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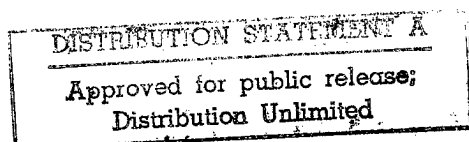
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# ***JPRS Report***

## **Central Eurasia**

***Military Affairs  
Defense Industry and Conversion***

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# Central Eurasia

## Military Affairs

### Defense Industry and Conversion

JPRS-UMA-93-029

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**Tarasov on Draft Law on State Defense Order**

93UM0663A Moscow KRASNAYA ZVEZDA in Russian  
3 Jul 93 p 6

[Interview with Russian Federation Supreme Soviet Committee for Industry and Power Engineering Subcommittee for Conversion Chairman Yuriy Fedorovich Tarasov by KRASNAYA ZVEZDA Correspondent Colonel Valentin Rudenko, under the rubric: "Defense Complex": "The Order That Will Be Protected by Law"]

[Text] The Law of the Russian Federation "On the State Defense Order" has been called upon to become an important legal act that regulates the procedures for the formation, placement and realization of the defense order. The Russian Federation Supreme Soviet Committee for Industry and Power Engineering conducted the development of this law. The Ministry of Defense, Roskomoborprom [Russian Committee for the Defense Industry] and other interested organizations and departments also actively participated in its preparation.

We requested that one of its authors, Russian Federation Supreme Soviet Committee for Industry and Power Engineering Subcommittee for Conversion Chairman Yuriy Tarasov discuss the primary provisions of the draft law.

[Rudenko] Yuriy Fedorovich, as we know, there has never previously been such a law. Why was it needed?

[Tarasov] Today defense enterprises simply can't get by without this legal act. The fact is that they were actually set adrift after the elimination of the military-industrial commission, Gosplan, and a number of other structures for planning, placement, and financing the defense order. Moreover, as a result of the shift to the market economy, the entire diagram of production relations has radically changed. All of this prompted us to develop a law which would become the legal basis that ensures the entire diagram for passage of the defense order, as they say from "a" to "z".

[Rudenko] What will the new legal act regulate?

[Tarasov] The law, if the Supreme Soviet adopts it, will define the status and the procedures for the formation and realization of the state defense order. It will regulate the relations of the organs of state rule and administration with enterprises and organizations that are involved with the development, production, supply and scientific-technical accompaniment of the operation of weapons and military equipment and also other defense issues.

[Rudenko] Could you discuss in more detail the status and procedures for formation of the state defense order? In fact, what should we understand that to mean?

[Tarasov] That draft law states that the defense order is the Russian Federation Government's consolidated planning document for the next budget year that has

been developed based on the Arms and Military Development Program and other long-term plans and programs that are associated with ensuring the country's defense and security.

In the program that the draft law discusses, we consider it necessary to define the primary directions of the development of arms and military equipment for a 15-year period; and, a target-oriented arms program for a 10-year period, including the task for NIOKR [scientific research and experimental design work], series production and capital construction at Russian Federation Ministry of Defense facilities. Its third integral part must become a target-oriented program of basic and applied NIOKR for the development of scientific-technical and technological facilities of the defense sectors of industry in the interests of a high level of arms and military equipment for a 5-year period. The program is being developed with a periodicity of five years and is approved no later than six months prior to the planned period by the Russian Federation President.

Responsibility for the formation and placement of the defense order and for monitoring its execution is being assigned to the state buyers and the Russian Federation Government.

The composition of the defense order will include search scientific-research work; NIOKR for the development and modernization of arms and military equipment and for new technologies for the manufacture of arms, military equipment and materials and mobilization preparation; development of dual-use facilities and technologies; purchase of experimental and series models of arms and military equipment, components and materials; work for the creation and development of mobilization capabilities; and, construction of facilities for defense needs, other work and services that are associated with ensuring the country's defense capability and security.

In the defense order, we envision a list (products list) and volume of production, content of work or services, the predicted cost of the defense order as a whole, and also according to its divisions and individual stages (works), and other issues.

The draft defined that the placement of the defense order will be conducted, as a rule, on a competitive basis through the conclusion of a contract between the state buyer and the principle performer. Granting the status of defense on an order will be conducted by a representative office of the state buyer. Price formation for a product, work and services that are supplied according to the defense order are determined exclusively by the terms of the contract. Financing is carried out from the Russian Federation federal budget through the allocation of resources to the appropriate state buyers.

If the performer of the defense order is a monopoly supplier of the appropriate product, the defense order for it is mandatory.

[Rudenko] Who can be involved in the fulfillment of the defense order?

[Tarasov] The draft law states that enterprises and organizations that operate in accordance with Russian Federation law, regardless of their organizational-legal form, form of ownership and departmental affiliation can act as the performer of a defense order on an equal basis. Enterprises that are competing for the performance of a defense order for the first time are obliged to create mobilization capacities, to have a State Certificate for the right of current production of arms and military equipment according to peacetime documentation. A certified enterprise has the right to a new defense order, and to obtain guarantees, benefits, subsidies, payments, etc., as prescribed by law. Certification of enterprises is a new factor. It is associated precisely with the change of the form of ownership of enterprises.

[Rudenko] The draft law also discusses the transition to contract relations between state buyers and performers of the defense order. What is the status of the state contract and what will be stipulated in it?

[Tarasov] The status of the state contract is defined by the Law "On Deliveries of Products and Goods for State Needs". All work included in the defense order will be performed by enterprises-suppliers based on the conclusion of a state contract and in a special period and under exceptional peacetime circumstances—in a mandatory manner.

The contract stipulates the mutual obligations of the state buyer, the primary performer and the performer. Typical forms of state contracts for scientific-research work, development and purchase of arms and military equipment are being developed by the Ministry of Defense based upon coordination with other state buyers and primary performers and is approved by the Russian Federation Government.

A calendar plan for the performance of work, a protocol of the agreement on the allocation of savings and reimbursement of costs that have arisen, the protocol of the agreement on the adoption of a decision as a result of a change of the contract price, obligations for the protection of guarded secrets, and other issues are an integral part of the contract. It has been stipulated that contracts can be concluded in different forms (with a fixed price, with reimbursement of expenses, a fixed level of profitability, and others) for all work as a whole (long-term contracts) or its stages (an annual contract). An advance can be made by the buyer for defense orders with a lengthy production cycle, and also in those cases when the purchase of raw materials, materials, and components is required for their performance. Based on the agreement of the parties, control points are established in contracts at which a decision is made on the advisability of further performance (adjustment) of the defense order based upon the accumulated information.

[Rudenko] Does the draft stipulate the procedures for the material-technical support of the defense order?

[Tarasov] Yes, that has been stipulated. Special quotas will be determined for the mandatory sale of resources to state buyers and defense order suppliers. The list and amount of the most important types of resources for which quotas are being established are determined on an annual basis by the Ministry of the Economy and are approved by the Russian Federation Government.

[Rudenko] The defense order is a serious matter. It is all the more important that enterprises have a moral and material vested interest in it.

[Tarasov] An entire chapter in the draft law has been devoted to incentives for the defense order. Specifically, it states that enterprises that produce defense products will have profit (income) tax benefits that are directed at technical development, increasing the quality of the product, target-oriented state grants and subsidies, and benefits for land. They will be completely free from taxes on land and on property used in the interests of carrying out mobilization tasks. Current and long-term credits will be granted under beneficial conditions with covering of the difference in the loan interest by a commercial bank at the expense of the Russian Federation state budget, fixed levels of profitability of the defense order on types of products will be established that ensure the creation of a stable financial basis for production, scientific-technical and social development. These enterprises will have the right to receive appropriations from the state budget that are needed for the construction or reconstruction of enterprises, equipping them with modern equipment, mastery of new equipment, etc. It stipulates mandatory indexing of budget appropriations that have been allocated for payment of defense order products in connection with a price increase for material resources and the increase of salaries and also a number of other benefits. It is important to note that these benefits may be extended both to the primary suppliers and also to subcontractors who supply components and materials and render services.

Our task, under conditions of the absence of Gosplan, is to make the defense order advantageous and prestigious.

[Rudenko] Yuriy Fedorovich, but what does the draft law state about liability for nonfulfillment of the defense order?

[Tarasov] First of all, I want to stress that liability applies equally to the buyer and to the performer of the defense order. In the event of nonfulfillment or improper fulfillment of the obligations that are stipulated by the contract by one of the parties, that party reimburses the other party for losses caused as a result and is deprived of the right to receive the benefits prescribed by this law and by the state contract and bears other liability that is established by Russian Federation law.

[Rudenko] Does the buyer have the right to completely or partially reject the product that has been produced according to the contract?

[Tarasov] Yes. But, in the process, he must completely reimburse the supplier for the losses incurred. If the product does not correspond to the requirements of the standardization-technical documentation or in the event of a leak of information on the primary protected secrets that have been stipulated in the contract that has been caused by the supplier, the right to not pay for the produced defense product is reserved for the state buyer.

If the buyer does not have the resources, the amount of the underpayment is indexed and is increased by 0.5% for each day the payment is overdue. The amount of the fine is calculated for the supplier of the product (services) and is not subject to taxation.

[Rudenko] Judging by the letters to KRASNAYA ZVEZDA, defense enterprises are anxiously awaiting the law. What are your predictions on its adoption by the Supreme Soviet?

[Tarasov] The draft law has been reviewed at a Russian Federation Supreme Soviet Presidium Committee for Industry and Power Engineering session. But work on it continues. Ahead are hearings in the Supreme Soviet. We will be grateful to everyone who will express their comments and proposals on the draft law that we have proposed.

### **Lima-93 Naval, Air Expo Planned**

93UM0619D Moscow KRASNAYA ZVEZDA in Russian  
16 Jun 93 p 3

[Article by Vladimir Alekseyev: "Malaysia Awaits Defense Workers"]

[Text] From 7 to 12 December of this year the Malaysian city of Lima will become a place of pilgrimage for defense workers from the entire world. The "Lima-93" maritime and aerospace exhibition will be conducted here in the International Exhibition Center.

That the intent of the organizers of the exhibition is serious is evidenced by the fact that the Malaysian government has itself become its official sponsor. Preparations are proceeding at full steam: Around \$20 million were allocated to modernize the airport in Langkawi. A new modern exhibition center with spacious pavilions is being created. The necessary microclimate will be maintained in these pavilions. Vast outdoor static exhibits, an airfield for demonstrations of aviation equipment, and 150 mooring spaces for exhibition of various watercraft are being prepared. The total area of the exhibition center will be 10,000 square meters. Eight thousand square meters are reserved for an exhibition of maritime equipment.

The main goal of the exhibition, according to an official representative of the EMAS company, "is to organize ties between the leaders of industry and respected purchasers in areas corresponding to the profile of the exposition." It should be added to this that the exhibition in Malaysia will doubtlessly also become an arena of struggle among producers of defense products for the

sales market, and chiefly the Southeast Asian market. It should be noted that the exhibition's organizers made the effort to invite key government figures from the region's countries to it. It would seem that Russian defense contractors should not stand on the sidelines in this aspect either. All the more so because, as the experience of similar international functions shows, including the recent exhibition in Abu Dhabi, they have the means to compete with Western and other producers.

What sort of things can be shown in the course of "Lima-93"? This will be what is referred to as a multi-profile exhibition. According to the organizer's plans, sections such as aerospace equipment (airplanes, helicopters, space equipment, propulsion systems etc.) and defense equipment (weapons, combat equipment, ammunition, mission support equipment, security agency and police gear, etc.) will have a visible place in it.

Judging from everything, the ship and boat building sections of the exhibition as well as an exposition of ship and port equipment will be of considerable interest to specialists. It will be useful for interested persons to know that the depth beside the quay wall where the exposition will be located will make it possible to exhibit ships and vessels with a displacement of up to 2 m (at low tide), and the harbor channel will allow passage of vessels with a displacement of up to 5 meters into the bay (in the high-water period).

And of course, we cannot go without mentioning the section of the exhibition which will perhaps impart a special hue to "Lima-93." This is the aquatic sports equipment section. Various sports watercraft and motors for them, all kinds of boat instruments and fittings, and gear for waterskiing, windsurfing, diving and underwater navigation will be exhibited here.

In short, "Lima-93" will provide a possibility for defense workers from all corners of the globe to demonstrate accomplishments not only in their own particular field—manufacturing military products, but also accomplishments in the sphere of conversion, and of production of goods for purely civilian purposes. Who knows, Russian participants in "Lima-93" might expect success and advantageous contracts. By the way, the immediate effect is not all that is important. Gradually acquiring experience, we are beginning to understand, it seems, that the outlays of participating in such international forums will far from always enjoy an immediate return. Contracts, advantages, profits—all of these things come later: What is needed in the beginning are image, prestige, authority in the eyes of foreign partners, and experience, which is acquired in this fashion.

A little about outlays. Those who wish to take part in "Lima-93" should keep in mind that it costs from \$125 to \$530 U.S. to rent one square meter of exhibition space. The EMAS company is ruling on the participation of particular organizations in the exhibition (contact telephone number in Moscow, 293-03-93). Applications for participation are being accepted until 30 June.

# **Ukraine's Conversion Chairman Kryuchkov on U.S. Trip, Cooperation Prospects**

93UM0628B Kiev NARODNA ARMIYA in Russian  
16 Jun 93 pp 1,3

[Interview with Vasilii Dmitriyevich Kryuchkov, chairman of the Subcommittee on the Military-Industrial Complex and Conversion of the Commission for Defense and State Security under Ukraine's Supreme Soviet, by Lt Col Aleksandr Tereverko, NARODNA ARMIYA correspondent, under the rubric "A Topical Interview": "We Are Well Aware of the Price of Peace"]

[Text] Our newspaper has already reported that a delegation from the Ukraine's Supreme Soviet has visited the United States of America to study the matters of national security and conversion. The delegation included Vasilii Kryuchkov, chairman of the Subcommittee on the Military-Industrial Complex and Conversion of the Commission on Defense and State Security under Ukraine's Supreme Soviet. Our correspondent interviewed him.

[Kryuchkov] I was visiting America for the first time. I learned about it during the terrible war years, though, when American canned meat came our way once in a while. I saw our troops retreat to the Moscow area, saw the helplessness of our army during the initial period of the war. I understood even then that this was a result of inadequate attention to defense. I decided to devote my life to this matter.

I completed the Tula Mechanics Tekhnikum for Small Arms and was assigned to Yuzhmash in Dnepropetrovsk. I later completed the physical mechanics school at the university in the same city. Since then and to this day I have studied what can be employed for countering a powerful enemy, what others possess for this purpose and what we need to do to avoid falling behind. I have considered and still consider a state's possession of modern missiles to be a restraining factor. We (I refer to the former USSR) spent a long time trying to catch up with the Americans in this area, even though we were first in space. Not until many years later did we begin to move ahead of the Americans with respect to the tactical/technical specifications of our missiles. The time has now come to get rid of them. I would point out that this process is nowise easier than that of creating the awesome weapons.

