Operational Testing of New Field Artillery Systems

by LTC(P) B. H. Ellis and LTC R. F. Bell

From January 1982 to April 1983, four new field artillery systems—The Battery Computer System (BCS), the fire support team vehicle (FISTV), the Multiple Launch Rocket System (MLRS), and Pershing II (PII)—have or will be undergoing operational testing (OT). Operational testing provides data to estimate the operational effectiveness and suitability of new weapons systems to support the Materiel Acquisition Process (MAP). The agency responsible for all Army operational testing is the US Army Operational Test and Evaluation Agency (OTEA). With this unusually large amount of operational testing of FA Systems in a relatively short period, it is important that field artillerymen be informed about operational testing in general, OTEA, and the operational test for BCS, FISTV, MLRS and PII.

Operational testing

The Army, of course, does not want to field weapons systems that may be technically functional, but not capable of operation by soldiers in peacetime or combat environments. The best way to preclude such a situation is to test new weapons systems operated by typical user operators, crews, or units in as realistic an operational environment as possible. This is operational testing.

Operational testing supports the Army's materiel acquisition process by providing information to assist decision makers at the major decision milestones during the acquisition process. Issues to be resolved by operational testing are provided to the testers by the combat developer, US Army Training and Doctrine Command (TRADOC). Based on OT issues and a weapons system's required operational capability, an independent evaluation plan is developed. From the evaluation plan, a test is designed to obtain data on system performance in a realistic operational environment. Operational tests are normally conducted in at least three phases:

•A phase to evaluate training.

•A phase to ascertain that correct data collection procedures and organization have been established.

•A field exercise phase—the heart of any operational test—in which the majority of the data is collected.

After the test is completed, a test report is written by the field testers that states the factual results of the test but draws no conclusions. Using data from the test report and from many other sources available on the tested system, the evaluator writes an Independent Evaluation Report (IER) that presents his conclusions to the acquisition decision-making body on the system's performance during the test. If all of the operational test issues are not resolved during a test due to limitations of tested item, the test support package, or the test conduct, then further testing on the new system may be recommended.

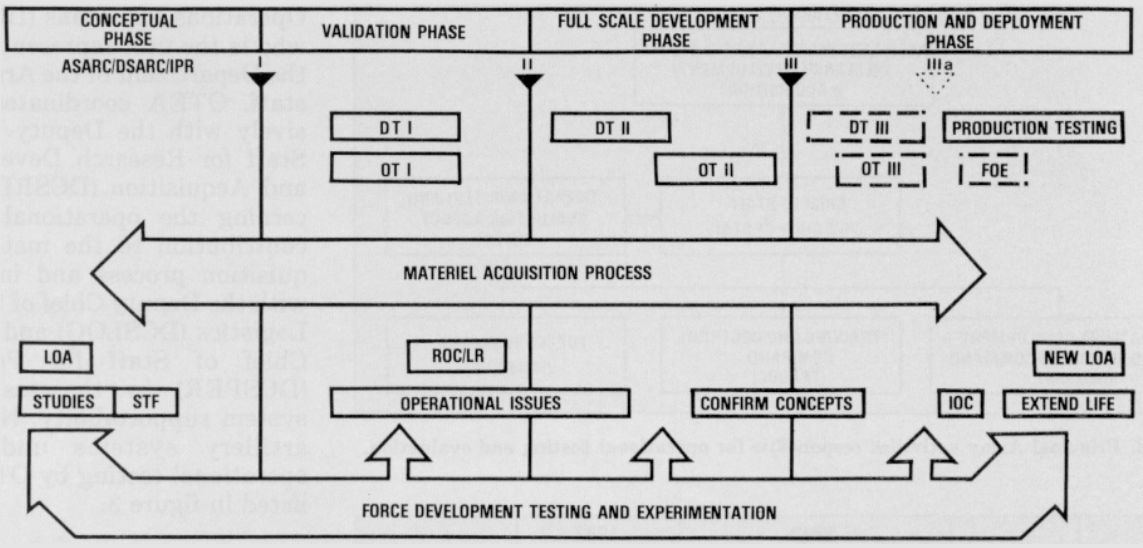
Operational tests are designated OT I, OT II, OT III or Follow-on Evaluation (FOE) according to how they support specific decision milestones, as shown in figure 1.

OT I is conducted during the demonstration and validation phase of early prototype systems to provide an indication of system potential, identify early operational problems, assist in planning later OTs, and gain insights.

