

# TACFIRE

by  
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Today, developments in modern warfare, its tactics and its equipment, have created new threats which the field artillery must counter if it is to maintain its dominant role on the battlefield. Highly mobile enemy forces, with sophisticated equipment to locate and destroy forward observers and weapons, demand quick and accurate fires from the field artillery. The weapons and ammunition are there. Modern artillery has remarkable accuracy, range and rate of fire; what has failed to keep pace are the fire planning and fire direction processes, which at present

are not capable of responding with sufficient speed to meet the critical needs of the modern battlefield. In addition, the volume of intelligence data collected and generated in a tactical situation has generally prohibited the timely and effective analysis, attack, or dissemination of intelligence targets or data. To correct this situation, TACFIRE (tactical fire direction system) has been developed.

TACFIRE is a tactical, automatic, data processing system with computer centers located at cannon field artillery battalion and division artillery levels. TACFIRE will assist the

PROGRAMS	FSE	DIV ARTY FDC	BN FDC
Ammunition and fire unit status	X	X	X
Preliminary target analysis	X		
Nuclear target analysis	X		
Chemical target analysis	X		
Fallout prediction	X		
Non-nuclear fire planning	X	X	X
Target intelligence	X	X	
Tactical fire control		X	X
Technical fire control			X
Artillery survey		X	X
Meteorological data	X	X	X

## **TACFIRE programs**

field artilleryman in many of his tasks with more speed, more accuracy, and with greater effect and economy than is possible with currently used methods. TACFIRE will assume the time-consuming burdens of computations and data handling that are now done manually or manually with the help of FADAC.

The objective of TACFIRE is to increase the effectiveness of field artillery fire support through improved response, better and more rapid use of artillery target information, improved and faster fire support planning, and greater efficiency in the determination of fire capabilities and allocation of fire units to targets. TACFIRE automates the same field artillery techniques, procedures, and terminology that have been proven successful in manual systems.

TACFIRE functions are performed in a continuous process with a constant interface of functions as the situation dictates.

The ammunition and fire unit programs keep account of the fire unit status and the ammunition available to support those programs concerned with placing fire on enemy targets.

Preliminary target analysis, nuclear target analysis, nonnuclear fire planning, chemical target analysis, and fallout prediction programs will assist in fire support coordination. The purpose of the fire support element programs is to assist in planning and coordinating conventional, nuclear, and chemical fire support and in analyzing all available fire support means. Preliminary target analysis assists the fire support coordination center in determining the best means to defeat a target. This program considers available Army, Navy, and

Air Force fire support means and provides data for decisions to the fire support element.

The nuclear target analysis program selects all fire units which can defeat designated targets with available yields to achieve the required degree of damage without violation of given safety data. It produces data which describe the target, fire unit, yield, and height-of-burst combination for the most effective use of nuclear weapons. It will also produce a list of nuclear munitions required to destroy or neutralize a specified list of targets. This program provides input data for the nuclear schedule of targets.

The primary functions of the nuclear fire planning program are to match target, fire unit and weapon assignments and to create a nuclear schedule of targets. It will also prepare a list of contingent effects for targets and fire unit combination as specified. The computer transmits the nuclear schedule of targets and contingent damage effects upon command.

Chemical target analysis is performed for all chemical fire missions and for chemical fire planning. It produces the optimum choice of the fire unit, type of agent, and quantity necessary to achieve specified criteria.

The fire planning program provides for the selection of targets for the selection of targets for an integrated fire plan. Fire plans will be produced in significantly less time and with improved accuracy and completeness over the present manual operation. The program assigns fire units, number of rounds, types of ammunition and fuzes, and the specific time each target is to be

attacked. Planning is done in accordance with guidance stored in the computer and incorporates limitations imposed by boundaries, no-fire lines, fire coordination areas, air corridors, and the amount of ammunition available. As an example, the Div Arty computer can produce a nonnuclear fire plan for the attack of 150 targets by 30 fire units in fifteen minutes as compared to several hours required with manual methods used today.

The artillery target intelligence function at division artillery provides assistance to the S2 in all phases of the intelligence cycle—collection, evaluation, interpretation, and dissemination. The result of this process is a complete, current, and accurate target list available on command.

