

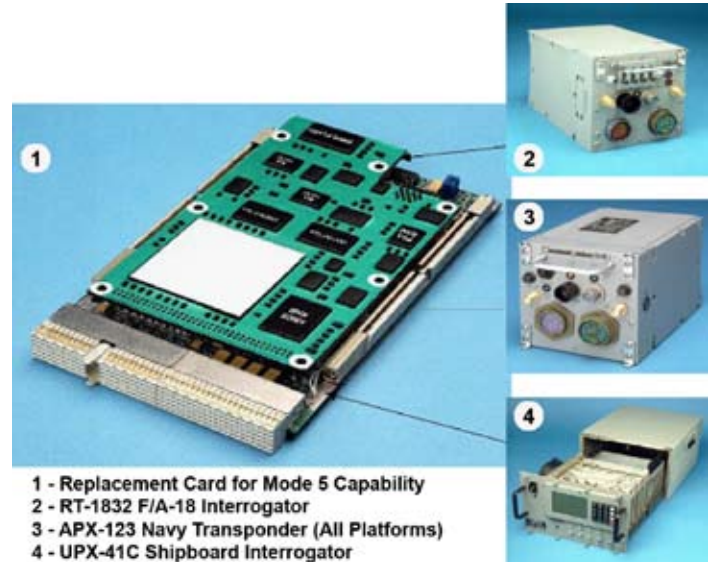
Mark XIIA Identification Friend or Foe (IFF) Mode 5

Executive Summary

- Independent Mode 5 programs exist in each U.S. Military Service as well as some NATO countries. Although not a joint program, the Services are developing equipment capable of employment on multiple Service platforms. Of the four separate Service efforts, the Navy has the only established Acquisition Category level II program, with incorporation of Service-specific Mode 5 capability through platform specific Engineering Change Proposals (ECPs). The Joint Requirements Oversight Council (JROC) validated a joint requirement for Mode 5 Initial Operational Capability (IOC) of 2014 to achieve Full Operational Capability (FOC) by FY20.
- In 2006, the Navy approved a low-rate initial production (LRIP) decision based on the results of a limited operational assessment, but without a DOT&E-approved Test and Evaluation Master Plan (TEMP).
- Although the Mark XIIA Mode 5 systems are being designed and built to comply with NATO and DoD Identification Friend or Foe (IFF) standards, DOT&E established oversight because of the concern that the multiple programs and vendors add risk to achieving joint interoperability.
- The Navy is planning to lead an IOT&E of Mode 5 capability in FY09 to include significant U.S. joint and allied participation. Successful planning and execution of this IOT&E should resolve DOT&E concerns about the lack of a coherent Mode 5 acquisition and test strategy, joint interoperability, and prevention of fratricide.

System

- The Mark XIIA IFF Mode 5 is a cooperative identification system that uses interrogators and transponders located on host platforms to send, receive, and process friendly identification data.
- Mode 5 is a military-only identification mode, which modifies the existing Mark XII system and addresses known shortcomings of Mode 4. Mode 5 will eventually replace Mode 4 and allows National Security Agency (NSA) certified secure encryption of interrogations and replies. Primary features include:
 - A lethal interrogation format, which is used by a “shooter” prior to weapons release as a final attempt to get a Mode



- 5 reply from the target even with his Mode 5 system in standby; this is intended to reduce fratricide
- A random-reply-delay, which prevents distorted replies from closely spaced platforms
- Mode 5 offers more modern signal processing, compatibility with legacy Mode 4 IFF systems and civilian air traffic control, and secure data exchange through the new waveform.
- Mode 5 serves as a component of a combat identification process used on ground-based systems such as Patriot, sea-based systems such as Aegis-equipped ships, and military aircraft to include the E-3 Airborne Warning and Control System and E-2 Hawkeye.

Mission

The combatant commander employs the Mode 5 to provide positive, secure, line-of-sight identification of friendly platforms equipped with an IFF transponder. In the future, this system's information will be combined with other cooperative and non-cooperative combat identification techniques in order to provide identification of all platforms – enemy, neutral, and friendly.

Activity

- The Navy's 2006 LRIP decision was for Mode 5 equipment intended for Navy platforms and represented 8 percent of the total Navy procurement. For efficiency and savings, the Army utilized the Navy contract to procure nearly one-third of the Army's Aviation Mode 5 equipment. Individual Army

- aviation platform managers are responsible for the integration of Navy supplied Mode 5 equipments into their platforms.
- The Army is developing a Mode 5 Air Defense Interrogator (Lethal Only) for use in the Patriot system.

NAVY PROGRAMS

- The Air Force Operational Test and Evaluation Center (AFOTEC) intends to test the integration of Mode 5 on the F-15 in mid-FY08.
- Under the OSD-sponsored International Cooperation Initiative for Coalition Warfare, the Navy Mode 5 program office conducted developmental flight tests of Mode 5 with Italian production representative Mode 5 capability. Expanded Cooperative Warfare Program (CWP) trials involving Mode 5 capability integrated into U.S. and allied aircraft will occur over the next several years.
- The Navy is currently developing a strategy for the conduct of an operationally realistic IOT&E of Mode 5 capability that will involve the use of interrogator and transponder-equipped joint Service aircraft of a variety of types using representative flight profiles.
- The Navy submitted, and DOT&E approved, a revised TEMP that will insure that Mode 5 is assessed in an operationally realistic environment that includes, in addition to Navy ship and aircraft platforms, a variety of Army and Air Force systems equipped with Mode 5 capability.
- OSD/AT&L and DOT&E are working with the Services to develop a Joint Acquisition and Test Strategy (JATS) and a Joint Operational Test Approach (JOTA) for Mode 5 across the DoD.

Assessment

- Although Mode 5 demonstrated good potential to be a significant improvement versus the existing Mode 4, the limitations to scope of testing prevented an adequate operational assessment.
- The Mode 5 equipment used in the operational assessment did not meet all the NATO or U.S. standards, increasing the risk that, without corrective actions, Navy Mode 5 equipment may

not be interoperable with other Service or allied developed equipment.

- The Navy operational assessment was not adequate to support the Army's Mode 5 procurement.
- Integration of Mode 5 capability with Army aircraft and the Aegis Combat System was outside the scope of the Navy operational assessment and was therefore not evaluated.
- Ongoing Mode 5 development, integration, and test activities across the Services, although still lacking an overall integration strategy, are increasingly coming together with the Navy taking the lead in developing a TEMP for an IOT&E of Mode 5 capability.
- The JATS and JOTA efforts (as well as the CWP) should help to insure that Mode 5 development, integration, and joint test and evaluation get the proper level of joint coordination and oversight across U.S. and allied Services.

Recommendations

- Status of Previous Recommendations. In order to ensure interoperability between interrogators, transponders, and combined interrogator-transponders, the Service program managers must continue to integrate their test schedules and look for opportunities to test in a joint environment. The Services should also jointly develop a capstone TEMP (FY05). The FY06 recommendations have been adequately addressed by DoD.
- FY07 Recommendations.
 1. All Services should fully participate in the JATS/JOTA process to insure that Mode 5 capabilities are tested in a realistic joint Service environment.
 2. The Navy should continue to refine its IOT&E strategy to support its Mode 5 full-rate production decision.