

Blues Skies Podcast

Season 1, Episode 41

Air Marshal Philip Rajkumar - Test flying career

00:41

Ganapathy:

Hello and welcome to the Blue Skies Podcast. I'm P. R. Ganapathy, your host.

01:01

Ganapathy:

Welcome back to the program. We have Air Marshal Philip Rajkumar with us again. You remember from episode three of the Blue Skies participated in the attack on Sargodha. And at the end of that episode, you spoke about being detailed for the test pilot school at EPNER in France. And so we'll pick up the threads from there. Welcome back to the program, sir.

01:23

Air Marshal Philip Rajkumar:

Thank you Guns, good to be back.

01:27

Ganapathy:

So, sir, as we mentioned, you were just beginning to enroll in a three month course of French to go to Epner. We've heard of ETPS. We've heard of Edwards Air Force Base. Tell us a little bit about EPNER and your experiences when you landed up there

01:46

Air Marshal Philip Rajkumar:

EPNER stands for the École du personnel navigant d'essais et de réception which in French means French School for Flight Test Personnel, dealing with both experimental and production testing. They run courses for test pilots, both fixed wing and Rotary Wing and flight test engineers, fixed wing and rotary wing and a third category of test group called instrumentation engineering. So the training was conducted in teams which are called Achieves and it is always a pilot, an engineer, and an instrumentation engineer who formed the team and went through the course. So the course started on the 8 October 1971. And my government of India letter for Sudhir and myself authorised us to stay in India for 275 days, which is a little over nine months, because India, as you know, in October 71 was going through a huge foreign exchange crisis. The Bangladesh War was looming. There was a lot of financial distress. So anyway, we went. We landed up at EPNER one day late, and we were rushed into the commandant's office. Both of us were in our tunics and peak caps

and log books in our hand. And the commandant gave us a welcome speech in French. And Sudir and I spoke with a silly grin on our face because we didn't know what he was saying. And fortunately, the chief instructor was Mr. Van Ecker, who had done a course in ETPS, UK, and he spoke English. So he said, I'm sure you gentlemen didn't understand what the commandant said. We said, you bet we didn't understand anything. So he said, Come with me. And he took us to his office and he said, I understand your predicament because I was in the same boat in the UK. But unfortunately, the instruction here is in French and we have not called you here. Your government has sent you here. So we expect you to get up to speed in the language in the next 30 days. Otherwise, we are going to send you back. So that was a huge shock. So Sudhir and I went to the library, pulled out some old tapes of French language conversation, and we sat with the earphones for hours together in the library whenever we had a little spare time. And I started speaking in my broken French to whoever I came across and they all laughed at me in the beginning. But then they realised that I was making a huge effort and they all became very cooperative. And at the end of 30 days we were able to manage. They didn't send us back. The second thing was I had no twin engine flying experience at all. So they were very concerned that I wouldn't be able to cope with twin engine. So my first eight sorties in EPNER were only on transport aircraft: the Nord 260 and Noratlas Aircraft, which looks - it's a smaller version of a Packet which we had.

05:31

Ganapathy:

So this one month that you were learning a crash course in French. The course was also going on. So there was also differential calculus and all of those complex technical things.

05:43

Air Marshal Philip Rajkumar:

In the first one month in ground school, there were, Incidentally, 400 hours of ground school and the ground subject classes used to run from 830 to 1130. 3 hours. 11-30 to 12-30 was the lunch break and 1230 to 5-30 was flying. This was the standard right through the course. And during the first four weeks we ran through the entire college, physics and maths syllabus, so to speak, a quick brush through algebra, calculus, a little bit of thermodynamics and so on. And every 15 days we had a ground test. The ground test was sometimes written, sometimes oral, and then the flying was also going on. So it was a very stressful time for us, at least because after flying I had to come back and write a report, which was immediately after the flight, I had to write the report. I had to go back to the room and sit in the night, sit up late in the night and write the report in French and hand it in the next morning. Whereas my French course matches come back from the sortie in 15-20 minutes, they scribble the report, hand it in and go off home. But I had to do the homework. So anyway, that carried on. We caught up with it. And the interesting thing was a couple of days after we landed up, they gave us sixteen pilots notes, all in French, and said, we expect you to be ready. We will give you two weeks notice that you'll be flying a particular type of aircraft. We expect you to study the notes, go to the aircraft, familiarise yourself with the aircraft and be ready because you will find your name on the flying program with a particular time. So the day I flew the Super-Mystere, in India, somebody would accompany you to the aircraft and help you strap up and see you off and all that. But there I came back after lunch,

I found my name on the flying program for the Super Mystere. I walked to the aircraft. There was not a soul in sight. When I reached the aircraft, one gentleman in a power cart drove up and he connected the battery, he manned the fire extinguisher and helped me strap up. I started up and he pulled out the chocks and off I went, this was very something I wasn't used to, but it gave a lot of confidence. And the same thing happened with the other types which I flew Mirage IIIB and later on the Etendard IV, the carrier borne fighter which we use, we did three sorties on that for evaluation. So it was a lot of confidence building and very interesting because we were flying over the south of France, that is the Mediterranean Sea. The coastline along the Mediterranean Sea was the flying area and it's a very pretty place. So it was a great experience and gave us a lot of confidence, especially for me because I hadn't flown transport aircraft. The Asymmetric flying training which I got there was very good. I came back much better informed and having better skills than what I had when I went.

09:41

Ganapathy:

Did they have variable geometry aircraft and things like that?

09:45

Air Marshal Philip Rajkumar:

Yeah. Can you imagine? Back in 1972, they were already flying not variable geometry, but variable stability, Mirage III,

09:56

Ganapathy:

variable stability, sorry,

10:00

Air Marshal Philip Rajkumar:

variable stability, Mirage Three with an analog fly by wire system which later on, towards the end of the 1970s, the 1980 they flew the Mirage 2000, which just goes to show the amount of preparatory work that has to be done before you launch a program. So I'll come to that later when we speak about the Tejas. So I flew the variable stability Mirage - two sorties and they showed us all the various stability problems that one is likely to encounter. And so that was a great learning experience. Another great experience was in the aircraft called the Nord 262 which is a 28 seater turbo-prop. There was a flight test engineer cum test pilot called Klopstein. Now, Klopstein was the man who felt that you could use the head up display to land in any kind of poor visibility conditions. And he had been a flight test engineer himself and a test pilot himself had designed the whole system. So as you came in blind, absolutely blind, you got a miniature runway appear on your head-up display, which if the inertial platform was accurate overlay the natural runway and you could just go in and land. So now the Klopstein window is quite a common thing in the head-up displays of commercial aircraft. I don't know which of the commercial aeroplanes which use this, but I know it is in current use, but Klopstein passed away in 2006 as quite an unsung hero. Then towards the end of the course, we went on various visits. We went to the Italian flight test Center, Pratica Di Mare near Rome, and I flew the Macchi 326 trainer there. Good trainer, did some spins and it was a very nice sortie flying over the Italian over the Italian Coast. Then we went into

