

**DOCUMENT RESUME**

05922 - [B1566594]

[Review of Army's Efforts To Develop TACFIRE]. LCD-78-116;  
B-163074. June 2, 1978. 10 pp. + 7 enclosures (28 pp.).

Report to Sen. William Proxmire; by Elmer B. Staats, Comptroller  
General.

Issue Area: Automatic Data Processing: Design, Development, and  
Installation of Software (106).

Contact: Logistics and Communications Div.

Budget Function: Miscellaneous: Automatic Data Processing  
(1001).

Organization Concerned: Department of the Army.

Congressional Relevance: House Committee on Armed Services;  
Senate Committee on Armed Services. Sen. William Proxmire.

After more than 10 years of effort, the Army's Tactical Fire Direction System (TACFIRE) was completed in January 1978. The Government must now decide whether TACFIRE should enter full-scale production while communications, maintenance, equipment, and software problems still exist. The TACFIRE equipment tested during Operational Test III and scheduled for production is not the equipment the Army plans to field; the Army has identified new equipment based on updated technology as potential replacement for certain TACFIRE components. Computer programs for nuclear fire planning and corps artillery operations need to be tested and completed before TACFIRE is fielded. The programs need to be rewritten because of changes made to nuclear doctrine in July 1977, but rewriting has not yet begun. The TACFIRE compiler, a program that converts programmer language to machine-readable instructions, contains at least 27 deficiencies that could disrupt computer operations and cause data processing errors. The production decision should be delayed to give the Army time to: complete software development; correct known system problems and deficiencies; complete development, testing, and evaluation of new equipment and associated software; and assess the impact that the changes will have on the TACFIRE contracts, production schedules, and deployment requirements. The Secretary of Defense should direct the Army to delay full-scale production of TACFIRE to permit the program to be reassessed. (RRS)

6594



COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

B-163074

June 2, 1978

The Honorable William Proxmire  
United States Senate

Dear Senator Proxmire:

Pursuant to your June 21, 1977, request, we have reviewed the Department of the Army's efforts to develop the Tactical Fire Direction System (TACFIRE). Our findings, conclusions, and recommendations, presented orally to your staff on February 3, 1978, are summarized below.

TACFIRE DEVELOPMENT COMPLETED

After more than 10 years of effort, TACFIRE's development phase was completed in January 1978, when Operational Test III ended. The Government must now decide whether TACFIRE should enter full-scale production. The Army Systems Acquisition Review Council is to make this decision in September 1978 based on the results of Operational Test III and other factors.

We don't know whether the test results will show that TACFIRE is ready for production, since the Army's calculations of the results have not yet been completed. However, our observations indicate that some problems, including communications, maintenance, equipment, and software problems, still exist.

Communications problems

TACFIRE uses digital communications and a digital message device to link the forward observers with the TACFIRE computer at the battalion level. This link is the primary path for inputting fire mission data into TACFIRE. The Army encountered problems with it during Operational Test III.

The tactically deployed forward observers of the 2/19 Field Artillery Battalion, using the digital message device with standard Army field radios, were unable to consistently transmit fire missions digitally to the battalions' fire direction centers. Raw data recorded by the Army testers

LCD-78-116  
(941134)

showed that only 28 percent of the tactically deployed forward observers' digital transmissions during the testing period were successful. When digital communications did not work, the forward observers reverted to voice communications.

The Army has not identified the cause of the communication problems. However, the problems may be caused, partly or wholly, by the use of standard Army radios designed primarily for voice communications. This was true even though the radios used in the test were finely tuned and supported by extraordinary maintenance measures, including special training and the use of civilian depot maintenance personnel.

### Maintenance problems

Equipment was repaired under a different maintenance concept from that intended for use in the test. The planned concept required equipment users to make 90 percent of the repairs onsite within an hour and to report those that could not be made within that time to the direct support maintenance battalion. The maintenance battalion was to make all other repairs except those requiring general support or depot-level maintenance.

However, during the test, equipment users reported equipment breakdowns immediately to the maintenance battalion, which in turn replaced troublesome components with operable ones. The replaced components were then sent to a Litton-operated maintenance facility for repairs. This facility handled depot-level maintenance, which will be done at Tobyhanna, Pennsylvania, when TACFIRE becomes operational.

Because the maintenance concept was not followed, the test was not a realistic exercise of the system. Consequently, the test did not provide sufficient data to properly determine the mean-time-to-repair, spare parts allocations, validity of the maintenance concept, or ability of the equipment users to make repairs. Without a fully developed and tested maintenance capability, there is little assurance that TACFIRE will be maintainable under critical operational conditions.

### Equipment and software problems

During the 12-day test, the Army encountered numerous equipment and software problems that may preclude TACFIRE from meeting the operational requirement of a mean time

between failures of 150 hours. The problems included many computer dumps and freezes like those experienced during the earlier Developmental Test III and various equipment problems involving line printers, digital data terminals, digital message devices, and mass core memory units.

The dumps and freezes shut down computer operations and caused (1) systems to be reloaded and restarted and (2) data bases to be reconstructed at a frequency not expected of a computer that has completed its development phase. Despite these problems, testing was not delayed, primarily because of backup computer procedures and the different maintenance concept employed. According to a testing official, had the intended maintenance concept been used, testing would have been administratively stopped because the supply of spare parts and components would have been exhausted after 3 days of testing.

Because of the problems, the operational test results most likely will not conclusively show that TACFIRE is operationally ready or that it should enter full-scale production without corrective actions. Those problems alone may be sufficient to delay production. However, of more significance is TACFIRE's lengthy development, which has produced, in our opinion, a technologically outdated system that apparently will be obsolete before production is completed. As a result, the Army plans to make major changes in key TACFIRE components.

#### NEW EQUIPMENT TO REPLACE TACFIRE COMPONENTS

The TACFIRE equipment tested during Operational Test III and scheduled for production is not the equipment the Army plans to field. The Army has identified new equipment based upon today's technology as potential replacement for certain TACFIRE components. The equipment is being developed with Government funding but has not yet been tested as part of TACFIRE.

#### Battery level computers

The Army is developing a battery level computer to give the firing batteries a computational capability integrated with TACFIRE. The computer will replace the obsolescent computing device called FADAC, which was fielded in 1964, and the TACFIRE Battery Display Unit, which provides the

batteries with firing data. Its introduction into TACFIRE will satisfy a longstanding requirement for battery-autonomous operations.

The battery level computer needs to be tested with TACFIRE, particularly to determine the adequacy of the interfacing software. This is to be done in November 1978.

#### Replacement computer

The Army has identified two fourth-generation computers (one Litton and one Control Data Corporation) as potential replacements for the TACFIRE computer, which is technologically outdated. It is competitively testing these computers at the direction of the Office of the Secretary of Defense. The purpose of the testing is to introduce competition into TACFIRE and other major development programs, such as the Tactical Operations System and the Missile Minder which use the TACFIRE computer, and to determine whether to retain or replace the TACFIRE computer. The testing was scheduled to be completed in March 1978; the replacement decision will be made in September.

Replacing the TACFIRE computer with a modern technology computer offers a number of advantages, including faster computations, increased operational reliability, fewer maintenance requirements, and compactness. The latter advantage would allow the Army to reduce the size of the TACFIRE equipment and thus increase operating space, which is presently cramped, within the van housing the equipment. Also, the replacement would eliminate potential supply problems of providing parts for outdated circuitry and subcomponents.

Acquiring a new TACFIRE computer would significantly affect the program. Its introduction would delay production schedules to permit system testing. Also, if it is not the Litton computer, all production options not exercised will be voided and new contracting may be required. According to Litton and Control Data, enough of the new computers could be available for system testing in November 1979.

#### Digital message device

The digital message device is used by the forward observer to input target information into TACFIRE. This component is being redesigned to incorporate new circuit

technology and to reduce its size. The new device should be available for testing with TACFIRE by June 1980.

