GAO

Briefing Report to Congressional Requesters

March 1987

TESTING OVERSIGHT

Operational Test and Evaluation Oversight: Improving but More is Needed

GAO/NSIAD-87-108BR

GAO

United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

B-217950

March 18, 1987

The Honorable David H. Pryor
United States Senate

The Honorable Charles E. Grassley
United States Senate

The Honorable Denny Smith
House of Representatives

The Honorable Mel Levine
House of Representatives

In your requests of June 26, 1986, concern was expressed about operational test and evaluation (OT&E) in the Department of Defense (DOD). As agreed during subsequent discussions with Congressman Smith's staff, we reviewed the activities of the Office of the Director of Operational Test and Evaluation (DOT&E). This letter summarizes our review and the appendixes discuss it in more detail.

The Congress, concerned that OT&E was not receiving the emphasis and independent oversight needed to ensure that weapon systems were ready for production, established the Director of OT&E in the DOD. (See Public Law 98-94, dated September 24, 1983, as amended.) In 1984 DOD established DOT&E within the Office of the Secretary of Defense. The Director is a civilian and principal adviser to the Secretary of Defense on OT&E matters and reports to the Congress on the adequacy of the operational testing done and whether weapon systems are operationally effective and suitable for combat.

Our review showed that DOT&E has made contributions to OT&E activities, especially in the test planning area. The office has been responsible for improvements in Test and Evaluation Master Plans (TEMPs) and detailed operational test plans. DOT&E has also participated in revising DOD Directive 5000.3, entitled Test and Evaluation, and its supplemental TEMP guidelines. However, we believe several areas need attention to improve DOT&E's effectiveness in carrying out its oversight activities. Specifically:

-- DOT&E appears to be making only limited numbers of actual on-site observations of operational tests.

-- DOT&E's analysis of operational tests is primarily based on military service test reports with little assessment of actual test results.

-- DOT&E has not provided policy and procedural guidance or maintained reliable records on some of its principal activities.

DOT&E officials acknowledged that these problems need additional emphasis and attributed them partly to a lack of staff. The Director estimates that 40 professional staff members are needed to adequately perform DOT&E functions. The office currently has 16 professional staff members.

* * * * *

As requested we did not obtain official agency comments. However, we discussed the matters presented in this briefing report with DOT&E officials on March 10, 1987, and considered their comments. DOT&E officials generally agreed with the information contained in this report.

Copies of this briefing report are being sent to the Secretary of Defense. We will also make copies available to others upon request.

If you need additional information, please contact me on 275-4587.

Michael E. Motley
Associate Director

Contents

ABBREVIATIONS

COMOPTEVFOR	Commander, Operational Test and Evaluation Force
DOD	Department of Defense
DOT&E	Director, Operational Test and Evaluation
DT&E	development test and evaluation
OT&E	operational test and evaluation
TEMP	Test and Evaluation Master Plan

TEST AND EVALUATION

DOD policy on the acquisition and testing of major weapon systems is stated in DOD Directive 5000.1, Major System Acquisitions; DOD Instruction 5000.2, Major System Acquisition Procedures; and DOD Directive 5000.3, Test and Evaluation. These documents emphasize the need for the successful accomplishment of test and evaluation as important support for moving a weapon system from one acquisition phase to another. Test and evaluation is a key determinant for committing resources to these programs.

TYPES OF TESTING DONE BY DOD

DOD does two types of test and evaluation--development test and evaluation (DT&E) and OT&E. DT&E is part of the engineering design and development process. It verifies that technical performance specifications and objectives can be met by the weapon system under development. OT&E is intended to estimate a system's operational effectiveness and suitability in its intended environment when operated, maintained, and supported by personnel having the same qualifications as those who would operate the system in the field.

Separation of development and operational testing

DT&E and OT&E serve different purposes for the following reasons.

