

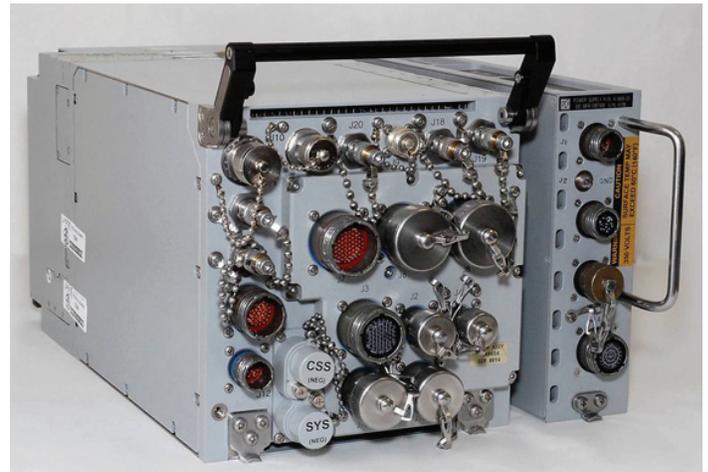
# Multi-functional Information Distribution System (MIDS) Joint Tactical Radio System (JTRS)

## Executive Summary

- The Navy completed the Verification of Correction of Deficiencies (VCD) operational test of the Multi-functional Information Distribution System Joint Tactical Radio System (MIDS JTRS) core terminal as integrated into the F/A-18E/F in December 2011.
- DOT&E published a MIDS JTRS VCD report in March 2012. DOT&E determined that testing was adequate to indicate that the MIDS JTRS, integrated into the F/A-18E/F, was now operationally effective and operationally suitable. Major deficiencies discovered during the 2010 IOT&E, including ineffective Link 16 message exchange and fine synchronization, as well as terminal and host platform integrated system reliability, have been resolved.
- The Air Force completed operational testing of the MIDS JTRS core terminal integration into the E-8C Joint Surveillance and Target Attack Radar System (JSTARS) aircraft in September 2011. DOT&E assessed that MIDS JTRS as integrated in the E-8 JSTARS is operationally effective and suitable with limitations.
- The Navy is continuing development of two major increments of MIDS JTRS capability that will improve datalink performance: Link 16 four-channel Concurrent Multi-Netting with Concurrent Retention Receive (CMN-4) and Tactical Targeting Networking Technology (TTNT). These new capabilities may require significant hardware and software design changes to the MIDS JTRS core terminal, as well as modifications to host platforms. DOT&E and the Navy are formulating the test strategies for these new MIDS JTRS terminal designs and their integration into host platforms.

## System

- When integrated into a host platform, MIDS JTRS provides Link 16 digital datalink, Link 16 digital voice communications, and Tactical Air Navigation (TACAN) capabilities, plus three additional programmable channels capable of hosting additional JTRS Software Communications Architecture-compliant waveforms in the 2 to 2,000 Megahertz radio frequency band. In addition, MIDS JTRS is intended to provide the capability for Link 16 enhanced throughput and Link 16 frequency re-mapping.
- Link 16 digital datalink is a joint and allied secure anti-jam high-speed datalink that uses standard messages to exchange information among flight or battle-group host platforms or between combat platforms and command and control systems.



- Link 16 digital voice provides host platforms with a secure anti-jam voice line-of-sight communications capability. TACAN is a legacy aircraft navigation system used in many military aircraft with air-to-air as well as air-to-ground modes of operation.
- The system includes the MIDS terminals and the host platform components and interfaces such as controls, displays, antennas, high-power amplifiers, and any radio frequency notch filters.
  - The MIDS JTRS terminals developed to conduct Concurrent Multi-Net Reception are intended to have improved digital receivers, improved buffering, and faster processors to allow host aircraft to receive more Link 16 messages during periods of high message exchange demand.
  - The Navy intends for the MIDS JTRS terminals under development to utilize the multiband capability of the MIDS JTRS to provide Link 16 and TTNT to the host platform. The Navy intends for TTNT to provide a larger throughput with lower latency, thereby enabling faster updates of precise information than Link 16 with expanded radio frequency coverage. The Navy intends to use TTNT as one of the communications enablers for the Naval Integrated Fire Control – Counter Air capability.