### Secure digital message device

The present digital message device is unsecured. Transmissions need to be manually encrypted. Otherwise, they must be sent in clear text that can be intercepted and used by enemy forces to disclose the forward observer position, friendly units' locations, and other tactical information. This deficiency is being corrected through the development of a crypto device, which is now available for testing with TACFIRE.

### Digital data terminal

The digital data terminal is the communications equipment link between the computer and TACFIRE's input devices. It is being redesigned to incorporate new technology that will increase communications throughput and reliability. The increased throughput is significant because the Army's new fire support team concept substantially increases the number of forward observers that will be inputting data into TACFIRE. The faster terminal, which should be ready for TACFIRE testing in June 1980, will provide a greater capacity to handle the increased communications.

### Magnetic tape unit

A new magnetic tape unit, used to load the TACFIRE computer, has been developed to correct operating deficiencies. This unit is presently available for testing.

### Digital plotter map

The existing plotter map is subject to mechanical failure and is considered inadequate. Electronic maps that have been developed and are being tested should be available in June 1982.

### TACFIRE APPLICATION SOFTWARE NOT COMPLETED

Computer programs for nuclear fire planning and corps artillery operations need to be completed and tested before TACFIRE is fielded. The programs that had been written for nuclear fire planning need to be rewritten because of changes

made to nuclear doctrine in July 1977. This rewriting has not yet begun.

TACFIRE is supposed to operate under the Army's corps structure, in which the corps commander directs and controls the artillery at all echelons. This requires TACFIRE, and particularly the computer programs used at the corps, division, and battalion echelons, to be interoperable and integrated. TACFIRE has accomplished this at the division and battalion levels, but the programs needed to automate the corps operations and to integrate them into TACFIRE have not yet been developed.

The development of the corps programs will affect the completed parts of TACFIRE. Changes to division and battalion computer programs, communications software, and operating procedures will be required to integrate the corps artillery operations into TACFIRE. Also, more equipment will be needed to process the additional workload. The effort will be substantial, but until it is completed and tested, TACFIRE will not be a complete system.

The Army received a proposal from Litton in August 1977 to do the development work. The proposal has not been accepted, purportedly because of the Army's desire to do the work in-house. The Army presently does not have a work plan or a target date for completing the work.

#### TACFIRE COMPILER IS DEFICIENT

The TACFIRE compiler, a program that converts programmer language to machine-readable instructions, was purchased from Litton. It contains at least 27 deficiencies that can disrupt computer operations and cause data processing errors. These deficiencies have been identified by Litton, which has proposed to fix them for about \$600,000.

#### NEED FOR SMART TERMINAL

TACFIRE includes a variable format message entry device that provides two-way digital communications between the fire direction center and remote users. This device restricts communications because it cannot be programmed to perform certain functions and it lacks the ability to store and forward messages. The need for a programmable or smart terminal is recognized by the U.S. Army Field Artillery School.

CONCLUSION

The new equipment developments offer the Army an opportunity to improve and upgrade TACFIRE before it enters full-scale production and to preclude costly retrofitting. This opportunity--coupled with the need to complete software development (particularly corps software) and the uncertainty of whether TACFIRE, as presently configured, will work adequately after it is fielded--indicates that the production decision should be delayed.

The delay will give the Army time to (1) complete software development, (2) correct known system problems and deficiencies, (3) complete development, testing, and evaluation of new equipment and its associated software, and (4) assess the impact that the changes will have on the TACFIRE contracts, production schedules, and deployment requirements. It will also give the Army an opportunity to plan and incorporate the Reserve Forces requirements into the TACFIRE program. Presently, none of those requirements are in the program, although the Reserve Forces have about 55 percent of the Army's artillery.

We recognize that delaying production may affect TACFIRE's October 1980 scheduled deployment to Europe, where it is most needed. However, we believe that the advantages of deploying an improved, completed, and fully tested TACFIRE would justify delaying deployment. This belief is compatible with those of the Commanding General of the U.S. Army Training and Doctrine Command and the Commanding General of the U.S. Army, Europe.

The latter has stated that a complex system such as TACFIRE should be thoroughly tested in the continental United States and then issued to Europe with proven logistic, maintenance, and training packages. He added that the deployment of TACFIRE with the battery computer system was considered a significant advantage.

The Commanding General of the U.S. Army Training and Doctrine Command has stated that while the need to deploy a combat multiplier such as TACFIRE to Europe at the earliest possible date is understood, the danger of hastily introducing a new complex system before establishing a thoroughly stressed logistics package, refined and tested doctrine (especially corps), plus equipping our force with a mixture of equipment, greatly outweigh the advantage of early



introduction. These statements were made in response to an inquiry into whether TACFIRE should be deployed 10 months earlier than scheduled.

#### RECOMMENDATION

We recommend that the Secretary of Defense direct the Army to delay full-scale production of TACFIRE to permit the program to be reassessed. Specifically, a special Defense Systems Acquisition Review Council should be convened to consider the two alternatives of redesign and redirection of the program to incorporate the system improvements that have been identified. Of these alternatives, we recommend that TACFIRE be redirected so that the Active and Reserve Forces can be equipped with an improved, completed, and fully tested TACFIRE within the shortest time. The details of this recommendation are included in our briefing document.

#### AGENCY COMMENTS

We discussed our review with officials of the Office of the Secretary of Defense and the Department of the Army. The Army's Director of Combat Support Systems (Office of the Deputy Chief of Staff for Research, Development and Acquisition) acknowledged the existence of the system improvements. According to him, development programs often lag behind technology and continual attempts to catch up would tend to keep programs in the development stages. He said that new equipment or improvements will always be available but that at some point a decision must be made to go with a certain equipment configuration or technology. He concluded that in such cases, a system can be upgraded by retrofitting or replacing equipment with higher performance equipment or components.

We agree that technology is elusive and that retrofitting is a way of catching up after a system is developed and produced. However, in the case of TACFIRE, technology that can improve the system is available now, before full-scale production begins. Moreover, the enhancements under consideration constitute major realignments of the system. We believe that the Defense Systems Acquisition Review Council should determine which of the improvements we itemized should be included in the production configuration and which should be postponed for future incorporation.

The officials also commented on the various test results, including our observations of Operational Test III, and financial matters. Where appropriate, we modified our briefing document to accommodate their views.

Your staff requested a copy of the briefing document containing the information presented above for your use during hearings on the fiscal year 1979 military budget. We are formally transmitting a copy of that document as enclosure I. Five classified pages have been withdrawn, but we can provide them to you separately if you wish.

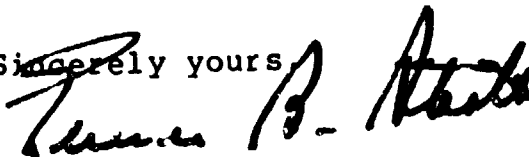
We are also transmitting the following information, requested by your office, as enclosures II through VII.

- II. Deputy Secretary of Defense memorandum for the Secretary of the Army, dated January 28, 1975, concerning production approval for TACFIRE.
- III. Office of the Director of Defense Research and Engineering memorandum for the Assistant Secretary of the Army (Research and Development), dated February 20, 1975, concerning TACFIRE Program Supplementary Guidance.
- IV. General Blanchard's message, dated August 5, 1977, concerning TACFIRE deployment and fielding.
- V. General Starry's letter to General Kerwin, Army Vice Chief of Staff, dated August 26, 1977, concerning TACFIRE deployment in Europe by October 1980.
- VI. General Kerwin's letter to General Starry, dated September 12, 1977, concerning TACFIRE deployment in Europe.
- VII. Abstract of Modification 130 to the Litton TACFIRE contract, which established a \$1 million incentive for Litton to fix software problems.

If you desire, we will gladly meet with you to discuss TACFIRE in greater detail or provide other assistance.