-- Operational testing is performed in an operational environment with all the rigorous conditions that exist there, for example, weather and terrain. Further, operational testing is carried out against a simulated enemy who is doing everything possible to control the situation.

-- Operational testing addresses the total system, not a component or "black box." An illustration would be a development test of a missile only versus an operational test of a missile system, which would include the missile, firing platform, targeting system, and logistics support system. Further, an operational test would integrate all components and subsystems in addressing effectiveness and suitability.

-- In development testing, one knows with precision what particular parameter is to be measured, for example, launch velocity. Development tests are structured to

hold many things constant, isolate others, and allow measurement of those being tested. In operational testing, the importance of parameters is secondary to creating combat conditions as closely as possible to a real conflict.

-- People participating in development testing are primarily technical. In operational testing, participants should definitely not be technical but rather operational with experience in using a weapon system. Further, program advocates are responsible for the performance of development testing, while independent military service organizations, separate from the developer and user, are responsible for doing OT&E.

Value of OT&E

Because OT&E is the primary means of assessing a weapon system's operational performance, its results are important in making key decisions in the acquisition process, especially the decision to proceed beyond full-scale development. OT&E results provide information on how well new systems work and can be invaluable in identifying ineffective or unreliable systems before they are produced.

Starting production before adequate OT&E is completed has some risks. If adequate OT&E is not done and the weapon system does not perform satisfactorily in the field, significant changes may be required. Moreover, the changes may have to be applied to items already produced and deployed. In extreme situations, DOD also risks deploying systems that cannot adequately perform significant portions of their missions, and could also endanger the safety of military personnel who operate and maintain them.

A more detailed discussion of OT&E is included in our recent report, Operational Test and Evaluation Can Contribute More to Decisionmaking (GAO/NSIAD-87-57, Dec. 23, 1986).

OFFICE OF DOT&E

The Congress was concerned that OT&E had not been receiving the emphasis and independence needed to ensure that weapon systems are ready for production. Therefore, it established in DOD the Director of OT&E. (See Public Law 98-94, dated September 24, 1983, as amended.) In 1984 DOD placed DOT&E within the Office of the Secretary of Defense. The Director is a civilian who serves as a principal adviser to the Secretary of Defense on OT&E matters. The Director also reports to the Congress on the adequacy of the testing performed and the

desirability of allowing weapon systems beyond low-rate initial production. The Director's responsibilities include the following:

-- Prescribe, by authority of the Secretary of Defense, policies and procedures for conducting OT&E.

-- Provide advice and make recommendations to the Secretary of Defense and issue guidance to and consult with the military departments on OT&E in general and on specific OT&E in connection with a major defense acquisition program.

-- Monitor and review OT&E in DOD.

-- Coordinate operational testing done jointly by more than one military department or defense agency.

-- Analyze the results of OT&E done for each major defense acquisition program and at the conclusion of operational testing, report to the Secretary of Defense and to the Senate and House Committees on Armed Services and on Appropriations:

  -- whether the test and evaluation performed was adequate and

  -- whether the test and evaluation results confirm that the items or components actually tested are effective and suitable for combat.

-- Review and make recommendations to the Secretary of Defense on all budgetary and financial matters relating to OT&E, including operational test facilities and equipment.

DOT&E is organized into three separate Deputy Directorates. (See app. III.) The Deputy for Operations is responsible for monitoring ongoing tests to include (1) providing observers as necessary, (2) preparing assessments for weapon programs scheduled to proceed beyond low-rate initial production, (3) obtaining threat assessments and intelligence information, and (4) overseeing joint OT&E. The Deputy is considered the primary point of contact for the services.

