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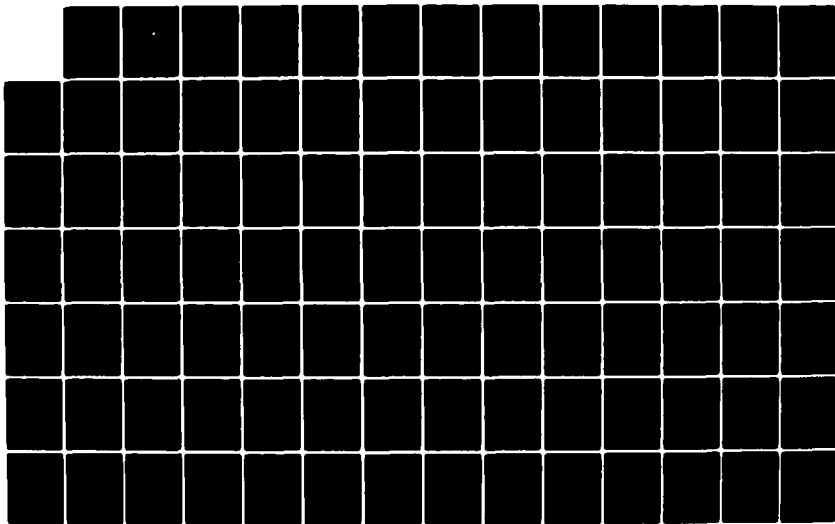
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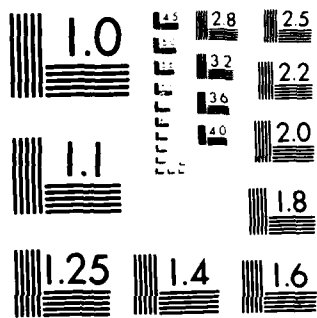
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NAVAL POSTGRADUATE SCHOOL
Monterey, California



THESIS

EXPANSION OF THE SCAN ENDGAME PROGRAM FOR
AIRCRAFT SURVIVABILITY STUDIES AND
DEVELOPMENT OF A SUPPORTING USER'S GUIDE

by

Jean-Paul Fourny

December 1982

Thesis Advisor:

R. E. Ball

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preparation by making it more interactive. In addition, a comprehensive User's Guide was prepared for use by NPS students involved in aircraft survivability/warhead lethality studies.



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Expansion of the SCAN Endgame Program for Aircraft Survivability
and
Development of a Supporting User's Guide

by

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Submitted in partial fulfillment of the
requirement for the degree of

MASTER OF SCIENCE IN ENGINEERING SCIENCE

from

NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

This study involved a detailed examination of the aircraft survivability analysis program called SCAN, and modification of the pre and post-processing graphics programs that support the program. The aim was the improvement of the originally installed version of SCAN at NPS by incorporating the graphics commands for the new IBM supported terminals, by increasing the speed of the display process, and by simplifying the input data preparation by making it more interactive. In addition, a comprehensive User's Guide was prepared for use by NPS students involved in aircraft survivability/warhead lethality studies.

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LIST OF VARIABLES

VARIABLES	DESCRIPTION
<u>Fragment Parameters</u>	
VMIN(I)	Fragment velocity at lower Polar Zone Boundary
UMAX(I)	Fragment velocity at upper Polar Zone Boundary
ZONMIN(I)	Lower angle of Polar Zone
ZONMAX(I)	Upper angle of Polar Zone
XWH(I)	Distance from warhead center to inertial fragment position
<u>Fuzing Parameters</u>	
FUZPOS	Distance from TDD to warhead center
FUZANG	Fuze look angle
RADMSL	Missile body radius
POSNOS	Distance from contact fuze to warhead center
POSTAL	Distance from warhead center to aft end of missile
<u>Blast Envelope Parameters</u>	
FUSBLR	Fuselage Blast Radius
FUSBL1	Distance from target CG to front of blast cylinder
FUSBL2	Distance from target CG to rear of blast cylinder
WNGBLR	Wing Blast Radius
WNGPT1(3)	End Point of wing blast centerline nearest fuselage
WNGPT2(3)	End Point of wing blast centerline nearest wing tip

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I. INTRODUCTION

This thesis examines in detail the SCAN package of programs as originally installed at the Naval Postgraduate School with the aim of improving the graphics capability, speed and ease of use. It investigates some of the limitations of the NPS version in relation to its usefulness as a supplement to classroom instruction on the aircraft survivability/lethality courses and describes the development of the resulting program additions and changes. In addition, the development of a comprehensive User's Guide for NPS students was undertaken.

A. OVERVIEW OF SCAN MODEL

To better understand the purpose of this study, a brief overview of the SCAN application is in order. SCAN provides an analytical means of assessing aircraft survivability against a specified missile threat. The encounter between an airborne target and a fragmentation warhead known as the endgame is mathematically simulated and impact computations are carried out for all fragments impacting a geometrical representation of the target. This type of model, as opposed to a fragment collector model, is less efficient and more time consuming since it computes all impacts, not just those at critical points. However, it has the distinct

advantage of allowing the analyst to experiment with shielding, component relocation, and extended vulnerable components. The added benefits of comparing results against real experimental data and providing a more realistic graphical display of the encounter are also possible. SCAN provides computations of survival probabilities, target hit distributions, and processes the data for statistical summary and/or graphical output. The actual structure of this model allows user options in defining target geometry down to specific component level, vulnerability criteria, warhead configuration, fuzing parameters, blast envelope parameters, and encounter conditions. For the purposes of this study, the target geometric and vulnerability descriptors are taken as predetermined and fixed for use by students. However, additional target models are available with special permission, and these can be modified by more experienced users. The primary features of this model as listed above, are summarized as follows:

1. Target Geometric Representation - Analytical equations characterizing the basic shapes are used in the model and combined to represent the component structure of the target. Both internal and external components can be modeled, and the information used to dimensionalize the components, is contained in the various target geometry files stored on disk. Figure I-1 illustrates the basic concept. A

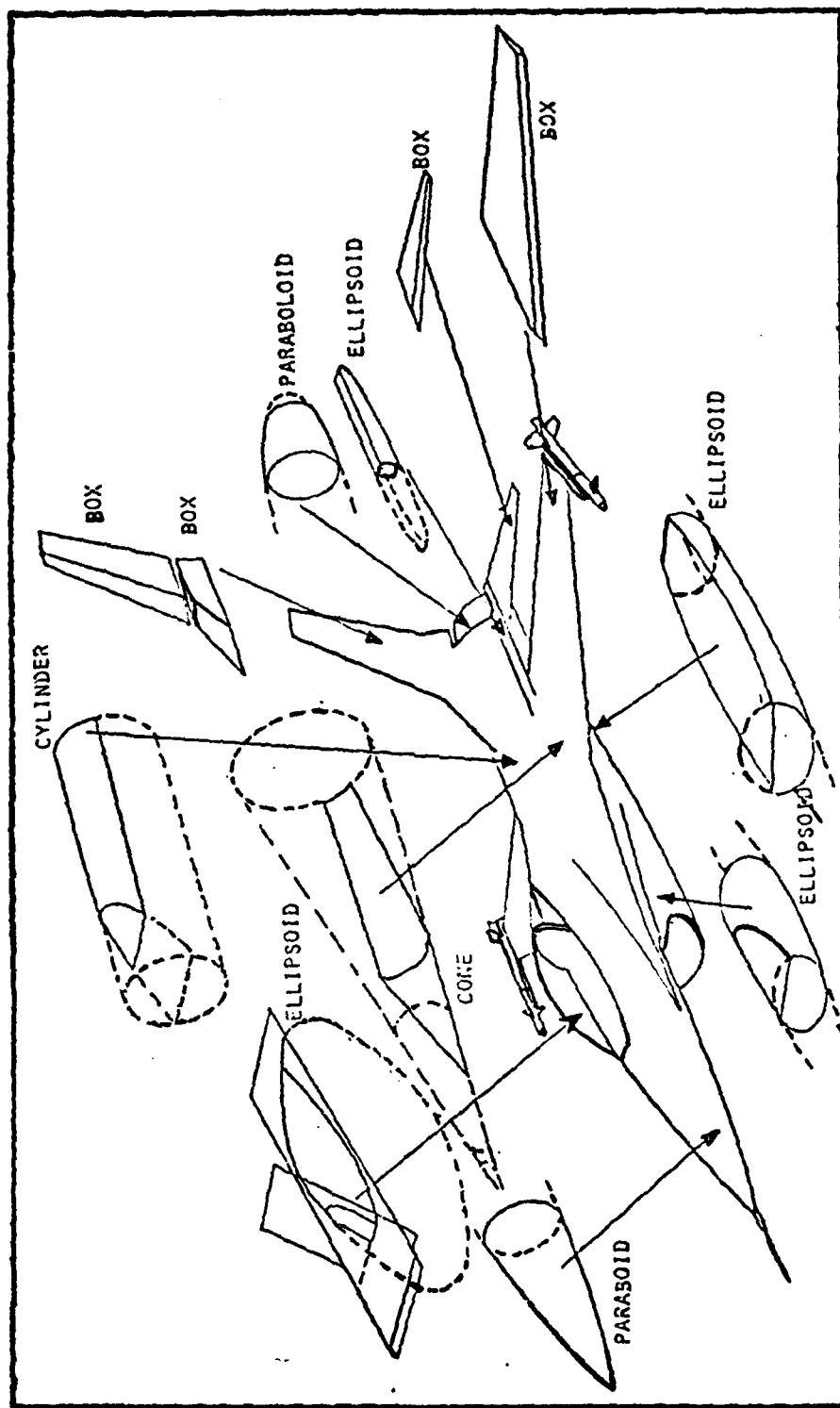


Figure I-1. Method of Target Modeling

detailed description of the geometric modelling is provided in SCAN, Volume I [Ref. 1] and an example of a geometry file is contained in the User's Guide, Appendix A.

2. Encounter Geometry - The modelling of the encounter scenario is done using four coordinate systems as depicted in Figure I-2. The features of primary importance include the kinematic and relational descriptors of the target and missile and the type of trajectory being simulated. The user has the option of specifying the miss distance of the missile at the time of detonation, or the miss distance from the aimpoint at the closest point of approach (CPA), with or without a Monte Carlo sampling specified by a circular error probable (CEP). Details of the encounter geometry modelling can be found in SCAN, Volume I [Ref. 1] and SCAN, Volume II [Ref. 2], and an example of the Case Data File is included in Appendix D.

3. Missile Representation - This feature is of primary importance to the student of a Warhead Lethality course, allowing him (her) the flexibility to redesign the missile warhead and fuze to a variety of specifications. Figures I-3a and b provide a pictorial representation of the warhead and fuze parameters used in the SCAN model. The warhead data file is also used to dimensionalize a blast envelope around the target, which can be extended or reduced by the user. The mathematical development of the damage mechanisms resulting from these parameter settings is

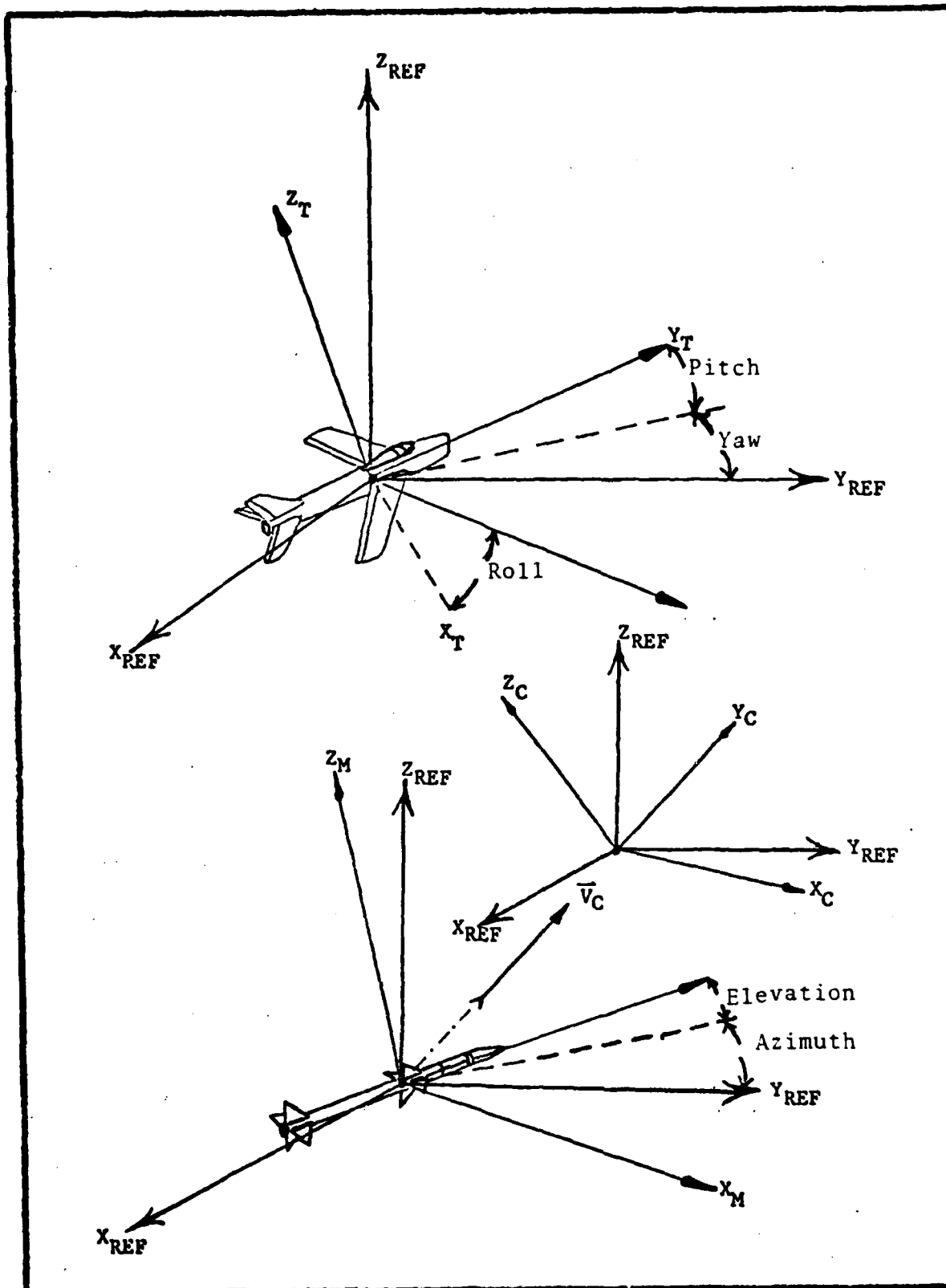


Figure I-2. Coordinate System Representation

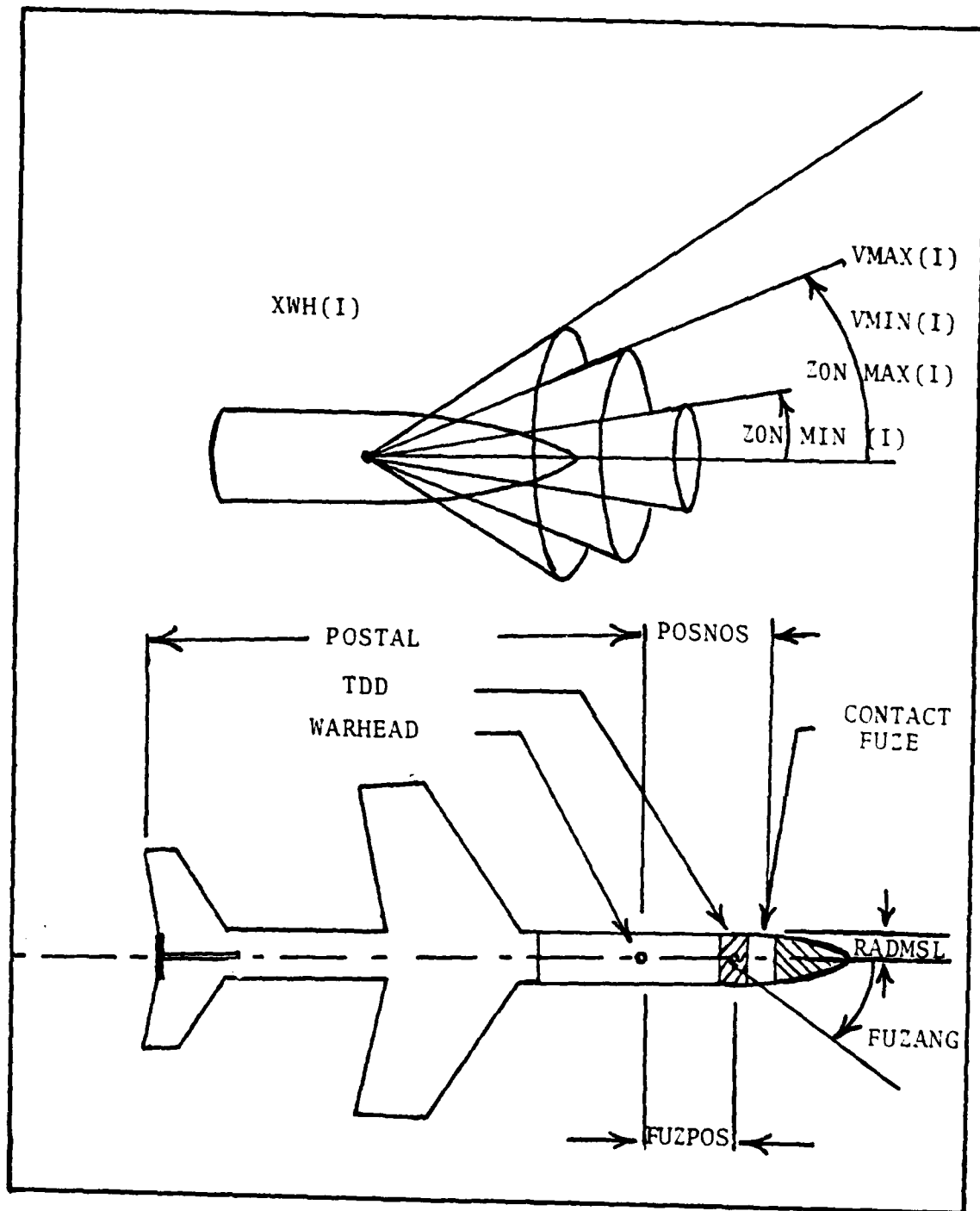


Figure I-3. Missile/Warhead Representation

thoroughly treated in SCAN, Volume II [Ref. 2]. A detailed description of these parameters and their interaction can also be found in [Ref. 3] and [Ref. 4]. The model for the blast envelope around the target is pictorially represented in Figure I-4.

B. STRUCTURE AND DESCRIPTION OF PROGRAM CHANGES

The structure of SCAN consists of three separate computer programs written in FORTRAN and developed at the Pacific Missile Test Center: SCANMAIN; SPLGEN and SPDRAW. SCANMAIN is the primary program and provides the actual analytical assessment of aircraft survivability against a specified missile threat. The program was installed at the Naval Postgraduate School in 1980 by Lieutenant J. Parr [Ref. 5]. The program is well documented and the support literature is abundant and current. The two graphics support programs installed at NPS are SPLGEN and SPDRAW. SPLGEN is the graphics pre-processor which accepts as inputs the target geometrical file and generates a target vector file for SPDRAW. SPDRAW accepts as input the target vector file from SPLGEN, and optionally the target impact file from SCANMAIN, and processes the data for graphical output based on user selected options. These two programs were installed at the Naval Postgraduate School in 1981 by Lieutenant Commander T. M. Hayes [Ref. 6]. Changes to these two programs and the creation of two file manipulation programs and an

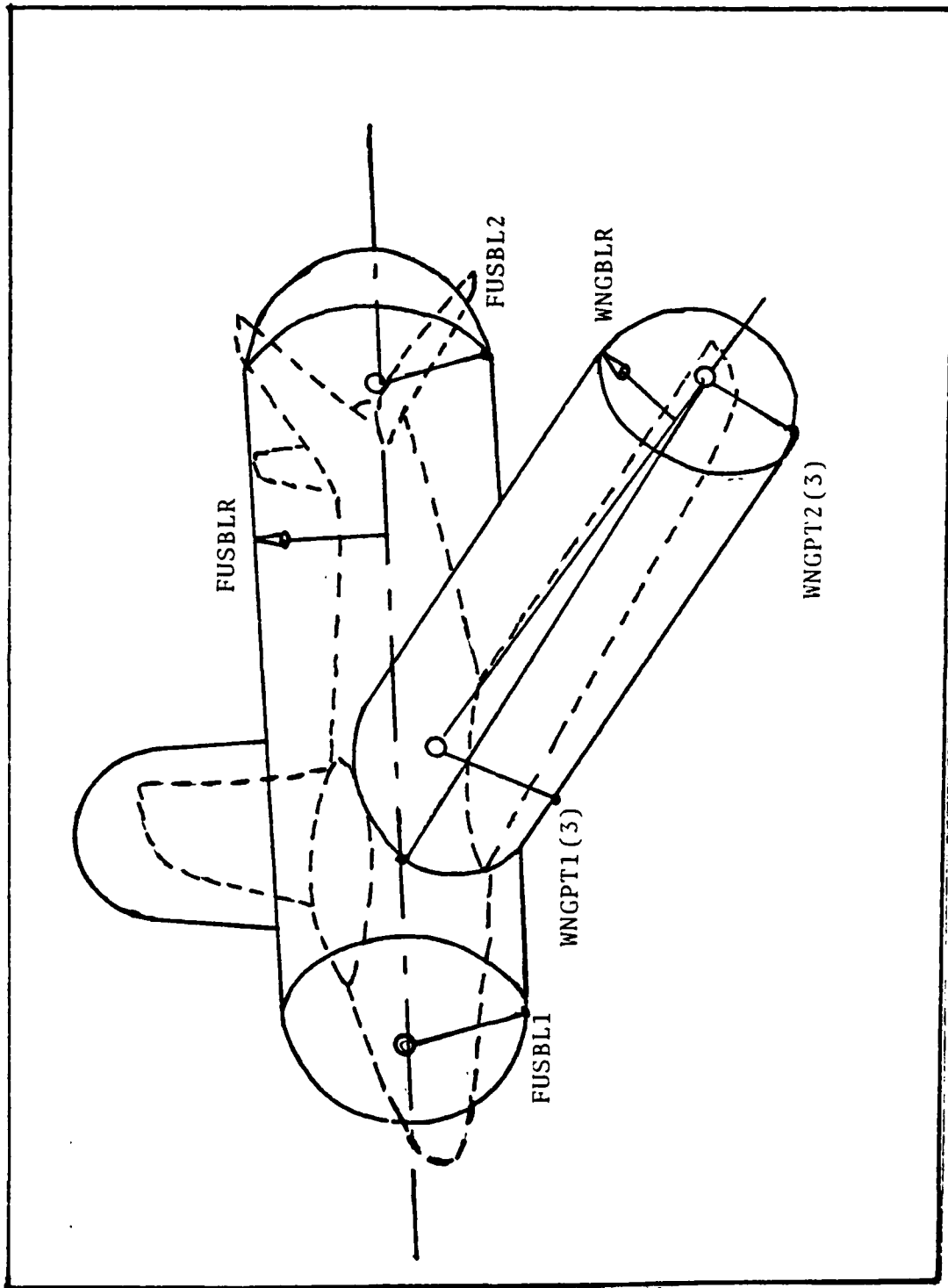


Figure I-4. Blast Envelope Representation

interactive control executive program were the major part of this thesis research.

Under the CMS timesharing system used at NPS, executive files can contain CMS or CP system commands or EXEC control statements and can be written and tailored to control special applications. Many of the burdensome system tasks required of a user can be eliminated by developing such a file as a control executive. This was done for the SCAN package at NPS and named NPSCAN. Figure I-5 summarizes the system commands required by the user on the original NPS version to run the entire application and the reduction of system commands to one on the revised version.

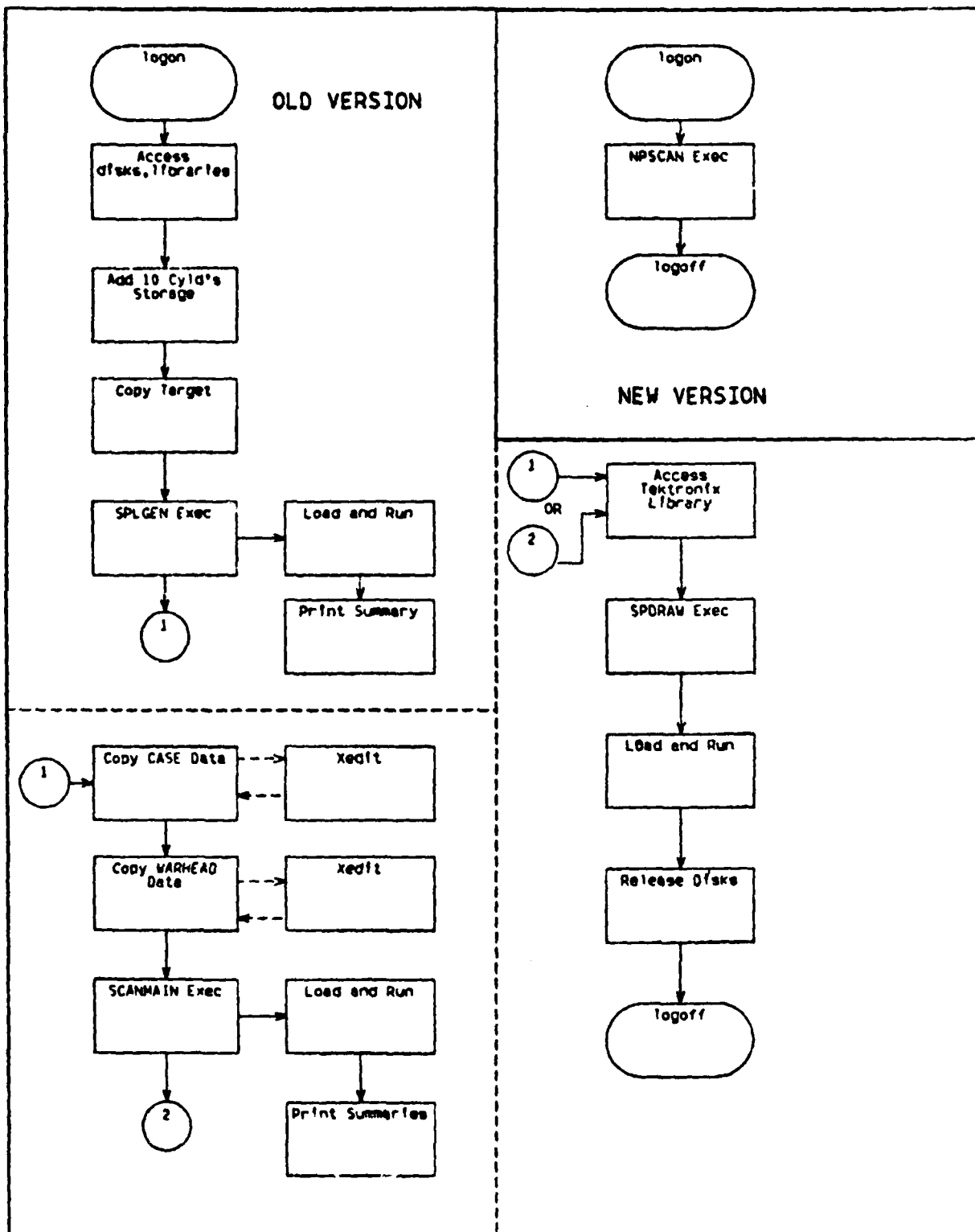


Figure 1-5. Comparative Flowchart of User Required System Actions

II. ANALYSIS OF SCAN

A. NPS SCAN PACKAGE LIMITATIONS

The original SPDRAW program was written in FORTRAN for the CYBER computer and used a PMTC graphics system dependent language to drive the particular graphics terminal at Point Mugu. Appropriate changes were made to the program when initially installed at NPS to make it compatible with the IBM 3033, and the graphics commands were translated to PLOT10 languages for use on the Tektronix 4012 and 4081 Terminals. Since its installation, the School has acquired the new IBM Dual Screen Management workstations utilizing the IBM 3277 keyboard terminal and the Tektronix 618 graphics terminal. The DSM stations use the software dependent GRAF 77 language package and can also be driven by the ISSCO Telegraph or DISSPLA software packages. The SPDRAW PLOT10 commands were translated to the GRAF 77 primitive commands as part of the thesis effort. In addition, some of the original code was changed. These changes resulted in four advantages over the original version.

