

Blues Skies Podcast

Season 1, Episode 23

Electronic warfare

[with Air Vice Marshal Arjun Subramaniam]

00:00

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01:02

Ganapathy:

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

01:20

I have the pleasure today of interviewing Air Vice Marshal Arjun. Subramanian. AVM Subramanian was commissioned into the fighter stream with the Indian Air Force in 1981 and has had many operational postings and staff postings. He's a bit of an intellectual soldier despite his fighter experience. He's also taken a step back and thought about the higher issues around use of airpower and also authored a few books on India's wars and the lessons that we learn from it. Welcome to the program, sir.

01:57

[AVM Arjun Subramaniam]:

Thank you. It's great to be on the show and I think the Blue Sky Podcast is a wonderful initiative to take the Indian Air Force and airpower to the wider audience you have.

02:09

Ganapathy:

Thank you. So it's really nice of you to say that as well as to take the time to speak to me today. Just start off by getting your background. Where did you grow up? What

was the motivation to join the service and what was your initial journey in the arc of your career?

02:24

[AVM Arjun Subramaniam]:

I grew up in Hyderabad and Bangalore and it's very interesting how I got into the military realm. I went to school at the Rashtriya Indian Military College in Dehradun and actually my father was on a flight to Delhi and he was seated next to General Bewoor, who was the army chief at that particular time. And General Bewoor asked him, "So how many children do you have?" My father said, "I've got a son who's not yet eleven". And that's when the General said, "Oh! Have you heard of the Rashtriya Indian Military College?" My father said no. So he said, "Okay, how long are you going to be in Delhi?" My father said, "I'm going to be there for a few days". He says, "you must go and visit RIMC. I will set up a trip for you there". So my father went to Dehradun, and liked the school. And then he came back and told me, he said, "Son, you're joining the RIMC". My mother was absolutely flabbergasted and she said, look, this guy wants to study history and you're sending him into the military. So my dad said "No. I've taken a call and I'm sure he will enjoy himself". That's how I ended up in uniform.

03:40

Ganapathy:

Actually, RIMC, of course, is quite an institution. It is just amazing how many stalwarts of the armed forces it is produced. So I would just love to hear what it was like. And it seems to have a really strong esprit de corps among the alumni of the school. I think they stay in touch and are really very closely bonded.

04:05

[AVM Arjun Subramaniam]:

Yeah. RIMC was tough, really for me because here was this and still I'm fairly short. And here I am one of the shorter guys on the course. And it was tough at RIMC, getting used to getting used to that environment, getting used to the toughening up process that included all the good stuff and some of the bad stuff. Also there was a spot of ragging during those days and it was pretty tough both at the end. During those days. In the early 70s, it was quite an experience. But then one gradually gets used to it. And then I still remember that I used to write home and I tell my dad that, look, it's tough. And then he used to say, just hang in there, you'll get used to it. And after that it will be a breeze. That's what he used to say, hang in there and it will be a breeze. So five years just flew past and then for RIMColians, NDA is actually a piece of cake. But there is a lesson. Also, there are several RIMColians who take it very easy at NDA and get overtaken by guys who are keen from City Street and who got appointed to me. So it's been a wonderful journey. It was a wonderful journey

through RIMC and through NDA.

05:38

Ganapathy:

In fact, my father's CO at Ambala was Group Captain Patney at that time. I think he was an RIMC alumnus. Yes. And he served as Vice Chief under Air Marshal Suri, who also is an RIMC alumni. Great. And what was your experience like in NDA then AFA, which aircraft did you do your basic and advanced training on?

06:01

[AVM Arjun Subramaniam]:

NDA also was quite an experience. You know What happens? Like I mentioned to you, if you're from a Sanik school or from RIMC sometimes you tend to take it easy during the early terms in NDA because everything comes so easily. Then you realise at some point in time that look, you can't live on past accomplishments. You've got to pull up your socks. And I found myself lagging off in academics, you know generally, wandering off and not focussed enough in NDA. Then I realised suddenly in my 3rd and 4th terms that I needed to pull up my socks. And Luckily I did pull up my socks and did reasonably well in NDA. And then AFA, I flew the HT-2, which was nothing short of a nightmare. The only saving grace was that if you swung on an HT-2, you swung with an instructor with you. So you couldn't be held completely responsible for the wreck..

