

the guru



1943

Still too many things interest me.

Yakovlevich

Yakovlevich

POV

I would like to work as long as my head can be of any use... It is interesting to solve difficult problems.



Winter 1941



Feodosia 1936

Solving two or even more tasks simultaneously is more brain training than complication.



Biography

Sergei Yakovlevich Petrov was born in Achinsk, Krasnoyarsk in 1922. His studies in the Moscow Electric Power Institute were interrupted by the attack of Germany on Russia in 1941. He was sent to Military School and after graduation as a lieutenant was sent to the front. In December 1942, near Stalingrad, he was heavily injured and lost his leg. He later continued his education, graduated in 1947 as an Electrical Engineer and started his carrier in the electric power research and design institute Energosetproekt in Moscow. During his carrier reached the position of Deputy Principal Engineer and worked on a wide range of projects – from generator to extra-high voltage transmission line protection. He was USSR's representative to CIGRE Study Committee 34 and participated in international projects in India and Bulgaria. In 1962 he received the Lenin's award in science and technology. He retired in 1991, but still works as Principal Specialist in power system protection.

Sergei Yakovlevich Petrov

Interview by Andrei Podshivalin: [PAC World Correspondent](#)



Team district championship 1954

PAC World: Sergei Yakovlevich, you have left behind several historical epochs. Could you tell us about your childhood??

SP: I grew up in Feodosia (Crimea, Ukraine). I graduated school with excellent marks. This would be equivalent to a "gold medal", but there were no medals (for excellent studies) at that time. I was going to become a doctor, but my father convinced me it was a very demanding job. I was later sometimes sorry for not becoming a doctor because I wanted to do work in "folk medicine". I consider this would have been the most interesting.

PAC World: What seemed attractive in folk medicine?

SP: I like to solve problems. I consider this task as very promising and comprehensive. Nevertheless, I like my present profession. There is certain gain, advantages and pleasure in relaying. It attracts me; I strive for deep knowledge and try to relay my experience and my love for our profession to young engineers. In general, tasks can be found everywhere. You know, even a street can be swept in different ways: boring and droning is one way; creative and permanently improving is another. If you like your profession, the knowledge is revealed in the work

As a student I

played for the Institute chess team.

process. The more you know the more interest you take on. My father loved his profession too. He organized the first T.B. prophylactic centre.

PAC World: You seem to have a broad outlook. Tell us about your education.

SP: I was getting a home education until the forth grade. I took classes in music and French. At school I also studied German. I remember most of what I studied at school: genetics, history etc. It is interesting that everything was taught in a different way. It was Soviet time, and we were children of the Soviet epoch. We sang revolutionary songs: "Our steam locomotive rushes on...", "We don't want a single inch of foreign land...", "If the enemy attacks...", "Steamship goes, starting waves...".

PAC World: How did it happen that you became a power engineer?

SP: At that time the country lived in five-year plans that had to be accomplished in four years. Personnel are everything – that was the slogan at the time. The country was building communism. I wanted to build too. I entered

the power engineering department of the Moscow Power Engineering Institute.

PAC World: And why relay protection?

SP: When I was a child, I was interested in radio engineering, just as many other boys. I assembled several types of receivers. I was proud of one of the radios – it was tuned by rotating one coil towards another. Unfortunately, I have not saved this apparatus. There was something in relay protection that attracted me most: one may find a problem, design a solution, introduce new features, and implement it. It was much easier then for a novice to assemble a relay or another device, implement your ideas yourself.

PAC World: Did you have other interests in your youth?

SP: I played football and volleyball for the Crimea junior team. Once I became a chess champion of Feodosia. However, the childhood was not easy - we were three children in our family. My father worked hard: in addition to the T.B. centre he worked in other sanatoria in order to live decent life. It was a time of hunger since the country was still recovering after the civil war.

PAC World: Were you a hard-working student in school?

SP: I wouldn't say it. My sister often did my homework. I used to replace my music classes with football games. Now I am sorry for that since playing the piano is relaxing and allows me express my emotions and feelings. To add to this, I have always had a small zoo. I had dogs, rabbits, a turtle, goldfish, a siskin, a rat – Anfisa. There was even a hedgehog. It was always interesting with them and I learned something new every time.