These advantages are:

1. Increased Speed
2. Increased Flexibility
3. Increased Accessibility and
4. Improved Graphics Support

The specific subroutine changes and additions resulting from this translation are contained in Appendix C.

When the initial familiarization and program examination of SPDRAW was being undertaken at the beginning of the research period, the graphics plotting speed was noted as being extremely slow for a computer generated image. A small improvement in plotting time was noted when the translation to GRAF 77 was finished, mainly due to the utilization of hardwired terminals (9600 baud) vice a modem connected terminal (1200 baud). After further examination of the program logic, the discovery was made that the SPDRAW line generation routines were calculating individual vectors, checking their validity, and then plotting the single vector before going on to the next vector calculation. A similar procedure was followed for the target (fragment) impact file. To improve this situation, two additional storage files were added to the control executive and introduced into the generation routines to store all calculated data points prior to any plotting. In the revised application, all vectors are first calculated and stored. On completion of all calculations, the total file is sequentially plotted in one step. Additional information on this new procedure is provided in the design section, and the results are discussed in Chapter III.

Students at NPS, as with users in any environment, can possess widely differing computer experience. Lack of experience can adversely affect the ability of a user to successfully implement an application. For this reason, an interactive program should take into account the diverse backgrounds and make allowances for the inexperienced user. An important parallel to this concern is the experience of the user with the application itself, which must be taken into consideration if accessibility is to be given to students whose time is limited, whose familiarity with the topic is non-existent until the time of the course of study, and whose opportunity to use the program will be limited to a few weeks at the end of a course. The time factor is particularly important in view of the fact that SCAN is an extensive and complicated application. Running the three original programs required extensive reading by the author, which brings up another limitation of the SCAN package of programs, the lack of comprehensive documentation. Various components of the package were documented in different manuals, with the majority of the documentation on SCANMAIN. For example, Fair [Ref. 3] discusses the structure of the warhead and case data files and provides insight into the manipulation of these files for user defined encounter scenarios and warhead parameters. Hayes [Ref. 4] provides a useful guide for the control of

the complete application and summarizes the function of SPDRAW, including a descriptive listing of the available commands and user options. Specific examples are provided in Hayes' thesis, as well as documented results of a specific analysis carried out to demonstrate SCAN's capability. Prior to this thesis, no attempt has been made to compile these various sources into a comprehensive guide. This fact and the previously listed limitations, were all taken into account in the design and development of the resulting program changes and additions to be discussed in the next section.

B. DESIGN AND DEVELOPMENT OF PROGRAM CHANGES

As stated in Section A, the design of an interactive application should take into account its intended user's familiarity with computers, as well as their understanding of and experience with the application itself. Since familiarity with a package is dynamic and not static, and regular users quickly pass from a beginning stage to more demanding users, stepwise learnability was incorporated into the design changes applied to the NPS version of SCAN. The concept of stepwise learnability breaks up the amount of information the user must assimilate into a series of steps [Ref. 7]. Three distinct levels of interaction were decided upon during the development of the changes. The

following levels were incorporated in SPLGEN, SPDRAW, and the new control executive program NPSCAN;

1. Novice
2. Intermediary
3. Experienced

Simplicity was a key issue in the design of the control executive. At the same time, meaningful results were desired with minimal prerequisite knowledge. In order to maintain simplicity and clarity without sacrificing efficiency, the first design decision was to develop the control executive such that all administrative and technical requirements to run the programs would be handled automatically, requiring minimal computer experience by the user and eliminating the problem of bothersome typing errors. The application simplification is clearly depicted in Figure I-5. To maintain clarity, programmed instructions were provided at all levels of interaction, and the User's Guide was organized into segments corresponding to each user level to provide expansion and further explanation of these instructions. No more information than was required at each level was provided so as not to burden the user with confusing detail. To ensure efficiency was not sacrificed using this approach, each section in the application was restructured to provide a varying degree of sophistication and complexity dependent on the user level.

Minimal changes were required in SPLGEN, since the only interaction provided was for line density settings, target size extension, and debugging print switches. Setting the debugging switches provided for the Intermediary and Experienced level as an option rather than an annoying requirement. The option was not offered to the Novice level, and switches are automatically set to default. Line density option was reduced to a simple choice of normal or high density and is offered to all levels of user. The size extension setting was completely eliminated and is now automatically provided from within the Control EXEC and passed to the program as a self-loading parameter.

The SCANMAIN program is completely non-interactive, but the input data files to this program are of primary importance to the user. They are, in fact, the tools available to the user for exploring the capabilities of SCAN and for carrying out useful analysis. Their importance cannot be overemphasized, and the contents of these files should provide realistic specifications for the missile and target. A standard default file of each type (missile warhead, target, and case) was prepared and they are presented in Appendix D. These default files are automatically loaded at the Novice level in order to allow the user to proceed with the application

without having to prepare any input data. The Intermediary level user is provided with the choice of selecting the default files, or creating and utilizing custom files. Two programs were developed for this purpose; each program allows the user to change the primary descriptors within each file interactively and provides instructive messages and selective branching options. At the Experienced level, the user is allowed complete freedom of choice in manipulating the data files through the CMS XEDIT feature incorporated into the control executive. Guidance for manipulating each descriptor is provided in the User's Guide given in Appendix A. Details of the two file manipulation programs, are contained in Appendix B and are flowcharted in Figures II-1 and II-2.

The principle interactive program within the SCAN package is SPDRAW. This program underwent several modifications during the progress of the thesis. As outlined in Section A, translation of the graphics commands was the initial change, followed by the later amalgamation of both PLOT10 and GRAFF 77 into the same program, to allow the user the choice of terminal types. These changes are detailed in Appendix C.

The next change to SPDRAW was the restructuring of the line generation routines to enhance the speed of the graphics display process. This change required the addition of two temporary storage files to the file

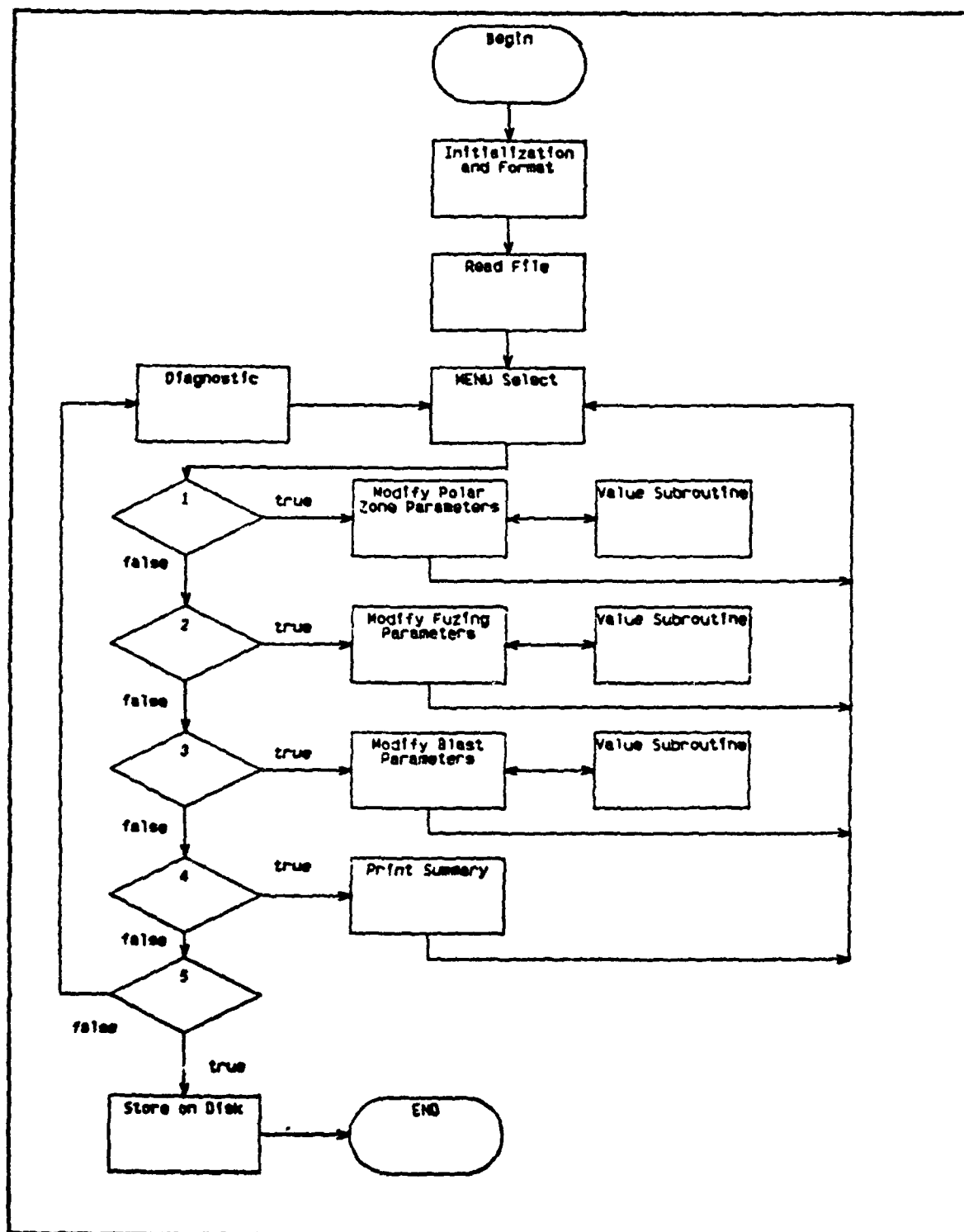


Figure II-1. Warhead Interactive Program Flowchart

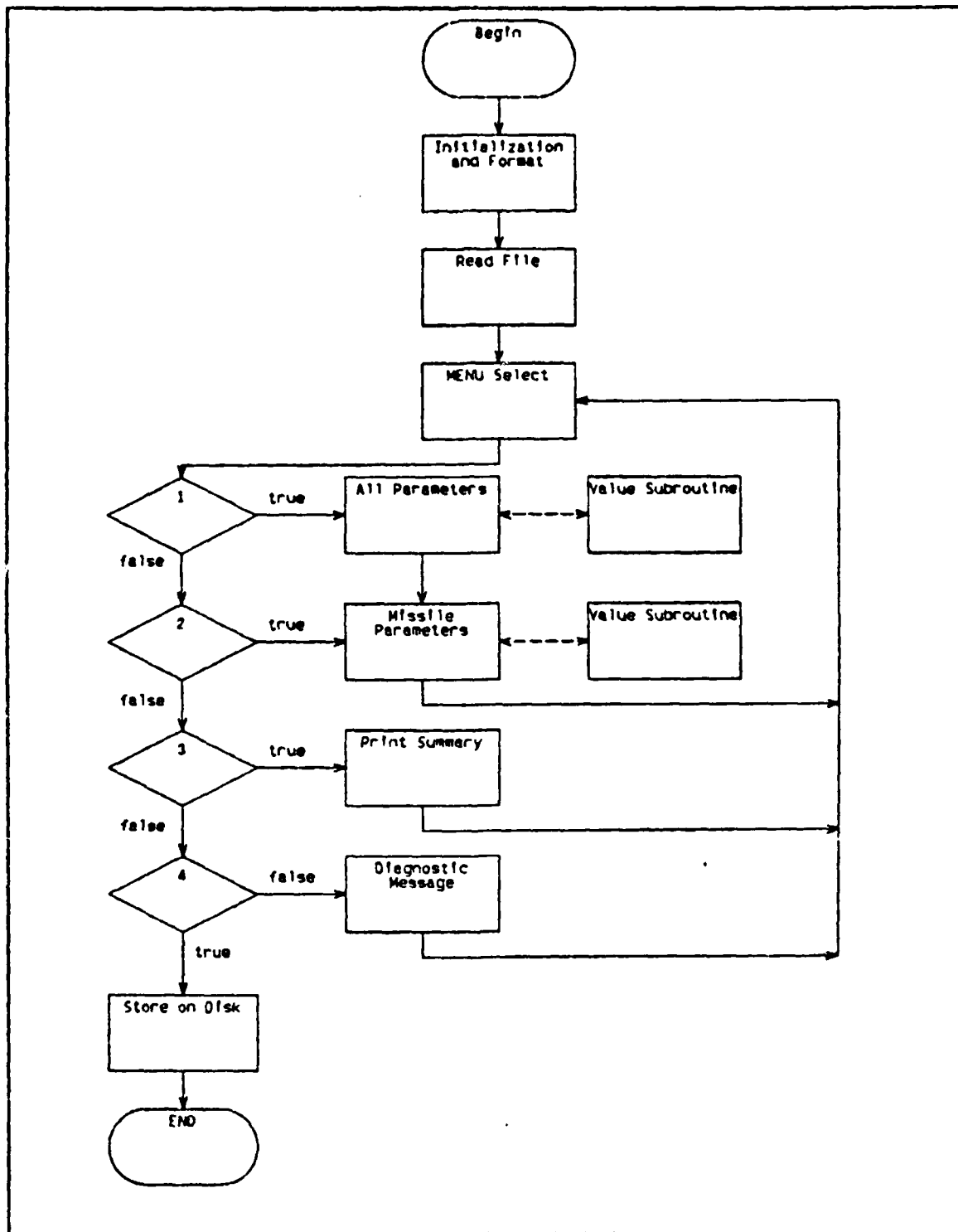


Figure II-2. Case Interactive Program Flowchart

definition for SPDRAW. A flowchart depicting the sequences of actions for the original and new version is found in Figure II-3.

The major additions and changes to SPDRAW were made to accomodate the three levels of user. The breakdown of command and option parameters for the three levels are shown in Figure II-4. The Novice level is provided with simple graphical capability including axes and fragment impact plotting. Control actions are provided through function key selection, with some numerical data entry. The Intermediary level user is provided with increased flexibility and options, while simplicity of selection is maintained using function keys and basic numeric data entry. The Experienced level user is provided the complete spectrum of graphic commands and options with control being maintained through more flexible typed command and option descriptors. All levels of user are provided with instructive messages, menu selection, diagnostics, and access to a newly written dynamic screen subroutine. This subroutine allows display manipulation without reentering a new PICTURE command. Details of this subroutine are flowcharted in Figure II-5. Additions and changes to SPDRAW are provided in Appendix C.

Another major contribution was the development of the control executive to replace the five original execs used with the NPS version [Ref. 4]. These five

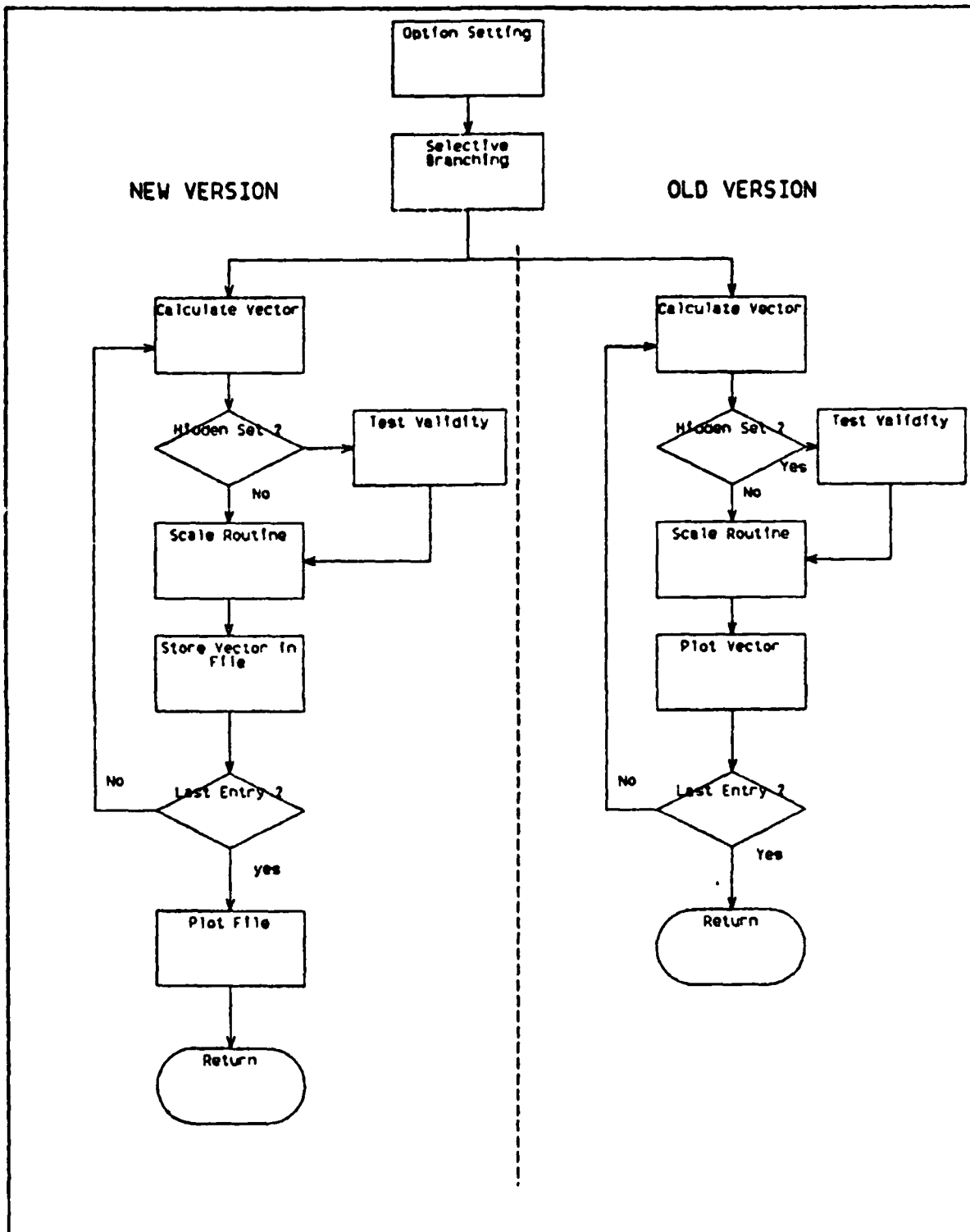
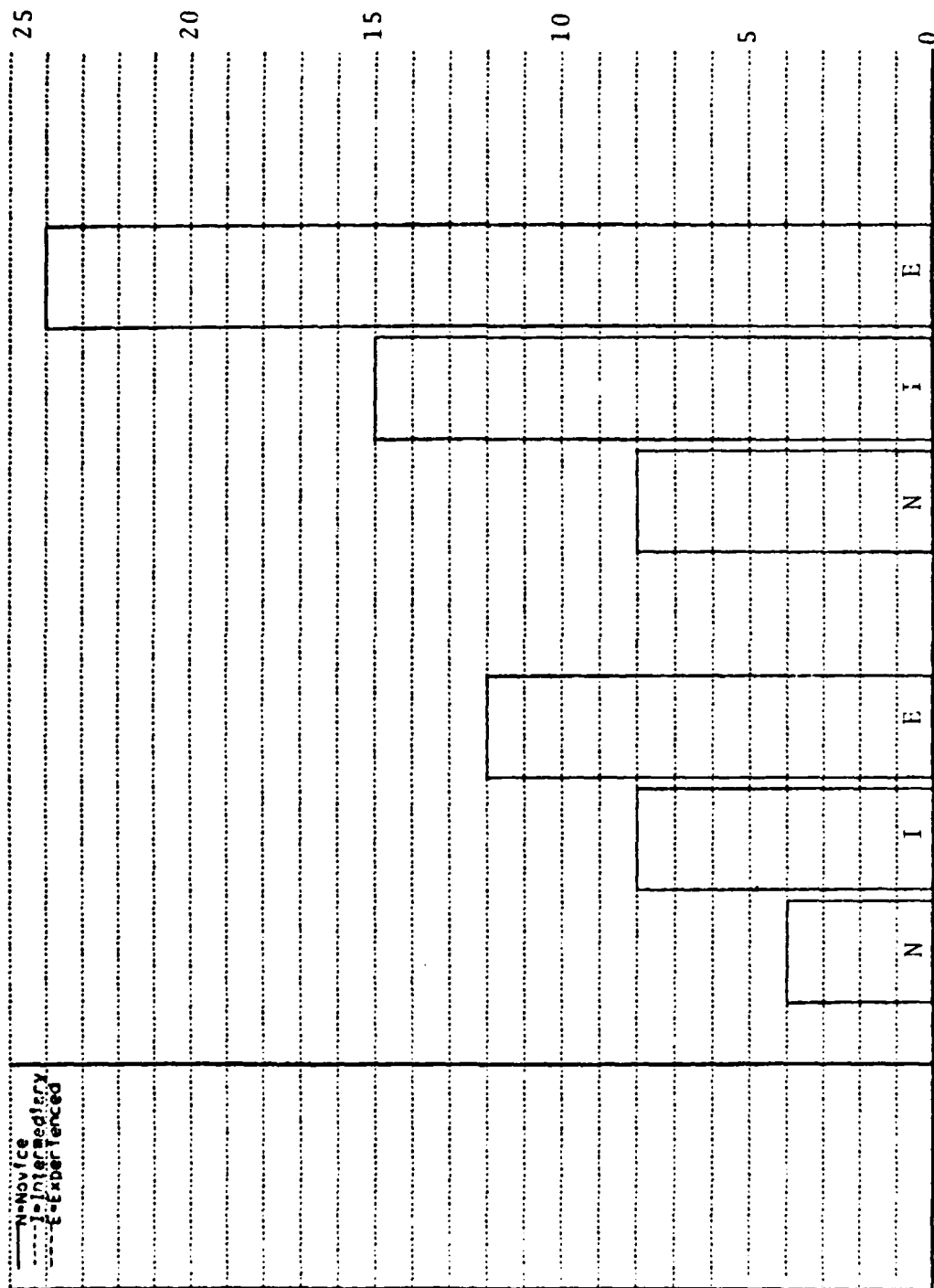


Figure II-3. Comparative Flowchart of Vector Plotting Sequence



COMMANDS_____OPTIONS

Figure II-4. User Level Accessibility to Commands and Options

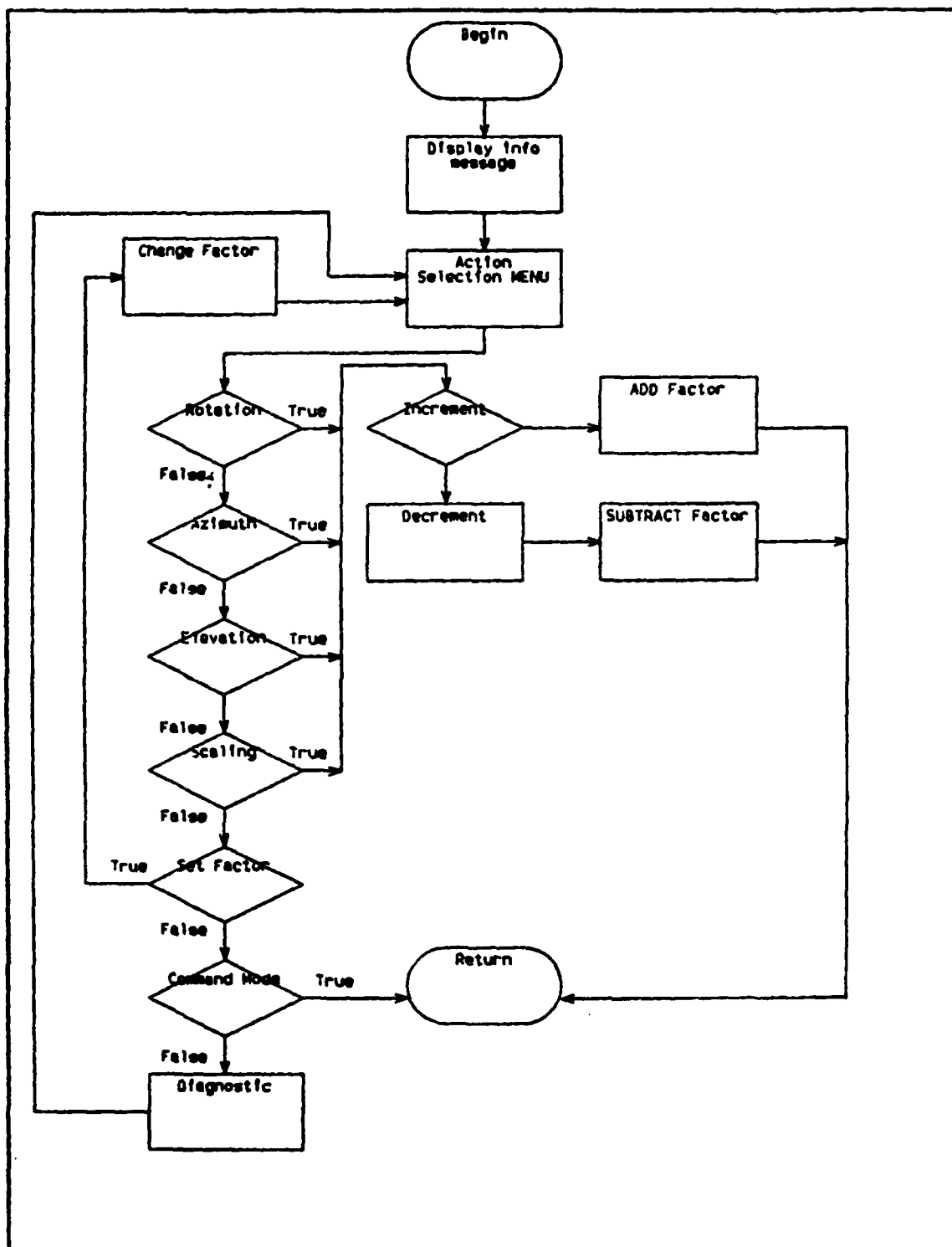


Figure II-5. Flowchart for Display Change Subroutine

programs ranged from three lines of code to ten lines of code and provided the file definitions, global statements, and loading commands for SPLGEN, SCANMAIN, and SPDRAW. The new version, called NPSCAN, is ten pages in length, contains five hundred lines of code, and is designed to be completely interactive. The exec is written to encompass two (three with further expansion) graphics languages and a variety of graphics displays. It can also be used with the standard non-graphical terminals to provide statistical data only. It provides the user with maximum flexibility but requires minimum user knowledge of the system by providing automatic program control, three levels of interaction, and self-helping instructions and diagnostics throughout the application. The flowchart for NPSCAN is depicted in Figure II-6, and details are contained in Appendix B.