07:15

Ganapathy:

That's

Ganapathy:

In terms of NDA, how did you choose the Air Force or why did you choose the Air Force? Because you could have chosen the Army, Navy, any service?

07:24

[AVM Arjun Subramaniam]:

No. Initially I was quite taken with the Maroon Berets and I actually wanted to be a paratrooper. But then I had a neighbour in Bangalore. I think you've heard of him by the name of Air Commodore Muthanna, who was a test pilot in HAL and Muthu was a neighbour and was quite crazy about flying from those days. And he said, the Air Force is the way to go when you join the AirForce is your first choice. So that's all. The Air Force is my first choice. And no regrets at all..

8:00

Ganapathy:

Especially given that RIMC is so close to IMA? Sure there's a strong army influence.

Yeah. Super and advanced training on the Kiran?.

8:12

[AVM Arjun Subramaniam]:

On the Kiran, both at AFA and at Hakimpet. And after that it was 8 Squadron the Pursuits for my MOFT [MiG Operational Flying Training] training.

8:24

Ganapathy:

Also my father's first Squadron, in fact.

8:25

[AVM Arjun Subramaniam]:

Okay. And then my first Squadron in the Air Force was the Hawkeys 108 Squadron in Adampur , where actually I think I learned a lot when it comes to the early years of fighter training, air combat and air to ground work.

8:45

Ganapathy:

So you came straight to MiG 21 after the Kiran, is it?

[AVM Arjun Subramaniam]:

Yes.

8:48

Ganapathy:

Oh, wow. Must have been quite a step up in terms of complexity and speed and everything else.

8:54

[AVM Arjun Subramaniam]:

Yeah. The thing was that because we were going directly to MiG21s from Karen, they gave us about six or seven sorties on the Iskra [PZL TS-11 *Iskra*] so that we could get some Russian instrumentation. But otherwise it was quite a change from the Kiran to the MiG 21. And they used to say, "Bhai Ram Bharose", so that kind of change!

9:23

Ganapathy:

What was your first flight to the MiG 21 like? I'm sure you remember them vividly because it's such an awesome beast. What were they like?

9:31

[AVM Arjun Subramaniam]:

To be very honest, I don't remember too much of my first few MiG 21 sorties, other than boy, other than the first landing when you're just relieved that you've made a landing and not arrived. Okay. And of course, it's a real change from doing a loop at 253 -300 knots and doing it at 900 and 950 kilometres. So those kinds of experiences, the initial feeling of, gee, the initial it's really difficult to express. But yes, it was a significant achievement, but we knew that there was much more to do.

10:28

Ganapathy:

And 108 Squadron in Adampur, what was that like? And that's why you did your operational syllabus.

10:33

[AVM Arjun Subramaniam]:

Yeah. One way it was a marvellous Squadron. We had a marvellous CO and site commander. We had Ashley Malcolm Brodericks as the CO and a typical Goan easy going, very sharp flyer, extremely good leader. He would put you through the paces. He was not impatient. His debriefs were not caustic. And on the other hand, we had a very stern flight commander by the name of Henry Osbourne. "Robbie" was a stickler for checks and procedures, for discipline. And he used to tell us, look, you have to earn your stint in the crew room. So he had us out on the tarmac, all of us. We were four of us who went in initially, we were on the tarmac for the first few days just to say, go count the rivets, go and get to know the aircraft properly. Go and speak to the men. So hang around the DSS, see what's happening, get a feel of the tarmac. Then you will deserve a place in the crew. So that's how it was.

11:47

Ganapathy:

And for the audience that don't know what DSS is, can you tell us what that is?

11:50

[AVM Arjun Subramaniam]:

Yeah, that's the Daily Servicing Section. It's primarily the one stop shop from where the aircraft are serviced. They are seen off from the tarmac, they are received, they are refuelled, they are checked around before every sortie for fitness. That's what the DSS is actually all about.

12:10

Ganapathy:

In terms of, of course, you go through MCF [*Maintenance Conversion Flight*], which is your conversion. But when you're spending time with the DSS and in Squadron, how much are you spending time? How much are you learning about what's below the surface in the aircraft? Getting your hands greasy, so to speak, and just understanding the nuts and bolts of the machine.

