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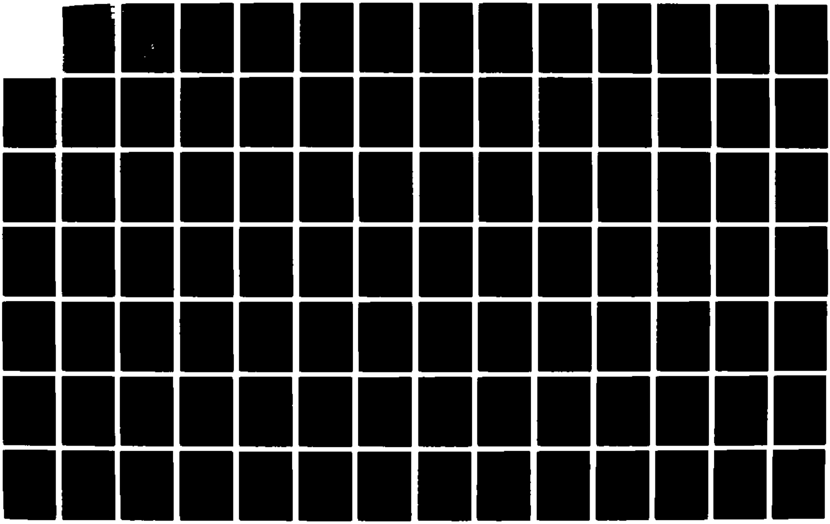

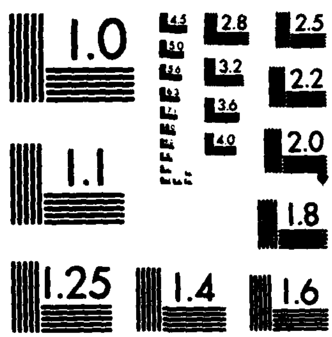

MICROCOPY RESOLUTION TEST CHART
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CONTRACTOR REPORT

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Creating Security System Models Using SNAP-PC

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CREATING SECURITY SYSTEM MODELS

USING

SNAP-PC

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ACKNOWLEDGEMENTS

SNAP was originally developed in the late 1970's by Pritsker & Associates, Inc., for Sandia National Laboratories. Funding was provided by the U.S. Nuclear Regulatory Commission and the U.S. Navy.

SNAP-PC was created to satisfy two fundamental needs, the first of which was to give individuals who did not have access to a host computer the power of using simulation analysis to evaluate security systems. The other was to simplify the simulation process so that a person knowledgeable in security planning and who had little experience in simulation techniques could use simulation in his evaluation of security systems. SNAP-PC was developed by Pritsker & Associates, Inc., for Sandia with funding provided by the U.S. Army Military Police School (USAMPS) and the Department of Energy, Office of Safeguards and Security.

The authors of this document would like to acknowledge those individuals who significantly contributed to the development of SNAP-PC. The original design of SNAP was developed by Dr. Floyd H. Grant now president of FACTROL, Inc. Dr. Grant was also instrumental in the early design phases of SNAP-PC. Doug MacFarland, also with FACTROL, Inc., was extremely helpful in the development of the user support programs.

M. Teresa Olascoaga supervised the project for Sandia and offered her support throughout the entire project. In addition, James A. Allensworth and William K. Paulus of Sandia and Ron

Branstetter of USAMPS made suggestions which significantly improved the final form of the user interface.

A special thanks is given to Dr. Leon D. Chapman who made significant contributions to the design of SNAP-PC.

EXECUTIVE SUMMARY

SNAP-PC (Safeguards Network Analysis Procedure for the Personal Computer) is a user-friendly version of SNAP designed for IBM XT or AT compatible microcomputers. SNAP is a simulation-based analysis technique supporting the evaluation of fixed-site security systems to prevent theft or sabotage of a specified target. Through SNAP the user is able to define the facility, the sensor system, the guard operating policies and response tactics, and the adversary's attack plan.

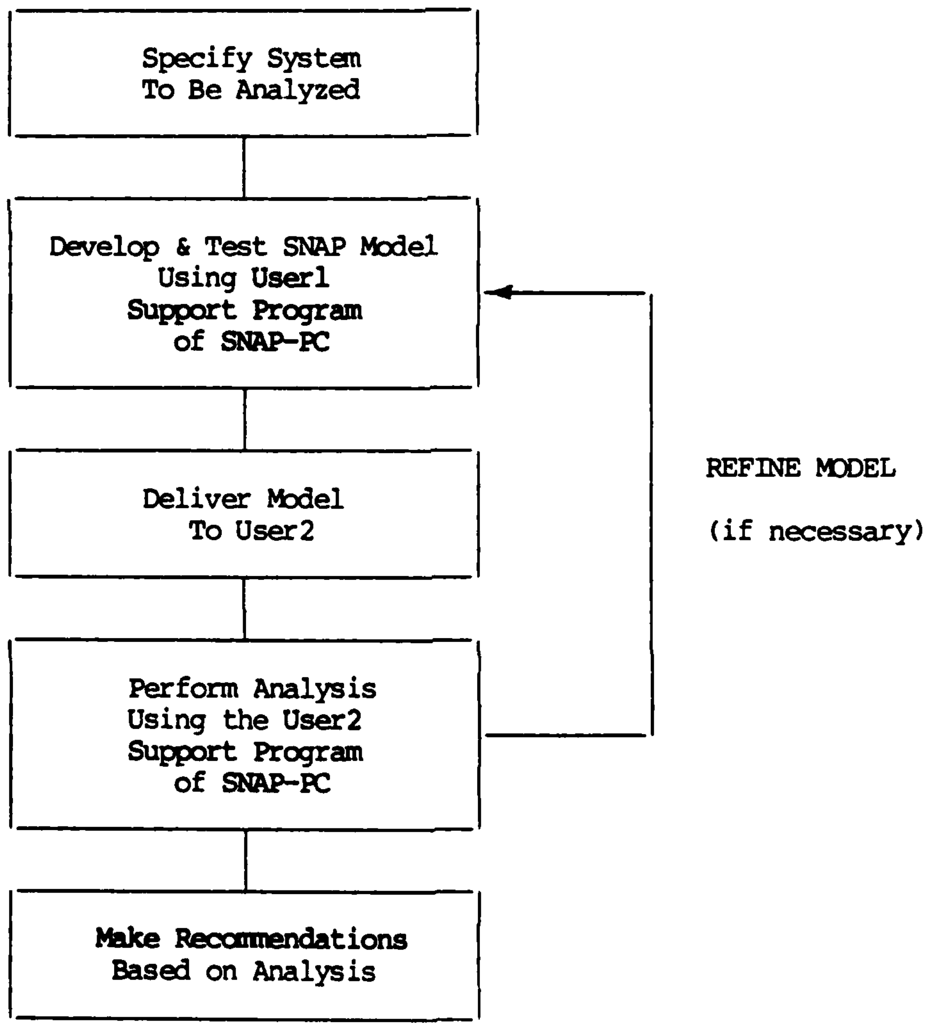
SNAP uses the system definition to analyze its effectiveness in defending against specific threats. The system performance statistics measured by SNAP include:

1) Adversary mission success probability;
2) Guard and adversary casualties;
3) Duration of engagements;
4) Outcome of engagements,
5) Duration of scenario by outcome (adversary success/fail), and
6) Adversary duration by facility location.

The development of SNAP began in the late 1970's for use on a mainframe computer. The mainframe version of SNAP, along with its graphical model manager, SOS, significantly reduces the task of analyzing security systems. The effort of putting SNAP on a microcomputer was undertaken to place this aid into the hands of a larger number of people who might not have the specific hardware required by the mainframe system. In addition, user support

programs were developed which greatly enhance SNAP by providing efficient model management and output analysis capabilities beyond those provided by SOS.

The task of effectively analyzing a security system requires significant effort. This manual deals with the construction of a model of a security system by a skilled model builder knowledgeable of SNAP analysis techniques, User1. The actual evaluation of the security system is usually performed by a security system analyst or on-site C.O. unfamiliar with SNAP, User2. This process, as shown in the figure shown below, is reduced to a manageable level by the SNAP-PC support programs.



The User1 Support Program for SNAP-PC greatly reduces the time previously required to model a facility by providing:

- graphical network builders for the entire modeling task,
- inherent database management for the different scenarios created for a particular facility,
- input data generators that automatically prepare the model for SNAP analysis, and
- capability to parameterize the model in such a way that sensitivity analysis of factors such as patrol force size, patrolling policies, etc., can be performed without editing the model.

After the model has been delivered to User2, the systems analyst can begin to evaluate how well the security system performs against a myriad of potential attack/defense scenarios. The User2 Support Program eliminates the need for User2 to deal with the large amount of performance data generated by SNAP and greatly speeds up the process of analyzing scenarios. In addition to the full capabilities of the mainframe version of SNAP, it provides:

- inherent database management for the collection, organization, and reporting of scenario performance measures,
- rapid sensitivity analysis through the use of a versatile question-response editor that can be used to alter patrol force size, weapon types, etc., and
- on-line animation of force movements, engagements, and neutralization.

The SNAP-PC package provides a compact analysis tool that can be used to analyze a wide variety of security systems. It places SNAP, a proven evaluation technique, in the hands of on-site personnel, not just computer analysts. The support programs eliminate the labor intensive tedious task of organizing and sorting through reams of output reports and greatly reduce the time previously required to analyze a security system.

1.0 INTRODUCTION/OVERVIEW

This document provides a detailed explanation of the use of the User1 Support Program that has been developed to aid the user in the building of SNAP models. This manual will explain how to install the program on your microcomputer and how to build SNAP models using the program. In addition, it will explain how to prepare models for execution and analysis by User2.

1.1 SNAP - History and References

The Safeguards Network Analysis Procedure (SNAP) is designed to assist users in the evaluation of guard/adversary force engagements at fixed sites. Through SNAP symbols, you will define the security system by outlining both the physical aspects (buildings, fences, sensors, etc.) and the procedural aspects (guard patrols, etc.). After defining the system, SNAP plays-out, or simulates, an attack to determine the likelihood of the security system successfully defending the site. Through re-definition of the security system (i.e., changing guard patrol procedures) and re-simulation with SNAP, you are able to identify possible improvements to the system.

SNAP was developed late in the 1970s by Pritsker & Associates under contract to Sandia and the Nuclear Regulatory Commission. The first installations of SNAP included the evaluation of nuclear power facilities and their security systems. In later years SNAP has been used to evaluate securities concerning nuclear submarines and nuclear weapon sites.

Further information on SNAP can be found in the User's Manual entitled The Safeguards Network Analysis Procedure (SNAP): A User's Manual, listed under Document Code NUREG/CR-3423 or SAND83-7123. In addition, several articles have been written describing SNAP analyses. These are listed in the section 'REFERENCES'.

1.2 User1 versus User2

The work of building and then analyzing SNAP models can be easily divided between two user groups, User1 and User2. User1 has the responsibility for developing basic SNAP models and then building those models using the User1 Support Program. User2 executes the models and performs the analysis. In our initial evaluation of the two users, User1 should be knowledgeable of IBM-compatible microcomputers and be trained in SNAP and its functions and capabilities. In addition, User1 should, to a limited extent, be knowledgeable in the security systems that are to be analyzed. User2 should have a passing knowledge of microcomputers, an understanding of SNAP and its basic purpose, and a detailed understanding of the security system to be analyzed.

1.3 Submodel Breakdown

To aid User1 in building SNAP models, the user-defined SNAP model is broken into five major submodels. These are the Facility Submodel, Control Submodel, Adversary Detection Submodel, Guard Submodel, and Adversary Submodel. To perform a SNAP analysis or simulation, you must combine one of each of these submodels.

The Facility Submodel defines the environment of the SNAP analysis. Typically, it identifies buildings, fences, and open spaces. The Facility Submodel must identify a target. The Control Submodel defines the parameters and status variables that the user wants to use throughout the other submodels. The facility's sensor-signal transmission system is defined using an Adversary Detection Submodel. The Guard Submodel outlines the course of action that guards take during normal patrols. In addition, it defines the response action guards would take when sensors are triggered or in some way an adversary is detected in the environment. The adversary's attempt to sabotage or steal the target is defined in the Adversary Submodel.

User1 will build only one Facility Submodel and one Control Submodel for your security system. However, you may be provided with numerous Adversary Detection, Guard, and Adversary Submodels. This will allow you to study particular aspects of your security system with greater ease. For example, you may be given two Adversary Submodels: SOUTH and EAST. The SOUTH scenario might detail an adversary attack on the southern perimeter of a guard facility, etc. A detailed breakdown of the SNAP nodes and statements that is covered by each submodel is listed in Appendix A.

1.4 Modeling Approach

As described in Section 1.3, a single SNAP model contains five different submodels. Using the User1 Support Program you will develop these submodels in a working space on your microcomputer. Typically, the first submodel built is the Facility

Submodel describing the environment of the SNAP analysis. Only one Facility Submodel is included in a working space. Then it is your responsibility to build the remaining submodels as necessary for your analysis.