[Tereverko] Vasilii Dmitriyevich, along with other matters, we know that the delegation studied American experience with the conversion and reduction of forces....

[Kryuchkov] Yes, it did. And although the scope of the reduction in weapons development and production is not as large in the United States as here, we did derive much of benefit from the trip. We thought that the so-called conversion begun 5 years ago would relieve us of all our troubles. Incidentally, I too believed that the VPK [military-industrial complex] basically had everything necessary to solve all of the problems which the

Ukraine had and still has. On the condition that the military-industrial complex not be expected to do it all, however, and not for free. Some people believed that the military plants could immediately begin producing cookies instead of missiles. It all proved to be far more difficult, though. It should be borne in mind that the conversion here was begun and is proceeding in a situation of market relations. Furthermore, all links with partners in the CIS were severed. Believe me, it is very difficult to undertake anything when a plant's management tells us that no one needs 80 percent of the products previously turned out. What kind of conversion is that? We could continue producing those missiles, after all. Not for the military, but for civilian purposes. Now that would be conversion. A very cautious and calculated approach is taken to these matters in the United States.

Its troop reduction system is also worthy of attention. To be more exact, not troop but base reduction. After a decision has been made to close a base, almost all of the military personnel are transferred to new stations. The civilian personnel servicing the base form committees made up of residents of the military post. They are the ones who decide what to do with the vacated military buildings and what to do to prevent people from being put out of work. Ordinarily, the plan is to set up small enterprises, medical facilities, training institutions and consumer-service facilities. Ecological issues and matters pertaining to the provision of electricity, heat and so forth, are decided along with the transfer of the buildings. The military depart, and the civilians take over the facilities with no trouble. We do a far worse job of deciding such matters, unfortunately, and the American know-how is therefore very useful to us.

[Tereverko] You were interested in their troop reduction and conversion. The Americans were no doubt interested in the fate of the nuclear weapons located in Ukraine, were they not?

[Kryuchkov] No matter whom we met with—senators, representatives of the war department or Assistant U.S. Secretary of Defense William Perry—the conversation always began with the missiles located in Ukraine. This is of concern to the entire world, including the Americans. In these cases we made a stipulation: Talk with us not as the possessors of missiles but as representatives of an equal state. We can discuss missiles later.

We expressed our opinion of the START 1 treaty. Yes, we are prepared to get rid of the nuclear weapons, but on the condition that Ukraine be given a firm guarantee it will be subjected to neither military, nor economic nor political pressure by any state. There must be assurances that the other states will follow our nation's example.

The Americans promise to help us and are planning to allocate 176 million dollars, if START 1 is ratified. We thank them for the help, but this is clearly not enough. I would point out that according to their own experts it takes more than 6 billion dollars to close a single air base

in California. Our "specialists" maintain, with no basis and not knowing the real state of affairs, that we can get by with 3 billion dollars. I can say with authority: We cannot!

Destruction of the missiles located in Ukraine is not the problem of our state alone. They did not appear in our Ukraine as a result of the good life. And today we are still something like hostages to the unrestrained arms race that once was.

Our delegation did not go to the Americans with hands out. We said that we ourselves could do a lot, but let them help us enter the international market. Ukraine is not now in a position to finance the removal of the missiles without selling our excess weapons. As soon as we have achieved an agreement with some state on the delivery of our equipment, we then receive a rejection. This is not happening for no reason. We understand that the world market is divided up, each country with its own zone. Our young state has not established itself in that zone. We lack experience. So allow us to enter the zone. Help us. Give us support so that we can earn something at this stage. This is the only way disarmament can advance.

Incidentally, U.S. Secretary of Defense Les Aspin avoided this problem during his visit in Kiev.

[Tereverko] Vasilii Dmitriyevich, what will follow from our delegation's visit to the USA?

[Kryuchkov] Everywhere we went, we found points of communication with representatives of various companies. We discussed what could be done jointly in the area of missile technology. I believe that in time we will be able to develop a missile together. There are extensive prospects in the field of communications. As a result of conversion there are plants in Ukraine which could produce technical products according to the specifications of leading U.S. companies, and we could enter the international market together. In order to trade, there must be cooperation.

We anticipate that Americans will soon come here and provide specific, on-site assistance. I am already calculating where to send whom, to what enterprises. We shall discuss all of these issues with Minister Chernenko.

[Tereverko] I would like to know what you predict will come of START 1.

[Kryuchkov] That is a complex subject. We in the parliament are not unanimous, after all. Most unfortunately, it is not the specialists who are defining ways to solve this extremely important problem today. I feel that we should think about those nuclear missile complexes whose service life is running out. As a test, part of the warheads could be turned over to Russia, asking in return "X" number of the [tvelov] which we need for nuclear-power engineering. I believe that the country would only benefit from this. Sooner or later we are going to have to pay to solve this problem in any case.

And we should not expect to rid ourselves of nuclear weapons one fine day, and that will be the end of it. A great deal of money will still be needed to "heal" the land where the missiles were located.

I repeat, however, that disarmament must be effected on an equal basis. That is the only way we can preserve peace on the planet. Believe me, one who has dealt with defense matters all his life. Everyone is well aware of the price of peace. It is incredibly great.

#### Vitebskiy: 'Threatening Situation' in Defense Industry

934D0225A Moscow FEDERATSIYA in Russian No 74, 6 Jul 93 (signed to press 5 Jul 93) p 2

[Interview with Vitaliy Vitebskiy, deputy chairman of the Parliamentary Committee for Industry and Power Engineering, by Vasilii Ustyuzhanin under the rubric "In the Supreme Soviet of the Russian Federation": "The Situation in the VPK Is Threatening"]

[Text] Last week, we heard questions on the defense-industrial complex twice—in the government and in the Supreme Soviet. What is behind this attention?

[Ustyuzhanin] Passions are seething around the defense complex. Some are talking about the destruction of the VPK [Military-Industrial Complex]. Others think that it will eventually shed its psychological burden and that a restoration of the industry will take place. But where does the truth lie?

[Vitebskiy] The truth, as always, is somewhere in the middle. Indeed, a psychological turning point is occurring in the industry. Many enterprises are coming out of the economic knockdown. They still need a little support on the part of the state, and they will finally stand on their feet.

I returned recently from Birmingham from the "Conversion-93" exposition. There our defense plants demonstrated technological achievements in the civilian sphere. I can testify: We have a lot to show and to be proud of. In technical characteristics, many of the exhibits do not have an equal in the world. For example, the civilian hydroplane Bi-200, produced in the Taganrog design bureau imeni Beriyev, explosion technologies for the extraction of technical diamonds, night vision instruments, and laser medical equipment. These commodities will do honor to any firm.

But there is also another side. The enterprises of the former VPK (and this is about 2,000 enterprises and millions of working people) are still not confident of tomorrow, and it is not at all clear as to how and owing to what they will continue to survive further. The situation in this respect is simply threatening. First of all, there is no clarity concerning the defense order, its outlook, its mobilization capacities, and payments. While in 1992 many enterprises were living by inertia on Union reserves, many enterprises are not in a condition

to implement the defense order for 1993. The government refused to conduct a quarterly indexation of expenditures. But who will sell ordered products at old prices?

Indexation did not occur in the first quarter. Indeed, the federal budget itself was signed only at the beginning of June. Preconditions have been created such that the state generally will not be able to purchase a part of the produced products. But here there is also the president's edict—all budget articles are being reduced by 15 percent.

[Ustyuzhanin] By what logic is the government guided?

[Vitebskiy] Being carried away by politico-commission work, it, in my opinion, lost the capability for adequate actions. It frequently makes a move with the left hand, and it does not control what the right hand is doing. On the one hand, the conversion program is being adopted very well. But on the other hand, a decision follows: Do not issue the necessary resources for the program. After all, even out of the 450 billion credit rubles that the parliament recently approved for the conversion program, enterprises began to receive resources only at the end of June. But what does it mean to receive resources a half year later, given the current inflation? The situation has become critical.

[Ustyuzhanin] Under what conditions is a turning point possible?

[Vitebskiy] The first condition: clarity concerning the state defense order—the armaments program, mobilization readiness, and economic guarantees for the future. The fact is that enterprises that suffered and are suffering the most in the defense industry now are those that are unable to reprofile their capacities quickly—by virtue of their uniqueness and orientation on the production of a stable commodity nomenclature. But no decisions are being made on this specificity.

Now, the defense order is issued in annual sections. But just what is a year for a large enterprise? An instant! A long-range outlook is required. In the draft law "On the State Defense Order," which has been worked on now by our committee jointly with subdivisions of the government, we wrote specifically: The armaments program must be drawn up for 15 years. Given this outlook, it is possible to plan and develop well-founded and large-scale projects.

According to the law in effect "On Conversion of the Defense Production Industry," enterprises must be notified of a state order two years ahead of time. The main task is to see to it that the future of the enterprises is quickly clarified.

[Ustyuzhanin] How soon, in your opinion, will the defense industry stop hanging like weights on the legs of the state?

[Vitebskiy] In recent years, it stopped grinding away resources, but it is impossible to say that we have

discarded the weights. The collapsing nature of conversion required the involvement of substantial state resources. After all, the conversion fell on the enterprises like a bolt from the blue. A majority was simply not ready for it. Enterprises were advised after the fact about the sevenfold reduction of defense orders. Is it conceivable? But even given an evolutionary course of changes in the VPK, substantial resources would have to be allocated.

There is also another fact. The defense complex was and remains a powerful economic locomotive. It has produced and is producing intricate equipment for enterprises of civilian industries. And now the proportion of "civilian commodities" in the VPK has increased to 70-80 percent of the total volume. In fact, there is no longer a question of the defense complex as such. Therefore, we are forced to prepare a law that would compel and stimulate enterprises to produce defense products. If you wish, the defense complex now is our only hope for entry into the world market. After all, we have encountered serious opposition for the entry of our defense technologies on the world market. Is this accidental? The Russian defense industry is really a powerful competitor to Western producers. In this connection, I support the recent statement of President Yeltsin about the fact that he will insist at the meeting of the "Group of Seven" countries not on credits, but on the creation of conditions for equal collaboration. If we are planning to live in a world economic system, then it is commodities created in the defense industry, and not the export of energy sources and credits that will help ensure the survival of the state and the success of reforms.

### 'Konversiya-92' Civilian Production From Defense Industry

93UM0653A Moscow KONVERSIYA in Russian No 2, 93 pp 13-24

[Article by Yuriy Sergeyevich Shkarenkov, under the rubric: "Exhibitions, Trade Fairs": "Defense Industry Enterprises New Civilian Production at the 'Konversiya-92' International Exhibition (December 7-14, 1992, Moscow, Sokolniki)"]

[Text] This article indicates the function, cites brief descriptions of the design and primary technical data of various types of presses, metal-cutting and woodworking machine tools, pumps, armatures, items made from composite materials, vacuum smelting and ladle devices and equipment for the agro-industrial complex that were exhibited and advertised at the "Konversiya-92" [Conversion-92] Exhibition.

Glahe International KG (Germany), "Moskovskaya Yarmarka" Russo-German Joint Venture, All-Russian Exhibition Center's "Nauka" Exhibition Complex, and the Association of Technologists-Mechanical Engineers were the exhibition's organizers. UNIDO—the United Nations Organization for Economic Development—actively participated in its preparation.

Scientific-research institutes, experimental-design bureaus, plants that manufacture series-produced products, production associations and other defense sector organizations primarily from the Russian Federation were the exhibition's participants. Defense enterprises of Ukraine, Lithuania, and Latvia also demonstrated conversion items. Some civilian sector of industry enterprises also demonstrated their products. German, Italian, Finnish, Swiss, Austrian, Japanese and PRC firms participated in the exhibition. Foreign firms displayed interest in cooperating with CIS defense enterprises, providing "know-how", and supplying equipment. Business contacts were established between domestic and foreign organizations that are involved in studying the proposals and needs of converted enterprises with the goal of joint development of specific projects and rendering assistance to these enterprises in resolving problems that they face. The exhibition provided all interested organizations with the opportunity to prepare mutually advantageous import-export operations, discuss cooperation and

compensation opportunities and also to discover the prospects of creating joint ventures.

Highly effective equipment, including electronics, aircraft, medical equipment, instruments, communications systems, consumer goods, and others, and also progressive technologies were exhibited on stands that were located in two pavilions with a total floor space of 10,000 m<sup>2</sup>.

#### Presses

**Bezhet'sk Experimental Pilot-Production Plant (BOEZ)** advertised crankcase mechanical presses of various modifications that are designed for cold stamping-blanking, bending, stretching, perforating and other operations. The offered equipment ensures sanitary standards for noise level and vibration, minimal margins for further processing, is reliable in operation, safe, and does not require the construction of cumbersome and expensive foundations. The plant guarantees the manufacture and delivery of required spare parts for the entire period of equipment utilization.

Technical Data				
Rated force, kN	630	1,000	1,600	3,150
Stroke of slide block, mm	10-85	25-130	160	200
Number of uninterrupted strokes per minute, no less than	90	80	37	32
Dimensions of the deck surface, mm	710 X 480	850 X 560	1,000 X 670	1,000 X 1,000
Total output of electric motors, in kWt	5.5	11.8	13.6	43.3
Dimensions, mm*	1,400 X 1,750 X 2,560	1,430 X 1,850 X 2650	1,765 X 2,000 X 3,560	2,940 X 3,070 X 5,310
Weight, kg	4,100	5,800	13,500	26,200
* Height above floor level				

Nevyansk Mechanical Plant's PLG-30, 100 Plant-Bending Press is designed to bend sheet metal both at major industrial enterprises and also at workshops that are involved with the installation of ventilation pipelines, roofing work,

etc. The ganged punch permits the bending of sheets of various formats and lengths and also carrying out the bending of angles and baffles, and to completely form a closed panel.

Technical Data	
Rated force, kN	300
Maximum length of the gauged punch, mm	1,000 (intervals of 100, 150, 200, 250, 500, and 1000)
Stroke of the Gauged Punch, mm	100
Speed, mm/sec	
—operating stroke	17.7
—return stroke	71.3
Dimensions, mm	1400 x 1505 x 2650
Weight, kg, no more than	2500

PGS semi-automatic hydraulic press is designed to obtain cylinder-type parts from a sheet blank using the method

of consecutive passes, for major specialized enterprises and small industrial sectors.

Nominal Pressure of the upper cylinder (ram), kN	
—During the down stroke	1,000
—During the up stroke	100
Nominal Pressure of the lower cylinder (punch), kN	
During the up stroke	1,000
During the down stroke	500
Stroke of the ram and the punch, mm	400 +/-3
Distance between the deck and the ram, mm	700-1,100
Dimensions of the deck, mm	630 +/-1 X 630 +/-1
Dimensions, mm	1,900 X 1,375 X 3,840
Weight, kg	3,250

Nelidovo Hydraulic Press Plant, that specializes in the production of sheet bending machines and presses for the wood working and furniture industries, advertised sheet bending machines with a swiveling beam (models IV2142,

IV2143, IV2144, IV2145, and IV2146) for the manufacture of cold flexible sheet metal parts. They can equip it with removable devices that permit the manufacture of parts of various configurations, including boxes.

