

Audit

Report



DEFENSE TRAVEL PAY
YEAR 2000 END-TO-END TESTING

Report Number 00-018

October 22, 1999

Office of the Inspector General
Department of Defense

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Acronyms

DFAS	Defense Finance and Accounting Service
JITC	Joint Interoperability Testing Command
IATS	Integrated Automated Travel System
Y2K	Year 2000



INSPECTOR GENERAL
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October 22, 1999

MEMORANDUM FOR DIRECTOR, DEFENSE FINANCE AND ACCOUNTING
SERVICE

SUBJECT: Audit Report on Defense Travel Pay Year 2000 End-to-End Testing
(Report No. 00-018)

We are providing this report for your information and use. This is one in a series of reports that the Inspector General, DoD, is issuing in accordance with an informal partnership with the DoD Chief Information Officer to monitor the Defense Finance and Accounting Service efforts to address the year 2000 computing challenge.

We issued memorandums to Defense Finance and Accounting Service management to communicate issues raised during the audit. This report includes comments we received from the Defense Finance and Accounting Service. We considered management comments on a draft of this report when preparing the final report.

Comments on the draft of this report conformed to the requirements of DoD Directive 7650.3 and left no unresolved issues; therefore, no additional comments are required.

We appreciate the courtesies extended to the audit staff. For additional information on this report, please contact Ms. Kimberley A. Caprio at (703) 604-9139 (DSN 664-9139) (kcaprio@dodig.osd.mil), or Mr. Dennis L. Conway at (703) 604-9158 (DSN 664-9158) (dconway@dodig.osd.mil). See Appendix D for the report distribution. The audit team members are listed inside the back cover.

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Report No. 00-018
(Project No. 9FG-9031)

October 22, 1999

Defense Travel Pay Year 2000 End-to-End Testing

Executive Summary

Introduction. This is one in a series of reports that the Inspector General, DoD, is issuing in accordance with an informal partnership with the DoD Chief Information Officer to monitor DoD efforts to address the year 2000 computer challenge. For a list of audit projects addressing the issue, see the year 2000 web page on the IGnet at <http://www.ignet.gov>.

For year 2000 purposes, the Defense Finance and Accounting Service has identified 45 systems as mission-critical. To test those systems for year 2000 compliance, it has identified seven business processes that are considered critical and has developed plans to test those business processes. Further, the Defense Finance and Accounting Service organized its end-to-end testing (that is, testing from the beginning to the end of a process) into seven testing events, one test event for each critical business process. Travel pay is one of the seven business processes to be tested.

The travel pay business process facilitates the determination and authorization of payments for military and civilian temporary duty travel, military and civilian permanent change of station travel, and local travel. The travel pay business process is supported by one travel pay system, the Integrated Automated Travel System. The Integrated Automated Travel System supports more than 1,000 travel offices and processes more than 6 million travel claims annually.

Objective. The overall audit objective was to evaluate the effectiveness of plans and results of end-to-end testing in the DoD travel pay area. Specifically, we reviewed the Defense Finance and Accounting Service Year 2000 Master Plan and the plans and results of end-to-end testing within the travel pay business process. The purpose of end-to-end testing is to verify that the set of interrelated systems supporting an organizational function, such as travel pay, interact from beginning to end as intended in an operational environment.

Results. The Defense Finance and Accounting Service Year 2000 Master Plan developed by the year 2000 project office included sound overall methodology for end-to-end testing. In addition, the travel pay event leader developed a plan specifically for end-to-end testing of the travel pay business process. However, after developing the plan, the event leader did not use it, but attempted to prove that previous system-level tests made on the travel pay system would qualify as end-to-end testing. Previous tests had been made only on systems that directly interfaced with the travel pay system, not on all systems in the travel pay business process. In addition, the previous tests were made using non-year 2000-compliant systems, contrary to guidance in the Defense Finance and Accounting Service Year 2000 Master Plan. Further, test scenarios were not developed for all systems in the travel pay business process.

We expressed these concerns in a memorandum to the Director, Defense Finance and Accounting Service, on July 9, 1999. The Director for Information and Technology, Defense Finance and Accounting Service, requested that the Joint Interoperability Testing Command independently verify and validate prior testing on the travel pay system. The Joint Interoperability Testing Command conducted reviews July 14-16, 1999, and identified problems similar to those we reported. To assist in resolving these problems, the Joint Interoperability Testing Command helped the travel pay personnel develop four end-to-end data flow diagrams to use in developing test scenarios. Using these data flow diagrams, the travel pay event leader developed more complete test scenarios and began the end-to-end testing for the travel pay business process.

However, in order to successfully complete end-to-end testing on schedule in October 1999, the travel pay event leader needs to verify that all systems in the travel pay business process have been identified; to validate that those systems are year 2000 compliant; and to finish developing test scenarios and conducting end-to-end testing. Because the issues identified in this report probably will not be resolved before the testing is complete, the Defense Finance and Accounting Service needs to take additional measures to reduce risks. Alternative measures should include performing supplementary end-to-end tests of the event, using code scanners, or expanding event contingency plans.

For details of the audit results, see the Finding section of the report.

Summary of Recommendations. We recommend that the Director, Defense Finance and Accounting Service, require the travel pay event leader to verify that all systems in the travel pay business process have been identified; to validate that all travel pay business process systems are year 2000 compliant; and to complete test scenarios and end-to-end testing for the travel pay business process. We also recommend that the Director, Defense Finance and Accounting Service, take additional measures to reduce the risks that travel pay business process systems may not be able to successfully process data after 2000. Alternative measures should include performing supplementary end-to-end tests of the event, using code scanners, or expanding event contingency plans.

Management Comments. The Director for Information and Technology, Finance and Accounting Directorate, concurred and stated that four scenarios were developed to test the travel pay business process and the scenarios identified all the systems involved. Further, additional year 2000 testing was completed after the Standard Finance System Redesign (Subsystem 1) disbursement system was certified as year 2000 complaint. Also, each thread leader for testing was provided a standard format to develop test scenarios and these were completed in September. The Defense Finance and Accounting Service also initiated action with assistance of the Joint Interoperability Testing Command to refine its approach to end-to-end testing, developed standard documentation procedures that provide reasonable assurance that risks from year 2000 problems will be mitigated, and initiated additional live testing. See the Management Comments section for the complete text of the management comments.