The Deputy for Plans and Programs is responsible for (1) developing and maintaining the DOT&E automated data base, (2) updating the list of all major defense acquisition programs monitored by DOT&E, (3) reviewing and approving TEMPs and

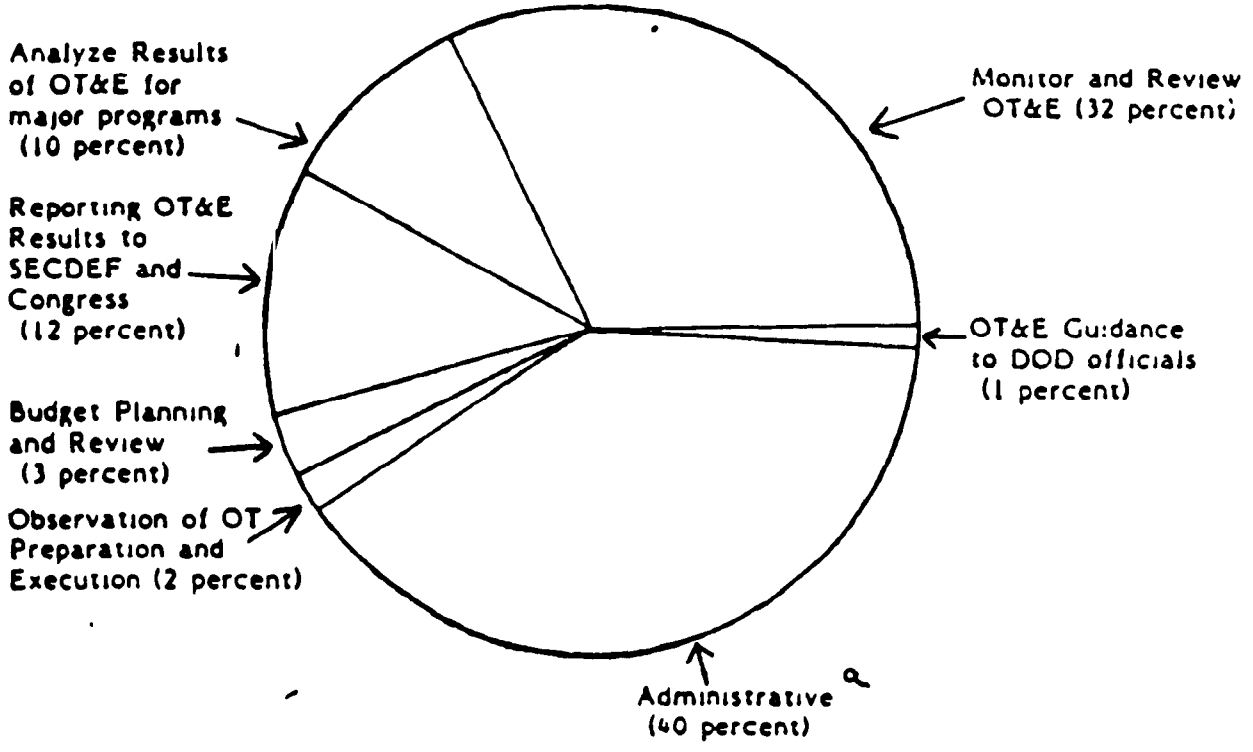
operational test plans, and (4) preparing the Director for participation in weapon system program reviews and other high level meetings.

The Deputy for Policy, Resources and External Affairs is responsible for (1) formulating, maintaining, and interpreting OT&E policy, (2) organizing DOT&E's input to the budget, (3) reviewing OT&E resources, (4) preparing media and congressional reports and correspondence, and (5) developing and maintaining media and congressional relations.

DOT&E has nine action officers, five military and four civilians, to perform the daily oversight responsibilities for individual weapon systems. These responsibilities are to (1) review TEMPs and operational test plans, (2) analyze test requirements, scenarios, and threats, (3) observe operational test preparation and execution, (4) survey test results, (5) prepare reports for systems slated to go beyond low-rate initial production, and (6) brief the Director on systems due to be evaluated for an acquisition milestone decision. Action officers also direct, monitor, and review DOT&E's contractor support activities.

