sec
7. Automatic Ranging (single or 2-3 ranges)
8. Fire (start Simulation and Ranging and Video Recording)
9. Zoom change (auto or manual during any phase)

Summary

- CITRON is cost effective, safe, productive and portable.
- “CITRON” is an advanced MIR simulation system which allowed to test and evaluate MAWS and to prepare and practice pilots against MANPADS.
- It’s based on a unique software and state of the art hardware including MWIR laser, LRF, HD CCD, fast and accurate gimbal.