Technical Data					
	Model				
	IV2142	IV2143	IV2144	IV2145	IV2146
Greatest width of the sheet being bent, mm	1,600	2,000	2,500	3,200	4,000
Greatest thickness of the sheet being bent, mm	6.0	5.0	4.5	4.0	3.5
Least internal radius of the bend	1.25 of the thickness of the sheet				
Smallest size of the bent edge	6 thicknesses of a sheet				
Dimensions, mm, no greater than	2,950 X 2,400 X 2,420	3,300 X 2,400 X 2,420	3,790 X 2,400 X 2,420	4,500 X 2,400 X 2,420	5,300 X 2,400 X 2,420
Weight, in kg	5,230	5,580	6,380	7,800	9,280

The sheet bending presses produced by this plant (models IB1430A, IB1430A-01, IB1430A-02) are used in all sectors of mechanical engineering to bend sheet metal.

The benches of the presses are equipped with devices for preliminary deformation that ensures obtaining a bend of heightened accuracy.

Technical Data			
	Model		
	IB1430A	IB1430A-01	IB1430A-02
Rated force, kN	1,000	1,000	1,000
Distance between members, mm	3,150	2,500	2,000
Distance from the axis of the punch to the deck (overhang), mm, no less than	250	250	250
Speed of the punch, in mm per second, no less than			
—During the operating stroke	15	15	15
—During the return stroke	65	65	65
Weight, in kg, no greater than	8,220	7,500	6,800

The P 6316A single-frame press that is manufactured at this plant is designed for pressing, pressing out, bending, fine forming, punching, and calibrating parts.

Technical Data	
Rated force, kN	40
Stroke of the punch, in mm	250
Greatest distance between the deck and the ram, mm	400
Dimensions of the deck, mm	320 X 300
Speed of the ram, in mm per second, no less than:	
During the operating (down) stroke	40
During the no-load (up) stroke	350
Height, mm	1,240
Weight, kg	435

The hydraulic press for cutting meat that was also advertised by this plant permits the cutting and preparation for sale or further processing of frozen meat without wastes and with minimal expenditures of physical

efforts. The pedal control of the knife's movement permits the worker to feed the product into the cutting zone with both hands. Small dimensions and weight permit placement of the press in any room.

Technical Data	
Rated force, kN	42
Stroke of the knife, in mm	405
Speed, in mm per second:	
—of lowering the knife	43.3
—of returning the knife	91.7
Width of the knife, mm	780
Dimensions of the deck, mm	780 X 780
Dimensions, mm	1,130 X 750 X 2,600

Nelidovo Hydraulic Press Plant also advertised the **MSGP-125 Press** for manufacturing brick blocks directly from the ground or components based upon it that are being used for the construction of small homes and buildings, dachas and garden homes, depots, etc. Depending on the technology, the following grades of brick are manufactured: with dry

pressing and firing—150-200 grade, with dry pressing and without firing—70-110 grade with 6% cement and 35-45 grade—without cement. The press can be installed on a model 83011 single-axle trailer-chassis (or a similar one) and in direct proximity to the construction site with the mandatory availability of energy and water supply sources.

Technical Data	
Rated force, kN	980
Capacity, bricks per hour	125
Power consumption, kVt, no greater than	8
Dimensions of the pressing unit, mm	250 X 140 X 140
Weight (with trolley), in tonnes	3.5
Dimensions, mm	
Without a trolley	2,866 X 1,420 X 1,200
With a trolley	4,000 X 2,200 X 2,175

#### Metal Cutting and Woodworking Machine Tools

Savelovskiy "Progress" Production Association's products were represented by several universal machine tools.

The **TVS-100U Precision Lathe** is designed for chucking and centric processing of parts. It permits the conduct of

all types of lathe processing of parts made of various materials, including cutting thread with taps and dies. The lathe is irreplaceable during the manufacture of small parts. It is equipped with three-jawed mechanical and collet chucks and with a set of chucks. Changing the speed of the feed and rotation of the spindle—is variable; the tool holder has four positions.

Technical Data	
Greatest diameter of the blank, mm	125
Greatest length of the surface being processed, mm	180
Movement of the support, mm:	
—Lengthwise	185
—Transverse	115
Rotational speed of the spindle, rpm's <sup>-1</sup>	30-3,500
Consumption of the spindle's electric motor, kVt	4.0
Dimensions, mm	1,650 X 1,100 X 1,540
Weight, kg	1,750

The **UF-200 Universal Milling Machine** has two spindles—vertical and horizontal and four decks—vertical, adjustable

angle, universal angle, and round. The vertical spindle turns in the vertical plane on both sides at 45 degrees.

Technical Data	
Working surface of the decks, mm:	
Vertical	550 X 195
Adjustable angle	630 X 200
Universal angle	500 X 200
Circular	φ250
Greatest movement of the spindles, mm:	
Horizontal	145
Vertical	70
Rotational speed of the spindle, minute <sup>-1</sup>	
Horizontal	100-1,650
Vertical	100-1,900
Dimensions, mm	1,150 X 1,100 X 1,600
Weight, kg	600

The SDF-1 Woodworking Milling Machine is designed for milling wooden items along the guard with manual feed, cutting simple dovetails using a dovetail carriage and curvilinear milling along a pattern with manual feed. The following are used for

milling: surfaces for processing beams and block parquet; contoured, curvilinear and radial surfaces during the manufacture of parts for furniture and baseboards; and, dowels and rings during the manufacture of structural elements.

Technical Data	
Greatest width of the blank being processed, mm	160
Dimensions of the deck surface, mm	1,000 X 800
Greatest vertical movement of the spindle, mm	160
Rotational speed of the spindle, minutes <sup>-1</sup>	3,000, 4,500, 6,000, 9,000
Largest diameter of the cutting instrument, mm	250
Dimensions, mm	1,125 X 1,050 X 1,550
Weight, kg	1,000

Krasnoarmeysk Mechanization NII has developed the ShKZ-M modernized shaped fused charge for cutting various types of metalworks in the open air. It is manufactured from a plastic explosive based on trimethylene trinitramine and is a fuse with a shaped depression that is lead-lined with a metal polymer compound that contains no less than a 92% powder of copper or iron.

The elasticity of the charge insures a close fit to objects of a complex configuration, thanks to which the maximum impact is achieved.

Initiation is from an ED-8 electronic detonator. Seven standard sizes of charges are being produced.

Employment of a fused charge will permit the rapid, and with less labor-intensity, cutting of metalworks of various shapes and ensure the greatest safety of operation in contrast to traditional methods.

Technical Data	
Speed of detonation, meters per second, no less than	7,500
Length, meters	1-30
Maximum thickness of the material (steel 3) being cut, mm	4-25
Weight of 1 running meter, kg	0.08-1.84
Temperature interval of employment, K	233-313
Guaranteed storage period, years	5

**Pumps, Armatures, and Items From Composite Materials and Others ("Iskra" NPO)**

**Pneumatic Membrane Pumps** are designed for pumping abrasion-containing, corrosive, binding, dough-like, and other substances, including mineral acids and alkalis; vegetable oils; solutions of hydrocarbons and organic acids; petroleum products in all

sectors of the national economy, especially in flammable and dangerously explosive industries.

The pumps are portable membrane-type equipment that operate from a compressed air source. They do not require electric motors, transmission devices, foundations or other rigging, they are compact and convenient during transportation, they don't heat up during operation, they are sealed, they don't need lubrication, and they can be operated underwater.

**Technical Data**

Parameters	Type			
	NSM036	NSM050	NSM006	NSM106
Capacity, m <sup>3</sup> per hour	2-10	10-25	0.05-0.1	0.05-0.1
Pressure, meters	18-55	18-55	18-55	18-150
Depth of suction, meters, no less than	5	5	5	5
Rated air pressure, MPa, no less than	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Maximum temperature of the products being pumped, °C	90	90	90	90
Dimensions, mm	320 X 250 X 600	400 X 400 X 800	170 X 130 X 150	160 X 170 X 235
Weight, kg	30	50	8	10

Based upon an agreement, "Iskra" NPO can develop and manufacture pneumatic membrane pumps of any standard sizes with a capacity of no more than 40 m<sup>3</sup> per hour with a pressure of no more than 300 meters.

**Junctions of flexible joints and compensating sealing devices** are designed to connect pipelines and to compensate for the

movements of pipes that are caused by deformations that arise as a result of temperature and mechanical impact. They are used in surface, underground, and underwater pipelines for transporting gas, oil, and petroleum products, and load-bearing standpipes of equipment for drilling and operating underwater wells, and in high-pressure equipment of pumping-compressor stations.

**Technical Data**

Greatest diameter of flow area, mm	1,000
Largest amount of displacement of flanges, mm:	
—angular	10
—linear	50
Greatest internal or external overpressure, MPa	15
Operating temperature, °C	from -20 to +70

**Ball cocks** (cut-off valves) of four standard sizes with manual control (with heating and without heating) are designed for use in the chemical and food industries. Utilization of titanium, stainless steels and new design materials guarantees high technical-economic specifications, a long period of operation and the reliability of these cocks.

**Technical Data**

Pressure, MPa	1.6
Operating environment	fatty acids, soda solutions, soap base, oil solutions, and water steam
Temperature of the operating environment, °C	35 ÷ 180
Maximum momentum, N-m, while controlling a cock of the type:	
Du15	30
Du32	30
Du50	60
Du80	100

**Multi-layered rubber-metallic flexible supports** (designed and manufactured jointly with TsNIISK imeni V.A. Kucherenko) are capable of withstanding significant axial loads and of effectively compensating for the seismic disturbances and vibrations of buildings and structures.

Monitoring the quality of this vibration protection is easily carried out both during assembly and also during the process of operation, and malfunctioning elements can be replaced. Assembly of the vibration protection system does not depend on the course of construction work.

Technical Data	
Frequency of a building's own oscillations on vibration supports, in Hz	7.0
Requirement for rubber per 1,500 tonnes of a building's weight, in tonnes	1
Reduction of a building's level of vibration, dB	by 20-30 (depending on the frequency)
Service life of the supports, years	25

The tanks and devices made from composite materials offered by "Iskra" NPO have high chemical stability in corrosive environments, have significantly less weight than similar tanks made of metals, are resistant to the impact of corrosion, are sealed, and ensure the cleanliness of the operating environment (the absence of ions of iron) etc. Their dual-layer walls can be manufactured from structural fiber glass, organic plastic, chemically stable carbon plastic and other composite materials.

Technical Data	
Volume, m <sup>3</sup>	0.002-100
Diameter, meters	0.1-2.8
Range of operating pressures, MPa	0.1-20
Range of operating temperatures, °C	-50 ÷ +90

"Iskra" NPO demonstrated series produced EPAN carbon filament components of a complex configuration designed for chemical equipment that operates in chemically corrosive environments and also at friction points. The corrosive environments and their concentration and temperature under which EPAN has chemical stability are listed in the table.

Environment	Concentration, %	Temperature, °C
Acids:		
—Nitric	5	40
—Nitric	10	20
—Sulphuric	Up to 50	Up to boiling
—Hydrochloric	Any	Up to boiling
—Phosphoric	85	100
—Acetic	80	Up to boiling
Benzine	100	Up to boiling
Formaldehyde	Any	Up to boiling
Alcohol	Any	Up to boiling

Parts from EPAN carbon filament are manufactured using the compressed molding method in a dimension without subsequent mechanical processing. Their utilization permits us to obtain significant savings of stainless steels and titanium alloys.

Technical Data	
Density, g/cm <sup>3</sup>	1.35-1.45
Ultimate strength, MPa:	
—When compressed	120-150
—When bent	50-80
Impact strength, Joules/m <sup>2</sup>	5,000-6,000
Heat resistance according to Martens, °C	no less than 140

"Iskra" NPO proposes the organization of joint ventures for series production of items based on developed technologies.

Furthermore, "Iskra" NPO proposes the manufacture of parts made from a titanium alloy using the method of casting of meltable models. These parts can be effectively utilized in the chemical, cellulose-paper, metallurgical, food, and medical industries.

Technical Data	
Density of the alloy, g/cm <sup>3</sup>	4.47
Ultimate strength, MPa	833
Yield strength, MPa	735
Elongation, %	5
Impact strength, Joules/m <sup>2</sup>	3

#### Vacuum Smelting and Ladle Plants

The Scientific Research Institute of Aircraft Technology and the Organization of Production (NIAT) advertised the DVL-125 and DVL-200 units to obtain facing castings from titanium alloys. Utilization of a cooled copper crucible in these plants that ensures superheating the fusion to a temperature of up to 300°C provides the capability to obtain a thin-walled casting. The DVL-250 unit is designed to obtain a large casting made from titanium alloys. All three units permit carrying out casting using the centrifugal method and in a stationary mold that has been heated beforehand.

The DVL-125 and DVL-250 units have microprocessor control ("GRAS" micro), the DVL-200—control from a microcomputer.

Technical data			
Capacity of the crucible, kg	125	200	250
Dimensions of the container, mm:			
—Internal diameter	1,000	1,380	1,440 (2,200)
—Height	700	1,000	1,500 (1,000)
Diameter of the expended electrode, mm	280	360	360
Temperature of the heated stationary mold, °C	1,000	—	—
Residual pressure, Pa	$133 \times 10^{-3}$	$133 \times 10^{-3}$	$133 \times 10^{-3}$

#### Equipment for the Agro-industrial Complex

MOTEK Joint-Stock Company advertised the equipment that it developed that is being manufactured by Russian defense complex plants.

**Refrigerated containers** ensure delivery from the field to the shelf without transshipment of plant or animal products in a cooled or frozen state with automatic temperature maintenance in a range from  $-20 \div +10^{\circ}\text{C}$  with an ambient air temperature from  $-40$  to  $+40^{\circ}\text{C}$ .

The containers can be installed in motor vehicle refrigerators, rail flat cars, river and ocean ships, and aircraft and can also be utilized in the form of fixed warehouses. These warehouses connect from two to 127 containers

that have a common monitoring and warning system and are equipped with electrical power systems that ensure they are connected to the common electrical power source.

The monitoring and warning system ensures monitoring the temperature regime in each container and accounting for products from the automated work place (ARM) that can be located at a distance of up to 10 kilometers from the storage site and also transmission to the ARM of information about an accident, fire, or unsanctioned penetration into any container.

The warehouses can be equipped with a suite of loading-unloading devices.

Technical Data			
Type of container	Measurements, mm	Usable space, m <sup>3</sup>	Weight, kg
IAA	12,192 X 2,438 X 2,591	60	5,000
IBB	9,125 X 2,438 X 2,591	44	4,000
ICC	6,058 X 2,438 X 2,591	28	3,000
ID	2,991 X 2,438 X 2,438	12	2,000

Heat transfer coefficient  $0.36 \text{ Wt/m}^2\text{K}$ .

