# METHODS DESIGN FOR DEVELOPING AN AUTOMATIC DATA PROCESSING SYSTEM

By

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Ramo-Wooldridge
A Division of Thompson Ramo Wooldridge

Canoga Park, California

# CONTENTS

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This paper describes the methods developed for designing a military tactical system which is to use advanced automatic data processing equipment in the Field Army.

## Background

In late 1956 the Commanding General, United States Continental Army Command (USCONARC), requested the support of the Office of the Chief Signal Officer in supplying advice and assistance to a USCONARC committee engaged in determining the feasibility of applying automatic data processing (ADP) to tactical military operations. The Chief Signal Officer established the Signal Corps ADPS Technical Analysis Group. The United States Army Electronic Proving Ground (USAEPG) at Fort Huachuca in Arizona was a member of this group, along with the participants from other Signal Corps agencies. This group considered approximately one hundred separate Army applications, as specified by the DA/USCONARC Committee, and as a result published, in February, 1957, a seven-volume report which affirmed the feasibility of tactical ADP applications, and recommended a program for further study.

Concurrently with the work of the technical analysis group, plans were made for developing militarized equipment which would be required for an ADP program. The Chief Signal Officer assigned to the U. S. Army Signal Research and Development Laboratories (USASRDL) the responsibility for developing a family of mobile, militarized computers (FIELDATA) and associated equipment. The Chief Signal Officer also assigned to USAEPG at Fort Huachuca the responsibility for the design of tactical ADP systems and the testing of these systems under field conditions. The ADP Department at USAEPG has proceeded with the establishment of an ADP test center and has initiated a program and plan for accomplishing the assigned USAEPG part of the Army Tactical ADP Program.

To provide technical assistance in the implementation of its program, the Army Electronic Proving Ground at Fort Huachuca has engaged the services of several private contractors. As a prime contractor for technical assistance in the ADP program, USAEPG has a five-year contract with Ramo-Wooldridge, a Division of Thompson Ramo

Wooldridge, Inc. Coordination, therefore, is required among the various organizations participating in the ADP program. These organizations are shown in Figure 1.

Figure 1, Organization Chart, DA/USCONARC Tactical ADPS Program, indicates, graphically, the relationship and function which are provided by each member in the ADPS program. Integration of tactical ADP systems into the Field Army operations will take place under the direction of USCONARC, with the aid of the Airborne and Electronics Board during the qualification testing phase.

## Establishing the Work Effort

Early in 1959 USCONARC approved the following four studies produced by the Artillery School at Fort Sill, Oklahoma:

1. Unit Firing Capabilities
2. Input/Output Data for Technical Fire Control
3. Artillery Survey
4. Tactical Ammunition Control

These studies recommended that certain portions of the total tactical field artillery operation be automated using equipment designed by the Signal Corps.

After detailed analysis of these studies, and after discussions with the various agencies concerned with the objectives of the ADP program, it was decided to select the function of the field artillery as one of the first tactical application areas for automation. This particular Automatic Data Processing System (ADPS) application area was designated as the Fire Support Subsystem 1 (SS-1). With enthusiastic and close cooperation of the study group, together with command level support from Fort Sill, it was decided to isolate a part of this subsystem and designate it as Subsystem 1a (SS-1a). The purpose of this action was to mechanize and field test this portion ahead of the complete subsystem (SS-1), and to demonstrate the capabilities of tactical ADP equipment to a user group at the earliest possible date.

At this point, the SS-1a program was in existence and we now needed a plan for implementing it. Figure 2 indicates the technical plan for developing SS-1a. In addition to this plan, an organization was established for carrying out the effort; more will be said about this area later in the paper. Since this technical plan represents the backbone of the total effort, I will discuss each step in some detail. It should also be noted here that each step in the plan is associated with a special document which was designed for specific step development.

## Objectives and Definitions

This first step establishes the general direction and functional areas to be automated. In effect, it is the planning framework for automating certain artillery procedures. A document reflecting this framework is prepared, coordinated, and approved by the ADP Chairman of the United States Army Artillery and Missile School (USAAMS), Fort Sill, Oklahoma, and the ADP Department, USAEPG, Fort Huachuca, Arizona. All future work efforts are then based upon this document.

Figure 3 indicates the general contents of this document. After the objectives and definitions of SS-la had been approved, artillery operations and procedures were segregated into workable functional areas. These functional areas roughly corresponded with the division of responsibility of the various departments in the Artillery School at Fort Sill. (For example, the functional area of fire control is the responsibility of the Gunnery Department at Fort Sill).

## Functional Design Charts

The second step in developing this subsystem is to determine the general requirements for each functional area. These general requirements are supplied by each user department at the Artillery School. The functional design chart represents the first documentation reflecting artillery procedures in a particular area of operation.

Figures 4a. and 4b. represent a sample of the functional design chart in the area of Firing Unit Capabilities. The charts include the following data: basic function, purpose, inputs-file-outputs, and remarks. Included is the user documentation reference for the procedure involved. These charts are revised and updated as required. After completion of these forms a flow-of-data analysis is prepared by the systems analyst responsible for this area.

## Functional Area Analyses

The flow-of-data analysis--the next step in the plan--is developed in a document entitled Functional Area Analysis. The purpose of this analysis is to indicate the "when" and "where" of specific elements of data. The instructional notes that follow indicate the detail and coordination required for a complete analysis.