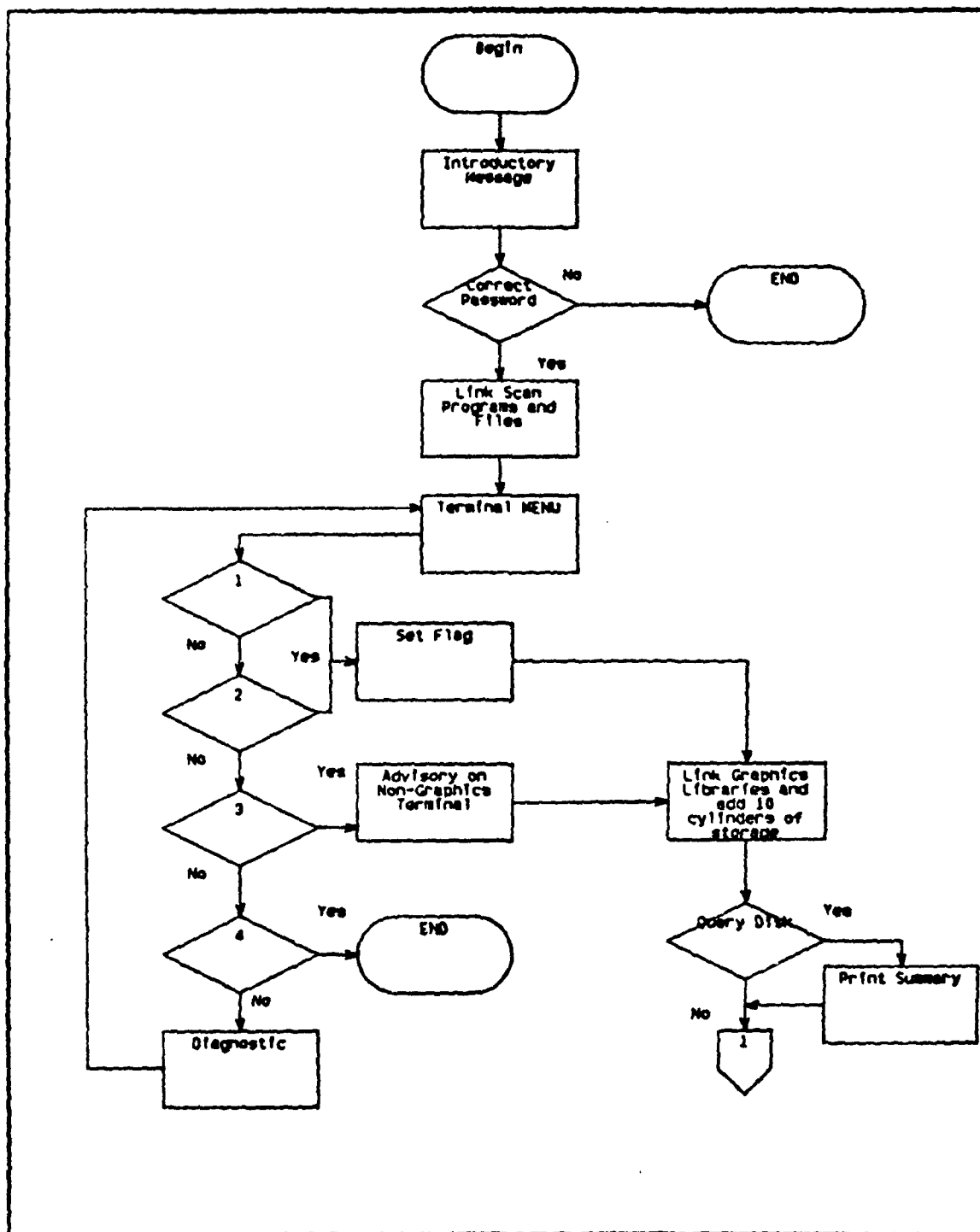


Figure II-6. NPSCAN Executive Flowchart

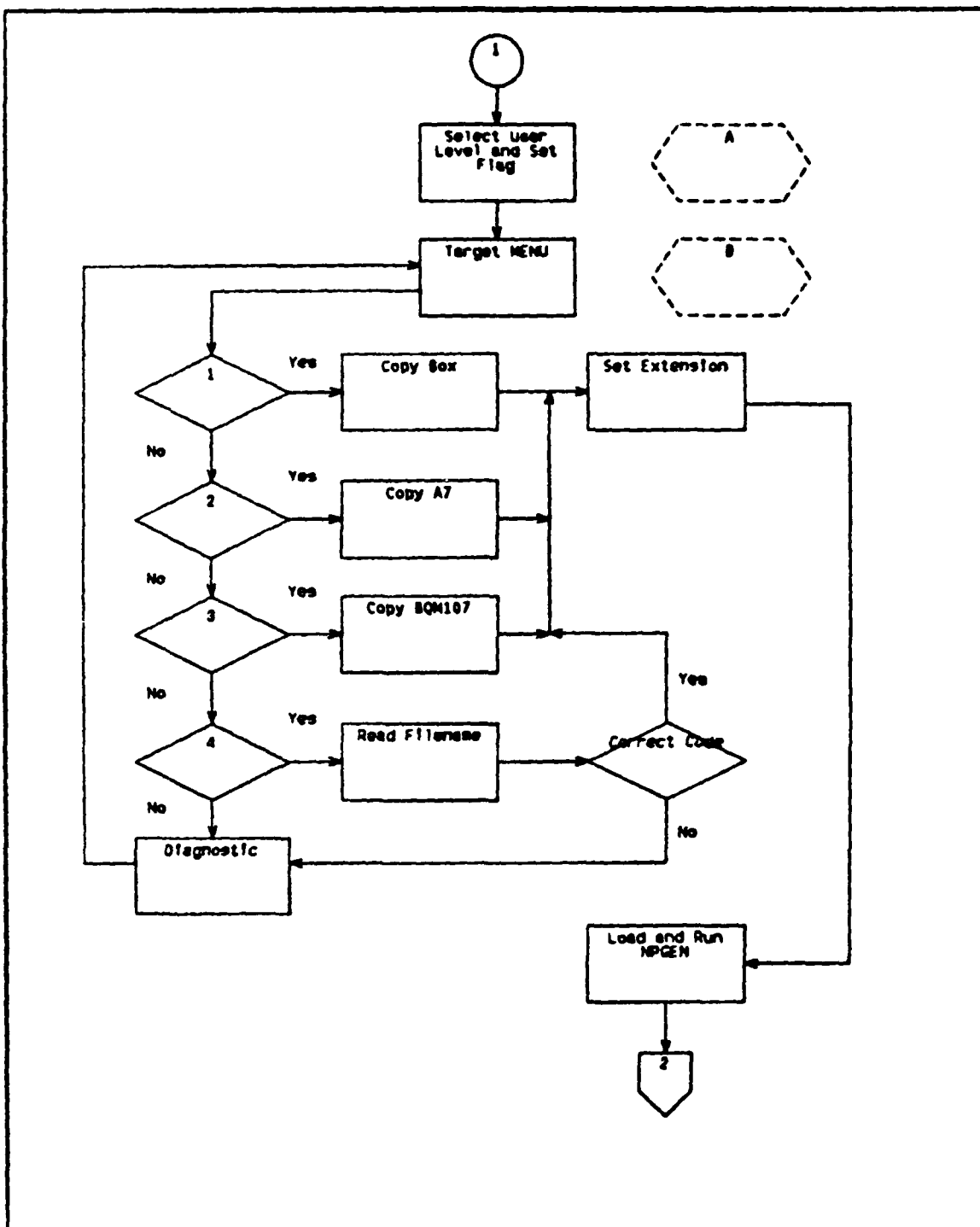


Figure II-6. (Continued)

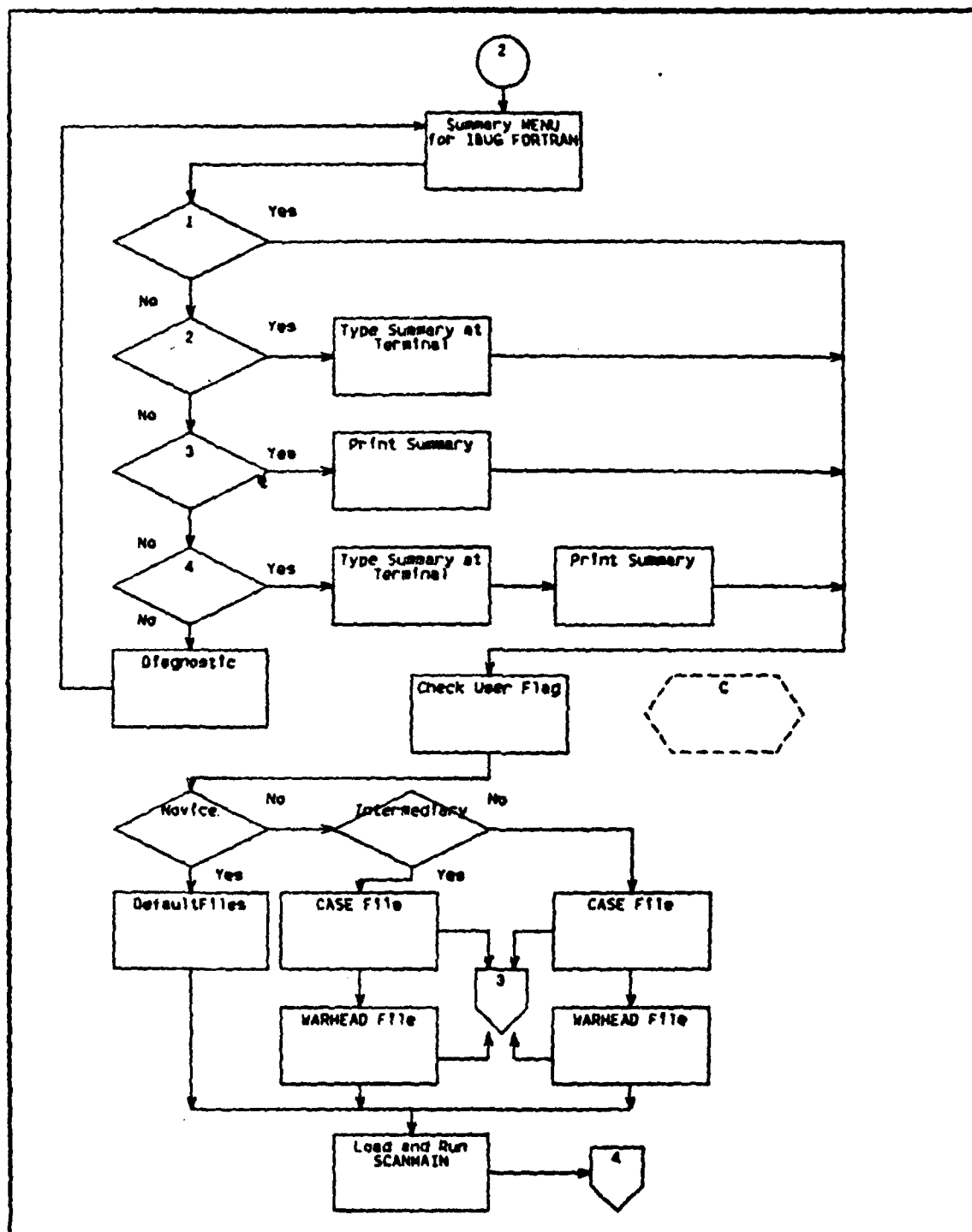


Figure II-6. (Continued)

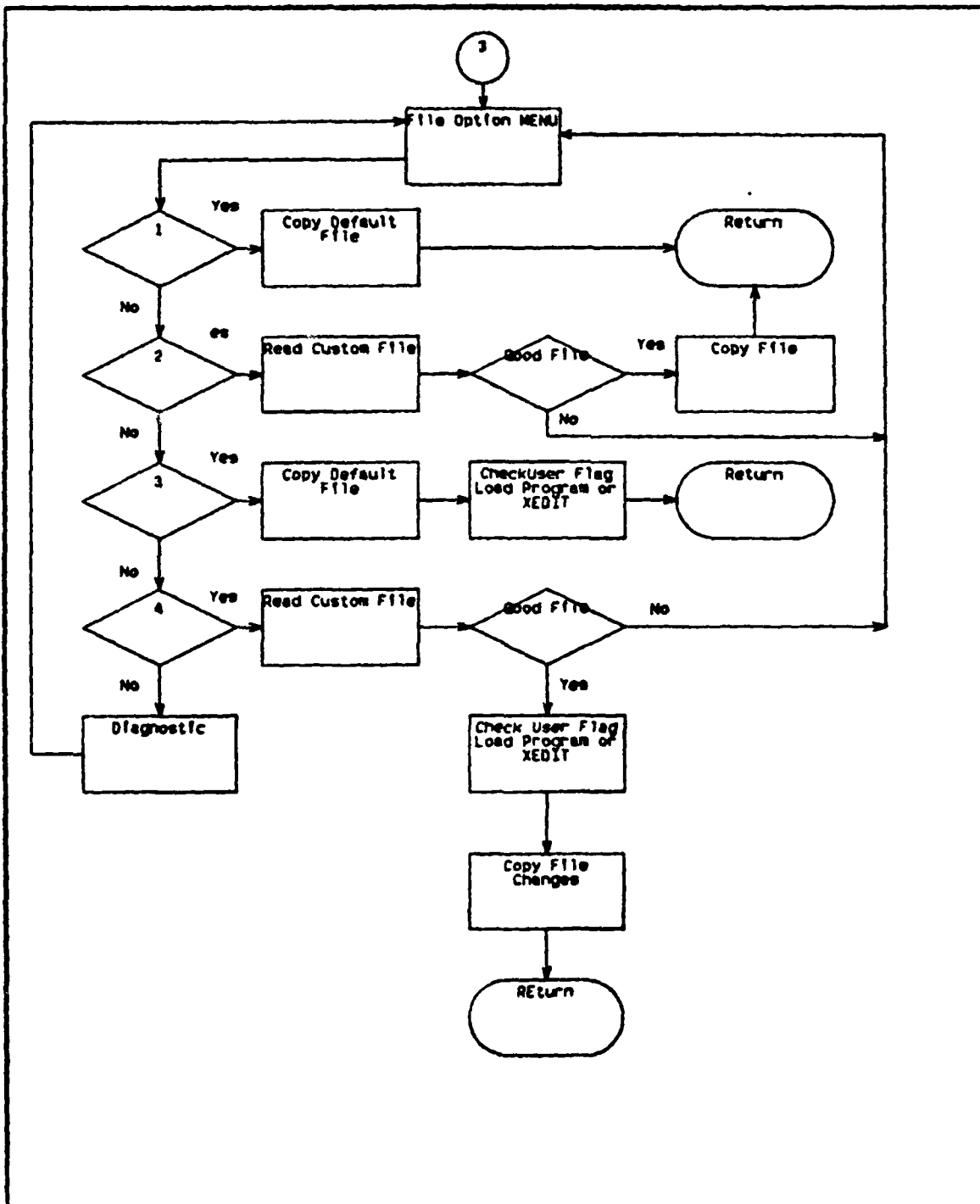


Figure II-6. (Continued)

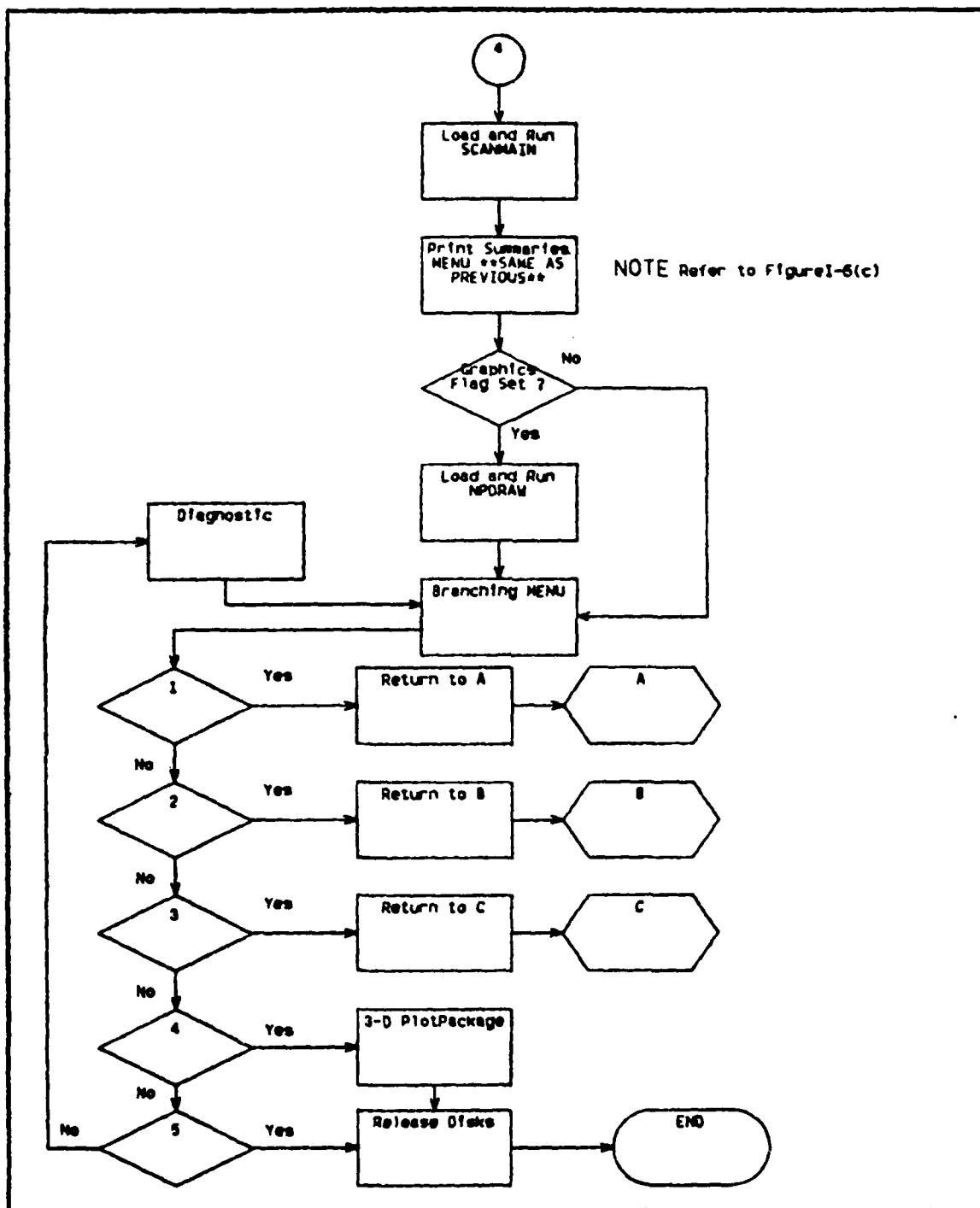


Figure II-6. (Continued)

III. RESULTS AND CONCLUSIONS

The SCAN package of programs is a valuable tool to the Endgame analyst, and with the changes and additions to the NPS version, should provide a useful and easy to use supplement to the Warhead Lethality and Aircraft Survivability courses taught at the School. The objectives of this study outlined in the Introduction were achieved and a summary of the results is given below.

Translation of the graphics commands to GRAF 77 resulted in four advantages. First of all, additional flexibility with the addition of a new language is evident by the increased useability, not only at NPS, but at other institutions. Second, accessibility at NPS is improved because of the large number of new IBM terminals that were acquired for the NPS system. Third, increased data transmission speed over that of the modem connected terminals was achieved since all IBM terminals are hardwired. Fourth, improved graphics support available for the new system terminals, although not optimal at present, will increase and improve as the system matures.

Restructuring the vector generation routines to calculate all values before commencing the plotting sequence had a significant effect on the speed of the

display process. An example of some of the observed time differences is as follows: display of a simple box target using the old version, PLOTIO (1200 baud terminal) was 69 seconds; the new version GRAF 77 (hardwired) used 1 second; for a complicated A-7 target display, the old version took 257 seconds; the new version took 24 seconds (these times include the fragment impact and axes generation). Testing times were taken during non-duty hours when computer usage was not heavy.

Development of three user levels will ensure that SCAN can be used to obtain desired results with minimum prerequisite knowledge and to provide flexibility and increased sophistication for the more experienced user. A breaking-in period of application usage by non-experienced users is necessary in order to assess effectively the achievement of this aim. Further refinement may be required at a later date after the revised version has been implemented and used.

The objectives of simplicity, clarity, and efficiency were achieved through the development of NPSCAN Control Program and the file manipulation programs. User knowledge of the computer system has been minimized. The addition of instructional messages and diagnostics to all interactive segments should prove useful even to the most seasoned users of SCAN.

The documentation that was compiled will provide each level of user with only that information that is necessary at that level and will eliminate the need to research additional sources, except of course in the case of the more advanced users.

One final note is concerning the research done to translate the graphics commands for DISSPLA and implement its use in the application. A custom executive was designed and incorporated into the Control Exec and used successfully in running a simple test program. When it was more carefully analyzed, it proved to be unsuitable for an interactive program such as SPDRAW, and was discarded. However, its use in development of a 3-D Plot Package at the conclusion of the application session could prove most useful and is recommended for further research.

APPENDIX A
NPSCAN USER'S GUIDE

SECTION

I. GENERAL DESCRIPTION

- A. Introduction
- B. Description of Application Programs
- C. NPSCAN Executive Program

II. NOVICE LEVEL

- A. Introduction
- B. NPGEN Program
- C. NPDRAW Program

III. INTERMEDIARY LEVEL

- A. Introduction
- B. NPGEN Program
- C. PROG1 and PROG1 File Programs
- D. NPDRAW Program

IV. EXPERIENCED LEVEL

- A. Introduction
- B. Listing of Abbreviations
- C. NPDRAW Program

V. TROUBLE SHOOTING

- A. Principle Parameter Tables for Case and Warhead Files
- B. Common System Difficulties

I. GENERAL DESCRIPTION

A. Introduction

NPSCAN refers to the Naval Postgraduate School version of SCAN and specifically represents the control executive used to drive the application programs herein referred to as:

1. SCANMAIN - Survivability assessment program
2. NPGEN - Graphics pre-processor
3. NPDRAW - Graphics post-processor
4. PROG1 - Interactive case file manipulation program
5. PROG2 - Interactive warhead file manipulation program

SCAN was originally developed at the Pacific Missile Test Center for the purposes of analyzing aircraft survivability to missile threats and providing detailed damage estimates down to the component level. Users of the NPS version have access to three target models and with special permission can obtain codenames for additional models. Figures A-1 and A-2 depict a 3-D view of the A7 and BQM107 models that students can work with. In addition, a simple BOX model is provided and is recommended for first time users to familiarize themselves with the commands and options in NPDRAW. It should be noted that BOX has external components only. Figures A-3 and A-4 depict an internal representation of the A7 target and its computer generated counterpart.