12:32

[AVM Arjun Subramaniam]:

Understanding the nuts and bolts of the machine DSS was an excellent experience because you had several senior sergeants and warrant officers who would sort of give you small tidbits about what are telltale signs of some amount of fatigue. How do you check the exhaust? What are some of the Idiosyncrasies of the aircraft? And then actually, much of the learning was peer group. And the next peer group sort of group it's from them that's a maximum learning emerged, the Flight Lts, young Squadron leaders who just finished their QFI course [*Qualified Flight Instructor course*]. If you had about six or seven of them, or eight of them in the Squadron, at least four of them would be committed to mentoring. And then you had a buddy in the Squadron who would keep track of you, who would check your films, who would see that you haven't exceeded G limits, and report you to the flight commander in case you repeatedly engaged in some violations. It was a learning environment that was very conducive to picking up adequate skills.

13:55

Ganapathy:

And what was the flying environment like in Adampur and Punjab in those years? What sort of missions were you doing? Practice were you doing? Which ranges were you using?

14:07

[AVM Arjun Subramaniam]:

We used to use SK range for normal armament. We used to go to Pokhran range for the once in a year heavy armament detachment. And we used to go to Kalaikonda maybe once in two years for air to air fire. Okay, so it was fun to look forward to these detachments. And most of our air combat training used to be in the area northwest of Jalandar, between Jalandar and these places called Una and Gagrait, which were all in the lowest Valley in Himachal. And then the northernmost limits of our local flying area was the Pongdan, which was in the local flying area of the Pathankot Squadrons.

When we did our strike training, we used to maybe strike Pathankot or we would go south and strike Ambala or Halwara. So it was all part of what they call the operational Squadron training.

15:15

Ganapathy:

And I'm sure you were also doing defence stuff with CAPs and things like other squadrons and other bases, hitting you and keeping those skills.

15:24

[AVM Arjun Subramaniam]:

Not too much of air defence missions initially, because we were on a base that had these MiG23 MFs. They were the main air defence aircraft of the Indian Air Force at that particular time even before the MiG 29s came in. In a way the 108 was essentially a ground attack squad. But you go through your operational squad and training like you said, you're right. You had to do your quota of air defence missions. It means to say ORP missions and establishing CAPS. And those days we used to still do those overhead capsules. A CAP is a combat air patrol. We used to climb overhead the airfield to 3 km and set up a CAP pattern with two aircraft on opposite sides of the circle. There used to be a radar which used to alert you to the impending approach of a strike mission, and then you drop onto the strike mission in what they call a "falling leaf" cluster kind of a manoeuvre. So, yes, it was fun. And thinking back is nice.

16:50

Ganapathy:

So if you can change gears now a little bit, I know you did spend a lot of time in the electronic warfare side of it, which is a very specialised kind of a role. So if I could trouble you to explain to a complete novice what electronic warfare is all about and what are major components.

17:10

[AVM Arjun Subramaniam]:

Yeah. There are three principles of electronic warfare. **Deny, Degrade, or Destroy.** Primarily for an aviator, electronic warfare deals with the spectrum of either seeing through clutter or to do something that will avoid being seen by an immediate you have passive and you have active measures. Now, to put it very simply, electronic warfare for a fighter pilot primarily means electronic countermeasures. It means electronic counter countermeasures. It means passive, passive measures like using shafts and flares to defeat missiles. So primarily electronic warfare during the early days involved slapping on pods and equipment onto aircraft in order to protect your own missions as they ingress into enemy territory by jamming enemy radars so that detection is delayed, jamming fire control radars so that guidance to weapon systems is delayed, and also probably jamming the guidance system also of the

weapon once launched, which is an extremely difficult task, and we didn't really do much of that at that particular time. So that is in very brief what electronic warfare is all about. And during those days, there was only one electronic warfare Squadron in the Indian Air Force, and that was the 35 squadron

18:52

Ganapathy:

And that was based in Bareilly, isn't it?

18:57

[AVM Arjun Subramaniam]:

That was based in Bareilly. It was originally a Canberra Squadron. What happened is 35 Squadron converted into MiG 21s also. So it had a flight of MiG 21-Ms, and it had a flight of Canberras. Former Chief of Air Staff, Air Chief Marshal Krishnaswamy was the first CO of the Squadron, and it was raised in 1978

19:20

Ganapathy:

You've got a radar on the ground, and the radar is transmitting at a certain frequency, and your beams are bouncing off you and going back. So I presume you have a pod that now senses that and then somehow puts out a signal that masks that, and is it doing it autonomously, or is that something that the pilot's consciously doing or engaging?