Since most of the submodels are of a network nature, the submodels can be built graphically on your microcomputer screen using the support program. Those portions of the model that are not in a network form are supported by a forms input. After these models are built, they are translated to SNAP input statements for later execution and analysis.

In addition to building the SNAP model as described in the SNAP User's Manual, you may also build a series of questions to be used by User2 to supply necessary data to prepare the model for analysis. For instance, you may choose to allow User2 to determine the accuracy of a sensor. Therefore, as you build the model you will not want to supply that piece of information, but allow User2 to be prompted for that data. Therefore, in addition to building the five submodels, it will be necessary to develop the set of questions that will be issued to User2, the Master Prompt Query Database. For each question in the Master Prompt Query Database, you will specify an acceptable range of answers and a default answer. The default answer will be used when the user does not wish to address the question. The procedure for creating a Master Prompt Query Database is discussed in Section 8.0 'GIVING USER2 CONTROL'. After building the submodels and the Master Prompt Query Database, it is suggested that you thoroughly test your model before making it available to User2.

As a beginner you may wish to build your initial model without any missing data which requires prompts to User2 and execute the model in that state before adding the prompts. The User2 manual will explain the process of supplying responses to the prompts that have been identified and executing the model.

1.5 Things You Should Know

This manual is written as a user-friendly companion to SNAP-PC and the User1 Support Program. Each of the following sections, from Section 2.0, 'INSTALLATION OF SNAP-PC SOFTWARE ON YOUR MICROCOMPUTER', through Section 11.0, 'PREPARING THE MODEL FOR USER2', covers an aspect of using the User1 Support Program. Within each section you will be led step-by-step through a different stage of a model development.

This section provides the basic syntax rules used to describe the commands you will use and some of the basic features described on the menus you will see on your console screen. The 'GLOSSARY OF COMMON TERMS' and the 'INDEX' at the back of this manual provide valuable aid in using this manual and should be reviewed by the first time user of the User1 Support Program.

1.5.1 Syntax Rules

When you read the phrase, enter [USER1], in this manual, you are requested to type the letters U, S, E, R, and 1, followed by hitting the [RETURN] or [ENTER] key on your console. The phrase, type [A], means you should hit the letter 'A' key once and nothing else. Certain commonly used keys will be abbreviated, such as [ESC] for the escape key and [PgUp] for the page up key.

1.5.2 Basic Features of Menu Screens

The menu screens printed in this manual are actual copies of a console screen that should differ very little from the ones you will actually see. The generic menu selection screens shown in this manual will be the same ones you will see at your computer terminal.

The basic features of a User1 Support Program menu include a line of description across the top, a line of command options along the bottom of the console screen, and a title. The description tells you where you are and what to do if you make a mistake. The command options tell you how to move about the menu and what commands are available to you. These are explained in more detail later. Each menu's title, such as 'GUARD SUBMODEL SELECTION MENU', uniquely identifies the menu.

When a menu first appears on your screen, the first line which you can select or write to will be shown in reverse video. On the bottom of the screen will be a list of processing commands from which you may choose. For example, if you are shown a menu containing a list, you may use the cursor arrow keys to move about the menu (↑ or ↓ - to choice). Or, you can hit the return, or enter, key to select an entry on the list ([RETURN]). Typing a question mark (? - Help) at almost any point in the User1 Support Program will cause a descriptive help message to be printed on your screen.

The help message associated with each menu screen printed in this manual is listed on a page following the menu for your reference.

Hitting the escape key, [ESC], boldfaced on the top of your screen, is your panic button when you make a mistake and easy-out when you get into a set of nested menus. The back arrow to the left of [ESC] on your screen points to the title of the menu you will be shown if you type [ESC]. For example, you may find yourself somewhere inside the Adversary Detection Submodel portion of the User1 Support Program and decide you want to look at a Guard Submodel. You can quickly and safely retreat back to the point where you can choose to look at the Guard Submodel by hitting [ESC]. After each 'escape' you will be pointed to the next prior menu, back to the first menu in the support program.

The basic panic feature of [ESC] is good for morale, but is not necessary. The only permanent damage that you can do to your data is to delete a submodel or working space. There is a redundant, "Are you sure?", at each of these points to prevent you from making a mistake.

2.0 INSTALLATION OF SNAP-PC SOFTWARE ON YOUR MICROCOMPUTER

When you, as User1, execute one of the support programs developed for SNAP-PC, you are actually submitting a batch job to the PC through DOS. The batch job executes a program located in a subdirectory on your fixed disk and that program, through the C-language 'system' command, calls a myriad of other programs based on your interactive menu selections.

This section provides the specifications for the microcomputer system that the SNAP-PC programs were designed to run on, the procedure to install the SNAP-PC programs on your fixed disk, and the miscellaneous information you will need to execute the programs.

2.1 Hardware Requirements

Table 2.1.1 lists the equipment that SNAP-PC is designed to run on. Both the IBM XT and AT come equipped with sufficient hard disk space to get you started. If you are using your microcomputer for other work or you are planning on keeping numerous copies of old runs on the disk as back-up, you will want to buy as much space as you can get. See the section 'Disk Space Requirements' for some rough figures on data file size.

The IBM XT is significantly slower than the IBM AT and the difference is quite noticeable during a side-by-side comparison.

Table 2.1.1: **Hardware Requirements for SNAP-PC**

Computer

IBM XT or AT with:

10 megabyte fixed disk (minimum)
512k memory (minimum)
80287 math co-processor

Monitor

IBM PC Color Monitor (or compatible)

Printer

Epson FX80 (or compatible)

However, during the user-interactive portions of SNAP-PC this difference is not disruptive, but the actual simulation portion of the program will run about three times faster on the IBM AT.

The math co-processor was made a requirement because it significantly speeds up the simulation portion of SNAP-PC and because of the user-interactive graphical model builders. With the co-processor the time it takes the model builders to locate a line in the database is barely noticeable on the AT even in the worst of cases.

The network screens may be printed on an EPSON compatible parallel printer. If you accidently try to print the screens on a serial printer or non-compatible parallel printer, you will get undefined results and will have to reboot your system.

2.2 Software Requirements

A complete list of the software you will need to take full advantage of SNAP-PC is in Table 2.2.1. The only software that you will need to get started that is not included in the SNAP-PC Installation Package, is the appropriate version of DOS and a file editor such as WORDSTAR^{TM}.

The simulation portion of SNAP-PC was written in FORTRAN and was compiled using Microsoft^{TM} FORTRAN V3.3. Experienced modellers may want to add their own user functions as described in the SNAP User's Manual. The procedure for doing this is described under 'Adding Your Own User Code to SNAP-PC'.

All of the user-interactive menus and graphics are written in C-86, by Computer Innovations, Inc. This code is not designed to be altered by the user and will not be discussed.

Table 2.2.1: Software Requirements for SNAP-PC

Operating System:	DOS 3.0 (or later)
FORTRAN Compiler:	Microsoft^{TM}FORTRAN V3.3
File Editor:	WORDSTAR^{TM} (or compatible)

2.3 Loading the SNAP-PC Software Diskettes

The diskettes that contain the SNAP-PC software are high capacity (1.2M) diskettes formatted on an IBM AT. If you cannot list the directory of a diskette using the DOS (DIR:) command, you will need to get another copy. If you have a double-sided disk drive, you will need to get a copy of SNAP-PC on double-sided

(360KB) diskettes. Since these diskettes cannot hold as much information as a high capacity diskette, SNAP-PC will be contained on more than the identified two diskettes.

SNAP-PC can be installed on your PC using either of two methods. You may install it 'by hand' using the instructions listed through the end of Section 2.3. The simpler method is to use the program LOADTOPC.BAT located on Diskette One to automatically load SNAP-PC to your PC. Simply place Diskette One in your drive a: and enter A:\LOADTOPC. You will be prompted when to change diskettes.

The normal distribution of SNAP-PC is contained on two high capacity diskettes (See Table 2.3.1). To load the software onto your PC you must set up the required subdirectory tree structure. This tree structure is given in Figure 2.3.1.

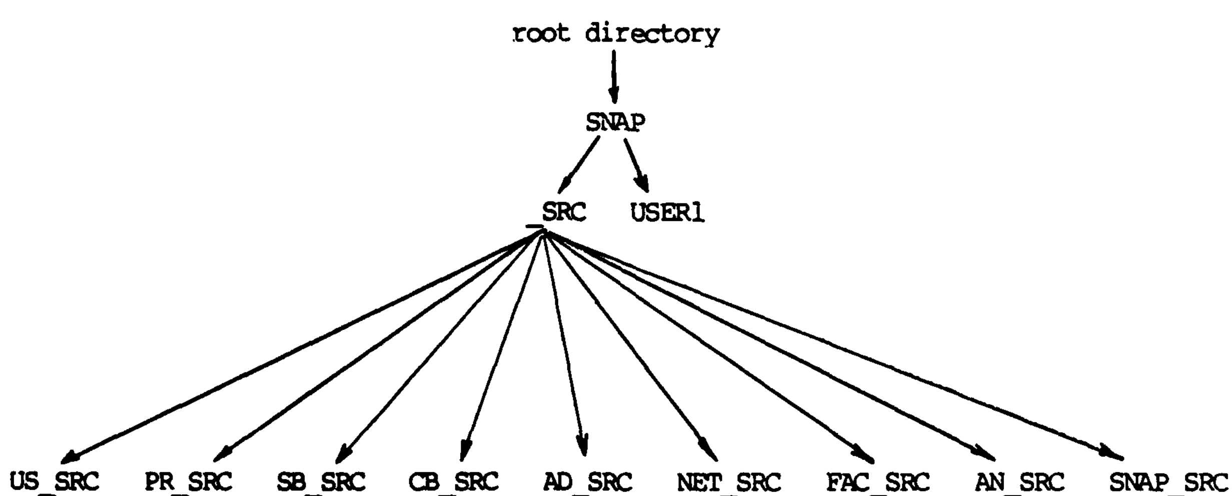


Figure 2.3.1: Subdirectory Tree Structure

Table 2.3.1: SNAP-PC Software Diskettes

DISKETTE ONE - 'SNAP-PC Executables, Help Screens, and Example Model'

Subdirectory	No. of Files
SNAP_SRC	18
SNAP_SRC\US_SRC	11
SNAP_SRC\PR_SRC	7
SNAP_SRC\SB_SRC	21
SNAP_SRC\CB_SRC	10
SNAP_SRC\AD_SRC	8
SNAP_SRC\NET_SRC	30
SNAP_SRC\FAC_SRC	4
SNAP_SRC\AN_SRC	3
SNAP\U2_USER\EXAMPLE	47
SNAP\USER1\EXAMPLE	23
SNAP	1
SNAP\USER1	1

DISKETTE TWO - 'SNAP-PC SIMULATION CODE'

Subdirectory	No. of Files
SNAP_SRC\SNAP_SRC	453

Each subdirectory is made by using the DOS command (MKDIR). The following set of commands will construct the appropriate tree structure:

Table 2.3.2: Commands Used to Set Up the Tree Structure

```
CD      \
MKDIR   SNAP
CD      SNAP
MKDIR   USER1
MKDIR   _SRC
CD      _SRC
MKDIR   US_SRC
MKDIR   PR_SRC
MKDIR   SB_SRC
MKDIR   CB_SRC
MKDIR   AD_SRC
MKDIR   NET_SRC
MKDIR   FAC_SRC
MKDIR   AN_SRC
MKDIR   SNAP_SRC
```

You are now ready to load the software diskettes. The diskette which contains the SNAP-PC executables, help screens and workshops is loaded first. There will be a direct correspondence between the subdirectories on the diskette and the subdirectories on the PC. Place Diskette One into your disk drive and change the directory to \SNAP_SRC. Change the directory on the fixed disk to \SNAP_SRC and copy files from the diskette. The following commands will accomplish the task:

Table 2.3.3: Copying Executables

```
A:
CD  \SNAP\_SRC
C:
CD  \SNAP\_SRC
COPY  A:*.*
```

This diskette also contains the information associated with the SNAP-PC help screens. The diskette contains subdirectories which are identical to the ones you set up under the \SNAP_SRC subdirectory. You must copy the files under each subdirectory from the diskette to the corresponding subdirectory on the fixed disk. For example, to copy files for the US_SRC subdirectory, you should type these commands:

Table 2.3.4: Copying Help Information

```
A:
CD  \SNAP\_SRC\US_SRC
C:
CD  \SNAP\_SRC\US_SRC
COPY  A:*.*
```

Follow these same commands, changing the subdirectory name correspondingly, for each of the other subdirectories on the diskette.

The example model which is discussed throughout both user manuals is also contained on diskette one. To load the model you must first create an appropriate tree structure for the model on your fixed disk. To construct this tree structure, follow the DOS commands in Table 2.3.5.