As discussed with your office, we are sending copies of this letter and enclosures to the Chairmen of the Senate and House Committees on Appropriations and Armed Services, the Secretary of Defense, the Secretary of the Army, and other interested parties.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Thomas B. Smith". The signature is written in a cursive style with a large initial "T" and "S".

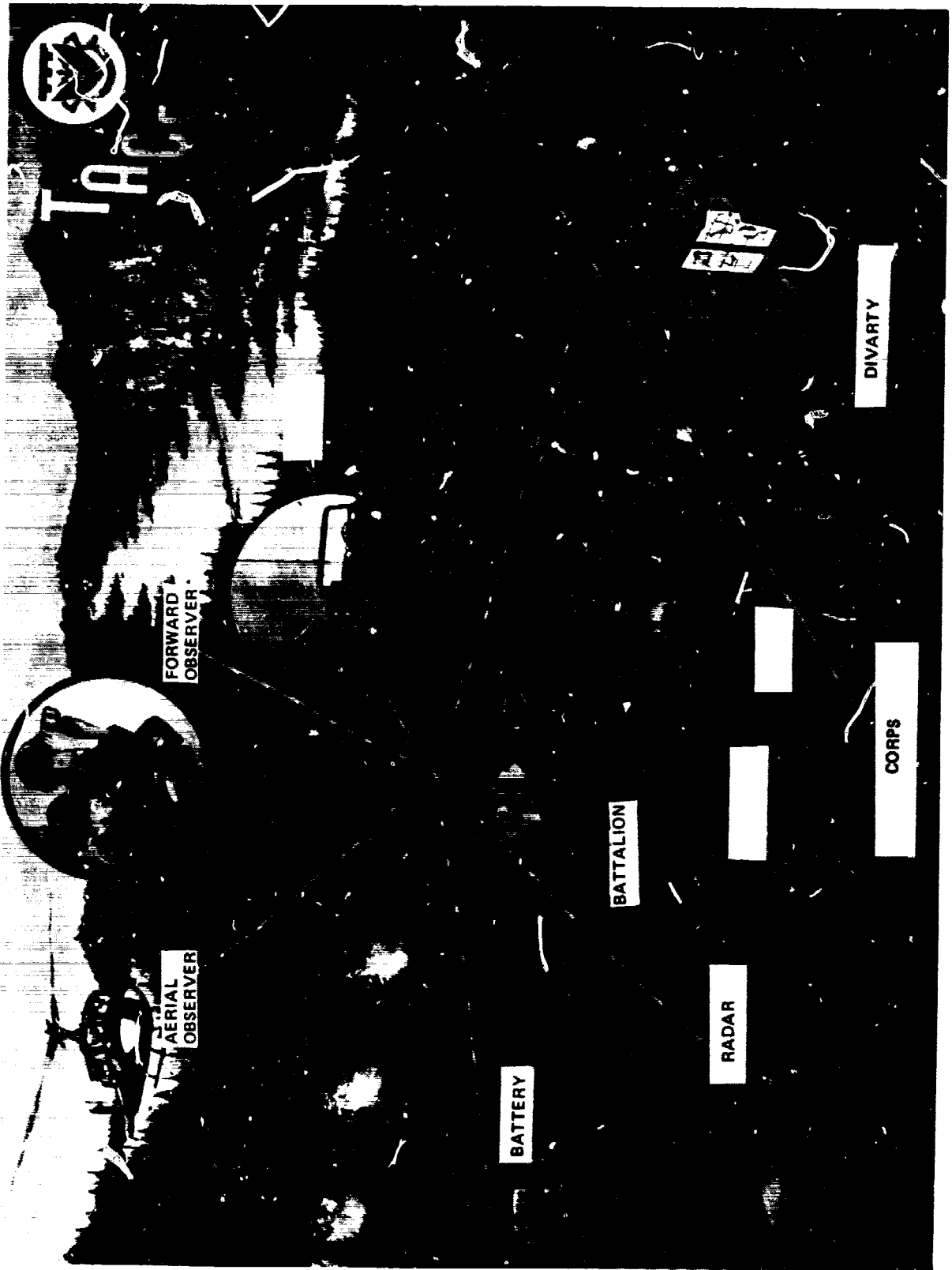
Comptroller General  
of the United States

Enclosures - 7

ENCLOSURE I

ENCLOSURE I

TACFIRE BRIEFING DOCUMENT



NOTE: The following classified pages have been omitted:

- (1) Page 3 (confidential) - Cost and Schedule Variations
- (2) Page 12 (confidential) - GAO Findings
- (3) Page 13 (confidential) - Additional TACFIRE Program Costs.
- (4) Annex A, 2 pages (Secret) - Electromagnetic Compatibility and Vulnerability.

TACFIRE BRIEFING DOCUMENT

TACFIRE PROGRAM

MILITARIZED, INTEGRATED ON-LINE COMPUTER SYSTEM USED BY FIELD ARTILLERY TO:

- AUTOMATE BALLISTIC CALCULATIONS
- COORDINATE TACTICAL SITUATION DATA IN THE PERFORMANCE OF FIRE MISSIONS AND FIRE PLANNING

OBJECTIVE:

- INCREASE EFFECTIVENESS OF FIELD ARTILLERY FIRE SUPPORT THROUGH INCREASED ACCURACY, BETTER AND MORE RAPID USE OF TARGET INFORMATION, AND GREATER EFFICIENCY IN THE DETERMINATION OF FIRE CAPABILITIES AND THE ALLOCATION OF FIRE UNITS TO TARGETS.

REQUIREMENT:

- TACFIRE IS THE APPLICATION OF AUTOMATIC DATA PROCESSING (ADP) AND EQUIPMENT TO SEVEN FIELD

ARTILLERY FUNCTIONS, NAMELY:

- AMMUNITION AND FIRE UNIT STATUS
- FIRE PLANNING (NUCLEAR AND NON-NUCLEAR)
- ARTILLERY TARGET INTELLIGENCE
- TACTICAL FIRE CONTROL
- TECHNICAL FIRE CONTROL
- METEOROLOGICAL DATA
- ARTILLERY SURVEY

TACFIRE BRIEFING DOCUMENT

## FIELDING LEVELS:

--TACFIRE COMPUTER SYSTEMS WILL BE LOCATED AT THE CORPS, GROUP, DIVISION, BATTALION, AND BATTERY LEVELS. SYSTEM INPUT IS PROVIDED BY THE DIGITAL MESSAGE DEVICE AND THE VARIABLE FORMAT MESSAGE ENTRY DEVICE.

## PROCUREMENT CONTRACT

1956-1966 CONCEPT FORMULATION PHASE - THE ARMY PLANNED A PROGRAM FOR THE DEVELOPMENT OF A TACTICAL AUTOMATIC DATA PROCESSING SYSTEM (TACFIRE).

JUN 66 DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING DIRECTED TACFIRE TO UNDERGO A COMPETITIVE CONTRACT DEFINITION PHASE.

FEB 67 ARMY DECIDED TO AWARD CONTRACT DEFINITION TO: BURROUGHS, IBM, AND LITTON. TOTAL OF \$3.7 MILLION.

DEC 67 TOTAL PACKAGE PROCUREMENT CONTRACT AWARDED TO LITTON WHO HAD THE BEST TECHNICAL APPROACH AT THE LOWEST PRICE. THE CONTRACT HAD PRICE, SCHEDULE, AND PERFORMANCE INCENTIVES.

MAR 73 TPP CONTRACT RESTRUCTURED BY MODIFICATION 88 INTO A 4-PHASE DEVELOPMENT AND PROCUREMENT CONTRACT.

JAN-JUNE 75 LIMITED PROCUREMENT AWARDED FOR 14 SETS.

SEPT 77 MODIFICATION 190 RESTRUCTURED SINGLE FULL SCALE PRODUCTION INTO 5 PRODUCTION OPTIONS.