the evaluation phase where we had to fly 3 hours on three different types of aircraft. Mystere 20, which later became the Falcon 20, the Etendard IV M carrier borne fighter and the Transall, the Transal was a twin turboprop large transport aeroplane of the An-32 class, not An 32, An 12 class. It was 48 ton all-up weight. And on these aeroplanes, of course, the Etendard IVM didn't have a trainer, so we just jumped into it and flew it. We had to practice carrier approaches and simulated carrier landing on a ground based facility at a place called Nîmes, which was 40 miles from Istres. Then in all these aircraft, we were just sent off in the Mystere 20. I did a cross country from Istres to Corsica to evaluate its use as an executive jet, how comfortable it was, how easy it was to fly, and the other characteristics. And we had to write an evaluation report. All in French, mind you. Then the Transall, which is such a big transport aeroplane. We were just given 1 hour, 30 minutes fuel. And then the next time I found myself sitting in the left seat with Sudhir on the right seat and the French engineer in the jump seat. So all this was a great experience and gave us a lot of confidence. Finally, in July, at the end of the course, I had to go to Brittany, which is just outside Paris, to the CEV headquarters for the final test. Final flying test. And the final flying test was conducted by Colonel Kanak, who is the boss of the centre. And he had done his course at ETPS with Wing Commander Chopra, who later became chairman HAL. So he did ask me how Choppy was doing. And so on. My final test was flown on a Caravelle 98 seater with two rear mounted engines. Colonel Kanak gave me a test order and said, this aircraft has undergone all these modifications. I want to see what kind of tests you plan and how you execute it. I'm a second pilot for you. I don't know anything about the aircraft. You have to guide me and there will be an engineer in the jump seat. You'll have to make use of his services also. And one of the things we look for is crew resource management. How you manage your test crew. So I've never sat in the Caravelle before. So quick familiarisation of the instrument panel. And with help from the flight engineer, we started up and went off and flew. And I took it through the test order which I had made. Can I call out various parameters that I was asking him to jot down? Then I made the flight engineer do some work. And then we came back. We fed into an ILS and came back and landed. And he said, go around as you're going around. He pulled back one engine. Now I had single engine. So I'd call out the engine failure checklist to the flight engineer to carry out. And I asked Kanak to check for the fire warning indications and so on. Anyway, I did a single engine circuit and landing and came back. In the debrief he said Your crew resource management was good, and I'm happy with the performance. I healed a huge silent relief and went back to Istres. And at the end, of course, the interview with the Commandant, he says, we were very worried when you came here because of your poor knowledge of French and the fact that you hadn't flown transport aircraft. But I'm very happy to tell you that you performed well and we think you have all the qualities to make an excellent test pilot. So I almost fainted when I heard this.

17 :20

Ganapathy:

Amazing.

17:21

Air Marshal Philip Rajkumar:

And I came back. In fact, I can take a photo shot of the end, of course, report, which, of course, is in French. I can send it to you and you can put it on. I'd love to see the podcast.

17:39

Ganapathy:

Yeah. Now, you had a grand total of maybe nine years of service at that point.

17:45

Air Marshal Philip Rajkumar:

Yeah.

17:47

Ganapathy:

It seems like a lot of stuff you went through in that one year as a very young pilot.

17:47

Air Marshal Philip Rajkumar:

Yes. I was 30 years old with nine years of service. In fact, for my 9th anniversary of my commissioning, it came on a weekend and we had gone to Paris and I celebrated my 9th anniversary watching the Lido show and the Champs Elysee. It was extremely stressful, period, but also a huge learning experience. And I came back much better informed, with much better skill sets.

18:45

Ganapathy:

And so when you came back, you then spent the next five, six years, I think, in test flying, right?

18:50

Air Marshal Philip Rajkumar:

Yeah. I came back in the middle of July and I reported to ANATU in Kanpur. It was still the aircraft and armament testing unit, and the day I reported the Group Captain Kapil Bhargava put on my Squadron Leader's tapes, my promotion had come through, so I became a Squadron Leader, but then I had to rush off on leave because I had some family problems to sort out. And I came back in September and I concentrated on converting onto the Avro 748, Marut and the Hunter. We had a Hunter on our establishment and I flew the Hunter 56, which was a beautiful aircraft. Then in early 73, Kicha and I, Krishnaswamy and I, I call him Kicha. So Kicha and I were sent off to Nasik to convert on to the Type 96, which is the new version of the Mig 21 M, which was just entering service. So we went to HAL, Ozhar, converted, and then the big trial which came up was the Mig 21 Ms, which came into the IAF. Two squadrons were bought and they had an engine called the R 13 engine, which was more powerful than the R 11. After doing the Type 96 conversion, we came to know that the two squadrons, which are being bought in flyway condition by the Air Force, were coming with the R 13 engine, an improvement on the R 11, more powerful and it had a second stage reheat which cut in about 1.3 Mach number. And in February, we had to do a comparative evaluation between one Type 96 with the R 11 engine and one fitted with the R 13 engine.

Because we had to carry out an evaluation and decide which engine to fit on the 150 Type 96, which were planned to be built at Nasik. So, Kicha and I did a total of 24 sorties, twelve each. And we flew both. He flew some on the R 11 and R 13 and I did the same, some on the R 11 R 13. And one of the interesting things which I had to do was the static climbs to 19 km. So I put on the pressure suit and sometime in early March, I did these climbs when the visibility was very poor and Kanpur only had a radio Compass, non directional beacon as a landing aid or a recovery aid. So the fat spine, they put a dorsal tank on the spine of the aircraft, which has spoiled the area ruling, the beautiful area ruling of the Type 77. And the supersonic acceleration was badly affected. So to do the static climb, I had to accelerate to 1.85 Mach number and then pull the nose up. But the acceleration took a long time and ate up a lot of fuel. And I was reaching 19 km with the 450 litre light glowing in the cockpit. And I would be about 150 km away from base. And then I had to throttle back and descend slowly, conserve fuel, land up on circuit with 300 litres. And the third group pump light would come on and probably switch off with something like 200 litres in the aircraft. So those tests required a lot of planning and had to be executed with care. Anyway, at the end of it, we said that there is small difference in performance, improvement in performance of the R 13 engine and decision on which engine to fit into the Indigenous aircraft would be based on techno economic considerations. And since the R-11 was already being made in Koraput, they decided to make the Indigenous aircraft coming out of Nasik; they fitted it with the R-11 engine. We didn't go for the R 13. So this was in early 73 then those days night attacks to carry out attacks at night they were using something called flare bombs. Each flare bomb will be dropped by Canberra from a height of about 3 km. And then as the flares were burning and drifting down, they created an illuminated area over the target and you could carry out your attacks. So Kicha and I, Kicha flew the Sukhoi-7 and I flew the MiG 21, and then Thomas dropped a few of these. We were comparing the Leapus English flare with the Russian flare bombs. So we finished that.