PAC World: Let's continue to your student years.

SP: At the institute I wasn't an exemplary student again. I did not attend all the classes and studied every subject by myself. I was successful in this self-education. At that time I played for the institute chess team. I remember one match with Averbach. He became a chess Grand master later. Still being a student, I was awarded a Stalin scholarship for excellent studies. I was not involved in scientific research at that time.

PAC World: Then the war began. Did it influence your life?

SP: It was after my second year at the institute, on June 22, 1941, when we (students) listened to the radio speech of Molotov. It was not a surprise. In fact, we were spiritually ready for the war. We knew about the two confronting worlds: capitalism and socialism. The public also knew Hitler. In general, we were prepared for the war, but we did not expect such a war, on our territory, with great losses. There was mobilization. After a single-month courses I became a trolleybus driver in Moscow. On October 16, the enemy army was close to Moscow, most establishments evacuated. I remember one scene from that day. Passing close to a cinema, I noticed such a long queue to the ticket-office. It was astonishing. Moscow was under siege, but life continued, it did not stop. Together with other students, we came to the institute. Everything



was in disorder - chaos, papers scattered, generally empty. As a student, I was evacuated to Leninogorsk (Kazakhstan) together with the institute. Then, there was the second draft. This is how I ended-up in the military school in Tashkent. I graduated as a lieutenant. It was a brief education. The intention was to make me a teacher, but we longed to defend our Motherland.

PAC World: What did the war change in your life?

SP: The army disciplines people, makes them more accurate. I was a platoon (about 30 people) commander on the battlefield, but I did not have a chance to fight for long. At the end of 1942 in a village close to Stalingrad (Volgograd now) I was wounded in the leg, in fact it was torn off. I crawled somehow out of the combat zone and hid in a basement. I did not feel it, but the blood loss was huge. I was discovered by some soldiers and taken to a hospital. The first half year I did not react much to the outside world, but I mostly recovered in a year and was released from the hospital. After that I went back to my parents in Petropavlovsk (Kazakhstan) and decided to continue my education.

PAC World: Was it easy to go back to school and adapt to the new environment?

SP: Yes, it was. I entered the third year at the institute. Most of the classmates were three years younger, but that was not an obstacle to our friendship and common studies. I continued self-education by books and passed exams easily. After graduation, I was assigned to the Teploenergosetproekt. Our division was then reformed and named Energosetproekt. This is still my place of employment.

PAC World: Did you have any remarkable events at the



Utilities should
try, test and

investigate.

institute?

SP: I was lucky to enter the Relay Protection, Automation, Stability, and Modeling department, where I participated in research and design of the systems, development of the techniques and the guiding documents, relaying principles, as well as application. Most papers made by the department are still of very high value and interest. This work has always been and remains interesting to me. There were many talented engineers and scientists in charge of the department: A.M.Fedoseev, V.L.Fabrikant, A.B.Chernin, V.M.Ermolenko, D.I.Azaryev. I have always been active in international cooperation. I was a representative in CIGRE Study Committee 34 for quite a while. And I have never stopped playing chess and participated in different competitions for the institute. We had a special "Feodosia" society, for people originally coming from Feodosia. I spent a lot of time in India during our cooperation as part of a "friendly aid" initiative. We built a power station close to Delhi. In order to be able to communicate with my Indian colleagues I had to learn English. India was a very interesting experience. In addition, obviously I had new "pets" at home: a mongoose, a hedgehog, a monkey and a wombat. I have many impressions out of that. The mongoose is a dreadful, but beautiful predator.