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Background

Addressing the Year 2000 Computing Challenge. This is one in a series of reports being issued by the Inspector General, DoD, in accordance with an informal partnership with the Chief Information Officer, DoD, to monitor efforts to address the year 2000 (Y2K) computing challenge. For a list of audit projects addressing the issue, see the Y2K web page on the IGnet at <http://www.ignet.gov>.

Defense Finance and Accounting Service. The Defense Finance and Accounting Service (DFAS) is the principal agency responsible for DoD accounting and finance processes. In FY 1998, DFAS processed a monthly average of 9.8 million payments to DoD personnel; 1.2 million commercial invoices; 600,000 travel vouchers or settlements; 500,000 savings bonds; and 120,000 transportation bills of lading. In FY 1998, DFAS monthly disbursements totaled approximately \$24 billion.

For Y2K purposes, DFAS has identified 45¹ systems as mission-critical. To test those systems for Y2K compliance, DFAS has identified business processes that are considered critical and has developed plans to test the business processes that include the mission-critical systems. Critical processes are defined as those that, if not performed, would preclude or immediately impair the disbursement, pay, and accounting functions. Specifically, DFAS identified the following seven critical business processes: civilian pay, military pay, vendor and contractor pay, transportation pay, travel pay, accounting, and disbursing.

End-to-End Testing. The end-to-end process is the flow of data through a set of interconnected systems that performs a core business process, function, or mission. Data flow begins with the initial input of data into the first system and ends with the final receipt of data in the last system and the receipt of output by the user. The purpose of Y2K end-to-end testing is to verify that the set of interrelated systems supporting DFAS business processes, such as DoD travel pay, operates and appropriately processes Y2K-related data.

DFAS End-to-End Testing. DFAS has organized its end-to-end testing into seven testing events, one for each critical mission or business process. DFAS has further divided each event or business process into threads. A thread is a system or set of systems that perform the functions within the business process. Each event can contain one or more threads that can be tracked to a critical business process.

DoD Y2K Management Plan. The "DoD Y2K Management Plan," version 2.0, December 1998, defines the DoD Y2K management strategy, including planning and executing end-to-end testing. Appendix I of the

¹ We identified 42 DFAS mission-critical systems in previous audit reports. DFAS recently added three systems to its mission-critical list: the Standard Accounting and Reporting System – One Bill Pay, the Standard Army Financial Accounting and Reporting System, and the Standard Base Supply System.

management plan, "Guidelines to Support DoD Y2K Operational Readiness," provides guidance on planning, executing, and evaluating the activities required to assess Y2K readiness. These activities include the end-to-end testing of functional areas. Appendix I identifies roles and responsibilities and defines requirements for developing end-to-end master plans, event plans, reporting, risk assessment, data collection and analysis, execution, and management controls.

DFAS Y2K End-to-End Master Plan. DFAS issued the "DFAS Y2K End-to-End Master Plan," revision 2.3, (the DFAS Y2K Master Plan) on June 21, 1999, specifically for accomplishing Y2K-related end-to-end testing of its mission-critical business processes. The DFAS Y2K Master Plan identified roles and responsibilities; assumptions and constraints related to testing; interfaces with non-DFAS organizations; and requirements for planning, testing, and reporting on test results.

Roles and Responsibilities. DFAS designated a Y2K project manager and a functional proponent at DFAS headquarters who have overall responsibility for Y2K testing. DFAS functional proponents were to assign event leaders, and thread leaders were to execute the end-to-end testing. DFAS assigned roles and responsibilities to system managers for controlling their segments of end-to-end testing.

Assumptions and Constraints. Because of limitations on time and resources, the DFAS Y2K Master Plan acknowledged constraints and identified assumptions related to Y2K end-to-end testing. These included, for example, the assumptions that third-party software and computing platforms are Y2K compliant; that operations and compliance testing takes precedence over end-to-end testing; that partner organizations will conduct their own internal end-to-end tests and provide input for DFAS; and that all mission-critical systems will have contingency plans in place.

Interface Requirements. The DFAS Y2K Master Plan stated that each test event will include critical automated interfaces with other departments and agencies. However, because of size limitations at the Defense Information Systems Agency Megacenters that support testing, DFAS and other DoD organizations may not be able to run true end-to-end tests simultaneously. Rather, each organization will maintain sufficient control of its segment of the end-to-end testing process to ensure the integrity of the data flow from one system to the other.

Planning, Testing, and Reporting. The DFAS Y2K Master Plan specified requirements for the following.

- **Live Versus Simulation Testing.** DFAS plans to test its business processes under normal operating conditions whenever possible.

Otherwise, DFAS will use a time machine or a simulated operating environment and will document the reasons and the associated risks.²

- **Critical Dates.** The DFAS Y2K Master Plan did not designate specific dates for testing, but recommended that testing include the following five dates: the FY 2000 crossover, the calendar year 2000 crossover, the FY 2001 crossover, the calendar year 2001 crossover, and leap year (February 29, 2000). DFAS recommended that the dates chosen for testing be consistent with dates tested by interfacing systems.
- **Baselines.** The DFAS Y2K Master Plan stated that after testing the dates, DFAS organizations should compare their test results to outcomes previously determined as the baseline. (The baseline is the set of known end-to-end test inputs and outputs extracted from systems that have been certified as Y2K compliant). Each DFAS organization will document the discrepancies between each of the tests and the baseline.
- **Data Analysis and Documentation.** The DFAS Y2K Master Plan required each DFAS organization to develop and document a data collection and analysis strategy in its test plan that provides sufficient information to support end-to-end test design, results, and analysis. The DFAS Y2K Master Plan left the details of data analysis or documentation to the organizations responsible for testing.

Objective

The overall audit objective was to evaluate the effectiveness of plans and selected results of end-to-end testing of DoD travel pay. This report addresses plans for conducting Y2K end-to-end testing for DoD travel pay. Other reports will address other DFAS critical business processes. See Appendix A for a discussion of the audit scope and methodology, the management control program, and prior audit coverage related to the audit objective. We are currently reviewing the contingency plans for the travel pay business process. We may issue a separate report on the results of that review.

