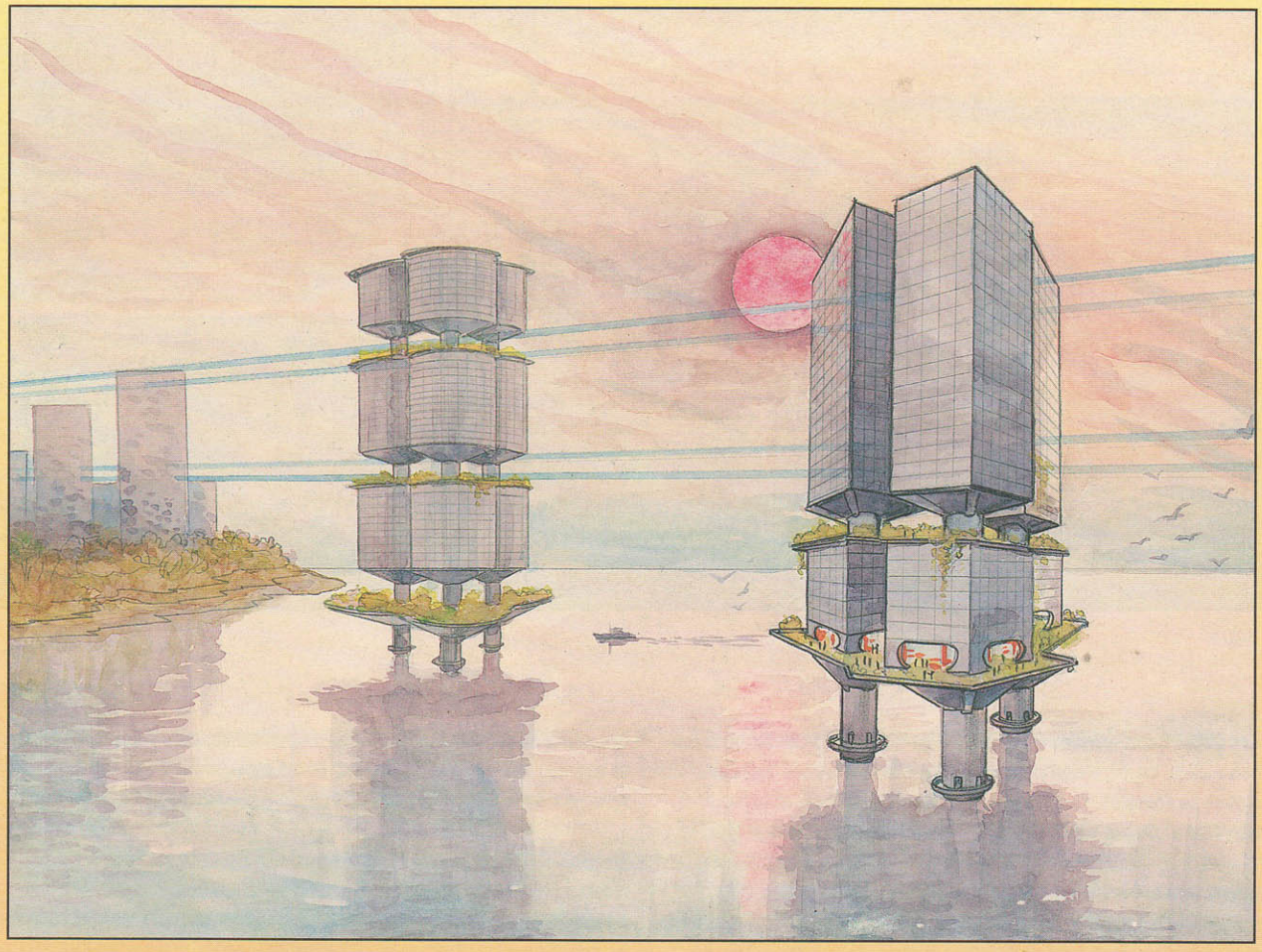
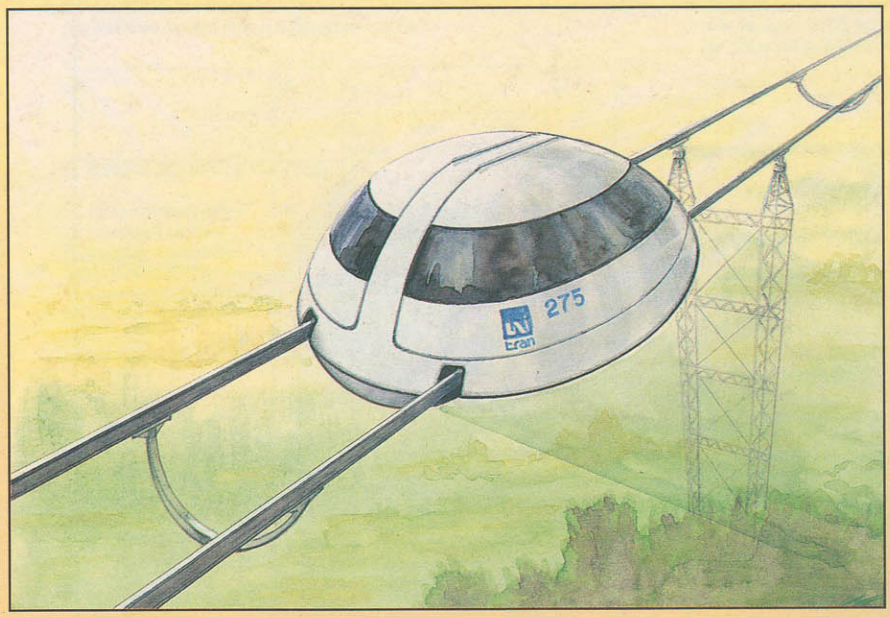