## Instructional Notes

A. After functional design charts for each area are prepared, using the objective and definitions of SS-1a as a general guide, functional area analysis is accomplished by preparing the following:

   1. Input-File-Output Forms (See Figures 5, 6, 7)

   2. Functional Area Flow Chart (In detail)

   3. Unit Equipment Utilization Forms

B. The functional area analysis must indicate the step-by-step flow of SS-1a data, explaining in detail:

   1. Required inputs

   2. Required file contents and maintenance

   3. Required outputs

   4. Type of equipment involved in flow-of-data

   5. Frequency and sequence of data used

   6. Characters or words of storage required

   7. Security classification desired

   8. Required formats for all messages, codes, and documentation

   9. Glossary of terms

C. The analysis is completed and coordinated simultaneously by members of the working team. The analysis is categorized as preliminary until the working team agrees that the analysis is satisfactorily completed. At this point, the analysis is characterized as firm.

D. Input-File-Output sheets and flow charts are referenced and sequenced by name and sequence number which corresponds to the sequence number of the functional design chart.

E. Input-File-Output sheets and flow charts for each functional area are updated, distributed, and filed in the operational "docket file" notebook.

F. Unit equipment utilization forms are completed for each ADP unit equipment in the functional area.

Functional Area Working Team Coordination - [✓ Preliminary] - Firm

Systems Analyst ____________ Date

Programming Analyst ____________ Date

Ft. Sill Project Officer ____________ Date

Ft. Sill ADP Coordinator ____________ Date

This analysis is composed of preparing a detailed flow chart and input-file-output forms. It is documents of this type that develop the subsystem in specific detail. After coordination with each individual working team, this analysis provides valuable information such as (1) storage and memory requirements, (2) volumes of data to be processed, (3) specific dissemination needs, (4) types of input/output formats, and (5) timing of data processing activities, to mention a few. It is at this point that the subsystem is described in step-by-step detail and both programming and equipment requirements can be effectively developed.

It is also at this point where approved deviations are developed between the present manual system and the new proposed ADP system. Studying Figures 5, 6, and 7, it can be seen that in addition to the information required by the form, a running flow chart describing the flow-of-data for a particular input-file-output sequence is indicated in the remarks column. Included in functional area analysis documentation is a glossary of terms peculiar to the area being analyzed.

## General Logical Flow Chart

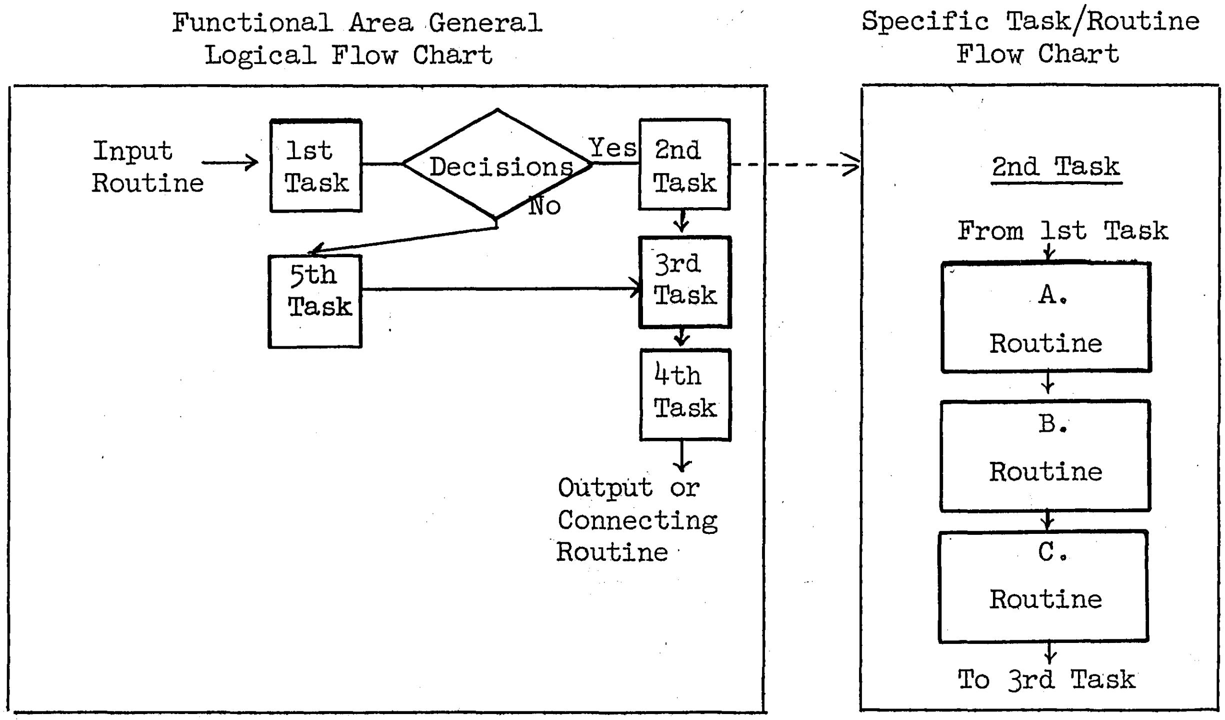
When the Functional Area Analysis document for a particular area is considered firm, a general logical flow chart is prepared outlining the major steps and decision points of the functional operation.

