



John Morrissey straps on the Sukhoi 26 as Peter Anderson looks on.

Ellen Dean

REFLECTIONS ON BORKI

by John Morrissey

Editor's Note: As trainer of the U.S. Aerobatic Team for the 1992 World Aerobatic Championships at LeHavre, John, along with Pete and Sara Anderson, Patty Wagstaff and Ellen Dean, was selected to participate in the U.S./Soviet aerobatic exchange program during October with the mission of learning as much as possible about their training methods and judging techniques.

This odyssey to the aerobatic camp at Borki began as a method of observing the training techniques and procedures used and refined by Soviet teams since they came under the tutelage of Kasum Nazhmudinov in 1969. My journey ended with eighteen new

friends and a deep admiration and respect for what must surely be one of the most talented, caring and capable assemblage of pilots, trainers and mechanics I have ever met.

My specific mission on the trip was to associate with Kasum and learn as much as possible about the very successful training techniques he has employed over the past twenty-three years. I was not disappointed. This extremely effective gentleman has been the trainer, coach and manager of the Soviet aerobatic program since 1969. Prior to that time, he was a fighter pilot in the Soviet Air Force and a member of their first cosmonaut class. He was a contemporary of Yuri Gagarin until a minor blood pressure prob-

lem forced him to retire from the space program. I found him to be an excellent pilot as well as a quintessential trainer. In a way, he reminded me of Alec Guinness in his role of Obi Wan Kenobi, Luke Skywalker's mentor in the Star Wars series. Kasum understood my mission and for the nineteen days of my stay, spent many long hours passing on the techniques and experiences which are uniquely his and which have served him well as he trained over a score of World and European aerobatic champions. As an aside, he also tried (without much success) to improve my chess game.

Without recanting Guido Lepore's excellent articles on Soviet training

Kasum Nazhmudinov in the two-seat YAK 52.

John Morrissey



camps, I would like to share the rhythm and flow of our daily routine and give some impressions of our gracious hosts and their magnificent planes. We were met at Sheremetyevo II, the international airdrome in Moscow, by Elena Klimovich, Victor Smolin and Peter Belevantsev. Jeffrey Barrie of PAC was also there to ease our way through customs, a surprisingly painless process. We boarded a large, comfortable passenger bus for our two and one-half hour trip to the site of our training camp in Borki, Russia, a very small town located on the Volga River between Dubna and Kimbry. The eighty mile journey began and ended in a darkness laced with rain and fog. Kasum and the remaining pilots turned out to give us a warm greeting as we reached our "hostel" about 8:00 p.m. We were shown our rooms and taken to the "canteen" in Kimbry for a warm meal. The food was plentiful and nutritious, although their diet seemed to contain a staple of meat at

every meal. The soups were excellent as were the fresh juices. After dinner, a very small Russian girl insisted that she clear the tables and clean our plates. I did not think too much about this at the time, but remembered the incident the next day as Pete Anderson and I were leaving the flight line.

On the way back to the hostel, Kasum told us to sleep in the next day and pick up the flying schedule in thirty-six hours. He went on to say that the bus would leave the next morning for the canteen at 0751 and that we were welcome to join the team if we wished. We wished! Patty, Ellen, Pete and I were on that bus. We enjoyed a good, but heavy, breakfast and were back at the hostel by 0840 where the morning briefing was held at 0900. We were formally introduced to the pilots and told that flying would begin immediately following the briefing. The "routine" would be to fly one dual flight with Victor Smolin in the YAK-52 to get a local area check out and then a flight in the YAK-55

prior to the "Suke," the Sukhoi 26M. There were ten aircraft available to fly: two YAK-52s, one YAK-55 and seven SU-26s. All of these aircraft were continually in commission. Even though I was selected to fill a non-flying position, Kasum said that I could and should fly the same program as our three "main" pilots. I appreciated this gesture as it certainly made the trip more meaningful. By the end of the first day, Pete and I had completed our flights in the 52, 55 and 26; Patty and Ellen completed their 52 and 55 flights. On subsequent days, we were allowed to fly the "Suke" twice a day and the 55 or 52 as many times as we liked. Kasum asked us to try for a ten minute turnaround when we became comfortable with the routine. They fly these planes nine times a day and try to take no more than ten minutes between flights. My impressions of their planes are extremely favorable. All of them shared the 360 hp, M-14P engine. All used the same two-bladed "paddle" propeller.