OT II is usually the most intensive and important operational test, with the results directly influencing what is perhaps the single most important checkpoint in the acquisition process—Milestone III. This decision review must decide whether or not to enter the system into production and deployment. If significant deficiencies exist in either the hardware or the system support package, the decision may be made to correct the deficiencies and conduct a re-test at OT IIA. However, if the decision at Milestone III is to move ahead to a production and deployment decision, several options are available, such as:

•To go into full production with no further testing.

•To conduct follow-on testing on the production items. This would then require that follow-on evaluation be conducted.



ASARC .....ARMY SYSTEMS ACQUISITION REVIEW COUNCIL
DSARC .....DEFENSE SYSTEMS ACQUISITION REVIEW COUNCIL
DT .....DEVELOPMENT TESTING
FOE.....FOLLOW ON EVALUATION (AS REQUIRED)
IPR.....IN-PROCESS REVIEW
IOC.....INITIAL OPERATIONAL CAPABILITY FDTE
LOA ..... LETTER OF AGREEMENT
LR..... LETTER REQUIREMENT
OT..... OPERATIONAL TESTING
ROC..... REQUIRED OPERATIONAL CAPABILITY
STF..... SPECIAL TASK FORCE

Figure 1. Materiel Acquisition Process (MAP).

In unusual circumstances, the decision may be for limited production items and conduct of an OT III. If operational issues remain unanswered after a production decision, the decision review may direct that the operational tester conduct an OT III or FOE, as appropriate. An OT III or FOE, which is conducted on production line items, addresses any unresolved issues and provides information not gained in an earlier OT.

New materiel systems requiring operational testing are designated either as major or non-major. Major systems, such as the Pershing II and MLRS, are intensively managed at DA or DOD level and hence require action by an Army Systems Acquisition Review Council (ASARC)/Defense Systems Acquisition Review Council (DSARC). Major systems, as a minimum, include those systems which involve over $200 million in research, development, test, and evaluation (RDT&E) funds or over $1 billion in procurement funds. The US Army Test and Evaluation Agency (OTEA) is responsible for operational testing of all major systems.

Systems which do not meet the requirements for designation as major are designated non-major systems and divided into four categories for operational test management. Category 1 non-major systems, such as FISTV, are systems which have high level interest and, therefore, are intensively managed by OTEA. These systems normally have RDT&E costs of less than $150 million or procurement costs of less than $600 million. OTEA also conducts operational testing for Category 1 non-major systems.

Operational testing for Categories 2, 3, and 4 non-major systems is conducted by other designated operational testers, such as the US Army Training and Doctrine Command's (TRADOC) Field Artillery Board. An example of these systems would be the M110A2 Crew Ballistic Shield and Field Artillery Ammunition Support Vehicle (FAASV). Although OTEA does not conduct the OT for Categories 2, 3, and 4 non-major systems, OTEA actively monitors these systems. Force development testing and experimentation (FDTE) is conducted primarily by the combat developer to evaluate new concepts of tactics, doctrine, organization, and materiel. Major FDTEs are tests which have the potential to impact significantly on doctrine, organization, or tactics of the Army and therefore become subject to intensive management by OTEA.

OTEA

The US Army Operational Test and Evaluation Agency was organized in September 1972 when the Secretary of Defense directed that all services form independent operational test and evaluation organizations.

The mission of OTEA is to support the Army's materiel acquisition and force development processes by exercising responsibility for all operational testing, FDTE, and joint user testing for the Army.

The US Army Test and Evaluation Agency, located in Falls Church, VA, is the Army's primary field operational testing and evaluation agency (figure 2). The commander reports to the Army Chief of Staff through the Vice Chief of Staff. OTEA has a close working relationship with

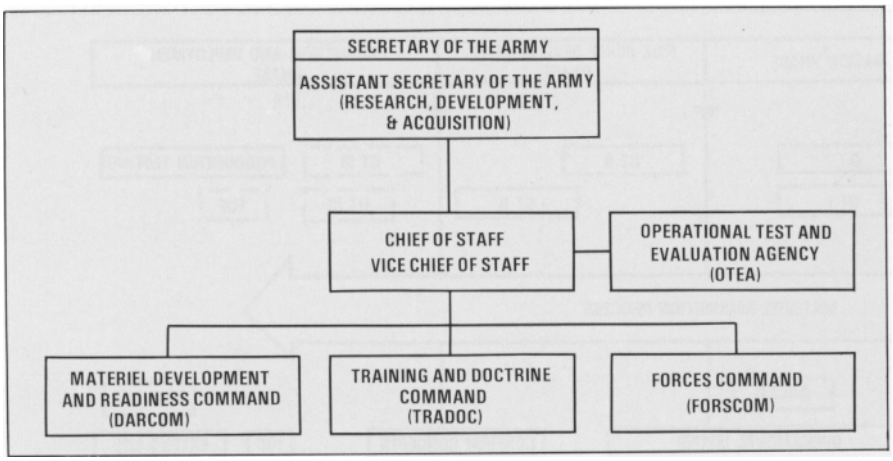


Figure 2. Principal Army activities responsible for operational testing and evaluation.