19:43

[AVM Arjun Subramaniam]:

During those days, you had two kinds of systems. One was an automatic system in which you programmed the electronic warfare pod. And the moment it received the signal at a particular strength it would then transmit electromagnetic radiation on the same frequency that would jam the radar and prevent it from seeing the target clearly through the jamming. Now, why did I say at the appropriate time? Because there's no point in jamming a radar from a great distance, because then the quantum of power you're able to pump into that radar is limited, because, after all, you can carry stuff only with limited power output. So there has to be a particular distance from the radar when you knew that if you started jamming, the jamming signal will be more powerful than the radar signal. And as a result, your blip in the radar would get drowned by the clutter that would be generated by your jamming.

20:50

Ganapathy:

And so if they switched frequencies, your pod would automatically figure that out and then also switch jamming on another frequency and things like that.

21:00

[AVM Arjun Subramaniam]:

No, again, the thing is, we had manual pod just to give the listeners an idea. 35 Squadron initially had EW pods that were called the Chatterbox. They were Swedish pods, even. I don't know exactly how we got them, but we got them. And ACM Krishnaswamy was involved in testing them, first for carriage on the MiG 21. And then the biggest challenge was how do you make the electronics of an EW pod work with the electricals of a Russian aircraft?

No, it was a herculean task. And hats off to the electronics engineers and the EOs of that time who managed these two systems and use the electrical power sources, the bus bars and things like that. It was a phenomenal feat of modestly complex electronic engineering.

22:08

Ganapathy:

Fascinating as I speak to a lot of you military aviators, I'm realising India has been doing that for a long time. We take various pieces of hardware best in class, and then we somehow really, in a very robust way, make these things all work together. And I guess Bison is another example of us doing that at another scale, but ranging from what we did with the DARIN Project or the Matra Magic missile being mounted on a MiG 21. So I keep hearing stories like this.

22:43

[AVM Arjun Subramaniam]:

Yeah, absolutely. We're good at modification, we are good at mating. But I wish we had displayed the same kind of zeal and initiative when it comes to innovation. And I think that's happening now. That's been happening. But I think we were a little slow off the block when it came to innovation. I think that's because of our overwhelming reliance on Soviet platforms and Soviet platforms give you very little window to innovate. They sent you the platform, it was assembled and you had it. That's it. Neither were you involved in the design of those platforms. Neither people went to convert. It was a challenge to convert with the language.

I'm sure your father would be the right person to talk about the challenges of inducting Soviet platforms into the Indian Air Force.

24:00

Ganapathy:

Yes, that's true.

Great. So coming back to this Swedish part, one thing that I've been reading about is the fact that a lot of the Swedish aircraft from the Grippen and the Viggen, their electronic suite, their countermeasures ECCM [*Electronic Counter-Counter Measures*], all of that seems to be really advanced. And is that true other Swedish in the world of aviation much better than anybody else. And why do you think that?

24:25

[AVM Arjun Subramaniam]:

The Swedes particularly with Ericsson and with SAAB and they have an excellent electronic ecosystem, whether it's semiconductors, whether it is switching equipment, whether it is telecommunication equipment. The Swedes are right up there. So I would place the Swedes on the same sort of platform as the Americans and the French and even the Israelis.

24:57

Ganapathy:

And so they say that some of these pods can also kind of project a beam that causes a blip to appear in a different place closer or further higher or lower than it actually is. And the Swedish parts we have, did they do any of those things?

25:12

[AVM Arjun Subramaniam]:

No. Unfortunately, the Swedish pods that we had, the Chatterbox, was a very basic noise jamming. It wasn't deception jamming. Okay. So the thing that you are talking about is - of producing blips that can appear at a different location as compared to the actual target, both in terms of range and in terms of azimuth - it's called deception jamming. And deception jamming is a far more advanced technique, and that's available on all modern generation self protection jammers.

25:50

Ganapathy:

And so you said the Air Force had only one electronic warfare Squadron and that's 35 Squadron. So how would the rest of the Air Force tap into this? Would they deploy these assets along with other assets? So did you trade a lot with the rest of the Air Force?

