The Spirit of '76 Pod Newsletter

October 1994 Issue 2

A Westinghouse Norden Systems publication

"We have a radar!" Chris Patrick 17 Sept 94

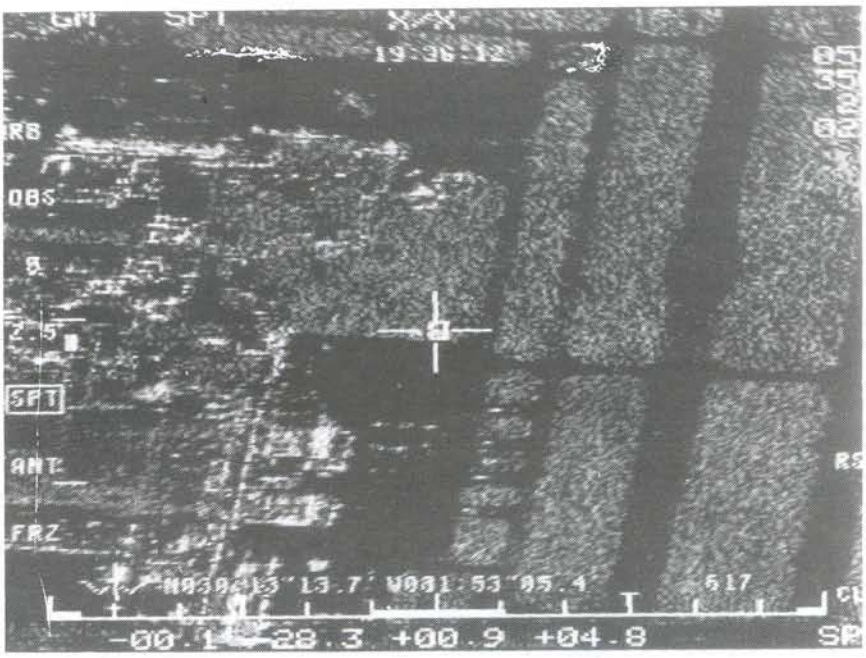
The S-3 aircraft designated "Gray Wolf" has completed safety-of-flight tests at Naval Air Warfare Center - Aircraft Division (NAWC-AD), Patuxent River, MD, and received Fleet Flight Clearance. The aircraft and ground station were transferred to NAS Cecil Field, where radar checkout flights were conducted. In addition, a Fleet test plan was prepared, and we participated in JTF-95.

Flight Clearance from Pax River

Gray Wolf with the APG-76 Pod was delivered to VS-24, Cecil Field NAS, FL on September 11. Pictured are (l to r): Dan Held, Director Advanced Programs and Kent Hutchinson, Vice President Programs of Norden; Conrad White, Installation Project Manager NAWC-AD; CDR Jim Hart, VS-24 CO; and Norman Thomas, Program Manager, Norden.

Commander Naval Air Systems Command message 122004Z SEP 94 granted "... flight clearance for full or partial installation (electrical and mechanical) of an AN/APG-76 Multimode Radar System (MMRS) on S-3 BUNO 158864..." This clearance was granted based on a technical analysis of the pod design and installation, four weeks of extensive electromagnetic interference and electromagnetic compatibility tests at NAWC with the radar installed on the aircraft, two captive carriage non-operating test flights, and a fully operational flight on the evening of September 8. Lt. Steve Rauch, NAWC project officer and radar operator for this first Gray Wolf flight, noted that the Gray Wolf aircraft and radar performed well through all phases of the flight test, and that there were no safety-of-flight discrepancies with the installed system. The remaining flight tests were canceled and a recommendation for flight certification was immediately passed to NAVAIR. As a result of the close coordination between the NAVAIR S-3 Class Desk, Cdr. Gary Peterson and his staff, and the NAWC Force Warfare Directorate, Cdr. Ray Griffith, Conrad White, Lt. Steve Rauch and their staffs, all the necessary approvals were obtained and clearance was granted within two working days.

Radar Flights at Cecil Field, Jacksonville, FL



AN/APG-76 Pod First Flight SAR Imagery of Cecil Field NAS, FL

Pod Second Flight Simultaneous SAR/GMTI Imagery of Interstates 75 and 10, Lake City, FL

On Monday, September 12, Commander Griffith and Lt. Rauch flew the Gray Wolf airplane and APG-76 pod to Cecil Field and turned it over to Captain Phil Voss, Commander, Sea Control Wing, Atlantic, and the "Scouts" of VS-24 commanded by Commander Jim Hart. Meanwhile, Dave Molter, drove the Norden Winnebago van with the ground station and radar support equipment to Jacksonville and was met by Chris Patrick, Bruce Jacobson, Hal Maney and Tom Watson. They completed the ground station set-up and data link, and prepared the radar for system flight tests. The first system tests were flown on the 17th, with excellent real beam, Synthetic Aperture Radar (SAR) ground

Radar Flights at Cecil Field, Jacksonville, FL (Continued)

mapping, precision location performance, and data link operation; a second flight on Monday, September 19, confirmed the operation of the Ground Moving Target Indication (GMTI) and ground moving target track modes of the MMRS in both SAR and doppler beam sharpening. The Gray Wolf Team and VS-24 were ready to demonstrate the benefits of the S-3 mounted APG-76 in its first operational exercise, the landing assault phase of JTF-95-1 in North Carolina.