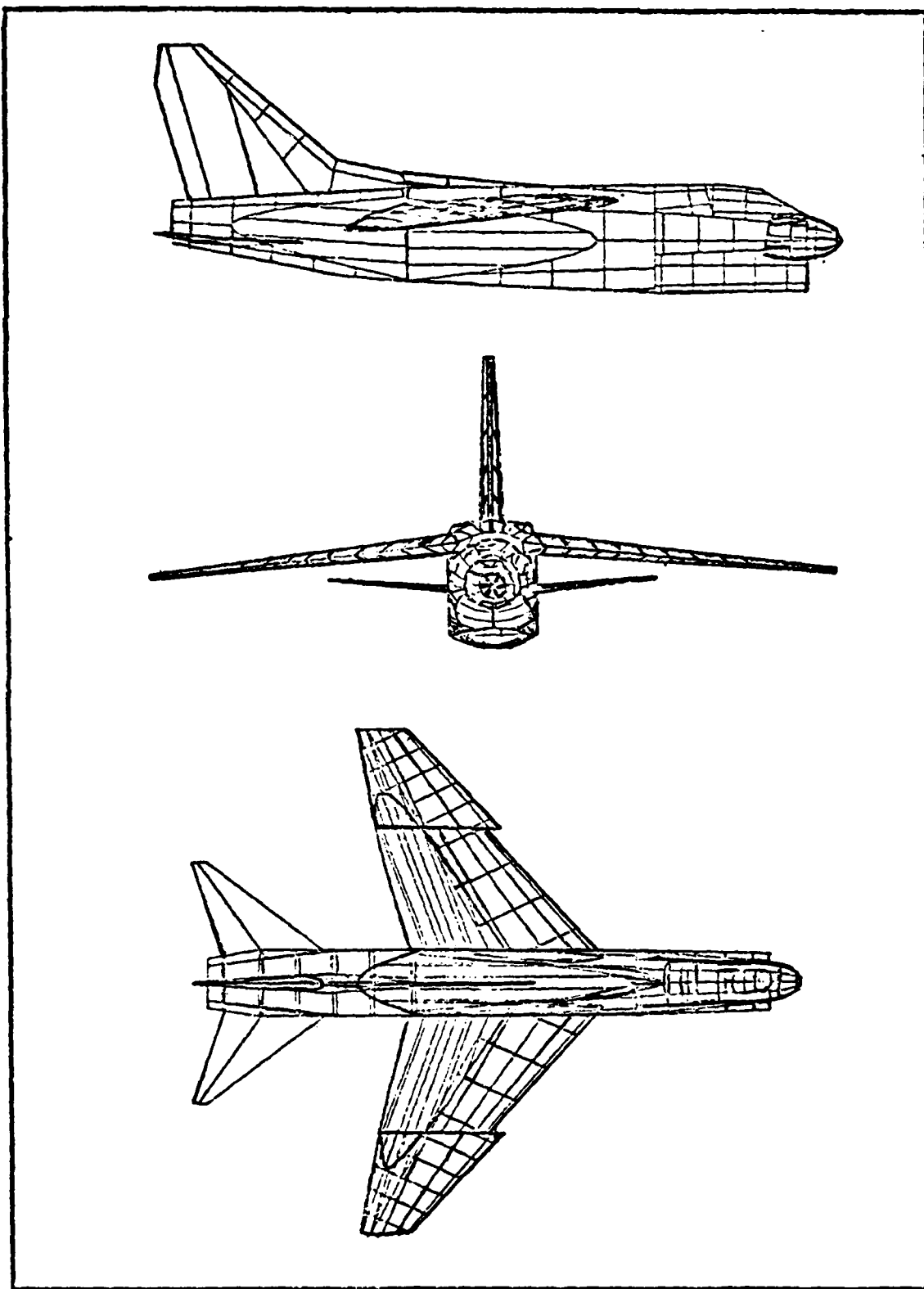


Figure A-1. 3-D Representation of A-7 Target Model

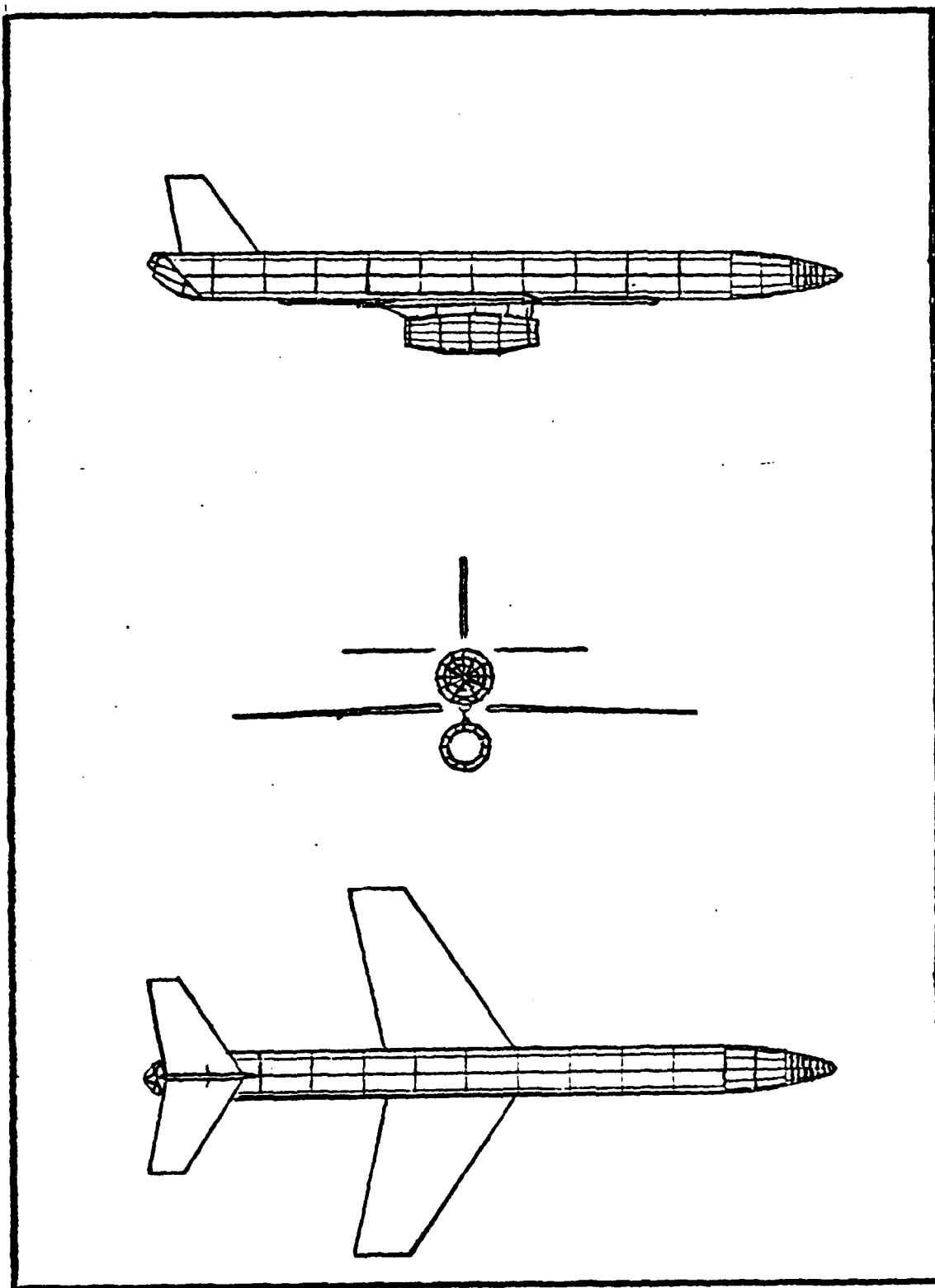


Figure A-2. 3-D Representation of BQM107 Target Model

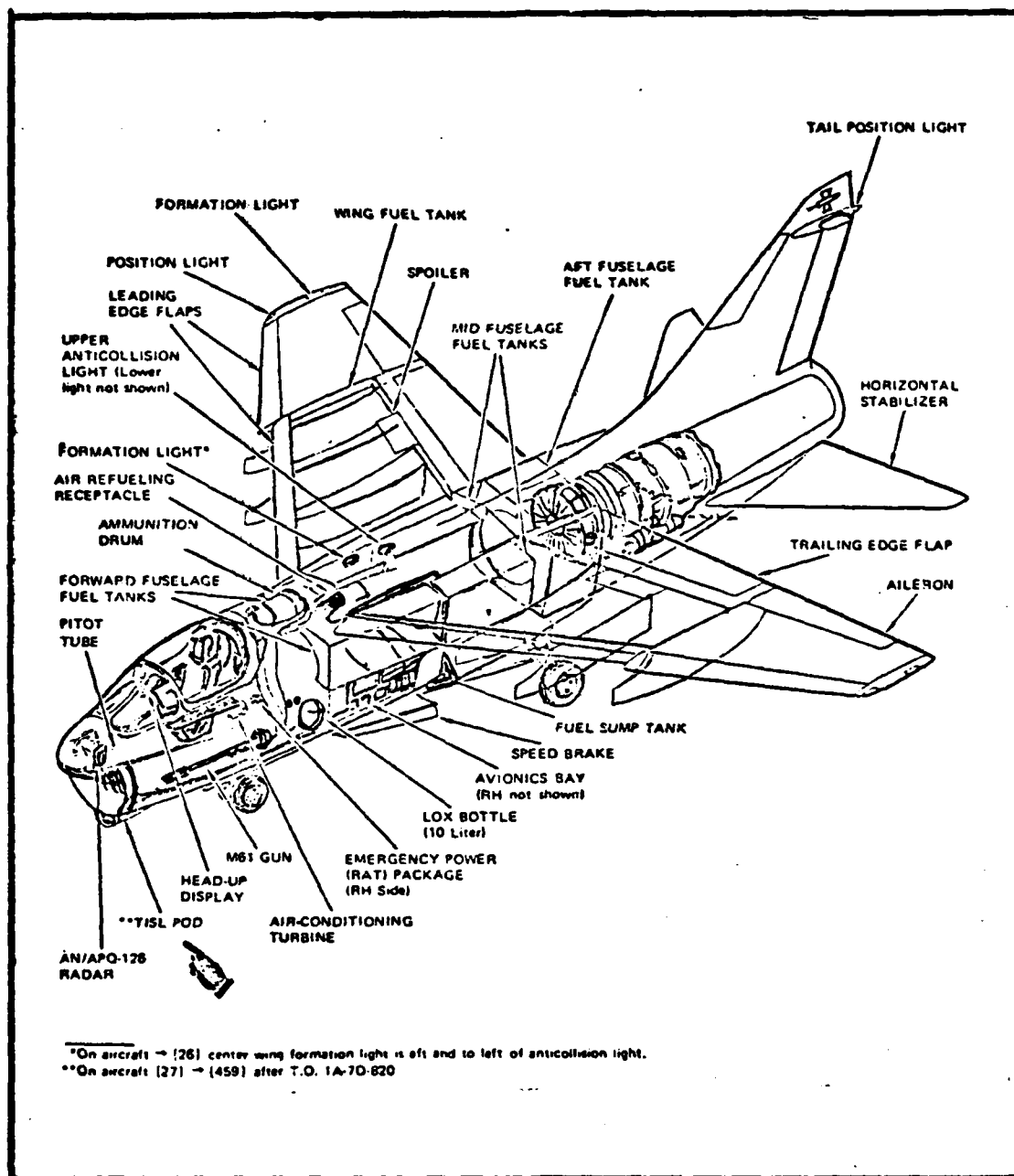


Figure A-3. A-7 Internal Representation

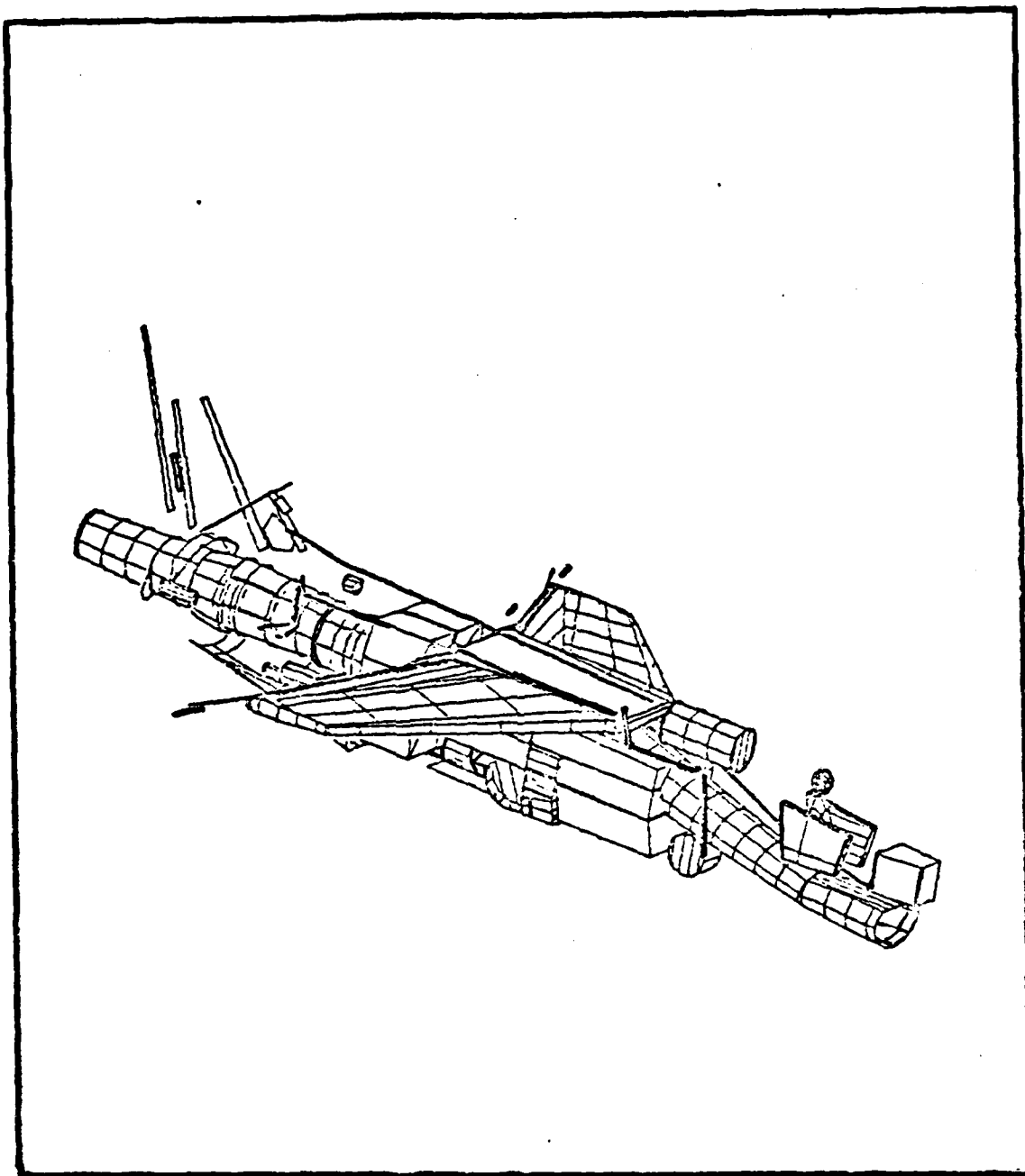


Figure A-4. A-7 Computer Generated Representation

Two files are provided to the user to describe the encounter scenario and the missile/warhead parameters. These are the case data file and the warhead data file. More information will be provided on these files in the respective user level sections.

B. Description of the Application Programs

SCANMAIN is the principle program in this package. It simulates the missile-target encounter mathematically and computes the expected damage. The three previously mentioned files (target, case, and warhead) are the input to this program and the output includes two printable summaries called SCAN1 and SCAN2, and the machine coded impact data used for NPDRAW. SCAN1 provides a descriptive summary of the target geometry, and SCAN2 is a summary of all the inputted endgame parameters, the damage results for the components, and the system and subsystem survivability, statistics.

NPGEN is the graphics pre-processor for the package. This program accepts the predefined target geometry file as input and sets up the machine coded target data for NPDRAW. If desired, the user can obtain an echo print of the inputted file at the end of program execution. This print will also contain the number of target vectors generated and can provide additional statistics on line generation if debugging switches are preset (this is a user dependent option).

NPDRAW is the actual graphics processor. It accepts the two machine-coded files generated by NPGEN and SCANMAIN as input and provides the user with a graphical display of the target and fragment impacts. It contains a variety of commands and options for the user which vary in complexity depending on user level selected.

PROG1 and PROG2 file manipulation programs allow the Intermediary user the ability to interactively modify the principle parameters in the case and warhead files to his own design specifications. These programs will be described in more detail in Section III.

C. NPSCAN Executive Program

NPSCAN was developed to automatically control the CP/CMS system commands on the IBM 3033 required to run the above listed programs, thus removing this burden from the student. It will handle the graphics application in PLOT10 or GRAFF77 graphics languages, depending on which terminal type the student logs in on, or alternatively, will generate statistical data only if logged on to a standard data media terminal without graphics capability. The program is written to be used interactively to provide simplicity and clarity, however, the user can experience difficulty or program crash if data is incorrectly entered. Typical causes of user problems are discussed in Section V - TROUBLE SHOOTING. The procedure to be followed to get a copy of the NPSCAN EXEC on your disk is as follows:

1. Link to the SCAN disk.
Type - CP LINK 0559P 191 192 RR - and enter
2. When prompted for the pass word type - XXXX - and enter
Type - ACC 192 B - and enter
3. Copy the executive onto your A disk.
Type - COPY NPSCAN EXEC B = = A - and enter
4. Release the SCAN disk.
Type - REL 192 (DET - and enter

Once you have a copy of NPSCAN, simply enter NPSCAN and the program will automatically run. It begins by requesting the same password used in the previous procedure, which is "XXXX". Applicable libraries and applications programs will be linked. The primary terminal keys required to operate this package are the CLEAR (PAGE) key, ENTER (RETURN) key, and numeric keypad at the top of the keyboard, as depicted in Figure A-5. The numeric keypad doubles as a function key select when followed by ENTER. Do not confuse these with PF keys which have no use in this application. On the modem connected terminals, such as the TEKTRONIX 4114, the alpha-numeric portion of the screen can be cleared using the scrolling knobs. Other non-hardwired terminals are not recommended for two reasons: first the screen alphanumerics tend to overwrite the graphics, making the application display cluttered and confusing; second, all modem connected terminals including the 4114 are much slower than the hardwired terminals.

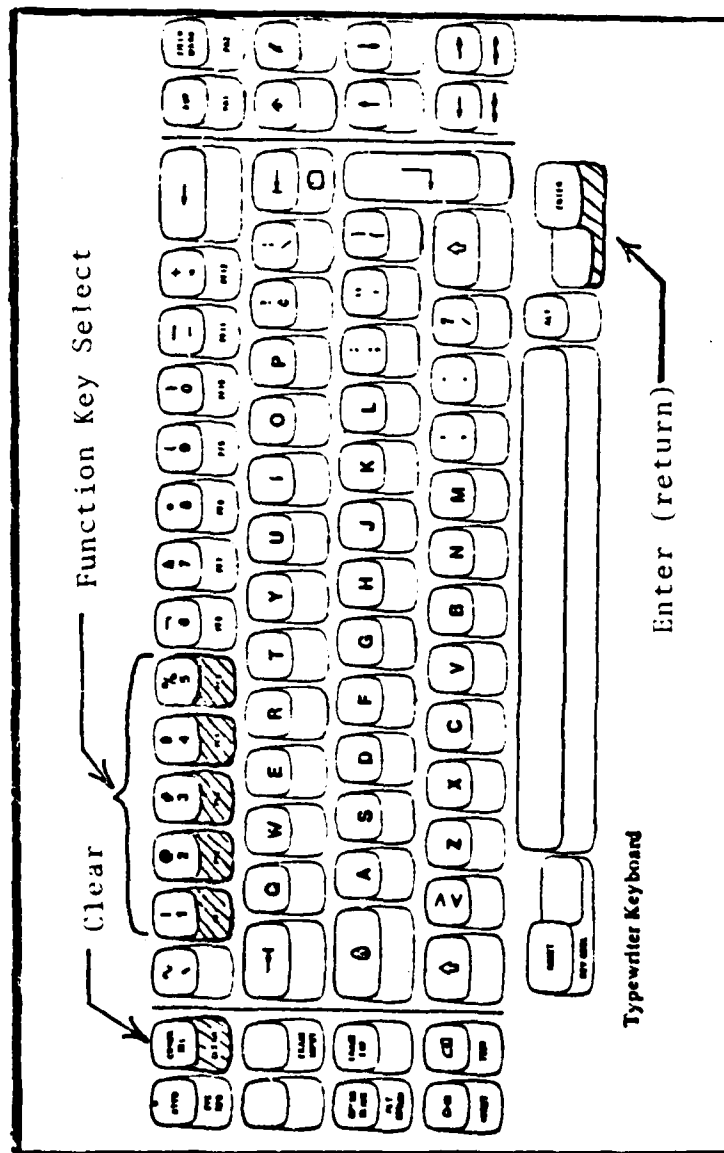


Figure A-5. Principle Keys Used With NPSCAN Application

Users begin an application run by selecting the numeric key corresponding to the terminal type being used and is self-explanatory.

```
*****
**      TEKTRONIX    618                                1      **
**      TEKTRONIX    4012,4081,4114                      2      **
**      NONE OF THE ABOVE                                3      **
**      EXIT PROGRAM                                4      **
*****
```

The program will then access ten extra cylinders of storage space and link to the applicable graphics libraries for the application. This procedure will vary in time depending on how busy the system is. Upon completion of the setup, the next menu block allows the user the choice of viewing his revised disk space allocation before continuing.

The user will then be requested to select the level he wishes to use. Beginners should always start at the Novice level to avoid confusing details and options.

```
*****
**      NOVICE LEVEL                                1      **
**      INTERMEDIARY LEVEL                          2      **
**      EXPERIENCED LEVEL                          3      **
**      EXIT PROGRAM                                4      **
*****
```

After the user level has been selected, the target model menu is presented. As previously mentioned, users should select the simplest model to familiarize themselves with

the program before continuing with a more complicated target, since the other models require much more computer time to simulate. Returning to the simplest model should be repeated each time a new level is selected so that valuable computer time is not wasted in the NPDRAW segment experimenting with new options and commands.

```
*****
** BOX 1 **
** A-7 2 **
** BQM-107 3 **
** SPECIAL (SEE PROF. BALL FOR **
** AUTHORITY FIRST) 4 **
*****
```

Choice of targets is self-explanatory for 1, 2 or 3. The Special Target Option, 4, can be used if the correct codename and required maximum extension are obtained from Professor Ball. The program will then load and execute NPGEN. At its conclusion, a summary menu for the printable output which is self-explanatory will appear.

```
*****
** NO SUMMARY 1 **
** SUMMARY AT TERMINAL ONLY 2 **
** SUMMARY AT PRINTER ONLY 3 **
** SUMMARY AT TERMINAL AND PRINTER 4 **
** EXIT PROGRAM 5 **
*****
```

The next segment involves the case and warhead file selection, and since program flow is dependent on user level,

it will be discussed in detail within each of the user level sections (II, III, and IV). At the conclusion of file selection, the primary program SCANMAIN will be loaded and executed. On completion of the execution, two summary menus will appear sequentially for each of the printable output files discussed in the Introduction (SCAN1 and SCAN2). The summary options are identical in format to those shown above for the NPGEN program. At this point, the program will either branch to the final menu if the user is logged on to a non-graphics terminal, or load and execute NPDRAW prior to branching if a graphics terminal is being used. The final menu will allow the user to return to any one of several locations in the package or to exit the program. The options are as follows:

```

*****
**      SELECT NEW USER LEVEL          1      **
**      SELECT NEW TARGET              2      **
**      MODIFY MISSILE FILES           3      **
**      RE-LOAD NPDRAW                 4      **
**      3-D PLOT PACKAGE               5      **
**      EXIT PROGRAM                   6      **
*****

```

Option 3, Modify Missile Files, is useful only to the Intermediary and Experienced levels. When the program executive is exited correctly, the previously accessed disks and libraries will be released. In case of a program crash anywhere during the application, refer to Section V.

II. NOVICE LEVEL

A. Introduction

The Novice level is intended to quickly introduce the new user to the overall application and familiarize him with the basic capabilities of SCANMAIN and NPDRAW. All non-selectable options will be automatically set to default values, and predefined case and warhead files are generated at this level. In addition to the information already outlined in Section I, the user is provided with the subsequent guide for NPGEN and NPDRAW programs.

B. NPGEN Program

This program contains the pre-processing necessary to set up the target vector file. At the Novice level, the debugging switches mentioned in Section I are not available to the user and therefore are set to default values. The target extension is automatically loaded from the executive program, and the user is given the choice of selecting either normal or high density for line drawings as depicted below.

```
*****
**                                     **
**  NORMAL DENSITY                   1  **
**  HIGH DENSITY                    2  **
**                                     **
*****
```

At the end of program execution, the user is offered the option of printed summary.

C. NPDRAW Program

Four commands and eight drawing options are made available through use of Function keys and standard numerical data input. These functions are purposefully restricted, but are sufficient to allow the user to understand the primary functions of NPDRAW and manipulate the more important parameters.

Command MENU

```
*****  
**  
** DRAW TARGET 1 **  
** SET OPTIONS 2 **  
** LIST AXES 3 **  
** EXIT PROGRAM 4 **  
**  
*****
```

1. DRAW TARGET is enabled by entering numeric key 1. It will prompt the user to enter desired values of azimuth, elevation, and rotation for the display. These angles may range from 0 to 360 degrees and can be entered in either real or integer format. An optional value can be entered for size, but is not required. After the picture has been displayed, a special menu will appear. Function keys in this menu allow the user to increment or decrement the azimuth, elevation or rotation by a ten degree (default value) factor without having to re-enter the draw command parameters. The user may also reset this increment factor to any number between 0 and 90 degrees or reduce the screen display scale to one-half, one-third or one-quarter the preset full screen size.

```

*****
***** INCREMENT --- (FK) ***** DECREMENT --- (FK) *****
*****
***** AZIMUTH          1          AZIMUTH          2          *****
***** ELEVATION        3          ELEVATION        4          *****
***** ROTATION         5          ROTATION         6          *****
***** SCALING          7          SCALING          8          *****
***** NEW COMMAND      9          RESET INCREMENT 10          *****
*****

```

2. SET OPTIONS is enabled by entering numeric key 2. It will shift the user from the command mode to the option mode. The user will be presented a descriptive summary of current option settings as shown in the example.

"1" - A one follows a component type that is set on for display. There are two component types, external and internal.

"0" - A zero follows a component type that is set off and not to be displayed.

"T" - A T follows an option descriptor that is currently true.

"F" - An F follows an option descriptor that is currently false.

Example of Option Setting Display:

CURRENT OPTIONS

"1" = ON "0" = OFF "T" = TRUE "F" = FALSE

EXTERNAL COMPS 1 INTERNAL COMPS 0 ERASE BACK LINES F
SPECIAL OPTIONS OFF T PLOT IMPACTS F DRAW AXES F

This describes a display that will plot external target components without erasing hidden lines and that has no special options. Following the option setting display, the option menu will appear.

Option MENU

```
*****
**          *          1
** EXTERNAL COMPS          *
**          *          2
** INTERNAL COMPS          *
**          *          3
** DRAW ALL LINES          *
**          *          4
** REMOVE HIDDEN LINES          *
**          *          5
** NO MORE CHANGES          *
**          *          6
** S PLOT IMPACTS          *
**          *          7
** S DRAW AXES          *
**          *          8
** CANCELL S OPTIONS          *
**          *
*****
```

Items suffixed by an "asterisk (*)" refer to original default settings when the program is loaded. Items prefixed by an "S" refer to special options.

