Issue Brief

July 2025
No : 444

CENTRE FOR LAND WARFARE STUDIES

CLAWS

अन्वेषणं ज्ञानस्य मूलम् ।

Iranian Air Defences:
Second Fall in a Row
An Analysis

Lt Gen (Dr.) VK Saxena,
PVSM, AVSM, VSM, PhD (Retd)

Iranian Air Defences: Second Fall in a Row
An Analysis

Lt Gen (Dr.) VK Saxena,
PVSM, AVSM, VSM, PhD (Retd)

Abstract

The performance (or the lack of it) on 13 June 2025 was a repeat of 26 October 2024 wherein the substantial air defences of Iran simply succumbed against the Israeli onslaught. Within days of the current air campaign, Israel made the claim— which the second mightiest air power in the world viz. Russia could not do even after more than three long years in the Ukraine war i.e. the achievement of 'air superiority'. How come? This work delves deeper to search for answers.

Keywords: Israel attack on Iran, Iran air defences, Israeli strikes

The performance (or the lack of it) on 13 June 2025 was a repeat of 26 October2024 when the substantial air defences of Iran simply succumbed against the Israeli onslaught (Saxena, V.K., 2024). Within days of the current air campaign, Israel made the claim which the second mightiest air power in the world viz. Russia could not do even after more than three long years in the Ukraine war, i.e. the achievement of 'air superiority' (Firstpost). How come? This work delves deeper into searching for answers.

The analysis flows along the following:

- Factors defining the strength of air defence.
- Assessing the air defence muscle of Iran.
- The reasons of non-performance

Factors Defining the Strength of Air Defence

Configured along the three verticals of 'Sensors' (to detect the incoming air threat), 'Shooters' (to intercept and destroy the threat) and the 'Battle Management and Control Systems' or BMC2 (to manage the fast flowing air defence battle), the air defence muscle of any nation is dependent on many factors. Some of these could be:

- The vintage and obsolescence of the systems falling in the above three verticals.

- Qualitative edge of air defence systems, implying the capability to detect, track and intercept the threat being inflicted.

- Quantitative adequacy in protection of various vulnerabilities.

- Degree of survivability of air defence systems against adversary's Suppression of Enemy Air Defenses (SEAD) or Destruction of Enemy Air Defenses (DEAD). Operations. Efficacy of BMC2 system (referred to as Air Defence Control and Reporting System {ADCRS}) to survive SEAD/DEAD and continue to execute the air defence battle.

It is the sense of the author that the Iranian air defences proved to be suboptimal on each of the above counts in the face of a hi-tech air threat prosecuted by Israel.

This is analysed further.

Assessing the Air defence Muscle of Iran

Iran has a significantly strong air defence though some of its systems are now ageing and are vintage. Following is stated:

Sensors

- For the detection of the air threat at long ranges, Iran has several long range Early Warning Radars (EWRs). These include over-the-horizon (OTH) radars which have a capability to look beyond the radar horizon (very long range); example: Sepehr Radar (claimed range: 3000 km, achieved: 300-700 km).

- Other types of EWRs are phased array radars (radar beam steered electronically and not by antenna rotation for quicker response); example: Ghadir radar with a range of 1100 km.

- There are several other 3 dimensional (3D) EWRs (reporting range, bearing and altitude for more precise tracking); examples: Ghamar radar (range 450 km and can track 100+ targets at a time), Matla-ur-Fajr and Alim radars (range 300 km for each) capable of detecting small RCS targets like drones etc. (The Radar Cross-

Section {RCS}is the degree of visibility of a target to radar— greater the RCS of a target higher will be the probability of its detection by the radar).

- Falak is another EWR inspired by the Russian S -300 system (range 300-350 km). There are certain other EWRs such as Asr (range 200km), Kashef (range 150 km) and Arash which is under development

Shooters

Following is stated:

- Much like the sensors, Iran's air defence 'fire arm' is multilayered with different weapons providing successive ranges and altitude coverage. This fire arm has towed and self-propelled (SP) guns and Very Short Range Air Defence Systems (VSHORADs) covering the range up to 10 km (towed guns: old vintage 100mm, Russian ZU 23, Iranian:Mesbah, Swiss 35 mm Oerlikon , VSHORADs: Rapier missile system).