²A time-machine test strategy involves setting system clocks to the year 2000 and operating under testing conditions. Simulation is a program that allows testers to simulate changing dates rather than actually changing the dates during normal operations.

End-to-End Testing of Travel Pay

The overall methodology for the Defense Finance and Accounting Service (DFAS) Year 2000 (Y2K) end-to-end tests was sound. In addition, the travel pay event leader specifically developed a plan for end-to-end testing of the travel pay business process. However, after developing the plan, the travel pay event leader did not use it, but attempted to certify that previous tests on the travel pay system would qualify as end-to-end testing. This approach was limited because:

- systems previously tested were different from the systems used in the travel pay business process;
- DFAS used systems that had not been certified as Y2K compliant; and
- test scenarios were not developed for all systems in the travel pay business process.

As a result, DFAS increased the risk that the end-to-end testing process would not be complete or would not disclose system problems that could prevent the successful processing of travel claims.

Travel Pay Business Process

The DFAS travel pay business process facilitates the determination and authorization of payments for the following entitlements:

- military and civilian temporary duty travel,
- military and civilian permanent change of station travel, and
- local travel.

DFAS Travel Pay System: DFAS has one travel pay system, the Integrated Automated Travel System (IATS). IATS supports more than 1,000 travel offices and processes more than 6 million claims annually.

IATS is an integral part of the four threads in the travel pay business process. The travel pay event leader divided the travel pay business process into the following four threads:

- the Standard Finance System - Redesign (Subsystem 1),
- the Automated Disbursing System,

-
- the Integrated Pay and Collecting System, and
 - the Standard Accounting, Budgeting, and Reporting System.

Each of these threads contains systems that facilitate the processing of travel payments.

Processing of Travel Pay Information. Travel pay information is initially entered into IATS and is then transmitted from IATS to systems in the DFAS disbursing business process. The disbursing systems process the travel data and transmit information back to IATS. Also, the disbursing systems transmit travel pay information to systems in the DFAS accounting business process and to Federal Reserve banks.

Methodology for DFAS Year 2000 End-to-End Tests

DFAS End-to-End Testing Methodology. The overall methodology for the DFAS Y2K end-to-end testing was sound. DFAS developed guidance that outlined its methodology for the end-to-end testing of its events. This guidance was issued as the DFAS Y2K Master Plan on June 21, 1999.

The DFAS Y2K Master Plan discussed specific requirements for conducting end-to-end testing. One requirement is that planning activities be conducted to ensure that processes and systems are ready for Y2K testing. This includes activities to verify that both DFAS and its external partners' roles in the critical processes are ready. A criterion for beginning planning activities is that mission-critical systems used in the end-to-end tests have been certified as Y2K compliant or that a contingency plan is in place.

Travel Pay Plan for End-to-End Testing. The travel pay event leader developed an "Integrated Automated Travel System (IATS) Year 2000 Test Plan" (the IATS Test Plan), June 21, 1999. The purpose of the IATS Test Plan was to develop test scenarios for end-to-end testing of the IATS system and its interfaces with other systems.

Testing of the travel pay business process began on July 1, 1999, however, the travel pay event leader stated that because of delays, testing will probably be extended through October 1999.

Adequacy of Travel Pay End-to-End Testing

Initially, the travel pay event leader did not use the end-to-end test plans, but attempted to certify that the system-level tests on IATS and its interfacing systems would qualify as an end-to-end test of the travel pay business process. However, this approach did not fully consider the following.

- The system-level test of IATS and its interfacing systems was not a full end-to-end test of all the systems in the travel pay business process.

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plan that we received on July 1, 1999, showed IATS interfacing with 11 systems in 1 chart, but with 1 system (the Data Element Managerial Accounting and Reporting) in a second chart. Several charts in the test plan showed that IATS transmitted data to and received data from the Integrated Paying and Collecting System; however, other charts showed that IATS only transmitted data to the Integrated Paying and Collecting System.

The Joint Interoperability Test Command's "DFAS Master Test Plan Methodologies Evaluation Report," May 21, 1999, expressed concern that the DFAS Y2K Master Plan did not identify the systems in the travel pay business process and stated that this indicated that planning for end-to-end tests of the travel pay event had probably been delayed. We issued a memorandum to the DFAS Director for Information and Technology on July 9, 1999, addressing our concerns with the fluctuation in the systems to be tested.

Until the travel pay event leader develops an accurate list of the systems used in the business process, DFAS will increase the risk that end-to-end testing will not be complete or will not disclose problems that would prevent the processing of travel claims.

Using Systems Certified as Y2K Compliant. To complete the previous IATS testing, DFAS used systems that had not been certified as Y2K compliant. The event leader certified that end-to-end tests were not needed because IATS had been tested with its interfacing systems. However, these tests were conducted with systems that were not certified as Y2K compliant. For example, tests on the interface between IATS and the Standard Finance System-Redesign (Subsystem 1) was completed in December 1998. However, the Standard Finance System-Redesign (Subsystem 1) was not certified as Y2K compliant until June 1999. In addition, the interface testing between IATS and the Automated Disbursing System was completed before the Automated Disbursing System was certified as Y2K compliant. The DFAS Y2K Master Plan requires all systems included in end-to-end tests to be Y2K compliant. Therefore, the previous tests of IATS and its interfacing systems did not qualify as end-to-end tests.

On May 28, 1999, in a memorandum to the DFAS Director for Information and Technology, we noted that DFAS was attempting to certify the transportation pay system based on the premise that prior testing had been sufficient to qualify as an end-to-end test. On June 8, 1999, the DFAS Director for Information and Technology responded to the memorandum, stating that:

...In addition to the Transportation Pay System, DFAS has identified several other systems, which claim completion of the end-to-end testing initiative. JITC will be used to verify that these systems indeed have met E2E requirements. If any system fails to pass the validation of JITC, steps will be initiated to complete all or any portion of the E2E process that needs to be completed.