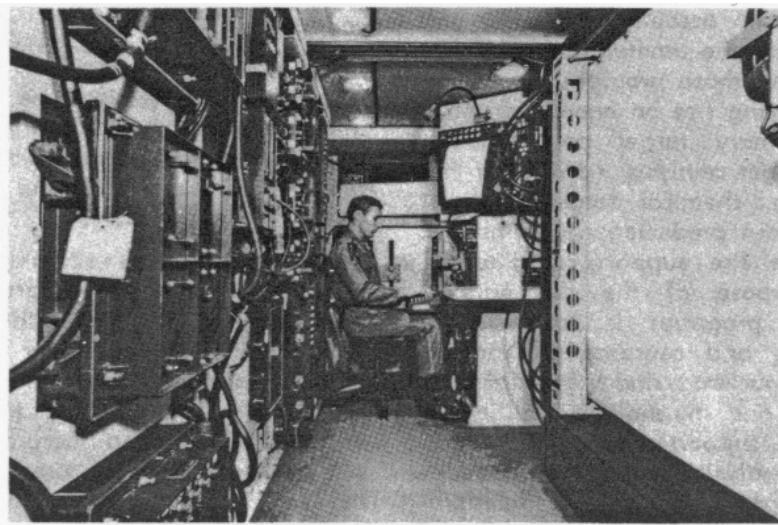
The tactical and technical fire control functions enable the artillery commander to direct fires on enemy targets in a rapid and efficient manner.

The computer accepts fire mission requests and produces fire commands appropriate to the specified target.

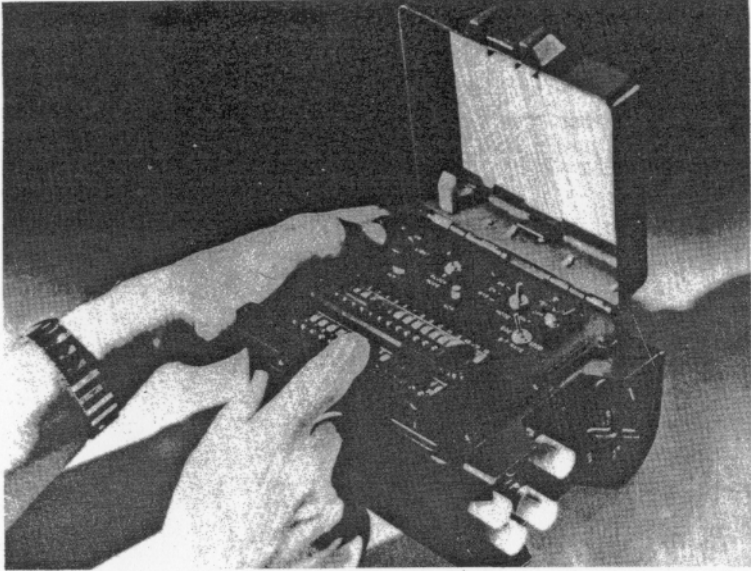
The survey program provides timely information and processing for all operations of the survey information center of division artillery and survey parties of both division artillery and battalions. The function provides for rapid storage, retrieval and computation of survey data.

The meteorological data function is responsible for updating met messages and distributing met data as directed by the Div Arty fire direction officer.

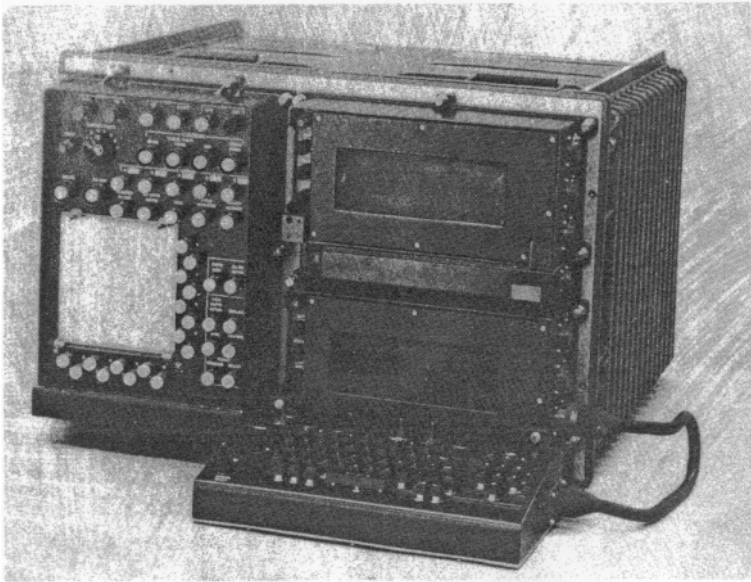
The fallout prediction program receives nuclear sighting reports, receives prestrike fallout requests, validates sighting reports to confirm a strike, stores and applies meteorological data, and determines applicable fallout risks for an attack based upon existing parameters. It