Further APG-76 Development

Westinghouse Norden Systems has just received a contract from the U.S. Air Force, Wright Labs, to conduct a flight test program aimed at evaluating new techniques for imaging moving targets. The tests will be carried out in January utilizing the Westinghouse Norden Systems Gulfstream II aircraft carrying the APG-76 radar. The Moving Target Imaging (MTIm) algorithms, developed and demonstrated by Norden under IR&D, take full advantage of the multiport interferometric antennas on the APG-76.

Demonstration Ground Station for the AN/APG-76 Radar

The Situation Station Displays Map Based Information Relative to Real-Time Aircraft and Target Geometries.

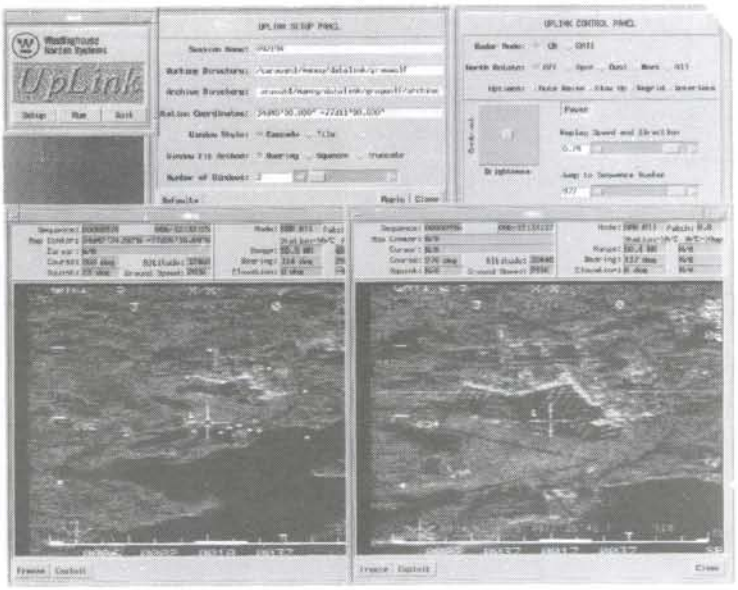
To take advantage of each test flight of the Gray Wolf pod, a fully equipped mobile ground station has been developed to receive radar data from the aircraft in flight and process and evaluate the data. The station is housed in a Winnebago van and contains all the necessary tools to allow real-time analysis and exploitation of AN/APG-76 radar images, providing users a quick turn-around capability.

The ground station communicates with the radar pod through an L-band microwave radio data link, and contains three operator/analyst positions. The first station, named the Situation Station, provides a display illustrating the aircraft position relative to a Defense Mapping Agency map, resident in a data base. Other information is also displayed numerically, including aircraft heading, speed and altitude. The operator can use a mouse to perform a variety of tasks on the display, such as distance and bearing measurements, as the aircraft continues its mission. The software for this station is the result of a joint effort between Westinghouse Law Enforcement Systems Division and Westinghouse Norden Systems. The software, originally developed for the Multi-Sensor Surveillance Aircraft (MSSA) situation display, was modified by Norden for this application.

Ground Station (Continued)

The second station, called the Director Station, provides the ground station with the same real-time digitized radar imagery as the operator in the aircraft. Using the workstation mouse, the ground "director" can manipulate the display, rotate it, create multiple images and freeze images for closer observation. The director can also use the display and mouse to read geographical coordinates to within 20-meter accuracy. Since all the received images are stored in a data base, the director station can "re-fly" a mission. If desired, the director can pass a selected image to the third station, the Exploitation Station, for further analysis.

The Exploitation Station uses commercial image processing software to allow the operator to do image enhancement, restyle, rotate, crop or change the color map of the image. A high resolution color printer is connected to this station for hard-copy output.



The Director Station Displays the Real-Time Radar Imagery.

The Exploitation Station Provides Image Enhancement, Real-Time Change Detection and Target Location Capabilities.

The Spirit of '76 Pod Newsletter is published by the Advanced Programs Department of Westinghouse Norden Systems. Contact Norman Thomas, Program Manager at (203)852-7725.