- Iran possesses a large number of man-portable missiles (MANPADs) which are deadly against attack helicopters and drones. The range of these fire-and-forget weapons is from 4-7 km. The types include Misagh I and II and Qaem (all Iranian), RBS 70 (Swiss) and HN 5 (Chinese).

- The missile fire arm providing successive outer layers are Short Range Surface to Air Missiles (SRSAMs) covering the range up to 30 km, Medium Range SAMs (MRSAMs) covering a range of 70-100 km and Long Range SAMs LRSAMs) with ranges >100 km.

- The SRSAMs include Azarakhsh SRSAM with a range of 25 km, Ya Zahra/HQ7 SRSAM covering 8-15 km and Herz 9 SAM with a range of 12 km. There are also some SAMs of Russian origin (Strela 10M with a range of 5km, and OSA-AK with a range of 10 km).

- Iran is quite strong in the MRSAM arsenal. There are old vintage Russian Kub 12 (range 25 km), ToR (range 25 km), SA 2 (range 45 km) and US HAWK with a range of 50 km. There are indigenous systems like Mersad and Shalamcheh (40- 45 km). Longer range MRSAM include Tabas (range 75 km) and Sayyad (range 40-300 km).

- The LRSAM gives Iran the capability to strike hundreds of km into the Israeli air space. Case in point are the Khordad series of LRSAMs (made operational in 2019 with a range spanning 150-200km), another weapon is Arman LRSAM which actually is an anti-

ballistic missile system with a range of 160-180 km. Then there is a supersonic LRSAM Shahin, effective from 70-150 km, and the RaaD SAM of range 105 km.

In addition to the above conventional weapon systems, Iran also has certain long range anti-missile systems. These include the Russian S-300 PMU 1 and S-300 PMU 2 and the indigenous Bavar 373 weapon system. Bavar, inducted in 2019, has an effective range of 230 km and a target handling capability of 100 targets, 60 of which can be tracked and engaged at any one time. The S-300 of course is a seventies vintage (1978) system which still holds a lot of relevance. Its long range surveillance radars provide a range of 600 km and the interceptors provide the fire arm from 40 to 300 km.

BMC2/ADCRS

The big guns and missiles of air defence arsenal only boom effectively when there is a solid ADCRS system behind them. ADCRS joins the sensors and the shooters in one kill machine. Battle tasks like fusing multiple sensor inputs to remove duplication and generating the Air Situation Picture (ASP) , identifying the threat into friendly (own) and hostile in the ASP, prioritising the targets based on the twin consideration of which strikes first and which is more lethal, selecting the most optimal weapon at a point in time to strike and designating the threat to the same in near real time, and finally, inflicting continuous punishment on the threat— shifting seamlessly from weapon-to-weapon, is a complex task sequence to be completed in a few fleeting moments. That is the criticality of ADCRS. Best of air defence weapons will only perform sub-optimally if not backed by a fool-proof and redundant ADCRS. In this context following points are stated:

- Nothing much is reported on the technical muscle of Iranian ADCRS. Capabilities like satellite-based communications and connectivity, capability of seamless data flow cutting across service domains, chain of connectivity between higher air defence nodes right down to weapon end etc., are largely not reported.

- With the benefit of the hindsight, if the adversary claims air superiority in a single day of air combat, what can be said of the ADCRS of the defender? Not much indeed.

Some Reflections on the Prowess of Iranian Air Defence

From the factual details presented above, following deductions are made:

- Iran has a fairly substantial air defence resources populated along all the three verticals viz. Sensors, Shooter and BMC2.

- The early warning range of its EWRs extends from around 150 to 1100 km; besides there are long range radars associated with anti-missile systems like Bavar 373, S-300 PMU I and II.