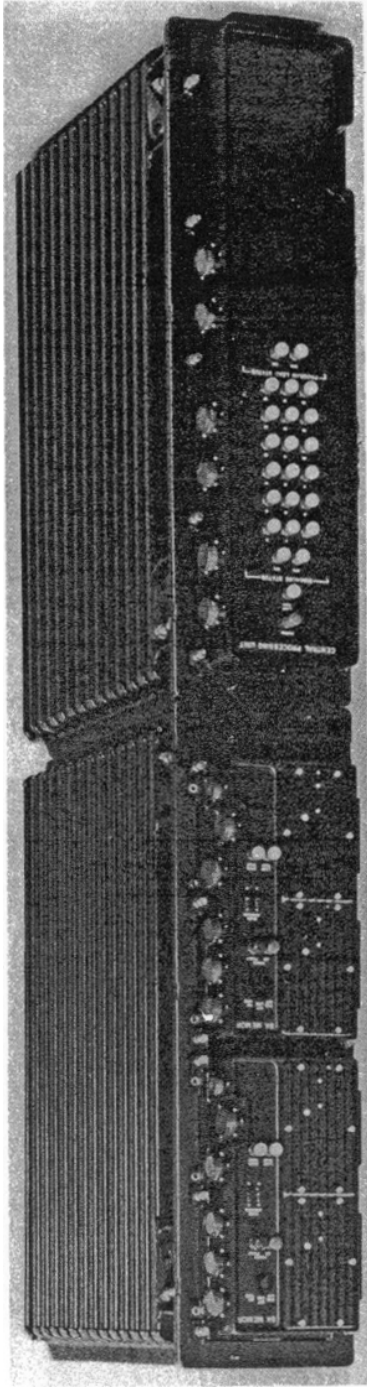
**S-280 shelter**



**Fixed format message entry device (FFMED)**



**Artillery control console (ACC)**



**AN/GYK-12 computer**

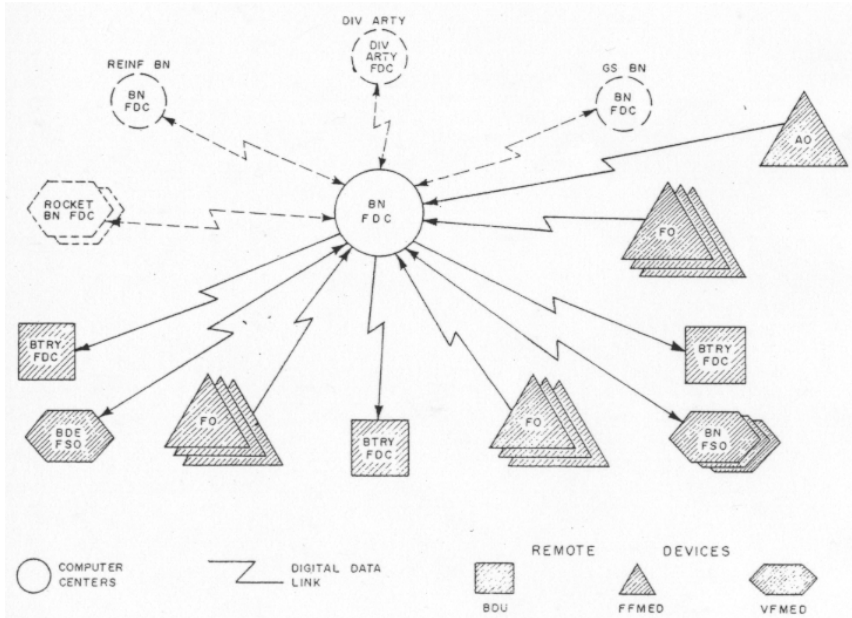
generates fallout prediction messages and an effective downwind message to allow units to evaluate their situation relative to a sighted burst or predicted burst.