24:34

Ganapathy:

How long do these flares take to descend and how long is that window that your target is illuminated.

24:42

Air Marshal Philip Rajkumar:

We used to get something like three minutes, two and a half to three minutes of illumination. And we could put in a fair number of attacks. And I remember Air Chief Marshal OP Mehra came to Jamnagarto see this. And I fired Salvo 32, 57 millimetre Rockets at night. That was some sight to see. But the elimination of the target using flare bombs has gone out of the window now, because now you don't need flares to see at night because of the infrared devices which we had. At that time, it was considered important. And we did this trial. Then we came back to Kanpur and again to rush off to Jamnagar. And I got to carry out some other trials. By that time ANATU had become ASTE in August of 1972, and ASTE was asked to move to Bangalore. Now, this was an entirely move thought up by Air Chief, Marshal OP Mehra, who became the chief of the air staff in March of 1973. And he at that time was wearing two hats. He was both the chairman of HAL as well as chief of the Air Force.

26:22

Ganapathy:

Oh, wow.

Air Marshal Philip Rajkumar:

So for about three or four months, he wore these two hats till a new HAL chairman was chosen. And during this time, he just ordered ASTE which came under his control. He said, you moved to HAL. HAL will give you land. And HAL gave us land because he controlled HAL as well. So it was a very fortunate turn of events where ASTE is housed today is all the land given by HAL at that time, Air Commodore Gole, who was the commandant at that time, came to Bangalore and did the first siting board and ASTE owes a lot to Air Commodore Gole for his foresight. Then, after coming to Bangalore later in that year, in August of 1973 I was sent to the Soviet Union and a team headed by Air Marshal Malse. And the purpose of that team was to look at the Soviet offer of a deep penetration strike aircraft. The Indian Air Force was searching for a deep penetration strike aircraft, and the IAF had already evaluated the Jaguar and the Mirage F-1 and the Buccaneer. So I went there, to Russia, to the Soviet Union, Moscow with the team, and we were shown an aircraft called Sukhoi 22, which is a bigger aircraft than the Sukhoi 7. And the outer one third of the wing would sweep forward and back, could be swept forward and back. Now, I was taken to the aircraft and there was a young Soviet Air Force force captain who didn't know a word of English, and I didn't know too much of Russian except a few technical terms. And we had the most hilarious time. For an hour, he tried to explain to me what, and we both laughed a lot. But in the end, we finally managed to understand what the other person was saying. Then I went around and got hold of the fuel consumption figures and I checked it out against the Air Staff requirements which we were carrying. And I found that it was only meeting about 40% of our requirements. So I went and told that to Air Marshal Malse and he immediately told the source that this aircraft is no use to us unless you show me something better. I'm going back. The Soviets went into a huddle and they said, no, you wait on it. So we waited there for a week. During this time, Air Marshal Malse was invited by AviaExport, the commercial arm of their Soviet aircraft industry, which sold commercial aircraft. We had a nice lunch on top of the TV tower in Moscow, which has a revolving restaurant, and we were shown the An-26. So the An 26, we said, we'll evaluate it against the medium transport aircraft requirements when we get back. So it took all the particulars and we came back and did a paper evaluation and rejected it, because we rejected the Sukhoi 22 the Soviets showed us the MiG 23.. The first time they showed us the MiG 23 swing wing aircraft and they said, we want to fly. They said, no, you sign the contract first and then we'll let you fly it. That was the standard Soviet response. So we came back. Then in all this while I was studying for the staff College entrance exam, and then on January-February 1974 Kicha and I appeared for the Staff College Entrance exam and both of us qualified. Kicha, being senior, then Air Commodore Gole said we can't let both of you go because only three of you are here. So Kicha went in 1975 and I went in 1976. But in the whole of 74, the important work we did was the IAF was very interested in putting a NAV attack system, mainly a navigation system, at least in the Hunters and the Canberrass. The Hunter 56-As had come in, which had these 230 gallon drop tanks, which gave us a lot of range at low level. But using a map and stopwatch was fast getting out moded - we needed something better. So we tried out the

Doppler twin Gyro platform navigation systems on both the Hunter and Canberra. And though it didn't go on the Hunter, we did equip a few Canberras with this Doppler twin Gyro platform system and they did the same service in the IAF. Then in 1975, I again went to Russia in April. This is because the Russians said you didn't like the R-13 engine. We'll show you an improvement of the R 13 engine. It's called the R 13 F, which will improve supersonic acceleration at low level. Right. So your father then Wing Commander Ramachandran, then CO 28 squadron, myself and a technical officer, Sq. Ldr Madhava Rao, . We went to Russia to a place called Krasnodar, near the Black Sea. And then we flew this aircraft. They said, in this populated area, you can't go supersonic. You have to limit yourself to 1000 km/hour indicated speed. So Ramu Sir and I did two sorties each at Krasnodar. We couldn't see any difference up to 1000 km/hour. Then they said, no, the real difference, you will see, is supersonic. So we said, Let us go supersonic. They said, no, here, you can't go supersonic. We'll tell you where to go, you go back to Moscow. So we went back to Moscow and waited for one month. Wow. And every morning, the three of us would March off to the embassy, to the air attaches office and spend time there. At the end of one month, the Soviets came back and said, Where we allow foreigners, you can't go supersonic. And where we go supersonic, we don't allow foreigners. We had to come back.

34:16

Ganapathy:

There was some story about the cows not giving milk if you go supersonic in this area or something.

34:22

Air Marshal Philip Rajkumar:

Yeah, that's an interpreter's joke. Why can't we go supersonic near the Black Sea? No No, our cows will stop giving milk. We came back to Delhi and rejected that engine, which was a good thing, because then the Soviets offered us the MiG biz with the R 25 engine, which was a much better engine, which was later on manufactured under licence at Koraput. So when I came back to ASTE after the Russian trip, I was shifted from the flight test squadron to the school. And Thomas changed places with me. He went from the school to the flight test squadron and I conducted number four production test pilot scores which had Neelu Malik who later became the vice chief, Nitin Gupte, Rakesh Sharma, the Cosmonaut Polly Mehra, who retired C in C SWAC. So a lot of good guys were there. And then in January 76, I went off to Staff College. After Staff College, I was posted back to ASTE for a short while and then I went to Pathankot for my flight commander's tenure.