Table 2.3.5: Creating the Tree Structure for Example Model

```
CD  \SNAP
MKDIR U2_USER
CD  U2_USER
MKDIR EXAMPLE
CD  \SNAP\USER1
MKDIR EXAMPLE
```

Once the tree structure is established, you may copy the model contents from the diskette into the appropriate subdirectories by following these commands:

Table 2.3.6: Copying Example Models

```
COPY A:\SNAP\USERS.SO_ C:\SNAP
COPY A:\SNAP\US_USER\FACILITY.SO_ C:\SNAP\U2_USER
COPY A:\SNAP\U2_USER\SUMRY$$$.LOG C:\SNAP\U2\_USER
COPY A:\SNAP\EXAMPLE\*.* C:\SNAP\EXAMPLE
COPY A:\SNAP\USER1\FACILITY.SO_ C:\SNAP\USER1
COPY A:\SNAP\USER1\EXAMPLE\*.* C:\SNAP\USER1\EXAMPLE
```

The second diskette contains the source and object code for the SNAP-PC simulation language. If you do not intend to use the user written support subroutine UF, you should not load this diskette as the disk storage requirement is large for these files. The SNAP-PC simulation executable which was loaded from Diskette One will run all models which do not have any user code. If you do intend to write user code, you must load all the SNAP-PC simulation object code, source file UF.FOR, all of the include files and response file RESP1 from Diskette Two. The remaining source code need not be loaded. To load, place Diskette Two into the disk drive and copy the indicated files into subdirectory \SNAP_SRC\SNAP_SRC. The commands to accomplish the task are:

Table 2.3.7: Copying SNAP-PC Simulation Code

```
A:
CD  \SNAP\_SRC\SNAP_SRC
C:
CD  \SNAP\_SRC\SNAP_SRC
COPY  A:*.*.*OBJ
COPY  A:UF.FOR
COPY A:*.*.*INC
COPY A:*
```

For information on Using Subroutine UF, see the Section 'Adding Your Own User Code to SNAP-PC'.

2.4 Configuring Your Microcomputer

To prepare your PC to run SNAP-PC, you must include the DOS command file COMMAND.COM in your root directory and alter two DOS files, CONFIG.SYS and AUTOEXEC.BAT to contain certain commands.

If the files already exist, they will be located in your root directory. There you must edit them to comply with the required format for SNAP-PC.

The CONFIG.SYS file may contain up to eight different commands (reference the DOS Manual for an explanation of these commands). In order to run SNAP-PC four of these commands must be set as indicated in Table 2.4.1.

Table 2.4.1: CONFIG.SYS File Configuration

```
device  =  ansi.sys
files   =  32
fcbs    =  32,32
buffers =  10
```

The AUTOEXEC.BAT file is a file that DOS looks for when you turn on your computer. You need to include in this file the correct PATH command and the command 'graphics.com'.

Table 2.4.2: AUTOEXEC.BAT File Configuration

```
path C:\SNAP\_SRC;C:\SNAP\_SRC\SNAP_SRC
graphics.com
```

The path command may contain paths to other subdirectories. However, it must include the two indicated paths. The graphics.com command is a DOS command which is used to specify the IBM personal graphics or compatible printer. It must be available from the AUTOEXEC.BAT file.

2.5 Disk Space Requirements

SNAP-PC executables and help screen information require approximately 941K bytes of disk space. The executables require the bulk of that space at 877K bytes. If you load the files associated with adding user code, it will require an additional 400K bytes of disk space. It is recommended that after you create the new SNAP-PC simulation executable that you remove these additional files.

For each run that is made with SNAP-PC, a summary file is created and is stored on the disk until deleted. This file's disk space requirement is dependent on the size of the model and the amount of statistics requested. It will normally range between 9K and 30K bytes. To limit the size of these files, make sure the echo check switch on the general run information statement is set to (N)one.

2.6 Adding Your Own User Code to SNAP-PC

If you are unable to model your facility using the SNAP-PC node symbology, you may write your own code to perform the desired logic. The function UF, which is contained in file UF.FOR, is supplied to interface between the task node INVL field and the user code. Before attempting to write your code, you should read pages 152-161 in the SNAP User's Manual. This section describes how the Function UF should be formatted and the support routines which may be called from your code.

Before you can write your user code, you must first load the required files from diskette two into the subdirectory SNAP_SRC\SNAP_SRC. Follow the commands in Table 2.3.7 to perform this task.

Function UF must be written in FORTRAN and compiled using the Microsoft™ compiler version 3.3. Once compiled you must create a new SNAP-PC simulation executable by linking the simulation object code and the new UF object file. This is simply done by using the Microsoft link command, the response file RESP1, and the Microsoft libraries FORTRAN.LIB and MATH.LIB. (It is extremely important that you use the 8087 version of the MATH.LIB.) To link you must type the following replacing 'path' with the actual path name to where your Microsoft files are stored:

Table 2.6.1: Creating a New SNAP Executable

```
'path'\LINK,@RESP1,SNAPEXEC/E,,'path'\FORTRAN+'path'\MATH /SE:600
```

Note: MATH.LIB must contain the 8087 library of Microsoft V3.3.

If the link completes successfully, the file SNAPEXEC.EXE will be created in the subdirectory. Before executing SNAP-PC you must move SNAPEXEC.EXE over to the subdirectory SNAP_SRC. This is done with the DOS copy command.

Table 2.6.2: Moving Your New SNAP Executable

```
COPY  SNAPEXEC.EXE  C:\SNAP\_SRC\SNAPEXEC.EXE
ERASE  SNAPEXEC.EXE
```

When you copy the executable over to the subdirectory \SNAP_SRC, it will replace the executable which already exists. Once you have the model running you may want to remove the SNAP object files from the PC to free the disk space.

3.0 GETTING STARTED

The SNAP-PC User1 Support Program is designed to be a user-friendly interactive model development aid. To begin a session, enter [USER1] on your terminal. The first screen displayed is shown in Figure 3.0.1 and allows you to organize your models into working spaces. A working space is a storage area containing all of the necessary components or submodels of a model.

```
                                                        QUIT <- ESC
----------------------------------------------------------------------
          WELCOME!  to the USER1 Support Program version 1.0.
               Please select the Working Space on which
               you would like to base this session:
----------------------------------------------------------------------

                    WORKING SPACE SELECTION MENU

          * Initialize a new working space
          * Select an existing working space
          * List names and descriptions of working spaces
          * Delete a working space
          * Change screen color
          * Quit

----------------------------------------------------------------------
     ↑↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 3.0.1: Working Space Menu

QUIT <- ESC

USER 1 PROGRAM HELP

The User1 Support Program is a menu driven program that assists the Type 1 User in developing models for analysis by a Type 2 User.

Each model is developed within a working space. A working space can contain only one Facility submodel and one Control submodel. Several Adversary Detection, Guard or Adversary submodels can be associated with the Facility submodel and the Control submodel and hence developed with one working space.

The user can move about a list of options on the screen by hitting one of the arrow keys; selection is made by hitting the return key on the console. This menu can be called up at any time by typing a question mark and then hitting return, (i.e., ? [RETURN]).

[RETURN] - To Continue . . .MORE

QUIT <- ESC

Hitting the escape key will take the user to the menu annotated on the top right corner of the screen. This is usually the menu immediately prior to the current screen. This is a fast way to exit or recover from a mistake.

[RETURN] - To Continue . . .DONE

Figure 3.0.1a: Working Space Help

3.1 Initialize a New Working Space

Before you can begin building your model, you must first initialize a working space for that model.

```
                                                          QUIT <- ESC
----------------------------------------------------------------------
        WELCOME!  to the USER1 Support Program version 1.0.
             Please select the Working Space on which
             you would like to base this session:

----------------------------------------------------------------------

                    WORKING SPACE SELECTION MENU

        * Initialize a new working space
        * Select an existing working space
        * List names and descriptions of working spaces
        * Delete a working space
        * Change screen color
        * Quit

----------------------------------------------------------------------
     ↑↓ - To Choice         [RETURN] - Make Choice     ? - Help
```

Figure 3.1.1: *Working Space Menu*
(Initialize a new working space)

After you have chosen to initialize a model working space, you must supply a name and description for the working space.

```
WORKING SPACE:  CREATE                                    MAIN <- ESC
---------------------------------------------------------------------
                       WORKING SPACE NAME MENU

        Enter a name for this working space:
         or type QUIT to leave this menu

---------------------------------------------------------------------
 [RETURN] - To Continue
```

Figure 3.1.2: Working Space Name

```
WORKING SPACE:  CREATE                                    MAIN <- ESC
---------------------------------------------------------------------
                       WORKING SPACE NAME MENU

        Enter a line of description for the working space:   EXAMPLE

---------------------------------------------------------------------
 [RETURN] - To Continue
```

Figure 3.1.3: Working Space Description

After supplying a name and description for the new working space, you are given the option to copy an existing model into your new working space. With this option you can replicate whole or parts of models without the need to recreate them.

```
WORKING SPACE:  CREATE                                    MAIN <- ESC
----------------------------------------------------------------------

                       WORKING SPACE NAME MENU

     Enter a line of description for the working space:      _EXAMPLE

     SNAP model given in the SNAP User's Manual, Chapter IX









     Do you want to copy another working space?    YES or NO

----------------------------------------------------------------------
 [RETURN] - To Continue
```

Figure 3.1.4: Copying an Existing Working Space

3.2 Select an Existing Working Space

Before you begin building or editing an existing model, you must first enter the working space you initialized for the model. This is done by selecting the option, 'Select an existing working space'.

```
                                                        QUIT <- ESC
-------------------------------------------------------------------
              WELCOME!  to the USER1 Support Program.
              Please select the Working Space on which
              you would like to base this session:
-------------------------------------------------------------------

                  WORKING SPACE SELECTION MENU

       * Initialize a new working space
       * Select an existing working space
       * List names and descriptions of working spaces
       * Delete a working space
       * Change screen color
       * Quit

-------------------------------------------------------------------
   ↑ ↓ - To Choice        [RETURN] - Make Choice     ? - Help
```

Figure 3.2.1 Working Space Menu
(Select an existing working space)

Use the arrow keys to move the highlighted block to the working space in which you would like to work and hit [RETURN].

```
WORKING SPACE:  SELECT                                    MAIN <- ESC

                     WORKING SPACE SELECTION MENU

   NAME                          DESCRIPTION
   ----                          -----------

 EXAMPLE   Example facility represented in SNAP User's Manual.
 SOLUTION  Solution to model BIG.
 TEST      This is a test problem to be solved in class
 TEST_SOL  This is the solution to the test problem
 WRKSHOPS  This is the work space which contains answers to workshops.
  QUIT      Quit this menu

   ↑ ↓ - To Choice        [RETURN] - Make Choice      ? - Help
```

Figure 3.2.2: Working Space Selection Menu

```
                                                          QUIT <- ESC

                     WORKING SPACE SELECTION HELP

      Use the arrow keys to select the working space with which you
      want to work.

   [RETURN] - To Continue                                    . . .DONE
```

Figure 3.2.2a: Working Space Selection Help

After you have chosen a working space you must select the submodel with which you would like to work. The construction of each submodel is covered in detail in the Sections 4.0 through 7.0.