IATS, the travel pay system, was one of the systems requiring certification by the Joint Interoperability Testing Command (JITC) that the previous testing had met end-to-end testing requirements. On July 14 through 16, 1999, at the

DFAS Indianapolis Center, Indianapolis, Indiana, JITC reviewed the previous testing of IATS. JITC recommended that DFAS investigate the noncompliant systems.

DFAS needs to complete the retesting of all systems that had not been certified as Y2K compliant at the time the IATS tests were performed. Until this testing is completed, DFAS will increase the risk that end-to-end tests will not be complete or will not disclose Y2K problems that would prevent the processing of travel claims.

Development of Test Scenarios. Test scenarios had not been developed for all systems in the travel pay business process. The scenarios tested only the IATS system and its interfacing systems. The scenarios did not include the systems in the travel pay business process that did not interface directly with IATS.

We reviewed the IATS Test Plan, dated June 21, 1999, and determined that it did not give the sources from which information was to be obtained. In addition, we identified test scenarios that provided inconsistent information. For example, the test item control sheet for local travel stated that results would be verified by reviewing account information and permanent change of station records, rather than local travel records. Further, after JITC reviewed the travel pay business process at the DFAS Indianapolis Center on July 14 through 16, 1999, JITC recommended that DFAS develop tests that verify dates and computations. JITC also recommended that DFAS provide more detailed information on the expected results of the tests.

As of August 26, 1999, the travel pay event leader was developing test scenarios and provided us with samples of some scenarios that could verify dates and computations. The travel pay event leader had developed 137 tests for the 4 travel pay threads and had completed 75 of those tests, as follows.

Table 2. Scenarios Developed and Tested for the Travel Pay Event

	<u>Number of Tests Developed</u>	<u>Number of Tests Completed</u>
SRD1 ¹	24	13
ADS ²	24	24
IPC ³	64	13
SABRS ⁴	<u>25</u>	<u>25</u>
Totals	137	75

SRD1: Standard Finance System - Redesign (Subsystem 1)

ADS: Automated Disbursing System

IPC: Integrated Pay and Collecting System

SABRS: Standard Accounting, Budgeting, and Reporting System

Without sufficient detail in the test scenarios, DFAS will increase the risk that end-to-end tests will not be adequate. The event leader must provide sufficient detail in travel pay test scenarios, include consistent information, and identify the sources and types of information used. The event leader must also follow through with developing and completing the tests to reduce the risk that the end-to-end testing process will not be complete or will not disclose problems that would prevent the processing of travel claims.

Alternative Measures. Senior DoD managers have emphasized that the testing of systems should be independently validated. If testing has been inadequate or retesting is needed, alternative measures need to be considered because of time constraints. Alternative measures may include retesting or the use of automated tools, such as code scanners. Code scanners have been used to identify hundreds of Y2K errors in systems previously certified as compliant. Code scanners are available free of charge for DoD organizations to use at any time during or after the testing process. In addition, those responsible for contingency planning may need to expand the plans.

Management Actions Taken

Inspector General, DoD, Memorandum, May 28, 1999. On May 28, 1999, we issued a memorandum to the DFAS Director for Information and Technology on six issues concerning the DFAS end-to-end test plans (see Appendix B). The DFAS Director for Information and Technology responded in a memorandum issued on June 8, 1999 (see Appendix C). Three of the issues are interfacing systems, critical crossover dates, and the problem of substituting Y2K tests on individual systems for end-to-end testing. These issues apply to travel pay.

Interfacing Systems. DFAS relies heavily on interfacing systems to provide most data in its systems. Our memorandum emphasized that coordination and the compatibility of data between interfacing systems is critical to ensuring successful Y2K end-to-end tests. DFAS agreed and stated that interface agreements had been established with all of its interfacing partners.

Critical Crossover Dates. The travel pay test plan did not include the testing of many critical dates in the DFAS Y2K Master Plan. DFAS stated that dates were not necessarily important in the relationship between systems. Further, DFAS authorized its functional managers to determine which dates should be tested.

The purpose of end-to-end testing is to determine whether the systems can receive and transmit data on critical dates. Therefore, the testing of those dates is essential. As of August 26, 1999, the travel pay event leader had included the five critical Y2K dates in test scenarios.

Use of Systems Testing. DFAS was attempting to certify the transportation pay system based on the premise that prior testing was sufficient to qualify as end-to-end testing. DFAS was attempting to certify the travel pay system in a similar manner. We commend DFAS for contracting with the JITC

to obtain an independent verification and validation of the DFAS testing of the travel pay system, and for conducting end-to-end tests of the travel pay business process after the JITC review showed that the testing was needed.

Inspector General, DoD, Memorandum, July 9, 1999. On July 9, 1999, we sent a memorandum to the DFAS Director addressing concerns with the end-to-end test plans. Those concerns included the issues discussed in this report: the travel pay event leader did not use the end-to-end test plans, and attempted to certify that previous tests of the travel pay system qualified as end-to-end testing. However, during the audit, the event leader worked to develop more complete test scenarios. The event leader also determined that end-to-end testing would be conducted for the travel pay business process.

Conclusion

During the audit, the travel pay event leader made significant progress in resolving the problems we identified. However, the event leader needs to verify that all systems in the travel pay business process have been identified; to validate that all travel pay business process systems are Y2K compliant; and to complete the development of test scenarios and end-to-end testing of the travel pay business process.

Because the issues identified in this report probably will not be resolved before testing is complete, DFAS should take alternative measures to reduce the risk that travel pay business process systems will not be able to process data successfully after 2000. Alternative measures may include performing supplementary end-to-end tests of the event, using code scanners, or expanding contingency plans.

Recommendations

We recommend that the Director, Defense Finance and Accounting Service, require the travel pay event leader to:

1. **Verify the accuracy and completeness of the list of systems in the travel pay business process that should be included in end-to-end testing.**

DFAS Comments. DFAS concurred and stated that the four scenarios intended to test the travel pay business area were refined and finalized August 25, 1999. The scenarios identified the systems that would be involved in the end-to-end test and the system relationship in the document flow and event cycles required to complete the thread of a paid travel voucher.

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2. **Verify that systems certified as Y2K compliant were used to complete end-to-end testing.**

DFAS Comments. DFAS concurred and stated that additional end-to-end testing of the previously non-compliant disbursement system was completed on September 16, 1999.

