PORTABLE AND STATIONARY LEAK PINPOINTING SYSTEMS

SUMMARY OF THE PROJECT

Purposes.

The Project provides for environment protection and resources conservation.

To attain this purpose, the Project envisages the development and production of new generation hi-tech *correlation-acoustic versatile Portable and Stationary Systems* *intended for leak detection and pinpointing of fluids, gases, multi-phase media in ordinary and double containment pipelines of all sorts including: supply and main; metallic and non-metallic; under-ground, under-water and non-hidden, in open spaces, in towns and ,industrial plants and inside buildings.*

Innovative Foundation.

The Project is based on the following effective innovations:

✱ *Latest inventions for double containment pipelines,* creating new correlation technology which provides, in particular, the detection of drop leaks, and leaks in under-filled pipelines.

✱ *New inventions providing new data transfer from sensors on pipeline to correlator, without cable or radio communications* which excludes for the transferred signal any distortions and interference influence, and any limitations by frequency range, signal/noise ratio and long range.

✱ *Former inventions perfecting the processing and analysis in correlation technology* providing, among other things, elimination of false results from the reflected and interference signals.

✱ *Construction of correlation analyzer and the whole Systems on personal computer* with all of its powerful resources, including modern software, auxiliary and communicative means; it provides, in particular, for speed, accuracy and enormous volumes of data being processed. (see also item State of the Project).

Principle construction of the Systems

The Proposal Systems are realized in several product lines including:

- *Mobile Portable Systems having consumer qualities and characteristics unattainable in existing systems;*
- *Stationary Systems for networks, main and building pipelines, as well as Stationary Systems augmented by Mobile Portable Systems, which are not to be found on the market;*
- *Mobile and Stationary Systems for Double Containment Pipelines with considerable new consumer quality and constructed on new principles.*

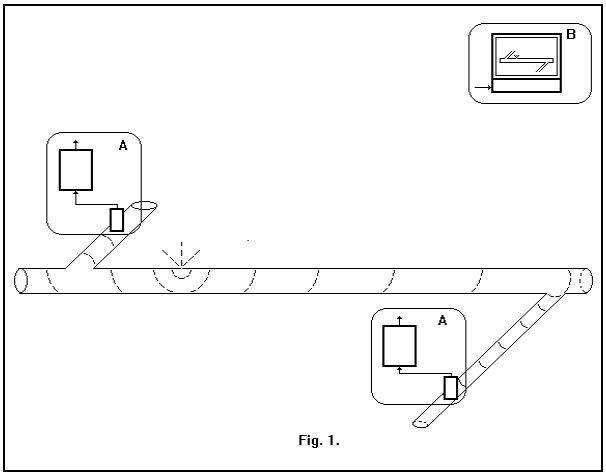


Fig. 1.

In all versions, the structure-functional scheme of a fragment of the System shown on Fig.1 consists of:

Sensors (A) which are identical electronic devices and which are installed on a pipeline segment being checked.

The sensors are installed on the pipeline temporarily during the check in the Portable Systems, and stationarily on the fixed places in the Stationary Systems.

A number of the sensors is varied from two, three or several in the Portable Systems to some hundreds or even to thousands in the Stationary Systems.

Correlation analyzer (B) which is a PC with signal processing board & software. Correlator can be found in any .place:

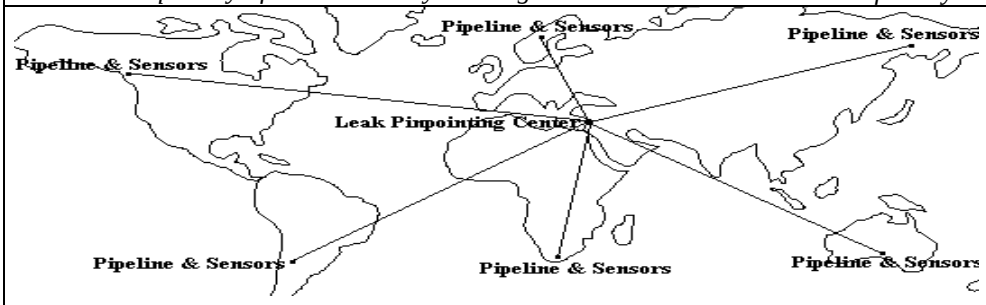
as a rule close to the pipeline being checked of the Portable Systems; and

in the Leaks Pinpointing Center which can be disposed even in other country or continent (as that is shown in the picture above) of the Stationary Systems.

Advantages of the Proposed Systems.

The Systems constructed with the application of these innovations, acquire *unique user qualities and characteristics considerably surpassing the level of modern systems.* Key advantages are shown below (the full list of the Systems advantages having about 50 items is given in the Project Description).

- *Highest versatility and specialization of the application for different types of pipelines and media.*
- *Super high sensitivity, essentially higher reliability of results, long range, and accuracy.*
- *Undistorted highly effective data transfer from sensors to correlator without radio or cable communications.*
- *Serviceability on complex pipelines, in zones of working pumping equipment and other kinds of interference.*
- *Unlimited quantity of simultaneously working sensors.*
- *Unlimited storing of signal realizations, calculated functions and results, and user information.*
- *Unlimited distancing of the correlator from the pipelines being checked, even on other country or continent.*
- *Applications for valve leak detection.*
- *Additional applications for acoustic measurements, analysis, diagnostics.*
- *Ordinary use of the Notebook computer from the System.*
- *Lower cost of the Systems.*



One of the new unique possibilities of the Proposed Systems is shown in the figure. This option of the creation of Pipeline Leak Monitoring or Leak Servicing Center is excellently provided for the territory of for any country

Main Advanced Characteristics of the Proposed Systems.