Sveta — one of the new Russian pilots.

Ellen Dean



ler and shared the same starting procedures, engine instruments and temperature limits. The 52 is a two place, tandem, retractable tricycle gear trainer with a plus five, minus three G limit. The YAK-55 is a single seat, all metal (no carbon fiber) monoplane with a plus 9/minus 6 G limit. I believe most of you are familiar with the SU-26 from previous articles in this magazine. Space does not permit an in depth discussion of the performance characteristics of each plane, suffice it to say that the 26 is in a league by itself. Even though we could fly the other two planes any time we desired, I am not aware of an instance when any of us flew anything but the "Suke" for the remainder of the visit.

The 26 is certainly the most exciting aircraft I have ever flown and I flew the single-seat F-105 when I was twenty-three. A few specifics: I timed the rate of climb for one minute following lift-off and came up with 3,825 feet per minute. Maximum sustained speed in level flight was an indicated

327 Km/hr at 2,500'. There is no tendency to overheat either the oil or cylinder heads. It is probably the easiest tailwheel aircraft to land that I have ever flown. Spins were perfectly conventional and displayed recovery characteristics very similar to the Pitts. The emergency spin recovery (Idle, Release, Determine Direction and Correct with rudder) worked perfectly. The ergonomics (pilot seating position and instrument/flight control placement) are the finest I have ever seen. Although it is any easy aircraft to fly, I feel it would take some time to extract the full potential of this very capable mount. This seems to be consistent with the Soviet experience.

A minor anecdote following our first days' experience might be of some interest. Pete and I were walking back to the hostel, which is only about 900 feet from the flight line, when a single "Suke" dove into the box. We stopped to watch as we began to appreciate the skill and aggressiveness of the pilot. I remarked that this indeed must be one of their champions

who was performing the last flight of the day in order to impress the Americans. Pete observed that it looked like we might be "... taking a knife to a gun fight". The flight was so impressive that we decided to wait until the pilot taxied in and then give him a round of applause for his outstanding performance. As the canopy opened, we both realized that the pilot was none other than the young girl who had cleared our plates at the canteen the previous evening. Later we learned that this was Svetlana Kabatskaya flying her third day at a main training camp. We called her the Madonna, not because of her resemblance to the singer but because this diminutive expert reminded us of the original Madonna in a Christmas pageant.

There are four approved areas where the daily flying is accomplished: zona 1, zona 2, zona 3 and the box. All the practice areas are within sight of the field, with the farthest zona being 5.5 Km away. The flight procedure consists of strapping in the plane, closing the canopy and

signalling to the crew chief standing by the left wing that you are ready to start. He nods his approval and you fire up the big nine cylinder radial. This event alone is almost worth the whole trip. Once the engine is running, and we never had any trouble with the starting procedure, you idle the engine at 50% (tach is in percent of maximum rpm allowed rather than a pure number) until the oil temperature is at least 40°C and the CHT is 120°C minimum. You then use the VHF radio to announce that you are taxiing. This is a simple procedure where we use our personal call sign (mine was John) and wait for Kasum to reply . . . "John, Taxi". We then proceed straight ahead about fifty feet from our midfield parking positions onto the center of the runway and turn in the direction of takeoff which is always announced at the morning

radio and over the next several days I benefited a great deal from the helpful comments not only of our own team members but also from Elena, Victor, and Alexander Shpigovski, the main critiquers for their team. Alexander will be the Commonwealth judge at WAC 92 and Victor was World Champion in 1982.