- a. EXTERNAL COMPS is used to set display for plotting external components only.
- b. INTERNAL COMPS is used to set display for plotting internal components only.
- c. DRAW ALL LINES draws applicable component type with all vectors found in target file.
- d. REMOVE HIDDEN LINES tests each vector for from user's perspective and erases all hidden lines before plotting.

- e. NO MORE CHANGES returns the user to command mode.
- f. S PLOT IMPACTS enables the plotting of fragment impacts over the target as calculated by SCANMAIN.
- g. S DRAW AXES superimposes an XYZ axes through the target model center. Tick spacing can be adjusted through the LIST AXES command.
- h. CANCELLS OPTIONS turns off all previously set special options and returns them to false.

3. LIST AXES is enabled by entering numeric key 3 from the command menu. This provides the user with the current XYZ grid extensions, origin, and tick spacing. The user may adjust the tick space value. The default value is "1.0".

4. EXIT PROGRAM is enabled by entering numeric key 4, This returns the user to the NPSCAN executive program and provides the final branching menu described in Section I.

III. INTERMEDIARY LEVEL

A. Introduction

The Intermediary level provides the user with two extensions to the application. First and foremost is access to the case and warhead files. The user can modify and customize the principle parameters contained in these files interactively. Second, expanded command and option descriptors are available for display. The format for data entry is the same as described for the Novice level. If you have not already run the application at the Novice level, it is recommended that you go back and do so before reading on.

B. NPGEN Program

In addition to the choice of line density setting, the intermediary user has access to a set of debugging switches which will provide additional line generation statistics at the end of program execution. The listing of debugging switches is shown below and is strictly optional.

- 2 - All prints concerned with line generation
- 3 - Line generation of bounding planes
- 4 - Line generation of elliptic cylinders
- 5 - Line generation of ellipsoids
- 6 - Line generation of paraboloids
- 7 - Line generation of elliptic cones

- 8 - Line generation of parabolic cylinders
- 9 - Line generation of hyperboloid 1
- 10 - Line generation of hyperboloid 2
- 11 - Line generation of parabolic hyperboloid
- 12 - Line generation of hyperbolic bounding planes
- 13 - Line generation of parabolic bounding planes
- 14 - Line generation of elliptical bounding planes
- 16 - Listing of target vectors
- 19 - Retrieval of components from target array
- 20 - Maximum extents, optical centers and number of lines for each component
- 0 - Null setting no activation takes place

Typing in the integer number representing switch will activate it. The user will be prompted ten times. However, if the user wishes only to activate a few switches, these should be entered first, followed by "0" for all remaining prompts. Following this, the program will continue with normal execution. If the user wishes to have a printed listing concerning a specific component, the component number is entered as a negative value to distinguish it from other switches. For example -2002 will turn on all line generation prints for Quadric No. 2.

C. PROG1 and PROG2

These two programs provide the intermediary user with interactive control of the case and warhead data files. The user will be provided with a file manipulation menu prior to each file selection.

```

*****
**                                     **
**      USE DEFAULT FILE              1      **
**      USE CUSTOM FILE               2      **
**      MODIFY DEFAULT FILE           3      **
**      MODIFY CUSTOM FILE            4      **
**                                     **
*****

```

1. USE DEFAULT FILE will copy the applicable default file from disk and load it into SCANMAIN as was done at the Novice level.

2. USE CUSTOM FILE will copy and load a user defined file that was previously created and saved under a user defined name.

3. MODIFY DEFAULT FILE will copy the applicable default file and load it into the PROG1 or PROG2 program. The user will then be given instructions on flipping through the file parameters and selectively changing or saving current values. The formats are as follows for the two program Menus.

PROG1 (Warhead File)		PROG2 (Case File)	
*****	*****	*****	*****
FRAGMENT PARAMETERS	1	ALL PARAMETERS	1
FUZING PARAMETERS	2	MISSILE PARAMETERS	2
BLAST ENVELOPE PARAMETERS	3	PRINT SUMMARY	3
PRINT SUMMARY	4	EDITING COMPLETE	4
EDITING COMPLETE	5		
*****	*****	*****	*****

To assist the user in identifying specific parameters, Tables A-1 through A-9 are provided in Section V. These include

the parameter description, units of measure, and in some cases a pictorial representation. Once the user has selected a parameter segment from the particular menu, the current values from the file will be given in sequence with their definition and a request to accept the value or change it to a new value.

```
*****
** CHANGE VALUE      1 **
** NO CHANGE        2 **
*****
```

On completion of one segment of parameters, the user will be returned to the selection menu to select the next segment, view a summary of parameters, or exit the program. These segments can be accessed in any order and as often as desired until the user is satisfied with all changes. The EDITING COMPLETE key is final and terminates the program. Therefore, it is recommended that the user carefully check all values using the PRINT SUMMARY option first. Once the program is exited, the user will be given the choice of making a permanent copy of the modified file on his A-disk. To avoid confusion, the user should not give it the same name as the default files, but should select a name that is similar for easy recall. Also, clear distinction between the filenames of a case-type file and warhead-type file should be maintained by the user to prevent inadvertent loading of a customized case file into the warhead program (PROG1) or vice-versa, resulting in a system crash.

4. MODIFY CUSTOM FILE will load a previously saved file into the PROG1 or PROG2 programs for further modification, after checking the validity of the file. The same procedure described in MODIFY DEFAULT FILE is followed for accessing and changing parameter values.

D. NPDRAW Program

The intermediary user is provided with eight commands and fifteen options. The command menu is as follows:

```
*****
*      DRAW TARGET          1      *
*      SET OPTIONS         2      *
*      EXIT PROGRAM        3      *
*      SET APERTURE        4      *
*      HIDDEN LINE LENGTH  5      *
*      SET LINE TOLERANCE  6      *
*      SET ANGLE TOLERANCE 7      *
*      LIST AXES           8      *
*****
```

1. DRAW TARGET is enabled in the same manner as described in the Novice level section, however, the type of data to be input by the user will depend on the options that are currently set and will be discussed in detail below.

2. SET OPTIONS will transfer the user to the option mode, provide him with the current listing of option settings, and present an option menu that is somewhat expanded from the Novice level.

Option MENU (Intermediary)

EXTERNAL COMPS	1	CARTESIAN COORDS	9
INTERNAL COMPS	2	SPHERICAL COORS	10
DRAW ALL LINES	3	***SPECIAL OPTIONS***	
ERASE HIDDEN LINES	4	S DRAW WITH DOTS	11
OPTICAL CENTER	5	S PLOT IMPACTS	12
EXPLICIT CENTER	6	S DRAW AXES	13
PARALLEL PROJ	7	CANCEL S OPTIONS	14
PERSPECTIVE PROJ	8	NO MORE CHANGES	15

"0", "1", "T", and "F" have the same significance as with the Novice level. "2" signifies the applicable component type is set on and to be displayed with dots vice interconnected vectors. Options 1, 2, 3, 4, 12, 13, 14 and 15 are the same as described in the Novice level. Only the new options will be discussed in this section.

- a. OPTICAL CENTER is the default setting and places the display center or origin in the center of the target.
- b. EXPLICIT CENTER allows the user to specify the XYZ center of the plot during picture sequences.
- c. PARALLEL PROJ is the default projection option and displays the target at optimum viewing distance from the viewer so that it fills the full screen on each projection. This can be overridden by the user during a picture sequence

in two ways; by specifying the optional size parameter, or by changing the screen scaling. When set, this option will result in user prompts for azimuth, elevation and rotation.

- d. PERSPECTIVE PROJ requires the user to specify the range in addition to the azimuth, elevation, and rotation.
- e. SPHERICAL COORDS is the default setting and is applicable with either of the two previously mentioned options.
- f. CARTESIAN COORDS overrides the three previous options and requires the user to provide XYZ viewer coordinates prior to the picture sequence. Rotation and optional size remain in effect.
- g. DRAW WITH DOTS will set the component type to "2" and display the components with dots instead of the normal vectors. The spacing of dots will depend on the line segment setting and is normally more time consuming to draw.

3. SET APERTURE command displays the current viewing aperture and allows the user to reset this value. The default setting is ten degrees. For rectangular plotting surfaces it is mapped to the full length of the smaller side.

4. HIDDEN LINE LENGTH displays the current maximum length of a line segment to be drawn or removed based on the visibility of its midpoint. The default value is 10.0 inches and can be reset by the user.

5. SET LINE TOLERANCE displays the current scale factor for hidden line removal and prevents adjacent surfaces or far side open surfaces from being eliminated during hidden line removal. The default value is 0.500 and can be reset by the user.

6. SET ANGLE TOLERANCE displays the minimum angular limit for hidden line removal and is used to check line segments of quadric surfaces only if the angle between the line of sight and surface normal is greater than this limit. The default value is 98 degrees and can be reset by the user.

7. EXIT PROGRAM and LIST AXES commands are the same as those described in Section II.

IV. EXPERIENCED LEVEL

A. Introduction

The experienced level provides the user with the full range of commands and options available. Program control is achieved by function keys, numerical data entry, and a more flexible set of typed commands in the NPDRAW program. The manipulation of case and warhead files is done by the direct Xedit feature built into the control executive. Therefore, normal Xedit commands used with the CP/CMS system are fully usable. Care must be taken when making changes to files to ensure that integers are right justified and placed in the correct columns. Tables A-1 through A-9 provide all the necessary information to assist the user with this segment of the package. NPGEN features are identical to those described at the intermediary level.

B. Listing of Abbreviations

The following listing of abbreviations is to be used in conjunction with the examples given to describe each of the experienced level commands in NPDRAW. All values are free format.

<u>Abbreviation</u>	<u>Description</u>
AZ	Azimuth value in degrees
EL	Elevation value in degrees
ROT	Rotation value in degrees
R	Range value used with spherical coordinates
SZ	Size extension given as an optional parameter
SN	Debugging switch ID number
XC,YC,ZC	XYZ coordinates for center of plot
XV,YV,ZV	XYZ coordinates for viewer location
XL,YL,ZL	XYZ extensions from the origin
NV	New value entered by user to replace a default value
FR#	Number of frames used in a SCENE sequence
D**	D preceeding any other parameter represents an incremental change in that parameter
CT	Component type; examples are B(OX), Q(UADRIC), P(OLYGON)
CN	Component identification number
TS	Tick spacing value for axes drawing
T	Viewing time in a SCENE command

C. NPDRAW Program

The commands available to the user are described in the subsequent paragraphs. They are shown in upper-case leters with their optional parts in parenthesis.

1. EN(D) terminates the execution of NPDRAW and returns control to the executive program.

2. P(ICTURE) is the basic drawing command and may be used alone or with numeric parameters as illustrated in the examples. If typed without parameters, the appropriate prompts will be given to the user interactively.

Example 1: P AZ EL ROT (SZ)

Current option setting; parallel projection; spherical coordinates; optical center.

Example 2: P R AZ EL ROT (SZ)

Current option setting; perspective projection; spherical coordinates; optical center.

Example 3: P XV YV ZV XC YC ZC ROT (SZ)

Current option setting; cartesian coordinates; explicit center.

3. SC(ENE) allows the user to view a sequence of frames and can be set like PICTURE in a variety of ways dependent on current options. Prior to initializing the first SCENE command, FRAMECOUNT 0 must be typed in. Following this, SCENE is initialized by typing it in alone or with the appropriate numerical parameters. Next, type in FRAMECOUNT 1, after which another SCENE command or a STEP command must be used. If followed by SCENE, the program will display the initial scene followed by the user specified number of frames in sequence up to and including the final scene specified

in the second SCENE command. Alternatively if STEP is used, the program will display the initial scene followed by the user specified number of frames in sequence, with each frame varying by some specified parameter change(s). See examples for clarification.

Example 1 (Using Scene command twice):

FR 0

SC T R AZ EL ROT (SZ)

FR 1

SC FR# R AZ EL ROT (SZ)

Current option setting; cartesian coordinates; optical center.

Example 2 (Using Scene command twice):

FR 0

SC T XV YV ZV ROT (SZ)

FR 1

SC FR# XV YV ZV ROT (SZ)

Current option setting; cartesian coordinates; optical center.

Example 3 (Using Scene and Step command):

FR 0

SC T XV YV ZV ROT (SZ)

FR 1

ST FR# DXV DYZ DZV DXC DYC DZC DROT DSZ

Current option setting; cartesian coordinates; optical center.

Any one or more numerical parameters may be varied in the STEP command, but all must be specified.

4. SY(STEM) or SU(BSYSTEM) allows the user to specify a list of components and display them as an independent subsystem. To create the list the user must specify those components by type and component number following the command, as illustrated in subsequent examples. If the command is typed without a listing of parameters, it will display the currently defined subsystem list if one exists.

Example: SY CT CN CT CN1 CN2, etc.

CT and CN must correspond to existing component types and identification numbers in the current target being simulated.

5. AX(ES) allows the user to either display the current origin, extensions, and tick increments, or change them accordingly. To actually view the axes, the AXIS option must first be set to true before using the P(ICTURE) or SC(ENE) command.

Example: AX TS XC YC ZC XL YL ZL

To change the current setting from:

CENTER AT	0.0	0.0	0.0
LENGTH	50.0	50.0	10.0
TICK SPACE	1.0		

to the following;

CENTER	5.0	5.0	0.0
LENGTH	100.0	100.0	10.0
TICK SPACE	5.0		

the user would type in:

AX 5 5 5 0 100 100 0

6. D(EBUG) allows the user to set a variety of debug switches similar to those discussed in NPGEN when working with a new target model. The switches are set by entering the integer number representing the switch following the command. Typing the command alone will provide a listing of the current switches. Useful switches available to the user are as follows:

<u>Switch</u>	<u>Description</u>
1	Command text analysis.
15	Trace of target line data as it is read.
17	Hidden line removal, line segment generation.
18	Hidden line removal, hidden algorithm results.
19	Hidden line removal, component retrieval.
21	Cross section intermediate results.
25	Axes intermediate results.

Example: D SN will output DEBUGGING SWITCHES SN and will list the results prior to the next graphics display.

7. O(PTION) is the most versatile command in this grouping and allows the user to reset any one or more of twenty-four different option parameters. The parameter(s) is typed in after the command O(PTION) and is followed by a descriptive summary of the current option settings. Available options to the experienced user are listed below:

<u>Parameter</u>	<u>Description</u>
EXTL	Draw external components with lines.
EXTD	Draw external components with dots.
NOEX	Do not draw external components.
INTL	Draw internal components with lines.
INTD	Draw internal components with dots.
NOI	Do not draw internal components.
DR	Draw all vectors in target file.
HI	Remove vectors hidden from viewer perspective.
CTRO	Optical center of target = center of plot.
CTRE	User specified center = center of plot.
NOP	Generate parallel projection
P	Generate perspective projection.
SP	Viewer position given in spherical coordinates with 3-D plot center as origin.
CA	Viewer position given in target model coordinate system.
NOS	Cancels all special plot options.

Special Options

AX	Draw cartesian axes through target model.
SU	Draw user defined component system
DO	Draw user defined system using dots.
MSKI	Save the current frame and store in file 35.

<u>Parameter</u>	<u>Description</u>
MSKD	Draw the previously saved rame.
IM	Plot impacts generated by SCANMAIN.
NOEJ	Inhibits normal screen erasure allowing multiple pictures on same frame.
EXP	Generates exploded view above center of plot.
X	Draw a cross-sectional view by passing a plane through the target model.

Example: O HI AX IM will set the drawing for hidden line removal and superimpose a cartesian axis and generated impacts over the target model.

8. AP(ERTURE) is used to display or reset the aperture setting as described in the intermediary level. It can be typed in alone to display the current setting or with a new value.

9. HL(ENGTH) is used to display or reset the incremental length for hidden line removal.

10. HTL is used to display or reset the scale factor for hidden line removal.

11. HTA is used to display or reset the angular limit factor for hidden line removal.

12. EJ(ECT) allows the user to advance a frame when in multiple picture mode.

13. HE(LP) allows the user to list a descriptive summary of each of the above commands. Typed in alone it will simply

recopy the complete list of available commands already given. Followed by a specific command, it will provide the user with instructions about using that command.

Example: HE O will provide the user with information on the O(PTION) command.

V. TROUBLE SHOOTING

A. Principle Parameter Tables for Case and Warhead Files

These tables provide a detailed listing of all case/warhead file parameters together with descriptive and pictorial information to assist the intermediary and experienced level users.

B. Common System Difficulties

When working with a complex application, it is easy to make errors. Errors can result in program diagnostics with standard fix-up, system diagnostic with program crash or worse, an application crash. This brief section will attempt to describe some of the more common pitfalls to avoid when using NPSCAN.

1. The SCAN password is incorrectly typed and an improper access occurs. The program will malfunction during the application. The user must exit with the first EXIT PROGRAM function key and restart the application.

2. Insufficient storage space is available because the system is too busy. The user must exit the program at the next menu block containing an EXIT PROGRAM function key.

3. User inputs a non-existent function key number. A diagnostic will appear and return the user to reselect a correct function key.

4. The user inputs a letter or a real number when an integer function key is required. The program will crash. If the user is returned to CMS, immediately type in the command CLERE to release the previously accessed disks and libraries before restarting the program. If the user is returned to the control executive, exit the program at the next menu block and restart.

5. User inputs an integer when a real is expected or a real when an integer is expected during a numeric data entry sequence. Standard fix-up will be taken and the program will continue. Problems in 4 and 5 can be easily avoided if the user slows down and checks each entry before hitting the ENTER key.

6. System incorrectly accesses disk space; program will malfunction during the application. This has been known to happen on rare occasions, and the user should always make use of the Query Disk function key provided at the beginning of the application. If the following two entries are not as shown below, he should exit the program and restart.

BALL	192	B	R/O	8	3330	1024	(Additional numeric information)
TEMP	193	C	R/W	10	3350	1024	(Additional numeric information)

7. Numeric data is incorrectly formatted while using NPDRAW commands. Diagnostic appears and the user reinstates the command procedure correctly.

TABLE A-1
Warhead Data File Line One

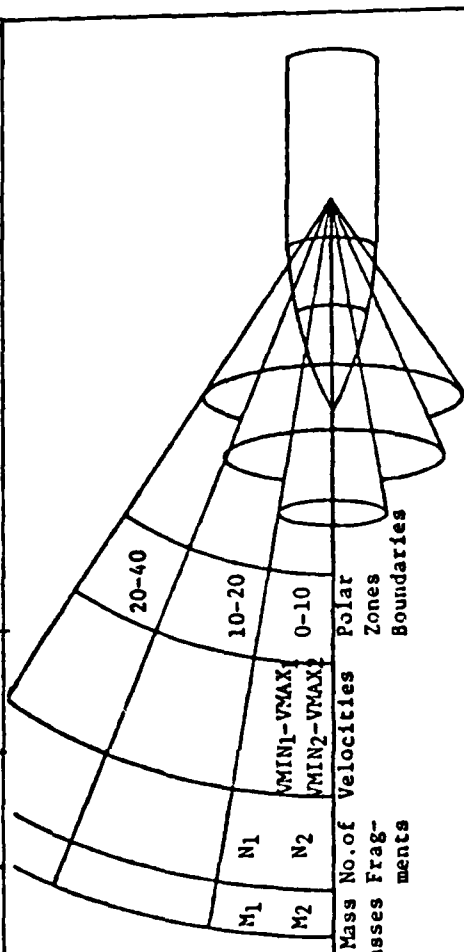
User Level	Column	Parameter	Units	Range of Values	Format	Description
I	1-10	NUMZON	-	1-6	I10	Number of static polar zones in warhead
E	1-10	NUMZON	-	1-36	I10	
E	11-20	NNASS	-	1-36	I10	
Number of mass classes for each polar zone One mass class only at intermediary level.						
 M1 N1 M2 N2 MIN1-VMAX1 MIN2-VMAX2 0-10 10-20 20-40 Mass No. of Velocities Polar Zones Boundaries Classes Frag-ments						

TABLE A-2

Warhead Data File Line Two

User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	1-10	ZONMIN (I)	Degrees	0-180	F10.3	Lower angle boundary of Ith static polar zone
I,E	11-20	ZONMAX (I)	Degrees	0-180	F10.3	Upper angle boundary of Ith static polar zone
I	21-30	VMIN (I)	Ft/Sec	≥ 0	F10.3	Speed of fragments at lower boundary of Ith zone
I	31-40	VMAX (I)	Ft/Sec	≥ 0	F10.3	Speed of fragments at upper boundary of Ith zone
E	21-30	VMIN (N,I)	Ft/Sec	≥ 0	F10.3	Speed of fragments of Nth mass class at lower boundary of Ith polar zone
E	31-40	VMAX (N,I)	Ft/Sec	≥ 0	F10.3	Speed of fragments of Nth mass class at upper boundary of Ith polar zone

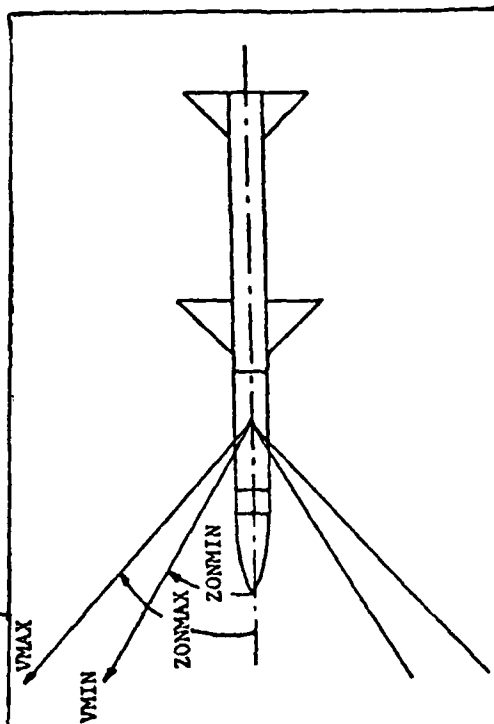


TABLE A-2
Warhead Data File Line Two (continued)

User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	41-50	FRAGMS (N,I)	Grains	≥ 0	F10.3	Average mass per fragment of Nth mass class in Ith polar zone. At intermediary level $N = 1$.
I,E	51-60	FRAGNO (N,I)	-	≥ 0	F10.3	Total number of fragments of Nth mass class in Ith polar zone. At intermediary level $N = 1$.
I,E	61-70	XWH (N,I)	Ft		F10.3	Initial position of the fragments of the Nth mass class and Ith polar zone with respect to center of warhead measured along missile axis at intermediary level $N = 1$.

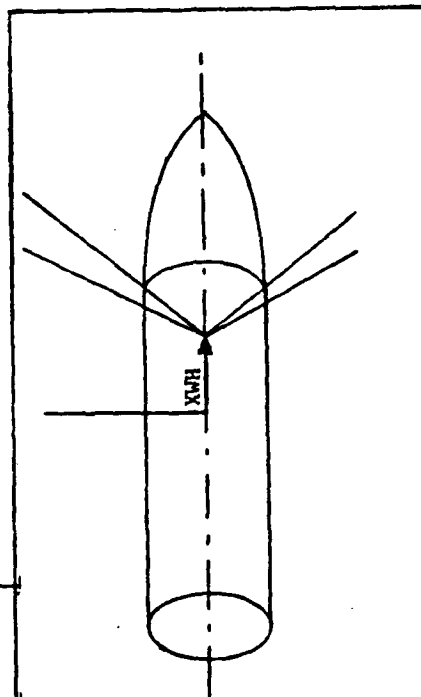


TABLE A-2

Warhead Data File Line Two (continued)

User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	71-74	NMAT(N,I)	-	1,...,10	I4	Material code indicating the type of material of which the fragment is composed. The following values are used: 1 - magnesium 2 - aluminum 2024T 3 - titanium alloy 4 - face hardened steel 5 - mild steel 6 - hard steel 7 - lexan 8 - stretched plexiglass 9 - doron 10 - bullet resistant glass
E	75-80	SHAP	-	CUBE SPHERE RECTAN IRREGU	A6	at the intermediary level N = 1 The fragment shape. The following values are available for input: CUBE - cubical fragments SPHERE - spherical fragments RECTAN - rectangular fragments IRREGU - irregular fragments

TABLE A-3
Warhead Data File Line Three

User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	1-10	FUZYTP	—	0,1,2	F10	Specifies which type of fuze model is to be simulated 0 - instantaneous detection, no fuze simulated 1 - fuze on IR source only 2 - fuze on any reflected target source
I,E	11-20	FUZPOS	Ft.	all	F10.3	Position of the proximity fuze target detection device with respect to the warhead center. This value is along the missile axis.
I,E	21-30	DELAY	Sec.	≥ 0	F10.3	Delay time between target detection and warhead detonation.
I,E	31-40	FUZANG	Degrees	$0^{\circ}-180^{\circ}$	F10.3	Mean value of proximity fuze cone half-angle measured from the missile centerline.
E	41-50	SIGFUZ	Degrees	$0^{\circ}-180^{\circ}$	F10.3	Standard deviation of the fuze cone half angle assuming a normal distribution of angles.
I,E	51-60	FUZRAN	Ft.	≥ 0	F10.3	Proximity fuze cut off range. If FUZRAN = 0 no fuze cut off is to be simulated.
I,E	61-66	RADMSL	Ft.	≥ 0	F6.2	Radius of missile cylindrical body.

Table A-3
Warhead Data File Line Three (continued)

User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	67-72	POSNOS	Ft	≥ 0	F6.2	Position of missile contact fuze or nose with respect to warhead center
I,E	72-78	POSTAL	Ft	≥ 0	F6.2	Distance of missile aft end from warhead center.