**A rapid freezing and drying shop** for vegetables, fruits and root crops directly at harvest gathering points and also freezing of meat, fowl and fish consists of individual container modules that form three production lines: processing and preparation of products; rapid freezing; and, drying.

The equipment of all of the modules is mounted in uniform containers that are connected into a single production line using connectors and mechanical locks.

The equipment of the shops can be installed in a different configuration (for example, without the drying, everyday, or auxiliary modules; with a vegetable and fruit or root crops receiving and preparation module).

Technical Data	
Capacity, kilograms per day	
For freezing	6,800
For drying	200 (plums), 100 (apples)
Power consumption, kVt	180
Water expenditure, liters per hour	3,000
Number of workers per shift	8

The "Radon" General Container Module is designed to service the work team of the agricultural product processing shop. It is equipped with equipment that is

required to prepare workers for a shift, their relaxation, feeding, fulfillment of hygienic operations, and minor repair of production and general equipment.

It consists of a metal frame, wood panels with heat and an external covering made of corrugated steel sheet.

The water supply is from an external source and an autonomous water supply system from a 1.5m<sup>3</sup> tank has been provided for. Oil electric radiators and electric water heaters are used for heating and hot water supply.

Technical Data	
Usable space, m <sup>2</sup>	32.8
Calculated ambient air temperature, °C	from +40 to -40
Calculated temperature within the module, °C	20-23
Voltage of the power network (50 Hz), V	380/220
Dimensions, mm	12,000 X 3,100 X 2,900
Weight of the module, tonnes	8

A laboratory for microbiological and chemical inspection of raw materials and certification of finished products insures inspection of the quality of fruits and vegetables that come in for processing (incoming inspection) and after processing (acceptance inspection).

Quality, standards, and content of mineral and plant ingredients, sugar, dry substances, moisture, nitrates, and also pathogenic microorganisms, yeast, molds, bacteria in berries, seed and pit fruit, vegetables and greens are inspected using organoleptic, chemical, and microbiological methods.

Technical Data	
Power consumption, kWt	20
Power voltage (50 Hz), V	380/220
Water expenditure, m <sup>3</sup> per hour	0.3
Number of servicing personnel	2
Weight of the installed equipment, tonnes	3
Dimensions, m	12 X 3.1 X 2.9

The IVZ-M1 grain humidity meter that is produced by "Elektrokhimpribor" Combine is designed for rapid determination of the weight fraction of humidity in grain and leguminous crops and processed products. It is utilized while accepting grain from grain deliverers, during mutual calculations, during storage, and post-harvest preprocessing and processing of grain.

Measurement is carried out using a software-digital method using a single-crystal microprocessor. Automatic recording of the results is ensured on a digital screen and printing of the document on a built-in thermal printing device. Automatic adjustment of the results of a measurement from the influence of temperature has been provided for.

Technical Data	
Humidity measurement range, %:	
Of grain	8-35
Of processed grain products	9-16
Accuracy of the measured humidity of grain and its processed products, %	
In subranges 8-17%	+/-1
In subranges 17-35%	+/-1.5
Time of measurement, in minutes, no greater than	1
Average service period, in years	10
Dimensions, mm	
of the initial measuring device	185 X 170 X 105
of the feed device	180 X 140 X 150
of the microprocessor device	335 X 280 X 175
Weight, kg, no greater than	11

The micro-mill that was advertised by "Energiya" NPO is designed to obtain flour of both coarse and fine milling, pulverization of grain wastes, preparation of fodder for domesticated cattle and fowl, etc. at farms, at small flour manufacturing enterprises for children's and dietary feeding, in remote areas that do not have centralized supply of flour and fodder, during the preparation of beer, at military garrisons and border outposts that have their own bakeries, etc.

The micro-mill is mounted on a 6-8 mm thick baseplate. The turning rotor and the fixed stator that have special profiled surfaces are the operating (milling) elements. The rotor is connected to an electric motor by a special coupling. The structure is equipped with a conical loading hopper and with a sleeve for output of the finished product.

The removable rotor is manufactured in two variations: heavy—for obtaining a finely milled product; and, light—for obtaining a coarsely milled product.

Technical Data	
Capacity, kg per hour:	
For corn, soy	60-70
For wheat, millet, and buckwheat	100
Electric motor:	
Consumption, kWt	0.2-0.3
Voltage, V	220
Frequency, Hz	50
Rotational speed, minutes <sup>-1</sup>	2,900
Weight, kg	10

"Potok" PO advertised automated laminated units for cooling milk, kefir [fermented goat's milk], wine, drinking wort, ice cream mixtures, heating milk before separation and milk for cheese plants and pasteurization of cream, milk, and sour

milk products. The varied technological equipment is designed for a 12-year service period (five years until major overhaul) and is equipped with an automated technological process monitoring and regulating system.

#### Technical Data

Parameters	Coolers and cooling units	Heating units	Pasteurization-cooling units
Capacity, liters per hour	1,250-25,000	5,000-25,000	2,000-15,000
Temperature, °C:			
Of the arriving product	15-90	5-10	5-45
Of pasteurization	—	—	76-95
Of cooling (heating)	+2 ÷ -12	30-45	2-50
Consumed electricity, kVt per hour	1.8; 3.3	1.3-5.2	1.6-13.0
Occupied space, m <sup>2</sup>	0.92-4.3	2.5-4.15	6.5-19.0
Weight, kg	700-1,700	470-785	1,360-4,400

The listed technical data of the equipment being produced is constantly being improved and the product list is being expanded.

"Potok" PO also produces OOV-1.25, OOV-2.5 and OOV-5 coolers with a purified surface that are designed for cooling a continuous flow of any mixtures of ice

cream and other highly-viscous liquids: high-fat creams, sour cream, condensed milk, animal fat, vegetable and fruit puree, candy and cosmetic creams, and others.

The coolers consist of a heat exchanger, a control panel and a brine filter. The heat exchanger consists of the housing, a cooling section and a drive.

#### Technical Data

	Brand		
	OOV-1.25	OOV-2.5	OOV-5
Capacity, kg per hour	1,250	2,500	5,000
Coefficient of automation		0.85	
Heat exchanger surface, m <sup>2</sup>	2.5	5.0	10.0
Temperature, °C:			
Of the product exiting the cooler		+2 ÷ +6	
Of the cold carrier at the entry to the cooler		-7	
Of the product at the entry to the cooler		+40	
Established output of the electric motor, kVt	1.5	2.2	4.0
Expenditure of cold (outgoing heat), kVt, no more than	50	110	200
Weight, kg, no more than	750	850	1,100
Occupied space, m <sup>2</sup>	1.7	1.9	3.2

Furthermore, "Potok" PO advertised a suite of FOM [filtering and cooling milk] equipment for filtering and cooling milk at dairy farms. This equipment is designed as a unit with equipment that is designed for milking into portable pails and also with milking equipment that

has a milk pipeline and accumulation-evacuation tank for the milk. It consists of a reception tank, a centrifugal pump, a filter with a disposable nonwoven filtering element, a laminated cooler, and an automatic control panel for pumping milk from the reception tank.

Technical Data	
Greatest capacity, liters per hour	1,250
Quantity of milk that has been purified prior to replacing the filtering element, kg	4,000
Temperature of the milk, °C:	
Final temperature, no greater than	5
Initial temperature	20-35
Prescribed consumption of the pump, kVt	1.1
Capacity of the reception tank, liters	120
Dimensions, mm	
Of the filter-cooler	670 X 240 X 1,010
Of the reception tank	φ510 X 930
Weight, kg:	
Of the filter-cooler	65
Of the reception tank	15
Of the pump	30

The "Atsenol-ShN" polimerattraktantnyy [not found] flexible braid, developed by Krasnoarmeysk NII of Mechanization and Vegetation Chemical Protection Systems NII, was designed to combat eastern and plum tortricidae through disorientation. It is manufactured from a plasticized polymer and wastes of wood working production with the addition of acelon—similar to a natural substance that is secreted by tortricidae females to attract males.

Resistant to the affect of ultraviolet radiation, humidity and other climactic factors during the course of the period of biological activity; suitably attaches to branches of trees; and, does not have a negative impact on useful insects. Employment of the braid will permit: a reduction of the damage of fruit to 0.05%; to obtain an ecologically clean product; and, to exclude the use of insecticides.

Technical Data	
Dimensions, mm	φ(3+/-0.1) X 200 +/-10
Temperature interval of operation, °C	0 ÷ +50
Biological activity, years	0.5
Number of braids per 1 hectare of garden in season (120-150 days)	1,000

The equipment for preparing and boiling sugar-molasses syrups, developed and manufactured by Krasnoarmeysk NII of Mechanization, has been manufactured in the form of individual modules and is used in the candy and bread baking industries. High output is achieved thanks to boiling the syrup in a thin layer; the availability of a foam suppressor; and, use of hydrodynamic cavitation

for rapid dissolving of the granulated sugar. The equipment is universally and easily incorporated into any modern production lines.

Technical Data	
Quantity of simultaneously prepared syrup recipes	2
Output for boiled syrup with a humidity of up to 4%, kilograms per hour	500
Consumed power, kVt	32.2
Expenditure of steam, kg per hour	238.20

This same NII produces an automated line for production of dry rapid preparation children's food products on a grain-milk base with automated packaging of the finished product in 250 and 500 gram boxes. The line consists of sectors of component preparation, obtaining rapid-rising flour, the mixture of dry components, bagging and packaging of the finished product.

It is equipped with a control system based on programmed controllers that permit control of the course of the technological process, to conduct inventory of raw materials and the finished product, and to perform diagnostics of the condition of the equipment.

It was developed in the CIS for the first time and will permit us to reject deliveries of expensive imported equipment.

Technical Data	
Output (of the finished product), kg per hour	1,500
Consumed power, kVt	750
Expenditure:	
of steam, kg per hour	500
of water, M <sup>3</sup> per hour	6
of compressed air, nm <sup>3</sup> per hour	1,000
of nitrogen, nm <sup>3</sup> per hour	70
Number of servicing personnel	20
Largest number of components being introduced	6
Weight, kg	220

Krasnoarmeysk NII of Mechanization has developed and is manufacturing the AL-500 PKKhS automated production line. It is designed for the preparation of mass candy using the cold mixing method and forming candy of the "Podolchanka", "Sonet", "Akvarel", "Tango" and other types.

It consists of sectors for preparing sugar powder, preparation of the mixed-liquid phase, mixing, drying, and forming.

Technical Data	
Output, kg per hour	500
Dosage accuracy, %	+/-1
Fineness of the granulated sugar syrup, mkm	48
Consumed output, kVt	56.36
Expenditure of compressed air under pressure of 0.3 MPa, m <sup>3</sup> per hour	28.2
Occupied space, m <sup>2</sup>	131
Weight, kg	12,500

The VD-20K strain-gage weighing machine, also advertised by this NII, is designed for weighing items by the piece (candy, caramel, taffy in a wrapper, pastry, cakes, etc.) during loading into a package of a different configuration and weight.

It permits compensation for the weight of the weighing hopper prior to the beginning of the weighing, assigns the weight of the batch and the tolerance for the batch, indicates the weight of the received batch, controls the received batch by weight and initiates the result of the monitoring, conducts the calculation and indication of the number of formed batches and the total weight of the product that has been poured into a package since the beginning of the shift. Adjustment for a false fill guarantees high accuracy and metrological reliability of weighing.

Filling the service hopper is carried out according to a signal from the built-in level signaler that prevents overfilling the hopper. It can operate both in the manual and in the automatic mode.

Technical Data	
Range of weight, kg	5 ÷ 20
Relative weight accuracy, %, no worse than	+/-0.5
Relative accuracy of controlling weight, %, no worse than	+/-0.1
Output, tonnes per hour	1.0 ÷ 1.3
Discreteness of the task of weighing the batch, kg	0.1

"Sviyaga" TPO demonstrated the GE-15 Electric Grill for roasting chickens and meat at public catering enterprises.

Technical Data	
Output (roasted chickens), kg per hour	20 +/-5
Time to heat the air in the operating chamber to 250°C, minutes no more than	15
Rated output, kVt	15
Rated voltage of three-phase alternating current, V	380
Dimensions, mm	1,000 +/-5 X 1,000 +/-5 X 2,180 +/-5
Weight, kg, no more than	250

A tank-container, manufactured by Nyuva Metallurgical Plant, is designed for storage and transportation of liquid and pureed food products by water, rail, and motor vehicle transport under conditions of a moderate or tropical climate.

The tank-container is an all-metal construction waterproof design that consists of a standard and large-tonnage container and a tank that is rigidly attached to it. The container's internal walls are covered with heat insulation made of polyurethane foam that ensures a decline of temperatures of the product within +/-3° during the course of 72 hours.

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Technical Data	
Capacity, m <sup>3</sup>	16.5
Dimensions, mm	6,058 X 2,591 X 2,438
Weight, tonnes:	
Of the tank-container itself	4.4
Maximum weight, with the product	24.0

**Addresses for Queries and Information**

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	Telex: 171835
Nevyansk Mechanical Plant	1, Oktyabrskiy Prospekt, Nevyansk, Sverdlovsk Oblast, 624170
	Telephone: 2-14-60; 2-15-54; 2-26-46
	Teletype: 348213; 348221 ELAK
	Telex: 721522 STAN SU
	Fax: (34356) 22490
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	Telephone: (095) 584-16-43
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	Telephone: 4-11-37; 4-12-69
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	Teletype: 224156, 224113 LUNA
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### Survey of Conversion in Siberia

*93UM0699A Novosibirsk DELOVAYA SIBIR in Russian No 24, Jun 93 p 12*

[Article by Doctor of Economic Sciences, RAN [Russian Academy of Sciences] SO [Siberian Department] Institute of Economics and the Organization of Industrial Production Deputy Director Sergey Kazantsev, under the rubric: "Conversion in Siberia": "Selection of Directions"]

[Text] In the previous issue, we began a series of articles on this important topic for the region. Today—is the second article of the cycle dedicated to the problems of investment policy in the defense complex.

### PRIORITIES FOR INVESTORS

Under conditions of the strict limitation of resources, knowledge of investment predisposition will help not only to correctly determine the needs toward the satisfaction of which we must work but also to find a potential companion in the realization of projects.

The analysis of the investment predisposition of state and private structures that we managed to accomplish based upon expert assessments indicated that all economic subjects consider financing short-term and very short-term measures to be more effective until normalization of the economic situation. Major reconstruction-type investment projects of existing plants and the construction of new plants are not economically advantageous from the point of view of the short-term perspective (if only because it is still unclear what kinds of plants will survive and what kinds of products society will need).

An especially complicated situation is being brought to light with regard to financing high-tech production. This production is not new for foreign investors but there are still few commercial structures in Russia that have accumulated sufficient capital and are ready to invest it in long-term high-tech research and development of new technologies and products. Furthermore, there are apparently still no experts with the required level of skill in the commercial structures who are

capable of sufficiently accurately developing long-term policy in the sphere of technological innovations.