System	Category	1982 J F M A M J J A S O N D	1983 J F M A M J	Location
BCS	C1	FOE		Fort Hood, TX
Pershing II	Major	OA		Orlando, FL
FISTV	C1	OT II		Fort Sill, OK
MLRS	Major	OT III		Fort Bliss, TX
Pershing II	Major		OT III	Fort Sill, OK

Figure 3. The 1982-83 operational test schedule for new field artillery systems.

the Deputy Chief of Staff for Operations and Plans (DCSOPS), who is the user representative on the Department of the Army (DA) staff. OTEA coordinates extensively with the Deputy Chief of Staff for Research Development and Acquisition (DCSRDA) concerning the operational testers contribution to the materiel acquisition process and interfaces with the Deputy Chief of Staff for Logistics (DCSLOG) and Deputy Chief of Staff for Personnel (DCSPER) in the testing of system supportability. New field artillery systems undergoing operational testing by OTEA are listed in figure 3.

Battery Computer System

The Battery Computer System (BCS) (figure 4) is required by the Field Artillery for two applications. First, it is intended to replace the M18 Field Artillery Digital Computer (FADAC) both at cannon battery level and in

Figure 4. Battery Computer System.

units not planned to be equipped with TACFIRE. Second, the BCS is also intended to replace the Battery Display Units (BDU) in TACFIRE to satisfy artillery requirements for independent battery operations, individual gun corrections, and direct battery to fire support team (FIST) and forward observer (FO) data links.

The BCS is planned to be used with the Battery Computer Unit mounted in the current M561 Gamma Goat or the M577 command post vehicle. The BCS is expected to interoperate with TACFIRE, the Meteorological Data System (MDS), FIST Digital Message Device (DMD), and Firefinder.

The BCS Follow-on Evaluation (FOE) was conducted at Fort Hood, TX, during January to March 1982, by elements of the 1st Cavalry (1-21st FA and 1-82d FA) and 101st Airborne (B/2-230th FA) Division Artilleries. The purpose of the FOE was to provide data and associated analysis on the operational effectiveness and suitability of the system. The BCS met all test objectives and was recommended for further production. The production decision was made in May 1982 to furnish enough BCSs to outfit the entire Army.

Pershing II

The Pershing II (figure 5) is a two-stage, solid-propellant, surface-to-surface weapon capable of engaging targets with an air burst/surface burst nuclear warhead. The Pershing II missiles consist of a reentry vehicle and two new propulsion sections. The additional propulsion section (second stage) provides additional range. A Pershing Ib will consist of the new reentry vehicle and only the first stage propulsion section. The PII forward area ground support equipment, which provides command and control to the firing platoons and the equipment required to launch a missile, consists of the following: a modified Pershing Ia erector-launcher, a M.A.N. 10-ton tractor/crane, a platoon control central, and a reference scene generation facility.

A Pershing II Operational Assessment (PII OA) was conducted at Orlando, FL, during July and August 1982. Troop support for this test was provided by the 3d Battalion (Pershing) 9th Field Artillery, from Fort Sill, OK. The purpose of the Operational Assessment was to provide information early in the development cycle on the operational effectiveness and suitability of the Pershing II system to support an October 1982 ASARC II. Reports for this test are presently being prepared for presentation to the Army Systems Acquisition Review Council. An operational assessment normally is not used as a method for the field testing of a system; however, the decision was made to examine selected operational criteria in order to have an earlier look at the system. An Operational Test III is scheduled for the March to April 1983 time frame. Testing during OT III will be conducted at Fort Sill, OK, and troop support will once again be provided by the 3-9th FA. OTEA will also monitor missile findings conducted during development tests.

