The AN/SPQ-9 Surface Surveillance and Tracking Radar, developed by Northrop Grumman Norden Systems, Melville, NY, is a track-while-scan radar used with the MK-86 Gunfire Control system on surface combatants. The AN/SPQ-9B detects sea skimming missiles at the horizon even in heavy clutter while simultaneously providing detection and tracking of surface targets and beacon responses. The AN/SPQ-9B is available as a stand-alone radar or as a replacement for the AN/SPQ-9 in the Mk 86 Gun Fire Control System, which will be integrated into the Mk I Ship Self Defense System (SSDS). The Radar Set AN/SPQ-9B is a high resolution, X-band narrow beam radar that provides both air and surface tracking information to standard plan position indicator (PPI) consoles. The AN/SPQ-9B scans the air and surface space near the horizon over 360 degrees in azimuth at 30 Revolutions Per Minute (RPM). Real-time signal and data processing permit detection, acquisition and simultaneous tracking of multiple targets. The AN/SPQ-9B provides raw and clear plot (processed) surface video, processed radar air synthetic video, gate video, beacon video synchro signals indicating antenna relative azimuth, Azimuth Reference Pulses (ARP), and Azimuth Change Pulse (ACP). The radar will maintain its capabilities in the presence of clutter from the sea, rain, land, discrete objects, birds, chaff and jamming. In the Radiate state the AN/SPQ-9B has three modes of operation: the Air mode, Surface mode and Beacon mode. Both Air and Surface modes have a submode for Organic Combat System Operator/Team Training. The AN/SPQ-9B serves as a complement to high-altitude surveillance radars to detect missiles approaching just above the sea surface. The system emits a one-degree beam that, at a range of approximately 10 nautical miles, is capable of detecting missiles at altitudes up to 500 feet. Since the beamwidth expands over distance, the maximum altitude will increase at greater ranges.

- The Air Mode uses the Pulse-Doppler radar for detecting air targets. When the AN/SPQ-9B radar detects an air target and initiates a track, it will determine the position, speed, and heading of the detected target. The Air mode has a sector function called, the Anti-Ship Missile Defense (ASMD), and a look back waveform. In the Radiate state, the Air mode is enabled continuously.
- The Surface Mode generates a separate surface frequency and an independent pulse with a Pulse Repetition Interval (PRI) commensurate with a range of 40,000 yds, not including radar dead time. The AN/SPQ-9B radar has a 360-degree scan coverage for surface targets. The radar displays raw and clear plot video. The AN/SPQ-9B Radar Surface mode has a submode called Surface-Moving Target Indicator (MTI), and operates concurrently with the Air mode. While in the radiate state, the Surface Mode is enabled continuously.
- The Beacon Mode generates a separate beacon frequency and an independent pulse with a PRI commensurate with a range of 40,000 yds, not including radar dead time. The AN/SPQ-9B radar has a 360-degree scan coverage for beacon targets. The received beacon video is sent to the console for display and distribution. Beacon track data is sent to the computer for processing. The AN/SPQ-9B Radar Beacon mode operates concurrently with the Air mode and Surface mode.
The ASMD Sector Function allows quick response detection of low-flying high-threat targets by the Air mode. The radar automatically detects, tracks, and reports any targets entering the ASMD sector that meet the conditions for targets with a time-to-go of less than 30 seconds. The ASMD azimuth sector width is operator selectable between 5 and 360 degrees. The ASMD range within that sector is operator selectable from the minimum range of the radar to a maximum of 20 nmi. The AN/SPQ-9B Radar ASMD sector function operates concurrently with the Air mode, Surface mode, and Beacon mode.

The Surface-MTI Submode allows for the cancellation of non-moving targets by the Surface mode. The Surface-MTI azimuth sector width is operator selectable between 5 and 360 degrees. The AN/SPQ-9B automatically displays any targets with a radial speed exceeding 10 Kn. The AN/SPQ-9B Radar Surface-MTI submode will operate concurrently with the Air mode, Surface mode and Beacon mode.

The Organic Combat System Operator/Team Training Submode provides for external scenario control by organic training systems for both static and dynamic targets in clutter in either the Radiate or Test state.

Deployment

The AN/SPQ-9B is slated to be installed on ships and aircraft carriers in the following classes:

- CG-47 TICONDEROGA-class cruisers
- LHD-1 amphibious ships
- LPD-17 SAN ANTONIO-class amphibious ships
- DD-963 SPRUANCE-class destroyers
- DDG-51 destroyers
- CVN-68 NIMITZ-class aircraft carriers
SPQ-9B (ADM) onboard Self Defense Test Ship, Fall 1994

Sources and Resources

AN/SPQ-9B Radar System Health Analysis Prepared by Naval Surface Warfare Center Crane Division Code 6022.