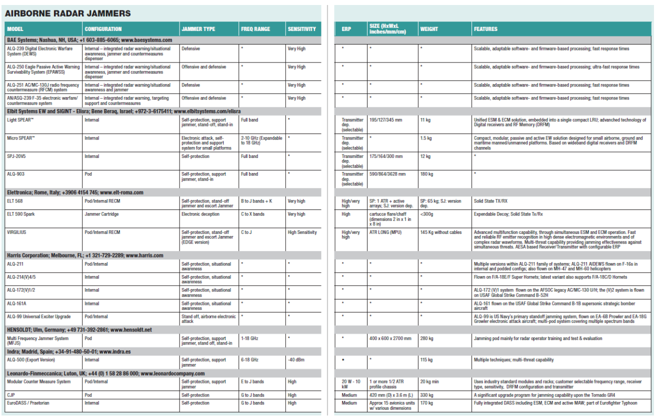
Technology Survey: Airborne Radar Jammers – July 2018 JED

– By John Knowles –

Our technology survey this month looks at airborne radar jamming systems. Airborne radar jammers are typically categorized as either self-protection jammers or support jammers. Self-protection jammers, as their name implies, are designed to protect the host aircraft by jamming air defense radars that are in the middle-to-late stages of the targeting and engagement process, such as performing target acquisition, target tracking or fire control for either a missile or an anti-aircraft artillery battery. These jammers, which typically feature an operating range from around 1 GHz up to 20 GHz, use a combination of denial and deception techniques that prevent the radar from tracking the target aircraft.



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A support jammer differs from a self-protection jammer in a few ways. It provides higher ERP to cover a dispersed formation of strike aircraft from being detected and tracked

by radars. It also will typically focus on defeating the lower-frequency early warning radars and surveillance radars in an enemy integrated air defense system (IADS), as well as using communications jammers to disrupt the C2 links between the radars. A support-jamming aircraft typically features an advanced electronic support measures (ESM) system to detect, identify and geolocate enemy radars at a much longer distance than a radar warning receiver (RWR) or ESM system that cues a self-protection jammer.

Until recently, the roles (and designs) of self-protection jammers and support jammers were fairly distinguishable. However, with the advent of gallium nitride-powered ASEA jammers that can deliver greater ERP in a focused beam, the newer self-protection jammers installed on a strike aircraft can deliver enough energy at a distance to play a limited support jamming role. In addition, some of the latest AESA radars on fighter aircraft, for instance, can provide self-protection jamming in select frequencies. The point here is that some of the traditional distinctions between a self-protection jammer, a support jammer and a radar are beginning to blur.

In the survey table, the first two parameters are the jammer's configuration (internal or podded) and the type of jammer – self-protection jammer or support jammer. The next column lists the operational frequency range. Some surveillance radars, for instance, operate in the lower portions of VHF band, while others can go up to approximately 6 GHz. This is a wide frequency range, and it addresses just one type of radar. As radar technology improves, the frequency for each type of radar is expanding and jammers must follow suit.

The next column describes installed receiver sensitivity, which defines the ability of the radar jammer to detect the radar signal and provide necessary jamming techniques. Lower installed sensitivity generally translates into greater detection range. Because a support jammer usually operates

outside of a threat's lethal range, the ESM receiver typically requires more sensitivity to detect the radar signals. Note that sensitivity has to be balanced with the jammer ERP to prevent interference between the jammer's receive and transmit paths.

ERP, or effective radiated power, defines the maximum output power of the jamming system. As discussed earlier, the ERP of a self-protection jammer is usually lower than the ERP of a support jammer. For self-protection jammers, the ERP figure is a balance between the radar cross section of the host aircraft and the detection range of the threat radar system. The jammer must generate jamming power that is greater than the reflected signal from the aircraft (RCS). The last few columns describe the size, weight, and additional features of each radar jammer. ♦

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