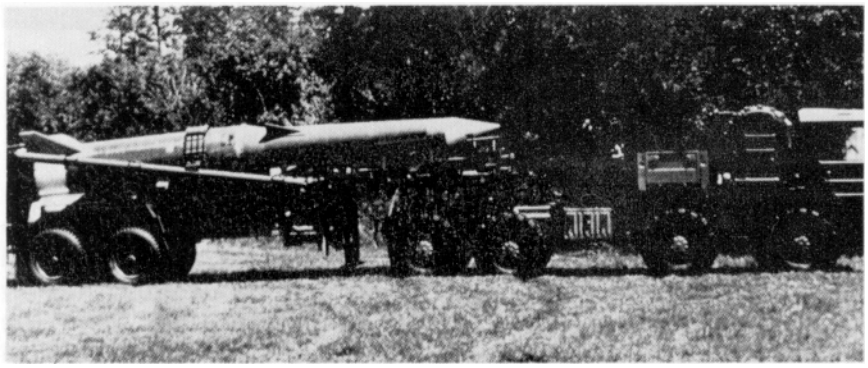


Figure 5. Pershing II.

Fire support team vehicle

The XM981 fire support team vehicle (FISTV) is a standard M113A2 armored personnel carrier which utilizes external fuel tanks and a modified M901 improved TOW vehicle (ITV) weapon station. The ITV weapon station has been modified to place the Ground/Vehicular Laser Locator Designator (G/VLLD), TOW night sight (AN/TAS-4) and a North Seeking Gyrocompass (NSG) under armor (figure 6).

The FISTV is intended to fulfill a need for a system that will allow the fire support team (FIST) to be compatible in mobility and protection with the mechanized infantry, armor, and armored cavalry units being supported.

Operational Test II for the FISTV will be conducted in three phases at Fort Sill, OK, during the period 15 September to 10 December 1982.

Phase I will be concerned with individual and collective training. Phase II will be a pilot test, designed to test and refine plans for data collection and scenario control. Phase III will be a series of field exercises to evaluate the operational effectiveness and suitability of the FISTV system.

Major troop support elements for this test will be provided by FORSCOM and TRADOC (Fort Sill). A production decision will be made for this system in March 1983.

Multiple Launch Rocket System

The Multiple Launch Rocket System (MLRS) is designed to supplement cannon artillery weapons available to US division and corps commanders for the delivery of large quantities of firepower in a very short time against critical, time sensitive targets. The MLRS (figure 7) includes four major elements:

- Self-propelled launcher/loader.
- Launch pod/container.
- Resupply vehicle and resupply trailer.
- Command, control, and communications system. The command, control, and communication system associated with the

MLRS consists of the on-board fire control system, a digital message device, and the fire direction system in MLRS battery and battalion fire direction centers.

Operational Test III (OT III) for the MLRS is being conducted in four phases:

•Phase I addresses individual and collective training. The individual training portion of Phase I was accomplished at Fort Sill, OK, during April and May 1982. The collective training portion of Phase I will be accomplished in early October 1982.

•Phase II will be a pilot test to evaluate and refine the plans for data collection and scenario control.

•Phase III will be two 12-day field exercises in which the MLRS unit will conduct tactical operations in a free maneuver environment, to include live and non-live fire missions and resupply operations. This phase is designed to provide data and associated analysis of the operational effectiveness and suitability of the MLRS.

•Phase IV will be a combined Development Test/Operational Test firing of a select number of MLRS rockets.

MLRS accuracy and target effects data will be collected during phases III and IV by the Test and Evaluation Command (TECOM) and OTEA for evaluation.

During OT III, the Army's Initial Operational Capability (IOC) unit, designated as D battery, 3d Battalion, 6th Field Artillery, will be used. This unit was formed and trained at Fort Riley, KS. Additional operational, logistical, and administrative support will be provided by elements of the 2d Battalion, 18th Field Artillery, and the Field Artillery Training Center at Fort Sill, OK. The MLRS OT III will also take on an international flavor in that the US battery will be augmented with a West German and a United Kingdom crew. The MLRS ASARC is scheduled for February 1983.