I kept a journal of the number of flights (nineteen), the flight time (average sortie length is .3) and the daily G load. The sorties were short because of the limited fuel (17 gallons) available in the "Suke" and because of the high G loads involved when flying this plane at competition speeds in the aerobatic zone. My personal average G per flight for the training camp was 8.5 positive and 4.3 negative. If I eliminate the negative G for the first three flights while I was building up my tolerance, then the average nega-

minus 4 for the first flight of the second day and then push it up to your normal value. A Russian technique, relayed by Nikolai Timofeev, is to stiffen your back and neck muscles, relax your stomach and curl your neck forward while pushing hard. The doctor told me that at the first hint of spatial disorientation, you should stop your practice flight and land; do not fly again for at least one and preferably two days before starting the negative G conditioning program **from the beginning**. They feel that if you get a serious case of the "wobblies" and repeat the experience the next day, you will be down for a minimum of two weeks and may **never** regain competitive negative G tolerance again. Based on my experience over the last fourteen years, I feel they are exactly right.

A few more thoughts and observa-



The YAK 55.

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briefing. Once you are lined up at midpoint on the 4,500' runway, you run the engine up to 65%, perform your pre-takeoff check and announce . . . "John Takeoff". Now, there is a bit of suspense building here, because the next thing you are going to hear is your takeoff clearance and your practice location. I was thinking of the Madonna's magnificent performance of the previous evening and praying I would not have to fly in the box while she viewed **my** performance. "John, takeoff, box". Well, maybe she won't look. Not! All of the flights in the box are critiqued by

tive G load for the final fifteen flights was 6.8. The average G on the meters (there is one for positive and one for negative G) when I would use an aircraft after a Soviet pilot was plus 9.5 and minus 8.5.

I had several conversations about G conditioning with the Soviet trainers, pilots and their doctor. In summary form, this is what they feel: limit your negative G exposure to the minimum required repetitions. If you lose your negative G tolerance (over six days without competitive negative G), limit your exposure to minus 3 for the first day (two to three flights),

tions on the planes. They flew them nine times a day and flew them hard. Nothing broke. No one that I talked to had ever had an engine failure while sitting behind the M-14P. I asked the crew chiefs if they had much trouble with either the engine or the propeller. The answers were unanimous . . . "no problems". When asked what power setting to use for various maneuvers, the answer was always the same . . . "maximum!" In nineteen days, I never saw an oil leak on any of their radials. Every fifth day was a "technical" day; one used for preventive maintenance. During

these days, the pilots assisted the crew chiefs. We were taken on a tour of the Sukhoi Design Bureau in Moscow and hosted to a formal dinner afterward by Mr. Siminov (read Mr. Sukhoi). After seeing the construction process and flying the 26 on a regular basis, it was obvious to me that these aircraft are extremely well built both, from a qualitative and a design perspective.

As the days followed one another, I began to feel like a young fighter pilot in up country Thailand: a daily diet of two flights, three meals and great camaraderie. Although I did not speak Russian and only a few of the Soviets spoke English, there was absolutely no communication problem. Kasum graced me with several long conversations and "Sasha" Shpigovski spent several hours detailing his perceptions of Soviet and Eastern bloc

"book" were simply mistakes or errors. I must say that every time I observed one of these "Soviet traits" at Borki, the critiquer called it to the pilot's attention. On the matter of spin entry, they feel that if the nose and wing drop together, even though the aircraft has not slowed to the one G stall speed, the spin entry is good as long as altitude does not change. They feel this technique helps with spin placement. I asked them to grade some of our traditional IAC spin techniques and they had no problem with those entries either, although slowing the Sukhoi from relatively high speed to the one G stall speed can cause a distinct impression of altitude gain due to deck angle change. My notes on their grading techniques show the following tendencies when associated with the referenced maneuvers:

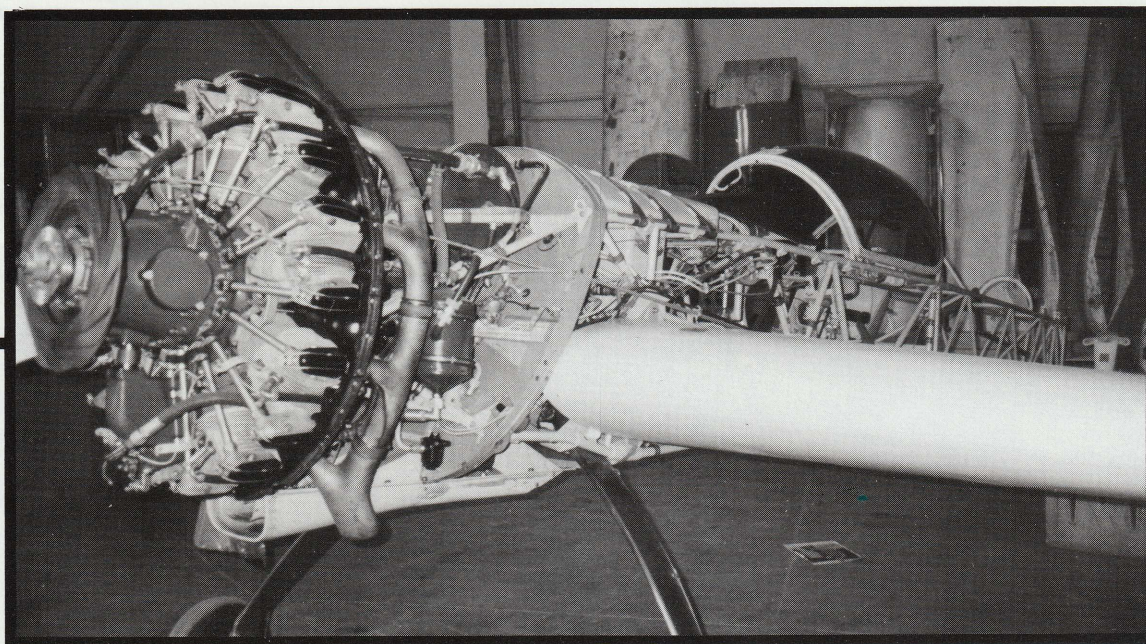
- On "Humpty" radii, they tend to

slide is a mistake, although I could not determine if this was to be downgraded. It may be that they feel vulnerable to torque-off problems and engine stoppages in a long slide.

- During any point roll, they feel that the pause should equal the time of rotation. In other words, the pause on a two-point roll would be longer than the one on an eight-point roll. They try to make the roll rate the same throughout the sequence.

- The Soviet view on centering the roll in vertical or 45° lines is to follow the rules, but to allow some balance between length and time. What this means to me is that you may get away with a slightly longer line where the time is short and a slightly shorter line where speed is slow and time in the line is relatively long.

- Regarding biplanes vs. monoplanes, all of their judges say that



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judging criteria. From judging and watching the Soviets at our Nationals and Fond du Lac, I suspected that they intentionally flew maneuvers with known deviations from accepted judging criteria in order to receive better grades. Examples of this would be long lines after rolls on down lines and late rolls on the way up. I had also noticed sharp transitions from 45° lines to looping segments, flying hammerheads around and forced entries into spins. I think I was wrong. They convinced me that they know and are trying to conform to accepted criteria and that deviations from the

deduct more for low energy than for a faulty radius. They tend to be more lenient on radius control that we (I) do.

- This philosophy carries over to the hammerhead where even a slight slide is more severely penalized than a fly-around. They allow one wing-span as **normal** displacement in a hammerhead.