The flow chart presents the "what" data in the "which" sequence for completing a functional operation at a specific echelon. Data flowing into this functional area from other areas are specified and sequenced in the operation as required. The same procedure applies for data leaving this functional area. Also, it presents a picture of the specific tasks requiring additional detailed flow charting and detailed explanations. It is this general flow chart that is used later for integrating the various interlocking functional areas.

## Specific Task/Routine Flow Charts

These particular flow charts fulfill the "how" requirement of a specific task within a general logical flow chart. It is this flow chart that passes to the programmer for his analysis and subsequent programming.

Graphically, the concept is as follows:



This methodology which might be called the "Function-Task-Routine-Method" has several advantages.

1. System and programming analysis can be accomplished immed-

idately in those areas where the information and procedures are firm and/or in those areas which may closely resemble the original manual system. We have found, for instance, that in some cases we were continually revising the functional design charts (user requirements) to reflect improved operating procedures, while in other instances it was possible to begin programming almost immediately.

2. This method is not overly detailed to the extent of requiring elaborate bookkeeping procedures or complicated recording systems for keeping accountability for each and every piece of documentation. Individuals find it difficult to keep in mind the whole picture and continuity of the entire effort if they are required to keep track of the status of many unrelated groups of information. And yet they are awed when presented the entire picture in a single complexity of detail. The "Function-Task-Routine Method" represents a logical compromise between extremes in method analysis.

3. We have found that rapport between the systems analyst and the programming analyst is increased by using this method. It has sufficient detail for the programmer and yet it is flexible enough to embrace changes (small and large) to the system.

4. And, of course, by segregating Subsystem la into functional areas resulted in judiciously utilizing, as needed, the time and manpower available.

## Specific Tasks to be Programmed

This is a simple tabular listing or schedule of the specific tasks to be programmed in some order of priority. It should include a description of input routines, primary and subroutines, connecting routines, output routines, and special executive routines as required. In addition, the names of the systems analyst and programmer should be indicated as well as an estimate of the manhours or mandays to complete the programming and systems effort. This document pinpoints the priority and team assignments for accomplishing the efforts associated with each specific task or groups of tasks. It is at this point when management can obtain a reliable "fix" concerning the efforts required in the total program with respect to systems and programming analyses.

## The Programming Effort

The next step is the actual programming effort. This involves accomplishing programming analysis, coding, check-out, and debugging of the various programs. In this effort the programmer and systems analyst must keep in mind equipment capability, message format, and the volume of information to be handled in the system. It is this step where flexibility and control are built into the system by efficiently preparing subroutines and executive routines which can call for strategic data at the proper time, and which can control and check the order of data and programs to be used. For example, in fire planning, targets will be added or deducted, depending upon the fire power required by the S-3. In this system the Division S-3 will only consider the targets in range of his battalions -- the automatic data processing system will automatically send to Corps Artillery (higher echelon) those targets which are not in range of Division Artillery.

## Integration of Interlocking Functional Areas

This is the effort that requires coordination among various working teams and among the various user groups. The analysis is developed similarly to the methods established above, with the limitation that most of the efforts resolve themselves to connecting type tasks. It should be noted that although functional areas are analyzed as independent work efforts they are, nevertheless, analyzed with respect to their dependency and/or alignment with other functional areas.

In addition, specifications of the subsystem are firmed at an early date so that detailed analyses can continue without major disruption to the general design of the subsystem. The systems design and specification phase is followed by a coordinated testing phase which includes:

1. Establishing test objectives and a method for evaluating these tests
2. Developing an information feedback cycle which could result in redesigning, reprogramming, and retesting portions of functional operations
3. Demonstrating the capability of the ADP subsystem during simulative tests and actual equipment tests

After designing the methodology, an organization for effectively accomplishing the work effort must then be developed.

## Organizing for the Effort

Subsystem la (SS-la) is the first subsystem of the Tactical Automatic Data Processing system to be developed. Its development is a complex task involving the participation of many organizations.

You will recall that study groups from the Artillery School at Fort Sill, Oklahoma, produced the original ADP studies of specific artillery functional areas, and with the enthusiastic cooperation of field artillery personnel, SS-la objectives and definitions were developed in a very short time period.

In organizing for the effort, the following factors were considered:

1. SS-1 is but a subsystem of the Tactical Automatic Data Processing system. It must fit into the complete ADP system, being coordinated with and compatible with other subsystems.

2. The development of SS-1 involves the participation of other agencies besides USAEPG and R-W -- specifically, USCONARC, the Artillery and Missile Center at Fort Sill, OCSigO, USASRDL, and contractors to USASRDL.

Well, it does not take much imagination to realize that an integrated team approach was required to produce a workable ADP system. The real problem was: "What form can the team take so as to retain its own flexibility of operation and still accomplish its tasks without undue pressures from outside of its immediate objectives?" This problem, of course, is not restricted to military type endeavors; commercial enterprises converting to Electronic Data Processing operations are confronted with the same problem.

