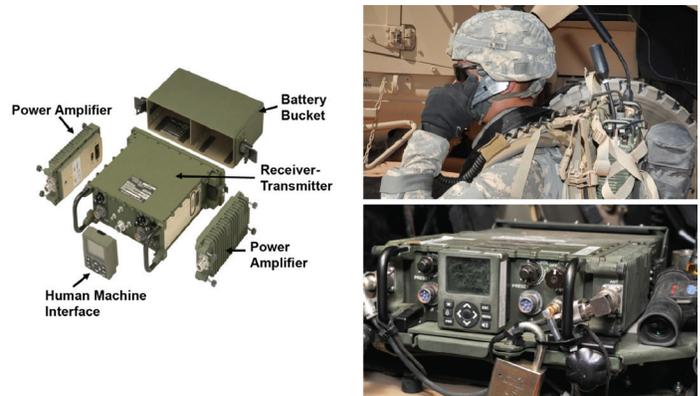


# Joint Tactical Radio System (JTRS) Handheld, Manpack, and Small Form Fit (HMS) Manpack Radio

## Executive Summary

- In May 2011, the Defense Acquisition Executive (DAE) approved a Milestone C Low-Rate Initial Production (LRIP) decision of 100 Manpack radios.
- In June 2011, the Army conducted a Manpack Limited User Test (LUT) as a part of its 2011 Network Integration Evaluation (NIE) 11.2. The Manpack radio demonstrated poor reliability, transmission range, and voice quality that restricted the unit's ability to accomplish its mission. These same problems were observed during previous developmental testing.
- In May 2012, the Deputy Assistant Secretary of Defense, Developmental Test and Evaluation (DASD DT&E) published a Manpack Assessment of Operational Test Readiness (AOTR) that stated the radio was not sufficiently mature to enter the planned Manpack Multi-Service Operational Test and Evaluation (MOT&E). DASD DT&E recommended that the Manpack radio not proceed to MOT&E to allow for corrective actions and additional developmental testing.
- In May 2012, the Army Test and Evaluation Command (ATEC) conducted the Manpack radio MOT&E as a part of its NIE 12.2. DOT&E assessed the Manpack radio as not operationally effective due to the poor performance of the Single Channel Ground and Airborne Radio System (SINCGARS) waveform and not operationally suitable due to a failure to meet reliability or availability requirements. The Manpack radio AOTR had outlined these major MOT&E deficiencies prior to operational test.
- In September 2012, the Army conducted a Government Development Test (GDT) 3 to demonstrate improvements in MOT&E deficiencies to support a planned 1QFY13 second LRIP decision.
- In October 2012, the DAE approved a second LRIP decision for 3,726 Manpack radios.
- The Joint Tactical Radio System (JTRS) Handheld, Manpack, and Small Form Fit (HMS) program is schedule-driven and has reduced developmental testing to support an aggressive operational test schedule. Operational testing continues to reveal problems that developmental testing should have identified and fixed.
- The Army continues preparation for a future Manpack radio MOT&E-2, which will include competition of Program of Record and alternate vendors.



- increased interoperability, flexibility, and adaptability to support numerous tactical communications requirements.
- The JTRS HMS program provides handheld and two-channel Manpack radios supporting Army, Marine Corps, Navy, and Air Force operations. The program develops Small Form Fit (SFF) radio configurations that include the stand-alone Army Rifleman Radio and embedded SFF variants that serve in Army host platforms such as the SFF-B (Shadow Unmanned Aerial Vehicle), SFF-B (V)1 (Nett Warrior), and the SFF-D (Small Unmanned Ground Vehicle).
- The program strategy has two phases of HMS production. The JTRS HMS program developed the Rifleman Radio as part of its Phase 1 effort to provide software programmable radios with National Security Agency (NSA) Type 2 encryption of unclassified information that could operate a networking waveform. Phase 2 consists of developing the Manpack radio to provide software programmable radios with NSA Type 1 encryption of classified information.
- The Manpack radio is a two-channel radio with military GPS that:
  - Is capable of operating at various transmission frequencies using the Soldier Radio Waveform (SRW), the SINCGARS waveform, and current military satellite communications waveforms. The JTRS HMS program intends to host the Mobile User Objective Satellite waveform on the Manpack radio as an objective capability.
  - Operates up to 20 watts at maximum power output.
  - Allows Soldiers to participate in doctrinal networks and transmit Position Location Information.

## System

- JTRS is a family of software-programmable and hardware-configurable digital radios intended to provide

## Mission

Commanders from the Army, Marine Corps, Navy, and Air Force use Manpack radios to:

- Communicate and create networks to exchange voice, video, and data using legacy waveforms or the SRW during all aspects of military operations.
- Integrate JTRS SFF variants into host platforms to provide networked communications capabilities for users engaged

in land combat operations to support voice, video, and data across the air, land, and sea battlespace.

