Moments in the Life of a MiG-21 Pilot

By Lieutenant Colonel Dimitar Nedyalkov

Certain instances in the experience of a combat pilot leave indelible marks in one's consciousness: critical situations he has encountered in flight (an environment God did not intend for humans) and his feelings at the first encounter with each successive aircraft type.

Speaking personally, the MiG-21 left, perhaps, the deepest such mark during my combat pilot's career. I do not ascribe this only to the 800 hours I went on to fly in various versions of this remarkable aircraft, but possibly to its authority — an authority that had emerged in the five wars and numerous conflicts this aircraft had seen before our first meeting.

It was in my first year after commissioning that I embarked on the MiG-21 theory course. By then I had accumulated over 350 hours on the Czechoslovak L-29 advanced jet trainer and on

subsonic Soviet MiG-15s and MiG-17s. Having flown in all weathers, by day and by night, and having practiced numerous dogfights, weapons firings and ground attacks, there was no need for me to feel apprehension regarding my flying skills. I had the confidence of a well-trained pilot, occupying the cockpit for each successive sortie with the ardour of all young men who have dedicated their lives to the grandiose idea of flight. Flying suited me.

Yet, as the ground technicians slid open the massive doors of the hangar housing the MiG-21s set aside for our training, I froze. The animated chatter among my 22-23-year-old colleagues halted. A machine of a completely different look to anything we had previously flown now faced us. Right away it impressed with its size, with its exacting shape, with the sheer impetus its designers had given it. Everything in it cried out for speed: the long cylindrical fuselage with its pointed nosecone and broad exhaust; the tiny, almost withered-looking wing; the conformal, rather sparingly glazed canopy.

I remember squaring up to the aircraft for some time, idly musing on whether I would manage. I had read much about its feats. We had studied combat experience and each of us recalled figures and facts. Like the 104 F-4 Phantoms downed in Vietnam against 57 MiGs in direct air-to-air combat. And like the 50-minute massed encounter overhead the Egyptian airfield of Mansoura where in 1973 fifty MiGs fought as many Phantoms, downing 18 of the latter at the cost of four of themselves, despite the American fighters' technological slickness and two-man crews. We recalled our future mount's excellent showing on the Syrian front in the same year, and its record against F-104 Starfighters in the Indo-Pakistani conflict. But we also recalled more experienced pilots warning us that, as distinct from anything we had flown prior to it, the MiG-21 was strict and unforgiving, especially at over 500 km/h (270 kt).

The Dove of Peace

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Front and rear views of the twin-seat trainer MiG-21 Mongol

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to start building up habits. The version to which we were converting was the MiG-21PFM, often called the Dove of Peace by Bulgarian fighter pilots. The nickname was justified by the paucity of armament on the subtype: two R-3S infrared-guided air-to-air missiles. The design had suffered from Khrushchev's view that missiles were the thing of the future and any on-board artillery was an embarrassment. But the aircraft was seen as an excellent platform for the training of young pilots.

MiG-17 experience had forewarned me to expect Spartan cockpits in Soviet fighters, and reality did not disappoint. After all, Spartan or not, this was a second-generation jet fighter with superior avionics, good cockpit lighting for night flying, the sure-fire KM-1 ejection seat which would save the pilot at zero altitude and a speed range from 115 km/h all the way to 1,400 km/h (60 to 760 kt), and all the requisite altitude equipment.

The narrow cockpit with its haphazardly placed switches was no problem for us, but visibility definitely was. The seat may have been height-adjustable, but this was of no benefit to a man of my ample height — and the view ahead augured well for strict reliance on instruments in flight. In flight, attention would have to be apportioned in a new way. This observation is valid for all MiG-21 versions I subsequently flew, except the MiG-21F-13. This subtype's cockpit offered significantly better visibility, but at the expense of 50s-style instruments with ultraviolet lighting that turned night flying into a genuine trial.

Initial flights bore out my apprehensions. In fact, I may as well have been unconscious for my first sortie. Speeds were so much higher than on machines I had flown previously that my reflexes were way too slow. It seemed I had hardly departed and cleaned her up for the circuit before I had to dirty her up again and land. On approach the ground seemed not so much to rise as come up and hit me.

To be fair to myself, I ought to note that the MiG-21 departed and arrived at the record speeds of 360-380 km/h (195-205 kt) and 290-320 km/h (155-175 kt) respectively, depending on external stores and weight. Bulgarian pilots said that whoever learned to land the beast would land anything. The reason for such excessive speeds at these most demanding phases of flight was the wing's small area and poor high-lift devices. Apart from two-position (take off and landing) flaps, the aircraft featured upper wing blowing which made things tolerable and allowed stable flight at 340-360 km/h (185-195 kt). The system was fitted to all marks bar the MiG-21F-13. The latter landed in what was practically the emergency configuration for all other marks: airbrakes out and flaps set for take off, allowing the engine to work no harder than was acceptable.