DOT&E has 26 staff positions, 24 of which are currently filled. Of these positions, 18 are professional and the remaining 8 are administrative. In October 1986, DOT&E estimated a need for 40 professional staff members to carry out its assigned responsibilities. Presently, to help carry out the responsibilities, DOT&E supplements the staff by using contractor personnel. DOT&E estimated the professional staff's work activities as shown in figure I.1.

Figure I.1
Estimate of DOT&E's Professional Staff Work Allocation



[a]Administrative activities encompass such things as reviewing acquisition program documentation, participating on boards and committees, developing systems and standards for acquisition and management, responding to the DOD Inspector General and our surveys and reports.

In fiscal year 1986, DOT&E contracted work totaling about $7.2 million with the Institute for Defense Analyses, the BDM Corporation, and Electronic Warfare Associates for technical and analytical support. Some of this assistance has been used to (1) supplement staff in areas where DOT&E does not have in-house expertise, (2) review test plans, (3) analyze test requirements, scenarios, and threats, and (4) analyze service test reports.

DOT&E has oversight responsibility for 155 weapon system programs. However, in October 1986, the Director reduced DOT&E's oversight activities by 99 programs to a current total of 56. The Director also discontinued the oversight of Foreign Weapons Evaluations, North Atlantic Treaty Organization side-by-side operational testing, international OT&E agreements, and joint operational tests. These reductions were attributed to staffing shortages.

DOT&E's Director sees his role as helping to ensure that weapon systems will be able to function properly. The Director does not consider this role as an adversary of the services, but as a member of the DOD team for providing good working systems to the soldier in the field. Therefore, DOT&E prefers to resolve differences with the services on an informal basis.

DOT&E'S CONTRIBUTIONS TO DOD'S OT&E

DOT&E has contributed to the OT&E process, primarily in the area of test planning. DOT&E has helped improve the quality of the operational test portion of TEMPs and the detailed operational test plans. These contributions can be attributed to DOT&E's review process and the issuance of a revised DOD Directive 5000.3, Test and Evaluation, and supplemental TEMP guidelines. DOT&E worked with the Office of the Deputy Under Secretary of Defense for Research and Engineering (Test and Evaluation) in revising the directive.

According to the directive, a TEMP is required for all major acquisition programs. A TEMP's purpose is to define and integrate test objectives, critical issues, systems characteristics, responsibilities, resources, and schedules for test and evaluation. A TEMP is to be approved before the initiation of testing. The Deputy Under Secretary and the Director OT&E jointly approve the overall TEMP.

Consistent with the TEMP, detailed operational test plans should contain specific test elements, such as test objectives; measures of effectiveness; operational scenarios; threat simulations; detailed resources needed; known test limitations;

and methods of data gathering, reduction, and analysis. These plans are to be sufficiently detailed to allow an assessment of the operational realism of the planned tests. DOT&E approves these plans for adequacy.

Review and approval of TEMPs

Military service operational test agency officials said DOT&E's ability to cause changes in planned testing is due to the independence of the office within the DOD structure. They said the services have come to realize that TEMPs and operational test plans will be reviewed and will be approved or disapproved; whereas, in the past, TEMPs were not given priority or emphasis as a management document. We reported on this concern in June 1983.[1] While it has caused improvements to test planning, DOT&E officials agreed that more effort is needed to ensure (1) tests are more realistic, (2) all test limitations are recognized, and (3) the effect of those limitations are identified in the service test reports.

DOT&E officials said that their purpose in reviewing a TEMP is to make these plans produce better test results. Examples of problems noted by DOT&E action officers follow:

-- The Army's Single Channel Ground and Airborne Radio System's TEMP, dated May 22, 1986, had not adequately (1) validated the threat levels before initial operational capability, (2) listed the specific threat test resources available, or (3) identified operational effectiveness thresholds for airborne and ground system tests during jamming and electronic support measures. DOT&E also stated that the Army should include a more detailed plan for multiservice and North Atlantic Treaty Organization interoperability testing.