3. **Monitor the development of test scenarios to ensure that they are completed in a detailed and consistent manner, and verify that scenarios are completed for each of the four travel pay threads.**

DFAS Comments. DFAS concurred stated that the monitoring and verification of the four travel pay threads were completed on September 29, 1999.

4. **Take alternative measures to reduce the risks that systems in the travel pay business process will not be able to process data successfully after 2000. Alternative measures may include performing supplementary end-to-end tests of the event, using code scanners, or expanding contingency plans.**

DFAS Comments. DFAS concurred and stated that with the assistance of the Joint Interoperability Testing Command, DFAS refined its approach to year 2000 end-to-end testing. Actions to perform supplementary end-to-end tests were completed September 29, 1999. In addition, live testing of the Travel business process contingency plan was conducted on 14 and 15 June 1999.

Appendix A. Audit Process

This is one in a series of reports being issued by the Inspector General, DoD, in accordance with an informal partnership with the DoD Chief Information Officer to monitor DFAS efforts to address the Y2K computing challenge. For a list of audit projects addressing the issue, see the Y2K web page at <http://www.ignet.gov>.

Scope and Methodology

We reviewed Y2K reporting requirements and policies issued by the Office of the Secretary of Defense and DFAS. We reviewed the DFAS Y2K Master Plan and met with DFAS managers to obtain additional information and clarification on the roles and responsibilities of its Y2K managers. We also met with JITC evaluators to learn whether the system-level tests of travel pay qualified as end-to-end tests, according to their review. IATS supports more than 1,000 travel offices and processes more than 6 million claims annually.

DoD-Wide Corporate-Level Government Performance and Results Act Goals. In response to the Government Performance and Results Act, the Department of Defense has established 2 DoD-wide goals and 7 subordinate performance goals. This report pertains to achievement of the following objectives and goals.

Goal 2: Prepare now for an uncertain future by pursuing a focused modernization effort that maintains U.S. qualitative superiority in key warfighting capabilities. Transform the force by exploiting the revolution in military affairs, and reengineer the Department to achieve a 21st century infrastructure.

Subordinate Performance Goal: Transform U.S. military forces for the future. (00-DoD-2.2)

DoD Functional Area Reform Goals. Most major DoD functional areas have also established performance improvement reform objectives and goals. This report pertains to achievement of the following functional area objectives and goals.

- **Information Technology Management Functional Area.**
Objective: Become a mission partner. **Goal:** Serve mission information users as customers. (Information Technology Management-1.2)
- **Information Technology Management Functional Area.**
Objective: Provide services that satisfy customer information needs. **Goal:** Modernize and integrate Defense information infrastructure. (Information Technology Management-2.2)

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- **Information Technology Management Functional Area.**
Objective: Provide services that satisfy customer information needs.
Goal: Upgrade technology base. (Information Technology Management-2.3)
 - **Information Technology Management Function Area. Objective:**
Reengineer DoD business practices. **Goal:** Modify existing systems and monitor new systems to be Y2K compliant (Financial Management-4.3)

General Accounting Office High-Risk Area. The General Accounting Office has identified several high-risk areas in the DoD. This report provides coverage of the Information Management and Technology high-risk area. In its identification of risk areas, the Y2K problem has been specifically designated as high-risk by the General Accounting Office.

Audit Type, Dates, and Standards. We performed this program audit from April 1999 through September 1999, in accordance with auditing standards issued by the Comptroller General of the United States, as implemented by the Inspector General, DoD. We did not use statistical sampling methods for this audit.

Contacts During the Audit. We visited or contacted individuals and organizations within DoD. Further details are available on request.

Use of Computer-Processed Data. We did not use computer-processed data to perform this audit.

Use of Technical Assistance. We met with technical experts from JITC to discuss their views on whether the system-level tests of travel pay qualified as end-to-end tests. JITC is the DoD activity that tests and evaluates the interoperability of information, communication, and intelligence systems.

We also met with technical experts in the Audit Followup and Technical Support Directorate, Office of the Assistant Inspector General for Auditing, DoD, to discuss the DFAS substitution of previous tests of the travel pay system for the end-to-end testing required by the DoD Y2K Management Plan.

Management Control Program. We did not review the management control program related to the overall audit objective because DoD recognized the Y2K issue as a material management control weakness in the FY 1999 Annual Statement of Assurance.

Summary of Prior Coverage

The General Accounting Office and the Inspector General, DoD, have conducted multiple reviews of Y2K issues. General Accounting Office reports can be accessed on the Internet at <http://www.gao.gov/>. Inspector General, DoD, reports can be accessed on the Internet at <http://www.dodig.osd.mil>.

Appendix B. Inspector General, DoD, Interim Report on End-to-End Test Plans



INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202-2884

MAY 28 1999

MEMORANDUM FOR DIRECTOR FOR INFORMATION AND TECHNOLOGY,
DEFENSE FINANCE AND ACCOUNTING SERVICE

SUBJECT: Status of Audits of Finance Functional Area Year 2000 End-to-End Tests

In April 1999, we initiated the following audit projects to evaluate the effectiveness of Y2K end-to-end testing by the Defense Finance and Accounting Services (DFAS). The projects were aligned by functional area in accordance with the functional break-out identified by DFAS:

Civilian Pay	Project 9FG-9025
Military/Retiree/Annuitant Pay	Project 9FG-9026
Vendor/Contractor Pay	Project 9FG-9027
Transportation Pay	Project 9FG-9028
Disbursing	Project 9FG-9029
Accounting	Project 9FG-9030
Travel Pay	Project 9FG-9031

Our review, to date, has focused on analyzing the adequacy of test plans for the seven areas. We evaluated the adequacy of the DFAS Y2K test plans using requirements contained in the DoD Y2K Management Plan, Version 2.1, Appendix I; the DFAS Y2K Management Plan, Version 1.0; the DFAS Y2K End-to-End Master Plan, Version 2.1; the DFAS Regulation 8000.1-R, "Information Management and Instruction Guidance," Version 5.0; and the GAO Operational Evaluation Assessment Tool. We anticipate future audits will assess test results and contingency planning efforts by DFAS.