TACFIRE BRIEFING DOCUMENT

DEVELOPMENT/TESTING HISTORY

ENGINEERING TEST/EXPANDED SERVICE TEST (ET/EST)

--PURPOSE--TECHNICAL AND OPERATIONAL TESTING TO DETERMINE THE SYSTEM'S READINESS FOR PRODUCTION

--TEST CONDUCTED APRIL 1972 FEBRUARY 1973

--NUMEROUS HARDWARE AND SOFTWARE PROBLEMS DETECTED. ET/EST SUSPENDED AND A FIND, FIX, TEST MODE WAS INITIATED.

DEVELOPMENTAL TEST/OPERATIONAL TEST II (DT/OTII)

--PURPOSE--DETERMINE WHETHER THE SYSTEM COULD BE USED IN AN OPERATIONAL ENVIRONMENT. IF SUCCESSFUL, A FULL SCALE PRODUCTION DECISION COULD BE MADE. IF UNSUCCESSFUL, MORE TESTING WOULD BE DONE.

--TEST CONDUCTED MAY-NOVEMBER 1974

--CONFIGURATION TESTED - 1 DIVISION AND 2 BATTALION SYSTEMS

--NUMEROUS SOFTWARE AND HARDWARE PROBLEMS IDENTIFIED

--AFTER DT/OT II, LITTON INDUSTRIES WAS GIVEN INCENTIVE CONTRACT TO FIX SOFTWARE AND RELATED

PROBLEMS

LITTON FIXED SOFTWARE PROBLEMS AND RECEIVED A \$1,000,000 INCENTIVE PAYMENT

LIMITED PROCUREMENT AWARD (14 SETS) ON JANUARY, 1975

FINAL QUALIFICATION TEST (FQT)

--TEST CONDUCTED NOVEMBER-DECEMBER 1976

--CONFIGURATION TESTED - 1 DIVISION AND 1 BATTALION SYSTEM

--COST OF TEST - \$330,000

--PRIMARILY A SOFTWARE TEST TO VERIFY THAT THE SYSTEM IS READY FOR FIRST ARTICLE TESTING (FAT)

--605 SOFTWARE PROBLEMS IDENTIFIED

TACFIRE BRIEFING DOCUMENT

FIRST ARTICLE TEST (FAT)

- TEST CONDUCTED FEBRUARY - MAY 1977
- CONFIGURATION TESTED - 1 DIVISION AND 4 BATTALION SYSTEMS
- COST OF - \$1.047 MILLION
- TO VERIFY THAT THE LIMITED PROCUREMENT (LP) SYSTEM PERFORMS UNDER LOAD IN A TOTAL SYSTEM

ENVIRONMENT

--RESULTS

- VERIFIED THAT 494 OF 605 FQT PROBLEMS WERE CORRECTED
- 390 ADDITIONAL OPERATIONAL DISCREPANCIES IDENTIFIED

PRODUCT IMPROVEMENT TAPE TEST (PIT)

- TEST CONDUCTED MAY - JULY 1977
- CONFIGURATION TESTED - 1 DIVISION AND 1 BATTALION SYSTEM
- SOFTWARE TEST TO DETERMINE IF PROBLEMS FOUND IN FQT AND FAT HAD BEEN CORRECTED

--RESULTS

- VERIFIED THAT 52 MORE OF THE 605 FQT PROBLEMS WERE CORRECTED
- VERIFIED THAT 226 OF 390 FAT PROBLEMS WERE CORRECTED
- 12 ADDITIONAL PROBLEMS WERE DISCOVERED DURING PIT

TACFIRE BRIEFING DOCUMENT

FORCE DEVELOPMENT TEST AND EVALUATION (FDTE)

- TEST CONDUCTED - MAY-JULY 1977
- COST - \$253,000

--DETERMINE IF INTRODUCTION OF TACFIRE REQUIRES CHANGES IN ARTILLERY DOCTRINE, TACTICS, OR

TECHNIQUES

--RESULTS

--ARTILLERY DOCTRINE CHANGED TO DECENTRALIZE FIRE PLANNING.

DEVELOPMENTAL TEST III (DT III)

- COST OF TEST - \$1.956 MILLION
- TEST CONDUCTED - AUGUST-SEPTEMBER 1977
- CONFIGURATION TESTED - 1 DIVISION AND 4 BATTALIONS

--OBJECTIVE:

PROVIDE TEST RESULTS AND SYSTEM EVALUATION TO ASARC IIIa (September 3, 1978) TO SUPPORT THE  
 DECISION FOR FULL SCALE PRODUCTION.

--TEST WAS CONDUCTED USING VERSION 71A OF OPERATING SYSTEM TAPE. THE TAPE WAS DELIVERED WITH 85  
 SOFTWARE PATCHES ON THE DIVISION SYSTEM AND 60 PATCHES ON THE BATTALION SYSTEM.  
 --MESSAGE DATED AUGUST 17, 1977 FROM THE TEST AGENCY TO THE COMMANDING GENERAL, TECOM STATED THAT  
 SOFTWARE EVALUATION COULD NOT ADEQUATELY BE DONE DUE TO EXCESSIVE PATCHES AND OTHER PROBLEMS  
 ENCOUNTERED DURING INITIAL PHASES. THE TESTER RECOMMENDED THAT HARDWARE TESTING PROCEED ACCORDING  
 TO PLAN, BUT SOFTWARE EVALUATION BE TERMINATED.

TACFIRE BRIEFING DOCUMENT

--TESTERS WERE DIRECTED TO CONTINUE TEST OPERATIONS AND DO THE BEST JOB POSSIBLE TO EVALUATE SOFTWARE.  
 --RESULTS

--209 OPERATING SYSTEM SOFTWARE PROBLEM AREAS IDENTIFIED

--FOUR MAJOR SOFTWARE PROBLEM AREAS DETECTED

## FILE MANAGEMENT

SALVAGE POINT RECORDING

PRIORITIES AND INTERRUPTS

DUMPS, FREEZES, LOCKUPS

--MEAN TIME BETWEEN FAILURE REQUIREMENT OF 150 HOURS WAS NOT MET (119 HOURS ACHIEVED)

--ORGANIZATIONAL MAINTENANCE REQUIREMENT OF 90% NOT MET (46% WAS ACCOMPLISHED)

--COMMUNICATIONS PROBLEMS WERE ENCOUNTERED--LOSS OF ACKNOWLEDGEMENTS, SYSTEM SATURATION, AND  
 UNRELIABILITY OF AM COMMUNICATIONS.

--MAINTENANCE SUPPORT TEST PACKAGE WAS INADEQUATELY DEFINED DURING DT III.

--FIVE MAJOR HARDWARE DEFICIENCIES WERE NOTED:

NETS 2 AND 5 FAILED ON COMMUNICATIONS CONTROL UNIT

POWER FAILURES AFFECTED ELECTRONIC TACTICAL DISPLAY MAP

COMMUNICATIONS TERMINAL BOX FOOTPADS PREVENTED COLLECTIVE PROTECTION EQUIPMENT INSTALLATION

DEFECTIVE PAPER JAM SWITCH ON THE ELECTRONIC LINE PRINTER

ELECTRONIC LINE PRINTER PAPER IMPROPERLY SPLICED

TACFIRE BRIEFING DOCUMENT

TECHNICAL TESTERS CONCLUDED:

- OPERATIONAL TEST III SHOULD NOT TAKE PLACE USING THE OPERATING SYSTEM TAPE USED IN THIS TEST.
- THE HARDWARE PROBLEMS ARE NOT SERIOUS ENOUGH TO DELAY OT III. THEY CAN BE CORRECTED AND RETESTED.

GAO CONCLUSION OF DEVELOPMENTAL HISTORY

- TACFIRE SYSTEM ENCOUNTERED SERIOUS PROBLEMS THROUGHOUT ALL PHASES OF THE TEST CYCLE. IT DID NOT MEET MISSION REQUIREMENTS.