-- The Navy's draft TEMP for the High Frequency Antijam Program did not contain adequate testing and did not include realistic threat resources. DOT&E stressed that the seven developmental systems proposed to be tested were not a sufficient number to do all tests required up to 1994 when low-rate initial production systems were to be available.

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[1]Better Planning and Management of Threat Simulators and Aerial Targets is Crucial to Effective Weapon Systems Performance (GAO/MASAD-83-27, June 23, 1983, pp. 13-27).

-- The draft TEMP on a Joint Tactical Information Distribution System did not clearly translate the required operational characteristics and OT&E objectives into critical test and evaluation issues with verifiable objectives, appropriate goals, and thresholds. DOT&E also noted that a current threat assessment was not included in the TEMP.

Review and approval of operational test plans

DOT&E reviews and approves service operational test plans to ensure that a realistic test environment is created. DOT&E emphasizes the importance of identifying adequate test resource requirements in service test plans. DOT&E has required revisions to operational test plans to improve the quality of such plans and ensure reliable test results. For example:

-- DOT&E informed the Navy that an operational test plan was inadequate because the weapon system would not be tested against all the countermeasures it may encounter to demonstrate its capabilities. DOT&E's position was that a realistic threat environment will contain more countermeasures against the weapon than were being tested. The Navy is responding to DOT&E concerns.

-- In November 1986, DOT&E told the Air Force that the planned follow-on operational test plan for the Low Altitude Navigation and Targeting Infrared System for Night was inadequate because the planned operational environment was not realistic. DOT&E's written assessment noted that the attack phase of operational testing did not ". . . even minimally . . . reflect the stress of a combat environment with regard to threats." The Air Force is responding to DOT&E's concerns.

-- In January 1987, DOT&E told Navy officials that the test plan for the High Speed Anti-Radiation Missile was ". . . less than adequate." The plan was approved, however, because it was considered to be the best effort that could be done with existing resources. Nonetheless, DOT&E requested the Navy provide a more detailed explanation of the test limitations, especially threat emitters, so DOT&E could better determine the impact of these limitations. The Navy is addressing DOT&E's concerns.

Other DOT&E activities

DOT&E has also had an effect on OT&E in several other areas. Through its annual report, information memoranda highlighting OT&E progress, and other monthly information memoranda, DOT&E has identified major OT&E issues for the Secretary of Defense. DOT&E has also been active in identifying OT&E resource shortfalls. In the fiscal year 1987 budget supplement, for example, DOT&E advocacy resulted in the Secretary of Defense requesting $120 million to improve the services capabilities to perform OT&E.

DOT&E'S OBSERVATIONS OF OPERATIONAL TESTS APPEARS LIMITED

When DOT&E was created in 1983, the law established the office as the evaluator of all of DOD's OT&E. The Director believes that observing tests is important and on-site observation of operational tests is necessary to fully evaluate service test results. However, DOT&E appears to have observed only a limited number of actual operational tests done by the services in the past 2 fiscal years. The Director recognizes the need for more on-site visits and is considering establishing field locations if staffing is increased.

Test observation is important for several reasons. It enables DOT&E to

-- determine if test plans are actually being followed,

-- ensure that the test site is properly set up and structured for the test,

-- ensure that raw test results are being properly collected and recorded,

-- ensure that military service OT&E agencies are controlling the tests and that contractors are not interfering with or influencing test results, and

-- evaluate service test results so that test reports can be evaluated for adequacy.