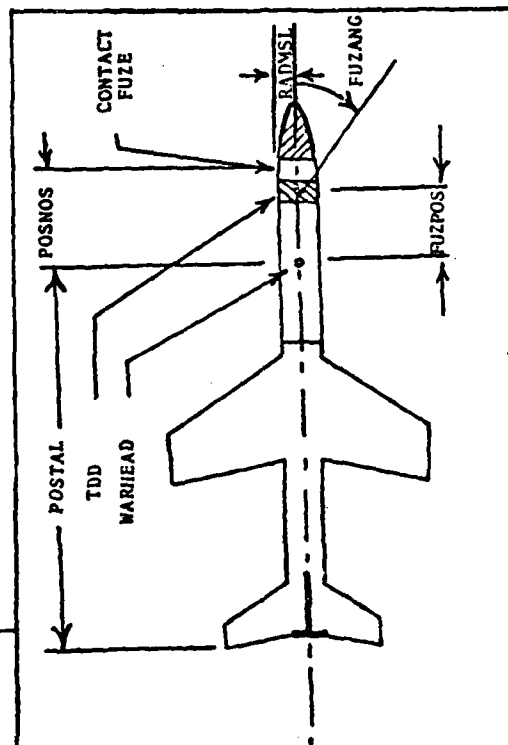


TABLE A-4

Warhead Data File Line Four

User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	1-10	FUSBLR	Ft.	≥ 0	F10.2	Fuselage blast radius is the maximum distance from the target centerline at which detonation will cause catastrophic structural failure.
I,E	11-20	FUSBL1	Ft.	≥ 0	F10.2	Distance of target CG to front of fuselage blast cylinder.
I,E	21-30	FUSBL2	Ft.	≥ 0	F10.2	Distance of target CG to back of fuselage blast cylinder.
I,E	31-40	WNGBLR	Ft.	≥ 0	F10.2	Wing blast radius is the maximum distance from wing centerline at which detonation will cause catastrophic structural failure.
I,E	41-70	WNGPT1(3)	Ft.	≥ 0	3F10.2	X,Y,Z components of the endpoint of the wing blast centerline closest to the target fuselage and measured from target CG.

TABLE A-5

Warhead Data File Line Five

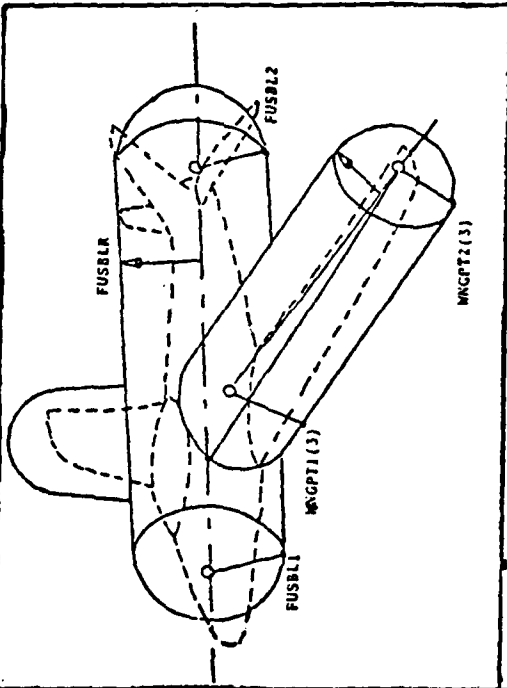
User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	1-30	WNGPT2 (3)	Ft	> 0	3 FI0.2	X, Y, Z components of the endpoint of the wing blast centerline closest to the wing tip and measured from target CG.
 The diagram illustrates a top-down view of a winged aircraft. A dashed line represents the wing blast centerline, extending from the wing tip towards the fuselage. Key points are labeled: FUSBL1 (fuselage blast line 1), FUSBL2 (fuselage blast line 2), WNGPT1(3) (wing point 1), and WNGPT2(3) (wing point 2). The aircraft's fuselage is shown as a central body with wings extending outwards. The wing tip is the point furthest from the fuselage along the wing span.						

TABLE A-6

Case Data File Line One

User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	1-10	ITRAJ	—	1,2,3	I10	Flag which indicates the type of missile trajectory to be simulated. ITRAJ = 1, indicates a fixed trajectory which is specified by an initial missile position measured from the aircraft CG. ITRAJ = 2, indicates a trajectory with a fixed missile guidance error (or miss distance). ITRAJ = 3, indicates a trajectory in which the missile guidance error is computed from a normally distributed sample with a given circular probable error, CEP.

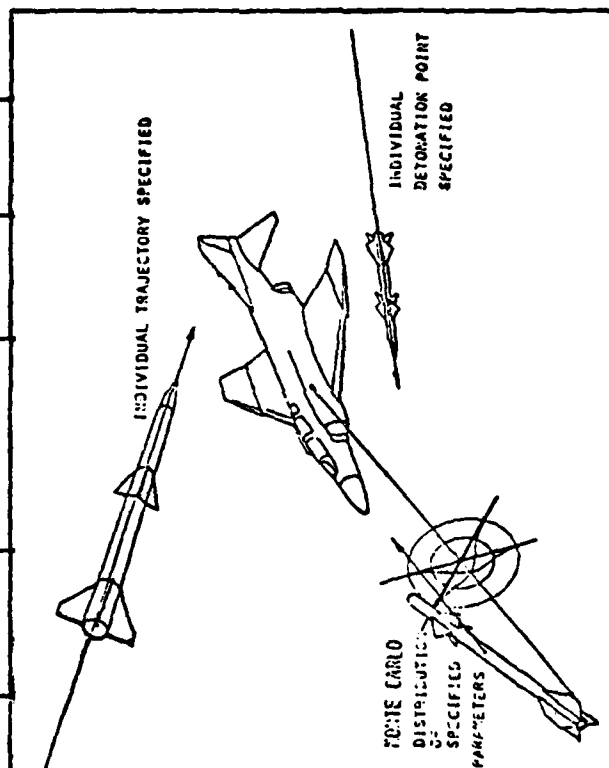


TABLE A-7
Case Data File Line Two

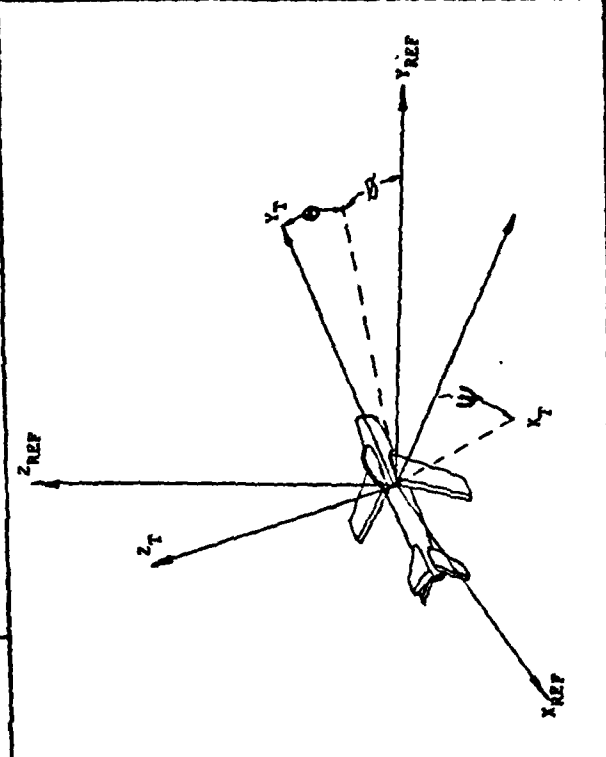
User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	1-10	JNUM (NUMMSL)	—		I10	The number of missile trajectories to be considered.
E	11-20	TSPD (VTARG)	Ft/Sec	>0	F10.3	The target speed at time of intercept.
E	21-30	TROL (PSIT)	Degrees	0-360	F10.3	The roll angle of target at intercept. ψ
E	31-40	TPIT (THETAT)	Degrees	+ 90-0	F10.3	The pitch angle of target at intercept. Θ
E	41-50	TYAW (PHIT)	Degrees	0-360	F10.3	The yaw angle of target at intercept. Ω
						

TABLE A-7

Case Data File Line Two (continued)

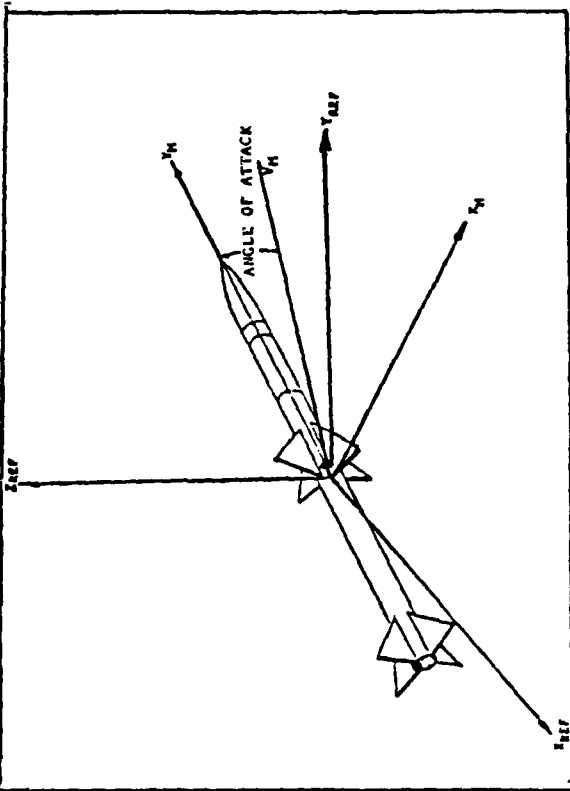
User Level	Column	Parameter	Units	Range of Values	Format	Description
I, E	51-60	MSP (VMIS)	Ft/Sec	> 0	F10.3	The missile speed at intercept.
I, E	61-70	MAA (ATTANG)	Degrees	≥ 0	F10.3	A mean value for the missile angle of attack.
E	71-80	MAAS' (SIGMAA)	Degrees	≥ 0	F10.3	The standard deviation of the missile angle of attack.
						

TABLE A-8

Case Data File Line Three

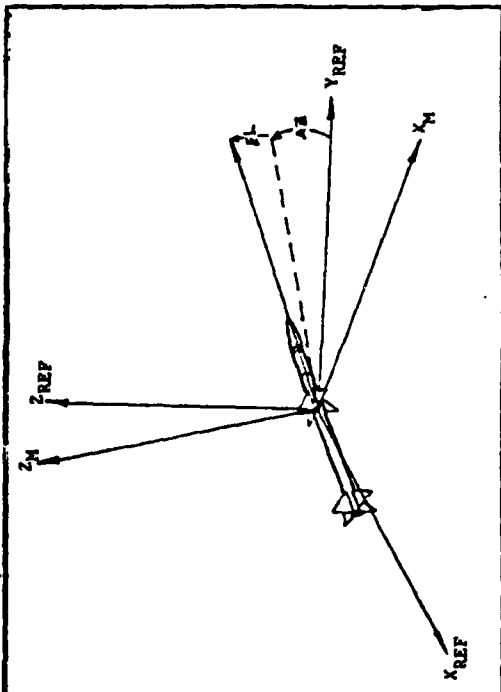
User Level	Column	Parameter	Units	Range of Values	Format	Description
E	1-10	MPA (ELEVAT)	Degrees	+90-0	F10.3	The mean elevation angle of the missile measured with respect to a flat earth.
E	11-20	MPAS (SIGMAE)	Degrees	≥ 0	F10.3	The standard deviation of the missile elevation angle.
E	21-30	MAZ (AZINUT)	Degrees	0-360	F10.3	The mean azimuth angle of the missile measured with respect to a flat earth.
E	31-40	MAZS (SIGMAZ)	Degrees	≥ 0	F10.3	The standard deviation of the missile azimuth angle.
						

TABLE A-8

Case Data File Line Three (continued)

User Level	Column	Parameter	Units	Range of Values	Format	Description
I, E	41-50	ALT	Ft.	≥ 0	F10.3	The altitude above sea level at which the engagement takes place.
E	51-80	AIMX AIMY AIMZ (AINPT (3))	Ft.	all	3F10.3	The nominal value of the missile aimpoint measured with respect to the target CG

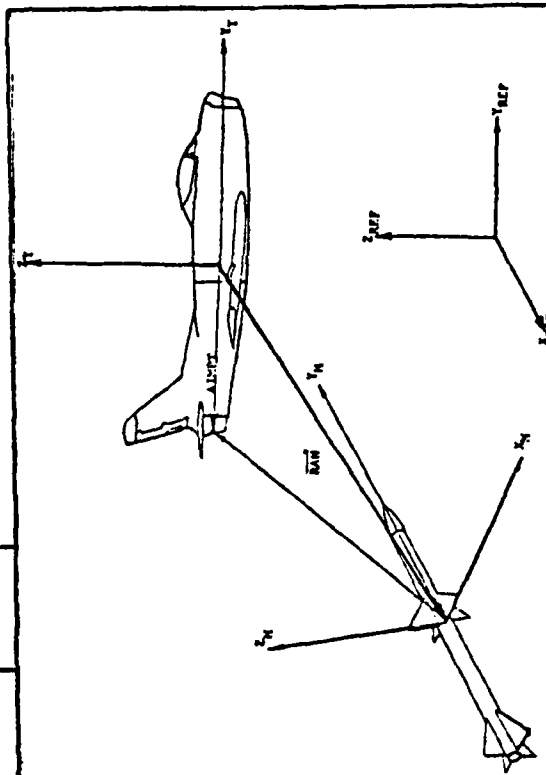


TABLE A-9

Case Data File Line Four

This line is used when ITRAJ = 1 on Case Data File Line One

User Level	Column	Parameter	Units	Range of Values	Format	Description
I, E	1-30	MISX MIXY MISZ (RAN(3))	Ft.	all	3F10.3	The initial position (range) of the missile measured in aircraft coordinate system. The values are input when detonation point is specified by user and not computed by the program.
I, E	31-40	TAOA(AOAT)	Degrees	+90-0	F10.3	The target angle of attack at intercept.
I, E	41-50	TSS(SST)	Degrees	+90-0	F10.3	The target sideslip at intercept.
I, E	51-60	MAOA(AOAM)	Degrees	+90-0	F10.3	The missile angle of attack at intercept.
I, E	61-70	MSS(SSM)	Degrees	+90-0	F10.3	The missile sideslip at intercept.

TABLE A-9

Case Data File Line Four-A

This line is used when ITRAJ = 2 on Case Data File Line One

User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	1-10	CPA(TCPA)	Ft.	≥ 0	F10.3	The closest point of approach of the missile trajectory to the specified nominal aimpoint.
I,E	11-21	TAOA(AOAT)	Degrees	+90-0	F10.3	This value is input when it is desired to determine the average survival probability for a fixed guidance miss distance.
I,E	21-30	TSS(SST)	Degrees	+90-0	F10.3	The target angle of attack at intercept. The target sideslip at intercept.

TABLE A-9

Case Data File Line Four-B

This line is used when ITRAJ = 3 on Case Data File Line One

User Level	Column	Parameter	Units	Range of Values	Format	Description
I,E	1-10	CEP(TCEP)	Ft.	≥ 0	F10.3	The missile circular probable error. (The radius of a circle within which 50% of the missile trajectories chosen from a normally distributed sample must pass)
						This card is input instead of card type 4 or 4A for situations in which the user desires the simulation to generate the initial engagement geometry from a distribution of encounter conditions and in which the miss distance for individual trajectories is drawn from a bi-variant normal distribution of specified CEP.
I,E	11-20	TAOA(AOAT)	Degrees	+90-0	F10.3	The target angle of attack at intercept.
I,E	21-30	TSS(SST)	Degrees	+90-0	F10.3	The target sideslip at intercept.

APPENDIX B

APPLICATION ADDITIONS

```

MYT00040
MYT00050
MYT00060
MYT00070
MYT00080
MYT00090
MYT00100
MYT00110
MYT00120
MYT00130
MYT00140
MYT00150
MYT00160
MYT00170
MYT00180
MYT00190
MYT00200
MYT00210
MYT00220
MYT00230
MYT00240
MYT00250
MYT00260
MYT00270
MYT00280
MYT00290
MYT00300
MYT00310
MYT00320
MYT00330
MYT00340
MYT00350
MYT00360
MYT00370
MYT00380
MYT00390
MYT00400
MYT00410
MYT00420
MYT00430
MYT00440
MYT00450
MYT00460
MYT00470
MYT00480
MYT00490
MYT00500
MYT00510

TRACE CN
*COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
*
* NPSCAN IS THE DRIVER EXEC FOR NPGS SCAN APPLICATION. IT HAS BEEN
* WRITTEN TO ENCOMPASS SEVERAL LANGUAGES FOR THE GRAPHICS AND
* WILL RUN ON ALL THE TERMINALS CONNECTED TO THE IBM 3033 AT THE
* TIME OF WRITING. THE EXEC IS DESIGNED TO PROVIDE THE USER WITH
* MAXIMUM FLEXIBILITY BY PROVIDING AUTOMATIC PROGRAM CONTROL, THREE
* LEVELS OF INTERACTION, AND SELF-HELPING INSTRUCTIONS AND DIAGNOSTICS.
*
*-----
CLRSCRN
*BEGETYPE -STAT1
* THE NPGS SCAN APPLICATION IS DESIGNED TO PROVIDE THE USER WITH
* MAXIMUM FLEXIBILITY BY PROVIDING AUTOMATIC PROGRAM CONTROL, THREE
* LEVELS OF INTERACTION, AND SELF-HELPING INSTRUCTIONS AND DIAGNOSTICS.
*
* TO USE SCAN YOU MUST FIRST OBTAIN THE PASSWORD FROM PROF. BALL AND
* THE AIRBORNE TARGET YOU WILL BE CONDUCTING YOUR EVALUATION ON.
* LINKING WILL TAKE ABOUT FIFTEEN SECONDS TO COMPLETE.
*-----
*STAT1
*COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
*
* LINK APPLICABLE PROGRAMS AND DATA FILES FOR APPLICATION
*
*-----
CP LINK 0555F 151 192 RR
ACC 192 B
CLRSCRN
*COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
*
* SELECT TERMINAL AND SET TERMINAL FLAG
*
*-----
*BEGETYPE -STAT3
* USER INPUT REQUIREMENTS WILL BE IN THE FORM OF PROMPTS AND WILL REQUIRE
* EITHER A FUNCTION KEY SELECTION OR KEYBOARD INPUT DEPENDENT ON THE
* LEVEL OF USER AND TYPE OF DATA REQUIRED. FOR CONSISTENCY NUMERIC
* KEYS 0 THRU 9 ON THE KEYBOARD WILL DOUBLE AS FUNCTION KEYS AT ALL
* TERMINALS. WHEN YOU ARE READY TO BEGIN ENTER THE CORRESPONDING
* FUNCTION KEY (INTEGER) FOR THE GRAPHICS TERMINAL YOU ARE USING.
*
*-----
* GRAPHICS TERMINALS ***** FUNCTION KEY *****
*
* TEKTRONIX 618 ----- ENTER 1
* TEKTRONIX 4012,4081,4114 - - - ENTER 2
* NONE OF THE ABOVE - - - ENTER 3
* EXIT THE PROGRAM - - - ENTER 4

```

AD-A127 557

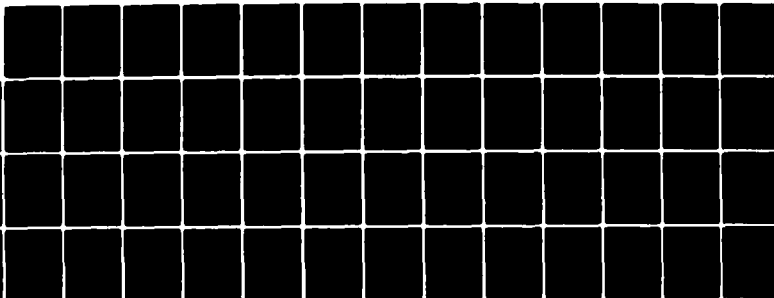
EXPANSION OF THE SCAN ENDGAME PROGRAM FOR AIRCRAFT
SURVIVABILITY STUDIES A..(U) NAVAL POSTGRADUATE SCHOOL
MONTEREY CA J FOURNY DEC 82

2/2

UNCLASSIFIED

F/G 9/2

NL



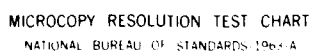
END

DATE

FILMED

5-83

DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```

*****
-STAT3
&READ VARS &FRM1
&IF &PRM1 = 1 &GOTO -SETT
&IF &PRM1 = 2 &GOTO -SETT
&IF &PRM1 = 3 &GOTO -NOGRPH
&IF &PRM1 = 4 &GOTO -FINI
&TYPE I NEED A 1,2,OR 3 TO MAKE SELECTION
&GOTO -STAT3
-NOGRPH
CLRSCHN
*COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
**
** INFO MESSAGE TO USER TO ADVISE NON-GRAPHICS CAPABILITY
** -----
&BEGTYPE -REF
SINCE YOU ARE NOT CONNECTED TO ONE OF THE GRAPHICS TERMINALS LISTED
YOU WILL BE UNABLE TO UTILIZE THE GRAPHICS ROUTINES FOR THIS
APPLICATION. YOU CAN HOWEVER STILL SIMULATE THE MISSILE/TARGET
ENCOUNTER AND GENERATE STATISTICAL DATA FOR THE TERMINAL OR
PRINTER. CO YOU STILL WISH TO CONTINUE.
*****
** REPLY *****
** FUNCTION KEY *****
** -----1-----2-----
** CONTINUE *****
** EXIT PROGRAM *****
** *****
ENTER THE CORRESPONDING FUNCTION KEY(INTEGER)
-REF
&READ VARS &ANS
&IF &ANS = 1 &GOTO -SETT
&IF &ANS = 2 &GOTO -FINI
&TYPE I NEED A 1,OR 2
&GOTO -REP
-SETT
CLRSCHN
*****
&BEGTYPE -STAT2
SCAN WAS DEVELOPED TO PREDICT THE PROBABILITY THAT AN AIRCRAFT WILL
SURVIVE AN ATTACK BY A MISSILE ARMED WITH A FRAGMENTATION WARHEAD.
THE PROGRAM SIMULATES THE ENCOUNTER BETWEEN A MISSILE AND AN AIRBORNE
TARGET MATHEMATICALLY AND COMPUTES EXPECTED FRAGMENT IMPACT AND
RESULTING DAMAGE. YOU WILL BE PROVIDED WITH NECESSARY INSTRUCTIONS
THROUGHOUT THE PROGRAM.
BEFORE COMMENCING IT IS NECESSARY TO ACCESS TEN(10) ADDITIONAL
CYLINDERS TO RUN THE PROGRAM. THIS PROCEDURE IS BEING AUTOMATICALLY

```

MYT00520
 MYT00530
 MYT00540
 MYT00550
 MYT00560
 MYT00570
 MYT00580
 MYT00590
 MYT00600
 MYT00610
 MYT00620
 MYT00630
 MYT00640
 MYT00650
 MYT00660
 MYT00670
 MYT00680
 MYT00690
 MYT00700
 MYT00710
 MYT00720
 MYT00730
 MYT00740
 MYT00750
 MYT00760
 MYT00770
 MYT00780
 MYT00790
 MYT00800
 MYT00810
 MYT00820
 MYT00830
 MYT00840
 MYT00850
 MYT00860
 MYT00870
 MYT00880
 MYT00890
 MYT00900
 MYT00910
 MYT00920
 MYT00930
 MYT00940
 MYT00950
 MYT00960
 MYT00970
 MYT00980
 MYT00990

```

MYT01000
MYT01010
MYT01020
MYT01030
MYT01040
MYT01050
MYT01060
MYT01070
MYT01080
MYT01090
MYT01100
MYT01110
MYT01120
MYT01130
MYT01140
MYT01150
MYT01160
MYT01170
MYT01180
MYT01190
MYT01200
MYT01210
MYT01220
MYT01230
MYT01240
MYT01250
MYT01260
MYT01270
MYT01280
MYT01290
MYT01300
MYT01310
MYT01320
MYT01330
MYT01340
MYT01350
MYT01360
MYT01370
MYT01380
MYT01390
MYT01400
MYT01410
MYT01420
MYT01430
MYT01440
MYT01450
MYT01460
MYT01470

UNCERTAIN FOR YOU AT PRESENT.
ACCESS TIME VARIES FROM 30 TO 180 SECONDS DEPENDING ON SYSTEM USAGE.
*****
* PLEASE WAIT *
*****
-STAT2
* COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
* ACCESS TEXT LIBRARIES AND LINK TO TEKTRONIX AND GRAF77 DISKS
*-----
C P DEFINE T3250 AS 193 CYL 10
&BEGSTACK -ENDI
YES
TEMP
-ENDI
SET CMSTYPE FT
FOR MAT 193 C
SET CMSTYPE RT
GETFMADR
&READ VARS &STAR &MODE2 &CUU
C P LINK GRAF77 191 &CUU RR
ACC &CUU &MODE2
GETFMADR
&READ VARS &STAR &MODE3 &CUU
C P LINK MAINTEK 191 &CUL RR
ACC &CUU &MODE3
&LB1 = GRAFLIB
&LB2 = TEKTRON
GLOBAL TXTRIE MOC2EEH FCRIMOD2 NONIMSL CMSLIB IMSLSP &LB1 &LB2
&TYPE ** ACCESS IS NOW COMPLETE ***
&PRM2 = 1
* COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
* USER DISK QUERY OPTICN
*-----
&BEGTYPE -INST
DO YOU WANT A SUMMARY OF YOUR DISK SPACE ALLOCATION
*****
* REPLY *****
* FUNCTION KEY *
*-----I-----*
* YES- *
* AC 2 *
*****
ENTER THE CORRESPONDING FUNCTION KEY(INTEGER)

```

```

-INST VARS &CISKP
&READ &DISKP = 1 &GOTO -QUER1
&IF &DISKP = 2 &GOTO -QUER2
&TYPE I NEED A 1, OR 2
&GOTO -INST
-QUER1
CLRSCLN DISK
QUERY DISK HIT THE 'ENTER' KEY WHEN YOU ARE READY TO CONTINUE
&TYPE *****
&READ VARS &KEY3
-QUER2
*****
CLRSCLN
&EGTYPE -STAT5
THE FOLLOWING LEVELS OF USER FAMILIARITY ARE TAKEN INTO CONSIDERATION
** THE NOVICE ** INTERMEDIARY ** EXPERIENCED ***
** THE NOVICE LEVEL IS RECOMMENDED FOR FIRST TIME USERS UNTIL AN
UNDERSTANDING OF THE BASIC COMMANDS AND FAMILIARITY WITH AVAILABLE
OUTPUT DATA IS ACHIEVED.
** INTERMEDIARY LEVEL WILL PROVIDE ADDITIONAL CAPABILITY OF USER DESIGNED
WARHEAD AND ENCOUNTER CONDITIONS AS WELL AS ADDITIONAL GRAPHICS
OPTIONS.
** EXPERIENCED LEVEL WILL ALLOW XEDIT CAPABILITY OF DATA FILES DIRECTLY
AND FULL FLEXIBILITY OF COMMANDS AND OPTIONS.
*****
** USER LEVEL ***** FUNCTION KEY **
** NOVICE *****
** INTERMEDIARY *****
** EXPERIENCED *****
** EXIT THE PROGRAM *****
*****
SELECT THE CORRESPONDING FUNCTION KEY.
-STAT5
*COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT *
* IDENTIFY USER LEVEL AND SET USER FLAGS
*
*
&READ VARS &LEVL
&IF &LEVL GE 4 &GOTO -DIAG
&IF &LEVL LT 1 &GOTO -DIAG
&GOTO -CONT
-DIAG
&IF &LEVL = 4 &GOTO -FIN
&TYPE I NEED A 1,2,3,OR 4

```

