Description
The thermal imaging system is meant for remote recording of fast thermal processes as thermal images (RTI) from old-type foreign and domestic imagers in real time at a rate of 25 frames per second. The system is calibrated to the absolute temperature values of a black body model for all positions of the scanner diaphragm of the thermal imager AGA-780 SW to 700 °C.

The program of recording and processing thermal images is written with the LabVIEW toolkit. The programming tools allow the IR image of an object to be viewed as a thermal picture, i.e. to get the temperature distribution data of object surface with the corresponding color-to-temperature scale or, should you record the cross-section of an IR laser beam, the intensity distribution as codes of analog-to-digital conversion ($2^n$). The recorder is supplied with the program that calculates the near-surface atmosphere effect on extinction of the thermal imaging signal in a wavelength range of 3 to 5 μm at distances of up to 2.5 km.

Updated thermal imaging systems are easy to mount onboard an aircraft or an automobile. With the LabVIEW toolkit it is easy to adopt different thermal imaging scanners and make correct settings for the parameters of the signal to be recorded so that they best fit measurement conditions and a carrier vehicle.

Technical appraisal and economic benefits
The system allows you to update measurement functions to outdated instrumentation. Prices for foreign analogues with similar performance and software content normally go higher than 60,000 USD.

Application areas
The complex can be used to
- study heating and burning processes;
- make temperature maps of the Earth’s surface;
- measure dynamic parameters of IR laser radiation.
Development stage
Laboratory mock-up. The system was developed under financial support of the International Science and Technology Center, project No. 2358.

Since 2004, the Federal State Unitary Enterprise Altay has been using this system for remote environmental control and monitoring of combustion products from disposal of special-purpose motors.

At the Institute of Atmospheric Optics, the system is used for studying low forest fires and the fire vortex formation mechanism for subsequent development of better fuel combustion techniques as well as in measurements of the parameters of IR lasers of continuous and quasi-continuous radiation.

Patent situation
No application was made.

Commercial offers
The system is available within six months after order placement.

Estimated cost
100,000-120,000 roubles.
Example of recording the fire vortex formation and development processes in laboratory environment.
Total vortex development and life time is 3.32 s, stable mode duration is 2.6 s.
Total number of recorded frames with vortices is 60. Time step between frames is 0.04 s. Stages covered:
starting moment of vortex formation (a), vortex in full growth (b) stage of flame extinction (c). Horizontal and
vertical profiles of temperature distribution through the point of peak temperature value (612°C) in frame No. 27
(d), (e).

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