Our particular problem was solved by starting at the lowest level and forming what we termed a "working team". Each "working team" represented an operational function of the fire support subsystem. (See Figure 8). For example, there is a working team for Target Acquisition, Fire Planning, Technical Fire Control and one for Communication and Equipment. Coordination and interchange of information among the four teams is accomplished by project coordinators--one located at USAEPG, Fort Huachuca, Arizona, and the other in Los Angeles, California. Each working team is composed of one artillery project officer, a systems analyst, and one programmer. A tactical field test representative is assigned to the SS-la project and attends meetings as required. (At Fort Huachuca, there is a Field Test Center which will provide the capability for field testing tactical automatic data processing equipment and systems).

Each working team has the responsibility of accomplishing objectives which they have established for themselves. Project coordinators--one civilian and one military--act as buffers with respect to outside influences which might tend to distract the efforts of each working team.

Coordination between USAEPG (Fort Huachuca) and USAAMS (Artillery School) is accomplished through artillery project officers and the artillery ADP Committee representing members from the various departments of the Artillery School.

As planning problems arise during the development of Fire Support Subsystem 1a, the USAAMS ADPS Committee effects coordination between USAAMS and USAEPG in matters of artillery policy, doctrine, and tactics. To date, this arrangement has met with a great deal of success.

The decisions made and the work performed are subject to review by the respective military and civilian supervisors to assure their soundness, their compatibility with the work on other subsystems, their compatibility with the supporting work on other Army studies, the analysis and simulation of individual applications, and to the programming research and field experiments generated during the period of subsystem development. All decisions and work efforts are reviewed by project management in accordance with military command procedure and R-W project management policy. Technical decisions proposed by Ramo-Wooldridge are reviewed by the ADP Department which, in turn, makes the official decisions resulting in approved plans, designs, equipment procurements, and tests.

## Documentation

One other important item remains in the over-all ingredients required to accomplish an electronic data processing conversion--this ingredient is documentation.

Documentation in detail is vitally important for the following reasons:

1. Documentation must serve as a clear-cut communication vehicle among systems analysts, study project leaders, and programmers. This involves standardization of methods of operation, procedures and codes.

2. Documentation must be sufficiently detailed in the area

of volumes and frequency of data use. This information is required for the projection of equipment needs.

3. Documentation should provide clear-cut definitions and categorizations which will serve as a basis in preparing work schedules, priority of efforts, and work assignments, both for present and future work efforts.

4. Detailed documentation will be an aid to the flexibility of the subsystem by providing "elements-of-data" which can be grouped and regrouped, depending upon the changes in subsystem requirements.

5. Documentation must be developed in a manner such that new personnel coming on the project can, with a minimum of effort, understand the work status and direction to date.

The formal documentation for this subsystem consists of:

1. Objectives and Definitions
2. Functional Design Charts
3. Functional Area Analyses
4. General Logical Flow Chart by Function
5. Specific Task/Routine Flow Charts
6. Programming Flow Charts
7. Integrating of Functional Flow Charts

All information concerning the subsystem is kept in an operational notebook called the "SS-la Docket File". There are 25 "Docket Files" in existence. In addition to the formal documents the file includes items as changes in working team organization, schedules, correspondence between team members, trip reports, etc. The Docket File is the central repository for all information and action concerning the subsystem.

## Conclusion

The certainty is nearly 1.00 (one) that this methodology cannot be used intact for another data processing project or system. Each project or system has its own peculiarities, its own distinctive milieu, and its own conditions and objectives--known and unknown. However, whether the project is military or commercial, it can still use much of the methods philosophy described in this paper.

