CENTRE FOR JOINT WARFARE STUDIES

CENJOWS

RADARS: ADVANCEMENTS IN CHINA

1. **Air Defence Radars Advancements in China.** Airspace defence of China against stealth aircraft such as F22 Raptor, have been the main concern of China for many years. Several research and development projects were launched to address this concern. These efforts have started to deliver desired results. Dave Makichuk[1] in his article "Nowhere to hide: Has China won the stealth war?" has brought out some of the measures shortlisted by China to detect stealth aircraft.

2. According to the Global Times, China's "meter wave radar can be deployed on vehicles, on land and warships, creating a dense web that gives hostile stealth aircraft nowhere to hide." In addition, it also functions as a fire control radar that can guide missiles toward stealth aircraft like the F-35 Joint Strike Fighter.

3. Chinese scientists have mastered the art of making best use of the different frequency band radars, all into one unit. Higher frequency band radars are good for guiding weapons to a target, whereas Lower frequency band radars, good for search role, aren't precise enough for fire control. Thus usually separate high- and low frequency bands radars tend to be paired for search and fire control. Stealth aircraft are shaped to avoid detection by high frequency band beams. Meter wave radars can detect stealth aircraft because modern stealth aircraft are mainly designed to avoid detection by microwave radar, and are less stealthy to meter wave radar.

4. Wu Jianqi, a senior scientist at the state-owned China Electronics Technology Group Corporation has reportedly solved the issue by designing the world's first

[1] ***Dave Makichuk, Nowhere to hide: Has China won the stealth war?https://www.asiatimes.com/2019/11/article/nowhere-to-hide-has-china-won-the-stealth-war/***

practical meter wave sparse array synthetic impulse and aperture radar as this radar has multiple transmitting and receiving antennas tens of meters high, scattered in a range of tens to hundreds of meters. This arrangement significantly enhances the radar's ability to track an aerial target, pinpointing the stealth aircraft's exact coordinates by synthesizing parameters and data gathered by the radar under the support of advanced algorithms. Since the radar can now see stealth aircraft clearly and track them continuously and accurately, it could become capable of guiding long-range anti-aircraft missiles precision strikes on them.

5. These claims by Chinese scientists my not entirely be true.The vulnerability of stealth aircraft to low-frequency beams has not escaped the notice of military researchers around the world. The Chinese designed multi band radar can be easily spoofed or jammed. Huge radar size could make it vulnerable to easy detection and destruction.

6. China also displayed two state-of-the-art radars recently, the JY-27A 3-D long range surveillance and guidance radar that is the Chinese military's first active phased array radar, and the JY-26 Skywatcher-U. This radar works in a broader bandwidth, in VHF and Ultra-High Frequency (UHF) bands. It also has a range of 500km and can track up to 500 targets at once. Reportedly, the Chinese government claimed that while under development in Shandong it was able to track American F-22 Raptors flying over South Korea[2].

(China displays some of its early warning radar equipment at Airshow. Credit: Defenseworld.net.)

[2] ***ibid***

7. China claims it has a radical new 'quantum' radar capable of detecting stealth fighters at great distances[3]. Presently, reported range is 100 km. This radar sends out a beam of photons as radio waves, quantum radar uses entangled photons. Entangled photons are two separate photons that share a deep quantum link. These photons mirror each other's behaviour when one of them is influenced in some way. Quantum radar would send out bursts of photons while retaining their 'pairs'. The changes in behaviour of the retained photon would then reveal what's happening to the photon in the beam. The entangled photons bounce back to a sensor which can then compute course, speed and size. The use of entangled photons has a second major benefit over radio waves. It's not likely to be jammed.

8. Only a few of the photons sent out will be reflected back if they hit a stealth aircraft. A conventional radar wouldn't be able to distinguish these returning photons from the mass of other incoming ones created by natural phenomena—or by radar-jamming devices. But a quantum radar can check for evidence that incoming photons are entangled with the ones held back. This enables it to detect even the faintest of return signals in a mass of background noise[4]. The developments will force sixth generation fighter aircraft designers to think afresh for incorporating stealth features in futuristic aircraft.

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[3] ***Jamie Seidel,China's claim it has 'quantum' radar may leave $17 billion F-35 naked; https://www.news.com.au/technology/innovation/inventions/chinas-claim-it-has-quantum-radar-may-leave-17-billion-f35-naked/news-story/207ac01ff3107d21a9f36e54b6f0fbab***

[4] ***Martin Giles, The US and China are in a quantum arms race that will transform warfare; https://www.technologyreview.com/s/612421/us-china-quantum-arms-race/***