```
WORKING SPACE:  SOTS                                           MAIN <- ESC
---------------------------------------------------------------------------

                               SUBMODEL MENU

      * Work with the facility submodel
      * Work with the control submodel
      * Work with the adversary detection submodels
      * Work with the guard submodels
      * Work with the adversary submodels
      * Quit

---------------------------------------------------------------------------
   ↑ ↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 3.2.3: Submodel Menu

```
                                                               QUIT <- ESC
---------------------------------------------------------------------------

                      SUBMODEL SELECTION HELP
                      -----------------------

      Select the submodel with which you would like to work.

---------------------------------------------------------------------------
  [RETURN] - To Continue                                           . . .DONE
```

Figure 3.2.3a: Submodel Help

3.3 List Names and Descriptions of Working Spaces

You may review a list of the working spaces that have been initialized.

```
                                                         QUIT <- ESC
--------------------------------------------------------------------
         WELCOME!  to the USER1 Support Program version 1.0.
              Please select the Working Space on which
              you would like to base this session:
--------------------------------------------------------------------

                  WORKING SPACE SELECTION MENU

        * Initialize a new working space
        * Select an existing working space
        * List names and descriptions of working spaces
        * Delete a working space
        * Change screen color
        * Quit

--------------------------------------------------------------------
   ↑ ↓ - To Choice        [RETURN] - Make Choice      ? - Help
```

Figure 3.3.1: Working Space Menu (List names and descriptions of working spaces)

```
   WORKING SPACE:  LISTING                              MAIN <- ESC
--------------------------------------------------------------------

                  WORKING SPACE DESCRIPTIONS

    NAME                          DESCRIPTION
    ----                          -----------

 EXAMPLE    Example facility represented in SNAP User's Manual.
 SOLUTION   Solution to model BIG.
 TEST       This is a test problem to be solved in class
 TEST_SOL   This is the solution to the test problem.
 WRKSHOPS   This is the work space which contains answers to workshops.

--------------------------------------------------------------------
  [RETURN] - To Continue                                   . . .DONE
```

Figure 3.3.2: Working Space List - Sample

3.4 Delete a Working Space

To delete a working space, select the option 'Delete a working space'.

```
                                                        QUIT <- ESC
-------------------------------------------------------------------
         WELCOME!  to the USER1 Support Program version 1.0.
              Please select the Working Space on which
              you would like to base this session:
-------------------------------------------------------------------

                     WORKING SPACE SELECTION MENU

          * Initialize a new working space
          * Select an existing working space
          * List names and descriptions of working spaces
          * Delete a working space
          * Change screen color
          * Quit

-------------------------------------------------------------------
    ↑↓ - To Choice         [RETURN] - Make Choice     ? - Help
```

Figure 3.4.1: Working Space Menu
(Delete a working space)

Select the working space that you want to delete from the list. You will be asked to verify your choice before the working space and its associated model is deleted.

```
WORKING SPACE:  DELETING                                   MAIN <- ESC

                    WORKING SPACE DELETION MENU

  NAME                        DESCRIPTION
  ----                        -----------

 EXAMPLE   Example facility represented in SNAP User's Manual.
 SOLUTION  Solution to model BIG.
 TEST      This is a test problem to be solved in class
 TEST_SOL  This is the solution to the test problem.
 WRKSHOPS  This is the work space which contains answers to workshops.
  QUIT      Quit this menu

  ↑ ↓ - To Choice          [RETURN] - Make Choice     ? - Help
```

Figure 3.4.2: *Working Space Deletion Menu - Sample*

```
                                                          QUIT <- ESC

                     WORKING SPACE DELETION HELP
                     ---------------------------

  Use the arrow keys to select the working space you wish to delete.

 [RETURN] - To Continue                                     . . .DONE
```

Figure 3.4.2a: Working Space Deletion Help

3.5 Change Screen Color

From this menu you may also change the color combinations that are displayed on your video screen.

```
                                                          QUIT <- ESC
----------------------------------------------------------------------
       WELCOME!  to the USER1 Support Program version 1.0.
            Please select the Working Space on which
            you would like to base this session:

----------------------------------------------------------------------

                   WORKING SPACE SELECTION MENU

        * Initialize a new working space
        * Select an existing working space
        * List names and descriptions of working spaces
        * Delete a working space
        * Change screen color
        * Quit

----------------------------------------------------------------------
      ↑↓ - To Choice        [RETURN] - Make Choice     ? - Help
```

Figure 3.5.1: Working Space Menu
(Change Screen Color)

```
                                                          QUIT <- ESC
----------------------------------------------------------------------

                        COLOR SELECTION MENU

        -> yellow on blue
        -> yellow on green
        -> magenta on black
        -> yellow on black
        -> green on black
        -> white on black
        -> cyan on black

----------------------------------------------------------------------
      ↑↓ - To Choice        [RETURN] - Make Choice
```

Figure 3.5.2: Screen Color Selection Menu

3.6 Quit

You may exit the User1 support program by selecting the 'Quit' option or by typing [ESC].

```
+------------------------------------------------------------------+
|                                                   QUIT <- ESC    |
|------------------------------------------------------------------|
|            WELCOME!  to the USER1 Support Program version 1.0.   |
|                Please select the Working Space on which          |
|                you would like to base this session:              |
|                                                                  |
+------------------------------------------------------------------+

+------------------------------------------------------------------+
|                                                                  |
|                    WORKING SPACE SELECTION MENU                  |
|                                                                  |
|        * Initialize a new working space                          |
|        * Select an existing working space                        |
|        * List names and descriptions of working spaces           |
|        * Delete a working space                                  |
|        * Change screen color                                     |
|        * Quit                                                    |
|                                                                  |
|                                                                  |
|                                                                  |
|------------------------------------------------------------------|
|     ↑ ↓ - To Choice        [RETURN] - Make Choice    ? - Help    |
+------------------------------------------------------------------+
```

Figure 3.6.1: Working Space Menu (Quit)

4.0 WORKING WITH THE FACILITY SUBMODEL

The Facility Submodel is a representation of the facility or site under investigation. The submodel uses SPACES, BARRIERS, and TARGETS to represent the site. Spaces describe the areas that are open and may be traversed freely. Barriers represent obstacles that adversary forces must penetrate to gain access. Targets are locations that adversaries must reach to satisfy their objective. Spaces, barriers, or targets may contain a sensor which detects the presence of adversaries.

The facility submodel is a direct translation of your site's schematic. Its goal is to represent the attributes of your facility to the required level of detail while keeping the use of the computer and analyst resources to a minimum. The level of detail is determined by how many spaces are specified. The more spaces you include, the higher the level of detail you obtain. The number of spaces you specify has a direct impact on the size of your guard and adversary submodels as you must describe how your forces move through each space.

The remainder of this section discusses how you can build and edit a representation of your facility using the Userl Support Program. For more information on the facility submodel you may reference the SNAP User's Manual pages 4 and 15-26.

It is suggested that you complete the facility submodel before attempting to build the guard or adversary submodel since these refer to the facility submodel.

To work with the facility submodel choose the 'Work with the facility submodel' option from the 'SUBMODEL MENU'.

```
WORKING SPACE:  EXAMPLE                                   MAIN <- ESC
----------------------------------------------------------------------

                              SUBMODEL MENU

   * Work with the facility submodel
   * Work with the control submodel
   * Work with the adversary detection submodels
   * Work with the guard submodels
   * Work with the adversary submodels
   * Quit

----------------------------------------------------------------------
   ↑↓- To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 4.0.1: Submodel Menu
(Work with the facility submodel)

4.1 Create/Edit the Facility Submodel

To create or edit a facility submodel select the 'Create/Edit the facility submodel' option.

```
WORKING SPACE:   EXAMPLE                                    MAIN <- ESC
-----------------------------------------------------------------------

                            FACILITY MENU

        * Create/Edit the facility submodel
        * Generate SNAP input statments for the submodel
        * Quit

-----------------------------------------------------------------------
  ↑↓ - To Choice         [RETURN] - Make Choice      ? - Help
```

Figure 4.1.1: Facility Menu
(Create/Edit the facility submodel)

```
                                                            QUIT <- ESC
-----------------------------------------------------------------------

                        FACILITY SUBMODEL HELP
                        ----------------------

     Choose to enter the facility submodel builder to create or edit the
     facility in this working space; or generate SNAP input statements
     for the facility that was built.

-----------------------------------------------------------------------
  [RETURN] - To Continue                                      . . .DONE
```

Figure 4.1.1a: Facility Menu Help

The first screen of the network builder will appear containing a grid and command line. The grid represents the pages available in which the facility may be drawn. These pages are identified using the letters and numbers labelling the grid. For example, the cursor is pointing to page D,3 in Figure 4.1.2. The character, '*' will mark the pages which already contain facility information. You are not restricted to fitting the facility onto one page. To select a page with which to work, move the cursor to the desired page (using the arrow keys) and type [ENTER].

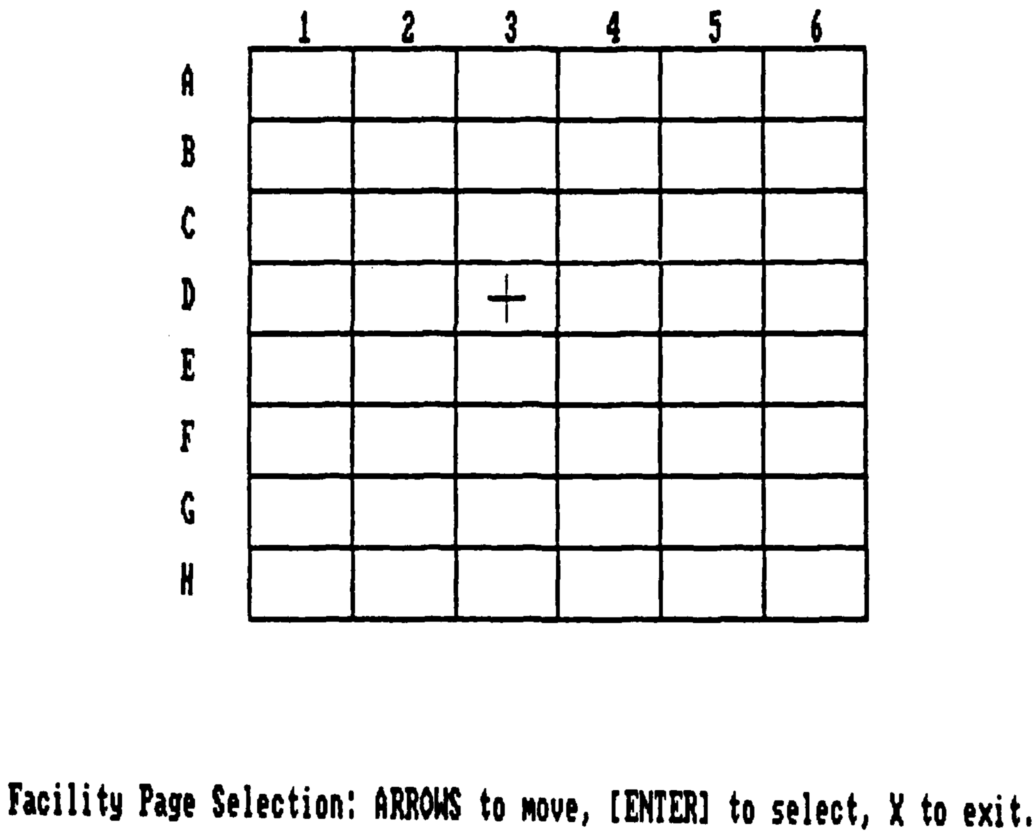


Figure 4.1.2: Facility Page Selection Screen

The contents of the page you selected will appear on the screen along with the page id in the uppermost right corner and a list of available commands along the bottom. A detailed description of the commands is listed in Figure 4.1.3a and is available, on-line, by typing [?].

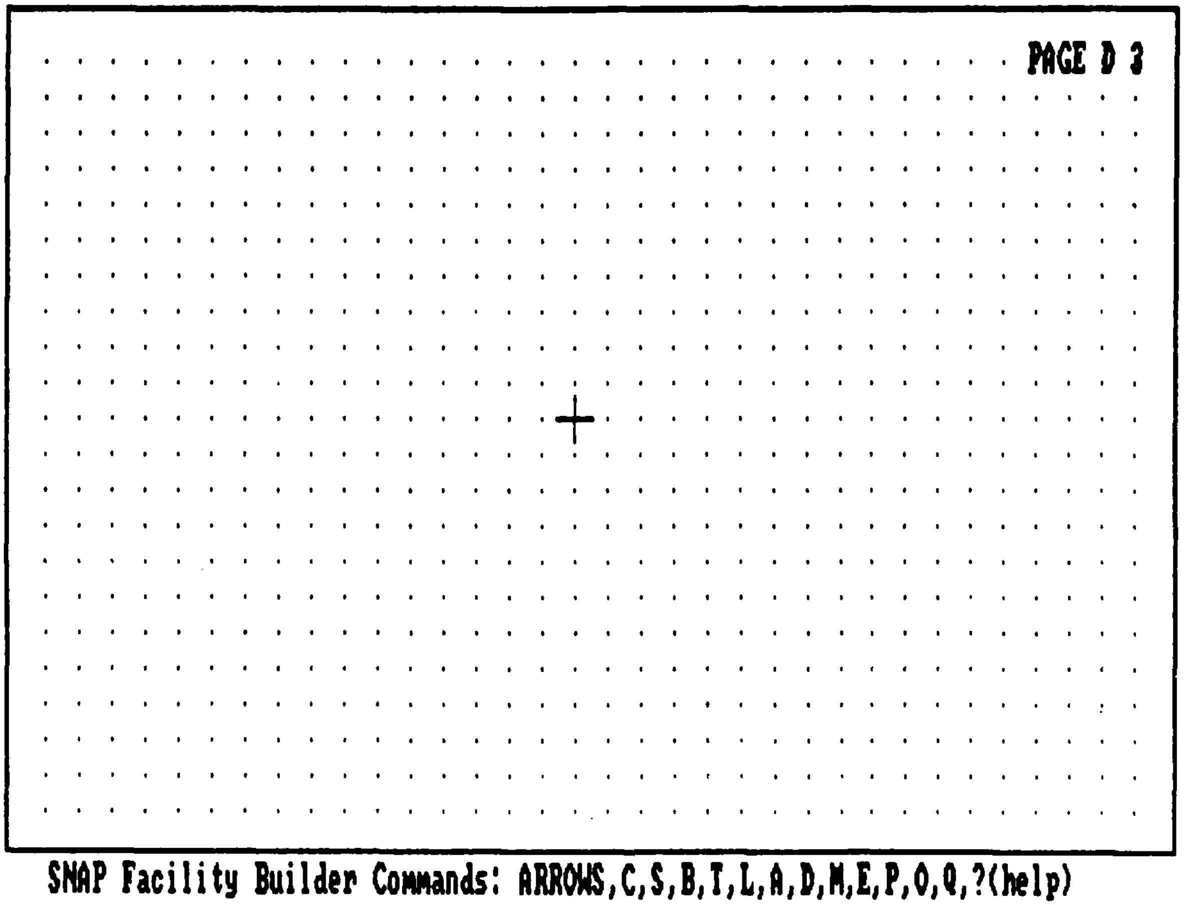


Figure 4.1.3: Facility Builder Page

```
           Description of SNAP Facility Builder Commands
           ---------------------------------------------
ARROWS     Move the crosshair in the appropriate direction.
C)rosshair Toggle the crosshair speed between fast and slow.
S)pace     Enter a space node at the current crosshair location.
B)arrier   Enter a barrier node at the current crosshair location.
T)arget    Enter a target node at the current crosshair location.
L)ine      Enter the line drawing mode.
A)nnotate  Enter text at the current crosshair location.
D)elete    Delete the node, text or line under the current crosshair
           location.  (Confirmation will be requested).
M)ove      Enter the move mode for the node or text under the current
           crosshair location.
E)dit      Edit the labels of the node under the current crosshair
           location.
P)rint     Generate a hardcopy of the current facility page on the printer.
O)ptions   Select current display options.
Q)uit      Exit from the SNAP facility builder.