DOT&E action officers told us that they were often unable to make site visits to observe tests or were not able to witness the full duration of the tests because of time constraints and the large number of systems each person monitors. Action officers characterized their test observations as generally lasting 1 or 2 days, while tests run from several weeks to several months. They

said they tried to time their visits to coincide with what they considered the most critical phases of the tests. They further said that they emphasized the planning and set up phases of testing. In addition, some action officers said that they used contractor personnel to supplement their efforts. The Director told us that there has never been a major program, particularly one approaching a major decision point, where DOT&E had not visited the test site. However, as we stated above, these visits were characterized as lasting 1 or 2 days while tests run for several weeks or months. Further, as discussed later in the report inadequate documentation precludes determining how well DOT&E carries out some of its principal activities. (See p. 15.)

Some service operational test agency officials questioned DOT&E's ability to adequately evaluate test results without on-site observation of the entire test process. According to these officials, more observations would increase the reliability of DOT&E evaluations and recommendations, and provide greater insight into how tests were done, including firsthand insight over test realism and test limitations.

DOT&E could not reliably identify either how many test the personnel had observed or the total number of operational tests done during fiscal years 1985 and 1986. Therefore, it is not possible to determine with any confidence how many tests were observed by DOT&E and the proportion of such observations in relation to the number of tests done.

DOT&E'S INDEPENDENT ASSESSMENTS OF OPERATIONAL TESTS ARE BASED PRINCIPALLY ON INFORMATION CONTAINED IN SERVICE TEST REPORTS

Public Law 98-94 requires DOT&E to analyze the results of OT&E done for each major defense program and provide an assessment to the Secretary of Defense and to the Senate and House Committees on Armed Services and Appropriations. The analysis is to contain information addressing (1) whether the test and evaluation performed was adequate and (2) whether the test and evaluation results confirm that the items or components actually tested are effective and suitable for combat.

DOT&E has not issued any formal policy or procedures specifying how analyses are to be performed. The methods of analysis are left to each action officer.

The action officers that we interviewed use various techniques to perform their analyses. Some use contractors to analyze service test reports, while others did the analyses

themselves. Most of those interviewed used the military service test reports as the bases for their analyses, and seldom analyzed raw test data or actual test results, thus, in our opinion, limiting their ability to provide full disclosure and to independently assess the adequacy of OT&E performance and results. The Director OT&E acknowledged that service test reports were the primary bases for analyses. However, he said that other sources of information such as site visits and discussions with test directors are used to supplement the service test report.

A comparison of five recent DOT&E reports to service test reports for the same systems showed that the DOT&E analyses contained basically the same information as was in the service test reports. These DOT&E reports can be characterized as brief summaries of the services' reports. They include similar discussions on test results, test realism, and test limitations. (We previously reported this same condition to Congressman Ron Wyden in April 1985.)[2] For example:

-- DOT&E's April 16, 1986, report on the Infrared Maverick Missile was substantially a summary of the Air Force Operational Test and Evaluation Center's report dated February 1986. Both reports summarized the follow-on test and evaluation for the missile when employed on the F-16 aircraft in the interdiction strike role. Both reports stated the system was operationally effective and suitable, and both reports stated the same test limitations.

-- DOT&E's October 7, 1985, report on the AV-8B Advanced Harrier summarized the Commander, Operational Test and Evaluation Force's (COMOPTEVFOR's) operational evaluation report. Furthermore, both reports identified and concluded that test limitations existed but did not preclude their individual evaluation of operational effectiveness and suitability.

-- A comparison of the Army's operational test agency report on the Army Helicopter Improvement Program to DOT&E's assessment of the test results showed the DOT&E report to be an almost verbatim copy of the information included in the test agency report. This was illustrated by virtually identical statements of the flight performance and attack role portions by DOT&E and the Army.

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[2]Fact sheet on the Office of DOT&E (B-217950, GAO/NSIAD, Apr. 3, 1985).