35:55

Ganapathy:

Right now, during this period, during 76, 77 is when you all went and finally test flew the MiG 23, isn't it? And that's when my father flew the 25?

36:05

Air Marshal Philip Rajkumar:

Yeah, that was a little later. That was in 79. So I'm talking about late 77, I reported to Pathankot 3 Sqn for my flight commander's tenure. The CO ,

36:16

Ganapathy:

What were they flying at that time?

36:20

Air Marshal Rajkumar

Type 77. And we were three MiG squadrons in Pathankot and the airspace was very limited, so we had to take turns, but a lot of flying going on later on. Later on in early 1978, I was sent to do the Fighter combat Leaders course at Jamnagar with TACDE. And so I did that course. Number twelve FCL came back in June and the signal promoting us to Wing Commander came. It was the height of Air Chief Marshal Moolgavkar's tenure. And there were a lot of people who got superseded, but I was one of the fortunate few who made it. And I went and took over 108 squadron, which was a Type 96 squadron based in Adampur in October of that year. And one of the two things which I did in 3 squadron when I was flight commander was that the CO was the only one who was cleared to give night checks. So I said, sir, you please clear me, I will start doing the dual checks. So I got cleared and I started doing the night duals. And the other thing was for the year 1978, 3 Squadron got the Flight Safety Trophy for carrying on 3000 hours of accident free flying. I was the flight commander. That was a good feeling.

38:13

Ganapathy

You were returning to squadrons after almost six, seven years in test flying. What was the mental shift that you had to make between the work that you'd been doing as a test pilot versus being back in this squadron?

38:27

Air Marshal Rajkumar

The biggest shift is one of the things that a fighter pilot needs is aggression. You got to be aggressive, you gotta have that killer instinct in you to complete the mission and face the enemy. Whereas in test flying, the emphasis is on caution. So test flying, we got to worry about safety all the time because having an accident or incident while test flying seriously sets back programs. So you have this shift between aggressiveness in operational squadrons to caution in testing tenures, that is a psychological adjustment you have to make.

39:17

Ganapathy

How easy or difficult did you find that?

39:21

Air Marshal Rajkumar

In my case, I had spent nine straight years in fighter squadrons before going for the test pilots course. So I didn't find that very difficult at all.

Then in Early 1979 April 79 I was CO of 108 squadron at Adampur, I was pulled out and sent to Russia along with Gp. Capt. Ramachandran, as a member of Air Marshal Katre's evaluation team. We went there and we were shown a number of aircraft. One was the Il 76 heavy transport, the other was the Mi 24 Armed helicopter. Then we were shown the MKiG 23 MF, the air defence version, then the MiG 23 BN the ground attack version and the MiG 25.

40:31

Ganapathy

Very productive trip. We bought all five.

40:34

Air Marshal Rajkumar

Yeah. Eventually, when Air Chief Marshal Katre was the CAS, all these aeroplanes were in service. So your father Gp. Capt. Ramachandran and I went off to Lugovaya and we had to spend almost 14 days there. Ten days of ground school, morning, 730 to evening, 730 almost. We're just on a break for lunch and there was no simulator, so we had to do cockpit familiarisation on our own. And then we flew six sorties each on the MF and BN. I flew the BN and then we came back and both those aircraft entered service based on our report.

41:27

Ganapathy

Now, to make up your mind on an aircraft in six sorties, what are the sorts of things you would do in those six sorties that would give you a complete picture that allows you to decide whether to recommend it or not?

41:39

Air Marshal Rajkumar

Yeah. So you have the air staff requirement with you.

41:45

Ganapathy

So sorry, sir. I don't think our audience knows what an air staff requirement is. Maybe this is a good time to ask you to explain that

41:51

Air Marshal Rajkumar

The air staff requirement is put out by the Plans branch at Air HQ, which lays down the requirements for any particular aircraft that IAF is wishing to acquire. The performance parameters and the maintenance requirements and so on. All the requirements that have to be met in service are laid down in the form of a document and that is the Bible. When you are carrying out an evaluation, you carry that with you and then you take the aircraft manuals and decide on spot checks, which is the performance envelope which I'll do a spot check like

maximum altitude, maximum speed, maximum turn rate. Then what are the navigation aids? What is the nav-attack system like? What are the communication aids? What are the electronic warfare equipment fitted and so on. So those are the kind of things you look for but basically you cannot go through the full envelope of the aircraft. So you do spot checks of takeoff and landing performance against the charts and the manuals and you do spot checks of performance in the flight envelope, mainly the high altitude, high speed, Hi G portions of the envelope.

43:23

Ganapathy

Okay. So you're not likely to discover some of the nastier habits of an aircraft because you're only doing this limited spot checks.

43:30

Air Marshal Rajkumar

No, that's perhaps too short a period to do that. And the other important thing is fuel consumption. You've got to check out the fuel consumption figures of the aircraft in various regimes of dry power, Max reheat and so on, and also the armament carrying capability. How much can it carry? How far can it go? What is the radius of action? You calculate all those on the ground and see whether it meets with the requirements- the air staff requirements.

44:05

Ganapathy

Now this air staff requirement, how detailed a document is this? Hundreds of pages.20-30 pages?

44:07

Air Marshal Rajkumar

It is quite detailed. A lot of time goes into the preparation of an air staff requirement. The plans branch takes inputs from the ops direct rate and the maintenance directorate and the industry in case you're planning licence manufacturer. HAL is also brought in and in some cases DRDO is also brought in and very detailed documents are prepared with all these inputs.

44:41

Ganapathy

Lovely. And I think later you held that position as director of air staff requirements and so we'll maybe speak about that a little more in detail a little later. Great. So just give us an example. This MiG 23 air staff requirement, what were the broad requirements? This was for a close air support, deep penetration strike. What was the headline requirement for this aircraft?