OPERATIONAL TEST III (OT III)

- COST OF TEST - \$1.037 MILLION
- TEST CONDUCTED - JANUARY 1978
- CONFIGURATION TESTED - 1 DIVISION AND 4 BATTALIONS (GROUP AND CORPS SIMULATED)

--OBJECTIVE

DETERMINE THROUGH OPERATIONAL TESTING IN A BATTLEFIELD ENVIRONMENT IF THE TACFIRE SYSTEM MEETS MISSION REQUIREMENTS THE RESULTS OF THIS TEST WILL BE USED IN ASARC IIIa TO MAKE A FULL SCALE PRODUCTION DECISION.

--RESULTS

TEST WAS CONCLUDED ON JANUARY 18, 1978. THE TEST REPORT WILL NOT BE AVAILABLE UNTIL APRIL 1978. GAO OBSERVATIONS OF SYSTEM PERFORMANCE

NUMEROUS HARDWARE AND SOFTWARE PROBLEMS WERE ENCOUNTERED.

TACFIRE BRIEFING DOCUMENT

GAO OBSERVATIONS OF SYSTEM PERFORMANCE (cont'd)

THE FORWARD OBSERVER DIGITAL COMMUNICATION LINK WITH THE FIRE DIRECTION CENTER DID NOT WORK.  
THE MAINTENANCE CONCEPT TESTING WAS INVALID AND WILL NOT ENABLE THE TEST AGENCY TO COLLECT ALL  
NECESSARY DATA.

TEST MANAGER CONCLUDED THAT OT III SHOULD HAVE BEEN STOPPED 3 DAYS AFTER IT STARTED.

--THE ARMY TRAINING AND DOCTRINE COMMAND SYSTEMS MANAGER CONCURRED WITH GAO OBSERVATIONS OF OT III  
IN THAT:

RELIABILITY, AVAILABILITY, AND MAINTAINABILITY DATA MAY NOT BE RELIABLE.

FORWARJ OBSERVER COMMUNICATION LINK WITH THE FIRE DIRECTION CENTERS HAD PROBLEMS.

PROCUREMENT GUIDANCE

--THE DEPUTY SECRETARY OF DEFENSE AND THE DEPUTY DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING ISSUED GUIDANCE IN FEBRUARY 1975 PROHIBITING COMMITMENT TO FURTHER TACFIRE PROCUREMENT UNTIL THE DT/OT II SYSTEM IS COMPLETED AND PROVEN IN DT/OT III.

TACFIRE CONTRACT RENEGOTIATED

--FULL SCALE PRODUCTION (FSP) OPTION WAS RENEGOTIATED INTO 5 SEPARATE OPTIONS ON SEPTEMBER 30, 1977.  
 --THE CONTRACT CONDITIONS WHICH WOULD HAVE CAUSED ARMY LIABILITY IN FY 78 FOR \$9.3 MILLION R & J RECOUPMENT WERE ELIMINATED.

FSP OPTION EXERCISED

--THE ARMY REPROGRAMMED \$17.4 MILLION IN JUNE 1977 TO PROCURE 10 TACFIRE SYSTEMS IN 1977 UNDER OPTION 1 AND \$44.4 MILLION TO PROCURE 12 SYSTEMS IN FY 78 UNDER OPTION 2.  
 --OPTION 1 WAS EXERCISED ON SEPTEMBER 30, 1977. OPTION 2 IS TO BE EXERCISED BY APRIL 1, 1978.  
 --THE \$9.3 MILLION R & D RECOUPMENT WHICH WAS TO BE ELIMINATED BY MODIFICATION 190 WAS PAID TO LITTON ON OCTOBER 6, 1977.

DECISION POINT

--ARMY SYSTEMS ACQUISITION REVIEW COUNCIL IIIa (ASARC IIIa) WILL MEET SEPTEMBER 1978 TO MAKE A FULL SCALE TACFIRE PRODUCTION DECISION.

TACFIRE BRIEFING DOCUMENT

## FINDINGS

-- TACFIRE EQUIPMENT TESTED TO DATE AND SCHEDULED FOR PRODUCTION IS NOT THE EQUIPMENT TO BE FIELDIED. THE ARMY PLANS TO FIELD TACFIRE WITH NEW EQUIPMENT AND IMPROVEMENTS BEING DEVELOPED WITH GOVERNMENT FUNDS WITHOUT CONDUCTING FULL CONFIGURATION TESTING. THE NEW EQUIPMENT AND IMPROVEMENTS IMPACT ON THE OPERABILITY OF TACFIRE AND NEED TO BE TESTED WITHIN THE TOTAL SYSTEM BEFORE TACFIRE IS PRODUCED.

--BATTERY LEVEL COMPUTER 11/78

--EMULATOR - 4th GENERATION COMPUTER (CENTRAL PROCESSOR, MEMORY, I/O UNIT) 11/79

--DIGITAL MESSAGE DEVICE UPGRADE 6/80

--SECURE DIGITAL MESSAGE DEVICE 6/80

--DIGITAL DATA TERMINAL 6/80

--MAGNETIC TAPE UNIT PRESENTLY AVAILABLE

-- NEW EQUIPMENT AND IMPROVEMENTS REQUIRE DEVELOPMENT OF INTERFACING SOFTWARE.

-- TACFIRE APPLICATION SOFTWARE IS NOT COMPLETE.

--NUCLEAR FIRE PLANNING

--CORPS ARTILLERY

-- TACFIRE COMPILER IS DEFICIENT.

--TACFIRE DOES NOT MEET THE NEED FOR A 'SMART' VARIABLE FORMAT MESSAGE ENTRY DEVICE.

1 THE INCORPORATION OF THE EMULATOR INTO TACFIRE IS DEPENDENT UPON AN ARMY DECISION TO BE MADE IN SEPTEMBER 1978.



TACFIRE BRIEFING DOCUMENT

ALTERNATIVE I

CONTINUE LIMITED PRODUCTION, OPTION 1 PRODUCTION, EXERCISE OPTIONS 2, 3, 4, 5. ALL IMPROVEMENTS OR CHANGES TO TACFIRE WILL BE ACCOMPLISHED THRU SUCCESSIVE RETROFITS.

AVAILABILITY:

--ALTERNATIVE I EQUIPS ALL FORCES IN THE SHORTEST AMOUNT OF TIME WITH TACFIRE (UNIMPROVED).

SUITABILITY:

--CONTINUOUS PRODUCTION OF TACFIRE (UNIMPROVED) WILL INHIBIT:

--ADEQUATE TEST AND CORRECTION OF ALL TACFIRE DEFICIENCIES.

--INTRODUCTION OF NEW SOFTWARE PACKAGES WHICH PROVIDE CRITICAL CAPABILITIES.

--ADEQUATE TEST AND INTEGRATION OF KNOWN EQUIPMENT IMPROVEMENTS.

EVALUATION FACTORS:

--FULL SCALE PRODUCTION OF A SYSTEM THAT IS INCOMPLETE AND UNREPRESENTATIVE OF CURRENT TECHNOLOGY AND UNTESTED, INTRODUCES A GREAT RISK OF DEGRADED PERFORMANCE AND SHARPLY INCREASED RETROFIT AND MAINTENANCE LIFE CYCLE COSTS. THE INITIAL PRODUCTION COSTS, HOWEVER, WILL BE MINIMIZED.

FULL SCALE PRODUCTION DECISION

--ALTERNATIVE I DOES NOT PROVIDE DECISION MAKERS THE CRITICAL INFORMATION ON COST AND PERFORMANCE THEY NEED TO MAKE A PRODUCTION DECISION.

NOTE:

--IT IS NO LONGER CORRECT TO VIEW TACFIRE AS A MINOR ACQUISITION SINCE THE TOTAL PROGRAM COSTS EXCEED \$2 BILLION. A DSARC SHOULD BE RECONVENED TO CONSIDER THE FULL SCALE PRODUCTION DECISION.