In the sphere of the production of investments, preference is being given to two groups of sectors:

1) sectors which, with relatively small amounts of capital investments can produce competitive goods and services on the world market. These are the sectors that extract precious, rare-earth and non-ferrous metals; sectors of the fuel-energy complex; the petrochemical industry; modern transportation and communications systems; and, the leisure industry and hotel management;

2) sectors whose products are enjoying increased demand on the domestic market and are capable of yielding substantial income. They are the production and processing of agricultural products; housing construction; development of a public catering network; paid health care; and, the biotechnical industries.

The local administration is interested in strengthening the territory's export potential, organizing production of products that are being imported into the region (first of all, that replace imported products), introducing energy and resource conservation technologies and reprocessing industrial and household wastes.

Investments in housing construction, the acquisition of land and garden plots, durable goods, and long-life food products, and precious metals are attractive for the population.

In the sphere of financial investments, securities of financial institutions and hard currency pose the greatest interest for

economic subjects. Foreign investors (first of all from the states that have divided from the USSR) are inclined to acquire securities of industrial enterprises. And our enterprises are taking that trend into account. So, a sociological survey of several Novosibirsk enterprises indicated that the highest level of their leaders are oriented primarily on foreign investors: 18% of those surveyed talked about the attraction of foreign investors for participation in projects being undertaken and 9% talked about the initiation of the attraction of native private investors.

Based upon polls of Moscow sociologists, more than two times as many potential investors want to purchase bank stocks than industrial company stocks. This attests to the presence of fierce competitors among defense complex companies that are becoming stock companies in the struggle for investment resources

### PRIORITIES FOR CONVERSION

Analysis of the activities of 66 Siberian enterprises that are being converted indicated that the goods being produced by them cover the positions on the directions of conversion that are being discussed (see the table). In the process, all of them are diversifying their civilian products and are developing both producer goods for various sectors of the national economy and also products that are typical for these sectors. And these enterprises are creating only producer goods for the light and food industries, sales and public catering alone. The largest number of enterprises being examined produce chemical-timber complex (KhLK) and metallurgical complex products and also producer goods for the food industry.

**Distribution of Siberian Enterprises by Types of Developed Civilian Products**  
(% of the number of enterprises that are part of the sample)

Complex, Sector	Kray		Oblast						Other regions	Total
	Krasnoyarsk	Irkutsk	Kemerovo	Novosibirsk	Omsk	Tomsk	Chita			
Chemical-Timber	9.1	6.1	4.5	1.5	12.1	1.5	3.0	4.5	1.5	43.8
Metallurgical	1.5	6.1	0.0	4.5	3.0	1.5	1.5	4.5	1.5	24.1
Agro-Industrial	1.5	3.0	0.0	3.0	7.6	3.0	1.5	0.0	1.5	21.1
Transportation	4.5	1.5	1.5	1.5	1.5	3.0	3.0	1.5	3.0	21.0
Construction	3.0	4.5	0.0	3.0	4.5	0.0	1.5	1.5	0.0	18.0
Fuel-Energy	1.5	4.5	0.0	0.0	3.0	3.0	1.5	3.0	0.0	16.5
Communications	0.0	3.0	1.5	1.5	6.1	4.5	4.5	0.0	0.0	21.1
Sales and public catering	0.0	1.5	0.0	1.5	1.5	3.0	1.5	0.0	0.0	9.0
Food Industry	1.5	7.6	1.5	3.0	3.0	4.5	1.5	1.5	0.0	24.1
Light industry	1.5	1.5	0.0	0.0	3.0	0.0	0.0	0.0	0.0	6.0
Public health	6.1	3.0	1.5	1.5	6.1	0.0	4.5	0.0	0.0	22.7

The enterprises being examined practically do not produce ecological products and are not oriented toward that sphere.

Analysis of the data in the table shows that the primary portion of the enterprises of the sample being examined (53%) in the output of civilian products are oriented toward the social complex (light and food industry, and

public health), and the chemical-timber (44%) and metallurgical (24%) complexes, APK [agro-industrial complex], the transportation complex and communications (21%), construction (18%) and fuel-energy (17%) complexes, and sales and public catering (9%). Furthermore, many enterprises produce general machinebuilding products.

According to regions, the following specialization of the examined converted enterprises has been noted. In Altay Kray, defense complex enterprises have selected the chemical-timber, public health, and transportation complexes as the primary direction of conversion, in Irkutsk Oblast—the chemical-timber complex, in Kemerovo—the metallurgical complex, in Krasnoyarsk Kray—the food industry, chemical-timber and metallurgical complexes, in Novosibirsk Oblast—the chemical-timber and agro-industrial complexes, in Tomsk Oblast—communications and public health, in Omsk—communications and the food industry and, in Chita Oblast—the chemical-timber, fuel-energy and metallurgical complexes.

Comparing the industrial requirements being expressed for the production of machine tools by other sectors of the national economy with the investment preferences of economic subjects and the priority directions of conversion that have been defined by the Russian Federation Government, let's point out that directions of conversion that are oriented on the development of products for these sectors of the national economy must enjoy a priority from the point of view of the development of transportation, communications and sales, fuel-energy, metallurgical and chemical-timber complexes, improvement of the ecological situation and the development of public health.

Proceeding from the investment preferences of economic subjects, it is advisable for converted enterprises and organizations to be oriented toward:

**production of products for the extractive sectors, agriculture and the food industry—first of all through the organization of the production of promising products and goods that have already been mastered by domestic producers and that replace products that are not produced in the Russian Federation;**

**development of technological processes for obtaining precious, rare-earth, and non-ferrous metals, and products that are ecologically-clean and not harmful to the environment.**

For the Siberian region, while considering the dominating role of the extractive industry in it, the structural reformation of the defense complex toward the fuel-energy, extractive, transportation and metallurgical sectors of the economy is attractive.

In our opinion, it is advantageous for the state to assist (to allocate resources, to grant benefits, etc.) enterprises in the development of sales systems, in maintaining employment with the goal of preventing a dangerous increase of the number of unemployed through a social upheaval, and to maintain production to promote the expansion and consolidation of reforms. Since that is not the financing of major investment projects that require the accumulation of significant resources, we can allocate money to enterprises in portions and, depending on their accomplishment of programs for the development of product sales systems, the reduction of delays in the production and sale of products, the creation of contemporary jobs, retooling production, etc.

Furthermore, the state structures of all civilized countries act as the primary investor in the sphere of the ecology and public health and are involved with the development of education and the social infrastructure. We must certify with regret that Russian state institutions, at least for the next 3-5 years, will not be able to ensure the required level of financial, material-technical, information and cadre support of these spheres that are most important for the nation's survival. Therefore, for example, with the realization of the medical equipment production program, the thorough development of the opportunities to obtain the state order for its production, market conditions, and also joint work at all stages of the development of products with public health organs are needed.

### **Financial Problems, Future of Closed Cities Discussed**

*93UM0634A Moscow KRSNAYA ZVEZDA in Russian 26 Jun 93 p 4*

[Article by KRSNAYA ZVEZDA Correspondent Mikhail Rebrov, under the rubric: "Defense Complex": "Zero" Cities: Hidden Behind Barbed Wire, They Strengthened the Fatherland's Defense Might for Decades. What Awaits Them in the Future?"]

[Text] Cities, like people, have their own biography and their own fate. If you like, they also have their own profession. It has been written about them: dig ore or sew linen, build ships or print books... From there it also goes: city of metallurgists, city of miners, city of ship-builders or textile workers. Others have acquired a profession in accordance with that severe and troubling time and have received names among the people that are different from those that were indicated in official administrative-territorial information guidebooks: Atomsk, Zvezdograd, Lesnoy... But there are even those which were not at all designated on a single map. You could not have heard about them—even spy information did not penetrate the strict regimented surveillance due to the "Iron Curtain".

### **Two Sides of the Coin**

The cities are behind barbed wire. With a special entry mode, remote from administrative centers, they lived a saturated and frequently dramatic life for many years, did great things, and it was as if they didn't exist for the outside world. Arzamas-16, Penza-19, Chelyabinsk-40, Krasnoyarsk-26. Peaceful... Outwardly they are different—based upon geographic coordinates and natural conditions, the nature of the production structures and the distinctive quality of the multi-story apartment houses... But there is something in common—the geometric nature of the planning of the streets, the buildings of the first development in the style of Empire, the soldiers marching along the city square, the strict guarding of facilities...

There were also buses and electric trolleys going somewhere that appeared at first glance to be normal—Zhukovskiy, Kaliningrad, Protvino, Chernogolovka, Obolensk... But the GAI [State Automobile Inspection] posts did not permit vehicles with diplomatic license plates to enter there, they could take up residence at the hotels based upon special authorization, and they did not permit foreigners to go near enterprises with innocent signs like "Machine Building Plant".

The social living standards of the closed cities were noticeably higher than beyond their limits. Salaries were a bit higher and provisioning was excellent. Here you had a kindergarten and a sports complex close at hand and schools teach one shift. Here apartments were a bit better and, let them be, as it is customary to say, departmental but no one was called upon to endure a line until the year 2000.

But there was another side to this "coin". Work discipline was an order of magnitude higher than anywhere else in the country. In previous years, uniquely skilled specialists did not know ordinary vacations. They relaxed locally, indeed, they received large amounts of money as compensation. A departure associated with hiring was authorized for far from everyone. They raised their children. Having received the "O.K." from the "facility" director, they left to study in the "Large Land" and nearly everyone returned to "their" city to continue the work of their fathers and grandfathers.

"We arrived at Arzamas-16, at that time it was Sarov, from Kramatorsk," Vladimir Aleksandrovich Belugin, currently director of the Federal Nuclear Center, told me. "My father worked at the numbered plant, at 550th, where they made projectiles for 'Katyushas'. Later he moved to the 'facility'. I graduated from school in 1948 and I only entered the institute a year later. General Zernov, he was the first director, specially went to see Beriya in order to obtain authorization for the departure of 11 school children. Approval came a day prior to the end of the acceptance of documents at Kazan Aviation Institute... Whoever did not return here ended up at a second 'facility' that was created in the Urals..."

The long-time residents of the "zero" cities who were assembled at one time by Beriya's department from the entire country worked conscientiously for decades, acknowledging with pride that they were involved in a most important cause for the Fatherland. As a rule, they were reticent people, they didn't ask any superfluous questions, they didn't talk about themselves, although each of them had an era behind them. They made our first atomic bomb, they started our first nuclear reactor for the production of atomic "filling" of Soviet weapons, they developed hydrogen bombs and war heads for intercontinental ballistic missiles, they designed and assembled these same missiles, made special satellites, and they were involved with the science that was laid at the foundation of our nuclear "shield"...

Academicians A.D. Sakharov, Yu.B. Khariton, Ye.I. Zababakhin, K.I. Shchelkin, Ye.A. Negin, Yu.A. Trutnev, A.I. Pavlovskiy, and I.K. Kikoin... The scientific elite, a constellation of names.

If we talk about the "technical equipment" of the at one time closed cities, it, I will not be afraid of this assertion, was an order of magnitude higher in many regards than anywhere else on the planet. At Krasnoarmeysk-45, a unique underground nuclear power plant of a mining-chemical combine was located at a depth of 250 meters; there are ultra-modern research and test facilities at Arzamas-16, the most powerful capacity at Chelyabinsk-40, and accelerators and cyclotrons at Protvino and Dubna...

It is difficult to transmit your sensations when you see individual atoms of a substance on a photo made via an electron microscope or when you hold in the palm of your hand a very small semiconductor laser that is a fraction of a millimeter in size. It is capable of transmitting information that is adequate for the simultaneous transmission of thousands of television programs through a fine optical cable that is similar to a fishing line... There is not enough time or imagination to represent even approximately all of the variety of the work, topics, and directions. These are billionths of a second, temperatures hotter than a thousand Suns, pressure in billions of atmospheres, materials with a purity of seven ninths after the decimal point (there are no similar ones in the world), basic discoveries...

Many, many billions even at the old prices were invested in the development of the scientific and production facilities of the small islands of the nuclear and space archipelago.

### The Shadow of Catastrophe

The time certainly will come and it is not so far away and many of the closed cities will become open. How to shift them to peaceful rails without tearing down the colossal potential, how to resolve the many problems that have been accentuated with great urgency already today?

Stanislav Nikolayevich Voronin, Chief Designer of Atomic and Hydrogen Weapons (there are a total of four such officials in the country) picked up another cigarette and, after a long drag, said: "It's impossible to build logic on absurdities. Even if Russia accepts the status of a nonnuclear power, it is criminal to destroy or pull apart that which we rightfully call the 'brain center' that is capable of giving material form to the most complex scientific and technical ideas".

We need to admit: purely theoretical conversations on that topic have been occurring for a long time. But for now they are only conversations. But life with all of its realities is already beginning to weigh down. And perceptibly. By the end of the 1980's, the majority of the closed cities turned out to be in a stagnant state for a whole series of reasons. Economic chaos and wholesale

conversion worsened their situation. The previous privilege—Atomograds, Raketograds, cities of chemists and physicists, yes and others like them were supplied with everything they needed from the center—has now been wrapped with misfortune. Centralized supply already does not exist, and expenditures simply have not been provided for the “ghost-cities” in kray and oblast budgets. How do we emerge from this situation? Zealous marketeers say: barter. But you will agree that ultra-pure uranium or plutonium, a nuclear warhead or a spy satellite—is not the best good for in kind exchange...

And mundane concerns drive us to pasture. And material burdens can turn into tragedies similar to that which occurred at Tomsk-7 this April. And that alarm is entirely substantiated. A half-starving man at a nuclear production facility is a dangerous worker. His mind is on everything but the strict technological process.

Incidentally, about accidents. In fairness, we need to say that they are single occurrences at regimented cities. But if they do occur, then the echo and traces of them will remain for a long time: so to speak, the specific nature of production... The Americans and the French have had extraordinary situations... A breakthrough into the unexplored has always been associated with a certain risk and a large one. Alas, that factor is indisputable.

#### The Golden Fleece Doesn't Grow on Buffaloes

This figure recently flashed by in the press: the budget deficit of the cities of science that is required for maintenance alone totals from 40-90%. I do not know whether it has been increased or, on the contrary, lowered. Somehow or other, uncoordinated, fragmented, “patch-work” and, on the whole, inadequate financing is present.

“In part, the ‘hopelessness’ of the situation is that fact that even if you assume that the enterprises are 100% provided for by the state budget and all taxes collected on the territory of the naukograd [science-city] remain in its budget, we still won't be able to completely eliminate the deficit,” thinks Union for the Development of Naukogrady [Science-Cities] (there is such a thing!) Vice President N.K. Nikitin. “Yes, and who said that the naukograd must live as a normal, historically developed city? It has an entirely different purpose. Yes this is not at all a city but it is a scientific-technical complex. Apply those requirements to naukograd as to a comprehensively developed industrial center, it is the same as breeding a rare strain of golden-fleeced lamb for decades and then suddenly harness it to a yoke and demand strength as from a buffalo, and at the same time ‘cost recovery’: why don't you give milk like a dairy cow?”