26:03

[AVM Arjun Subramaniam]:

Exactly. That was actually the icing on the cake for a young flying officer and just became a flight Lieutenant to be able to train and fly with the best in the Air Force, because with only one EW Squadron, 35 Squadron was in tremendous demand across the Air Force. So if you had exercise Akraman going on in TACDE, exercise

Akraman couldn't be conducted without an element of EW coming from Bareilly. So there used to be a Canberra, and we used to have a small detachment of MiG 21s over there for the entire duration of the exercise. So every day, rubbing shoulders with all the guys who are doing the FCL and the FSL course, going up as a flying officer and briefing the formation about what the EW escort is going to do and how he's going to join up and what's going to be the procedure to be followed was quite a learning experience. And then in all the major exercises, Bareilly was actually a base to come back to and recoup. But the actual operating bases for 35 Squadron were all the forward operational bases. We used to do detachments at Adampur, we used to do detachments at Ambala, we used to do attachments at Suratgarh, detachments at Nal. And what used to happen is that two aircraft, four aircraft, used to be located over there. And if there was an eight aircraft Jaguar Strike getting airborne from Ambala and it was hitting Jodhpur, then we would get airborne, say, from Suraghar or from Nal, and join up with the Jaguar somewhere halfway, because that was what our range limitations were. We used to join up with them, escort them to the target area, and then at an opportune moment, leave them and head back to our operating base.

27:56

Ganapathy:

Fascinating. Wow. Can you give me a sense for a typical mission like that, where you were escorting a group, if you had not been there, what would they have done differently? Or what might have happened in terms of their being detected and specific sorties or examples that you can remember would be terrific?

28:19

[AVM Arjun Subramaniam]:

No. The thing about electronic warfare is electronic warfare is all about percentages. You are reducing vulnerability. So if you have an 8 aircraft Jaguar strike and you have effective EW cover along with air defence cover, the chances of that mission going unscathed and dropping its weapon load and coming back is 90-95%. In the sense, we didn't do our calculations in that way because you just didn't have the tools or you were not wired to do your calculations that way at that time. But now when you think back, you say that those were pretty much the kind of probabilities that existed with EW cover without EW cover, with air defence cover, without air defence cover. I would reckon that, particularly the kind of weapon systems that. Okay, this would interest your listeners.

We were at that particular time in the 80s, we were obsessed with the Crotale surface to air guided missile which the Pakistani Air Force had. So practically every ground attack Squadron was only brainstorming as to how do you do your weapon delivery and stay outside the launch envelope of the Crotale? Or how do you defeat

the Crotale? And that's where we came in.

So it was a fascinating cat and mouse game, and the Crotale was a good system. And then the other radar that we were particularly concerned about at that particular time, particularly during Exercise Brasstacks. And the aftermath of that was this radar called the fly catcher, because the fly catcher was widely deployed along with the Pakistan Army's Armoured Division. And jamming them was a very important way of degrading their air defence guns that used to get guidance from the flycatcher radar.

It was actually fascinating. And I think I've written one experience in my book. Also, the Jaguars and the MiG-27s used to, during those days, used to do something, which is called a toss bombing profile. So at a particular distance from the target, they would pull up very steeply at about four and a half or 5G. And at the top of their climb, they would release the bomb and then sharply turn down to a half roll. Okay. Half roll is kind of a manoeuvre, but turn downwards with again, maintaining your G, because all this while, what they used to be doing is that they used to be riding the outer envelope of the crotale missile or whichever is the missile. Okay. And outside the launch envelope. And while they would be doing that, we would be doing our own bit, and we could never keep up with them when they did that toss bombing profile because we were flying with five stations.

Five stations on the MiG 21 was the most delicate in terms of stability. And we could not pull more than, I think, what it was 3G or something like that. While carrying these pods and with 5 stations, we had to be very careful about departure. We had to be very careful about landing weight. We couldn't land with more than four or 500 litres of fuel.

32:13

Ganapathy:

Holy cow. That's not a lot of fuel.