## Major Contractor

General Dynamics, C4 Systems – Scottsdale, Arizona

## Activity

- The Army conducted four developmental tests of the Manpack radio:
  - Manpack Customer Test, conducted at Fort Benning, Georgia, February 7 – 11, 2011.
  - Manpack GDT, conducted at the Electronic Proving Ground (EPG), Fort Huachuca, Arizona, April 15 – 22, 2011 (originally planned for 45 days).
  - Manpack GDT 2, conducted at the EPG, Fort Huachuca, Arizona, March 2 – 30, 2012.
  - Manpack GDT 3, conducted at the EPG, Fort Huachuca, Arizona, September 19 through October 3, 2012.
- In May 2011, the DAE approved a Milestone C LRIP decision to procure 100 Manpack radios of a total acquisition objective of 71,814 radios. The Manpack radio LRIP is intended to support future developmental and operational tests.
- In June 2011, the Army conducted the Manpack LUT as part of its NIE 11.2 at White Sands Missile Range, New Mexico. The Army used the LUT to assess the performance of the Manpack radio under numerous mission scenarios executed by a cavalry troop.
- In March 2012, the program conducted GDT 2 to assess the Manpack radio and verify fixes of deficiencies highlighted during the 2011 LUT.
- In May 2012, ATEC conducted the Manpack radio MOT&E as part of the Army's NIE 12.2 at White Sands Missile Range, New Mexico. ATEC tested the Manpack radio under various missions conducted by a motorized infantry company. Soldiers used the Joint Enterprise Network Manager to plan, load, and monitor the Manpack radio waveforms. The test was conducted in accordance with a DOT&E-approved test plan.
- The Army conducted a Manpack radio GDT 3, from September through October 2012. The test was intended to verify fixes to reliability and performance deficiencies found during the MOT&E and GDT 2.
- On October 11, 2012, the DAE approved a second LRIP for an additional 3,726 Manpack radios to increase the total LRIP procurement to 5 percent of the total acquisition objective.
- The Army is developing a JTRS HMS Manpack Radio Acquisition Strategy Report and Test and Evaluation Master Plan. These documents are required for future developmental and operational testing.

## Assessment

- The Army reduced the first Manpack GDT (April 2011) from a scheduled 45 days to 8 days in order to place radios into the NIE 11.2 Manpack LUT.
- Both the Manpack Customer Test and GDT highlighted deficiencies in performance and poor reliability. The Army determined that the Manpack radio's SINCGARS waveform was not ready for test and therefore did not test it during the shortened GDT.
- During the NIE 11.2 Manpack LUT, the radio demonstrated the following:
  - Ability to transmit and receive on two channels
  - Ability to distribute Position Location Information throughout the network
  - Poor reliability
  - Poor transmission range performance of the SRW and SINCGARS waveforms that constricted the operational area of the cavalry troop
  - Inconsistent voice quality
  - SINCGARS waveform did not support unit operations and was immature for operational test
- The NIE 11.2 Manpack LUT reliability data collection was not adequate and not conducted in accordance with the DOT&E-approved test plan.
- The Manpack radio in GDT 2 demonstrated improved performance of the SRW, but the performance of the SINCGARS waveform and reliability were poor.
- In May 2012, DASD DT&E published a Manpack radio AOTR that stated the radio was not sufficiently mature to enter the planned MOT&E due to developmental test deficiencies that included poor reliability and an immature SINCGARS waveform. DASD DT&E recommended that the Manpack radio not proceed to MOT&E to allow for corrective actions and more developmental testing.
- Based on the NIE 12.2 Manpack radio MOT&E, DOT&E made the following assessment:
  - Not operationally effective due to the poor voice quality and limited range of the SINCGARS waveform compared to legacy SINCGARS radios. Since the SINCGARS performance was poor, the company leadership resorted to using satellite-based chat communications of the Blue Force Tracker.

- The SRW performance was good and the Soldiers were able to employ the Manpack radio for intra-company voice and data communications.
- Not operationally suitable due to a failure to meet reliability and availability thresholds.
- No waveform met the Army's reliability requirement. The SRW was the most used waveform and demonstrated a reliability of 163 hours Mean Time Between Essential Function Failure (MTBEFF) compared to the radio's revised requirement of 477 hours. This translates to a 63 percent chance of completing a 72-hour mission compared to a requirement of 86 percent.
- No waveform met the availability requirement. The SRW achieved an operational availability of 0.86 compared to a 0.96 requirement.
- The radio's design allowed Soldiers to accidentally zero the Manpack radio. This action erases all radio presets and communications security, and requires 20 – 25 minutes to restore the Manpack radio to operation.
- The Army's integration of the radios into Mine Resistant Ambush Protected vehicles was poor and reduced the radio's performance. The program did not test vehicle integration in developmental testing prior to the MOT&E.
- During GDT 3, the Manpack radio demonstrated:
  - Improved performance of the SINCGARS waveform that met requirements of mounted and dismounted transmission range, voice quality, and call completion rates under benign conditions of developmental test.
  - Poor reliability with the SRW waveform demonstrating 177 hours MTBEFF compared to the Manpack requirement of 477 hours. This translates to a 66 percent chance of completing a 72-hour mission compared to a requirement of 86 percent.
- The Army continues preparation for a future Manpack radio MOT&E-2, which will include competition of Program of Record and alternate vendors.
- The JTRS HMS program is schedule-driven and has reduced time for developmental testing to support an aggressive operational test schedule.

## Recommendations

- Status of Previous Recommendations. The JTRS HMS program did not address the previous recommendations to perform adequate developmental testing prior to operational testing and to complete necessary documentation to support developmental and operational testing.
- FY12 Recommendations. The Army should:
  1. Ensure that adequate developmental testing is performed prior to future operational tests.
  2. Correct any JTRS HMS deficiencies noted at the May 2012 Manpack radio MOT&E prior to the scheduled MOT&E-2.
  3. Perform a holistic reliability growth analysis to rigorously assess Manpack radio maturity and to provide the information needed to develop a detailed plan for achieving required reliability.
  4. Complete necessary Manpack radio documentation to support future developmental and operational testing.

# DOD PROGRAMS