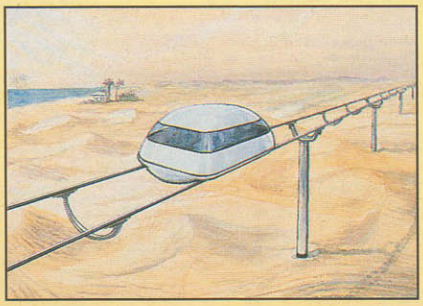
THE CONSTRAINTS OF TIME AND SPACE ARE CHALLENGED BY NTL AND THEIR NEW UNIVERSAL HIGH-SPEED TRANSPORT SYSTEM

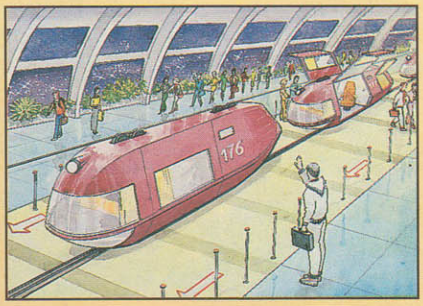
Having convinced himself of the feasibility of the concept of a new universal high-speed transport system as proposed by Anatoly Yunitsky first mentioned in February/ March 1993 issue of the magazine «Delo (Vostok+Zapad)» (p.35), Alexander Kapitonov started investing in the project. This fact is more than simply eloquent: a member of the business community found faith in the project.

After acquainting themselves with the concept's calculations, not one of the independent experts invited to scrutinise the project was able to put forward any concrete arguments against Yunitsky's idea. For the development and eventual implementation of the concept, Messrs Kapitonov and Yunitsky founded their own company in Germany, «NTL - Neue Transportlinien GmbH.» The partners are engaged in the development of a prototype model. The technology for the project already exists, but, it would seem, mankind is too concerned with the numerous other problems before him to realise this fact.