```

MYT01480
MYT01490
MYT01500
MYT01510
MYT01520
MYT01530
MYT01540
MYT01550
MYT01560
MYT01570
MYT01580
MYT01590
MYT01600
MYT01610
MYT01620
MYT01630
MYT01640
MYT01650
MYT01660
MYT01670
MYT01680
MYT01690
MYT01700
MYT01710
MYT01720
MYT01730
MYT01740
MYT01750
MYT01760
MYT01770
MYT01780
MYT01790
MYT01800
MYT01810
MYT01820
MYT01830
MYT01840
MYT01850
MYT01860
MYT01870
MYT01880
MYT01890
MYT01900
MYT01910
MYT01920
MYT01930
MYT01940
MYT01950

```


MYT02440
MYT02450
MYT02460
MYT02470
MYT02480
MYT02490
MYT02500
MYT02510
MYT02520
MYT02530
MYT02540
MYT02550
MYT02560
MYT02570
MYT02580
MYT02590
MYT02600
MYT02610
MYT02620
MYT02630
MYT02640
MYT02650
MYT02660
MYT02670
MYT02680
MYT02690
MYT02700
MYT02710
MYT02720
MYT02730
MYT02740
MYT02750
MYT02760
MYT02770
MYT02780
MYT02790
MYT02800
MYT02810
MYT02820
MYT02830
MYT02840
MYT02850
MYT02860
MYT02870
MYT02880
MYT02890
MYT02900
MYT02910

```
CCPY &TNME BATA B GEOM DATA C
CCPY GEOM DATA C = (UNPA REPL
&TYPE TYPE IN THE MAXIMUM EXTENSION OF YOUR TARGET
&TYPE *****
&READ VARS &SIZE *****
&GCIC -LDGEN *****
-NOTRG *****
CLRSCFN *****
&TYPE THERE IS NC TARGET &TNME STORED ON DISK *****
&GCIC -CONT *****
*CCMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
* SET FILE DEFINITIONS FOR NPGEN PROGRAM
*-----
-LDGEN 1 TERMINAL (PERM
FILEDEF 5 DISK GEOM DATA C (PERM
FILEDEF 6 DISK IBUG FDRTRAN C (RECFM FA BLOCK 131 PERM
FILEDEF 7 TERMINAL (PERM
FILEDEF 30 DISK TARGET DATA C (RECFM VBS LRECL 127 BLOCK 131 PERM
*CCMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
* LOAD IN TARGET LINE GENERATOR NPGEN
*-----
CLRSCFN THE GRAPHICS PREPROCESSOR IS NOW LOADING AUTOMATICALLY
&TYPE *****
&STACK &SIZE *****
&STACK &LEVL *****
LCAD MYGEN *****
START *****
CLRSCFN *****
&BEGTYPE -STAT7 *****
A SUMMARY *****
***** FUNCTION KEY *****
*****
NC SUMMARY/CONTINUE 1
SUMMARY AT TERMINAL ONLY 2
SUMMARY AT PRINTER ONLY 3
SUMMARY AT PTR AND TERM 4
EXIT THE PROGRAM 5
*****
SELECT CORRESPONDING FUNCTION KEY *****
-STAT7 *****
*CCMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
```



```

*****
&TYPE -SUB1 WARHEAD
&GOTC -CONT3
*CCMPNT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
* EXPERIENCED USER LEVEL
*-----*
-STAE2
&BEGTYPE -STAE3
AT THE EXPERIENCED LEVEL YOU HAVE THE OPTION OF MANIPULATING THE CASE
AND WARHEAD FILES DIRECTLY. FUNCTION KEYS ARE PROVIDED ONLY TO ACCESS
THE FILES AND PLACE YCL IN THE XEDIT MCDE.
*****
SELECTION OF "CASE FILE "
*****
-STAE3
&CALL -SUB1 CASE
&CLRSCRN
&TYPE SELECTION OF "WARHEAD FILE"
*****
&CALL -SUB1 WARHEAD
*****
&GOTC -CONT3
*CCMPNT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
* SUBROUTINE INTERACTION AND CONTROL FOR TWO UPPER LEVELS OF USER
*-----*
SUB1
-SLBB
&EECTYPE -STAE4
*****
FILES
*****
FUNCTION KEY
*****
1
2
3
4
5
*****
LSE DEFAULT FILE
USE CLSTOM FILE
MODIFY DEFAULT FILE
MODIFY A CLSTOM FILE
EXIT THE PROGRAM
*****
SELECT THE CORRESPONDING FUNCTION KEY
*****
-STAE4
&READ VARS &EDT -SDEF
&IF &EDT = 1 &GOTC -STAE5
&IF &EDT = 2 &GOTC -STAE6
&IF &EDT = 3 &GOTC -STAE7
&IF &EDT = 4 &GOTC -STAE8
&IF &EDT = 5 &GOTC -FIN
*****

```



```

&RETURN
*CCPMT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
* * CCPY MODIFIED FILE ON USER'S A DISK
* * -----
* *
* * CPYFW TYPE IN THE NAME YOU WANT TO CALL THIS NEW FILE
&TYPE *****
&READ STRING &FNME *****
COPY &1 DATA C &FNME DATA A *****
&RETURN
*LCDEF1
FILEDEF 5 TERMINAL (PERM *****
FILEDEF 6 TERMINAL (PERM *****
FILEDEF 10 DISK CASE DATA C (PERM *****
LCAD PRG2 *****
START * *****
&BEGTYPE -STAE8 *****
DO YOU WANT A PERMANENT COPY OF THIS MODIFIED FILE CN YCUR A DISK *****
* * YES 1 *****
* * NO 2 *****
* * *****
SELECT FUNCTION KEY *****
-STAE8 VARS &CEDT *****
&IF &CEDT = 1 &GCTO -CPYFC *****
&IF &CEDT = 2 &GCTO -CRET *****
&TYPE I NEED A 1,CR 2 *****
&GOTO -STAE8 *****
-CRET *****
&RETURN *****
*CCPMT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
* * CCPY MCDIFIED FILE ON USER'S A DISK
* * -----
* *
* * CPYFC TYPE IN THE NAME YOU WANT TO CALL THIS NEW FILE
&TYPE *****
&READ STRING &FNME *****
COPY &1 DATA C &FNME DATA A *****
&RETURN *****
&GCTO *****
*CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
-STAE7 *****
&TYPE *****
&TYPE *****

```

```
&READ STRING &FNME  
#COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-*
```

CHECK VALIDITY OF USER FILENAME

[illegible]

MYT05800
MYT05810
MYT05820
MYT05830
MYT05840
MYT05850
MYT05860
MYT05870
MYT05880
MYT05890
MYT05900
MYT05910
MYT05920
MYT05930
MYT05940
MYT05950
MYT05960
MYT05970
MYT05980
MYT05990
MYT06000
MYT06010
MYT06020
MYT06030
MYT06040
MYT06050
MYT06060
MYT06070
MYT06080
MYT06090
MYT06100
MYT06110
MYT06120
MYT06130
MYT06140
MYT06150
MYT06160
MYT06170
MYT06180
MYT06190
MYT06200
MYT06210
MYT06220
MYT06230
MYT06240
MYT06250
MYT06260
MYT06270

```

* * -----
* * READ VARS & SUM2
* * IF &SUM2 = 1 &GOTO -CONT2
* * IF &SUM2 = 2 &GOTO -CLST2
* * IF &SUM2 = 3 &GOTO -PLST2
* * IF &SUM2 = 4 &GOTO -CLST2
* * IF &SUM2 = 5 &GOTO -FIN
* * TYPE I NEED A 1,2,3,4, OR 5
* * -CLST2
* * TYPE SCAN1 FORTRAN C
* * HIT THE ENTER KEY WHEN YOU ARE READY TO CONTINUE
* * *****
* * READ VARS & KEY2
* * IF &SUM2 = 4 &GOTO -CCNT2
* * -PLST2
* * TYPE SUMMARY 'SCAN1' IS NOW BEING SENT TO PRINTER AS REQUESTED
* * PRINT SCAN1 FORTRAN C
* * -CCNT2
* * CLRETYPE -STAT8
* * A SUMMARY OF MISSILE DATA AND SURVIVAL PROBABILITIES IS AVAILABLE
* * *****
* * SCAN2
* * FUNCTION KEY
* * -----
* * 1
* * 2
* * 3
* * 4
* * 5
* * NC SUMMARY/CONTINUE
* * SUMMARY AT TERMINAL ONLY
* * SUMMARY AT PRINTER ONLY
* * SUMMARY AT PTR AND TERM
* * EXIT THE PROGRAM
* * *****
* * SELECT CORRESPONDING FUNCTION KEY
* * -STAT8
* * COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
* * DETERMINE IF SCAN2 SUMMARY DESIRED BY USER
* * -----
* * READ VARS & SUM3
* * IF &SUM3 = 1 &GOTO -CONT4
* * IF &SUM3 = 2 &GOTO -CLST3
* * IF &SUM3 = 3 &GOTO -PLST3
* * IF &SUM3 = 4 &GOTO -CLST3
* * IF &SUM3 = 5 &GOTO -FIN
* * TYPE I NEED A 1,2,3,4, OR 5
* * -CLST3

```

[illegible]

MYT06760
MYT06770
MYT06780
MYT06790
MYT06800
MYT06810
MYT06820
MYT06830
MYT06840
MYT06850
MYT06860
MYT06870
MYT06880
MYT06890
MYT06900
MYT06910
MYT06920
MYT06930
MYT06940
MYT06950
MYT06960
MYT06970
MYT06980
MYT06990
MYT07000
MYT07010
MYT07020
MYT07030
MYT07040
MYT07050
MYT07060
MYT07070
MYT07080
MYT07090
MYT07100
MYT07110
MYT07120
MYT07130
MYT07140
MYT07150
MYT07160
MYT07170
MYT07180
MYT07190
MYT07200
MYT07210
MYT07220
MYT07230

```

** * * * LOAD THE MAIN GRAPHICS PROGRAM NPDRAW
** * * *
** * * * LCAC MYDRAW
** * * * START *
** * * * -CMPL1
** * * * CLRSCLR
** * * * &EGETYPE -CMFL2
** * * * THIS TARGETS THE SCAN APPLICATION. YOU MAY BRANCH BACK TO SELECT
** * * * A NEW TARGET IF YOU HAVE AUTHORIZATION OR MODIFY YOUR WARHEAD AND
** * * * CASE DATA FOR DIFFERENT MISSILE DESIGN OR GENERATE A 3-D PROBABILITY
** * * * ENVELOPE IF YOU HAVE PLENTY OF TIME.
** * * * *****
** * * * BRANCH *****
** * * * FUNCTION KEY * *
** * * * 1 2 3 4 5 6
** * * * CHANGE USER LEVEL
** * * * SELECT NEW TARGET
** * * * MODIFY MISSILE DATA
** * * * RELOAD GRAPHICS PROGRAM
** * * * 3-D PLOTTING
** * * * EXIT PROGRAM
** * * * *****
** * * * -CMPL2
** * * * COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
** * * * SELECT BRANCHING OPTIONS FOR REKUNS CR 3-D PLCTS
** * * *
** * * * &REAL VARS &FRM3
** * * * &IF &PRM3 = 1 &GOTO -BRCH1
** * * * &IF &PRM3 = 2 &GOTO -BRCH2
** * * * &IF &PRM3 = 3 &GOTO -BRCH3
** * * * &IF &PRM3 = 4 &GOTO -LDSP
** * * * &IF &PRM3 = 5 &GOTO -PLCT
** * * * &IF &PRM3 = 6 &GOTO -FIN
** * * * &TYPE I NEED A 1,2,3,4,5,CR 6
** * * * &GOTO -CMPL2
** * * * -ERASE1 GEOM DATA C
** * * * ERASE CASE DATA C
** * * * ERASE WARHEAD DATA C
** * * * &GOTO -QUER2
** * * * -ERCF2
** * * * ERASE GEOM DATA C
** * * * ERASE CASE DATA C
** * * * ERASE WARHEAD DATA C
** * * * &GOTO -CCNT

```

```

-BKCF3
-ERASE CASE DATA C
-ERASE WARHEAD DATA C
-EGOTC -JMP2
-FLCT
-ETYPE PLOT PACKAGE NOT YET WRITTEN
-FIN
*COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT-COMMENT*
**
** RELEASE PFEVICSLY ACCESSED DISKS AND LIBRARIES
**
REL 193 (DET
REL 8MODE2 (DET
REL 8MODE3 (DET
-FIN
REL 192 (DET
CLRSCRN
EXIT
CCCC
THIS PROGRAM INTERACTIVELY CHANGES THE WARHEAD DATA FILE PARAMETER
COMMON /TAPSTW/ NUNWT
REWIND NUNWT
COMMON/BLST/FUSBLR,FUSBL1,FUSBL2,WNGBLR,WNGPT1(3),WNGPT2(3)
COMMON/FUSE/FUZTYP,FUZPOS,DELAY,FUZANG,SIGFUZ,FUZRAN
COMMON/WARHD/ZONMIN(6),ZONMAX(6),VMIN(6),VMAX(6),FRAGMS(6),
*FRAGNO(6),NMAT(6),XWH(6),NUMZON,NMASS
DIMENSION SFAP(4)
INTEGER FUZTYP,NUMZON,NZON,ADZON,NMASS,NMAT,SET
NZON=1CO
*****
**
** FORMAT STATEMENTS FOR FRAGMENT PARAMETERS
**
1000 FCRMAT(2X,'THE WARHEAD DATA FILE CONTAINS FRAGMENT SPRAY PARAME',
**TERS,'/2X,'FUZING PARAMETERS AND BLAST ENVELOPE GEOMETRY AROUND',
**THE TARGET,'/2X,'AT THE INTERMEDIARY LEVEL YOU HAVE THE OPTION',
**OF SELECTIVELY,'/2X,'MODIFYING ANY ONE OR MORE OF THE SEGMENTS',
**BELOW WHICH CONTAIN,'/2X,'THE PRIMARY WARHEAD PARAMETERS.').)
1010 FCRMAT(2X,'ERROR IN WARHEAD DATA FILE')
1020 FCRMAT(2X,'CURRENT VALUE IS',I10)
1030 FCRMAT(6X,'*****/6X,'** CHANGE VALUE 1 *****')
**
** /6X,'** NO CHANGE
**/2X,'SELECT FUNCTION KEY'.)
1040 FCRMAT(2X,'ENTER NEW VALUE'.)
MYT07240
MYT07250
MYT07260
MYT07270
MYT07280
MYT07290
MYT07300
MYT07310
MYT07320
MYT07330
MYT07340
MYT07350
MYT07360
MYT07370
MYT07380
MYT07390
MYT07400
MYT07410
MYT07420
MYT07430
MYT07440
MYT07450
MYT07460
MYT07470
MYT07480
MYT07490
MYT07500
MYT07510
MYT07520
MYT07530
MYT07540
MYT07550
MYT07560
MYT07570
MYT07580
MYT07590
MYT07600
MYT07610
MYT07620
MYT07630
MYT07640
MYT07650
MYT07660
MYT07670
MYT07680
MYT07690
MYT07700
MYT07710

```


MYT09160
MYT09170
MYT09180
MYT09190
MYT09200
MYT09210
MYT09220
MYT09230
MYT09240
MYT09250
MYT09260
MYT09270
MYT09280
MYT09290
MYT09300
MYT09310
MYT09320
MYT09330
MYT09340
MYT09350
MYT09360
MYT09370
MYT09380
MYT09390
MYT09400
MYT09410
MYT09420
MYT09430
MYT09440
MYT09450
MYT09460
MYT09470
MYT09480
MYT09490
MYT09500
MYT09510
MYT09520
MYT09530
MYT09540
MYT09550
MYT09560
MYT09570
MYT09580
MYT09590
MYT09600
MYT09610
MYT09620
MYT09630

```

IF (J.EQ.2) GO TO 170
WRITE (6,1060)
GO TO 120
160 WRITE (6,104C)
165 CCNTINCE
    READ(5*) NZON
    GO TO 175
17C CCNTINCE
    NZON=NUMZON
    *****
    *      CALCULATE DIFFERENCE BETWEEN CLC AND NEW      *
    *      NUMZON VALUE AND SELECTIVELY BRANCH            *
    *      *****
    *      SET=NZCN-NUMZON
    *      WRITE(6,2005) SET
    *      IF (SET.LT.-2.OR. SET.GT.3) GO TO 200
    *      IF (SET.LE.0) GO TO 300
    *      GO TO 400
    *      WRITE(6,1050)
    *      GC TO 165
    *      *****
    *      NC CHANGE IN NUMZON/DETERMINE FRAGMENT PARAMETERS *
    *      *****
    *      DO 350 I=1,NZON
    *      WRITE(6,1100) I
    *      RMVAL=ZONMIN(I)
    *      CALL CHR(RMVAL)
    *      ZCNMIN(I)=RMVAL
    *      WRITE(6,1150) I
    *      RMVAL=ZONMAX(I)
    *      CALL CHR(RMVAL)
    *      ZCNMAX(I)=RMVAL
    *      WRITE(6,1200)
    *      RMVAL=VMIN(I)
    *      CALL CHR(RMVAL)
    *      VMIN(I)=RMVAL
    *      WRITE(6,1250)
    *      RMVAL=VMAX(I)
    *      CALL CHR(RMVAL)
    *      VMAX(I)=RMVAL
    *      WRITE(6,1300)
    *      RMVAL=FRAGMS(I)
    *      CALL CHR(RMVAL)
    *      FRAGMS(I)=RMVAL
    *      *****
    *      300
    *      *****

```

MYT09660
MYT09650
MYT09660
MYT09670
MYT09680
MYT09690
MYT09700
MYT09710
MYT09720
MYT09730
MYT09740
MYT09750
MYT09760
MYT09770
MYT09780
MYT09790
MYT09800
MYT09810
MYT09820
MYT09830
MYT09840
MYT09850
MYT09860
MYT09870
MYT09880
MYT09890
MYT09900
MYT09910
MYT09920
MYT09930
MYT09940
MYT09950
MYT09960
MYT09970
MYT09980
MYT09990
MYT10000
MYT10010
MYT10020
MYT10030
MYT10040
MYT10050
MYT10060
MYT10070
MYT10080
MYT10090
MYT10100
MYT10110

```

WRITE(6,1350)
RMVAL=FRAGNC(I)
CALL CTR(RMVAL)
FRAGNO(I)=RMVAL
WRITE(6,1400)
RMVAL=XWH(I)
CALL CTR(RMVAL)
XWH(I)=RMVAL
WRITE(6,1450)
IMVAL=NMAT(I)
CALL CTR(IMVAL)
NMAT(I)=IMVAL
CONTINUE
GO TO 3805
350 *****
C *****
C * * * * * NUMZCN VALUE CHANGED/DETERMINE FRAGMENT PARAMETERS * * *
C * * * * *
C *****
400 *****
405 *****
I=1
IF (I.GT.NZCN) GO TO 3805
IF (I.GT.NUMZCN) GO TO 425
WRITE(6,1100) I
RMVAL=ZONMIN(I)
CALL CTR(RMVAL)
ZCNMIN(I)=RMVAL
WRITE(6,1150) I
RMVAL=ZONMAX(I)
CALL CTR(RMVAL)
ZONMAX(I)=RMVAL
WRITE(6,1200)
RMVAL=VMIN(I)
CALL CTR(RMVAL)
VMIN(I)=RMVAL
WRITE(6,1250)
RMVAL=VMAX(I)
CALL CTR(RMVAL)
VMAX(I)=RMVAL
WRITE(6,1300)
RMVAL=FRAGMS(I)
CALL CTR(RMVAL)
FRAGMS(I)=RMVAL
WRITE(6,1350)
RMVAL=FRAGNC(I)
CALL CTR(RMVAL)
FRAGNO(I)=RMVAL
WRITE(6,1400)
RMVAL=XWH(I)

```

```

CALL CTR(RMVAL)
XWH(I)=RMVAL
WRITE(6,1450)
IMVAL=NMAT(I)
CALL CF(I,IMVAL)
NMAT(I)=IMVAL
I=I+1
GO TO 405
IF (I.GT.NZON) GO TO 3805
WRITE(6,1100)
CALL CFETR(RMVAL)
ZCNMIN(I)=RMVAL
WRITE(6,1150)
CALL CFETR(RMVAL)
ZCNMAX(I)=RMVAL
WRITE(6,1200)
CALL CFETR(RMVAL)
VMIN(I)=RMVAL
WRITE(6,1250)
CALL CFETR(RMVAL)
VMAX(I)=RMVAL
WRITE(6,1300)
CALL CFETR(RMVAL)
FRAGMS(I)=RMVAL
WRITE(6,135C)
CALL CFETR(RMVAL)
FRAGNO(I)=RMVAL
WRITE(6,14CC)
CALL CFETR(RMVAL)
XWH(I)=RMVAL
WRITE(6,145C)
CALL CFETR(IMVAL)
NMAT(I)=IMVAL
I=I+1
GO TO 405
*****
** FUZZING PARAMETERS **
*****
**
**
** *****
** CALL FFTCMS('CLRS CRN ')
** WRITE(6,31CC)
** IMVAL=FUZYTP
** CALL CF(I,IMVAL)
** FUZYTP=IMVAL
** RMVAL=FUZYPCS
** CALL CTR(RMVAL)

```

```

FUZPOS=RMVAL
WRITE(6,32CC)
RMVAL=FELAY
CALL CHR(RMVAL)
DELAY=FMVAL
WRITE(6,32F0)
RMVAL=FUZANG
CALL CHR(RMVAL)
FUZANG=RMVAL
WRITE(6,3300)
RMVAL=SIGFLZ
CALL CHR(RMVAL)
SIGFUZ=RMVAL
WRITE(6,33FC)
RMVAL=FUZRAN
CALL CHR(RMVAL)
FUZRAN=RMVAL
WRITE(6,3400)
RMVAL=FADMSL
CALL CHR(RMVAL)
RADMSL=RMVAL
WRITE(6,345C)
RMVAL=FOSNDS
CALL CHR(RMVAL)
PCSNDS=RMVAL
WRITE(6,3500)
RMVAL=FOSTAL
CALL CHR(RMVAL)
POSTAL=RMVAL
GO TO 2805
*****
** BLAST ENVELOPE **
*****
***** FTCLMS('CLRS CRN ')
CALL FTECMS(6,35FC)
RMVAL=FUSBLR
CALL CHR(RMVAL)
FUSBLR=RMVAL
WRITE(6,3600)
RMVAL=FUSBL1
CALL CHR(RMVAL)
FUSBL1=RMVAL
WRITE(6,36FC)
RMVAL=FUSBL2
CALL CHR(RMVAL)
FUSBL2=RMVAL

```

```

WRITE(6,37CC1)
RMVAL=NGBLR
CALL CHR(RMVAL)
NGBLR=RMVAL
WRITE(6,4100)
RMVAL=NGPT1(1)
CALL CHR(RMVAL)
NGPT1(1)=RMVAL
WRITE(6,4150)
RMVAL=NGPT1(2)
CALL CHR(RMVAL)
NGPT1(2)=RMVAL
WRITE(6,4200)
RMVAL=NGPT1(3)
CALL CHR(RMVAL)
NGPT1(3)=RMVAL
WRITE(6,4250)
RMVAL=NGPT2(1)
CALL CHR(RMVAL)
NGPT2(1)=RMVAL
WRITE(6,4300)
RMVAL=NGPT2(2)
CALL CHR(RMVAL)
NGPT2(2)=RMVAL
WRITE(6,4350)
RMVAL=NGPT2(3)
CALL CHR(RMVAL)
NGPT2(3)=RMVAL

```



```

C * SUB TO HANDLE INTEGER VALUE CHANGES TO WARHEAD FILE *
C * **
C *** SUBROUTINE CHI(INTVL)
C
50 WRITE(6,1020) INTVL
   WRITE(6,1030)
   CONTINUE
   READ(5,*) J
   IF (J.EQ.1) GO TO 55
   IF (J.EQ.2) GO TO 60
   WRITE(6,1040)
   GO TO 50
55 WRITE(6,1040)
   READ(5,*) INTVL
   CONTINUE
   CALL FFTCMS('CLRS CRN ')
   RETURN
1020 FORMAT(2X,'CURRENT VALUE IS ',I10)
1030 FORMAT(4X,'*****//6X,,'* CHANGE VALUE 1
      *//6X,,'*****//6X,,'*****
      *//2X*SELECT FUNCTION KEY*)
1040 FORMAT(2X,'ENTER NEW VALUE')
1060 FORMAT(2X,'I NEED A 1,OR 2')
      END
C *****
C * SUB TO HANDLE REAL VALUE CHANGES TO WARHEAD FILE *
C * **
C *** SUBROUTINE CHR(RELVL)
C
50 REAL RELVL
   WRITE(6,1020) RELVL
   WRITE(6,1030)
   CONTINUE
   READ(5,*) J
   IF (J.EQ.1) GO TO 55
   IF (J.EQ.2) GO TO 60
   WRITE(6,1040)
   GO TO 50
55 WRITE(6,1040)
   READ(5,*) RELVL
   CONTINUE
   CALL FFTCMS('CLRS CRN ')
   RETURN
1020 FORMAT(2X,'CURRENT VALUE IS ',F10.2)
1030 FORMAT(4X,'*****//6X,,'* CHANGE VALUE 1
      *//6X,,'*****//6X,,'*****

```