32:16

[AVM Arjun Subramaniam]:

So what used to happen is that let's assume that we finished our base and we finished our mission, and we are coming back to Bareilly. From Bareilly. The closest diversion is Bakshi Ka Talab. And so we needed a minimum of 1000 litres of fuel for that diversion. So we used to come overhead with that diversion fuel. And then once we were absolutely committed to a landing, we used to engage, reheat, burn up fuel for about two minutes, get down to 500 litres, and then come in for a circuit approach and landing. If you botched up that circuit, approach and landing, you just had fuel for one more circuit. Those were fun times.

32:55

Ganapathy:

Very nice. Now, you didn't speak about electronic intelligence, which is picking up where those radars are, where they've been located, so that people can then do their tactical routing, keeping that in mind. So did you all do that, too?

33:10

[AVM Arjun Subramaniam]:

No, ELINT was not a Role of MiG21. The Canberras did a little bit of ELNIT role, and the Canberras had an ELINT role. We had other dedicated aircraft to do the ELINT role. And there used to be a system of flow of information or flow of frequencies and electronic data used to come in. And that's how we used to program our systems, based on the elements that we received from various sources. Okay.

34:03

Ganapathy:

And you also spoke about destroying the enemy's electronic capability. What is that involved and how is that done?

34:15

[AVM Arjun Subramaniam]:

Now, obviously, the best way of taking out a system is by destroying it. But then how do you get in close enough to the target to launch a missile to destroy it? So you can destroy a surface-to-air guided weapon with conventional weapons if you have the location. And you do a good strike on it. And an even more effective way of destroying a surface-to-air guided weapon is by destroying it with an anti radiation missile. Anti radiation missiles are programmed to pick up a wide range of targets. And they even have the capacity. They even have the capability to loiter over a target area to pick up the ideal signature and home onto it. ARMs are an essential weapon in a modern air force.

35:08

Ganapathy:

And so you have what they call the SEADs that move ahead. And then after that, you get the strike package that follows. And that sort of strategy, isn't it?

35:16

[AVM Arjun Subramaniam]:

Yeah, exactly. So normally what you do is that you will have a mission that is tasked with destroying. It's called Suppression of Enemy Air Defences. So the SEAD

mission goes ahead of the strike mission, but even ahead of the SEAD mission, you have the fighter sweep going.

Before the fighter sweep goes into enemy air space like an heavyweight boxer like a suite class of aircraft saying "Come up, come, we are waiting for you". And then when that muscle flexing takes place, the SEAD mission follows. And once the SEAD mission does its job and puts out of action a couple of enemy air defence systems, that's when the main package will come up.

And all this is in a matter of seconds. A couple of minutes. And the main package will have air defence escorts. It will have electronic warfare escorts. And today, you really don't have this concept of EW escorts today because most aircraft have got self protection suites. And this is all a result of advances in miniaturisation in electronics wherein you can squeeze more and more powerful jammers into smaller canisters kind of. So that's how the concept of self protection jammers is now what is most prevalent in modern Air Force.

36:53

Ganapathy:

Tell me about electronic counter countermeasures. What is that? And how does that work?

37:00

[AVM Arjun Subramaniam]:

Yeah. Okay. The electronic counter countermeasure facility will be embedded in a radar. So you could have active measures and you could have passive measures. The active measure is something which gets triggered off electronically within the radar system that defeats any kind of jamming that is coming in. And a passive system is in case you find that you are being targeted by a radar, you have Chaff. So the Chaff is also part of your ECCM countermeasure suite. And finally, you have your IR flares that are dispensed when you feel that you have been locked onto by a radar and a launch is imminent. And that if there is a launch, at least you have an IR signature, a displaced IR signature, to cheat the incoming missile.

37:55

Ganapathy:

And a lot of these strategies work Irrespective, whether it's a ground based radar or airborne radar or mobile radar, all of these principles still apply, I presume?

38:05

[AVM Arjun Subramaniam]:

Yeah, they still do apply. The IR flares are as applicable to an air launched heat

seeking missile as it is to an Iгла class of missile as a manpad. But listeners must remember that a flare cannot cheat a radar guided missile.

38:30

Ganapathy:

Correct. I guess the strategy is to alternate dispensing Chaff and flares. When you know that a missile has been launched at you, how does one know that a heat seeking missile has been launched at you? I know with the radar homing missile, there is a tone that it picks up because the radar goes into its attack mode. Narrow beam.