Alas, this is no joke. The situation continues to remain serious, if you can't say more. Academician Lieutenant-General Ye.A. Negin noted bitterly: “How can all of these misfortunes not result in the loss of leadership”. And that danger is not at all exaggerated. Let's think about what will occur if the first (and main!) element falls out of the triad of “basic research—applied

research—equipment”? The answer is simple: if the feed maintenance of science with fundamental ideas dries up, it will wither and will be transformed into a craft.

And this is the comparison that TsAGI [Central Institute of Aerodynamics imeni N.Ye. Zhukovskiy] Director G.I. Zagaynov (Zhukovskiy) cited: one kilogram of the weight of a fighter aircraft costs up to \$2,000 on the world market, one kilogram of the weight of an automobile costs \$10-15, and one kilogram of the weight of frying pans is another order of magnitude lower. These figures suggest the enormous science-intensive nature of the aviation industry and about the level of its technical equipment.

VNII [All-Union Scientific Research Institute] for Experimental Physics Head V.A. Belugin (Arzamas-16) complained that institute associates are not being paid their salaries for months and that people have been compelled to work a reduced work week and added angrily: “We certainly need to reduce weapons—tanks, aircraft, missiles, and warheads. But what has that got to do with scientific-research work?”

And you can't object to him. Just what “security” is and what “sufficiency” is are being interpreted in different ways in the world today. One thing is not in doubt: the nuclear arsenal—this is a weapon of political deterrence. They beat and rob the powerless and dictate conditions to them. But a great country—this is first of all respect for it. Why are the Americans persistently and purposefully improving their weapons? They say: for security. And now do we really not need security?

At one time Arzamas-16 Gorsovet Chairman V. Takoyev sent a note to the President of Russia in which he set forth his concerns. In it, he raised the question on the status of the closed city, thinking that its residents must be socially protected since they voluntarily live and work behind barbed wire where their rights have been closed for some reasons or other.

In February 1992, the president visited Arzamas-16. There were many meetings and conversations and there were many timely questions. As a result of the trip, the Edict was signed on the Creation of Two Russian Federal Nuclear Scientific Centers at Arzamas-16 and Chelyabinsk-70 Based on VNII [All-Union Scientific Research Institute]. The decision was timely but the issue on the mechanism for financing the centers for the nuclear workers and the cities on the whole still remains open. Yes and the concept for the further utilization of their intellectual and technological potential still remains unclear.

#### From Plutonium to Screw Drivers?

Each naukograd or tekhnopolis has its own specific features and there cannot be a single approach to their structural transformations. This also concerns both conversion, privatization, and forming joint-stock companies... Active searches are being conducted for ways to reorient production and to utilize specialists in their

fields at "Mayak" Chemical Combine (Chelyabinsk-40). Here in less than a year they have developed and introduced their own radiation technology for manufacturing ion-selective films for chemical sources of current. The new production has been located in the weapons-grade plutonium processing reactor building that was halted in 1989. Studies of other radiation technologies that have been employed in various sectors of the national economy and medicine are being intensively conducted. However, under the absence of broad cooperation of enterprises in the direction of conversion, any of these innovations is being introduced very slowly and with a large overexpenditure of resources.

At one time, they planned to build a powerful AES [nuclear power plant] with fast neutron reactors alongside the cooling "combat" reactors. The outstanding operators and other experienced and highly skilled specialists could have transferred to work there. The atom that had been working for war could be laboring for peace through their hands. The plan for that plant was prepared and comprehensively discussed, committees of experts were conducted, but the project came to a halt.

A portion of society that was frightened by Chernobyl is protesting. So they are "demobilizing" people, they are leaving, and the "fathers" of the apartment building city have headaches as they attempt to figure out how to supply it with heat and electricity. And this is also a problem which requires a solution.

Secret Plant Director (Krasnoyarsk-45) A. Shubin has his own headache; programs have been slowed down and you won't make money during downtime.

There is an applied mechanics NPO [Scientific Production Association] at the "numbered" Krasnoyarsk plant—that is the leading enterprise in the country for missile-space communications and television systems. The firm's General Director, Academician M.F. Reshetnev, a comrade-in-arms and associate of S.P. Korolev, began the development at this facility of the Molniya, Raduga, Gorizont, Ekran, Luch, Tsikada, Glonas (the latter two for navigation), Geo-IK, and Etalon (geodesic) satellites... Objective assessments of these "items" are most ecstatic. But today's misfortunes of the space NPO are hardly distinguishable from the misfortunes of the nuclear workers or the chemists. The firm manufactures children's sports trainers, canteens and "health disks". And that at a time when the collective is capable of setting up normal communications on the territory of all of Russia! And we are in 27th place in the world based upon the number of telephones...

Such are the "particulars". And if we talk about the total possible directions of conversion, here these variations are being tracked. First—transformation of existing science-intensive technologies to other sectors of the national economy. For example, at TsAGI (Zhukovskiy)—the transfer of aviation design testing technology for durability and serviceability to the automobile and tractor industry. Something similar is occurring

in Kaliningrad (TsNIIIMash [Central Scientific Research Institute for Machinery], Energiya and Kompozit NPOs...).

The difficulty is that in a number of cases this transformation is encountering small series production. A search for partners is needed for large series production. However, the positive thing is that the high scientific-technical potential of the enterprises is being used and may be preserved.

The second path—is the involvement of technologies (they are called "spin offs") for the production of consumer goods. But even here there are their "buts". The technique is good because, they told me, it permits providing work for unskilled associates, however, it requires monitoring and regulation. If a search for jobs is the only goal of conversion, there is a danger that unique plant will begin to produce products that are totally inadequate to their technological potential.

There is one other danger—in the free uncontrolled market conditions that have developed, the scientific-technical level of the named centers can be undermined by the attractiveness of hasty, wholesale imports: they say, everything overseas is better. Let's recall the situation with the influx of computer equipment, and often not of the best quality, into the country. It hit domestic enterprises so hard that some of them are still knocked out.

#### A Life Preserver or a Millstone Around One's Neck?

Privatization. Here we also need a purely individual approach. Some enterprises may be totally privatized but others that have unique research and experimental facilities must remain federal property. But since they were built according to the principle of "subsistence economy" (they have auxiliary buildings, cultural and consumer services facilities, transportation, etc.), then this, side portion, can also be privatized. That's what the experts think.

As for formation of joint-stock companies, then many people with whom I had the opportunity to speak on this topic think that it is advisable to organize a holding company based on major enterprises, the stockholders of which will become first of all associates of the primary enterprise. They propose creating a system of subsidiaries around it that will adapt the high technologies of the core-enterprise, master other technologies, and conduct commercial activities. This actually signifies the organization of "technoparks" based on major production within which an effective system can be set up for high technology transfer to the national economy since stimuli for this transfer can be set up here from the very beginning.

An example? That same firm of Mikhail Fedorovich Reshetnev's. The NPO is developing a series of new generation geostationary satellites. At the same time, it has become the co-founder of "Informkosmos" Association that was created for the development, manufacture

and commercial operation of the "Ekspress" satellite system. "Vostok" Commercial Bank undertook the financing of this work. Will these plans sell? We will hope so. Only you can hardly count on success without preserving the economic ties that have developed over the years.

### The Damage of "Regimented" Approaches

Analysis of the situation surrounding and within the closed cities shows that their misfortunes have been caused not only by the transition to the market economy and the reduction of the budget. "Regimented" approaches that are exacerbating the situation under current conditions were placed in the formation of scientific and production complexes several decades ago. What do we have in mind here?

The creation of "zero" cities—naukograds and tekhnopolises—required the concentration of talented scientists and highly skilled workers by selecting them from the associates of leading NII's [scientific research institutes] and KB's [design bureaus] and graduates of the country's best VUZs [higher educational institutions]. At the same time, a system of professional training of specialists from natives of the region was not placed in the closed cities. Much later, they attempted to resolve the shortage of skilled cadres by creating branches of higher educational institutions in these cities. But the problem did not lose its urgency.

The cadre composition of scientific and production centers has turned out to be quite dissimilar: with the presence of a world-class scientific-technical elite, a large percentage of workers—are professionally untrained people who frequently have not obtained the required work skills. This has become the cause of social tension both in the NII and KB collectives and also in the cities themselves.

The past speaks for itself and therefore we can say with certainty: the most unique research, design, production and test collectives are doomed to the loss of their personality and uniqueness and will be transformed into rank and file organizations in a generation or two without a new, thoroughly thought-out cadre policy (including an education system).

This question is not as simple as it may appear to be at first glance. The needs of even one naukograd or tekhnopolis are extraordinarily great in the spectrum of specialties: from scientists (physicists, mathematicians, chemists, programmers, etc.) electrical engineers, radiation experts, designers, mechanics, hydraulics experts, heat technicians, etc., to doctors, teachers, bookkeepers, economists...

In a word, even today "cadres resolve everything". But no one, not even the largest naukograd, is capable of organizing the training of specialists of such varied skills.

### Resolve the Problems in Stavanger?

The survival strategy of the "zero" cities is more or less becoming clear. This is the structural restructuring of enterprises and the diversion of the excess associates to the development of other sectors. This transformation signifies the structural restructuring of the cities, the reduction of the strength of those working directly in the atomic, aviation of missile-space industry and the shift of these people to work in the interest of other production with a much higher percentage of output and market products. Under the rational placement of the matter in the naukograd or tekhnopolis, the regulated outflow of cadres from defense enterprises can ensure the normal functioning of the infrastructure of the cities—the municipal economy.

Further. Since the majority of converted enterprise have technologies that pose interest for the region (for agriculture, medicine, construction, transportation, ecology, etc.), the organization of the cooperation of defense enterprises with all other enterprises of the region and the joint resolution of the problems of land, housing, foodstuffs, medical services, and engineering and scientific support of these enterprises is possible.

These approaches were discussed last year at the Norwegian city of Stavanger where an international conference took place that was devoted to the problems of closed cities in the former Union. Experts from Scandinavia, the United States, Great Britain, and other countries were present at it. I can suggest that there was no shortage of advice and best wishes at that conference. But I think that we can better resolve our problems in our country and not in Norway. All the more so that all of the hopes will be reduced only to will we manage to legally protect the interests of the closed cities and science as a whole. This work is occurring in the government but concern remains: our law-making, as a rule, lags behind. All the more so that bureaucracy, as a rule, does not rush to execute them. Here, without exaggeration, delay is like death.

Right now more than a million people live in the "zero" cities—Arzamas-16, "Nineteenth City", Sverdlovsk-16, Tomsk-7, Klimovsk, Chelyabinsk-40, Plesetsk, and other closed or semi-closed "zones". Let's ponder: a million human lives and fates are associated with the ghost cities. A million unique personalities, spiritual essences, internal worlds, and world views. Among them is the flower of native basic science and Russia's technocratic elite. Its priceless property. Its hope for a fitting future...

At the entrance to Arzamas-16, the bronze Holy Seraph has raised its hand in prayer to the sky. The words are inscribed on the stone block: "God have mercy on us".

God have mercy on all those who live in the "zero" cities.

**Firms Participating in 'Gasprom' Program**

93UM0699B Moscow MOSKOVSKIYE NOVOSTI in Russian No 26, 27 Jun 93 p 11B

[Unattributed table, under the rubric: "Conversion": "Military-Industrial Complex Enterprises' Participation in 'Gasprom' Programs for the Development of New Equipment"]

[Text]

<b>Military-Industrial Complex Enterprises' Participation in "Gasprom" Programs for the Development of New Equipment</b>		
<b>Enterprise</b>	<b>Type of Equipment</b>	<b>Share of Total Amount of Investments, in %</b>
"Aviadvigatel" AO [Stock Company], "Iskra" NPO [Scientific Production Association] (Perm)	Gas Compressor Units (GPA)	28.5
"Trud" NPO (Samara)	25 and 16 MVt [megawatt] motors for gas compressor units	2.0
Samara Motor Building Enterprise	6.3 MVt motors for gas compressor units	0.5
"Saturn" NPO imeni A. Lyulki (Moscow), Ufa Motor Building PO [Production Association]	16MVt motors for gas compressor units, power plants, and gas generators	11.4
"Kirovskiy zavod" AO (St. Petersburg)	16 and 25 MVt gas turbine gas compressor units, centrifuges for drilling mud, and a 16MVt steam turbine gas compressor unit	8.4
<b>"Mashproyekt" (Nikolayev)</b>		
Gas compressor units with ship drives		2.0
NPP [Scientific Production Enterprise] of Electronic-Hydraulic Automation (Moscow)	Standardized power drive control system	0.46
Kurchatovskiy Institute Scientific Center (Moscow)	Plasma-chemical gas processing technology	0.47
"Energiya" NPO (Kaliningrad, Moscow Oblast)	Self-contained power plant based on fuel cells	0.27
Voronezh Mechanical Plant	Christmas tree armature	0.24
"Atommash" PO (Volgodonsk)	Christmas tree armature	0.24
"Titan" TsKB [Central Design Bureau], "Barrikady" Plant (Volgograd)	Christmas tree armature	0.47
NII [Scientific Research Institute] of Measurement Systems (N. Novgorod)	Automated control equipment and systems for extracting, transporting, and processing gas	3.1
VNII [All-Union Scientific Research Institute] of Automation (Moscow)	Metrological support sensors and systems	0.2
VNIIEF [All Union Scientific Research Institute EF [not found]] (Arzamas-16)	sensors	0.2
"Khartron" NPO (Kharkov)	Standardized automation systems	0.6c
"Prompribor" NPO (Moscow)	Systems for injecting inhibitors into wells	0.07
"Morskoye korablestroyeniye" AO (Moscow)	Development of ships for laying gas pipelines on the bottom of the sea	2.7
"Energomash" NPO (Khimki)	Self-sufficient power plants	0.34

**Conversion at Khabarovsk Shipbuilding Factory**

93UM0702A Moscow ROSSIYA in Russian No 27,  
6 Jul 93 p 9

[Article by Lyubov Latypova]

[Text] Khabarovsk—The defense industry in Khabarovsk appears to be starting to take on some qualitatively new features. The Amur Shipbuilding Plant, a joint-stock company in Khabarovsk Kray, is ready to turn out tankers; one of the military plants in Amursk is ready to assemble South Korean busses; the Khabarovsk Shipbuilding Plant, which formerly produced escort vessels, has found the first buyers for two trawlers.