45:06

Air Marshal Rajkumar

The MiG 23 BN, which I evaluated. The requirement was it was supposed to carry two tons of bombs over 300 nautical miles. That was the principal requirement. But the MiG 23 BN could carry 6 tons of bombs, but it didn't go as far, it didn't go 300 nautical miles, it probably went as much somewhere around 240-250 nautical miles. It was also swing wing and it had one big drawback in the sense that to go the maximum range, to get you the maximum radius for action, it had to carry these 800 litre tanks under the wing and when the tanks were carried, you couldn't sweep the wings back. To perform an operational mission. You have to sweep the wings back for 45 degrees, which means tanks have to be jettisoned on every mission. So that was a huge drawback for that aircraft. Usually in peacetime training and just manage with the ventral tank. I think the IAF procured a large number of 800 liter tanks just to meet the operations requirements. Otherwise, the aircraft was extremely powerful. It has an 11.5 kilo ton engine. The R 29 B, which was later on manufactured on the licence at Koraput. The MF version, which Ramu sir flew, was an interceptor. So the main emphasis was on the kind of radar it had and the kind of missile it would carry and so on. But both these aeroplanes also serve in the IAF.

47:22

Ganapathy

Now, during your test flight, you had this chase plane and you pulled a little fast one on the chase pilot. Tell us about that.

47:27

Air Marshal Rajkumar

Yes. One of the requirements was to check out the navigation system. So it had a Doppler and twin gyro platform kind of system. So I said, I want to do a triangular cross country. So they said, okay. I did a 300 kilometre triangular cross country. And without telling me, they sent a chase guy to make sure that I didn't stray from my NAV route. So as I was heading to the first turning point, I found an aircraft in my rear view mirror. So instead of turning the shortest way around to the next way point, I did the long way around and I crossed this guy head on. I came back and on the last leg I said I must sweep the wings back to full 72 degrees and go to the maximum indicated airspeed allowed. And with the wing swept back, the MiG 23 was like an arrow head, very sleek and roll stability was very poor. You had to have the damper on. Otherwise the wings would keep on rocking all the time. Oh, wow, that was a great experience. And the aircraft did serve in the IAF for about almost 25-28 years. Then in '79 as I came back to Adampur after this Russian trip, my squadron was moved to Bhatinda. Bhatinda was a forward base support unit, it had no infrastructure. The ATC was a makeshift construction. There was no fuel because the fuel had to come all the way from a place called Mullanpur on the Ludhiana -Moga highway. It was a difficult time for the squadron because we could do very little flying and I couldn't even do night flying there. So I had to operate detachments at Adampur for night flying training. Finally, after I handed over the squadron in 1980 Jan the squadron was moved back to Adampur But I had the rough end of the stick at Bhatinda but we coped. Then I came back to ASTE and this time I was the only Wing Commander in ASTE. In 1980, I was looking after both the school and the flight test squadron and I ran number 3 experimental test pilot's course, which fortunately had

only three Yah. It had only three pilots on the course, three fixed wing pilots. One of them was an Iraqi pilot, Major Hussein. So after finishing that course. And the following year, I went off to Iraq for two years.

51:03

Ganapathy

Right now, I don't recall you having done FIS.

51:07

Air Marshal Rajkumar

No, I never did FIS.

51:09

Ganapathy:

You never did FS. Okay,

51:11

Air Marshal Philip Rajkumar:

Well, the other thing is, during my various tenures in the school, I was clear to instruct on six different types of aircraft. Kiran, the MiG 21, the Marut trainer, the Canberra trainer, the Avro, and the Hunter. I will show you a snapshot of the certificate in my logbook. Also then in Iraq, I went to Iraq at the end of 81. And the Iraq tenure, there are three things that stand out. One is that the Iraqi cadets we were supposed to train, I was in 27 Squadron Iraqi Air Force, which was the MiG 21 OCU, and the cadets who were coming to us. They had done L 39 flying, but their English was very poor. So a lot of time was being wasted in briefing and debriefing. Then we got a batch of students who are done two years of their flying training in France. So I found that their French was much better than their English. So I started instructing them in French. So this was an Indian instructor teaching an Iraqi cadet to fly a Russian aircraft in French. So that was globalisation, long before the word became popular.

52:40

Ganapathy:

And had the war broken out by then?

52:42

Air Marshal Philip Rajkumar:

Yes, the war had broken out in September 80, and we went there in October 81.

52:50

Ganapathy:

Okay, so what was it like training them on MiG 21, but during a war?

52:56

Air Marshal Philip Rajkumar:

Yeah, they were all being sent off to operational squadrons wherever they deployed in the south of Iraq. So there's a great amount of pressure to push these courses through. So one was instructing in French. The second was during my second year there. One day, I was doing a section takeoff with an Iraqi teaching him to do a formation take off. I was number two. And when the leader put out his Afterburner, my aircraft just shot forward, I said what are you doing? He said, Sir, I can't move the throttle back. So I held the throttle and I tried. It was locked solid. So I quickly put off the Afterburner using the circuit breaker and climbed to 7 or 8 km in dry power, put out the dive brake, set up an orbit, and the speed stabilised at 750 km an hour, which is a manageable speed. And I was orbiting all the time. And I'm telling the cadet, keep tugging at the throttle. Keep tugging at the throttle. Then after about ten minutes, both of us hauling the throttle and the small amount of play developed. So we kept rocking it. Suddenly the jerk came back to 85% and got stuck. Then, of course, I declared an emergency. I told the base what was happening, and I said, now my throttle is at 85%. I'm going to come back and attempt the landing, because I knew from trials carried out at ASTE that it was possible to land an aircraft with the total stuck at 85%. So I came in and burnt up fuel to about 400 litres, came down, told the crash crew and everybody to be waiting for me. The side of the runway and ground crew with chocks because I couldn't switch off the engine so the hot brakes would start fading. As I touched down, I saw all these crash vehicles charging on the side of the runway. And after I touched down, I told the Iraqi cadet "Pull", and both of us hauled the throttle back with all our might until it came back to the blown flap gate. Okay. So I was able to bring the aircraft to a stop and they quickly put the chocks on the wheel. But it took another 15 to 20 minutes for the airmen to disconnect the fuel lines and for the engine to wind up. And this was on a cold February morning in Tikrit. And when I got out of the aircraft, my overall was absolutely drenched in sweat. Yeah. So that was one. Then the next interesting thing that happened was July 1973. We were ordered to move to a different base called H2. There's an oil pipeline running from the Kirkuk oil fields to Haifa and Southern Israel. And they have these pumping stations called H One, H Two, H Three, built by the British. And each of these pumping stations has a small airfield for air maintenance. Okay, so those strips were developed into full fledged bases by the Iraqis. So we moved to a base called H Two towards the Jordan border. And a couple of days after landing there, the base commander sent for me. So I went and he said, I hear you're a test pilot. I said, yes. He said, you please come with me. Then he took me to the hanger where there were a lot of crates of woven bamboo, what they call bamboo screens you see in South India crates made out of that with bitumen lining inside for waterproofing. And inside were these Chinese MiG 21 F-7s made by Chengdu in China. And they come in these crates. And there were Chinese guys in the hangar erecting these aircraft, the fuselage, the wings, the tail planes, they're all being put together. He says these aircraft have come from China. Will you do the air test on that? I said, sure. Show me the manula. He showed me the manual. They were all in Mandarin. And it was slightly different from the mix we were flying because it had a canopy hinged at the back. It had two internal guns, had a different ejection seat. So I said, Let me sit in the cockpit. He said, okay, you go and sit in the cockpit. On one of the erected aircraft, I went and sat inside and found all the cockpit inscriptions were in Mandarin again. But the cockpit was an identical replica of the F 13 cockpit, which we were flying in Iraq. So I asked for a hydraulic trolley and a battery to be connected. Then I checked out the functionality of all the switches and looked at the engine manual and noted down the jet pipe