Because of the urgency of Year 2000 efforts, our intent is to communicate potential areas of concern as quickly as possible so that management may address these issues in a timely manner. The attachment to this memorandum reports the initial results of our review. During our preliminary review, we identified concerns regarding the adequacy of DFAS planning efforts for functional end-to-end testing. If these concerns are not addressed, there is increased risk that DFAS end-to-end testing may not detect a significant Y2K problem. We may include these and any additional issues in a draft report at a later date. We request that you provide a response to this memorandum by June 8, 1999. If there are any questions, please contact Ms. Kimberley Caprio, Program Director at (703) 604-9139 or DSN 664-9139.

F. Jay Lane
Director
Finance and Accounting Directorate

DFAS has made significant progress in addressing testing requirements for its functional areas including the issuance of a Master Plan, identification of levels of responsibility, and checklists for test planning purposes. During our review, we identified the following concerns that should be addressed by DFAS. On May 27, 1999, we met with DFAS officials to discuss the concerns and actions to be taken.

1. **Roles and Responsibilities.** The DFAS Master Plan identified four levels of responsibility for end to end testing including Headquarters functional proponents, systems managers, event leaders, and thread leaders. The Plan defined roles and responsibilities for functional proponents and systems managers, but did not provide details on the responsibilities for either the event or thread leaders. During the May 27, 1999 meeting, DFAS Headquarters personnel, acknowledged the need for oversight and agreed to provide the details immediately.

In addition, the Master Plan was not issued until May 11, 1999, and in some cases had not arrived at the event leader level until May 18, 1999. However, functional event plans and allocation of responsibilities was already occurring. As a result, the individuals delegated the responsibilities may not have been appropriate. For example, for the Travel pay event, the same person was tasked as both the functional proponent and the event leader. As a result, it precludes the separation of duties by allowing one function to oversee the other function. To ensure that the 4 levels of responsibility are appropriately staffed, the DFAS Headquarters Project Office should review the assigned personnel and ensure that they are aware and understand their delegated responsibilities.

2. **Master Plan Checklists.** The DFAS Y2K Master Plan included four checklists to be used by DFAS Headquarters personnel, the functional area proponent, the event leader, and the tester. These checklists require DFAS personnel to assess the effectiveness of the end-to-end testing program at each designated level including such items as assessing the adequacy of testing staff, funds, and interface agreements. The DFAS Master Plan stated that these checklists would "provide independent auditors with evidence of compliance with the end-to-end test requirements," however, the Master Plan did not make completion of the checklists mandatory.

We believe the checklists should be mandatory and maintained at the functional level along with test results. The 2 to 3 page checklists provide an excellent means to ensure and document that essential steps were taken prior to performing end to end testing of DFAS functional areas. Completion of the planning section of these checklists provides a tool to help ensure compliance with the Master Plan requirements and allow for early corrections of deviations or omissions from the plan. Further, use of the checklist affords standardization of the process used throughout DFAS for end to end test planning efforts. Without the use of the checklists, DFAS lacks assurance that the testing was complete, adequate, and consistent. We also believe that a

signature block or notation should be included in the checklists to establish accountability for the responses and to facilitate quick actions should a problem arise later.

3. **Interfacing Systems.** DFAS relies heavily on interfacing systems to provide the majority of data included in DFAS systems. As such, coordination and compatibility of data exchanged with interfacing systems is critical to ensuring successful Y2K end to end tests. If data from a non-compliant system feeds into a DFAS system, the potential exists for the DFAS system to not be able to function properly after Y2K. The level of assurance being obtained by DFAS functional area officials regarding Y2K compliance of interfacing systems varies from exchanging documentation to merely assuming that interfacing systems are compliant or relying on verbal responses

Given the significant potential impact of interfaces on successful testing, we believe that DFAS functional leaders should take the extra step to validate that key interfacing systems are, in fact, compliant. Information on the compliance of each DoD mission critical system should be available in the OSD database. As such, DFAS personnel for the functional areas should be able to access the database and validate that those applicable interfacing partners are clearly designated as Y2K compliant before entering the end-to-end test. We discussed this matter with DFAS Headquarters officials who agreed that, while they are only testing with compliant interfacing partners, it is reasonable that DFAS review the database to ensure that interfacing partners are compliant prior to testing.

4. **Critical Crossover Dates.** The DFAS Master Plan identified 5 critical crossover dates as mandatory for inclusion during end-to-end tests. The dates are consistent with the 5 dates recommended by the Assistant Secretary Defense (Command, Control, Communications, and Intelligence) The dates are fiscal year 2000, calendar year 2000, leap year crossing (February 29, 2000), fiscal year 2001, and calendar year 2001. Developers of DFAS test plans have not planned to test all 5 dates. For example, the Marine Corp Total Force System is only testing the leap year 2000 crossover. The Computerized Accounts Payable System is not testing the fiscal year and the calendar year 2001 crossovers. The reduced number of dates being tested is a result of

- The test plans being developed prior to the issuance of the DFAS Master Plan on May 11, 1999,
- Personnel pay systems, for example, not being impacted by fiscal year changes,
- Funding being allocated based on test plans developed prior to the Master Plan.

In order to ensure compatibility of interfacing systems, it is important that the same dates are tested, particularly where DFAS systems feed data to other systems. For example, data from systems within the Travel Pay test event feed into systems within the Disbursing test event. Further, once processed within disbursing, data is fed to both

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accounting and back to travel systems. Incoming files to the Automated Disbursing System (ADS) (part of the Disbursing test event) plan to test all dates specified in the DFAS Y2K Master Plan. However, the Travel Pay test event does not plan to test the fiscal year 2000 to 2001 crossover. As a result, the potential exists that data relying on the fiscal year 2000 to 2001 crossover may not function properly. Meanwhile, DFAS may report a successful test based on the less than 5 dates being tested.

It is important that interfacing systems select test dates in a similar manner to ensure Y2K data flows through each system appropriately. DFAS functional leaders should ensure that critical crossover dates for each of the seven functional areas are compatible prior to testing.