The ESC key may be used to cancel any command in progress.
```

Press any key to continue.

Figure 4.1.3a: Facility Builder Commands Help

Using the facility builder (L)ine command you can draw a representation of your facility on the screen. To draw a line place the cursor at the point you wish the line to begin and type [L]. Then move the cursor (by using the arrow keys) in the direction you wish the line to be drawn on the screen. To make a bend point in the line, type [SPACE] at the point you wish the bend to be and continue moving the cursor. To end the line and exit the line mode, type [ENTER].

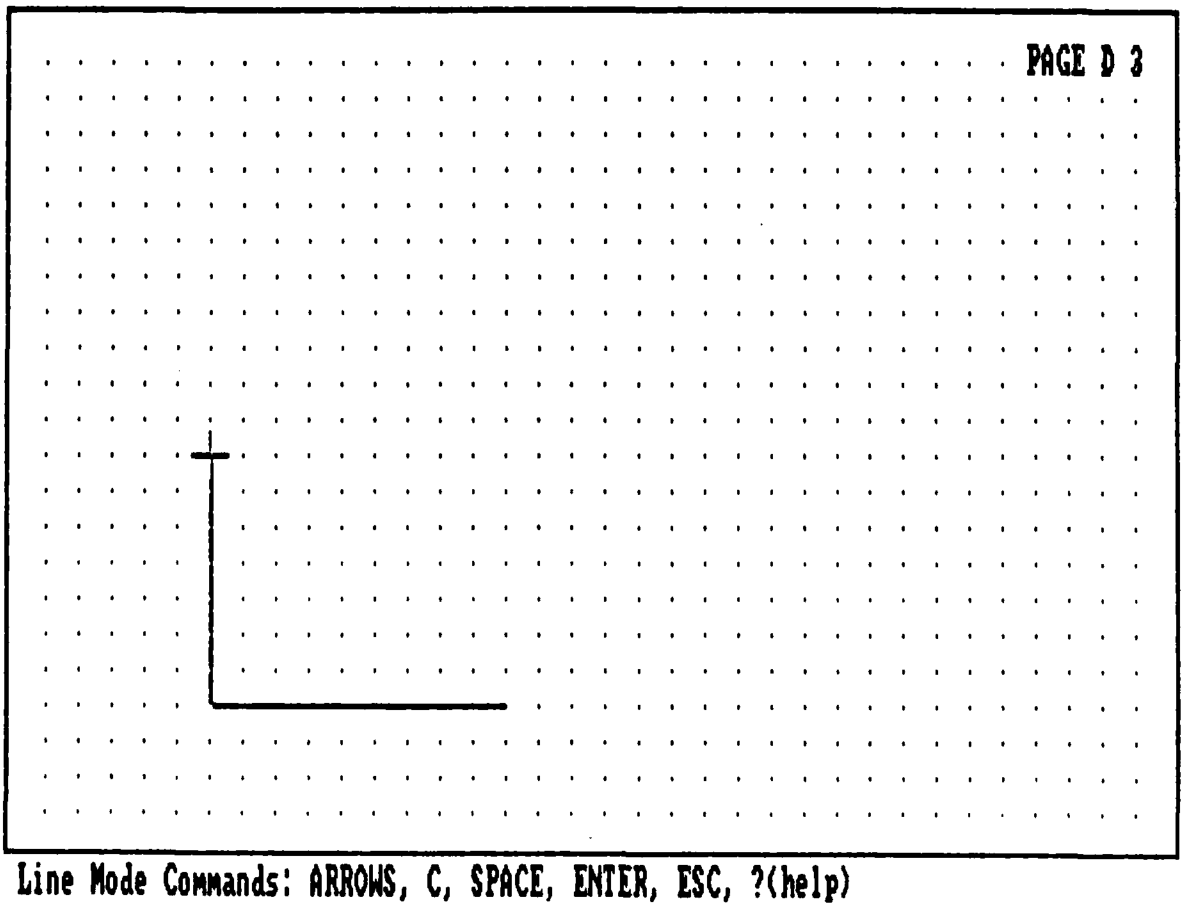


Figure 4.1.4: Line Mode

Description of Line Mode Commands

ARROWS — Move the crosshair in the appropriate direction and update the "rubber band" line from the current origin point to the crosshair location. (The initial origin point is the current crosshair location at the time the line mode is initiated, but it may be updated by the SPACE command. See below.)

C)rosshair — Toggle the crosshair speed between fast and slow.

SPACE — Make the current "rubber band" line permanent, and then begin entry of a new line with its origin at the current crosshair location.

ENTER — Make the current "rubber band" line permanent, and then return to the main command menu.

ESC — Abort entry of the current line and return to the main command menu.

Press any key to continue.

Figure 4.1.4a: Line Mode Help

Once you have sketched the outline of your facility, you may section it into areas and define them as spaces, barriers, or targets. To define the areas on the diagram you place the appropriate facility node in the sectioned area. By typing [S], [B], or [T], you may place space, barriers, or targets onto the diagram. When you add a node, you will be asked to supply a node label, a sensor label if one exists, and a specification for node statistics (Yes or No). Node labels can be up to four characters long.

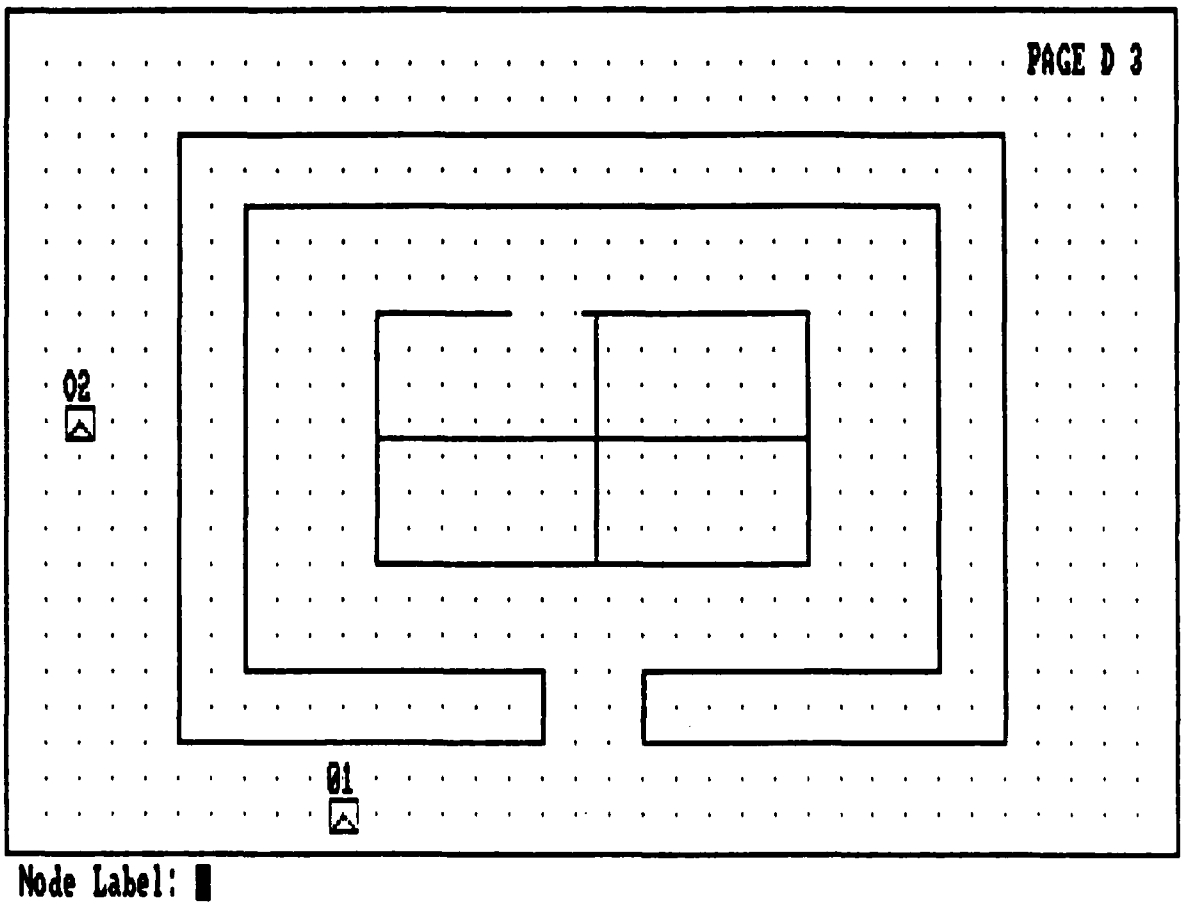


Figure 4.1.5: Node Placement

If you wish to change the information associated with a node (i.e., node statistics), you may do so by using the edit command. By placing the cursor on the node you wish to edit and typing [E], you may change any of its information. You may move the location of a node around the current page by placing the cursor on the node and typing [M]. You can then move the node around the page using the arrow keys. Typing [ENTER] will place the node at its new location or an [ESC] will redraw it back at its original location.

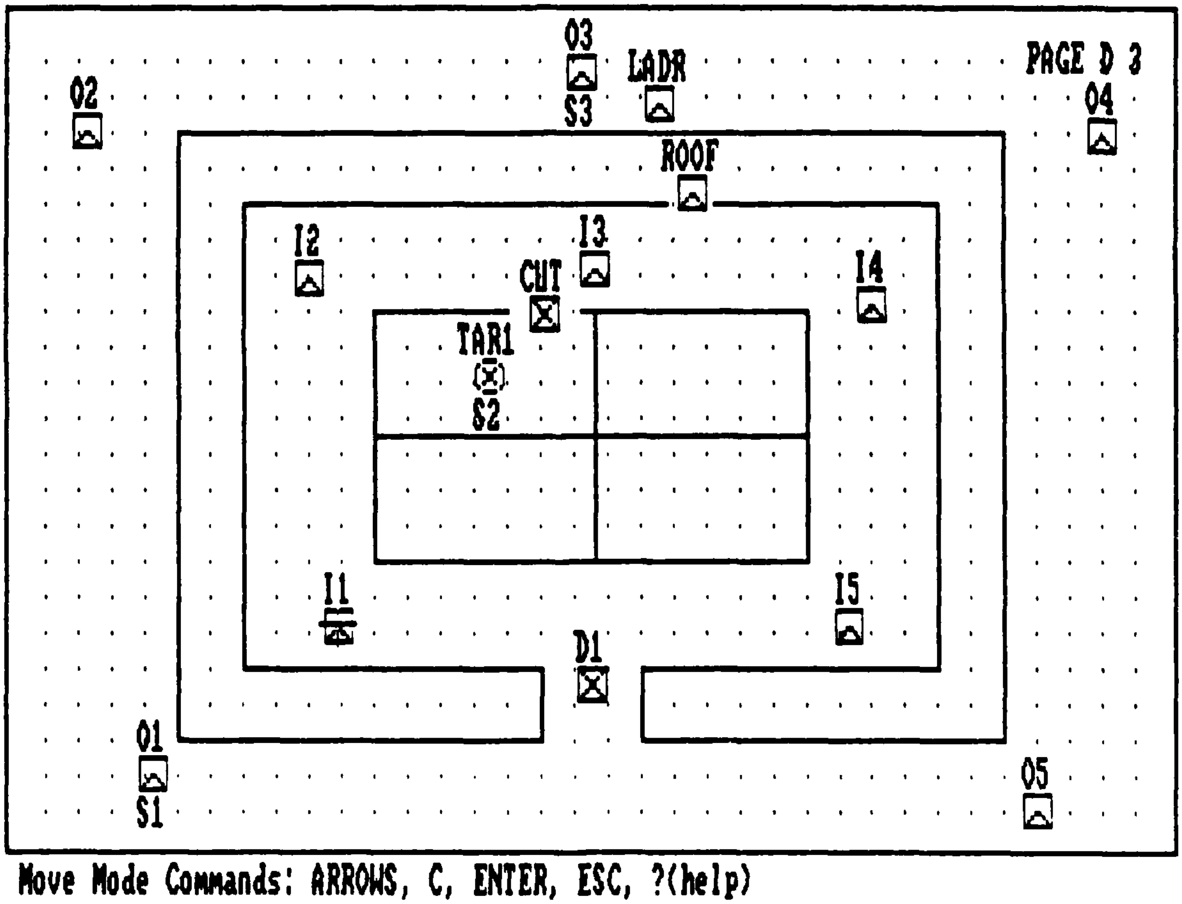


Figure 4.1.6: Move Mode

Description of Move Mode Commands

ARROWS   Move the crosshair and associated node or text in the appropriate direction.

C)rosshair Toggle the crosshair speed between fast and slow.

ENTER   Complete the move command by fixing the location of the node or text associated with the crosshair at its current location. End move mode and return to the main command menu.

ESC   Abort the current move command and return the node or text associated with the crosshair to its position prior to the start of the move command. End move mode and return to the main command menu.

Press any key to continue.

Figure 4.1.6a: Move Mode Help

To add clarity to a diagram, you may add text to a page by using the annotation command. Place the cursor at the location you want the text string to begin and type [A]. Type the text in the space provided, up to one line at a time, and hit return to display the text on the diagram. You may edit the text using the backspace key while typing it. Once you have hit the return key you may delete the string and then re-enter it if you wish.