temperature limits, the rpm limits, oil pressure limits. You could make one, because those are figures. And armed with this information. I said, I'm ready to go. So the base commander said, Go. And so I sat and fired the engine and took off.

59:29

Ganapathy:
My goodness.

59:34

Air Marshal Philip Rajkumar:
And the aircraft handled very well. I was quite impressed by the Chinese ability to reverse engineer an aircraft. And then I came back. I tested four more aeroplanes and all the other Indian instructors. I briefed them. Then everybody got into the act. But the Iraqi cadets were never allowed to fly this, only the instructors flew it. As long as we were there

1:00:06

Ganapathy:
Now these cadets, were you teaching them combat, or were you just teaching them basically how to fly the MiG 21?

1:00:14

Air Marshal Philip Rajkumar:
No, we taught them the basics of air combat, like tailchase 1v1, 2v2, and also air to ground weapon delivery, front guns, Rockets and bombs.

1:00:30

Ganapathy:
Were there instructors from other countries?

1:00:35

Air Marshal Philip Rajkumar:
No. When we first went, there was a Pakistani officer, wing commander Cecil Chowdhuri, who was with us in the same squad, and we flew together. We were great friends. Chowdhury was a much decorated officer who participated in both the 65 and 71 wars, but because he was a Christian, he wasn't destined to go very high up. So he left as a group captain. And I think he spent the last portion of his career in Abu Dhabi or one of the Emirate countries. But he was a good flyer and a very gregarious and social guy. He would visit all of us in our homes in the evening, for Diwali he said, Come on, come on. Let's play teen patti. But it was nice.

1:01:35

Ganapathy:
Did you speak about your Sargodha raid with him?

1:01:38

Air Marshal Philip Rajkumar:

No. We left the two wars out of our conversation. So I came back to ASTE, and this time in 1984, I was promoted to Group Captain, and I became the chief test pilot. But before that, in early 84, your father was the Commandant. He detailed me to carry out the An-32 induction trials. Okay. So I went up to Delhi and met the Russian team, did a conversion on An-32 with them, and then we went and did all the landings in the forward areas, like Machuka, Tooting, Walong.

1:02:42

Ganapathy:

Wow, fascinating. Tell me about those flights

1:02:45

Air Marshal Philip Rajkumar:

Machuka and Tuting were okay. The PSP sheets were there on those.

1:02:57

Ganapathy:

How long was it? 3000?

1:02:58

Air Marshal Philip Rajkumar:

No, they were about between six and eight hundred yards long. But the An-32 could easily hack it. And when the An-32 had come earlier in 1976, AVM Lamba had done the evaluation, and he pointed out a number of flaws. One of them was stalling behaviour, the wing used to drop badly during the stall. So I had to check those things out and they cured all of that. But the real crazy landing was at Walong, which is roughly North-South 02-020 kind of thing and it is on the West Bank of the Lohit River. So the Caribou and the Otters and all used to land facing the northeast and take off facing the Southeast. There was a big Hill at the end of the runway and then duck down into the Valley and come away. This was not possible to do in the An-32 and so the Russian test pilot Kurlin and I went. We did a number of approaches on both sides and Kurlin said, I will land facing southwest, that is on 20 or 22 and take off the other way.

Wow. Into the Hill.

So one fine morning we got airborne in March of 1984. We got airborne from Jorhat. There's only four people in the aircraft, one was Kurlin, Wing Commander Ghosh who had done the An-32 conversion in Russia and come back. He was part of my team. And Kurlin said, I want him on the right seat. I said, fair enough because he's more experienced. And I sat in the jump seat and there was a Navigator and we took just enough fuel to go there and come back. So the aircraft was light okay. So Kurlin came down from the northwest along the Lohit River. There's a sharp turn to the right and lined up with the runway and landed. And before landing at a height of about three or 4ft, he unlocked the props. So this huge discing drag and aircraft landed with a hell of a thump and he brought the aircraft to a stop. Turn it

around. Now we are going to be taking off downwind. And the Kurlin said, no, I'm going to switch off. I'll get out. I want to see this place. So there was a small Gorkha regiment there. And the Gorkha Regiment guys presented cooling with a Khukri. Now, I was least interested in all these festivities because I was looking at the windsock because the wind was picking up and tail wind was increasing, we would be taking off downwind. So finally we lined up at the very end of the runway with the Hill at the back and took off facing northeast. And soon after getting airborne, there's a big mountain side. It looks close, but it is about a kilometre, kilometre or more. We rolled and we got airborne for two reasons. One, as the runway was finishing Kurlin increased flaps from 15 to 30 degrees. And then the runway finished. So we were airborne. Now this cliff, this mountain face... we were heading towards it when Kulin put on a bank to turn to the left, to climb away along the river, So I was sitting there looking at this aircraft literally hanging in the air. But Kudlin was a master, mastercraft craftsman the way he handled that aircraft, the way he performed the take off, the way he knew his aircraft was really an eye opener. So he came back and landed safely at Jorhat and in the report. I said the An-32 is not fit for operations from Walong this was in 1984 I don't know if things have changed now.

1:08:04

Air Marshal Philip Rajkumar:

When I became CDP in 84, before October, I became a group captain and the first thing I did was go and do a Jaguar conversion at Ambala. And I got involved with the Jaguar DARIN program and the whole of 85 went in this DARIN program. I was also always very enamoured of the team concept, which I learnt at EPNER. I said We must also follow the team concept in India and have a pilot engineer team. So I conducted two ad hoc flight test engineer's courses at ASTE. I think half a dozen officers came, trained as flight test engineers, but Wing Commander AVM Dey when he became Commandant in 85, he says, no, the ad hoc course is all very well, but we shouldn't make it. The government should authorise it and we must have proper establishments and proper facilities. So we stopped running after two courses and then a long battle with MOD ensued. And finally we managed to run the courses from, I think, 91 onwards proper courses. But this was a direct result of my EPNER training.