As an illustration of how the TACFIRE system operates at battalion level, assume a forward observer has just transmitted a request for fire to the battalion FDC, which is housed in one S-280 shelter. The observer used a fixed format message entry device (FFMED), connected to his organic radios or telephone, to send the messages in coded digital form. At the battalion FDC, the request is authenticated, expanded and entered directly into the computer. The artillery control console (ACC)

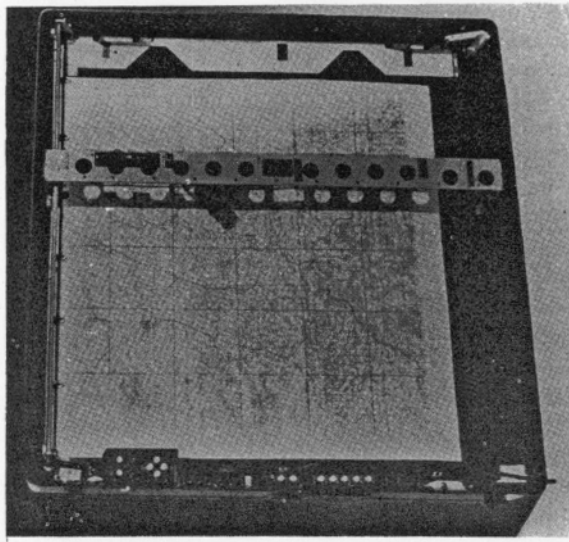
provides a visual presentation of firing data generated by the AN/GYK-12 computer plus the original fire request, after the fire mission has been processed.

Also located in the battalion FDC is the digital plotter map (DPM), a 4-by-4 foot plotter for large-scale display of the tactical situation on an overlay or map, and an electronic line printer (ELP) that is used to provide a hard copy record of all incoming and outgoing messages. These devices give the FDO ready access to fire orders and commands for several missions, and allow him to monitor the situation, quickly establish priorities of targets during

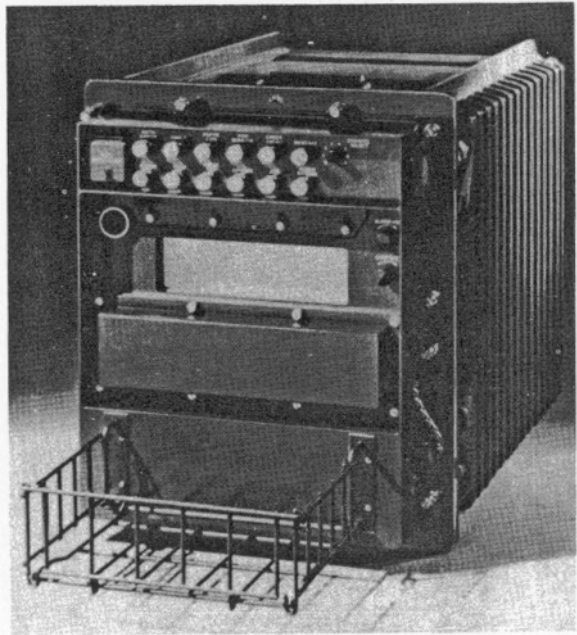
**BATTALION COMPUTER CENTER CAPABILITIES**



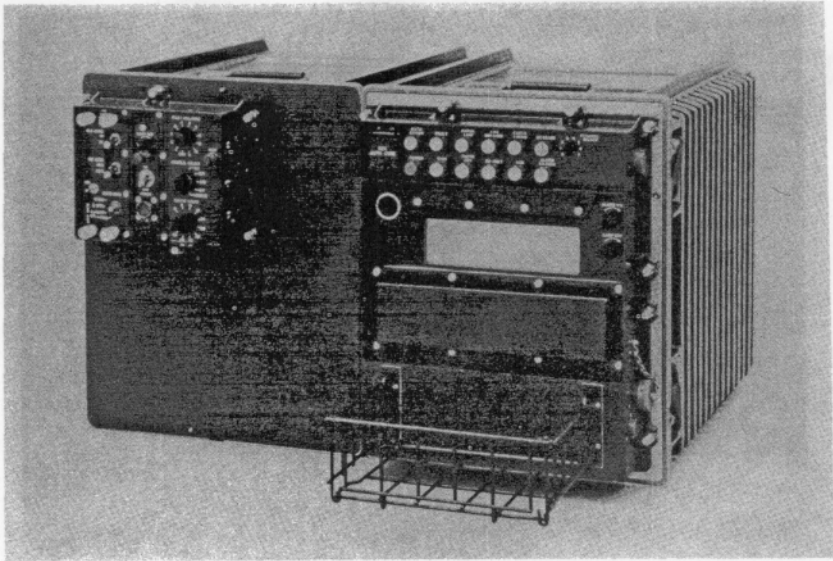
**Battalion TACFIRE schematic**



**Digital plotter map (DPM)**



**Electronic line printer (ELP)**



### **Battery display unit (BDU)**

peak loads, and generally retain full control of the FDC operations. They also provide a complete hard copy record capability.