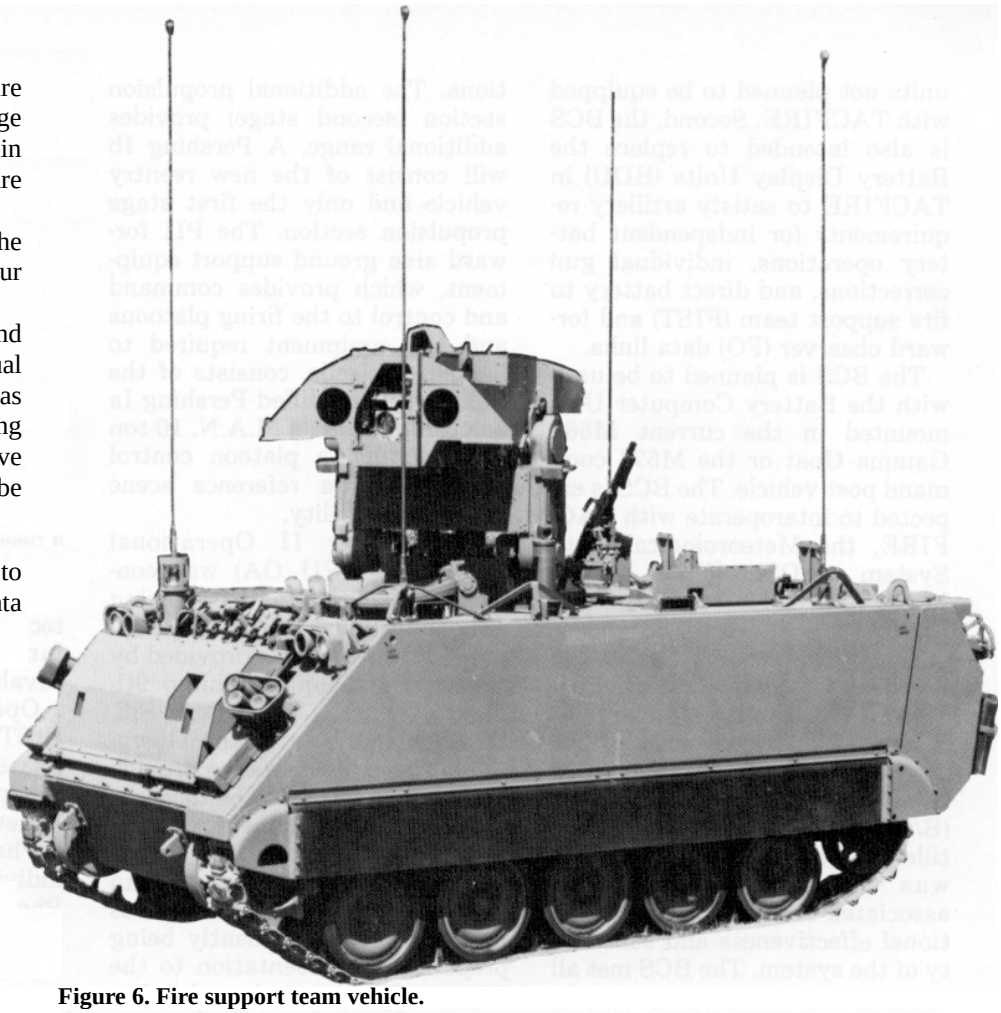


Figure 6. Fire support team vehicle.

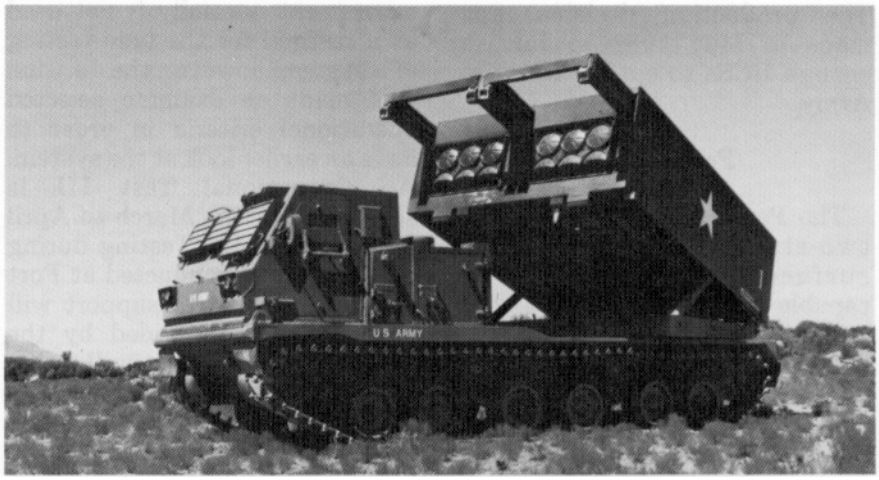


Figure 7. Multiple Launch Rocket System.

Summary

The four new field artillery systems undergoing operational testing in 1982 and 1983 will add significant firepower capability to the US Army. OTEA is proud to support this effort to get the best equipment possible in the hands of our fine soldiers.

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