1:09:42

Air Marshal Philip Rajkumar:

On April 86, I was part of the team which went to France and the UK to evaluate the advanced jet trainer. The IAF was looking for the advanced jet trainer and the two candidate aircraft were the Alpha jet in France and the Hawk in the UK. So Air Commodore Jayal was the leader of the team and it was a fairly big team. But I was one of the test pilots and Sq. Ldr PR Sharma was with me.

1:10:23

Ganapathy:

And up until that point for advanced jet training, we didn't have anything. You couldn't describe an Iskra or Kiran Mark II as an advanced jet trainer, I guess,

1:10:33

Air Marshal Philip Rajkumar:

yeah. Those two aircraft didn't meet our requirements. So this was basically a new Air Staff requirement that had been put out. So we went to France and we flew the Alpha Jet and the flying was carried out at a place called - back to Istres in my old haunt, Istres. So one of the first things I did when I went there, I went and paid a visit to the school. It had completely changed, the facilities had improved, they moved to new premises. Anyway, we were happy to see an old graduate over there.

1:11:18

Ganapathy:

What was the Alpha jet like?

1:11:21

Air Marshal Philip Rajkumar:

Alpha jet was a very good trainer, very good performance. And the main characteristic was spinning. It could perform four types of spins, normal spin and oscillatory spin, a flat spin and then inverted spin. And you could enter each of these with just by varying the inputs at entry, the way you move the stick over or applied aileron. And it took some getting used to to get these entry conditions right to make. But the French test pilot Patrick, an expert I was flying with, he demonstrated these four spins. And the surprising thing was that the recovery action for all of them was just release controls. The canopy, it was a clamshell canopy. And to lift it, you had two handles on the cockpit rim. So those are called spin recovery handles. You just let go of the control column and hold those two handles. Then the aircraft recovered by itself. It is amazing. So I was so impressed by this, I said, Patrick, I need to do one more sortie of this, we climbed to 40,000 ft over the Mediterranean. Nice, lovely day it was. And I don't know how many spins we did, but the flat spin was great because the spin axis passes behind the cockpit and you get thrown forward, And your nose is going along the horizon, rotating on the horizon. And the rate of rotation was fairly fast. Then the inverted spin, of course, I had never experienced so he showed it to me a couple of times and I did one and it's quite easy to make out an inverted spin once, you know the differences. Then we came back to land and Patrick said, I'll show you a vertical overshoot. I said, what is the vertical ocean? He opened full power. He was sitting at the back, he raised the undercarriage and he did a loop. He did a loop. And when in the inverted position, he stayed for a while so that he got the right spacing and throttle back, put the dive brakes or put the undercarriage down and came and landed off that. He said, now, you try. I did the same thing and I've never, ever done it before since the vertical overshoot. But it was great fun.

1:14:29

Ganapathy:

You see it being done by the Rafale in their demo nowadays, where they come, they climb, do a half roll and then pull dive brakes under carriage and then touch down on the runway. It's quite an amazing manoeuvre.

1:14:46

Air Marshal Philip Rajkumar:

Yes, I was absolutely blown off by this vertical overshoot. Anyway, I personally was a bit sad that we didn't choose the Alpha Jet because it was a wonderful trainer. Anyway, from there, we went to the UK and we flew the Hawk. After the spinning experience on the Alpha Jet the Hawk spin was very steady, but the Hawk had much better visibility from the instructor's seat at the back and also the engine in the Hawk was the dry version of the 811 engine, which was being made at a chill Bangalore for the Jaguar. The Hawk had the un-reheated engine. So there was a great deal of commonality, and I think on techno economic grounds, they chose.

1:15:53

Ganapathy:

Is there anything else we looked at? Did we ever look at the L 39 Albatross?

1:15:59

Air Marshal Philip Rajkumar:

No. This evaluation, we only did

1:16:02

Ganapathy:

and we didn't look at the Italian Macchi for that requirement? You
He went on to station command. After that,

1:16:19

Air Marshal Philip Rajkumar:

Yeah, once I finished my CTB tenure I went to Gorakhpur as the AOC, but before that, in late 87 I was specially nominated by Vayu Bhavan to do the first self protection jammer trials on the Jaguar. This was the first big EW electronic warfare equipment that we acquired from Israel. Of course, those days we didn't even have diplomatic relations with Israel and the whole thing was very hush-hush. So I did the initial trials.

1:17:03

Ganapathy:

So this is an external pod

Air Marshal Philip Rajkumar:

External pod carried on the Ventral station. It was called the Dawn Part, and the two Squadrons in Gorakhpur were supposed to be equipped with that. So I had to go to Gorakhpur and set up the DAWN servicing facilities and induct this equipment into service and so on.

1:17:28

Ganapathy:

And this would operate by itself, so it would detect hostile radar signals, jam them, do all those things by itself, or was the pilot controlled?

1:17:39

Air Marshal Philip Rajkumar:

The pilot had very little control over it. But the main thing was you needed good intelligence. You need to know the frequencies of the radar and certain other parameters like the pulse width and the pulse repetition frequency and so on. So it had some standard techniques in it, like range gate pull off, you fire the return pulse with a fractional delay of nanosecond or two, and that gives the wrong range. And since the missile misses you by, let's say ten to 15 metres or 20 metres, you're probably going to get away with it, right. So that was the self protection jammer trials. And then in Gorakhpur, there was a lot of admin work. I didn't do much flying, even though I was Jaguar qualified, I didn't do much flying, but I did manage to do a Mi-8 conversion on the helicopter. In fact, I ended up flying about 30, 40 hours on the Mi-8 where I flew very little of the Jaguar.

1:19:12

Air Marshal Philip Rajkumar:

So from there I went to RCDS in 1990 and there the big thing was we were students from 28 nations, we were 40 Brits and 40 foreigners, foreigners from 28 countries. And there I met up with Brigadier Pervez Musharraf who later later became president of Pakistan. And the Air Force officer was one Air Commodore Ali again we were good friends. Later on in 2005, we had a reunion and I was able to visit Pervez in Pakistan when he was president. But that's a different story

1:20:00

Ganapathy:

Now just for the audience, what is RCDS? And I think if you can just explain the three tier education system of the armed forces, the NDA Staff College and then NDC level courses.

