The Spirit of '76 Pod Newsletter

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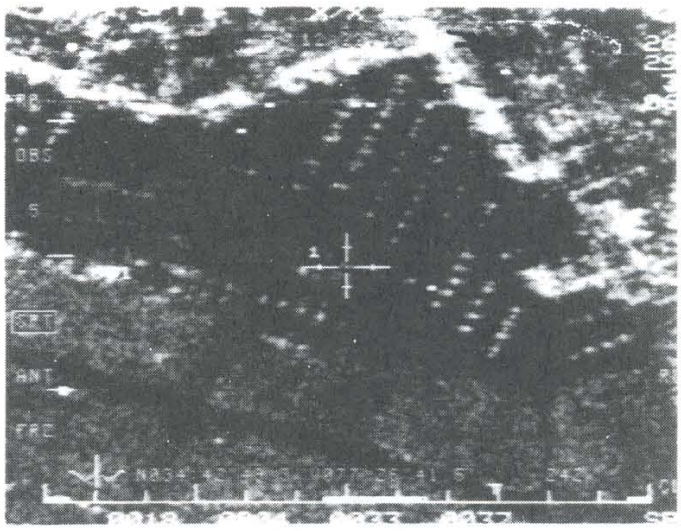
Gray Wolf in Navy Assault Exercise



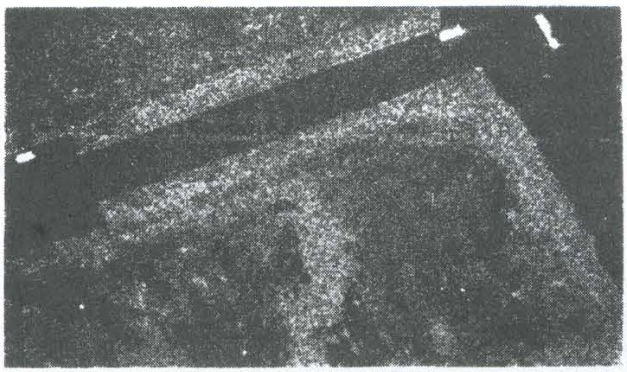
APG-76 radar image of helicopters from a radar range of over 110 kilometers observed during the JTF-95 exercise.

On September 21 and 22, the Norden APG-76 radar mounted in a pod flown on the U.S. Navy S-3B "Gray Wolf" aircraft participated in a beach assault exercise near Camp Lejeune, North Carolina. The exercise was held in conjunction with the JTF-95 program, which seeks to integrate elements from each branch of the U.S. military into a cohesive task force.

The first day of the exercise was a rehearsal. The Gray Wolf's mission was to provide pre-landing surveillance of the landing area, and to monitor aircraft and activity at nearby "hostile" military airfields. The Gray Wolf data-link ground station, operated by Norden engineers Bruce Jacobson and David Molter, had been positioned near the assault site to receive data-linked imagery and data. The APG-76, operated on board the S-3B by Norden engineer Chris Patrick, was able to detect and image several placements of equipment, as well as provide a count of "hostile" aircraft on the airfields. This was accomplished through very thick cloud cover and rain, at radar ranges exceeding 110 kilometers. The ground station was able to monitor real-time image data sent from the S-3 aircraft at data link ranges up to 240 kilometers. Thus the combined radar and data link successfully demonstrated a nearly 350-kilometer over-the-horizon capability which could be provided to a battlefield commander in real time.

The second day of the exercise was the actual beach assault. The Gray Wolf's mission was to provide real-time surveillance of the landing area, as well as monitor the hostile airfields. Using the GMTI mode of the APG-76, the Gray Wolf aircraft was able to detect moving targets approaching the landing zone during the beach assault. The ground station was again able to monitor this activity in real time.

High Resolution APG-76 Tested Aboard Gulfstream II



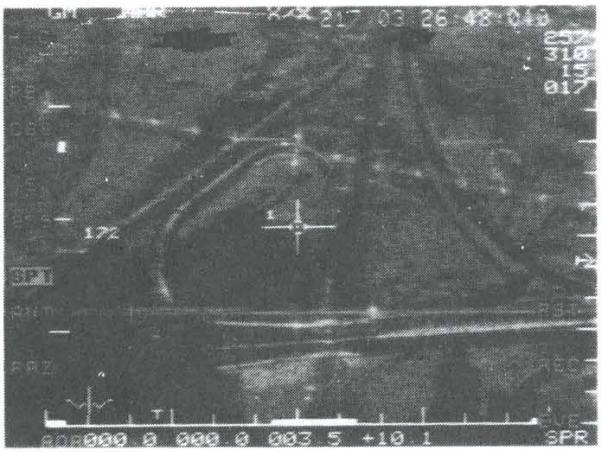
Post-processed 0.3-meter resolution SAR map of Rentschler Airfield, Hartford, Connecticut. A portion of a corner reflector array and three stationary vehicles (left to right: recreational vehicle, a fuel truck and a flatbed) on the taxi-way and runway are clearly visible. Range to the targets was 52 km.

On September 23, Westinghouse Norden Systems successfully completed the initial flight test of **real-time, on-board, 0.3 meter and 1-meter resolution SAR modes** with a modified AN/APG-76 radar. The flight tests were conducted using Norden's Gulfstream II test aircraft. During the flight, 1-meter resolution images of stationary tanks were generated at ranges of over 130 km while 0.3-meter resolution imagery of parked aircraft (C-5s) was generated at ranges of over 54 km. (Security guidelines do not permit the release of the images of military targets in this newsletter.) Additional tests planned over the next few months will provide fully focused 0.3-meter imagery at ranges over 100 km.

Although the baseline AN/APG-76 radar was developed for the Israeli Air Force, and is now installed in the Navy S-3 pod, the improved resolution capability is being developed for U.S. applications. Modifications for the higher resolution modes included a new waveform generator module and modification of the signal processor software for on-board processing of the higher resolution data. These high-resolution modes will be incorporated in the U.S. Air Force F-16 pod-mounted radar next spring.

This flight test was preceded by a series of flights in which the high resolution waveform and the hardware modifications were validated by post-flight processing of raw radar data. Calibrated corner reflectors and other targets were used to test sensitivity, resolution, and sidelobe levels.

This improved capability provides the AN/APG-76 radar the resolution needed to be compatible with automatic target recognition (ATR) techniques. Furthermore, unlike conventional radars, the AN/APG-76 is a multi-channel (multiple antenna ports and multiple RF/IF receiver channels) radar. Its highly unique architecture has been used to great advantage to demonstrate such capabilities as "3-D SAR" and "Interferometric Moving Target Focusing" for imaging ground-moving targets. These capabilities, combined with its new higher resolution, offer unique opportunities for an ATR sensor.



On-board 1-meter resolution SAR map of an area near Baltimore-Washington International Airport. In addition to the "cloverleaf" intersection of Route 170 and I-195, the approach lights to BWI runways are clearly visible. The image was made at a range of 31 km.

The Spirit of '76 Pod Newsletter is published by the Advanced Programs Department of Westinghouse Norden Systems.