TACFIRE BRIEFING DOCUMENT

ALTERNATIVE II

CONTINUE LIMITED PRODUCTION AND OPTION 1.

DEVELOP AND TEST A REDESIGNED TACFIRE SYSTEM (COMPETITIVELY) FOR ACTIVE AND RESERVE FORCES.

THE INITIAL TACFIRE SYSTEMS WILL BE USED FOR FULL LIFE CYCLE BY THE TIME THE NEW SYSTEM IS AVAILABLE.

AVAILABILITY:

--ALTERNATIVE II EQUIPS ALL FORCES IN THE SHORTEST AMOUNT OF TIME WITH A TACFIRE SYSTEM THAT

IS REPRESENTATIVE OF MODERN TECHNOLOGY--A SYSTEM TOTALLY REDESIGNED USING STATE-OF-THE-ART TECHNOLOGY.

SUITABILITY:

--- FULL SCALE PRODUCTION OF A REDESIGNED SYSTEM SHOULD PROVIDE IMPROVED PERFORMANCE AND REDUCED LIFE CYCLE COSTS. THE PEDESIGNED SYSTEM, HOWEVER, MAY NOT BE AVAILABLE FOR YEARS.

EVALUATION FACTORS:

--THE INITIAL PRODUCTION COSTS WOULD BE CONSIDERABLY GREATER THAN IN ALTERNATIVE 1 OR 3, BUT THE REDESIGNED SYSTEM MAY BE DEVELOPED AND PROCURED ANYWAY AS A REPLACEMENT FOR THE CURRENT SYSTEM.

FULL SCALE PRODUCTION DECISION:

--THIS ALTERNATIVE COULD BECOME A REALITY IF THE DECISION IS MADE TO STOP PRODUCTION OF THE CURRENT SYSTEM AT ASARC IIIa (SEPTEMBER 1978).

NOTE:

--A DSARC SHOULD BE RECONVENED.

TACFIRE BRIEFING DOCUMENT

ALTERNATIVE III

WE BELIEVE THAT ALTERNATIVE III SHOULD BE SELECTED. -  
CONTINUE LIMITED PRODUCTION AND OPTION I PRODUCTION.  
DEVELOP AND TEST TACFIRE (IMPROVED), THEN CONTINUE PRODUCTION OPTION 2, 3, 4, 5, AND RESERVE QUANTITIES.  
THE INITIAL TACFIRE SYSTEMS WILL BE RETROFITTED LATER ON.

AVAILABILITY:

--ALTERNATIVE III EQUIPS ALL FORCES IN THE SHORTEST AMOUNT OF TIME WITH TACFIRE (IMPROVED).

SUITABILITY:

- A PAUSE IN PRODUCTION AFTER OPTION 1 WOULD ALLOW:
- ADEQUATE TEST AND CORRECTION OF ALL DEFICIENCIES.
- INTRODUCTION OF NEWLY DEVELOPED SOFTWARE PACKAGES WHICH PROVIDE CRITICAL CAPABILITIES.
- ADEQUATE TEST AND INTEGRATION OF KNOWN EQUIPMENT IMPROVEMENTS.

EVALUATION FACTORS:

- FULL SCALE PRODUCTION OF A COMPLETED AND TESTED SYSTEM GREATLY REDUCES THE RISK OF DEGRADED PERFORMANCE, UNCONTROLLABLE MAINTENANCE LIFE CYCLE COSTS, AND SUCCESSIVE AND COSTLY RETROFITS.
- THE INITIAL PRODUCTION COSTS WILL BE SOMEWHAT MORE THAN IN ALTERNATIVE I, BUT SUCCESSIVE RETROFIT AND LIFE CYCLE MAINTENANCE COSTS WILL BE REDUCED.

FULL SCALE PRODUCTION DECISION:

--ALTERNATIVE II PROVIDES DECISION MAKERS THE CRITICAL INFORMATION ON COST AND PERFORMANCE THEY NEED TO MAKE A PRODUCTION DECISION.

NOTE:

--A DSARC SHOULD BE RECONVENED.

TACFIRE BRIEFING DOCUMENT

IMPLEMENTATION STEPS

- A SPECIAL DSARC SHOULD BE CONVENED IMMEDIATELY TO TERMINATE OR REDIRECT THE TACFIRE PROGRAM.
- IF THE PROGRAM IS REDIRECTED, THE FOLLOWING COURSE OF ACTION WOULD ADDRESS THESE FINDINGS AND

CONCLUSIONS.

--THE ARMY SHOULD:

1. COMPLETE THE SYSTEM FOR TESTING:

HARDWARE:

--DETERMINE HOW MANY ADDITIONAL SYSTEM COMPONENTS OR CONTRACTOR SERVICES ARE NEEDED TO

FULLY EQUIP:

- 1 CORPS ARTILLERY (FIELD ARTILLERY SECTION, BRIGADE OR GROUP)
- 1 DIVISION ARTILLERY
- ALL FIELD ARTILLERY BATTALIONS
- ALL FIELD ARTILLERY BATTERIES WITH BATTERY LEVEL COMPUTERS (9)
- ALL FIRE SUPPORT TEAMS
- 1 CORPS, 1 DIVISION, 3 BATTALIONS WITH AN EMULATOR

SOFTWARE:

--DEVELOP CORPS, NUCLEAR, BATTERY LEVEL COMPUTER, MAINTENANCE, DIAGNOSTIC, TRAINING AND

INTERFACE SOFTWARE

MAINTENANCE AND LOGISTICS:

--DEVELOP MAINTENANCE AND LOGISTICS SCHEME, AND IDENTIFY FACILITIES AND EQUIPMENT REQUIREMENTS

TACFIRE BRIEFING DOCUMENT

TRAINING:

--RE-EVALUATE TRAINING HARDWARE, SOFTWARE, AND FACILITIES REQUIREMENTS

LIFE CYCLE SUPPORT:

--DETERMINE LIFE CYCLE SUPPORT FACILITIES AND PERSONNEL REQUIREMENT

2. IF NECESSARY TERMINATE ALL CONTRACTS EXCEPT FOR SERVICES AND MAINTENANCE SUPPORT.

3. TEST THE SYSTEM

--A COMPLETE TECHNICAL AND OPERATIONAL TEST OF THE COMPLETED SYSTEM SHOULD BE CONDUCTED

BY ARMY INDEPENDENT TEST AGENCIES.

4. PRESENT THE RESULTS OF THE TESTING SEQUENCE TO A DSARC, WHICH WILL DECIDE TO

--TERMINATE THE PROGRAM, IF NECESSARY

--PRODUCE THE SYSTEM FOR ACTIVE AND RESERVE COMPONENTS

--DEVELOP A NEW SYSTEM.

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THE DEPUTY SECRETARY OF DEFENSE

Washington, D.C. 20301

January 28, 1975

MEMORANDUM FOR THE SECRETARY OF THE ARMY

SUBJECT: Production Approval for TACFIRE

The Army is hereby authorized to proceed with a limited procurement of TACFIRE by exercising the option with Litton to procure 14 sets of TACFIRE equipments. Based on the recommendation of the DSARC, the TACFIRE program is changed from an LRIP program to a "Limited Procurement" program. This limited procurement will permit employment with some of the early deploying divisions and an examination of the doctrinal impact. This decision should not be construed as authorizing full-scale production even if all of the provisions of the Department of Defense Directive 5000.3 are satisfied in subsequent testing. The Army will expedite completion of testing of the changes being made to the DT/OT II baseline to assure system readiness to proceed with DT/OT III. The alternative to proceed with the core/drum memory configuration as tested will be retained until the all mass core memory is proven in acceptance testing.