# ORGANIZATION CHART, DA/USCONARC TACTICAL ADPS PROGRAM

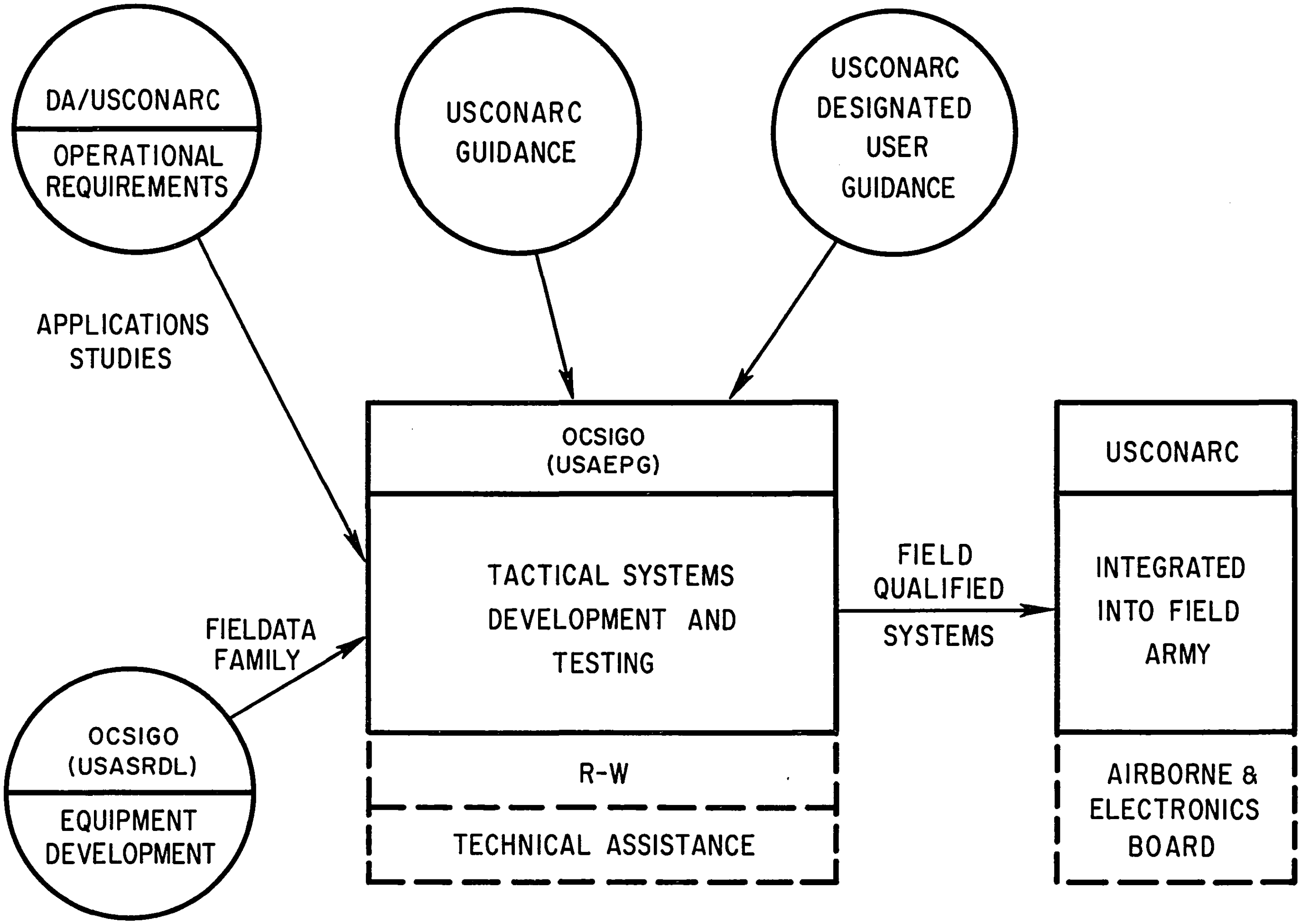


FIGURE I

# LOGICAL STEPS
# IN DEVELOPING SUBSYSTEM Ia

❶ OBJECTIVES AND DEFINITIONS OF SSIa

❷ FUNCTIONAL DESIGN CHARTS

❸ FUNCTIONAL AREA ANALYSIS

❹ GENERAL LOGICAL FLOW CHART

❺ SPECIFIC TASK/ROUTINE FLOW CHARTS

❻ SPECIFIC TASK/ROUTINES TO BE PROGRAMMED (BY PRIORITY)

❼ PROGRAMMING

❽ INTEGRATION OF INTERLOCKING FUNCTIONAL AREAS

FIGURE 2

# EXAMPLE OF OBJECTIVES AND DEFINITIONS OF SSIa

I OBJECTIVES

- a. PROVIDE AN INITIAL ARTILLERY SUBSYSTEM, CONSISTING OF MILITARIZED HARDWARE, PROGRAMS, AND PROCEDURES.
- b. PROVIDE EXAMPLE OF AUTOMATICALLY HANDLING FIRE PLANNING, SURVEY, AMMUNITION CONTROL, ETC.

II DEFINITIONS

- a. NUMBER, TYPE, AND LOCATION OF COMPUTERS
- b. GENERAL FUNCTIONAL AREAS TO BE AND NOT TO BE AUTOMATED.

III ARTILLERY ORGANIZATION FOR A TYPE DIVISION

IV ADPS COMMUNICATIONS AND TRAFFIC PATTERN

V ARTILLERY SSIa – MASTER FLOW CHART

FIGURE 3

# EXAMPLE OF FUNCTIONAL DESIGN CHART SS1a

FUNCTIONAL AREA TITLE

FIRING UNIT CAPABILITIES
(FIRE PLANNING)

| FUNCTIONAL IDENTIFICATION | | | BASIC FUNCTIONS | PURPOSE | INPUTS | | | FILE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| MAJOR | SUB | MINOR | | | SEQ. NO. | | DOC. REF. | SEQ. NO. | | DOC. REF. |
| 9 | 2 | 1 | FIRING UNIT CAPABILITIES AT BN LEVEL | DETERMINE THE AREAS WHICH CAN BE COVERED BY THE FIRING BATTERIES | 1 | BATTERY DATA<br>a. UNIT DESIGNATION (FROM BATTERY)<br>b. COORDINATES OF BATTERY CENTER<br>c. AZIMUTH OF CENTER LINE | C-7 | 1 | COORDINATES OF BATTERY CENTERS<br>a. TYPE OF UNIT (105, 155)<br>b. UNIT DESIGNATION<br>c. AZIMUTH OF CENTER LINE | C-7 |
| | | | | | 2 | UNIT CONSTANTS PRE-PROGRAMMED | | 2 | MAXIMUM RANGE (CONSTANT)<br>LIMITS-RIGHT & LEFT (CONSTANT)<br>UNIT DESIGNATION (BATTERY)<br>NO FIRE LINE DESIGNATION<br>(BN S-3)<br>MINIMUM RANGE (SAME DATA) | |