- It will be logical to assume that the EWRs would have been so deployed as to cover the air space well outside the Iranian borders. According to one assessment, this coverage extends some 400-650 km from its borders in threatened areas towards West and Southwest towards the Strait of Hormuz.

- Keeping aside a few radars which are still under development or the ones associated with newer SAMs such as Bavar 373 etc., most of the EWRs of Iran belong to the era 2010-2014 (Sepehr-2013, Ghadir-2014, Ghamar-2010, Matla-ul-Fazr-2012 etc.). Of course the radars of S-300 PMU I and II are of 1978 vintage.

- As to interceptors, again leaving aside some new systems like Azarakhsh SRSAM (2024), Arman LRSAM (2024), Khordad and Bavar LRSAMs (2019) and some of the MRSAMs like Sayyad and Tabas— most of the weapons are of eighties and nineties vintage.

- Another peculiar thing to note in the Iranian arsenal is a near absence of tailor-made counter drone (C-UAS) systems both in terms of detection and killing of small RCS drones. Open source does not mention much about electro-optical/ infra-red/ radio frequency or radar based drone detection resources or the soft and hard kill means in the Iranian air defence inventory to take on the drone threat. This is a major deficit.

The author's take on the Iranian ADCRS has already been stated

A word on Initial Deployment of Air Defence Resources

It will be obvious to assume that the air defence resources would have been deployed on assets in comparative priority to their vulnerability to Israeli attacks. These could include nuclear

installations, missile storage sites, missile manufacturing facilities, uranium mines, seat of power, critical infrastructure, war-waging resources and so on.

Assessment of likely deployment on each asset is beyond the confines of space of this work

What hit Iran on 13 June 2025

The following points are stated:

- In the wee hours of 13 June 2025, Israel launched a massive pre-emptive air strike using more than 200 aircrafts in five waves and deploying some 300 Precision Guided Munitions (PGMs).

Though the initial strike took on more than 100 targets, following were the major strike areas (Beaumont, P. 2025):

- Natanz- the main uranium enrichment site.
- Tabriz North missile base.
- Esfahan Nuclear Technology Centre.
- Shiraz missile production facility.
- Bid Kaneh- IRGC HQ.
- Maragheh observatory.
- IRGC military base at Kermanshah.
- Arak nuclear facility.

It is an irony that, despite all the might of air defences protecting most of the above assets, all of these suffered heavy damages. The details of damage on various targets is not covered.

The Why of Non-Performance

The reported statement by one Israeli pilot in the first wave of strike saying that "Fighting 1500 km from home isn't a walk in the park" actually captures the great complexity of the operation and the precision with which it was executed. These are explained:

- Years before the operations on 13 June, there have been painstaking covert efforts by the Israeli intelligence agency viz. Mossad to establish the precise location of various air defence SAM sites, weapon deployments, ADCRS control nodes besides the asset map of nuclear sites and precise location of missile storage sites and more (D'Urso, S., 2025).
- Reports suggest that for doing the above, Mossad made successful attempts at covert infiltration aided by compromised Iranian personnel.

So widespread has been this effort at covert infiltration that Israel was reportedly able to do the following (ET, 2025):

- Establish a drone control centre in Iran, close to Tehran, capable of launching small kamikaze and First Person View (FPV) drones. FPV drones are guided by the operator all the way by accessing the live video on the drone's camera. In essence, a control centre will only need to be a small facility with some laptops and connectivity which can control the

launch and flight of small drones (Berman, L., 2025). Reportedly, this was located in a multi-storey building.

- Besides this, Mossad's agents could also place PGMs close to air defence SAM deployment sites. These could be remote control weapon stations (RCWS) which could be operated remotely (Newdick, T., 2025).

- Other weapons which Mossad could successfully deploy close to air defence sites includes loitering drones, anti-armour missiles and ground launched precision guided artillery rocket (Newdick, T., 2025).

- Vehicles carrying mini drones, small tactical armed drones and FPV drones were unobtrusively placed at various locations from where these could strike at air defence SAM sites and vehicles carrying missiles from storage sites to operational area (Newdick, T., 2025).