In the opinion of the partners, man's need for survival as a species necessitates the development of such a transport system; a system free of the numerous inadequacies of current modes of transport. All of the current means of transportation - automobiles, railways, aeroplanes, ships, etc. - contribute significantly to the destruction of the environment. This problem has taken on world-wide proportions. Mankind's survival itself is threatened by the likelihood of ecological catastrophe. Now, as never before, the need is apparent for the development of a feasible and environmentally friendly transport system with the capacity to bring peoples closer together and contribute to their mutual understanding. Kapitonov and Yunitsky contend that their system, the NTL, is the only one currently accessible that can successfully achieve the goals of brining people closer together and help ►







◄ more quickly solve mankind's problems. They cite social problems, problems of production, the expansion of cultural ties and exchanges and business contacts as examples. Their concept incorporates practically all of the favourable aspects of transport systems in wide use today: the high speed of the modern airliner, the low cost of shipping or rail transport, and the environmentally friendly qualities of electric cars. The capacity of their proposed system would be no less than that of a modern superhighway. On one line alone of the NTL system, in the space of one day up to one million passengers could travel to destinations limited only by the size of the earth.

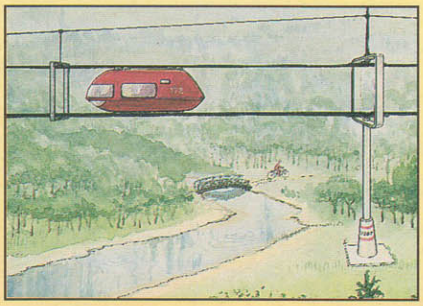
The NTL system is an individual transport system, but will be accessible to everyone regardless of his social status and, unlike others, more traditional forms of transport, it will be completely safe. Passengers will climb into single or multiple seat transport capsules which will differ from the cabins from today's automobiles only in their higher level of comfort, besides all of which, no one will be required to sit behind the wheel. These transport capsules will travel at speeds of up to 1000 kilometres per hour along specially designed wires tightly strung between supports spaced from 10 to 50 metres apart. The schedules by which these capsules will travel will not depend on unreliable weather or on the mood or well-being of a dispatcher. The flow of traffic along the routes will be controlled by computers. The NTL system was, it would seem destined to be computer controlled, given today's level of sophistication in the computer industry. To automatically control the transport capsules only two parameters are needed: speed and distance between capsules. As far as planning a journey, the task of choosing direction and destination could be performed by a child simply by dialling in a destination code or even through voice activation.

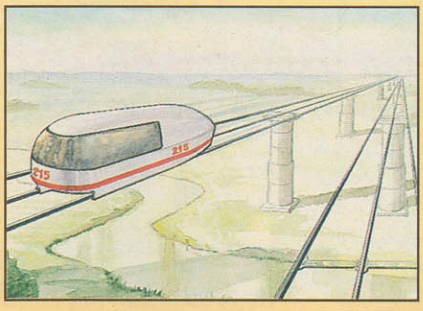
The NTL system will be virtually silent thanks to the aerodynamic design qualities of the passenger capsules. Their teardrop shape with no protrusions except for a few small wheels, sticking out no further than 5cm, will allow these capsules to pass through the air almost without a sound. At speeds above 200 metres per second, the capsules will travel in special tubes with a diameter of two metres. There are two options for consideration here: air within these tubes could either be evacuated or directed at a given speed in the direction of travel, thus vastly reducing drag on the capsule. These tubes could be mounted on supports above ground, buried underground or laid beneath water at a depth of up to 100 metres, thus linking continents and islands.