## Mission

U.S. Services and many allied nations will deploy aircraft, ships, and ground units equipped with MIDS JTRS in order to provide military commanders with the ability to communicate with their forces by voice, video, and data during all aspects of military

operations. MIDS JTRS-equipped units are intended to exchange information including air and surface tracks, identification, host platform fuel, weapons, mission status, engagement orders, targeting data, and engagement results.

## Major Contractors

- ViaSat, Inc. – Carlsbad, California
- Data Link Solutions – Wayne, New Jersey and Cedar Rapids, Iowa

## Activity

- The Navy's Commander, Operational Test and Evaluation Force completed the VCD test of the MIDS JTRS, as integrated on the F/A-18E/F, operating from the Naval Air Warfare Center China Lake, California, and during deployed detachments to Naval Air Station Fallon, Nevada, during December 2011.
- The Air Force's 605th Test and Evaluation Squadron (TES) conducted a Force Development Evaluation of the JSTARS Communications and Network Upgrade Phase 1, which includes the MIDS JTRS integration, from June to September 2011. This evaluation took place at Patuxent River Naval Air Station, Maryland, in the U.S. Southern Command Joint Interagency Task Force – South area of responsibility, and at the JSTARS Test Force and Northrop Grumman Corporation facilities in Melbourne, Florida. All testing was conducted in accordance with DOT&E-approved Test and Evaluation Master Plans and operational test plans. DOT&E published a MIDS JTRS VCD report in March 2012.
- DOT&E and the Navy are formulating the test strategies and revising TEMPs for new MIDS JTRS terminal designs and their integration into host platforms. These designs include Link 16 four-channel Concurrent Multi-Netting with CMN-4 and TTNT.

## Assessment

- The FY12 DOT&E MIDS JTRS VCD indicated improved Link 16 message exchange compared to the 2010 IOT&E result. DOT&E determined that the MIDS JTRS, as integrated into the F/A-18E/F, was now operationally effective and operationally suitable.
- Testing indicated that Link 16 messages provided situational awareness of friendly force positions and intentions. These messages were consistently and accurately exchanged with 100 percent success during air-to-air missions. The test data also indicated a 99 percent successful ability to obtain Link 16 fine synchronization compared to the IOT&E result of 84 percent.
- The test data indicated that terminal and host platform integration reliability had improved relative to IOT&E. System reliability improved to 21.6 hours between critical

- failures compared to 8.1 hours during the IOT&E. Operational availability had improved to 99 percent compared to 68 percent during the IOT&E.
- The built-in test false alarm rate of 1 false alarm every 5.9 flight hours failed to meet the threshold requirement of 1 false alarm every 113 flight hours.
- DOT&E found the integration of the MIDS JTRS core terminal into the E-8C JSTARS operationally effective and operationally suitable with limitations. The system was effective in transmitting Link 16 datalink and voice communications. JSTARS had no MIDS JTRS terminal failures in 114.3 hours accumulated during testing, but terminal operators experienced display anomalies. The JSTARS Program Office plans to fix the display anomalies in the next upgrade cycle.
- New capabilities such as Link 16 four-channel Concurrent Multi-Netting with CMN-4 and TTNT may require significant hardware and software design changes to the MIDS JTRS core terminal, as well as modifications to host platforms to integrate the new TTNT capability.

## Recommendations

- Status of Previous Recommendations. The Navy and the MIDS Program Office made satisfactory progress on the previous recommendations related to the correction of deficiencies identified during the IOT&E.
- FY12 Recommendations. The Navy should:
  1. Continue software design efforts to reduce the incidence of built-in test false alarms and plan a maintenance demonstration to include an exhaustive evaluation of failure diagnostics prior to the start of the operational test of the Link 16 Concurrent Multi-Net Reception capability.
  2. Adopt a Design of Experiments approach to the test strategies and include a reliability growth analysis/plan as TEMP revisions occur for future MIDS JTRS capability increments. Conduct a thorough review of the manufacturing process of the terminal with new capabilities to verify the new production-representative terminals will be stable during operational testing.