39:00

[AVM Arjun Subramaniam]:

However, you have a MAWS these days. It's a Missile Approach Warning System. You have a missile approach warning system. So the MAWS detects a launch, whether it is from a ground based system or an airborne system, and it alerts you. That's how it works. And then it automatically triggers whether you need to dispense IR flares or whether you need to dispense Chaff.

39:35

Ganapathy:

Okay. Got it. Wonderful. So how long did you spend in electronic warfare?

39:38

[AVM Arjun Subramaniam]:

I was there for almost five years. That's a long tenure. And it's because I spent such a long tenure that I actually moved on from 35 Squadron to 1 Squadron on Mirages because by the time I left 35 Squadron, 1 Squadron on the Mirages had converted into electronic warfare. Okay. We used to have the third generation Caiman Offensive Jammer as well as Remora Self protection Jammer. My first tenure in the Mirage was a short one wherein I just learnt the tricks of the trade and then went off the flying Instructor's school. And then I got back to Mirages. Once I finished my flying instructors tenure and my staff College,

40:25

Ganapathy:

What was the Mirage like? A lot of people described it is quite a delight to fly

40:33

[AVM Arjun Subramaniam]:

Absolute delight to fly, very easy to handle on approach and landing. And it makes sense because the mission by itself, the missions themselves were so complicated.

And the missions were long. They were complicated. They were intense. They required a lot of mission preparation on the ground. And therefore, it made sense to make the basic job of flying the aircraft easy because the difficult thing was mission execution. So that was what it was a whole new experience for the Indian Air Force to deal with that level of technology, to deal with that level of reliability, that level of manoeuvrability, those kinds of launch envelopes. It was fascinating.

41:28

Ganapathy:

Were the Mirages, did they have air to air fueling in your time or was it.

41:32

[AVM Arjun Subramaniam]:

No, the air fueling came in much later. It wasn't there when I was in the field.

41:39

Ganapathy:

And then you went down to command 30 Squadron, which is Rhinos. I still have a couple of beer tankers at home. In fact, from 30 Squadron. What aircraft were they flying at that time? Where were they based?

41:52

[AVM Arjun Subramaniam]:

They were flying Type 77 (MiG 21). The same aircraft that I flew as a trainee officer, I went back to command that, and that experience was completely different. I mean, that was an experience of a lifetime in which you had a whole bunch of youngsters and you had a bunch of highly qualified and competent staff with you FCLs and A2s and basically, your job was to polish those Uncut gems who came out from the fighter training wing.

42:39

Ganapathy:

And this was out of Tezpur? Where was this Squadron at that time?

42:44

[AVM Arjun Subramaniam]:

Yes. This was in Tezpur and that was quite a memorable time.

43:00

Ganapathy:

Subsequently, you've also spent a lot of time at the intellectual level of the Air Force, were both in Staff College among the directing staff, and then after NDC, I think you

were among the staff at NDC also. So what caused that move towards those intellectual pursuits?

43:24

[AVM Arjun Subramaniam]:

It wasn't a cause-effect kind of syndrome. I was always interested in military history and intellectual work. I used to read voraciously even when I was a young officer, and even when I was a kid. And I come from a family of teachers. My father was a professor at IIM Bangalore, and my mother was a teacher for many decades at the Krishnamurti Foundation School in Bangalore. So I was passionate about history, I was passionate about teaching. And along the way, I always look for opportunities to do a bit of writing.

So I started writing also very early in my career for, like, Flight safety Journal and things like that. And so one thing left another, and there comes a time in your life when you say that, what is it that's going to really drive you in the years ahead? And that's when I realised when I was a group captain that, look, I had an option as a group captain to completely focus on the operational side of things. But I chose to make the switch to the intellectual dimension and academic because I felt that was a weak area in our armed forces.

Building intellectual capital in an emerging military is a sign of a leading power. And I think not enough focus was laid in the 90s and the early part of this century on building intellectual capital within the armed forces. And I said that, look, this is one thing that I can help and let me develop the skills and the wherewithal to be able to impact this realm of soldiering,

45:25

Ganapathy:

Especially since I think we're in a very rapid technological change that is changing the battery field in ways that I guess very few people can imagine. So it becomes all the more relevant in this time of rapid change. I would guess

45:38

[AVM Arjun Subramaniam]:

it's not just change in technology, it's also the rapid changes in the nature of warfare itself. We never heard about this concept of full spectrum operations in the last century. But today the buzzword in the armed forces is full spectrum conflict. Now, the only way in which practitioners can cope with full spectrum conflict is if there is greater emphasis on the knowledge and skill domain. Understanding warfare, understanding adversaries is as important as fighting them. And that's how I made this gradual move.