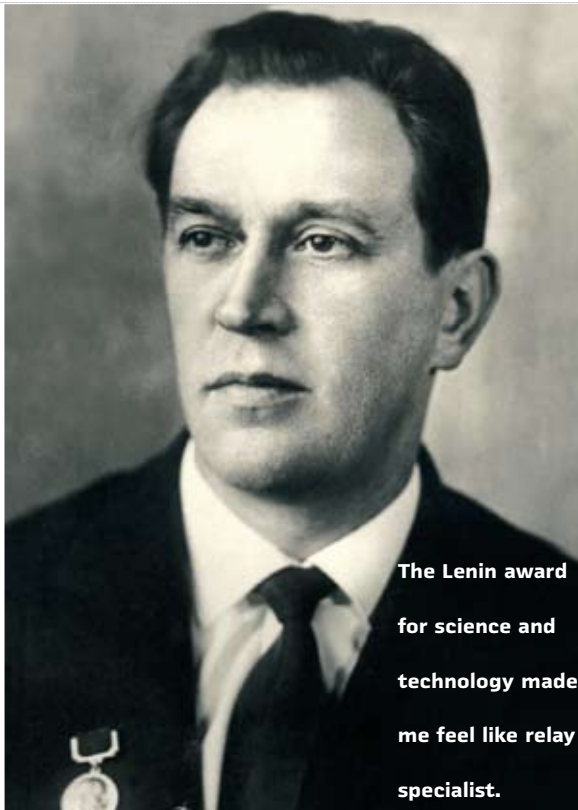
PAC World: During this period you were honored with the Lenin award (the top award in the Soviet Union). Tell us about it?

Only this can
make it public
and let new
techniques
develop.

SP: Well, yes, our department was awarded in 1964. At the institute we dealt with turn-key projects for power utilities. Our work on ultra-high voltage projects development was in fact awarded. We made possible extra-long-distance transmission projects: Kuybishev-Moscow, Stalingrad-Moscow. It was a miracle at that time. Transmission was straight and several intermediate switching substations did not change the nature of this long line. Now you will not find such lines on the map; they are transformed by the introduction of generation in between. We solved this task together with ChEAZ (Cheboksary, Russia) and VNIIR (Cheboksary, Russia). This award let me feel like real relaying specialist.

PAC World: What other projects did you find most interesting?

SP: All of the projects were interesting. First, I would mention the microprocessor-based relay technology. We had to master it. Second, I was the author of protection implementation guidelines for most applications, including distance protection. I believe it was an extremely needed work. Nowadays every company is trying to conceal the real operating principles. This is wrong from the utility and application point of view, as far as every relay should be set and coordinated. Sometimes this work helped to discover mistakes in manufacturer's formulae and relay design. There were samples, which had been produced for 25 years, but not tested thoroughly enough. Our level of scientific work was really high. I have never felt that domestic relays lack features compared to the world leaders. Unfortunately, there are less and less broad specialists in the world. In relay protection, one must always think of systems: design of a single protection



The Lenin award
for science and
technology made
me feel like relay
specialist.

scheme determines requirements for all other schemes. Different kinds of protection are closely correlated.

PAC World: What do you think of the modern state of relay protection?

SP: Most modern relays available on the market are more or less equal in basic features and characteristics. Most manufacturers perform all kinds of control and tests before the product leaves the factory; sometimes even soldering joints tests for conductivity, optical monitoring etc. Nevertheless, even this high quality of production cannot guarantee absence of failures but the manuals rarely tell about reliability. I am glad that Russian producers are at the same level with the leaders in basic characteristics. I like the development teams in some enterprises. They are researchers applying new scientific features in their products. Long ago, we cooperated with VNIIR. It was learning experience for all of us: we studied relays, while the VNIIR staff learned the theory.

PAC World: What protection issues are most interesting for you now?

SP: Stability and reliability issues. These problems are of minor priority now, while sooner or later we will be forced to deal with them. Some time ago, it was easy to estimate the reliability of electromechanical and static relays. It was determined using the reliability of a single element.

Interconnections were plain and enumerable. In modern relays this has not been investigated. The research work is too expensive and no company can afford it. The leading companies assume certain levels of reliability as postulates. As an example, we can see installation of three protection relays on a single line, which is considered "redundant". The question is if it is technically and economically justified.