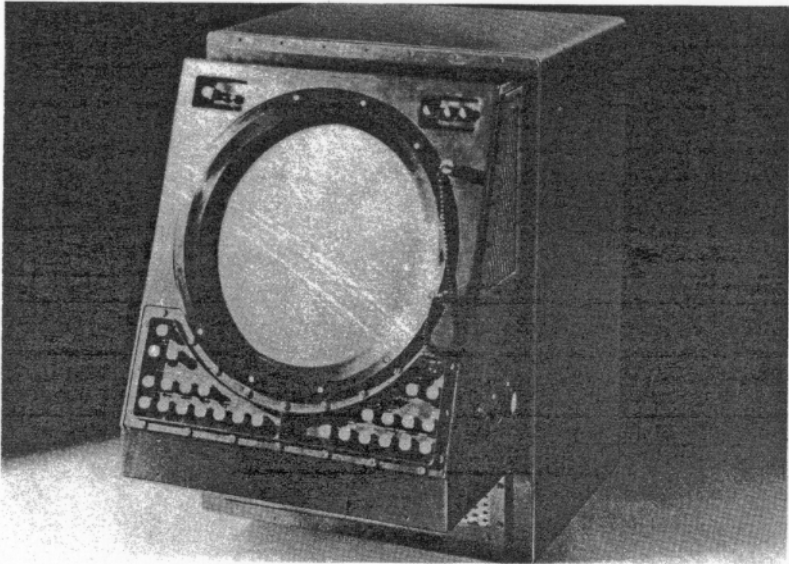
Once the fire commands produced by the computer are reviewed by the FDO, the ACC operator activates a switch on the ACC to send the commands to the batteries, where they are printed on an electronic line printer of a battery display unit (BDU). The battery radiotelephone operator activates the ACKNOWLEDGE switch on the BDU to transmit a signal back to the battalion FDC. The battery executive officer then announces the fire commands to the guns from the hard copy furnished him by the BDU.

The speed at which these computer decisions and calculations are made will result in printed fire commands at the battery in less than 10 seconds from the time the call for fire is originated.

The TACFIRE computer center at division artillery is housed in two S-280 shelters because of additional equipment requirements. The division artillery equipment is identical to the battalion equipment but is supplemented with an additional memory drum, a second printer, and an electronic tactical display (ETD). The ETD provides a rapidly updated graphical display of the tactical situation. Data from the 4-by-4 foot digital plotter map can be expanded and displayed on this device. The S2 and the S3 may use this device independently or simultaneously to help accomplish their staff functions.

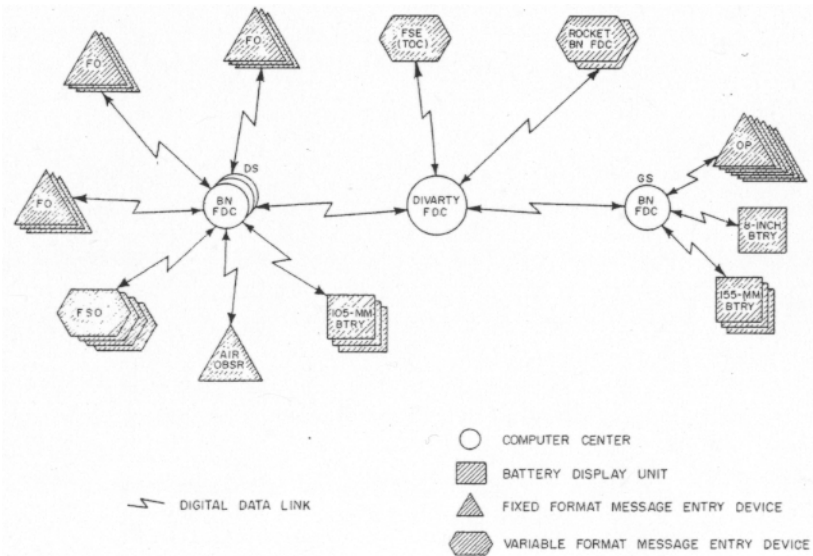
Unlike the fixed format message entry device, the variable format message entry device (VFMED) will provide two-way communications between users at the division, brigade, and battalion fire support element and to the missile battalion