FIGURE 4a

# EXAMPLE OF FUNCTIONAL DESIGN CHART SSIa

REVISED
DATE: 11 JANUARY 1960
CHART 1 OF 1

FUNCTIONAL AREA IDENTIFICATION NUMBER

| | | |
|---|---|---|
| 9 | 2 | 0 |

ACTION AT VARIOUS ECHELONS

1. ACCEPTS DATA
2. COMPUTES ON DATA
3. COMPILES DATA
4. STORES DATA
5. DISPLAYS DATA
6. TRANSMITS DATA
7.
8.

LOCATION (PHYSICAL)

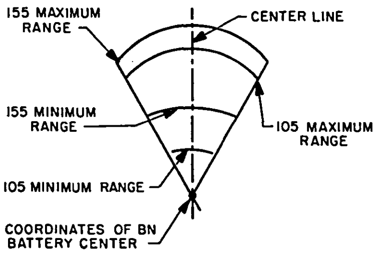
| OUTPUTS | | | SURVEY COMPAC | FC COMPAC | | BASICPAC DIVARTY | | CORPS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SEQ. NO. | | DOC. REF. | II | II | | XX | | XXX | | OTHER | DOC. REF. | REMARKS |
| | FIRE CAPABILITIES DATA HARD COPY (PREPARED BY BN S-3) | FM<br>6-40 | | | | 1<br>2 | | | | 1 COPY TO BN S-3 | | FIRE UNIT CAPABILITIES CHART IS CONSTRUCTED MANUALLY BY S-3 STAFF |
| 1 | COORDINATES OF BATTERY CENTERS | C-7<br>FM | | 1<br>4 | | 3<br>4 | | | | 1 COPY TO DIV-ARTY S-3 | | INPUT AND FILE CONTENTS ARE IDENTICAL |
| 2 | UNIT DESIGNATION | 101-10 | | 5 | | 5 | | | | | | DIVISION BASICPAC AND BATTALION COMPAC COMPUTERS ARE INVOLVED WITH THESE OPERATIONS |
| 3 | MAXIMUM RANGE (CONSTANT) | | | 6 | | | | | | | | DATA IS PREPARED AT DIVISION AND Bn., DIVARTY COPY IS SENT TO FSCC |
| 4 | LIMIT-RIGHT & LEFT (CONSTANT) | | | | | | | | | | |  |
| 5 | MINIMUM RANGE (CONSTANT) | | | | | | | | | | | AZIMUTH OF CENTER LINE LIMITS (RIGHT AND LEFT)<br>MAXIMUM RANGE<br>MINIMUM<br>TOPOGRAPHY NOT CONSIDERED IN SS-Ia |