I am glad that at the last CIGRE conference in Cheboksary (Russia) speakers presented several reports on stability and reliability. This type of studies cannot be private - they should be led by governmental organizations in protection, which, as far as I know, are currently missing in Russia. Manufacturers' mean time between failures equal to 30 years seems very low in the modern world. When there are many elements in a substation, we should think of some other units to measure reliability. Consider the case when we have hundred devices in substation. What shall we do then? However, I estimate the reliability of the modern systems close to 0,97 - 0,98.

PAC World: What are your personal achievements?

SP: Achievements ? Well, I probably collected much knowledge and I can continue working over the problems, I can help young people get to know the nature of relay protection. I am thinking about expressing this knowledge on paper. There are proposals from magazines, but, you know, I wasn't used to publishing many papers. It was mostly institute proceedings and application guidelines. However, I think I was lazy. I am not satisfied with this part of my professional life. I could publish more, even my teaching materials at the qualification courses. When there is a task to solve, it is of interest; when I find the solution, my interest fades away and there is no personal reason to write a complete paper.

PAC World: What do you think of the "protection concept" being under development in Russia?

SP: My opinion is that this concept already exists as a general idea. The concept is providing an uninterrupted power supply to the consumer, ensuring reliability. To implement the concept a number of solution criteria should be invented. I'm not familiar with the final review of the document and, therefore, cannot evaluate it.

PAC World: What obstacles in remote back-up protection do you see?

SP: I The main problem is the remote-end in-feed for the remote faults. It decreases the sensitivity of the protection. Therefore, my suggestion is a single weak component principle. This gives some advantages. All protections in series are coordinated with each other. This makes settings of protections at the sources very high. The weak component will decrease these settings. Of course, the sequential tripping of the element is a sacrifice. This solution is currently not applicable if the substations belong to different owners. People forget that the power system is our common roof and if it somehow collapses, the consequences are common too. This is the main idea of my papers and recent reports. These problems should



be solved in the new economical environment. One of the main problems is that the new technology is laid onto the Procrustean bed of old regulations. As a first step, we should revise regulations and instructions, which is also very expensive. However, there are many parties interested in this process.

For now, there are two such organizations in the world – IEC and CIGRE. These two organizations develop standards, which are then adapted in many countries. There is a good example with EMC tests, which are acknowledged almost everywhere. This was a tremendous work based on lots of measurements. This investigation required special equipment, which was designed and actuated. The results are now excellent. Now we need to create a similar Russian interagency organization dedicated to the relevant problems. This group should unite manufacturers, as well as utilities in order to be legitimate. It should develop the unified technical policy. These functions were assigned to ORGRES in old times.

Protection specialists are much more than relaying specialists - we must have understanding of other areas like primary equipment: machines, transformers, switchgear, automation.

PAC World: What do you think of the new generation?

SP: Unfortunately, in my opinion, the personnel are undereducated now. The quality of teaching should be the main task. The scientific level should be improved too. Studies performed by specialists in different companies are often not published. Twenty years ago, these functions were over VNNIE, which has almost disappeared. The scientific tradition should be maintained. Utilities should try, test and investigate. Only this can make it public and let new techniques develop. This can be the role of the scientific schools that we have.

PAC World: What is your attitude towards new technology in relay protection, for example IEC 61850?

SP: I do not have deep knowledge of the protocol, but I see very positive tendencies in it. Protection schemes should be somehow standardized. Utilities are just starting to accept this protocol. It will take some time before it is broadly implemented. This raises the question of reliability once again. This concerns data transmission and processing times, processing techniques and many other issues to be solved for every device separately. Nevertheless, this protocol has definitely a positive impact. Unfortunately, domestic producers are still not compliant with the standard.

PAC World: How do you identify retirement?

SP: Retirement is fading. When one works all his life and has to leave it, it is a great tragedy. I would like to work as long as my head can be of any use. I have worked in a single company (the institute) for sixty years and reached as high as the Deputy Chief Engineer (or Design Director). It is interesting to solve difficult problems. Still too many things interest me. Protection specialists are much more than relaying specialists - we must have understanding of other areas like primary equipment: machines, transformers, switchgear, automation, fault modeling and stability issues.

Interview by Andrei Podshivalin:
PAC World Correspondent