5. Data Collection and Analysis. The DoD Y2K Management Plan states that Y2K event output products such as plans and procedures should specify in detail what data needs to be collected, who will analyze the data, and how it will be analyzed. Essentially, the requirement is to define expected test results. Consistent with the DoD Plan, the DFAS Master Plan requires, as exit criteria to the test planning phase, that responsible parties specify pass/fail criteria for all tests, that data collection procedures are in place, and mechanisms needed to capture data are installed. The DFAS Master Plan, however, does not specify:

- What types of data should be collected to ensure consistency in reporting test results.
- A methodology for each DFAS organization to document the data collection process in the appropriate Event Plan

For the 7 DFAS functional events, data collection and data analysis plans are either nonexistent or do not ensure the tests will be judged objectively. For example, the Defense Industrial Financial Management System (DIFMS) Test Plan, which is part of the Accounting Test Event, plans to review reports, queried data, and DIFMS screens to accomplish data analysis, but did not establish expected test results criteria or a baseline that could be used to determine the adequacy or accuracy of the reports, queries, and screens. As another example, the Civilian Pay Event lacks either a data collection plan or a data analysis plan. Instead, the Event Leader indicated that years of prior testing and DCPS experience will identify discrepancies should they arise.

Both DoD and DFAS require the establishment of a structured approach to testing including identifying expected outcomes, test participants, and other details. Without such plans, there is no organized or standardized approach between the participating systems, nor any assurance that test goals are met and tests were successful. Given the nature of end-to-end testing, with its large numbers of participating or "partner" systems, it is prudent to ensure that the data collection is as consistent as possible for each event, and that the analysis of the test data is objective. Without the definition of data collection and data analysis plans before testing begins, this will be difficult.

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DFAS Functional Test Leaders need to ensure that detailed test collection, results, and analysis requirements are clearly defined prior to testing.

6. Transportation Pay Event. DFAS identified Transportation Pay as one of the 7 functional areas for testing purposes. However, DFAS has not yet developed an end-to-end test plan for the event. There are two systems involved in transportation, the Defense Transportation Pay System (DTRS) and the Military Traffic Management Command - Financial Management System (MTMC-FMS). The Transportation Pay Event Leader stated that MTMC-FMS testing during Y2K conversion process accomplished the end-to-end requirements of the Master Plan. DFAS has subsequently contracted with the Joint Interoperability Testing Command (JITC) to independently verify and validate the prior testing. We plan to follow-up on this functional area

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Appendix C. Defense Finance and Accounting Service, Response to Inspector General, DoD, Interim Report



DEFENSE FINANCE AND ACCOUNTING SERVICE

1931 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VA 22240-5291

JUN 8 1999

DFAS-HQ/S

MEMORANDUM FOR DIRECTOR, FINANCE AND ACCOUNTING DIRECTORATE
OFFICE OF THE INSPECTOR GENERAL, DEPARTMENT OF
DEFENSE

SUBJECT: Status of Audits of Financial Functional Area
Year 2000 End-to-End Tests

The attached outlines Defense Finance and Accounting Service (DFAS) response to the DoD Inspector General's (IG) initial review of and concerns about DFAS' End-to-End Test (E2E) Plans. DFAS recognizes that a great deal of work is still to be done to ensure all necessary requirements for E2E are accomplished. To meet this goal, DFAS has conducted meetings with event and thread leaders to review all E2E guidelines and requirements.

All concerns addressed in the DoD IG's memo are being addressed.

Roles and Responsibilities: Concur. Action to expand event and thread leader roles will be accomplished by June 25, 1999.

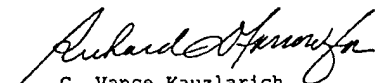
Master Plan Checklist: Non-concur. DFAS will not mandate the checklist.

Interfacing Systems: Concur. This action is considered completed, but with periodic updates.

Critical Crossover Dates: Concur. This action is completed.

Data Collection and Analysis: Concur. This is an ongoing action with no specific target date.

Transportation Pay Event: Concur. This is an ongoing action with a target completion date of June 30, 1999.


C. Vance Kauzlarich
Director for Information and Technology

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Roles and Responsibilities. Concur. DFAS acknowledges that testing and planning activities were occurring prior to the issuance of the Master Plan on 6 May. However, several coordination meetings had already occurred and guidance on developing Event Plans was issued on 31 March. DFAS also acknowledges the need to clarify and augment the roles and responsibilities of the event and thread leaders in the DFAS E2E Master Plan. We are currently making site visits and meeting with the testing teams to clarify roles and responsibilities and are updating the Master plan as well. It should be noted there may be an overlap in the area of responsibility, due to the fact that the internal DFAS support structure for each business process/application has a great bearing upon the specific breakout of roles and responsibilities. DFAS does not view this as a conflict or an inappropriate assignment of duties.

Master Plan Checklist. Non-concur. DFAS designed and issued these checklists as tools to assist DFAS personnel responsible for planning, tracking, and conducting end to end testing. Because each business area/application has a normal testing practice already established, DFAS did not make the checklists mandatory, and would prefer to keep the use of checklists optional. However, DFAS will encourage the use of the checklists whenever possible.

Interfacing Systems. Concur. DFAS agrees that coordination and compatibility of data exchange between DFAS systems and their interface partners is essential to a successful Y2K effort. DFAS has pursued this goal for the past two years. DFAS has established Interface Agreements with all of its interface partners. This effort generated in excess of 1400 agreements. In addition, DFAS has tracked and updated on a monthly basis the status of testing and compliance of each of its interface partners. DFAS system managers are well aware of the status of each of its partners. DFAS will continue to track and monitor the status of its interface partners mission critical and other.

Critical Crossover Dates. Concur. DFAS acknowledges the importance of testing as many dates as possible, and the coordination of these dates among partners. All DFAS managers have been encouraged to coordinate this initiative with all pertinent parties. It must be understood that dates do not necessarily play an important part in the relationship of one system to another. The DFAS E2E Master Plan has recently been updated to empower the Functional

Managers with determining which dates are critical for testing within their specific business process. We have also hired JITC to independently validate and verify our planning efforts.

Data Collection and Analysis. Concur. DFAS agrees that current plans lack specific exit criteria and we are taking action to strengthen this area of our plans. DFAS 8000.1-R, Part E, Chapter 3, Test and Evaluation provides guidance concerning data collection and analysis. Our central design activities normally plan and execute their tests, using this guidance, precluding the need for specific guidance to be issued relative to E2E testing.