- Bomb laden quad copter drones, drone parts, and other PGMs were smuggled into Iran, over the years, using all sorts of means (shipping containers, trucks, business deal transactions with unsuspecting partners and more (The Times of Israel, 2025).

- Drones, weapons and subsystems smuggled across various routes were put together by Mossad agents and handed over to teams on ground. Even team leaders, trained outside Iran, were infiltrated to pass on the skills to the operators on ground (The Times of Israel, 2025).

- AI was put to use to sift through the colossal amount of data and get critical information on air defence targets, live location of military leadership and a detailed look-see inside each of the nuclear facility (Euronews, 2025).

- All this was coupled with a serious blow through cyberattacks. Pro-Israeli group—Gonjeshke Darande (Predatory Sparrow), the one associated with the infamous Stuxnet cyberattack on Iran way back in 2010, had again become active (Fruhlinger, J., 2022).

- It struck disrupting the operations of a bank and flooding the capital market with $90 Mn of stolen funds. There were cyberattacks on critical infrastructure. There were also reports of sudden centrifuge malfunctions at some facilities. That this group would have also tried to cripple the communications and connectivities of the air defence ADCRS, is not farfetched.

According to reports, preparations of this level has taken years (some estimates put it at three years).

- o Surprise was one of the greatest strengths of this operation. Air defences, at various assets, were actually caught off guard. Vehicles carrying drones took on SAM launchers coming out of their sheds to retaliate after the first shock wave was delivered on 13 June (Fruhlinger, J., 2022).
- o Another ruse to maintain surprise was the talks on nuclear deal. The next meet between Iran and US was expected on 15 June at Oman; Israel struck on 13 June with 'US in the know'!

Now a word about the aircrafts used for the strike— The F35I Adir. Following points are stated:

- o F35 is a multi-role air superiority fifth generation combat aircraft which is 'gold standard' in its class. The platform has super stealth signatures with RCS as low as 0.0015 m^2 (AFI, 2025).
- o To get an idea as to how small is this RCS, take a sample the RCS of typical combat aircrafts (F16 C -1.2 m^2, MiG 21 3 m^2, SU 30 Mk 1 4 m^2) (Global Security.org).

In addition to the above, the F35I had certain other Israeli specific modifications keeping West Asia in view. These made F 35I an exclusive Israeli platform. A brief glimpse:

- o Integration of electronic warfare (EW) suit by Elbit Systems of Israel in replacement of the original BAE EW suit. This integration allowed seamless integration of various indigenous weapons and sensors with no compromise on the platform's stealth features.
- o The sensors on board F 35I provided a 360^0 situational awareness.
- o Integration of indigenous weapon systems by Rafael Advance Defence Systems on F 35I. These included the following:
  - Python-5 air-to-air missile with dual band IR seeker.
  - SPICE precision guided munitions with a standoff range of 100 km.
  - Integration of specialised 1000 kg bombs in internal carriage.

- o Integration of 'conformal fuel tanks' that provide an additional range of 1700 km. Conformal fuel tanks, as the name suggests, conform to the body of the aircraft introducing no additional drag (some trade off on stealth for sure). Why 1700 km? The aircrafts can hit as far forward as Iran without refueling (the air strike distance between Israel and Iran is 1300-1500 km).
- o F 35 I had EW suit that is optimised to electronically counter the Russian air defence systems like S -300, S- 400 etc.