(in comparison with existing systems)

Name of Characteristics		The Proposed Systems	The Existing Systems
Frequency range of acoustic signals		*up to 20 kHz and more*	5 kHz (typical);
Useful signal to noise ratio		*100 dB and more*	50 dB; limited by radio means
Reliability of results		*95 %*	65 %, i.e. in seven times worse
Sensitivity:	**on double pipes**	*single drops*	inapplicable
	on ordinary pipes	*0,0001 cub.m/h or better*	in some tens times worse
Long range (distance between sensors)		*up to 20 km (theoretical)*	up to 1,5 km (tipical)
Number of sensors:	**in portable systems** **in stationary systems**	*2, 3 or several* *up to thousands*	2 only inapplicable

Market.

Inasmuch as the Systems will successfully work practically on any pipelines with any media, therefore market of the Systems is extended for any place in all over the world, where there is any pipeline.

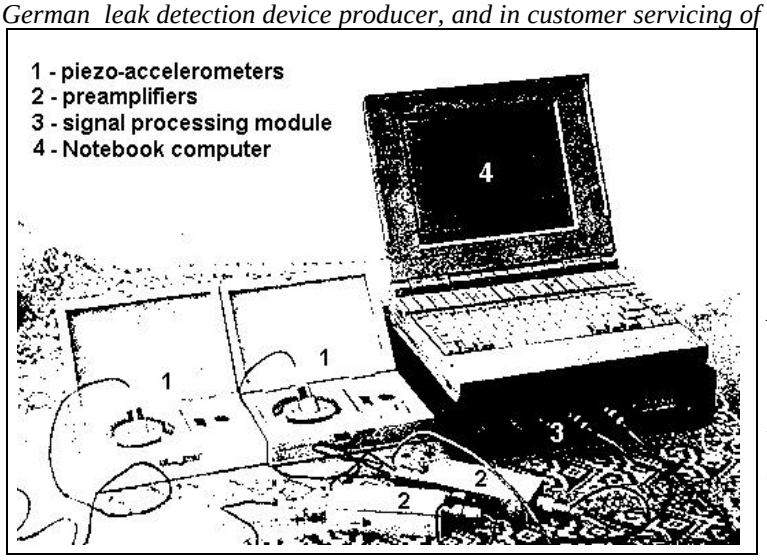
The main consumers of the Systems are firms and organizations in any country of the world, which:

* operate pipelines for transportation of media in them, including:
  - plants and manufacturers possessing pipelines that carry petroleum, chemicals, water, steam, gas etc.;
  - storehouses for petroleum, gas, chemicals and other media;
  - municipal water pipelines;
  - main pipelines for petroleum, gas, chemical, water etc.
* provide service, maintenance and repair of pipelines, both general, and for leak location and elimination only;
* produce and operate double containment pipelines.

State of the Project.

At initial stage: the Project was supported by Israeli State Organizations, and the following has been realized:

* A *Notebook-added Experimental Model of the Portable System* (according to the fourth item in the section on Innovative Foundation...) *was constructed by the author of the Project. The Model was successfully tested in the laboratory base of an German leak detection device producer, and in customer servicing of pipelines in Israel*



* Important inventions concerning data transfer and double-pipelines (mentioned in the section on Innovative Foundation...) were developed. Patent search has shown patent cleanliness of said inventions.

At present:

* A cluster of said new *inventions concerning the data transfer* has been applied for patent registration at Israeli Patent Department in December 1997; *the patent application description contains 84 text pages, 65 claim items, and 54 block diagrams*.
* In the time of the last trip in Russia (August -October 1998) the author has constructed *Cable Model of the Portable System* (not integrating the author's inventions) by the order of Nijny Novgorod municipal water supply organization. *This Model has been made and is used for pipeline services in Nijny Novgorod city (2 mln. townspeople).*

- Such Model can be demonstrated and sold for interested firms and organizations.
- *By means of this Model the author could also execute the pipeline services for leak pinpointing against orders.*
- *The author is looking for an Investor and a Strategic Partner for the said patent and for realization of the next R & D stage of the Project in the framework of one of Israeli Technology Incubators or independently.*

Forthcoming R & D Stage of the Project.

The next stage of the Project is two years of the Research & Development envisaging the creation of the Production Models Lines of the Portable, Stationary, and Double-Pipe Systems. The creation of those different application lines is provided thanks to extremely high versatility of the Proposed Systems in their construction, elaboration and application on the objects.

The Production Models are specified as unit construction; and a considerable part of the forthcoming R & D is the *elaboration of versatile sensor units*. The producing of Systems is the making *of these sensor units.* All modifications of the Production Systems will be completed and delivered mainly from *those versatile units plus computer*. Thus, the market and the consumers will determine the demand for this or that modification of the Systems.

Financing.

Some variants of the Project budget for R & D and for the creation of the production base with the reduction of the investments are shown bellow:

- *Israeli StateTechnology Incubator*: Project budget *for two R & D years* in Technology Incubator requests *US $ 360,000*. The Project would be received US $ 300,000 after permission by the Ministry of Industry and Trade. *US $ 60,000* during these two years is necessary to receive *from co-investor*.
- *Direct subsidy from the Ministry*: *Project budget for direct financing of Israeli company* requests *US $ 300,000* for 18 months. At that the subsidy from the Ministry could be 50% to 64% of the budget.
- *Russian Base*: *Full Project budget for the development of Production Systems* on the said Russian Base requests *US $100,000* for 12 months including expenses for international patenting and for the creation of the producing base.
- The development and making of a *Working Model* on the Russian Base requests *US $25,000*. The Model can be created during 4 - 5 months.