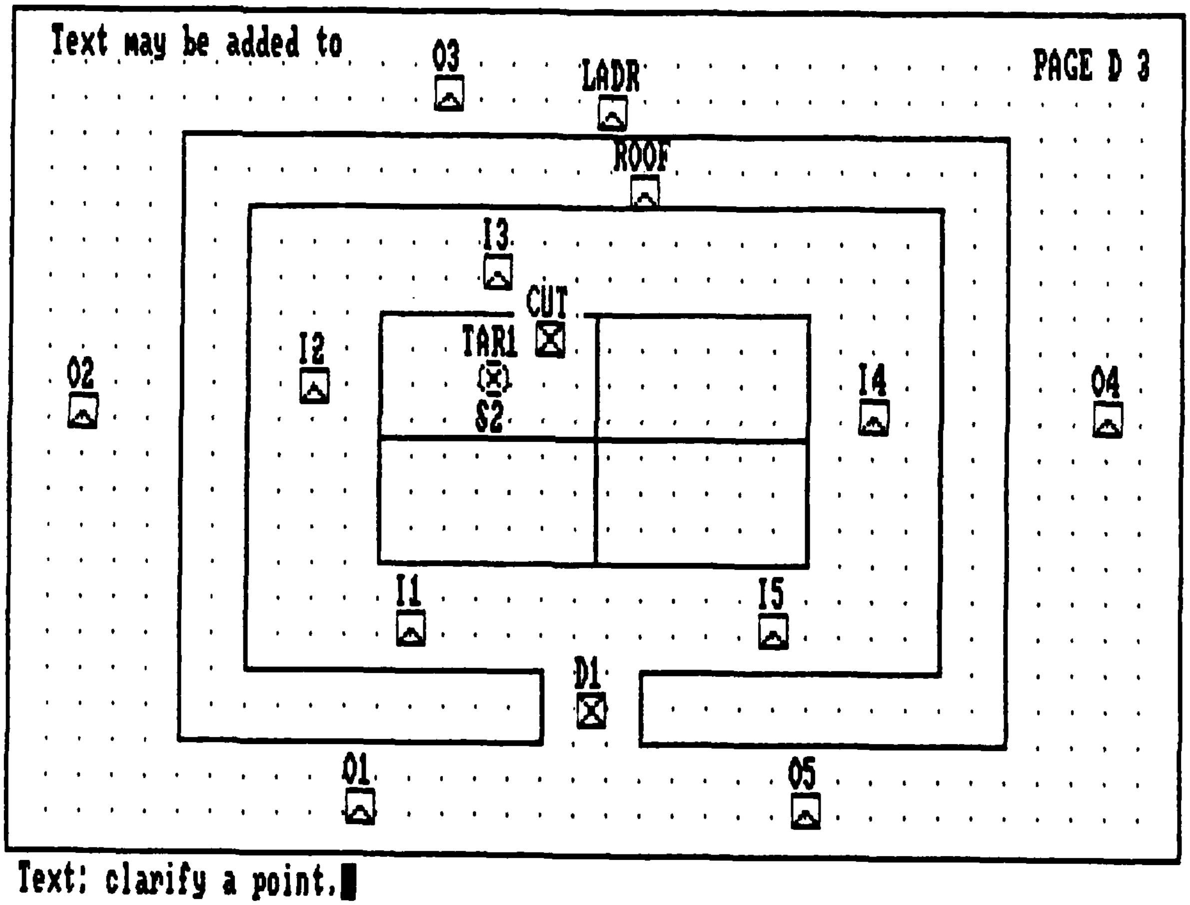


Figure 4.1.7: Adding A Textual Description

To delete any node, line, or annotation from the screen, place the cursor on the item you wish to delete and type [D]. The item you selected will flash and you will be requsted to verify your selection. To obtain a paper copy of the current page, you may use the print command, [P]. It sends a copy of the page to any EPSON-compatible parallel printer.

You may change how your screen is displayed by selecting the display option [O]. From here you may toggle the display of the grid, nodes, node labels, and annotation on and off. You also have the option to review the status of your submodel.

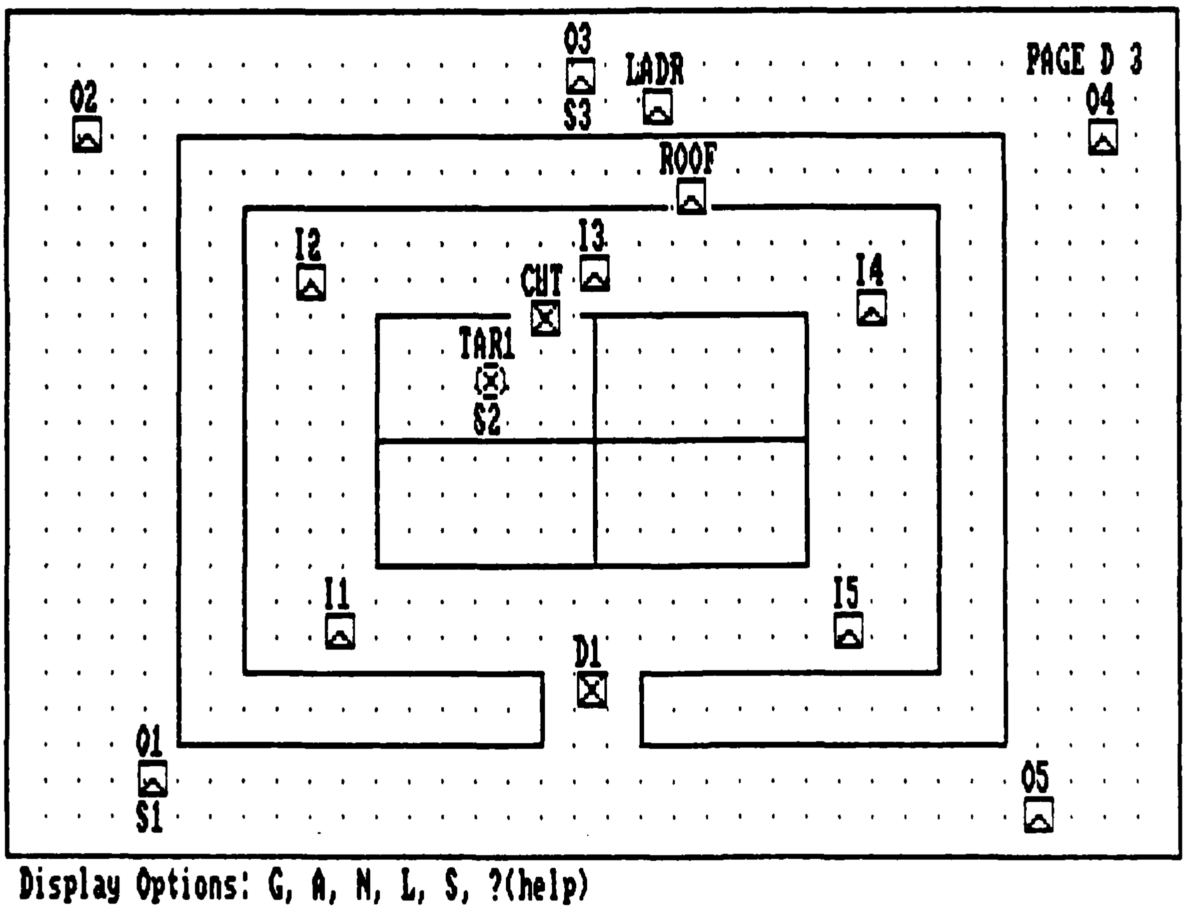


Figure 4.1.8: Display Mode

Description of Display Option Commands	
G)rid	Toggle the grid display on or off.
A)nnotation	Toggle the display of annotation on or off.
N)ode	Toggle the display of SNAP nodes on or off.
L)abel	Toggle the display of SNAP node labels on or off.
S)tatus	Display a report on the status of the display options, status of the current display page and status of the overall facility.

All display option commands return to the main command menu upon completion.

Press any key to continue.

Figure 4.1.8a: Display Help

The status of the facility submodel is sectioned into three parts; the display status, showing how each display toggle is set; the page status, which shows the page id and the number of lines, nodes and annotations on that page; and the overall facility status, which gives you the number of lines, nodes and annotations in the whole facility, along with the available memory space left for construction. When you begin work with a new facility submodel, there are 65000 bytes of memory free. Each line, node, and annotation you add requires a portion of that memory and reduces the amount available. So there is an upper limit to the size of the facility that may be defined. However, it is very large and should never be a limiting factor.

Facility: C:\SNAP\USER1\SCRATCH

Facility Status	Page Status	Display Status
19 Lines 15 Nodes 2 Annotations 57022 Bytes Free	Page No. D, 3 19 Lines 15 Nodes 2 Annotations	Grid: ON Annotation: ON Nodes: ON Node Labels: ON

Press any key to continue.

Figure 4.1.9: Status Screen

Once you have completed working with a page, you may exit it by typing [Q]. If you have entered information on an empty page, you will notice that a star '*' has been added to the Facility Page Selection Screen. You may continue constructing the facility submodel by choosing another page with which to work, or if you are done, you may exit the facility submodel builder by typing [X]. When you type [X], you will be asked whether you want to save the changes. By typing [Y], the changes are saved. By typing [N], the changes are not saved and your facility returns to its status prior to this editing session. In either case you will return to the 'FACILITY MENU'. Typing any other key at this point will cancel the exit option and return you to the page selection screen.

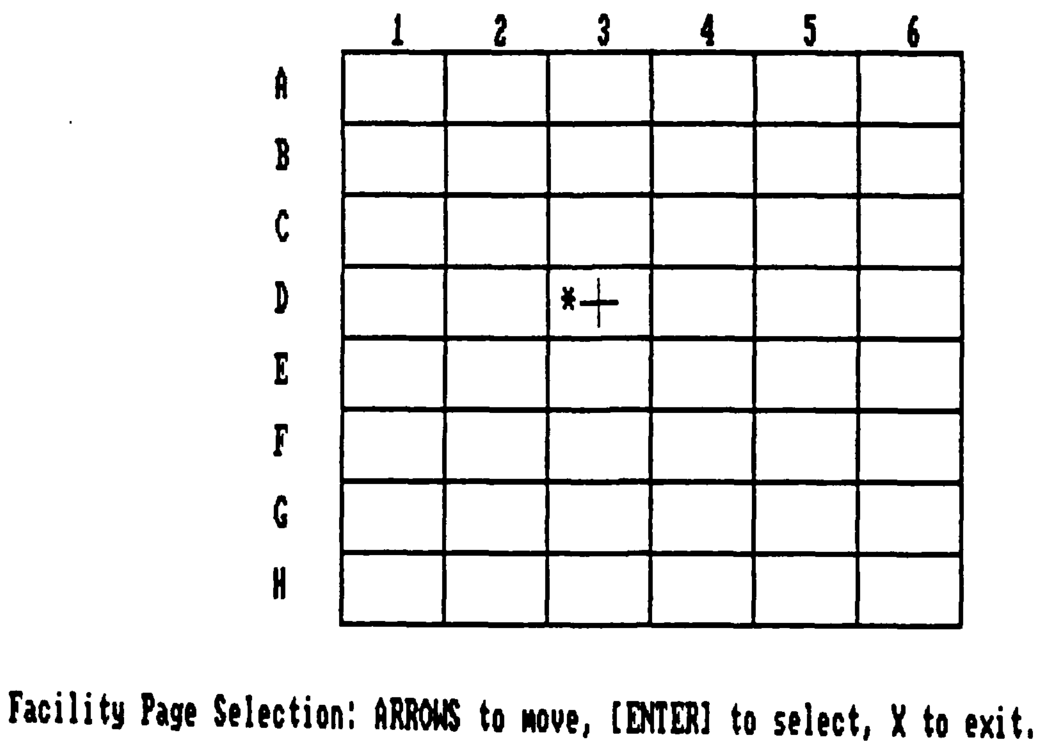


Figure 4.1.10: Page Selection Menu After Entering Information

4.2 Generate SNAP Input Statements

After you have created your facility submodel, you may generate the SNAP input statements for the submodel. From the 'FACILITY MENU' choose the option 'Generate SNAP input statements for the submodel'. The program will then convert your facility diagram into SNAP statements and write them to a file (FACILITY.NET). This file will be in your working space subdirectory. It contains the input data read by SNAP and must be regenerated after every change to the graphical facility submodel.