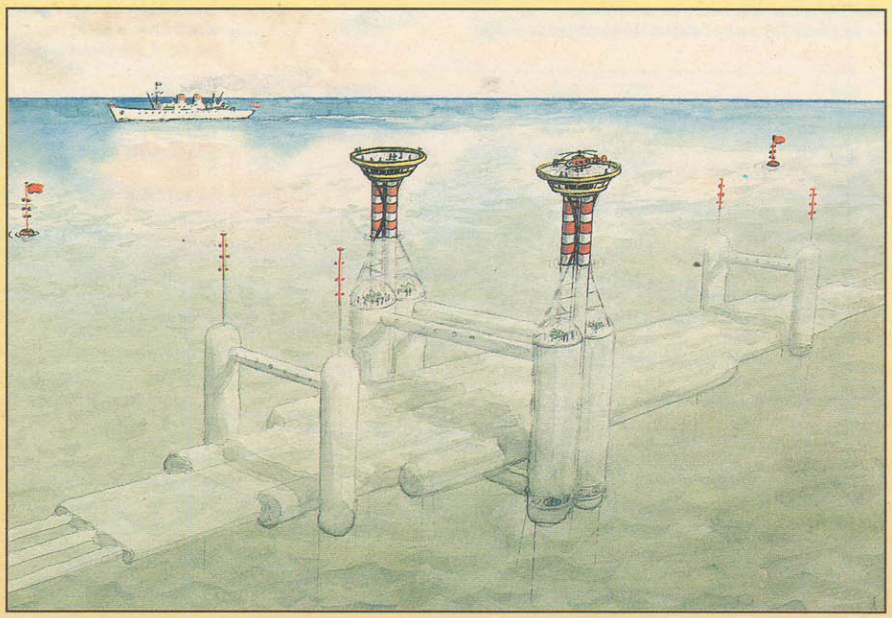
The time-saving advantages of contemporary air transport are often severely reduced in the end by the time lost in travelling to and from inconveniently and crowded airports. The NTL system will solve this problem as well. The transport lines of the new system will travel near and even through cities, given their low space requirements. Only small areas of land are needed to erect supports for the lines. Even municipal buildings could serve this purpose.

Of principal significance is the effect the NTL system would have on the development of the city of the future. Cities could be built along thousands of kilometres of ecologically clean areas where millions of people might live in harmony with the environment and linked with these high-speed transport lines. The NTL system might also link cities built above stretches of ocean where the sea bed is at a depth of between 50 and 100 metres. For countries such as Japan and The Netherlands, the construction in the next century of cities above the sea will become a real issue, according to expert predictions. The NTL system will be able to cross stretches of ocean of up to five kilometres without the need for intermediate supports; to ascend and descend mountains and hills as steep as 45 to 60 degrees.

At the heart of the project lie its so-called «wires». These specially constructed «wires» will be strung between anchor supports with a tension of several hundred tonnes creating a perfectly straight line without any visible joints or sagging. Along these lines the small wheels of the capsules will travel, acting as the capsule's «pantopraphs», feeding the silent electric motors. Any sagging of these «wires» caused by the high-speed travel of the capsules on them will be no greater than 1/1000 of a given stretch's length. The ideally flat surface of the «wires» will form an element of the line's structure, which, thanks to original design, will be able to compensate for any resonance vibration caused by the loads. These «wires» will so constructed and strung that they will cancel out the vibratory effects of one another, and would have virtually no







effect on the capsule's trajectory. All of these such critical design elements have been carefully calculated. An application has been submitted for international patenting by NTL NEUE TRANSPORTLINIEN GmbH, Germany. The author of the patent is Anatoly Yunitsky. The patent will be registered in 60 countries.

Messrs Yunitsky and Kapitonov invite all interested private businesses, as well as state and public organisations, to participate in the project's development. According to calculations, some $200 million are required as investment to have the system up and running by the year 2000. The system could be completed and installed in a relatively short period of time, thanks to its simplicity and original design solutions. For the most part, the pace depends on investment strategy and a timely research and development programme, as well as the creation of the necessary implementation infrastructure.

Patenting the concept in the developed countries, with a demonstration of its principles and systems, will be the first step in determining the project's overall development strategy. Dozens of the concept's original designs are ready to be patented. With a well defined strategy and organisation, the NTL transport system could be in wide use with five to seven years.

