

Introduction to F-35 Radar Warning Receiver (RWR)

The Radar Warning Receiver (RWR) on the F-35 Lightning II is a critical defensive system designed to detect, identify, and provide warnings of radar signals emitted by hostile radar systems such as enemy surface-to-air missile (SAM) radars and enemy fighter aircraft radars. This system enables the pilot to take countermeasures or evade enemy threats.

Frequency Ranges Detected by the F-35 RWR

The F-35's RWR is engineered to monitor a broad spectrum of radar emissions covering multiple frequency bands typically used by military radar systems worldwide. While exact classified details are withheld for security reasons, we can discuss general frequency bands and radar types typically detected by modern fighter RWRs including the F-35:

- **VHF Band (30 MHz to 300 MHz):** Some long-range early warning radars and certain air surveillance radars operate in this range. Detecting them helps locate distant threats.
- **UHF Band (300 MHz to 1 GHz):** Used by various ground-based radars and some tactical surveillance radars. The RWR monitors this range for medium-range threats.
- **L Band (1 GHz to 2 GHz):** Commonly used for airborne early warning radars and long-range surveillance radars.
- **S Band (2 GHz to 4 GHz):** This band is widely used by tracking radars, search radars, and fire control radars.
- **C Band (4 GHz to 8 GHz):** Often utilized for fire control radars on fighter aircraft and SAM systems. Detection in this band is crucial for determining targeting radars locking onto the aircraft.
- **X Band (8 GHz to 12 GHz):** Typically employed for high-resolution targeting radars and missile seekers. Detection enables warning of imminent missile threats.

How the F-35 RWR Uses This Frequency Information

The F-35's RWR does not just detect the presence of radar signals; it also analyzes the signal characteristics (such as pulse repetition frequency, pulse width, frequency modulation) to classify the threat type. By identifying the radar emitter, the system can:

- Provide pilot with situational awareness about the type and location of threats
- Trigger automated defensive countermeasures like electronic jamming or deploying chaff and flares
- Assist in evasive maneuvers to avoid being tracked or targeted by enemy radar-guided weapons

Conclusion

The F-35's Radar Warning Receiver is a sophisticated, wideband electronic warfare sensor that monitors radar frequencies ranging approximately from 30 MHz up to 12 GHz. This coverage encompasses the typical radar bands of hostile air defense and fighter radar systems. By continuously scanning and analyzing these frequencies, the RWR helps ensure the pilot's survival and mission success through enhanced detection and timely warning of radar-based threats.