- F35I has been operationally integrated with F 15I Ra'am in a win-win joint missions. In this, the F 35 I leads, with its unprecedented capability to degrade enemy's air defences by soft and hard kill means, isb to be followed by F- 15I doing the heavy lifting of firepower with its 18000 ibs payload of bombing operations. F 35I provides a 360 degree situational awareness to allow placing F 15I in optimal position to inflict heavy punishment.
- The seamless integration between the two platforms has been achieved through sophisticated data sharing algorithms resulting in significant force multiplication effects.
- The technological superiority of F 35I, F 15I and other platforms stand far apart in comparison with the Iranian air fleet. This fleet comprises of some 230 fighter aircrafts (out of a total inventory of 400 airframes).
- These include 63xF4D/E/RF jet interceptor and fighter bombers (vintage 70s), 41xF14A/AM interceptors (vintage 1969-1991), 35xF5E fighters (vintage 50s) , 23xSU 24 all-weather tactical bomber and strike aircrafts (vintage 1967-1993), 18xMiG 29 fighters, (vintage 2010) besides 17xF-7 (vintage 1965-2013), 12xMirages F 1E, (vintage 70s), 12xSaeqeh fighters (vintage 2012) , 6xAzarakhsh fighters (vintage 1997) and 4x Kowsar fighters (vintage 2018).
- Reports coming out post strikes indicate major destruction of F 14 interceptor fleet by Israeli drones and air to ground missions.
- Statements from the pilots, who were a part of the first strike, have made clear   that the Iranian Airforce aircrafts, which were scrambled to take on the incoming threat actually, 'fled' giving minimal resistance.

The Scenario of Non-Performance

With all that has been stated, a scenario can now be imagined:

- In the wee hours of 13 June 2025, F35I aircrafts, armed to the teeth and fully armed with overall intelligence and battle awareness scene, organised in five strike waves, got airborne for a combat mission that will take them 2000+ km two way.
- The combat mission flies over Iraq goes undetected since most of the air defence sensors in Iraq have already been taken out in earlier strikes.
- At an appropriate time so as to retain total surprise, multiple Iran's air defences sites are subjected to sudden strikes by drones, loitering munitions, anti-armour missiles and PGMs.
- Due to this, many SAM sites get crippled even before firing a shot. Some others, which will now huddle into quick deployment, would be subjected to repeat strikes causing them extensive damage.
- There is no chance of early detection of the F 35I strike mission by the vintage sensor fleet of the Iranian air defences, though some missile systems like the Bavar or S- 300 go into action.
- The EW suit on board F- 35I takes out multiple S- 300 engagement radars. The standoff PGMs cause extensive damage on critical assets. Most of the air defences at these sites already stand crippled either by ground attacks or precise aerial bombing.'
- A conspicuous absence of tailor-made C-UAS arsenal in the Iranian air defences, hands over a disproportionate advantage to the Israeli drone force which attacks at will and claims loses.
- The Iranian Airforce puts up a minimal resistance and actually flees in the face of the Israeli onslaught.
- The Isareli attacks continue relentlessly, blunting whatever kill power is still resident.
- A situation is reached in 36 h when Israel declares air superiority over Iranian skies. F -15I Ra'am and F- 16I Sufa carry out follow up strikes totally unopposed (Kass, H., 2025).

Commenting on the decimation of Iranian air defences a former director of intelligence at Mossad said, "It was shocking how quickly Israel took down Iran's air defences. Our country's Air force took only 36-48 hrs to dominate completely" (msn).

It is difficult to disagree with the Director's observations, though he is cleverly hiding 'years' of work to reach this 'moment'.

The reader now knows why?

Works Cited

AFI (2025, February 20) F-35: A Strategic Dilemma for India's Air Force. *IDRW*.https://idrw.org/f-35-a-strategic-dilemma-for-indias-air-force/#googlevignette.

Beaumont, P. (2025, June 15). What has Israel hit in Iran and how has Iran responded? *The Guardian*. https://www.theguardian.com/world/2025/jun/13/what-has-israel-hit-in-iran-and-who-were-the-generals-and-nuclear-scientists-killed.

Berman, L. (2025, June 13). Mossad set up drone base in Iran; UAVs were activated overnight to strike surface-to-surface missile launchers aimed at Israel. *The Times of Israel*. https://www.timesofisrael.com/liveblog_entry/mossad-set-up-a-drone-base-in-iran-uavs-were-activated-overnight-to-strike-surface-to-surface-missile-launchers-aimed-at-israel/.

D'Urso, S., (2025, June 13). Israel Releases Details of Unprecedented Attack on Iran. *The Aviationist*. https://theaviationist.com/2025/06/13/israel-attack-iran-details/.