The first profit from the project could be realised even before that time, in two or three years, through the sale of licences, according to experts. Analyses of the project indicate that one dollar invested at the patenting stage could bring a profit of between $100 to $1000. That same dollar invested in the R&D stage would bring a profit of between $10 to $100, and if invested in the construction stage, a profit of between $1 to $10. Once the system is up and running, a one-dollar investment will bring a stable $0.5 to $5 profit.

The project's authors forecast the following receipts for the period from 1995 to 2000:

■ In Stage 1 (Patenting various aspects of the project's design, prototype model construction and demonstration; licence sales) - $100 million;

■ In Stage 2 (Research and Development work, further patenting of proven designs, sale of licences and technology) - $1000 million;

■ In Stage 3 (Final testing of prototype designs, patenting of proven designs, sale of licences, technology, engineering expertise and various NTL component parts) - $10,000 million;

■ In Stage 4, as a result of the efforts of the various trans-national corporations, consortiums, jcint-stock companies and other organised business structures created for the realisation of the project, when the full-scale production of the NTL system begins, a phenomenon comparable to that of the Ford experience will be launched. Technical history, whose impetus was provided in the twentieth century by the automobile revolution, will be continued by the NTL system.

After 2000, according to the project's authors, the NTL system will begin it's full-scale operation. The profit of just one transport line alone linking Japan with Western Europe through Russia would reach $10,000 million per year.

At a cruising speed of 600 kilometres per hour, a capsule travelling from Minsk to Tokyo could reach it's destination in 15 to 18 hours. If enclosed in the special tubes described above, the travel time could be from two to three times less. The capacity of such a line could reach one million passengers per day. The cost of such a journey would be three to five times less than current air travel.

In terms of economic character, and likewise passenger safety and environmental friendliness, the NTL system is unique. Anyone who invests in this project is buying for himself and his heirs a ticket for the future.

Tables 1 and 2 show the NTL system compared with contemporary forms of transport and expenditure estimates for Stage 1 of the project's development. ►

◀ NTL as compared to the existing transport systems
(for a double-sided passenger stream of 10,000 passengers per hour)

Index	NTL	Road			Rail-road	Air
		asphalt concrete	ferro-concrete	trestle bridge		
1. RESOURCE PROVISION (per 1 km of route)						
1.1. Volume of earthwork (cu.m.)	100	75000	75000	1000	50000	1000
1.2. Expenditure of steel (tons)	100	10	100	500	400	10
1.3. Expenditure of concrete and ferro-concrete (cu.m.)	100	100	4000	8000	500	500
1:4. Expenditure of road metal (cu.m.)	—	5000	5000	—	5000	500
1.5. Expenditure of asphalt concrete (cu.m.)	—	4000	—	1500	—	100
1.6. Area of alienable plots (ha)	0,02	5	5	2	5	1
2. OPERATIONAL CHARACTERISTICS						
2.1. Operational speed * (km/h)	250–500**	80–100	80–100	80–100	100–150	200–500
2.2. Route cost (relative units)	1	3	4	10	4	1
2.3. Engine's power (kW/passenger)	50	20	20	20	15	100
2.4. Energy costs (kW/passenger)*	100	220	220	220	120	250
2.5. Kind of energy used	electr.	chem.	chem.	chem.	electr.	chem.
2.6. Energy cost (relat.units)	1	5	5	5	1,2	6
2.7. Cost of rolling stock per 1,000 km «shoulder» (relat.units)	1	5	4	3	2	50
2.8. Annual wages of drivers and service staff (relat.units)	1	10	8	7	2	5
2.9. Cost of stations and accompanying services (garages, filling stations, repair shops, etc) (relat.units)	2	1	1	1	2	5
2.10.Factors hindering from traffic security	none	fog, rain, ice-covered ground, snow-drift	fog, rain, ice-covered ground, snow-drift	fog, rain, ice-covered ground	snow-drift	fog, snow, thunder-storm, birds
2.11.Unfavorable impact on environment	none	chemical pollution, noise	chemical pollution, noise	chemical pollution, noise	noise, soil vibration	chemical pollution, noise
2.12.Annual average rate of line route construction (km per day)	1	0,5	0,5	0,05	0,5	—

* Operational speed on the «shoulder» of 1,000 km in delivering a passenger from downtown of the departure city to downtown of the destination city, taking into consideration of the time loss for buying a ticket, getting to the airport, waiting for boarding the plane, fuel filling, driver's rest (for road transport), etc.