Within 90 days the Army will provide the following:

1. Funding, schedule, and testing plans which fully support the program for upgrading TACFIRE subsystems.
2. The details of the Army's approach for providing competition on selected items in follow-on production if it appears practicable to pursue competition for this system.
3. A plan for the conduct of
  - a. A detailed review of artillery command and control requirements including consideration of new weapons and target acquisition systems, battery level computation requirements and foreign developed artillery command and control systems.
  - b. An analysis of potential changes in artillery doctrine with the introduction of TACFIRE or an alternative system.

/s/ H. P. Clements, Jr.

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OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING  
Washington, D.C. 20301

February 20, 1975

MEMORANDUM FOR THE ASSISTANT SECRETARY OF THE ARMY (R&D)

SUBJECT: TACFIRE Program - Supplementary Guidance

In his memorandum of January 28, 1975, which approved limited procurement of TACFIRE, the DepSecDef identified several requirements to which the Army must respond within 90 days after the limited production approval. The purpose of this memorandum is to provide additional details on the guidance expressed in Secretary Clements' memorandum. For example, while TACFIRE is apparently effective at division and battalion level, it does not satisfy the critical need for a battery level computer that would be capable of single gun solutions applicable to CLGP and which would also offer potential improvements in accuracy and allow battery dispersal for improved survivability.

While limited production of TACFIRE has been authorized, before we commit to any production beyond that, the Army should complete the following tasks and submit appropriate reports to OSD at least 90 days prior to the DSARC IIIA:

a. Conduct operational tests of the TACFIRE system which incorporate a realistic battlefield electromagnetic (RF) environment as well as concentrated EW activities that would reflect, to the degree feasible, enemy EW capabilities in the 1980's.

b. Conduct a thorough review of artillery ADP requirements specifically addressing:

- the adequacy of TACFIRE to handle new weapons, e.g., CLGP, and improved target acquisition capabilities.
- battery level computation requirements and the need for ADP at corps and group levels.
- suitability of foreign ADP developments, e.g., FACE, MILLIPAC, for battery level needs and the problem of interface with TACFIRE at battalion and division levels.

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c. Conduct further cost effectiveness analyses. The cost effectiveness information developed to date has been constrained by organizational limitations imposed by current doctrine and has shown only modest improvement with the introduction of TACFIRE. Are there other system configurations which would take advantage of TACFIRE developments that would prove more cost effective? How would an equal investment in an available battery (FACE) or battery/battalion (MILLIPAC, ODIN) level system and additional weapons compare to TACFIRE?

A status report addressing, RF and EW test plans, the approach to the artillery ADP review including the systems to be considered, the plans for the expanded COEA analysis, and other pertinent considerations should be submitted to OSD by September 1975.

Expeditious testing of the changes to the DT/OT II baseline as noted in the DepSecDef memorandum will permit early examination of the questions outlined above and will enable the Army to conduct DT/OT III with equipment and concepts more fully defined to exploit the application of ADP technology to fire support operations heretofore unrealized.

/s/ Robert N. Parker

Robert N. Parker  
Principal Deputy



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DEPARTMENT OF THE ARMY
PENTAGON TELECOMMUNICATIONS CENTER

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- FM CINCUSAREUR HEIDELBERG GERMANY //AEAGC-RSI//
TO FUWTRCE/CDRUSAFAS FT SILL CK //ATZR-AGPA//
RUECBIA/PM ARTADS FT MONMOUTH NJ //CRCPM-TDS-TF//
INFC RJFTFRA/CDRV CORPS FRANKFURT GERMANY //AETVSE//
RUCLAIA/CDR TRADCC FT MONROE VA //ATCD//
RUEADWD/DA WASH DC //DAMO-RQ//
RUFLOWA/CDRVII COFFS MCEHRINGEN GERMANY //AETSAT-FSE//
RUFYTHA/CDR 41ST ARTY GP BABENHAUSEN GERMANY
RUFTEA/CDR42D ARTY GP GIESSEN GERMANY
RUFYTJA/CDR72D ARTY GP WERTHEIM GERMANY
RUFYTRA/CDR210TH ARTY GP PERZGGENAURACH GERMANY
RUFLLTA/CDRSEVENTH ARMY TNG COMD GRAFENWOEHR GERMANY
RUFZTMA/CDR 1ST ARMD DIV ARTY ZIRNDORF GERMANY
RUFUSA/3D ARMD DIV ARTY HANAU GERMANY
RUFYUVA/8TH INF DIV ARTY SAUMHELDER GERMANY
RUFYTLA/3D INF DIV ARTY KITZINGEN GERMANY

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SUBJ: TACFIRE DEPLOYMENT AND FIELDING

- 1. USAREUR HAS EXAMINED THE ALTERNATIVES FOR TACFIRE DEPLOYMENT / TRAINING IN EUROPE AS PRESENTED BY THE USAFAS BRIEFING TEAM DURING THEIR VISIT ON 18-29 JUNE 1977.
2. USAREUR CONCURS THAT TACFIRE TRAINING FOR USAREUR UNITS MUST BE ACCOMPLISHED IN EUROPE.
3. USAREUR FAVORS THE "CONUS FIRST-EUROPE ASAP" DEPLOYMENT OPTION. THE FIELDING OF A COMPLEX MAJOR SYSTEM, SUCH AS TACFIRE, MUST BE ACCOMPANIED BY THOROUGHLY TESTED AND PROVEN LOGISTIC, MAINTENANCE, AND TRAINING PACKAGES. THE AVAILABILITY OF THE BATTERY COMPUTER SYSTEM WITH THIS OPTION IS CONSIDERED A SIGNIFICANT ADVANTAGE.
4. USAREUR FAVORS THE CONVERSION/TRAINING OF ONE DIVISION ARTILLERY/ FIELD ARTILLERY GROUP AT A TIME. THIS CONVERSION RATE MINIMIZES ANY ADVERSE READINESS IMPACT THAT MAY INITIALLY RESULT DURING THE CONVERSION. ADDITIONALLY, THIS OPTION REDUCES USAREUR TRAINING AND SUPPORT REQUIREMENTS WHICH WOULD BE DOUBLED IF TWO DIVISION ARTILLERY/FIELD ARTILLERY GROUPS WERE TO BE TRAINED SIMULTANEOUSLY.

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HEADQUARTERS  
UNITED STATES ARMY TRAINING AND DOCTRINE COMMAND  
OFFICE OF THE COMMANDING GENERAL  
FORT MONROE, VIRGINIA 23651

26 August 1977

ATCD-CF-F

General Walter P. Kerwin, Jr.  
Vice Chief of Staff  
United States Army  
Washington, D. C. 20310

Dear General Kerwin:

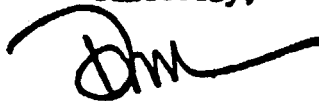
During the last Tactical Automation Appraisal (TAA) at Fort Hood, you directed that TRADOC examine the feasibility of deploying TACFIRE to Europe prior to the scheduled October 1980 target date. Since the TAA, we have thoroughly examined the early fielding options and their impact on training, personnel, and logistics. In addition, a team from the Field Artillery School carried the various training and deployment alternatives to Europe and briefed the USAREUR staff. Our investigation found that we could, in fact, get TACFIRE to Europe in December 1979, some ten months prior to our original target date. However, there were some serious drawbacks, e.g., the first two division artilleries would be equipped with the interim battery display unit equipment rather than the new battery computer system, thus introducing an equipment mix in Europe; the CONUS sustaining base for Europe would be the 1st CAV DivArty only; the logistical package would have been stressed under only a one division load during TACFIRE OT III and a full corps equipped with TACFIRE would not have received a CONUS shakedown prior to European deployment.

General Blanchard's 5 August 1977 TACFIRE Deployment and Fielding message requests the October 1980 deployment date and stressed the importance of a complex system such as TACFIRE being thoroughly tested in CONUS and then issued to Europe with proven logistic, maintenance and training packages. The USAREUR message went on to say that waiting an additional ten months to deploy TACFIRE with the battery computer system was considered a significant advantage.