```
WORKING SPACE:  EXAMPLE                                        MAIN <- ESC
--------------------------------------------------------------------------

                              FACILITY MENU

         * Create/Edit the facility submodel
         * Generate SNAP input statments for the submodel
         * Quit

--------------------------------------------------------------------------
   ↑↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 4.2.1: Facility Menu
(Generate SNAP input statements for the submodel)

4.3 Quit

To exit the facility submodel section, select the 'Quit' option.

```
WORKING SPACE:  EXAMPLE                                  MAIN <- ESC
--------------------------------------------------------------------
                         FACILITY MENU

     * Create/Edit the facility submodel
     * Generate SNAP input statments for the submodel
     * Quit

--------------------------------------------------------------------
  ↑↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 4.3.1: Facility Menu
(Quit)

5.0 WORKING WITH THE CONTROL SUBMODEL

```
WORKING SPACE:  EXAMPLE                                   MAIN <- ESC
----------------------------------------------------------------------

                          SUBMODEL MENU

        * Work with the facility submodel
        * Work with the control submodel
        * Work with the adversary detection submodels
        * Work with the guard submodels
        * Work with the adversary submodels
        * Quit

----------------------------------------------------------------------
   ↑↓- To Choice          (RETURN) - Make Choice        ? - Help
```

Figure 5.0.1: Submodel Menu

The control submodel consists of the general run information, the parameter statements and all of the status variable statements. Since this submodel contains data intrinsic to the other submodels, you are permitted to build only one to avoid confusion. It can be parameterized to permit User2 to alter global variables.

5.1 Create/Edit the Control Submodel

After you have chosen to work with the control submodel, you have two options. You may create or edit the control submodel or you may generate the SNAP input statements.

```
WORKING SPACE:  EXAMPLE                                  SUBMODEL <- ESC

                              CONTROL MENU

        • Create/Edit the control submodel
        • Generate SNAP input statements
        • Quit

  ↑ ↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 5.1.1: Control Submodel Menu
(Create/Edit the control submodel)

```
                                                          QUIT <- ESC

                              CONTROL HELP
                              ------------

   Choose to enter the control submodel builder to create or edit the
   control submodel in this working space; or generate SNAP input
   statements for the control submodel that was built.

 [RETURN]   To Continue                                       . . .DONE
```

Figure 5.1.1a: Control Submodel Help

Since you cannot generate SNAP input statements until you build the control submodel, you must select the create/edit option first. When you select this option, a menu containing the seven types of control statements will appear. From here you may select the type of statement you wish to create.

```
                                                        USER1 SHELL <- ESC
---------------------------------------------------------------------------

                        CONTROL SUBMODEL STATEMENTS MENU

   Choose the statement type to create or edit:

     -> General run information statement
     -> Parameter statements
     -> Global flag statements
     -> Global variable statements
     -> Force flag statements
     -> Auxiliary action macro statements
     -> Timer statements
     -> Quit

---------------------------------------------------------------------------
         ↑ ↓ - To Choice      [RETURN] - Make Choice          ? - Help
```

Figure 5.1.2: Control Submodel Statements Menu

```
                                                             QUIT <- ESC
---------------------------------------------------------------------------

                         CONTROL SUBMODEL STATEMENT HELP
                         -------------------------------

       There are seven statement types associated with the control
       submodel. Submodels will not necessarily contain all of the
       statements, you need only to create the statements associated
       with your own model.  Move the highlighted block to the
       statement category you desire to create/edit and hit [RETURN].

---------------------------------------------------------------------------
   [RETURN] - To Continue                                     . . . DONE
```

Figure 5.1.2a: Control Submodel Statements Menu Help

5.1.1 General Run Information Statement

The first statement on the menu contains general run information. It is the only statement that is required in the control submodel.

```
                                                        USER1 SHELL <- ESC

                        CONTROL SUBMODEL STATEMENTS MENU

   Choose the statement type to create or edit:

      -> General run information statement
      -> Parameter statements
      -> Global flag statements
      -> Global variable statements
      -> Force flag statements
      -> Auxiliary action macro statements
      -> Timer statements
      -> Quit

        ↑↓ - To Choice       [RETURN] - Make Choice          ? - Help
```

Figure 5.1.1.1: Control Submodel Statements Menu
(General run information statement)

When you originally select to create it, a data input menu will be displayed containing the statement defaults. For an explanation of each field, refer to the copy of the help screens in Figure 5.1.1.2a. If you need further explanation, you may reference the SNAP User's Manual, pages 93-95.

```
                                                STATEMENT MENU <- ESC
---------------------------------------------------------------------

                   GENERAL RUN STATEMENT MENU

   Simulation end time: 1.E20

   Maximum concurrent entities in system:     20

   Level of echo check desired: P

   Are histograms desired: N

   Are faciltiy statistics desired: N

   Is BATLE output desired: N

   Approximate minimum run time per iteration:     0.0000

   Approximate maximum run time per iteration:   100.0000

---------------------------------------------------------------------
        ↑↓ - To Choice      [RETURN] - Make Choice         ? - Help
```

Figure 5.1.1.2: General Run Statement Menu

QUIT <-- ESC

GENERAL RUN STATEMENT HELP

Definition	Options	Default
Simulation end time	real	1.E20
SNAP storage requirement	integer	20
Echo flag	C-complete, P-partial N-none	P
Histogram print flag	Y-yes, N-no	N
Facility statistics option	C-complete, P-partial N-none	N

[RETURN] - To Continue . . .MORE

QUIT <-- ESC

BATLE output option	Y-yes, N-no	N
Minimum expected run time per simulation iteration (in minutes)	real	0.0
Maximum expected run time per simulation iteration (in minutes)	real	100.0

@xx - where xx is a number, may be entered in most fields to note parameters

ESC - will cancel any changes made to this menu screen during this session

[RETURN] - To Continue . . .DONE

Figure 5.1.1.2a: General Run Information Help

5.1.2 Parameter Statements

Parameter statements are used to define statistical distributions that are used by the model.

```
                                                         USER1 SHELL <- ESC
----------------------------------------------------------------------------

                    CONTROL SUBMODEL STATEMENTS MENU

   Choose the statement type to create or edit:

     -> General run information statement
     -> Parameter statements
     -> Global flag statements
     -> Global variable statements
     -> Force flag statements
     -> Auxiliary action macro statements
     -> Timer statements
     -> Quit

----------------------------------------------------------------------------
        ↑↓ - To Choice      [RETURN] - Make Choice          ^ - Help
```

Figure 5.1.2.1: Control Submodel Statements Menu (Parameter statements)

When you select to create a parameter statement, a listing menu will be displayed giving you the option to add statements. The global flag, global variable, force flag, and timer statements will also have a similar listing menu associated with them.

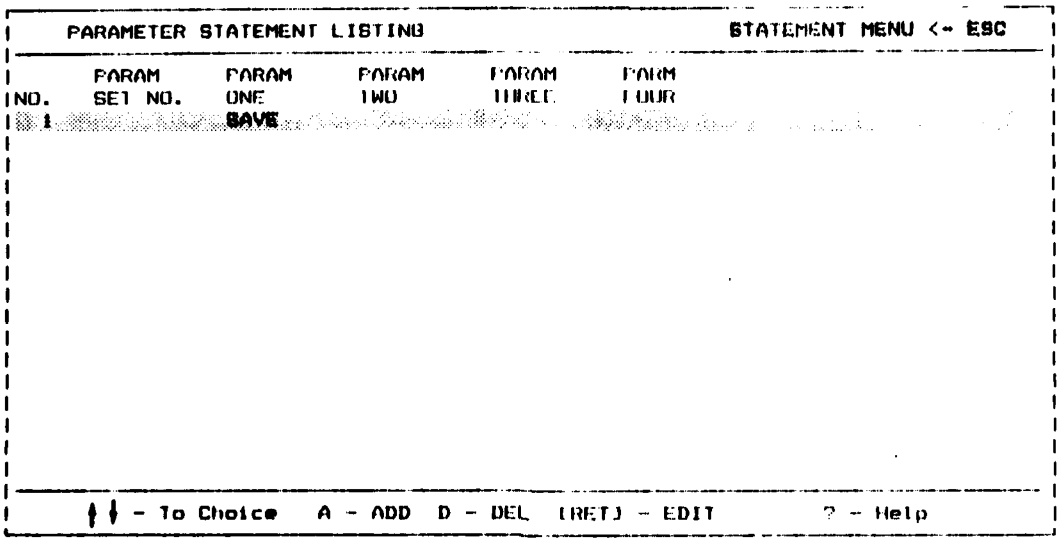


Figure 5.1.2.2: Parameter Statement List

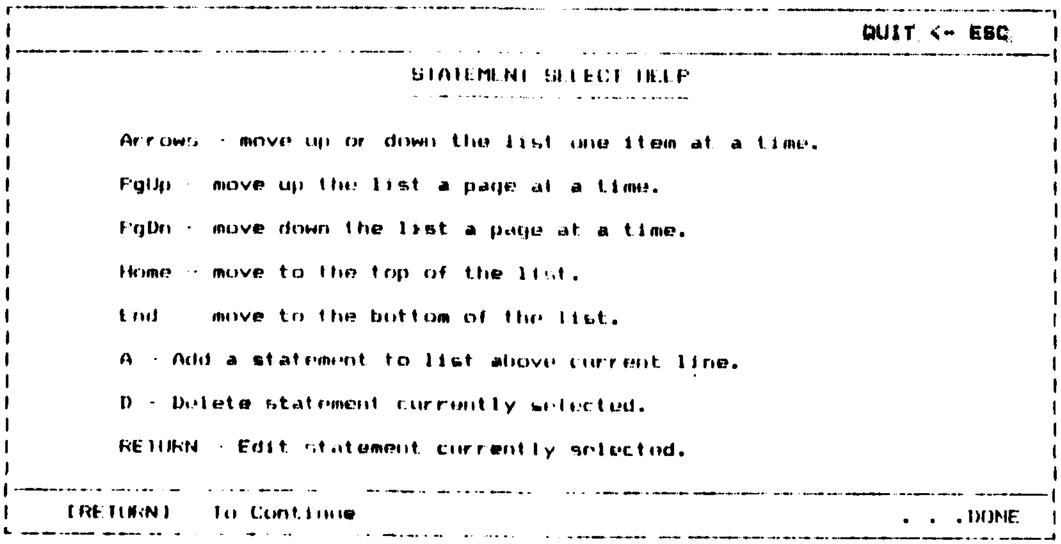


Figure 5.1.2.2a: Parameter Statement List Help

By typing [A] a data input menu for the parameter statement will appear. This menu allows you to enter the data for a single parameter statement. For an explanation of each field a copy of the help screens is given following the statement menu figure. If you need further explanation, you can reference the SNAP User's Manual, pages 12-14 and 74-75.

```
                                              STATEMENT LIST <- ESC
--------------------------------------------------------------------

              PARAMETER STATEMENT MENU

   Parameter set number: 1

   Parameter one: **

   Parameter two: 0.0

   Parameter three:

   Parameter four: 0.0





--------------------------------------------------------------------
   ↑ ↓ - To Choice                                ? - Help
```

Figure 5.1.2.3: Parameter Statement Menu

```
QUIT <- ESC
-----------------------------------------------------------------
                     PARAMETER SET HELP
                     ------------------

          Definition                  Options            Default
          ----------                  -------            -------

 Parameter set number           integer 1 to 100            1

 1st parameter                         real                 **

 2nd parameter                         real                0.0

 3rd parameter                         real               1.E20

 4th parameter                         real                0.0

-----------------------------------------------------------------
   [RETURN] - To Continue                             . . .MORE
```

```
                                                   QUIT <- ESC
-----------------------------------------------------------------
   @xx    - where xx is a number, may be entered in most fields to note
            parameters
   **     - denotes fields which cannot be defaulted
   ESC    - will cancel any changes made to this menu screen during this
            session

-----------------------------------------------------------------
   [RETURN] - To Continue                             . . .DONE
```

Figure 5.1.2.3a: Parameter Statement Help

Once you have entered all the data for the statement, you can save it by typing the return key while in the last data field. This will redisplay the statement listing menu. You can continually add more statements to the list by typing [A]. In addition, you may delete [D], edit (type [RETURN]) a statement, or save the data you have entered. The help screen shown in Figure 5.1.2.2a explains the options you have on the listing menu.