FIGURE 4b

EXAMPLE

*INPUT DATA SHEET SSIa*

E SEQUENCE

PAGE 1 OF 7

AREA 27 OF 41

STUDY OR AREA TITLE TARGET DATA AND UNIT ANALYSIS

NAME OF INPUT FIRE PLANNING CRITERIA

FLOW CHART REFERENCE DC 940 SEQUENCE NO. 942-3

PREPARED BY AL MORAVEC DATE 9 FEB. 1960

INPUT RELATED TO TARGET DATA LIST FILE AND UNIT LOCATION FILE

SOURCE S-3 DETERMINES WHICH FIRE PLANNING CRITERIA VALUES OR FACTORS WILL BE USED

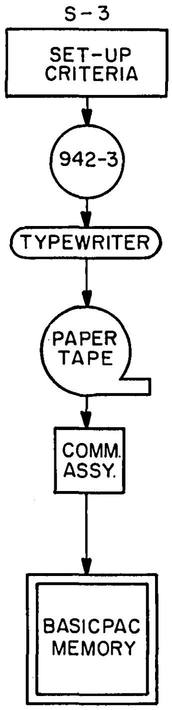
FREQUENCY (IMMEDIATE, BATCH, OTHER) PRIOR TO ORDERING OF TGTS - TWICE FOR SSIa

METHOD OF TRANSMISSION PRE-PROGRAMMED ON PAPER TAPE

PHYSICAL FORMAT SEE ATTACHED SHEETS

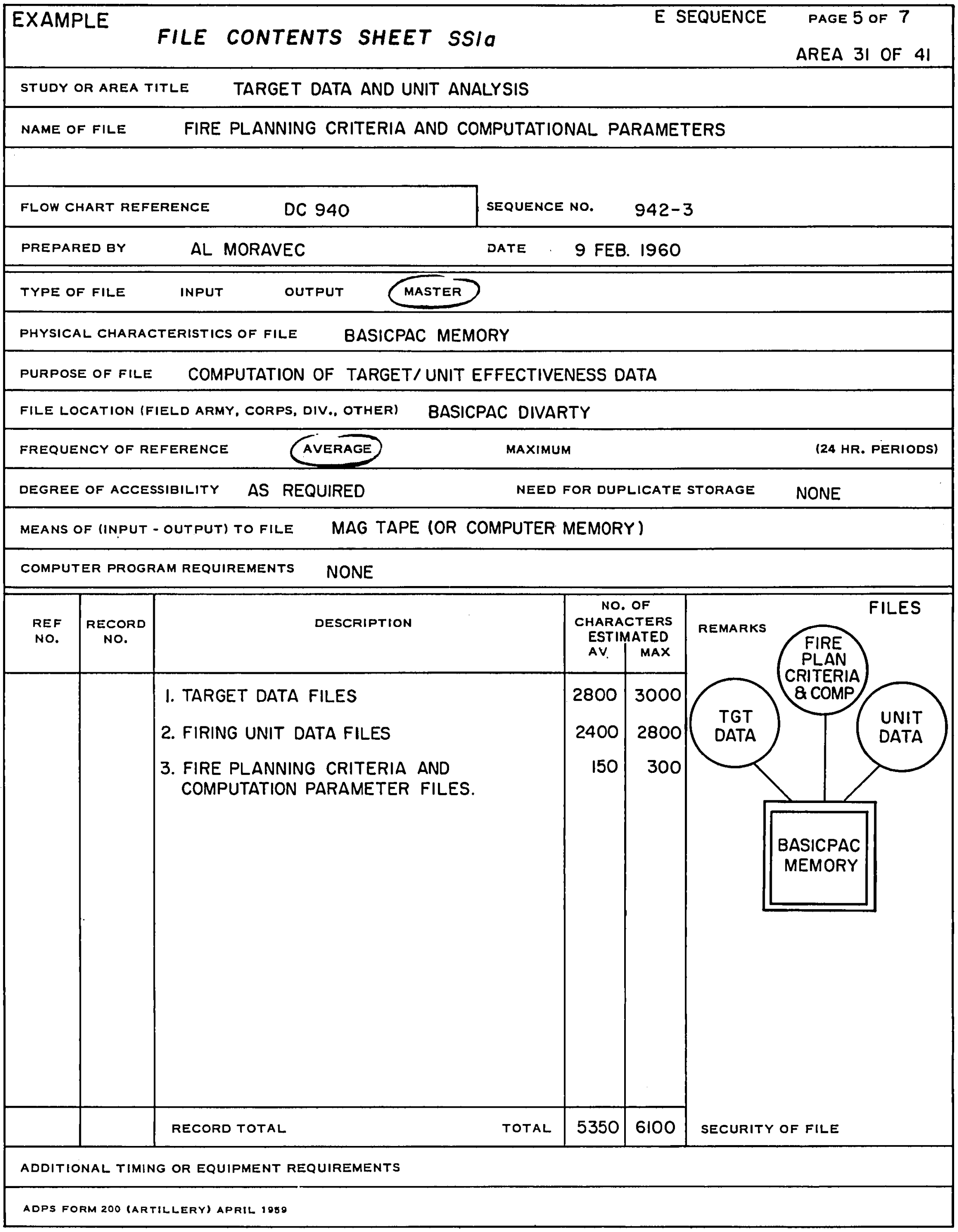
SPECIAL CODING REQUIRED NONE

INPUT LOCATION (FIELD ARMY, CORPS, DIV., OTHER) DIVARTY FDC BASICPAC

| REF NO. | LINE NO. | DESCRIPTION | NO. OF CHARACTERS ESTIMATED | | REMARKS |
|---|---|---|---|---|---|
| | | | AVERAGE | MAXIMUM | |
| | | FIRE PLANNING CRITERIA | | |  |
| | | 1. CALIBER TO TYPE TGTS (TARGET/ WEAPON PREFERENCE CHART) | 40 | 60 | |
| | | 2. PRIORITY TO TYPE TGTS | 30 | 50 | |
| | | 3. STANDARD VOLLEYS PER UNIT | 10 | 15 | |
| | | 4. INTENSITY DESIRED (FRACTIONAL DAMAGE DESIRED) | 12 | 16 | |
| | | 5. EFFECTIVENESS ANALYSIS COMPUTATION PARAMETERS (TGT/WEAPONS LETHAL EFFECTS) | 50 | 70 | |
| | | 6. AMMO REQUIREMENTS | 25 | 30 | |
| | | 7. REPEAT REQUIREMENTS | 10 | 12 | |
| | | 8. EFFECTS SAFETY LINE (NO FIRE LINE ADJUST) | 20 | 30 | |
| | | LINE TOTAL TOTAL | 197 | 283 | |
| TOTAL NO. OF INPUTS (DOCUMENTS PER 24 HR. PERIOD) | | | | | |
| ADDITIONAL TIMING OR EQUIPMENT REQUIREMENTS | | | | | SECURITY OF INPUT ______ |

ADPS FORM 100 (ARTILLERY) APRIL 1959

FIGURE 5



EXAMPLE

FILE CONTENTS SHEET SSIa

E SEQUENCE PAGE 5 OF 7

AREA 31 OF 41

STUDY OR AREA TITLE TARGET DATA AND UNIT ANALYSIS

NAME OF FILE FIRE PLANNING CRITERIA AND COMPUTATIONAL PARAMETERS

FLOW CHART REFERENCE DC 940

SEQUENCE NO. 942-3

PREPARED BY AL MORAVEC

DATE 9 FEB. 1960

TYPE OF FILE INPUT OUTPUT [✓ MASTER]

PHYSICAL CHARACTERISTICS OF FILE BASICPAC MEMORY

PURPOSE OF FILE COMPUTATION OF TARGET/ UNIT EFFECTIVENESS DATA

FILE LOCATION (FIELD ARMY, CORPS, DIV., OTHER) BASICPAC DIVARTY

FREQUENCY OF REFERENCE [✓ AVERAGE] MAXIMUM (24 HR. PERIODS)