While the need to deploy a combat multiplier such as TACFIRE to Europe at the earliest possible date is understood, the danger of hastily introducing a new complex system prior to the establishment of a thoroughly stressed log package, refined and tested doctrine (especially corps), plus equipping our force with a mixture of equipment, greatly outweigh the advantage of early introduction.

Recommend that we adhere to the original plan and introduce TACFIRE together with the battery computer system in Europe in October of 1980.

Sincerely,

A handwritten signature in black ink, appearing to read 'Dm', with a large, sweeping flourish above it.

DONN A STARRY  
General, USA  
Commanding



DEPARTMENT OF THE ARMY  
OFFICE OF THE CHIEF OF STAFF  
WASHINGTON, D.C. 20310

12 September 1977

Dear General *Starry*:

In light of your investigation of the possible ten month acceleration of TACFIRE to USAREUR, and of General Blanchard's desire for assurance that the logistics, maintenance, and training packages are solid, I agree that the October 1980 deployment date should be maintained.

The key issue of acceleration is TACFIRE's impact as a combat multiplier. Therefore, it is essential that we overcome the problems we face in fielding this system. The rationale of waiting for the Battery Computer System (BCS) prior to the deployment offers obvious advantages. However, further slippage in fielding TACFIRE must be avoided. Our record in the area of battlefield automation can certainly be improved and I support full development of the key TRADOC roles as the Army's doctrinal focal point and combat developer for battlefield systems.

Therefore, I concur in adhering to the October 1980 deployment of TACFIRE and BCS with the understanding that the delivery of a complete package will present an immediate capability to USAREUR.

Sincerely,

A handwritten signature in cursive script, appearing to read "W. Kerwin".

WALTER T. KERWIN, JR.  
General, United States Army  
Vice Chief of Staff

General Donn A. Starry  
Commander  
US Army Training and Doctrine Command  
Fort Monroe, Virginia 23651

STANDARD FORM 311 JULY 1968 GENERAL SERVICES ADMINISTRATION GSA FPMR (41 CFR) 101-11.6		<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>		FORM 145
1. AMENDMENT/MODIFICATION NO. DAAB07-68-C-0154 P00130		2. EFFECTIVE DATE 75 Jan 30	3. REQUISITION/PURCHASE REQUEST NO. CM-5-75137-01-CM-CA	4. PROJECT NO. (If applicable) S0517A
5. ISSUED BY Electronic Systems Procurement Branch Procurement & Production Directorate, United States Army Electronics Command Fort Monmouth, New Jersey 07703		6. ADMINISTERED BY (If other than above) Chief, DCASC-Litton 21300 Burbank Blvd Woodland Hills, CA 91364		
7. CONTRACTOR NAME AND ADDRESS  LITTON SYSTEMS, INC. Data Systems Division 8000 Woodley Avenue Van Nuys, CA 91409		8. AMENDMENT OF SOLICITATION NO. _____ DATED _____ (Use block 11)  9. MODIFICATION OF CONTRACT ORDER NO. DAAB07-68-C-0154 DATED 67 Dec 08 (Use block 11)		
9. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS <input type="checkbox"/> The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of offers <input type="checkbox"/> is extended <input type="checkbox"/> is not extended. Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods: (a) By e-mail and returning copies of this amendment (b) By acknowledging receipt of this amendment on each copy of the offer submitted, or (c) By separate letter or teletype which includes reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by teletype or letter, provided such teletype or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.				
10. ACCOUNTING AND APPROPRIATION DATA (If required) Funds allotted as of this date are chargeable to: 2152035 562-4450 P5212-2570 S28-043 \$1,000,000.00 (21200,00000,00,00VTZZZ-0)				
11. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS (a) <input type="checkbox"/> This Change Order is issued pursuant to _____ The Changes set forth in block 12 are made to the above numbered contract/order. (b) <input type="checkbox"/> The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data) set forth in block 12. (c) <input checked="" type="checkbox"/> This Supplemental Agreement is entered into pursuant to <u>the terms of the contract and Article 127 "CHANGES"</u> It modifies the above numbered contract as set forth in block 12.				
12. DESCRIPTION OF AMENDMENT/MODIFICATION WHEREAS the Government issued Modification P00118 exercising the Low Rate Initial Production (LRIP) option contained in Modification P00088 as amended by Modification P00096; and WHEREAS the Government issued Modification P00121 and P00122 (See Note 77) to modify the LRIP program as reflected in the revised LRIP Statement of Work (SOW), dtd 24 Feb 75. NOW THEREFORE the parties agree that this modification reflects the revised LRIP program hereinafter referred to as Limited Procurement (LP).				
RECEIPT ACKNOWLEDGED: Contract <u>LITTON D.S.D.</u> By <u>R. Hyman</u> Date <u>30 June 1975</u>				
ARTICLE 1 - ARTICLES AND SUPPLIES CALLED FOR, is amended as follows: CLINS 0016 through 0035, including sub-CLINS, Attachments and Exhibits thereco, except for CLIN 0023, are deleted in their entirety and the following substituted therefor: <small>Except as modified herein all terms and conditions of the document referenced in block 8 as hereinafter changed remain unchanged and in full force and effect.</small>				
13. <input type="checkbox"/> CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT. <input checked="" type="checkbox"/> CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN <u>1</u> COPIES TO ISSUING OFFICE.				
14. NAME OF CONTRACTOR/OFFEROR Litton Systems, Inc.		17. UNITED STATES OF AMERICA <u>Carl Fravel</u> Signature of Contracting Officer		
BY <u>Robert Hyman</u> (Signature of person authorized to sign)		18. NAME OF CONTRACTING OFFICER (Type in print) CARL FRAVEL		
15. NAME AND TITLE OF SIGNER (Type in print) ROBERT HYMAN MANAGER, CONTRACTS		16. DATE SIGNED 30 June 1975	19. DATE SIGNED 30 June	

SOFTWARE INCENTIVES

1. The Software Incentives consists of four parts, each of which stand alone:
  - a. Transitioning to include verification.
  - b. EPR correction (short title: EPR).
  - c. All MCMU operating system (short title: MCMU).
  - d. Preliminary Qualification Tests (short title: PQT).
2. Total incentive dollars are shown in Table I. Incentives won in one part shall not depend on gaining any portion of the incentives in any other part.

TABLE I	
Transitioning	\$200,000
PQT	200,000
EPR	300,000
MCMU	300,000
<b>TOTAL</b>	<b>\$1,000,000</b>

3. TRANSITIONING. The transitioning incentive program shall consist of a formal PSS(B) Compiler/Assembler FQT, compilation of the current tape version (version 32A) on the PSS(B) compiler, and a scenario consisting of application program timing comparing the B compiled version to the A compiled (baseline) version, and the first five hours of DivArty scenario 5 run on both the PSS(A) and PSS(B) compiled tape versions.

a. Objective.

To complete the transitioning process to the PSS(B)

TACFIRE SOFTWARE INCENTIVE PROGRAM

The Army paid Litton \$1 million to accelerate software development so that operable software would be ready for scheduled testing starting with Final Qualification Testing in November 1976. The payment was made because Litton was not contractually committed to demonstrate software capabilities until Final Qualification Testing. Problems identified at that time would have delayed further testing including DT/OT III. By paying Litton \$1 million the Army bought time to fix software problems before testing began. The payment was for the following:

1. Accelerated transition of software from a developmental compiler to the deliverable compiler. The transition was completed July 1975, 14 months earlier than scheduled. (\$200,000)
2. Accelerated correction of 100 software problems identified during DT/OT II. Corrections were completed January 1976, 9 months earlier than planned. (\$300,000)
3. Accelerated demonstration that new Mass Core Memory Unit functioned with software application programs. Demonstration completed June 1976, 5 months earlier than planned. (\$300,000)
4. Army participation in contractor preliminary software qualification tests, which contractually enabled the Army to identify problems as they occurred and to have them fixed before formal testing. (\$200,000)