```

*** /6X, ** NO CHANGE 2 ** /6X, *****
*/2X* SELECT FUNCTION KEY. )
1040 FORMAT(2X, 'ENTER NEW VALUE. ')
1060 FORMAT(2X, 'I NEED A 1, OR 2. ')
C2010 FCKMAT (F10.2)
END
C *****
C SUB TO CREATE NEW REAL VALUES FOR WARHEAD FILE
C *****
C SUBROUTINE CRETR (RELVL)
C *****
C WRITE (6,1040)
C READ (5,*) RELVL
C CONTINUE
C CALL FRTCMS ('CLRSCRN ')
C RETURN
1040 FCKMAT (2X, 'ENTER NEW VALUE. ')
C2010 FORMAT (F10.2)
END
C *****
C SUB TO CREATE NEW INTEGER VALUES FOR WARHEAD FILE
C *****
C SUBROUTINE CRETII (INTVL)
C *****
C WRITE (6,1040)
C READ (5,*) INTVL
C CONTINUE
C CALL FRTCMS ('CLRSCRN ')
C RETURN
1040 FORMAT (2X, 'ENTER NEW VALUE. ')
END
C *****
C BLOCK DATA
C COMMON /TAPSTW/ NUNWT
C DATA NUNWT/ 12 /
END
C *****
C THIS PROGRAM INTERACTIVELY CHANGES THE CASE DATA FILE PARAMETERS
C *****
C COMMON /TAPSTC/ NUNCT
C REWIND NUNCT
C INTEGEF SENT
C REAL MSP, MSS, MAOA, MAA, MAAS, MPA, MPAS, MAZ, MAZS, MISX, MISY, MISZ

```

MYI12520
 MYI12530
 MYI12540
 MYI12550
 MYI12560
 MYI12570
 MYI12580
 MYI12590
 MYI12600
 MYI12610
 MYI12620
 MYI12630
 MYI12640
 MYI12650
 MYI12660
 MYI12670
 MYI12680
 MYI12690
 MYI12700
 MYI12710
 MYI12720
 MYI12730
 MYI12740
 MYI12750
 MYI12760
 MYI12770
 MYI12780
 MYI12790
 MYI12800
 MYI12810
 MYI12820
 MYI12830
 MYI12840
 MYI12850
 MYI12860
 MYI12870
 MYI12880
 MYI12890
 MYI12900
 MYI12910
 MYI12920
 MYI12930
 MYI12940
 MYI12950
 MYI12960
 MYI12970
 MYI12980
 MYI12990

MYT13960
MYT13970
MYT13980
MYT13990
MYT14000
MYT14010
MYT14020
MYT14030
MYT14040
MYT14050
MYT14060
MYT14070
MYT14080
MYT14090
MYT14100
MYT14110
MYT14120
MYT14130
MYT14140
MYT14150
MYT14160
MYT14170
MYT14180
MYT14190
MYT14200
MYT14210
MYT14220
MYT14230
MYT14240
MYT14250
MYT14260
MYT14270
MYT14280
MYT14290
MYT14300
MYT14310
MYT14320
MYT14330
MYT14340
MYT14350
MYT14360
MYT14370
MYT14380
MYT14390
MYT14400
MYT14410
MYT14420
MYT14430

```

IF (ITRAJ.GT.0) GC TO 40
IF (ITRAJ.GT.0) GC TO 50
WRITE(6,1050)
GC TO 5000
WRITE(6,1010)
GC TO 5000
CONTINUE
IF (ITRAJ.EQ.1) GC TO 180
IF (ITRAJ.EQ.2) GC TO 280
IF (ITRAJ.EQ.3) GC TO 380
READ(NUNCT,2100) JNUM,TSPD,TROL,TPIT,TYAW,MSP,MAA,MAAS,MFA,MPAS,
*MAZ,MAZS,ALT,AIMX,AIMY,AIMZ,MISX,MISY,MISZ,TACA,TSS,MADA,WSS
GO TO 480
280 *MAZ,MAZS,ALT,AIMX,AIMY,AIMZ,MISX,MISY,MISZ,TACA,TSS
READ(NUNCT,2200) JNUM,TSPD,TROL,TPIT,TYAW,MSP,MAA,MAAS,MFA,MPAS,
*MAZ,MAZS,ALT,AIMX,AIMY,AIMZ,TCPA,TACA,TSS
GO TO 480
380 *MAZ,MAZS,ALT,AIMX,AIMY,AIMZ,TPIT,TYAW,MSP,MAA,MAAS,MFA,MPAS,
*MAZ,MAZS,ALT,AIMX,AIMY,AIMZ,TCEP,TACA,TSS
WRITE(6,1015)
WRITE(6,1020) ITRAJ
CONTINUE
READ(5,*) J
IF (J.EQ.1) GO TO 60
IF (J.EQ.2) GO TO 65
WRITE(6,1060)
GO TO 580
WRITE(6,1040)
READ(5,*) ITRAJ
CONTINUE
IF (ITRAJ.GT.3) GC TO 60
*****
* SELECT USER ACTION
*
*
*
*****
180C CALL FRTCMS('CLRSCRN ')
*****
182C WRITE(6,4855)
CONTINUE
READ(5,*) J
IF (J.EQ.1) GO TO 1900
IF (J.EQ.2) GO TO 3000
IF (J.EQ.3) GO TO 3100
IF (J.EQ.4) GO TO 3200
WRITE(6,4860)
GC TO 1820
*****
*
*
*
*****

```


MYT14920
MYT14930
MYT14940
MYT14950
MYT14960
MYT14970
MYT14980
MYT14990
MYT15000
MYT15010
MYT15020
MYT15030
MYT15040
MYT15050
MYT15060
MYT15070
MYT15080
MYT15090
MYT15100
MYT15110
MYT15120
MYT15130
MYT15140
MYT15150
MYT15160
MYT15170
MYT15180
MYT15190
MYT15200
MYT15210
MYT15220
MYT15230
MYT15240
MYT15250
MYT15260
MYT15270
MYT15280
MYT15290
MYT15300
MYT15310
MYT15320
MYT15330
MYT15340
MYT15350
MYT15360
MYT15370
MYT15380
MYT15390

```

RMVAL=MISY
CALL CHR(RMVAL)
MISY=RMVAL
WRITE(6,1600)
RMVAL=MISZ
CALL CHR(RMVAL)
MISZ=RMVAL
GO TO 1800
3030 WRITE(6,1650)
RMVAL=TCPA
CALL CHR(RMVAL)
TCPA=RMVAL
GO TO 1800
3040 WRITE(6,1700)
RMVAL=TCBP
CALL CHR(RMVAL)
TCBP=RMVAL
GO TO 1800
*****
C * * * * * PRINT SUMMARY OF CURRENT VALUES * * * * *
C * * * * * *****
C * * * * * *****
3100 IF (ITRAJ.EC.1) GC TO 3110
      IF (ITFAJ.EC.2) GC TO 3120
      IF (ITRAJ.EQ.3) GC TO 3130
3110 WRITE(6,4850) ITRAJ
      GO TO 3140
3120 WRITE(6,4850) ITRAJ
      GO TO 3140
3130 WRITE(6,4850) ITRAJ
      GO TO 3140
3140 WRITE(6,4865)
      READ(5,*) J
      GO TO 1800
*****
C * * * * * RECAP FILE AND STCRE ON DISK * * * * *
C * * * * * *****
C * * * * * *****
3200 IF (ITFAJ.EC.1) GC TO 3210
      IF (ITFAJ.EC.2) GC TO 3220
      IF (ITFAJ.EQ.3) GC TO 3230
3210 REWIND NUNCT
      WRITE(NUNCT,2005) ITRAJ
      WRITE(NUNCT,210) JNUM,TSPD,TRQL,TPIT,TYAW,MSP,MAA,MAAS,MFA,MPAS,

```

[illegible]

APPLICATION CHANGES

129


```

2003 FORMAT(5X,39FEN(C) - TERMINATES EXECUTION OF PROGRAM) MYI01480
2004 FORMAT(5X,39HO(PTION) - DISPLAY/SET PLOTTING OPTIONS) MYI01490
2005 FORMAT(5X,56P(ICTURE) - DRAWS PICTURE OF MODEL USING CURRENT OPTI MYI01500
    *CNS) MYI01510
2006 FORMAT(5X,36FSC(ENE) - DRAWS SEQUENCE OF PICTURES) MYI01520
2007 FORMAT(5X,25FST(EP) - SIMILAR TO SCENE) MYI01530
2008 FORMAT(5X,8HSY(STEM)/5X,68H GR - DISPLAY/DEFINE (ADD TO) C MYI01540
    *CURRENT USER DEFINED SUBSYSTEM/5X,11HSU(BSYSTEM)) MYI01550
2009 FORMAT(5X,47HAX(ES) - DISPLAY/DEFINE AXIS DRAWING PARAMETERS) MYI01560
2010 FORMAT(5X,46HD(EBUG) - DISPLAY/SET DEBUGGING PRINT SWITCHES) MYI01570
2012 FORMAT(5X,43HAP(ERATURE) - DISPLAY/SET VIEWING APERATURE) MYI01580
2013 FORMAT(5X,58HFR(AMESPEED) - DISPLAY/SET FRAMESPEED IN FRAMES PER S MYI01590
    *ECOND) MYI01600
2014 FORMAT(5X,71HHL(ENGTH) - DISPLAY/SET HIDDEN LINE SEGMENT LENGTH (I MYI01610
    *N PLOTTER RASTER)) MYI01620
2015 FORMAT(5X,71HHL - DISPLAY/SET HIDDEN LINE REMOVAL LINEAR TOLERANC MYI01630
    *E (IN MODEL UNITS)) MYI01640
2016 FORMAT(5X,65HHTA - DISPLAY/SET HIDDEN LINE REMOVAL ANGULAR TOLERAN MYI01650
    *CE (DEGREES)) MYI01660
2017 FORMAT(5X,61FEJ(ECT) - ADVANCES FRAME (ONLY WHEN IN MULTIPLE PICTU MYI01670
    *RE MOCE)) MYI01680
2018 FORMAT(5X,7CHHE(LP) - PRODUCES THIS LIST. FURTHER INFORMATION CN MYI01690
    *SPECIFIC COMMANDS/5X,76HIS REQUESTED BY TYPING THE IDENTIFIER OF T MYI01700
    *HE COMMAND AFTER THE WORD 'HELP'.) MYI01710
2020 FORMAT(1X,;COMMAND 2.1X,;*****) MYI01720
2025 FORMAT(1X,;OPTIONS ARE SET BY TYPING "G" FOLLOWED BY OPTION DES., MYI01730
    *CRIPTOR.) MYI01740
2040 FORMAT(6X,;*****COMMAND DESCRIPTORS 1 **/6X, MYI01750
    ** ACCESS OPTION DESCRIPTORS 2 **/6X, MYI01760
    ** ACCESS OPTION DESCRIPTORS 2 **/6X, MYI01770
    ** ***** MYI01780
2045 FORMAT(3X,;I NEED A 1,OR 2.) MYI01790
    *C MYI01800
    *C MYI01810
    *C MYI01820
    *C MYI01830
    *C MYI01840
    *C MYI01850
    *C MYI01860
    *C MYI01870
    *C MYI01880
    *C MYI01890
    *C MYI01900
    *C MYI01910
    *C MYI01920
    *C MYI01930
    *C MYI01940
    *C MYI01950

```

```

MDTS=.FALSE.
SPNP=.TRUE.
JSZE=1

```

```

DETERMINE USER LEVEL
*****

```

```

IF (LEVL.EQ.1)GO TO 61
IF (LEVL.EQ.2)GO TO 63
WRITE(6,109C)
WRITE(6,2000)
WRITE(6,2003)
WRITE(6,2040)
55 CONTINUE

```


MYTC2920
MYTC2930
MYTC2940
MYTC2950
MYTC2960
MYTC2970
MYTC2980
MYTC2990
MYTC3000
MYTC3010
MYTC3020
MYTC3030
MYTC3040
MYTC3050
MYTC3060
MYTC3070
MYTC3080
MYTC3090
MYTC3100
MYTC3110
MYTC3120
MYTC3130
MYTC3140
MYTC3150
MYTC3160
MYTC3170
MYTC3180
MYTC3190
MYTC3200
MYTC3210
MYTC3220
MYTC3230
MYTC3240
MYTC3250
MYTC3260
MYTC3270
MYTC3280
MYTC3290
MYTC3300
MYTC3310
MYTC3320
MYTC3330
MYTC3340
MYTC3350
MYTC3360
MYTC3370
MYTC3380
MYTC3390

```

READ(5,*) JJ
GO TO(60C,605,610,615,620,625,630,635,640,645,650,655,660,
*665,67C),JJ
60C EXT=1
    INT=0
    GO TO 74
605 INT=1
    EXT=0
    GO TO 74
610 HIC=.FALSE.
    GO TO 74
615 HIC=.TRUE.
    GO TO 74
620 CEN=.FALSE.
    GO TO 74
625 CEN=.TRUE.
    GO TO 74
630 PERSP=.FALSE.
    GO TO 74
635 PERSP=.TRUE.
    GO TO 74
640 CART=.TRUE.
    GO TO 74
645 CART=.FALSE.
    GO TO 74
650 MDT=.TRUE.
    GO TO 74
    IF (INT.EQ.0) EXT=2
    IF (EXT.EQ.0) INT=2
    GO TO 74
655 IMPX=.TRUE.
    SPGP=.FALSE.
    GO TO 74
660 AXES=.TRUE.
    SPCP=.FALSE.
    GO TO 74
665 IMPX=.FALSE.
    SPCP=.TRUE.
    AXES=.FALSE.
    MDT=.FALSE.
    IF (EXT.EQ.2) EXT=1
    IF (INT.EQ.2) INT=1
    GO TO 74
67C ICURP = 0
    CALL FRTCMS('CLRSCN ')
    GO TO 60
    TPR=.FALSE.
    WRITE(6,*) TPR
    CALL INCR(Y,Z,SPIN,TPR)

```

C


```

150 READ(MFIL) G,NN,X1,Y1,X2,Y2
    IF (Q.LT.-100.0) GO TO 195
    IF (Q.GT.0.0) GO TO 160
    IM=X2
    IF (Q.LE.0.0) GO TO 170
160  X1=X1/JJSZE
    Y1=Y1/JJSZE
    X2=X2/JJSZE
    Y2=Y2/JJSZE
    CALL GSVECT(0,X1,Y1)
    CALL GSVECT(1,X2,Y2)
    GO TO 150
170  A=X1/JJSZE
    B=Y1/JJSZE
    IM=X2
    CALL GSVECT(0,A-IM,B-IM)
    CALL GSVECT(1,A-IM,B+IM)
    CALL GSVECT(1,A+IM,B+IM)
    CALL GSVECT(1,A+IM,B-IM)
    CALL GSVECT(1,A-IM,B-IM)
    GO TO 150
195  CALL GSFRCF
    RETURN
250 READ(MFIL) G,NN,X1,Y1,X2,Y2
    IF (Q.LT.-100.0) GO TO 260
    IF (Q.GT.0.0) GO TO 260
    IM=2
    IF (Q.LE.0.0) GO TO 270
260  X1=X1/JJSZE
    Y1=Y1/JJSZE
    X2=X2/JJSZE
    Y2=Y2/JJSZE
    CALL MCWABS(X1,Y1)
    CALL CRWABS(X2,Y2)
    GO TO 250
270  A=X1/JJSZE
    B=Y1/JJSZE
    IM=IM/2
    CALL MCWABS(A-IM,B-IM)
    CALL CRWABS(A-IM,B+IM)
    CALL CRWABS(A+IM,B+IM)
    CALL CRWABS(A+IM,B-IM)
    CALL CRWABS(A-IM,B-IM)
    GO TO 250
C295 CALL TSEND
295  RETURN
    END
C

```

```

MYIC53320
MYIC53330
MYIC53340
MYIC53350
MYIC53360
MYIC53370
MYIC53380
MYIC53390
MYIC54000
MYIC54010
MYIC54020
MYIC54030
MYIC54040
MYIC54050
MYIC54060
MYIC54070
MYIC54080
MYIC54090
MYIC54100
MYIC54110
MYIC54120
MYIC54130
MYIC54140
MYIC54150
MYIC54160
MYIC54170
MYIC54180
MYIC54190
MYIC54200
MYIC54210
MYIC54220
MYIC54230
MYIC54240
MYIC54250
MYIC54260
MYIC54270
MYIC54280
MYIC54290
MYIC54300
MYIC54310
MYIC54320
MYIC54330
MYIC54340
MYIC54350
MYIC54360
MYIC54370
MYIC54380
MYIC54390
MYIC54400
MYIC54410
MYIC54420
MYIC54430
MYIC54440
MYIC54450
MYIC54460
MYIC54470
MYIC54480
MYIC54490
MYIC54500
MYIC54510
MYIC54520
MYIC54530
MYIC54540
MYIC54550
MYIC54560
MYIC54570
MYIC54580
MYIC54590
MYIC54600
MYIC54610
MYIC54620
MYIC54630
MYIC54640
MYIC54650
MYIC54660
MYIC54670
MYIC54680
MYIC54690
MYIC54700
MYIC54710
MYIC54720
MYIC54730
MYIC54740
MYIC54750
MYIC54760
MYIC54770
MYIC54780
MYIC54790

```

```

C C C C C
SEQUENCE ADDED TO ALL DRAWING CONTROL SUBROUTINES TO ACCOMMODATE
COMMON LINE STORAGE FILE, INCLUSION OF SENTINNEL, AND XSECTN
ADDED TO SUBROUTINE GENHD, DRWALL, DRWHDN, EXPLODE, *****
*****
COMMON /MYFILE/ MFIL
COMMON /FSPCL/ XSEC, SUBS, EXPLO, AXES, LABL, IMPX, NOEJ
LOGICAL XSEC, SUBS, EXPLO, AXES, LABL, IMPX, NOEJ
Q=-999.9
SENT=1
MFIL=((APPLICABLE FILE NUMBER))
WRITE(MFIL) Q, SENT
IF (.NOT. NOEJ) CALL FRAME
CALL SHCMT
*****
***** CHANGES MADE TO SPLGEN PROGRAM *****
*****
READ(1,*) SIZE, LEVL
CALL FRTCMS('CLRSCRN ')
*****
* BEGIN INTERACTIVE SESSION *
*****
1 IF(LEVL.NE.1) GO TO 30
2 DO I=1,10
3   TRUG(I)=C
4   CONTINUE
5   WRITE(7,130)
6   CONTINUE
7   READ(1,*) PRMPI
8   IF(PRMPI.EQ.1) GO TO 5
9   IF(PRMPI.EQ.2) GO TO 7
10  WRITE(7,90)
11  GO TO 3
12  DENSITY=25.0
13  GO TO 40
14  DENSITY=40.0
15  GO TO 40
16  FORMAT(5X, 'I NEED A 1, CR 2, '
17  * IF VCU INTEND. 73X, 'TO DO EXPLODED VIEW,
18  * IS RECOMMENDED FOR NOVICE USERS. //10X,
19  * *****
20  * ***** SETTING *****
21  * ***** FUNCTION KEY *****
22  * *****
23  * *****
24  * *****
25  * *****
26  * *****
27  * *****
28  * *****
29  * *****
30  * *****
31  * *****
32  * *****
33  * *****
34  * *****
35  * *****
36  * *****
37  * *****
38  * *****
39  * *****
40  * *****
41  * *****
42  * *****
43  * *****
44  * *****
45  * *****
46  * *****
47  * *****
48  * *****
49  * *****
50  * *****
51  * *****
52  * *****
53  * *****
54  * *****
55  * *****
56  * *****
57  * *****
58  * *****
59  * *****
60  * *****
61  * *****
62  * *****
63  * *****
64  * *****
65  * *****
66  * *****
67  * *****
68  * *****
69  * *****
70  * *****
71  * *****
72  * *****
73  * *****
74  * *****
75  * *****
76  * *****
77  * *****
78  * *****
79  * *****
80  * *****
81  * *****
82  * *****
83  * *****
84  * *****
85  * *****
86  * *****
87  * *****
88  * *****
89  * *****
90  * *****
91  * *****
92  * *****
93  * *****
94  * *****
95  * *****
96  * *****
97  * *****
98  * *****
99  * *****
100 * *****

```

```

MYI05800
MYI05810
MYI05820
MYI05830
MYI05840
MYI05850
MYI05860
MYI05870
MYI05880
MYI05890
MYI05900
MYI05910
MYI05920
MYI05930
MYI05940
MYI05950
MYI05960
MYI05970
MYI05980
MYI05990
MYI06000
MYI06010
MYI06020
MYI06030
MYI06040
MYI06050
MYI06060
MYI06070
MYI06080
MYI06090
MYI06100
MYI06110
MYI06120
MYI06130
MYI06140
MYI06150
MYI06160
MYI06170
MYI06180
MYI06190
MYI06200
MYI06210
MYI06220
MYI06230
MYI06240
MYI06250
MYI06260
MYI06270

```

```

MYI06280
MYI06290
MYI06300
MYI06310
MYI06320
MYI06330
MYI06340
MYI06350
MYI06360
MYI06370
MYI06380
MYI06390
MYI06400
MYI06410
MYI06420
MYI06430
MYI06440
MYI06450
MYI06460
MYI06470
MYI06480
MYI06490
MYI06500
MYI06510
MYI06520
MYI06530
MYI06540
MYI06550
MYI06560
MYI06570
MYI06580
MYI06590
MYI06600
MYI06610
MYI06620
MYI06630
MYI06640
MYI06650
MYI06660
MYI06670
MYI06680
MYI06690
MYI06700
MYI06710
MYI06720
MYI06730
MYI06740
MYI06750

```

```

** NORMAL DENSITY          1      * //10X,
** HIGHER DENSITY          2      * //10X,
** *****                * //10X,
CALL INTER(CENSTY,IBUG)
WRITE(6,9) SIZE,DENSITY,IBUG
INTERMEDIARY/EXPERIENCED SET SIZE DENSITY AND DEBUG SWITCHES
SUBROUTINE INTER(DENS,IBUG)
COMMON /DEBUG/ IPRNT(30)
DIMENSION IBUG(10)
CALL FRTCMS('CLRSRN ')
WRITE(7,130)
CONTINUE *1 PRMP1
READ(1,1) PRMP1 GC TO 5
IF(PRMP1.EQ.1) GC TO 5
IF(PRMP1.EQ.2) GC TO 7
WRITE(7,90)
GO TO 3
DENS=25.0
GO TO 9
DENS=40.0
GO TO 10
DENS=100.0
GO TO 11
GO TO 12
CONTINUE
WRITE(7,140)
READ(1,1) PRMP2
IF(PRMP2.EQ.1) GC TO 35
IF(PRMP2.EQ.2) GC TO 12
CALL FRTCMS('CLRSRN ')
WRITE(7,150)
WRITE(7,155)
WRITE(7,160)
WRITE(7,165)
WRITE(7,170)
WRITE(7,175)
WRITE(7,180)
FORMAT(5X,1,10X,SCAN LINE GENERATION - PART 1,1,9X,
100 *
110 FORMAT(5X,PLEASE REFER TO TABLE 2 OF YOUR USERS GUIDE,15X,
110 * ENTER ANY ALPHANUMERIC KEY TO BEGIN DATA INPUT :1,5X,
110 * *****
130 FORMAT(3X,THE DENSITY OF LINES CAN BE SET HIGHER THAN NORMAL,
130 * IF YOU INTEND,1,3X,TO DO EXPLCDED VIEWGRAPHS. NORMAL SETTING,
130 * IS RECOMMENDED FOR NOVICE USERS,1,10X,

```

[illegible]

MYI07240
MYI07250
MYI07260
MYI07270
MYI07280
MYI07290
MYI07300

```

IF (DENS.LE.0.0) DENS=25.0
WRITE(7,66) SIZE,DENS,IBUG
WRITE(7,67) IPRNT
66 FORMAT(2X,SIZE=,2F10.2,2X,IBUG SWITCH,516/2X,516)
67 FORMAT(2X,IPRINT=,2F10.2,2X,1016/2X,1016)
RETURN
END

```

C
C
C

APPENDIX D

DEFAULT WARHEAD AND CASE FILES

The following outline describes the default Case and Warhead Data files that are provided for use with the NPS version of SCAN:

1. CASE DATA - Encounter Geometry Summary.

Trajectory Type 1: Fixed detonation point measured from target CG.

Detonation Point: X = 35.0 feet aft of CG
Y = 0.0 feet centered on CG.
Z = 25.0 feet above CG.

Number of runs in Sample 5:

Target Parameters:	Velocity	1000.0 feet/sec
	Roll Angle	0.0 degrees
	Pitch Angle	0.0 degrees
	Yow Angle	0.0 degrees
	Sideslip	0.0 degrees
	Angle of Attack	0.0 degrees
Missile Parameters	Velocity	2000.0 feet/sec
	Pitch Angle	0.0 degrees
	Azimuth	0.0 degrees
	Aimpoint	Target CG
	Angle of Attack	5.0 degrees
	Sideslip	0.0 degrees
Encounter Altitude	10,000 feet	

2. WARHEAD DATA - Fragment, Fuzing and Blast Envelope Summary

a. Fragment Parameters

Number of Polar Zones 3

Number of Mass Classes 1

Polar Zone Number 1

Limiting Angles 50-60 degrees

Upper/Lower Velocity of Fragments 5000 ft/sec

Fragment Mass 100 grains

Fragment Number 2000

Fragment Initial Position from Center 5.0 feet

Fragment Material Mild steel

Fragment Shape Rectangular

Polar Zone Number 2

Limiting Angles 60-70 degrees

Upper/Lower Velocity of Fragments 4750 ft/sec

Fragment Mass 100 grains

Fragment Number 2000

Fragment Initial Position from Center 2.5 feet

Fragment Material Mild Steel

Fragment Shape Rectangular

Polar Zone Number 3

Limiting Angles 70-80 degrees

Upper/Lower Velocity of Fragments 4500 ft/sec

Fragment Mass 100 grains

Fragment Number 2000

Fragment Initial Position from Center	0.0
Fragment Material	Mild Steel
Fragment Shape	Rectangular

b. Fuzing Parameters

Fuze Type	0
Fuze Position	3.5 feet
Fuze Delay	0.0 seconds
Fuze Look Angle	75.0 degrees
Fuze Cut-off Range	25.0 feet
Radius of Missile Body	1.0 feet
Nose of Missile	5 feet in front of warhead

c. Blast Envelope

Fuselage blast radius	20.0 feet
Wing blast radius	25.0 feet
Cylinder length forward of CG	20.0 feet
Cylinder length aft of CG	20.0 feet
Starting point of wing cylinder	2.5 0.0 1.5
Endpoint of wing cylinder	20.0 5.0 1.5

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