DEGREE OF ACCESSIBILITY AS REQUIRED

NEED FOR DUPLICATE STORAGE NONE

MEANS OF (INPUT - OUTPUT) TO FILE MAG TAPE (OR COMPUTER MEMORY)

COMPUTER PROGRAM REQUIREMENTS NONE

| REF NO. | RECORD NO. | DESCRIPTION | NO. OF CHARACTERS ESTIMATED AV. | MAX | REMARKS |
|---|---|---|---|---|---|
| | | 1. TARGET DATA FILES | 2800 | 3000 | |
| | | 2. FIRING UNIT DATA FILES | 2400 | 2800 | |
| | | 3. FIRE PLANNING CRITERIA AND COMPUTATION PARAMETER FILES. | 150 | 300 | |
| | | RECORD TOTAL TOTAL | 5350 | 6100 | SECURITY OF FILE |

ADDITIONAL TIMING OR EQUIPMENT REQUIREMENTS

ADPS FORM 200 (ARTILLERY) APRIL 1959

FIGURE 6

EXAMPLE

## OUTPUT DATA SHEET SSIa

E SEQUENCE PAGE 6 OF 7

AREA 32 OF 41

STUDY OR AREA TITLE TARGET DATA AND UNIT ANALYSIS

NAME OF OUTPUT 1. TARGETS THAT CAN'T BE HIT EFFECTIVELY
2. TARGET/UNIT EFFECTIVENESS ASSIGNMENT PLAN

FLOW CHART REFERENCE DC 940 SEQUENCE NO. 941-2,3,4

PREPARED BY AL MORAVEC DATE 9 FEB. 1960

SOURCE (TYPE FILE OR TAPE) TGT. DATA FILES, COMPUTER MEMORY FIRING UNIT FILES, FIRE PLANNING, CRITERIA FILE

METHOD OF TRANSMISSION BASICPAC COMPUTER

PHYSICAL FORMAT (REPORT, DISPLAY, OVERLAY, ETC.) PRINTOUT HARD COPY - SEE ATTACHED SHEET

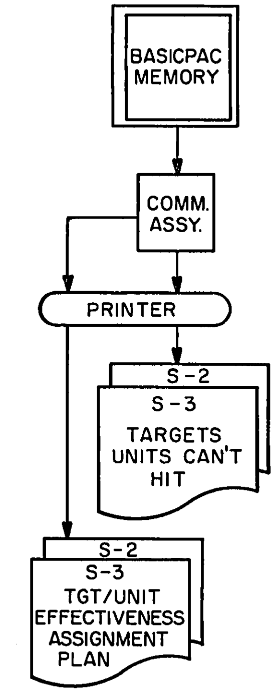
OUTPUT LOCATION (FIELD ARMY, CORPS, DIV., OTHER) DIVARTY FDC BASICPAC

NO. OF COPIES IF REPORT 2 TO S-3, S-2 DIVARTY

SPECIAL PROGRAMMING REQUIRED NONE

REPRODUCTION REQUIREMENTS 1. TGTS. UNITS CAN'T HIT
2. TGT/UNIT EFFECTIVENESS ASSIGNMENT PLAN

DISSEMINATION NEEDS TO S-3 AND S-2 OF DIVARTY

| REF. NO. | LINE NO. | DESCRIPTION | NO. OF CHARACTERS | | REMARKS |
|---|---|---|---|---|---|
| | | | AVERAGE | MAXIMUM | |
| | | 1. TARGETS UNITS CAN HIT | 3000 | 4000 |  |
| | | 2. UNITS CAN HIT TARGETS | 3000 | 4000 | |
| | | 3. TARGETS THAT CAN'T BE HIT EFFECTIVELY (HARD COPY OUTPUT) | 700 | 900 | |
| | | 4. TARGET/UNIT EFFECTIVENESS ASSIGNMENT PLAN (HARD COPY) | 1000 | 1500 | |
| | | NOTE<br>AMMO TYPE IS HE, FUZE IS FUZE QUICK, CHARGE AND NO. OF ROUNDS ARE DETERMINED AFTER TARGET/UNIT EFFECTIVENESS ASSIGNMENTS. | | | |
| | | LINE TOTAL TOTAL | 6700 | 8900 | |

TOTAL NO. OF OUTPUTS (REPORTS OR DISPLAYS PER 24 HR. PERIOD)

ADDITIONAL TIMING OR EQUIPMENT REQUIREMENTS

SECURITY OF OUTPUT ______

ADPS FORM 300 (ARTILLERY) APRIL 1959

FIGURE 7

# ORGANIZATION FOR SSIa EFFORT

## *FUNCTIONAL AREA FIRE PLANNING*

### WORKING TEAM

| | |
|---|---|
| 1. SYSTEM ANALYSIS | R-W AND USAEPG |
| 2. PROGRAMMING | R-W AND USAEPG |
| 3. FIELD TEST | R-W AND USAEPG |
| 4. USER COORDINATION | TACTICS AND COMBINED ARMS DEPT. (ARTILLERY SCHOOL) |

### GENERAL COORDINATION

USAEPG - SUBSYSTEM COORDINATOR
ADP DEPARTMENT

USAAMS - CHAIRMAN
ARTILLERY SCHOOL ADPS COMMITTEE

FIGURE 8