- In tailslides, they cheat but only in the last 5% of the line. They feel that a line which carries the cheat from the bottom should be more severely downgraded. They look for 1½ ship length slide and feel too long a

there is no "prejudice" against the Pitts, but their judges see one so seldom that they do not have the confidence to give either an extremely high or low mark to the maneuver. They all spoke of the difficulty in judging the vertical in the Pitts. Their view is that since they are not certain in their own minds that the plane is vertical, it is hard to give a maximum score.

After I had been there about a week, I began to realize that there was another noteworthy aspect of this Soviet aerobatic team; they care about one another and continually

think of themselves in terms of the team. Naturally, there is a great deal of concern about the short and long term effect of the new political and economic situation not only on them as individuals but especially as a team. Nikolai shared with me the idea that he would have to go to the United States or England and fly airshows in order to earn money . . . "FOR MY TEAM". A very revealing and unselfish point of view. As if to emphasize the interdependence of the team members upon one another, they are required (get to) fly a formation mission every fourth day. This flight includes a formation takeoff, close formation loops and rolls, followed by a formation landing. They use the YAK-52s for this. That answered my question of why they keep two 52s on the field and showed the wisdom of Kasum in putting his

return trip, we left at 2:00 a.m. in heavy rain and "tooman" (fog). The bus was no longer available, so the pilots drove us and took twice as many cars as needed in case one of them broke down. They think and act as a team and pass along goodwill and positive energy among one another. Kasum told me that he would not keep a pilot on the team, no matter how talented, who caused "difficulty by bad attitude". He also waits until about two weeks prior to the world contest to decide who the team pilots will be. He said that sometimes a person's health, personal situation or current performance level might dictate that they not accompany the team to the contest site. He viewed our method of picking a team almost a year prior to a major contest as being very restrictive; however, he does have the advantage of several

ing situations which just cannot be accommodated in any other way except by being in the arena; this was one of those times. I will be much more confident and capable in my job as team trainer from living this experience. For one thing, I have seen the current standard and flown their equipment; consequently, I have a very good idea of where the "mark on the wall" is. Our team pilots acquitted themselves in an outstanding manner. I believe it was very appropriate for Patty Wagstaff and Pete Anderson, our current and previous National Champions, to be with us at Borki. It showed that we cared enough to send our best. Their National Champion from 1991, Sergei Rakhmanin, was also present. The attitude we tried to portray was, exemplified by Ellen Dean, . . . "show us our room, we'll sleep in it gladly. Serve us a meal and we'll enjoy it with

LEFT — A "bare bones" Sukhoi 26 at the factory in Moscow.

RIGHT — John Morrissey poses by the American, Russian, and Soviet flags flying in front of the Central Aero Club in Moscow. The Central Aero Club has been renamed the National Aero Club of Russia.



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pilots in the most team-oriented arena that flying has to offer - formation! They are also required to maintain proficiency in instrument flight with a "hood" hop in the 52 every two weeks. When any team pilot is flying, he or she always had a "buddy" to watch that flight from takeoff to landing. In the box, the critiquer covers this requirement; but, in the outlying zones, the "buddy" watches to ensure that the plane comes back on time (remember, only 17 gallons of fuel) and that if there is a problem, the proper action is taken. When it came time to take us back to Sheremetyevo II for our

world class pilots from which to choose. As a special treat on our last day, Kasum offered to remove any restriction on our number of flights. There had been several days of "tooman" during our stay which had curtailed flying. I was able to fly four times. A great way to wind up a magic journey. That night their pilots fixed us a delicious going away meal at the hostel. Kasum provided the champagne and we both gave and received many special remembrances.

On a professional note, I found the experience valuable from a team trainer perspective. There are learn-

appreciation. Play a game and we'll participate willingly. Put the plane on the ramp and we'll fly it".

I will miss this very special group of people who personify a passage from Robert Fulghum's book **All I Really Need to Know I Learned in Kindergarten** . . . the world is a dangerous place and "when you go out in the world, hold hands and stick together".

I hope my new friends are still sticking together and holding hands, for theirs is becoming a very dangerous world.

Spasiba, Kasum. Dosvedania!