Each testing agent within DFAS implements the regulation within their own construct, resulting in a non-standard, but successful, data collection and analysis process. Because Y2K E2E testing requirements are not system centric, but business process centric, we have hired JITC to independently validate and verify our E2E planning and testing efforts. The JITC analysis/evaluation will document specific risks associated with data collection and analysis procedures, in sufficient time for us to take corrective action.

Another measure of risk mitigation is to conduct site visits, where we meet with all thread participants. During these meetings we are emphasizing the need for adequate documentation of their data collection and analysis procedures, as well as documenting version control and configuration management procedures.

Transportation Pay Event. Concur. In addition to the Transportation Pay System, DFAS has identified several other systems, which claim completion of the end to end testing initiative. JITC will be used to verify that these systems indeed have met E2E requirements. If any system fails to pass the validation of JITC, steps will be initiated to complete all or any portion of the E2E process that needs to be completed.

Appendix D. Report Distribution

Office of the Secretary of Defense

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Director, Defense Logistics Studies Information Exchange
Under Secretary of Defense (Comptroller)
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 Deputy Chief Information Officer and Deputy Assistant Secretary of Defense (Chief
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Department of the Navy

Assistant Secretary of the Navy (Financial Management and Comptroller)
Inspector General, Department of the Navy
Auditor General, Department of the Navy
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Assistant Secretary of the Air Force (Financial Management and Comptroller)
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 Information Management Division

Congressional Committees and Subcommittees, Chairman and Ranking Minority Member

Senate Committee on Appropriations
Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
Senate Special Committee on the Year 2000 Technology Problem
House Committee on Appropriations
House Subcommittee on Defense, Committee on Appropriations
House Committee on Armed Services
House Committee on Government Reform
House Subcommittee on Government Management, Information, and Technology,
 Committee on Government Reform
House Subcommittee on National Security, Veterans Affairs, and International
 Relations, Committee on Government Reform
House Subcommittee on Technology, Committee on Science

Defense Finance and Accounting Service Comments



DEFENSE FINANCE AND ACCOUNTING SERVICE

1931 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VA 22240-5291

DFAS-HQ/S

SEP 30 1999

MEMORANDUM FOR DIRECTOR, FINANCE AND ACCOUNTING DIRECTORATE
OFFICE OF THE INSPECTOR GENERAL, DEPARTMENT OF
DEFENSE

SUBJECT: Draft of a Proposed Audit Report on Defense Travel Pay Year 2000
End-to-End Testing (Project No. 9FG-9031)

The Defense Finance and Accounting Service response to the Department of Defense
Inspector General's Report on Defense Travel Pay Year 2000 End-to-End Testing is attached.

The recommendations in subject report are being implemented as outlined. Defense
Travel Pay test scenarios have been defined, documented, and tested with Y2K compliant
systems.

A handwritten signature in cursive script, appearing to read "C. Vance Kauzlarich".

C. Vance Kauzlarich
Director for Information and Technology

Attachment:
As stated

COMMENTS ON
DRAFT REPORT OF AUDIT
ON TRAVEL
YEAR 2000 END-TO-END TESTING
PROJECT NO 9FG-9031

1. **Recommendation #1** - Verify the accuracy and completeness of the list of systems in the travel pay business process that should be included in end-to-end testing.

DFAS Comments - Concur. DFAS has developed four (4) scenarios intended to test the travel pay business area. The scenarios identified the systems that would be involved in the test and their relationship in the document flow and event cycles required to complete the thread of a paid travel voucher. Test Scenarios were developed on site at Indianapolis Center 7/16/99. Scenarios were refined and finalized in August. Action completed 8/25/99.

2 **Recommendation #2** - Verify that systems certified as Y2K compliant were used to complete end-to-end testing.

DFAS Comment - Concur. DFAS has completed additional Y2K end-to-end testing with the SRD-1 disbursement system after SRD-1 was certified Y2K compliant. Estimated completion 9/16/99. The Y2K office is awaiting verification of completion.

3. **Recommendation #3** - Monitor the development of test scenarios to ensure that they are completed in a detailed and consistent manner, and verify that scenarios are completed for each of the four travel pay threads.

DFAS Comment - Concur Each Thread leader was provided a standard format to develop test scenarios. All scenarios included complete and sufficient data and were developed in a detailed and consistent manner. Estimated completion 9/29/99.

4 **Recommendation #4** - Take alternative measures to reduce the risks that systems in the travel pay business process will not be able to process data successfully after 2000. Alternative measures may include performing supplementary end-to-end tests of the event, using code scanners, or expanding contingency plans.

DFAS Comment - Concur. With the assistance of the Joint Interoperability Testing Command (JITC) DFAS has refined its approach to Y2K end-to-end testing. We have developed and implemented standard and comprehensive documentation procedures that provide the Agency reasonable assurance that risks resulting from Y2K threats will be mitigated. Actions to perform supplementary end-to-end tests were initiated during the site visit to Indianapolis in June 1999 with expected completion date of 9/29/99. Live testing of the Travel business process contingency plan was conducted on 14 and 15 June 1999.

Revised attachment:CAM:10/6/99

Audit Team Members

The Finance and Accounting Directorate, Office of the Assistant Inspector General for Auditing, DoD, prepared this report. Personnel of the Office of the Inspector General, DoD, who contributed to the report are listed below.

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INTERNET DOCUMENT INFORMATION FORM

A . Report Title: Defense Travel Pay Year 2000 End-To-End Testing

B. DATE Report Downloaded From the Internet: 02/09/99

C. Report's Point of Contact: (Name, Organization, Address, Office Symbol, & Ph #):
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D. Currently Applicable Classification Level: Unclassified

E. Distribution Statement A: Approved for Public Release

F. The foregoing information was compiled and provided by:
DTIC-OCA, Initials: __VM__ Preparation Date 02/09/99

The foregoing information should exactly correspond to the Title, Report Number, and the Date on the accompanying report document. If there are mismatches, or other questions, contact the above OCA Representative for resolution.