** Calculation for the NTL system are done for a rate speed of 500 km/h.

National and foreign organisations and businessmen interested in joining the NTL project may contact with the editorial board of **«Delo (Vostok+Zapad)»** [«Business (East+West)»] **magazine of international cooperation.**

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Expenditures Estimate for the Realization of the first stage of the NTL program from 1995 to 2000 (serial introduction time), USD mln.

Kind of work	total	on which in 1995–96	note
1. Patenting	4	0,2	
2. Manufacture of demonstration models, total	1	0,8	
Of which:			
2.1. Scale 1:50 with the route plot 5–10 m long («room» alternative) – within 6 months	0,1	0,1	within 6 month
2.2. Scale 1:5 with the route plot 500–1,000 m long (speed 20–200 km/h) – within 1 year	0,9	0,7	within 1 year
3. Research work, total	50	5	
Of which:			
3.1. Research of track structure and transport capsule dynamics	15	1	laboratory is needed
3.2. Research of aerodynamics	5	0,5	same
3.3. Research of electrodynamic problem	10	1	same
3.4. Research and working out of technical and technological standards	5	0,5	same
3.5. Research of automatized control problems	10	1	same
3.6. Research of materials required for track structure and transport capsule	5	1	same
4. Experimental design work, total	75	5	design office is needed
Of which:			
4.1. Working out engine system	10	0,5	same
4.2. Working out transport capsule (hull, mechanic groups, equipment, design)	5	0,5	same
4.3. Working out management and control systems	10	0,5	same
4.4. Working out communication:			
– mechanical	5	0,5	same
– energy	5	0,5	same
– information	5	0,5	same
4.5. Working out string track structure (supports included)	15	1	same
4.6. Working out automatized construction combine for the rout's line construction	10	0,5	same
4.6. Working out automatized construction combine	10	0,5	same
5. Designing and construction of test fields for mastering traffic speed, total	60	15	
Of which:			
– low speed (100–250 km/h; route length – 5 km)	10	10	construction of the test field will require over USD 100 mln and will last till the year 2005
– medium speed (250–500 km/h; route length – 20 km)	50	5	
– high speed (over 500 km/h; route length – 100 km/h)	—	—	
6. Advertizing, total	10	4	
Of which:			
6.1. Working out advertizing concept	1	1	
6.2. Production of advertising movies with computer's animation (20 movies in total)	4	2	
6.3. Advertizing in mass media (with the aim of licence sale and attraction of investors))	5	1	
6.4. Designing and construction of experimental sections of the route «city – airport», «city – city», «city – health resourt», etc 100 km long (rate traffic speed – 200 km/h)*	100	20	
TOTAL	300	50	

* The experimental section of the route 100 km long, the volume of passenger traffic being 100,000 a day, will be repaid within a year, the whole NTL program – within two years (without profit from licence sale and launching the transport's serial production).

Yunitsky, Anatoly Eduardovich. Inventor, with over 70 inventions to his credit, of which 22 have been put into practice in national economies of Belarus and CIS countries. General designer and co-owner of the «NTL GmbH» company. Railroad engineer by education. Born in 1949. Married. His wife Galina is a housewife. His son Denis, 22 years old, is an economist.

Kapitonov, Alexander Alexandrovich. Entrepreneur. His sphere of interests is raw materials business. Director and co-owner of the «NTL GmbH» company (Germany). Economist by education. Born in 1965. Married. His wife Maya is a housewife. Has got two children: a three-year old daughter Masha and a one-year old son Artyom.

Design: DELO (Ost+West). Illustrations: Guennadij Paleev