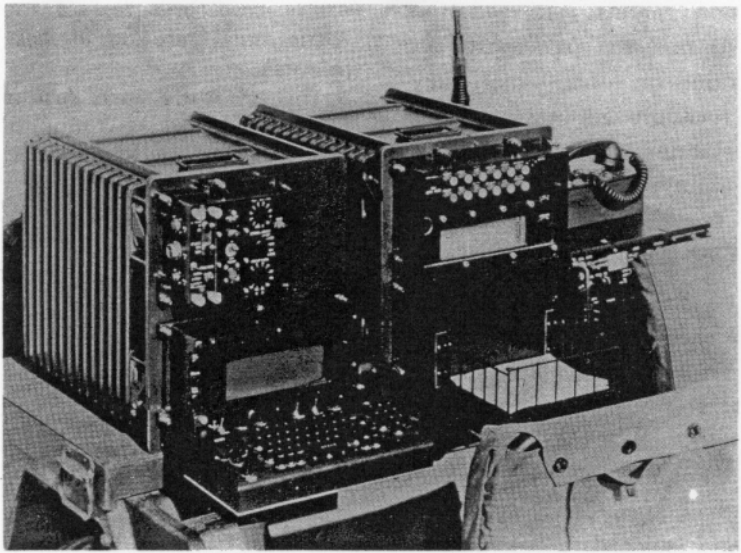


**Electronic tactical display (ETD)**

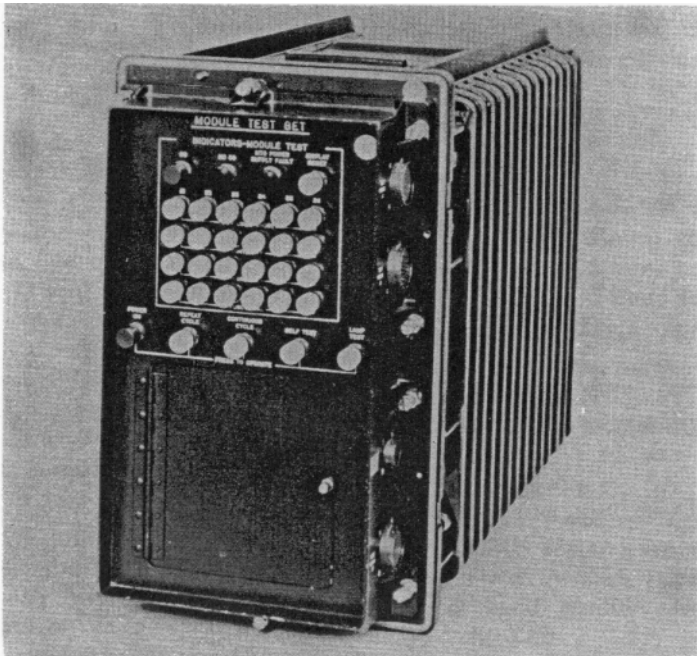
**DIVARTY COMPUTER CENTER CAPABILITIES**



**Division artillery TACFIRE schematic**



**Variable format message entry device (VFMED)**



**Module test set (MTS)**

fire direction centers. It is similar to the BDU but has a display and edit scope and an alphanumeric keyboard to facilitate editing and composing messages. The VFMED provides an input/output capability not found in the BDU, for the BDU is an output device only.

A unique feature of the TACFIRE system is the maintenance concept for the system. A maintenance and diagnostic software routine checks the system on a scheduled basis when the computer is not busy. Any failure that occurs can be rapidly detected and isolated to a few cards through the use of built-in computer programs. Rapid fault isolation down to the specific card is facilitated by a built-in, handheld GO/NO-GO circuit card tester called a module test set (MTS). Operating personnel can locate and replace a faulty card and restore the system to normal operation in less

than 10 minutes.

The US Army Field Artillery Board has conducted a manual/FADAC comparative service test which began on 14 December 1970 and was completed 30 April 1971. This test was conducted to measure the performance of a field artillery organization using the manual/FADAC system in accomplishing TACFIRE functions for later comparison with the performance of a field artillery organization equipped with TACFIRE. New equipment training for Board personnel scheduled to participate in the TACFIRE service engineer test (ET/ST) began 25 January 1971. The TACFIRE ET/ST is scheduled to begin on or about December 1971 and will last for approximately 10 months. The TACFIRE system will be fielded throughout the Army's field artillery units during the mid-1970's.