Although the sale of the first output allowed the enterprise to breathe somewhat more easily, its situation is still a long way from normal. The wheels of conversion, as Mikhail Granik, deputy director, put it, have rolled over the plant twice. The first time was in 1989, when the VPK [military-industrial complex] was considered to be the cause of all the country's troubles, and state orders were curtailed sharply. There was a 70-percent reduction at this enterprise. The second was last year, when half of the remaining capacities were cut without warning. The ill-conceived nature of this decision was obvious. The plant, the only one of its kind in the Far East, built ships for which there was a stable demand. The reduction in construction meant that the Pacific Fleet, both military and fishing, would be without them within the next few years.

In addition to everything else, the Khabarovsk Shipbuilding Plant built ships with technical equipment more advanced than that of similar foreign ships by a good 10 years. Incidentally, the first military ship was launched from the plant's slips on 12 December 1962 and is still serving faithfully to this day. Nor is its most recent ship, which is presently being readied for launching, any exception. We know that the Americans are prepared to buy a number of its assemblies through a third party. Be that as it may, the fierce competition with potential enemies forced the plant to keep a finger on the pulse of scientific and technological progress.

The drastic cut in state orders forced the plant to begin an urgent search for new and competitive products which, most importantly, would enable it to keep the collective together.

The conversion program, behind which director Semen Ladyzhets is considered to be the main ideologue, had both supporters and opponents. There were many variations. It was proposed that the plant return to that with which it

began: building Meteors, dry-cargo vessels and cutters. In this case, however, the plant, with its unique cadres, would become an ordinary workshop. It was difficult to accept this, as well the fact that with this alternative entire categories of workers would be eliminated from the shipbuilding process.

Market conditions prompted the building of trawlers. It seemed that 85 percent of the fleet of refrigerated ships in Russia's Baltic area were ready to be written off, and the Far East did not have an excess of these vessels either. Thirty years ago the Khabarovsk workers helped the Far East fishermen by starting to build SRTs [medium fishing trawlers], which up to then had only been purchased abroad. So there is some relevant experience.

And then, taking the old production unit quite by surprise, an inconspicuous floating crane settled in alongside the huge ships, and near it a small cutter. How did these strange craft get there? It all turned out to be very simple. It was economic accountability, a phenomenon once popular and intensively introduced at enterprises, and then, before the winds of privatization, thoroughly forgotten. A development totally in keeping with restructuring and conversion. When it became apparent that there would be no large volumes of work in the immediate future, and the collective had to be held together by some means. It had been formed over a period of decades but could be destroyed overnight. Sergey Osipov, at that time a shop chief and currently a plant deputy director, was the first to introduce the system of one-time outside projects. This meant that the shop would have to find its own orders, materials and assistants, while it would keep for itself the earnings transferred to the plant, except for 10 percent, and spend them exclusively at its own discretion. A fairly large number of partners was ultimately found, from the city waterworks and the railway to the Amur River Steamship Line and Yakutзолото.

It is felt that these one-time projects are a trifle compared with the main production operation. This "trifle," however, has accounted for up to a third of the additional earnings for shop workers in some months. Without it they would have been idled or been forced to seek a different job.

Many collectives could perfectly well have become separate enterprises after undergoing this schooling. Although reorganization talks are underway, the shops are in no hurry to drop out of the overall system, because relations with subcontractors are still conducted on a contractual basis, and they believe that it will be far easier to withstand the difficult times within the accustomed system of coordinates.

Every seemingly hopeless development has its positive aspects. Extreme circumstances precisely indicate who is who and what this or that production operation is worth. For more than 3 decades the enterprise operated under the wing of the government. Not to say that it was living in clover, but the military-industrial complex had its "residual principle," under which shipbuilding was assigned one of the lowest priorities. In the situation of universal absence of freedom, the plant still had the funds to develop production and improve social conditions and personal services.

Then the pendulum swung to the other side, and the state's concerns all at once were in the hands of the enterprise itself. Does this mean that it was granted complete freedom and that if it has not sunk by now, one can consider that the main task has been accomplished and the reforms have gone forward? The relative stabilization of the plant's economy does not evoke a great deal of optimism in the shipbuilders. They believe that they now need state support even more than before—not petty patronage but the shaping of a real state order for products which always have been and still are in great demand. Several years go by between the time a ship begins to be designed and its launching. Are we going to have to procure abroad once again that which we ourselves presently make better than anyone else?

### **Taganrog Aviation Designers Convert ASW Be-12 to Fire Fighter**

*93UM0720A Moscow TRUD in Russian 14 Jul 93 p 1*

[Report by Aleksey Komarov: "The Chayka Soars Over the Waves"]

[Text] Irkutsk—An ASW plane, the Be-12, nicknamed the Chayka by the military pilots, appears over the smooth, blue surface of the Angara. These are the first tests, conducted near Irkutsk, of the military aircraft converted for fighting forest fires.

Setting down on the water, the Be-12 suctions up 6 tons of water, moving at speeds of 140 kilometers per hour, in 15 seconds and departs for a fire. A large forest fire 70 kilometers from the reservoir is extinguished in four trips taking only an hour.

Taganrog aircraft designers converted the Be-12 from an ASW aircraft into a fire-fighting plane. A mixed crew of designers and Irkutsk aircraft builders are testing it. The conversion program calls for regular production of the multipurpose civilian aircraft, the Be-200 amphibian, at the Irkutsk Aviation Production Association.

### Series Production of Mi-28 Added to Acquisition Program

93UM0736A Moscow KRASNAYA ZVEZDA in Russian  
29 Jul 93 p 3

[Article by KRASNAYA ZVEZDA Correspondent Valentin Rudenko: "The Troops Are Waiting For the Mi-28"]

[Text] It took the helicopter manufacturers of the Design Bureau imeni M.I. Mil two years to develop the most powerful combat helicopter in the world and nearly ten years to put it into series production.

Today, it seems that the fate of the new combat aircraft has finally been determined. As Russian Federation First Deputy Minister of Defense Andrey Kokoshin noted during a visit to the Moscow Helicopter Manufacturing Plant imeni M.I. Mil, the Mi-28 is well integrated into the Russian Army's long-term arms program that is being formed. We need to speed up work on finishing and improving it and also modernize the weaponry on "Mi" brand helicopters that are already in the inventory that comprise the basis of Russia's helicopter fleet.

The Mi-28 was developed in response to the U.S. AH-64 Apache that was accepted into the inventory several years ago. Based upon expert assessments, it largely exceeds its American counterpart, specifically, in speed—the helicopter is capable of operating in a range of speeds from zero to 350 kilometers per hour and in maneuverability. The aircraft has no equals in survivability. The cockpit's windshield can withstand a direct hit by a 12.7 mm bullet and also by shell fragments.

At the present time work is being conducted at the design bureau to develop a "round-the-clock" variant of the Mi-28. It's anticipated that the first such aircraft will takeoff already at the beginning of 1995. The Mi-40 helicopter infantry fighting vehicle is being developed based on the combat helicopter. But we have to resolve a whole series of difficult problems in order to realize these plans and also to ensure modernization of helicopters that are already in the troops. The primary problem is financing.

We must say that the helicopter manufacturers are not waiting for, as they say, manna from heaven, but they themselves are seeking solutions to this difficult financial-economic situation. They are largely managing to do that. As General Designer Mark Vaynberg told journalists, today 55-60% of all of the firm's resources are earned independently. But naturally it counts on the support of the state, including the Ministry of Defense.

### Missile Guidance System Firm Seeks Commercial Role

93UM0745A Moscow NOVOYE VREMYA in Russian  
No 30, Jul 93 (Signed to press 20 Jul 93) pp 16-17

[Article by Margarita Shii under "Conversion" rubric: "Secrets of Island N: What Are They Doing on the Island

of Gorodomlya? Some Say They Are Producing Bacteriological Weapons, Others—Strategic Missiles"]

[Text] The "foot-and-mouth-disease" institute, the design bureau of the renowned German designer Werner von Braun, a branch of the firm of Sergey Korolev, and the closed defense enterprise "Zvezda" (Ostashkov-3) are all landmarks in the history of the island of Gorodomlya.

### Soviet Missiles of German Origin

One reaches Gorodomlya by motor boat in the summer and fall, over the ice of the Seliger in winter, and with the help of an icebreaker during the spring when the roads are bad. Although nature here beckons tourists and fishermen, the way to the island with its pine forest, berries and mushrooms, and fish that can practically be caught by hand is blocked directly at the pier by a control passage with a menacing guard. The way here has been open only with special permits since the 1930's.

The so-called "foot-and-mouth-disease" institute (remember, in the "Caucasian Captive," the injections of the famous trio Nikulin—Vitsin—Morgunov against foot and mouth disease, the disease of cattle?) actually did work here but what it dealt with was the search for a vaccine against foot and mouth disease or something else that is still unknown.

Those who love sensations talk about a secret bacteriological weapon developed here. The local people, among whom no witnesses of these events remain—as if the earth had swallowed them up!—nevertheless refute these rumors. They said that some biologists and chemists worked here but then were cut back and finally left.

The ship pines that Ivan Ivanovich Shishkin depicted in his famous painting "Morning in the Pine Forest" could say a lot about the birth of the Soviet missile programs and about how in 1946 they brought German specialists here from the city of Penemuende on the Baltic Sea. The Germans worked at Gorodomlya right up until 1952 and then they were sent home. Even now in Hamburg there are 12 families comprising an association of fellow countrymen who sentimentally—no joking—remember the Russian period of their work.

The Germans did not live as captives: they had their servants and their diversions. After the departure of those who helped us to strengthen our defensive might, they drastically changed the subject matter of the closed developments on the island.

Gorodomlya has been working "for space" since 1957. At first they organized branch No 1 of the Sergey Korolev Design Bureau here and a little later the enterprise "Zvezda," which exists on the island to this day. The 100-percent defense order in the recent past guaranteed a comfortable existence for this highly technological production. The best people from the entire Union gathered here—graduates of the leading technical VUZ's with gyroscopic departments.

The main output of the enterprise is gyroscopes for inertia navigation guidance systems or, more simply, for orienting space ships in the vastness of the universe. The accuracy of these supersensitive instruments 2X2 cm in size makes possible the automatic docking of stations. They are in operation at the orbital and missile complexes "Mir," "Proton," "Buran," and "Energiya." Formerly the production of one gyroscope cost about 10,000 rubles [R] but today it is about R3 million.

Formerly the share of purely military production (if our space can be considered peaceful) was about 40 percent. Today the defense order has declined to 15 percent and is the least advantageous for the enterprise.

#### China Saves

Today the island of Gorodomlya is the enterprise "Zvezda" with its infrastructure and a rest home for the colleagues from Podlipki near Moscow. To avoid vibration, flights of aircraft over the island are prohibited. The railroad is located 15 km from the shops of "Zvezda." The island has everything for living and recreation, even an internal lake besides the external Seliger.

More than 4,000 people live here, all of them coworkers of "Zvezda" (except for the children), for whom there is a swimming pool, a house of culture, and excellent medicine. Formerly the enterprise was so stable that it spared no expense for the welfare of its own island and even of the rayon center. The road from Torzhkov to Oshdashkov was also built at their expense.

"Zvezda" has its own fleet with more ships than the city's own steamship company. This is practically the last stable enterprise in the Russian missile-space branch.

They began to talk about conversion here long before it became so prevalent. The conversion program on Gorodomlya began in the mid-1980's. At that time, the leadership of "Zvezda" made a fundamental decision: it is inexpedient for the highly qualified personnel to be pushing consumer goods such as irons or shovels or even complex but amusing toys like a little electronic-mechanical dog that barks, stands on its hind legs, and wags its tail. The little dog, by the way, is made up of 107 parts.

A lot of ideas are coming out of "Zvezda" that may be applied in the most varied branches of the national economy. An example is an electrostatic paint sprayer operating without bearings that makes it possible to prime the surface of a car without additional hand processing. The AZLK (Motor Vehicle Plant imeni Leninskiy Komsomol in Moscow) has purchased such a line and has been operating it without repairs for six months now. There have been no breakdowns.

There are also more exciting developments. There is an air-cooling system that makes it possible to produce refrigerators without freon. The cooling is down to 67

degrees Celsius. Kazakhstan wanted to order a batch of such units to freeze slaughtered cattle directly in the pastures but the disintegration of the Union prevented this. The story was the same with a Minsk plant for refrigeration equipment.

For the time being, the only reliable customer of "Zvezda" is China. In Beijing, an SP [expansion not given] will soon go into operation for the production of inertial navigation systems for the civil fleet. The new word in aviation technology is the navigation-piloting system GLONAS with satellite correction. This development has not yet interested our industrialists but the Chinese have decided to invest millions of dollars in it. The expenditures must pay for themselves within 5 to 6 years. "Zvezda" is investing its intellectual property in the SP.

The latest developments by "Zvezda" specialists are instruments to locate oil bore holes. Inclometers of this kind do not exist anywhere else in the world but it turned out to be a rather complicated task to take them to the world market and thereby squeeze the Americans. Essentially these instruments could revive 80 percent of the bore holes: it is well known that a developed oil bore hole leaves behind up to 60 percent of the oil. So far there are no customers for this output, just as there are none for prostheses working on the basis of signals from the brain. Essentially this is an almost adequate replacement for human organs.

#### Falling "Star" [Zvezda]

The defense industry is supervised by five different departments, although there is still no special structure that would coordinate a government conversion program. Conferences are convened at the office of Oleg Soskovets or Vladimir Shumeyko or Andrey Kokoshin.

Viktor Glukhikh, chairman of the Committee of the Russian Federation on the Defense Branches of Industry, still does not have any official powers from the state to influence policy in the missile-space sphere.

"Zvezda" Director Boris Mokrushev refers to the Chinese experience in conversion, where they immediately determined a list of priorities and set up a state agency that deals with conversion. The second step was to make a list of those enterprises that needed to be assisted first of all. "Credit for all is no solution, that only prolongs the agony," thinks Mokrushev. Moreover the loans from the Central Bank go to the current accounts of the enterprises for two or three months and during this time the money is definitively devalued.

Boris Mokrushev thinks that it is necessary to retain a maximum of 300 enterprises in the entire defense complex (approximately one-third) and not to allow them at least to perish. "If the government does not define the rules of the game in the near future, we will also play our own game."

For the time being, "Zvezda" is fairly calm, although the wages are of course ludicrous for specialists with such qualifications—about R30,000 a month.

#### Does Russia Want to Sit on the Security Council?

It is useless to expect immediate returns from conversion. It has been calculated that a conversion ruble will pay for itself in two to three years and R2-3 must be invested in it. The volumes of production have been reduced substantially. But the most frightful thing is that working capital has been frozen and credit lines have not yet been opened, although there are decrees on this from the Supreme Soviet of the Russian Federation and government.

Essentially production is not being renewed and the head research institutes are closing or turning their space over to commercial structures. The plants are shying away from defense orders like the devil from holy water. Government indebtedness to the defense people is growing.

The deficit of working capital at "Zvezda" amounts to R500 million. The electric boiler house built "for good" also turned out to be a calamity—it consumes too much electric power, which must now be purchased without rebates. "Zvezda" is asking the Defense Ministry for at least R200 million to cover top-priority debts to pay for electric power and to pay off accounts with suppliers.