ET online (2025, June 17). Mossad's ghost army runs wild behind enemy lines in Iran. *The Economic Times*. https://economictimes.indiatimes.com/news/defence/israel-iran-war-mossads-ghost-army-runs-wild-behind-enemy-lines-in-iran/articleshow/121907086.cms?from=mdr.

Fruhlinger, J. (2022, August 31). Stuxnet explained: The first known cyber weapon. *CSO*.https://www.csoonline.com/article/562691/stuxnet-explained-the-first-known-cyberweapon.html.

Kass, H. (2025, June 17). Which Fighter Jets Did Israel Use to Attack Iran?. *The National Interest*. https://nationalinterest.org/blog/buzz/which-fighter-jets-did-israel-use-to-attack-iran.

Newdick, T. (2025, June 13). Israeli Commandos Attacked Iranian Air Defenses With Drones From Inside The Country: Report. *TWZ*. https://www.twz.com/air/israel-hid-drones-missiles-around-iran-to-target-nuclear-facilities-and-more-report.

Radar Cross Section. *Global Security.org*.https://www.globalsecurity.org/military/world/stealth-aircraft-rcs.htm.

Saxena, V.K. (2024, November 26). How Come Iran's Air Defences Succumbed on 26 Oct 2024? A Brief Analysis. *CENJOWS*. at https://cenjows.in/how-come-irans-air-defences-succumbed-on-26-oct-2024-a-brief-analysis/.

Speed Israel 'took down' Iranian air defences was 'shocking', ex-Mossad chief says. *msn*.https://www.msn.com/en-gb/news/world/speed-israel-took-down-iranian-air-defences-was-shocking-ex-mossad-chief-says/ar-AA1GYc7j?cvid=41e9e8cf8a034be1bffea9adbb522bf9.

TOI Staff (2025, June 15). Ships, trucks, and suitcases: How Israel reportedly got its attack drones into Iran. *The Times of Israel*. https://www.timesofisrael.com/ships-trucks-and-suitcases-how-israel-reportedly-got-its-attack-drones-into-iran/.

(2025). Israel Claims Air Superiority Over Iran, Destroys Missile Launchers |Vantage with Palki Sharma |N18G [YouTube]. *Firstpost*. https://www.youtube.com/watch?v=m4wBOfVVlI0.

(2025). Israel's spy agency used AI and smuggled-in drones to prepare attack on Iran, sources say.*Euronews*. https://www.euronews.com/next/2025/06/18/israels-spy-agency-used-ai-and-smuggled-in-drones-to-prepare-attack-on-iran-sources-say.
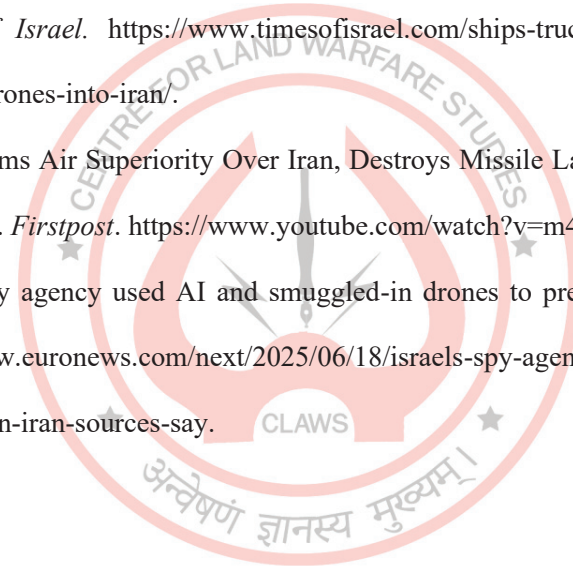
About the Author

Lt Gen (Dr) V K Saxena is the former Director General of the Corps of Army Air Defence. He is the Distinguished Fellow at VIF and a Visiting Fellow at CLAWS besides being a UN and a Law scholar. The General is a prolific writer who has authored five books and is regularly published by the Defence media of the country. He is also a regular at TV shows contributing on many a defence issues.