1:20:16

Air Marshal Philip Rajkumar:

Yeah. You see the three tri-service organisations in the Indian Armed Forces of the National Defence Academy, where cadets come. All three are trained together for three years. Then the next time they meetup is around ten to eleven years of service at the Defence Services Staff College at Wellington, where you learn about each other's service and you learn how to write appreciations and conduct exercises, sand model exercises and so on. The third one is that at the Colonel Brigadier level, we have the National Defense College in Delhi. So every year some people from the UK Armed Forces come here and one or two Indians are sent to the UK. And then it is called the Royal College of Defence Studies. It is an international course, lot of country studies. Lots of tours. We went and visited NATO countries, NATO bases in Europe. Then we had a world tour. I went to South America, visited Venezuela, Mexico, Chile and Argentina. The interesting thing in Argentina was we were the first British delegation to go there after the Falklands War. This was sort of to break the diplomatic frosty

ties which existed after the war. But the Argentinian Air Force guys refused to meet us because the Argentinian Air Force had almost stopped the invasion. They sank five ships and they put bombs inside of five more ships. But the bombs didn't go off because they dropped too low for the fuses to arm. And Admiral Sandy Woodford, Woodward, the task force commander, he said that those five bombs had gone off. I'd have had no choice but to withdraw. So that was a very close call. And by the way the world tour was a great experience meeting all the Latin American armed forces.

1:22:49

Ganapathy:

This is the time in your career where you begin to appreciate how the armed forces fit into broad national security policy, diplomacy and things like that.

1:23:01

Air Marshal Philip Rajkumar:

Yes, exactly. And it was again, a very big learning experience. I must thank the Indian Air Force for giving me all these learning experiences, starting with the Air Force Academy. Then the junior commander's course, the staff college, the test pilot's course, fighter combat leaders course, the RCPS, It was a huge, lifelong learning. So that was that. I came back and I took over the command of AST from AVM Lamba who superannuated. And during my tenure as Commandant, two things happened. One is An-32 Reenging. We re-engined, the one An-32 with An-12 engines.

1:23:52

Ganapathy:

Yes. Groupie Agtey has spoken about that in his episode.

1:24.01

Air Marshal Philip Rajkumar:

And we did a number of engine failures at rotation, 13 of them and wrote out the operations manual. And so that was very interesting. Then towards the end of my two year tenure as commandant, I was sent to Israel to evaluate the Israeli offer of the MiG 21 upgrade. So in May of 1993, I went to Israel, which again was very hush-hush because we had just started diplomatic relations. So I had to fly from Delhi to Frankfurt via Lufthansa, and fly Frankfurt-Tel Aviv by Lufthansa Again. On the return trip I had to go British Airways Tel Aviv to London and London. Delhi, all sorts of funny things. Anyway, I flew the Lavi, which was supposed to have I was supposed to be evaluating the radar which was being offered. But unfortunately, as soon as we took off, within ten minutes, the radar packed up. And so for the rest of the time, the Israeli pilot was the chief pilot of the Israel aircraft industry. He said, I will show you Israel, and went a little further north. We saw the Golan Heights and then it turned right and saw the Sea of Galilee further south, went to the Negev desert. And then finally we still had some more fuel and time we came and did aerobatics over the Gaza Strip and landed.

1:25:59

Ganapathy:

What is your experience like flying the Lavi? What is that aircraft like?

1:26:04

Air Marshal Philip Rajkumar:

Oh Lavi was a beautiful aircraft. The flight controls, the power it had, and the avionics. It had a glass cockpit and it was a very fine aircraft. And I think the Chinese J-10 is modelled quite a lot on the Lavi. So I came back and the other thing I asked is: really we want to have a life extension of the airframe of the MiG Bis, because without the airframe life extension, we won't be able to exploit the aircraft. So I said, do you have the structural data to do this work? They said, no, we expect you to give it to us. So I knew we didn't have it. I knew that structural test program was on the way at NAL. So I came back and I put these two things in the report that the radar could not be evaluated and the structural data is not available with the Israelis.

1:27:14

Ganapathy:

I guess that's why we decided finally to go with the MiG proposal.

1:27:18

Air Marshal Philip Rajkumar:

Yeah. Then there was a school of thought in Vayu Bhavan in the Plans branch. I was DASR at that time in the Plan branch that we could buy various bits and pieces of the best equipment in the world and put it together and integrate it on the aircraft. I said, hold your horses. This is not easy because I was involved in the DARIN program. I knew how difficult and how time consuming it is to integrate various pieces of equipment. I said, it is better to go with the Mikoyan design bureau offer because they are the manufacturers and they know best. So I led two teams to Moscow in December 93 and July of 94 to finalise the tech specs of the upgrade. And that was again, visiting all the Russian firms and firming up the upgrade was a good experience. And we landed up in Moscow in the month of December. And you know what the Russian winter is like. That was bitterly cold and the Russian Soviet Union had broken up and the new Russian Federation had come and things were in a real mess. People were standing on roadsides and selling off their possessions. The country was in a really bad shape. And the Mikoyan design bureau people apologised to the chief designer. Mr. Belyakov apologised to us and he said, listen, I don't have the money even to take you all out for a good lunch or a good dinner. So that was the state of affairs.

1:29:04

Ganapathy:

And you'd seen it in its glory days in the mid seventies

1:29:10

Air Marshal Philip Rajkumar:

Yeah, I've seen it in the height of the Soviet era. Moscow was the safest city in the world. But now things have changed. We were cautioned not to go out on our own because you're likely to be mugged all that. So I said we must go with the Mikoyan offer because they would be the best people to integrate whatever equipment we choose. So that's what eventually happened.

1:29:45

Ganapathy:

There was also that Romanian upgrade, the Lancer. Did we ever look at that?

1:29:50

Air Marshal Philip Rajkumar:

No. That was the experience which the Israel aircraft industry was planning to use for our upgrade. The Romanian Lancer was done entirely by Israel. So, then this was the Mikoyan upgrade thing. The other thing which I did when I was DASR, the LCA program also fell into my lap, how to monitor the LCA program and so on. And I knew that the control law team, the national control law team had been established and the national wing team had been established. Drawing the expertise from several organisations to achieve a particular objective. So I said even for flight testing, I was convinced that a small group of people needed to look full time at the LCA program.

1:30:51

Ganapathy:

Well, folks, I think we're going to take a stop here. We've spent an hour and a half with Air Marshal Rajkumar. Just listening to his fascinating experiences as a test pilot and somebody who was involved with a significant portion of the selection of new aircraft for the Indian Air force. My interview continued with him where we began to speak about his involvement with the LCA. He's going on to set up the national flight test centre. That interview will be released next week as the first interview as part of a series of interviews with test pilots and flight test engineers that were involved with the LCA program that will go on for pretty much all of January and maybe some of February.