"Russia must finally decide: Does it want to be a world power and sit on the Security Council or not?" says the director of "Zvezda." If it does not want to fall to the level of third-rate countries, then it is necessary to determine a long-term (for 10 to 15 years in advance) conversion program. Otherwise in the near future the entire former defense complex will die away and its highly qualified personnel will go to other cities and towns in search of a better share. And where can they go: on Gorodomlya, for example, there simply are no other enterprises...."

#### Western Interests in Yak-141

93UM0741A Moscow KOMMERSANT DAILY in Russian 23 Jul 93 p 1

[Article by KOMMERSANT DAILY Correspondent Leonid Zavorskiy: "The American Navy Liked the Yak-141"]

[Text] The new model of fighter aircraft developed by the renowned KB [Design Bureau] imeni Yakovlev has caused definite interest in the world aircraft market. The U.S. Marine Corps, the American NASA aerospace agency, and also McDonnell-Douglas and British Aerospace corporations are conducting negotiations with the Design Bureau imeni Yakovlev on possible cooperation in the sphere of developing a future supersonic vertical take-off and landing fighter aircraft. The latest round of negotiations occurred in Moscow in the middle of July which Yakovlev Design Bureau General Designer Aleksandr Dondukov discussed at a press conference that occurred yesterday.

At the present time, the Yak-141 aircraft is the only supersonic vertical take-off and landing fighter aircraft in the world. The British Aerospace Company's British Harrier GR-9 fighter aircraft of this class and its American version, the McDonnell-Douglas AV-8B Harrier-2 that is being used by the U.S. Marines, have exhausted their capacity for modernization. To replace these subsonic aircraft, U.S. and British aerospace firms are working on the design of the ASTOVL (Advanced Short Take-off and Vertical Landing) supersonic vertical take-off and landing aircraft. In the majority of the primary specifications, the Yak-141 corresponds to the requirements being made of the ASTOVL which must begin flights in the next century. Yakovlev OKB's [experimental design bureau] leading position in this class of aircraft compelled representatives of the U.S. Marine Corps to begin negotiations with the Russian firm on possible cooperation in September 1992. Later, NASA, McDonnell-Douglas and British Aerospace became involved in the negotiations.

The Western side is specifically interested in the Yak-141's production technology and also the possibility of flight tests of already existing models. Informed sources do not exclude the possibility of developing a joint Russian-British-American consortium that will be involved with the development of a future supersonic vertical take-off and landing fighter aircraft for which the Yak-141 will possibly serve as the basis. Right now the Russian Ministry of Defense has frozen the Yak-141 production financing program due to a shortage of resources and the OKB imeni Yakovlev has obtained an aircraft in its possession as intellectual property.

At the press conference, Mr. Dondukov discussed OKB imeni Yakovlev's program of participation in the International Aerospace Show that will occur in Moscow from August 31 through September 5. The firm will display the Yak-141 and also its new passenger liners, sports aircraft and business jet class aircraft at the air show.

#### The Yak-141 Fighter Aircraft's Primary Technical Specifications

Take-off weight	19.5 tonnes
Length	18.3 meters
Height	5 meters
Wing span	10.1 meters (in the folded position—5.9 meters)
Wing area	31.7m <sup>2</sup>
Power plant	one R-79 vectored-thrust engine with 15.5 tonnes of thrust and two RD-41 lift engines with 4.1 tonnes of thrust
Maximum combat payload	2.6 tonnes
Combat radius with a 2-tonne payload	690 kilometers
Maximum speed	1,800 kilometers per hour
Maximum flight range	3,000 km

### Missile-Space Designer on Retaining Research Capacity

93UM0587A Moscow KRASNAYA ZVEZDA in Russian  
29 May 93 p 3

[Interview with Academician, twice Hero of Socialist Labor, TsNII Mash Director Vladimir Fedorovich Utkin by KRASNAYA ZVEZDA Correspondent Mikhail Rebrov: "Hammer Nails With Microscopes and Use Unique Laboratories for Commercial Warehouses—Isn't That Really One and the Same Thing?"]

[Text] Our interlocutor is Vladimir Fedorovich Utkin, academician, missile-space complex chief designer, twice Hero of Socialist Labor, Laureate, headed "Yuzhnoye" NPO [Scientific Production Association] (the former Yangel firm) for many years and currently TsNII Mash [Central Scientific Research Institute of Machinery Building] director.

The Central Scientific Research Institute of Machine Building, the head institute in the Russian Space Agency, was founded in 1946. Among other directions, it conducts theoretical research and experimental development of designs in a broad range of various payloads, and the appraisal of designs of missile-space systems and is involved with the development of methods and algorithms for resolving the tasks of command and control, ballistics and navigation. It has a super-modern scientific-research and test facility.

The widely known in our country and abroad Center for Command and Control of Space Complex Flights functions under the center.

[Rebrov] Vladimir Fedorovich, let's begin with the most painful subject. As far as I know, your scientific-technical giant has not avoided conversion...

[Utkin] Do you see that the essence of our space production is peaceful and has been directed at the development of the national economy and science. It has given a qualitatively new solution to the problems of communications, television, navigation, meteorology, geodesy, cartography, the study of natural resources, ecological monitoring, etc. But the achievements of astronautics inevitably began to be used in the interest of defense. As a result, all of space production was declared to be a part of the military-industrial complex [MIC] and, as a consequence, ended up under the press of wholesale conversion.

[Rebrov] But nothing needed to be broken or retooled and only the center of gravity had to be shifted to the resolution of national economic and scientific tasks for the shift of astronautics to "civilian" rails...

[Utkin] That's obvious. Well, how would you regard the fact that suddenly someone had decided to destroy, say, the Moscow telephone network on the grounds that the military was using it for its own purposes? Would you have begun to destroy unique space telescopes to

research the Universe only because again the military had at one time deployed them on Earth? They are practically identical...

In my opinion, just what is conversion? First of all, it is the large-scale reallocation of resources with the goal of their best use in the country's interest, its economy, and in the interest of man. And, judging by the declarations, once we have selected the road toward the international market that ensures respect, equal rights and the ability to compete to our state, common sense tells us we need to go to that market with the appropriate product. Space technologies are also a competitive good with which Russia can occupy a worthy place in the international market, despite all of the obstacles that we create and that we will continue to create. But what have we begun to do? With ecstasy, we report that we have mastered everyday kitchen appliances, refrigerators, meat grinders and washing machines instead of unique rocket engines, onboard systems and so forth...

[Rebrov] Vladimir Fedorovich, you are a practical person and you have worked in defense for many years. Your position is logical: preserve the intellectual potential, scientific-research base, technological chains, and workers collectives... I understood all of that as a human being. But let's pose the question this way: are the people capable of carrying the unbearable load of the MIC any further?

[Utkin] You know somehow the thought has recently become fashionable that it is the directors corps and other MIC "sharks" that have become interested in what you have enumerated. This is not a question of directors but about completeness, about the enormous number of Russians. Approximately five million people are employed directly at the defense complex. Add the subcontractors here—12 million people. Let's consider the families—there are tens of millions! You will agree that there are quite a few "interested" parties. To destroy the highly developed production, to not consider the qualifications of these people, and to leave them without work?.. Decades will be required to later revive what has been destroyed. And much in general is not subject to revival, like, say, our trans-, super-, hypersonic and vacuum aerodynamic tunnels, gas-aerodynamic pressure chambers, stands for durability tests, and unique plasma guns... We can test items that are up to 30 meters high, that are 16 meters in diameter and that weigh up to 50 tonnes! To create enormous strike loads, to generate streams of various gases under pressures up to 2,500 atmospheres, and to obtain temperatures of up to 11,000°... I can't list all of it. Based on the technical level of equipment, only the United States can compete with us.

[Rebrov] In a word, for your institute, conversion in that form that the hot heads are attempting to interpret it can turn out to be somewhat greater losses than it seems?

[Utkin] To adapt unique laboratories into warehouses of commercial structures, to set up the production of "boxes" for televisions in them, to attempt to make

industrial diamonds in specialized strike tubes is just like banging in nails with microscopes.

Incidentally, the cost of the capital facilities, stands, plants, measurement equipment, electronic computers, and energy facilities (required short-term peak electrical output reaches 250 megawatts to simulate space conditions) will cost approximately 500 million rubles in 1989 prices. But that is not only money, that is an interrelated complex of material and intellectual treasures that are capable of resolving fundamental problems of space, yes and not only space, science and technology. And in this sense, it is practically priceless.

And nuclear energy scientists, electronics experts, chemists, and laser researchers have their unique scientific-production facilities... This is Russia's prestige, this is what made Russia a great power.

[Rebrov] On the world market, our space products and testing technologies cost 5-6 times more in dollars than they do in our country in rubles. So, wouldn't it be more advisable to activate existing potential to fulfill foreign orders and to exchange the hard currency obtained in that manner for consumer goods?

[Utkin] And we are doing that. At the present time, contract research of models of the French Hermes devices are being conducted at the institute and other countries of Europe and also America and China are displaying interest in us... But for now this money suffices only for maintaining individual laboratories.

[Rebrov] And still it seems to me that the NIIs [scientific research institutes] and KBs [design bureaus] in any case must be involved not with series production of consumer goods but with their design development. Moreover, it's possible that not strict tasks but an emphasis on initiative are needed here.

[Utkin] Theoretically, that is so. In fact it is much more complicated. In the future, I hope that common sense will prevail. But today we have set up a line for the production of consoles for televisions. We are making 1,000 consoles per day. We intend to begin the production of finished goods household radios... Why? Understand the situation. The money that they allot to us is not enough to pay salaries. It's impossible to begin any type of major program when you don't know how much money you will get or when you will get it. Those large-scale programs are structured with the prospects of many years. Right now, appropriations for science are being drastically reduced. TsNIImash is incapable of providing a workload for our unique stands today and the golden national wealth is standing idle. And that means that the reliability of the equipment—I am talking

not only about space but also about such engineering structures as bridges, pipelines, and reactors for AES [nuclear power plants], etc., are being substantially reduced. That is today and tomorrow. But what will happen later? Due to the lack of adequate centralized support and concern about the experimental and test base that needs to be constantly renewed, we will arrive at the point where, in our still leading sector, we will soon reap those fruits of economic ruin like in many other sectors. That is why I oppose, let me put it this way, radial romanticism: let's go, let's move faster.

[Rebrov] But time is rushing by...

[Utkin] I agree, it is rushing by. However, incompetence lies beneath the surface of impatience. There is no benefit whatsoever but the harm is obvious. We need to know how to evaluate the variations and to select the optimal one. We would prefer that it would be precisely determined which part of our work will be assigned to the state order. And that they would give us the opportunity to find a consumer for our primary "product"...

[Rebrov] Vladimir Fedorovich, a few words about your attitude toward privatization...

[Utkin] Reasonableness and deliberation are needed here. Today the situation is such that the majority of state enterprises, especially defense enterprises, have not been made stock companies. Because of that, investment is losing its effectiveness and does not correspond to the laws of a civilized stock market. However, privatization of defense state enterprises is improbable today. They are not attractive for private investors due to their low profitability. Is there a solution to the situation? There is. A number of experts think that not wholesale privatization but the creation of mixed private-state enterprises of the former MIC could turn out to be more promising. In short, we need to think...

### **New K-115 Light, Easy-to-Operate Helicopter Being Designed**

93UM0623B Moscow KRASNAYA ZVEZDA in Russian  
30 May 93 p 1

[News item: "New Light Helicopter Being Designed in Russian"]

[Text] The K-115, designed for 5 persons, is being designed by the renowned "Kamov" company, which develops military and civilian helicopters.

Speaking to journalists, the general designer Sergey Mikheyev announced that the K-115 helicopter, with a takeoff weight of two tonnes, might interest business persons, since "it is no harder to control than a passenger car."

### MiG Aviation Association Conversion

93UM0662A Moscow KRASNAYA ZVEZDA in Russian  
3 Jul 93 p 6

[Article by Valentin Rudenko: "MAPO Tries Mightily in Europe"]

[Text] Like other defense enterprises, the oldest aviation production association of Russia, MAPO, is actively involved in conversion programs nowadays. In the company's assembly shop one can see a passenger liner for local airlines, the Il-114, the multipurpose T-101 "Grach" 9-passenger aircraft, and "Aviatika-890" ultralights. But the basic production capacities are still working to produce one of the best fighters in the world, the MiG-29. It is the main trump card of the Moscow aircraft builders in bringing their products to the world market. As incidently was once again confirmed at the Le Bourget air show.

At the Paris exhibition, the association presented a modification of the well-known MiG-29 fighter, but with vitally higher combat capabilities and performance characteristics. It is equipped with a TACAN international navigation system, satellite navigation, a second radio set with an emergency frequency, and a landing system, allowing the aircraft to be flown in virtually all points on the earth. By virtue of the two suspended tanks mounted on the fighter, with a total capacity of 2,300 liters, its flight range was increased to 3,000 km.

According to specialists, the MiG-29 has a number of indisputable advantages over the American F-16 and F-18 fighters, and is capable of retaining them for the foreseeable future. The aircraft can be additionally equipped with in-flight refueling apparatus, and modernized for operation not only against air targets, but against ground targets as well, i.e. equipped with air-to-surface missiles with television and laser homing heads. The MiG-29 also has untapped reserves to achieve a vital increase in operating life.

"Our fighter is intended to assure the defensive sufficiency of any peaceloving state. It is not an offensive

weapon, but a defensive one," says the general director of MAPO, Vladimir Kuzmin. "Many states, including neutral ones, are interested in such an aircraft. And we could really sense that at Le Bourget. There were objective talks with a number of countries, and not only European, but also from Southeast Asia and the Near East, for deliveries of the aircraft."

It should be mentioned that the association has great experience in international cooperation. In three decades MAPO has delivered more than 3,000 combat aircraft like the MiG-21, MiG-23 and MiG-29 to 42 countries of the world. It is no accident that it was one of the first to be granted the right to independently sell combat equipment abroad, naturally under the supervision of the state.

At present some MiG-21s and MiG-23s are coming to the end of their operating life, and it is to the advantage of the countries operating these aircraft to replace them with new and more sophisticated ones of the MiG-29 type. The Russian fighter is not inferior to the best foreign models, and in many indices it is better than them, including the American aircraft, and can be bought for much less. The fact is that these countries already have a system of airfield support and ground maintenance which is adapted to precisely this type of aircraft. It has been calculated that purchase of each lot (approximately 40 aircraft) would save from one to one-and-a-half billion dollars.

And another no less important detail: MAPO has offered its partners a new approach to service maintenance of the delivered aviation equipment, including through joint enterprises.

"We would like to show foreign colleagues our readiness for closer cooperation," said Vladimir Kuzmin the day before his departure for Le Bourget. Today we can say with all certainty that this goal has been achieved.

When this material had already been prepared for press, it was learned that a contract had been signed for delivery of one lot of MiG-29 fighters to Hungary to help pay off Russia's foreign debt.

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