High speeds and small wings made arrivals palpably hard, while excellent wheel brakes and the tail parachute reduced the landing run. Limited visibility hindered ground view in the flare only if the manoeuvre was initiated too high or was too steep. In these cases the intake completely obscured the runway, rendering directional control difficult in the instants before touchdown. That was why converting to the type called for (at the very least) an average level of skill from seconded pilots.

Impressive acceleration

Airborne, the aircraft also had its peculiarities. Acceleration was impressive: it is not surprising to me that all marks of MiG-21s can compete with fighters of subsequent generations in acceleration. Apart from easily picking up speed, the machine broke the sound barrier effortlessly, rapidly building up the M numbers. Though limited to M2.125, many of us trainee novices reached M2.5 through errors and poor thrust management: clearly, this was no problem for the airframe.

Gaining height after accelerating to M1.7 was no problem, either. Most of us reached the flight manual limit of 19,000 m (62,700 ft) in our initial stratospheric flights. Subsequently, we would occasionally boast of exploits in excess of 20,000 m (66,000 ft): an altitude where some machines' engines were better able to cope than others.

This performance by the MiG-21PFM afforded us successful practice intercepts and successful chases of targets flying at over 900 km/h (490 kt). Subsequent marks' performance was somewhat duller, while still good for the close-combat (or 'frontline') fighter class. Interceptor pilots were hampered by the RP-21 Saphir onboard radar with its 20-25 km (12-15 mile) range and 10-16 km (6-10 mile) intercept range for all marks, and the attendant need for ground vectoring. Near-misses with targets were frequent in training, rendered more serious by 600-800 km/h (325-435 kt) closing speeds and leading to the necessity to perform additional post-interception separation manoeuvres. This was never a favourite part of the sortie for us, because of its incredibly short duration.

That was why one of the most important dials in the cockpit was the fuel consumption gauge, its significance rising further when reheat was used. No MiG-21 pilot would forget the butterflies in the stomach occasioned by the thin needle's rapid march towards the red line. Even today I find the memory of the sight unsettling, despite my solid 'hourage' on combat types. The three drop tanks with their 490 litres (108 Imp Gal) each under the body and each wing, did not help much. While greatly limiting the already modest external stores, they extended combat radius by a modest margin, especially for low-altitude sorties.

Naturally, in the context of frontline fighters, close combat piloting technique was paramount. As could be deduced from the type's core task, it did not enjoy manoeuvrable flying, being in its element in high-altitude intercepts. However, it rolled stably at high speeds and climb gradients of up to 24 degrees. The most advantageous combat speeds lay in the 850-1000 km/h (460-540 kt) range. At critical alpha and speeds below stable roll minima, the airframe would shake. This was characteristic of all marks and served as due warning. The good thrust to weight ratio (0.85 with reheat and a warload of two AA missiles) allowed level combat with any contemporary fighter except the F-5.

Vertical aerobatics worked perfectly at alphas of up to 20 degrees, with preferred heights in the 200 to 5,000 m (600 to 15,000 ft) range. Above this, thrust was not always sufficient for confident

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juggling away from the enemy at the top of ordinary and Immelmann loops. Attention also had to be paid when descending, as the aircraft speeded up very rapidly and could easily go supersonic. This called for careful thrust management. Airbrakes were recommended when flying demi-tonneaux above 6,000 m (18,000 ft), to maintain normal flight when entering the dive.

Speeds below 500 km/h (270 kt) were considered undesirable in figure flying due to the machine's configuration. A drawback in figure flying was the engine's great thirst when in reheat. Normal aerobatic flight duration was not more than half an hour, this allowing sufficient reserves for going around or diverting if necessary.

'Subsonic chuckability'

As a sensation, flying the type was pleasant, with light stick loads at all speeds, with any excess load fully 'trimable'. The MiG-21F-13 was especially pleasant to fly semi-aerobatically and aerobatically, being devoid of any autopilot and radar. This made it rather light and imbued pilots with a sense of limitless 'subsonic chuckability' combined with high performance and faithful handling (the aircraft followed every tremor of the pilot's hand obediently and immediately). This fidelity eroded progressively with successive marks.

The instrument fit allowed complex manoeuvring in complex weather and at night (except with the MiG-21F-13). Horizon indication would often be lost momentarily at alphas above 110 degrees, but would presently return. However, horizon errors could accumulate in lengthy high-g vertical manoeuvres: a hazard to flying in cloud and at night without natural references. In such cases the narrow cockpit with its sparse glazing reduced the likelihood of loss of spatial awareness. Overall, awareness of aircraft attitude was rather strong in the MiG's cockpit.

The aircraft's prowess as a fighter did not extend to ground attack and recce. Limited cockpit visibility again increased the time needed to pinpoint ground targets. For the same reason, and also due to the nature of weapons used, it was recommended for ground attacks to be delivered from the dive. In this case the machine's good acceleration was a disadvantage, leaving far too short a time for the pilot to aim.

Despite these drawbacks, Bulgarian military pilots take pride in any MiG-21 hours in their logbooks: they attest to quality training and high attainment. Practice shows that type conversions are significantly easier after time spent in this aeroplane: a type that represents an era in world military aviation.

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MiG-21F-13