During our review of COMOPTEVFOR's documentation pertaining to testing of the Advanced Harrier, we found that the full-scale development and pilot production aircraft used in the test were powered by the Rolls Royce F402-RR-404 engine. The operational test plan stated that production aircraft would be powered by the F402-RR-406 engine (a newer model). Since production models of the newer engine would not be available for OT&E, COMOPTEVFOR identified this as a test limitation in the operational test plan. However, neither DOT&E's nor COMOPTEVFOR's reports identified this limitation or discussed the effect the different engine might have on OT&E results.

The similarity between test reports is due, in part, to DOT&E action officers and contractors not evaluating the actual operational test results and using the service test reports as their principal bases for evaluation. We were told by DOT&E officials that the common practice is to rely on the service test reports for logic, issues, and results, rather than analyze the test results that these reports summarize. If the test report does not contain any identifiable deficiencies, it probably would not be questioned. The Director believes that the reports should not differ from service test reports. Any differences between DOT&E and the service operational test agencies are resolved before any test reports are issued.

DOT&E LACKS GUIDANCE AND DOCUMENTATION FOR SOME OF ITS PRINCIPAL ACTIVITIES

Good internal management control requires, among other things, that an agency provide policy and procedural guidance and document its activities. However, we found that DOT&E has not provided policy and procedural guidance or maintained reliable records on some of its principal activities.

For example, DOT&E action officers frequently do not document the results of their reviews of TEMPs and operational test plans, changes made because of these reviews, or methods used to analyze service test reports. Further, no uniform policies or procedures exist that provide guidance to action officers on how to perform their functions or document their efforts. While some kept records of comments they made on TEMPs and test plans, others had no documentation of their reviews, suggested changes, or actions taken by the services. In addition, while an activity log in the Office of the Director is maintained, it is not maintained consistently.

The lack of documentation makes it very difficult to accurately determine how well DOT&E carries out some of its

principal activities. The Director of OT&E acknowledged that the office lacked policy and procedures for many of principal activities. The Director said that several initiatives were currently underway to rectify the situation and improvements will begin to occur by early summer 1987.

CONCLUSIONS

DOT&E has made contributions to test planning through its participation in revising DOD Directive 5000.3 and through its review and approval of test planning documents. However, certain DOT&E activities need more attention to improve DOT&E's ability to carry out oversight functions in the independent manner intended when the office was created.

First, DOT&E appears to be observing only a limited number of operational tests done on DOD weapon systems. The lack of on-site observation precludes DOT&E from being fully aware of conditions or situations that may have influenced operational test results, but which may not have been documented in the service test reports. It may also limit DOT&E's ability to assess whether the test and evaluation performed was adequate--a requirement of the law.

Second, DOT&E's analyses of service operational tests were generally limited to analyzing military service test reports rather than test results. Relying on service test reports does not provide the necessary insight into the supporting data to ensure full disclosure and whether the test reports are adequately supported.

Third, DOT&E has not yet provided uniform policy and procedural guidance or maintained reliable records pertaining to the testing oversight and analyses of test results. Therefore, it is difficult to evaluate DOT&E's effectiveness in carrying out the responsibilities under the law.

OBJECTIVES, SCOPE, AND METHODOLOGY

Our objectives were to identify (1) DOT&E contributions to DOD's OT&E activities and (2) any areas on which DOT&E needs to place emphasis to improve functioning as a fully independent oversight activity.

We accomplished our objectives by reviewing (1) applicable laws, regulations, and directives, (2) TEMPs, (3) operational test plans, (4) operational test reports, and (5) certifications for low-rate initial production. We also interviewed DOT&E and service operational test agency officials. The five weapon system operational test reports reviewed were:

Air Force: Low Altitude Navigation and Targeting Infrared System for Night,

Infrared Maverick Missile,

ARMY: Army Helicopter Improvement Program,

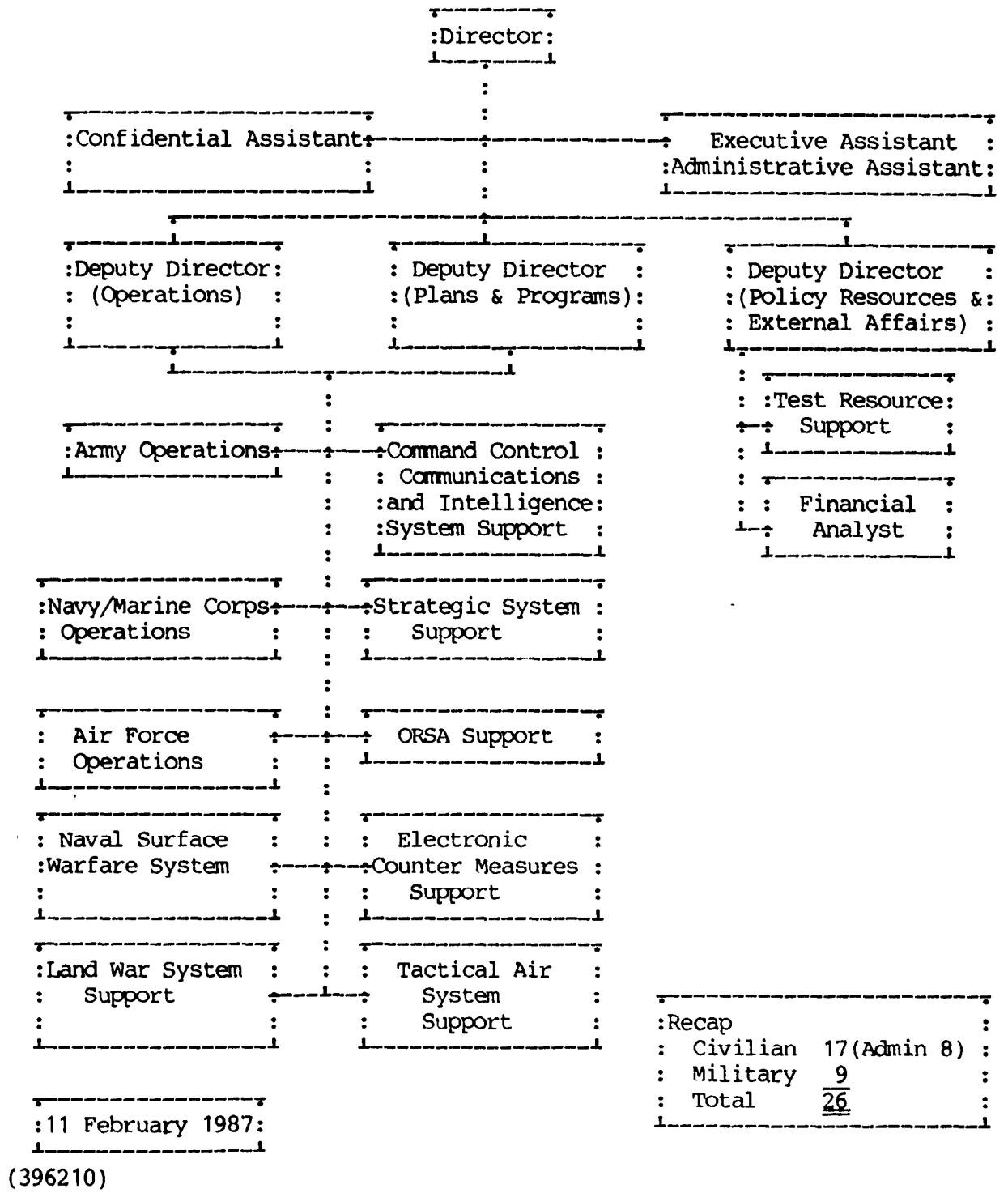
NAVY: AV-8B Advanced Harrier Aircraft, and

Tomahawk Conventional Land Attack Cruise Missile.

Our review was performed in accordance with generally accepted government auditing standards.

APPENDIX III

ORGANIZATIONAL CHART DOT&E



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