46:26

Ganapathy:

If I recall correctly, you also spent some time in the Aerospace Command, the Space Command, is that right?

46:32

[AVM Arjun Subramaniam]:

No. As an AVM, I was the assistant chief of Air staff, looking after space concepts and doctrines. And that was also a very fulfilling tenure because that allowed me to leave some kind of an impression or Mark on the doctrinal process in the Indian air force. It's my team that put together the 2012 IAF doctrine that still stands today. Okay. It was a wonderful opportunity there to put things into practice. Actually,

47:08

Ganapathy:

Tell me about your books, what motivated you to write them, and who was your intended audience, and what was the message that you were hoping to convey through the books?

47:18

[AVM Arjun Subramaniam]:

Yeah, that's another story altogether. Somewhere down the line, around 2012, I felt that I had plateaued out as far as air power and flight safety is concerned, I'd written a lot. I had published a large number of papers, and Air Commodore Jagjeet Singh was extremely happy with what I was doing. And then suddenly one day, I realised that contemporary Indian military history has not been given the kind of attention that it deserves from a holistic perspective. And that's when I said that. Then I looked around the environment and I saw that there wasn't any decent writing on contemporary Indian military history that could appeal to a wide readership. I said, why should I write something only for military officers? Or why should I write something only for the I said, I must write something for anyone who's interested in military history. And that's when I picked on this particular genre . And I said, Let me write military history in a robust but reasonably easy narrative so that it can be read by a wide cross section of people, ranging from young people to policy makers, whoever have you. And it's not only to offer something reasonably easy to digest for a wide spectrum of readership, but also, I think, to do justice to the discipline of military history, because I felt that it's a very neglected element of contemporary Indian historical discourse. And I think it needed to be set forth.

49:05

Ganapathy:

And so for the audience who don't know the two books, one of them covers the wars from 48 to 71. And the second one is about this full spectrum concept that the Air Vice Marshal just spoke about, and that covers the period from 72 to 2020. So it really not only builds on the history of past wars, but also speaks about various changes in the military sphere and how wars are fought today or will be fought tomorrow. And so it's a great read, I think, for anybody. And we'll add links to the books on Amazon in the show notes so that the audience can get a hold of it. You've also been doing some teaching, sir.

49:44

[AVM Arjun Subramaniam]:

Teaching? Oh, yeah. When I retired in 2017, that was another area that I decided to dive into. And I said that I was very fond of teaching at Wellington and at NDC. And I wanted to also benchmark my own teaching skills that I acquired on my own and within service. And I said, let me try and rub shoulders with folks and academics outside to see how that environment is. I taught a semester at the Fletcher School of Law and Diplomacy. I taught for a year at Ashoka University and Jindal. Exposure to this kind of and when I taught at Fletcher, there were a number of US military officers also doing their postgraduate program over there. So it allowed me to see how the Western system blends civilian academia and the professional military education ecosystem. And I said, let me come back and see how one can influence the Indian professional military education system to move to the next level, to its next level of logical evolution.

That's why this current assignment of mine allows me to experiment and allows me to see how best one can evolve a professional military education system that fits into the requirements of contemporary war fighting and the contemporary security scenario that calls for a whole of government approach. And that's why I'm thoroughly enjoying my current stint at National Defence College as an Occupant of the President's Chair of Excellence, basically in a mentoring and advisory role.

51:40

Ganapathy:

Fascinating, fascinating. I certainly hope the appreciation of military issues within other parts of the government significantly improves, which is what NDC is designed to do, is, I think, break those barriers down. I've taken almost an hour of your time. I want to thank you for being so generous with your time to talk to us about your experiences in the Air Force as a fighter pilot and later as a teacher, as an intellectual, as a thinker. I'm really very grateful to you for your service as well as for the time you've taken with us today.

52:15

[AVM Arjun Subramaniam]:

It was a pleasure being on the show with you and more power to your podcast.

52:18

Ganapathy:

Thank you very much, sir.