5.1.3 Global Flag Statements

Global flags are used to allow you to control portions of the model by the status of a flag. This statement allows you to define and initialize global flags.

```
                                              USER1 SHELL <- ESC

                 CONTROL SUBMODEL STATEMENTS MENU

   Choose the statement type to create or edit:

     -> General run information statement
     -> Parameter statements
     -> Global flag statements
     -> Global variable statements
     -> Force flag statements
     -> Auxiliary action macro statements
     -> Timer statements
     -> Quit

       ↑↓ - To Choice      [RETURN] - Make Choice        ^ - Help
```

Figure 5.1.3.1: Control Submodel Statements Menu (Global flag statements)

The following figure shows the data input menu for the global flag statement. This menu is accessed in the same manner as the parameter statement, discussed in Section 5.1.2.

```
                                                    STATEMENT LIST <- ESC
-------------------------------------------------------------------------

                    GLOBAL FLAG STATEMENT MENU

    Global flag label: **

    Initial state of Global flag: DISABLED















-------------------------------------------------------------------------
    ↑↓ - To Choice                                          ? - Help
```

Figure 5.1.3.2: Global Flag Statement Menu

```
                                                          QUIT <- ESC
-------------------------------------------------------------------------
                          GLOBAL FLAG HELP
                          ----------------

            Definition                    Options            Default
            ----------                    -------            -------

  Flag label                         4 characters max          **

  Initial flag state                 ACTIVE, DISABELD        DISABLED

  @xx    - where xx is a number, may be entered in most fields to note
           parameters
  **     - denotes fields which cannot be defaulted
  ESC    - will cancel any changes made to this menu screen during this
           session



-------------------------------------------------------------------------
   [RETURN] - To Continue                                       ...DONE
```

Figure 5.1.3.2a: Global Flag Statement Help

5.1.4 Global Variable Statements

The global variable, much like the global flag, can be used throughout the model to control or effect force actions. The global variable statement defines and initializes the global variables.

```
                                                        USER1 SHELL <- ESC
--------------------------------------------------------------------------

                     CONTROL SUBMODEL STATEMENTS MENU

   Choose the statement type to create or edit:

     -> General run information statement
     -> Parameter statements
     -> Global flag statements
     -> Global variable statements
     -> Force flag statements
     -> Auxiliary action macro statements
     -> Timer statements
     -> Quit

--------------------------------------------------------------------------
        ↑↓ - To Choice     [RETURN] - Make Choice            ^ - Help
```

Figure 5.1.4.1: Control Submodel Statements Menu (Global variable statement)

The Global Variable Statement Menu is accessed in the same manner as the parameter statement, discussed in Section 5.1.2.

```
                                              STATEMENT LIST <- ESC

                  GLOBAL VARIABLE STATEMENT MENU

   Global variable label: ##

   Initial value of Global variable:    0.00


                                                      ? - Help
```

[illegible] Variable Statement Menu

5.1.5 Force Flag Statements

The force flag serves as an attribute of a force and can be used to control action in the model. This statement supports the definition and initialization of force flags.

```
                                                  UGENI SHELL < ESC

                   CONTROL SUBMODEL STATEMENTS MENU

  Choose the statement type to create or edit:

     -> General run information statement
     -> Parameter statements
     -> Global flag statements
     -> Global variable statements
     => Force flag statements
     -> Auxiliary action macro statements
     -> Timer statements
     -> Quit

         - To Choice      [RETURN] - Make Choice         ? - Help
```

Figure 5.1.5.1: Control Submodel Statements Menu (Force flag menu)

The 'FORCE FLAG STATEMENT MENU' is accessed in the same manner as the parameter statement, discussed in Section 5.1.2.

```
                                              STATEMENT LIST <- ESC
--------------------------------------------------------------------

                    FORCE FLAG STATEMENT MENU

   Force flag label: **

   Initial state of force flag: DISABLED










   ↑↓  To Choice                                        Help
```

Figure 5.1.5.2: Force Flag Statement Menu

```
                                                       QUIT <- ESC
-------------------------------------------------------------------

                            FORCE FLAG HELP
                            ---------------

            Definition                    Options            Default
            ----------                    -------            -------

   Force Flag label                  4 characters max           **

   Initial state for each force      ACTIVE, DISABLED        DISABLED

   @xx    - where xx is a number, may be entered in most fields to note
            parameters
   **     - denotes fields which cannot be defaulted
   ESC    - will cancel any changes made to this menu screen during this
            session

-------------------------------------------------------------------
   [RETURN] - To Continue                                   . . .DONE
```

Figure 5.1.5.2a: Force Flag Statement Help

5.1.6 Auxiliary Action Macro Statements

The macro statement is used to set several variables or flags at a specific point in time in the simulation.

```
                                                  USER1 SHELL <- ESC
--------------------------------------------------------------------

                 CONTROL SUBMODEL STATEMENTS MENU

  Choose the statement type to create or edit:

     -> General run information statement
     -> Parameter statements
     -> Global flag statements
     -> Global variable statements
     -> Force flag statements
     -> Auxiliary action macro statements
     -> Timer statements
     -> Quit

--------------------------------------------------------------------
       ↑↓ - To Choice      [RETURN] - Make Choice          ^ - Help
```

Figure 5.1.6.1: Control Submodel Statements Menu (Auxiliary action macro statement)

When creating a macro statement, you must first supply the name of the new macro. This is done by selecting the create option on the macro name menu.

```
 MACRO NAMES                                      STATEMENT MENU <- ESC
 ----------------------------------------------------------------------

   CHOOSE THE MACRO TO EDIT OR CREATE A NEW MACRO:

  CREATE      QUIT










 ----------------------------------------------------------------------
  ↑ ↓ → ←  - To Choice      [RETURN] - Make Choice          ? - Help
```

Figure 5.1.6.2: Macro Name Menu

```
                                                           QUIT <- ESC
 ----------------------------------------------------------------------

                          CREATE\EDIT MACRO HELP
                          ----------------------

       A macro consists of a set of auxiliary actions.  To create
       a macro move the highlighted block to CREATE and hit [RETURN].
       Then enter the name of the new macro in the data field which
       will appear.  To edit an existing macro move highlighted
       block to the desired macro name and hit [RETURN].









 ----------------------------------------------------------------------
  [RETURN] - To Continue                                       . . .DONE
```

Figure 5.1.6.2a: Create/Edit Macro Help

Enter the new macro name in the input field that appears on your screen.

```
 MACRO NAMES                                   STATEMENT MENU <- ESC
---------------------------------------------------------------------

   CHOOSE THE MACRO TO EDIT OR CREATE A NEW MACRO:

 CREATE       QUIT




   Enter the name for the new macro:

---------------------------------------------------------------------
         ↑ ↓ - To Choice     [RETURN] - Make Choice
```

Figure 5.1.6.3: Entering New Macro Name

After entering the name, a listing menu like that of the parameter statement will appear. From here you can enter all of the auxiliary actions associated with the macro in the same manner as described for the parameter statement. If additional help is needed concerning the macro statements, you can reference the SNAP User's Manual, pages 76-77. After you have added all the auxiliary actions, you can save the entire list by choosing the save option on the listing menu.

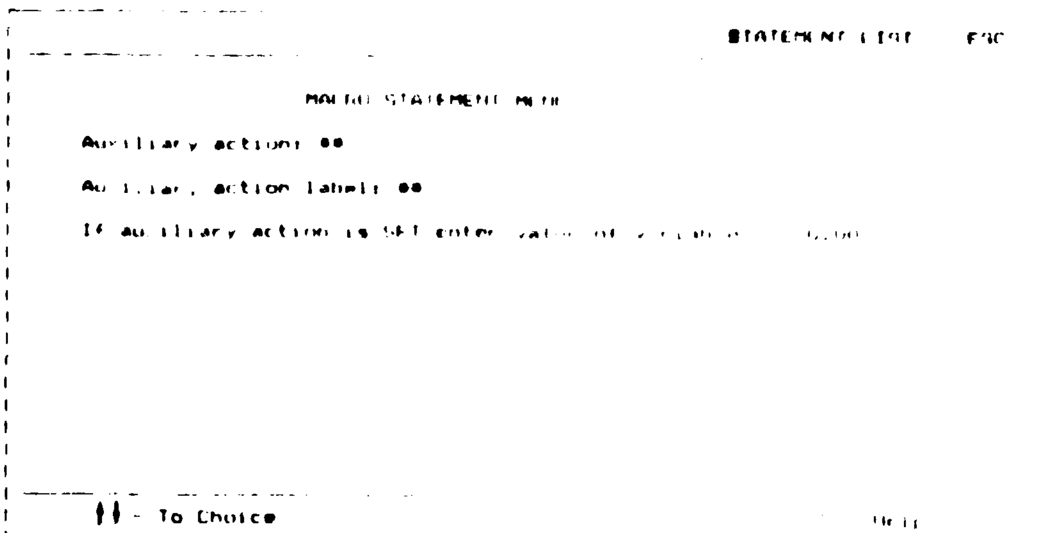


Figure 5.1.6.4: Macro Statement Menu

EXIT <- ESC

MACRO STATEMENT HELP

Definition	Options	Default
MACRO label	4 characters max	**
auxiliary actions	Any auxiliary actions except CALL	**

@xx - where xx is a number, may be entered in most fields to note parameters
** - denotes fields which cannot be defaulted
ESC - will cancel any changes made to this menu screen during this session

(RETURN) - To Continue . . . .DONE

Figure 5.1.6.4a: Macro Help

5.1.7 Timer Statements

Timers are used to support statistics collection of the length of time it takes to perform a series of actions. This statement supports the definition of timers.

```
                                                    USER1 SHELL <- ESC

                      CONTROL SUBMODEL STATEMENTS MENU

   Choose the statement type to create or edit:

     -  General run information statement
     -> Parameter statements
     -> Global flag statements
     -> Global variable statements
     -> Force flag statements
     -> Auxiliary action macro statements
     => Timer statements
     -> Quit

       ↑↓ - To Choice     [RETURN] - Make Choice          ? - Help
```

Figure 5.1.7.1: Control Submodel Statements Menu (Time statement)

The 'TIMER STATEMENT MENU' is accessed in the same manner as the parameter statement, discussed in Section 5.1.2.

```
                                                STATEMENT LIST <- ESC
---------------------------------------------------------------------

                      TIMER STATEMENT MENU

   Timer label: ##

   Timer type: TSM

   Timer identifier:










---------------------------------------------------------------------
   ↑↓ - To Choice                                      ^ - Help
```

Figure 5.1.7.2: Timer Statement Menu

```
                                                              QUIT <= ESC
---------------------------------------------------------------------------

                              TIMER CARD HELP
                              ---------------

              Definition                  Options                  Default
              ----------                  -------                  -------

  TIMER label                     4 characters max                   **

  TIMER type                      TBR - Time Between                 TSM
                                        Records
                                  TSM - time Since Marked
                                  TFR - Time of First
                                        RECORD

  TIMER identifier                20 character name for             blank
                                    output

---------------------------------------------------------------------------
    [RETURN] - To Continue                                        . . .MORE
```

```
                                                              QUIT <= ESC
---------------------------------------------------------------------------
  @xx    - where xx is a number, may be entered in most fields to note
           parameters
  **     - denotes fields which cannot be defaulted
  ESC    - will cancel any changes made to this menu screen during this
           session

---------------------------------------------------------------------------
    [RETURN] - To Continue                                        . . .DONE
```

Figure 5.1.7.2a: Timer Statement Help

5.1.8 Quit

You may exit the control submodel creating and editing session by selecting the 'Quit' option. After selecting 'Quit' you will be asked whether you wish to save the changes made to the submodel.

```
                                                 USER1 SHELL <- ESC
---------------------------------------------------------------------

                 CONTROL SUBMODEL STATEMENTS MENU

   Choose the statement type to create or edit:

      -> General run information statement
      -> Parameter statements
      -> Global flag statements
      -> Global variable statements
      -> Force flag statements
      -> Auxiliary action macro statements
      -> Timer statements
      -> Quit

---------------------------------------------------------------------
        ↑↓ - To Choice      [RETURN] - Make Choice          ? - Help
```

Figure 5.1.8.1: Control Submodel Statements Menu (Quit)

5.2 Generate SNAP Input Statements

Once you have created all of your control statements, you are ready to generate the control submodel input statements.

Simply select the 'Generate SNAP input statements' option of the 'CONTROL MENU' (Figure 5.1.1) to create the input statements file. The file that is generated (CONTROL.CSM) is located in your working space subdirectory. Like all of the submodel statement files, it is transparent to both User1 and User2.

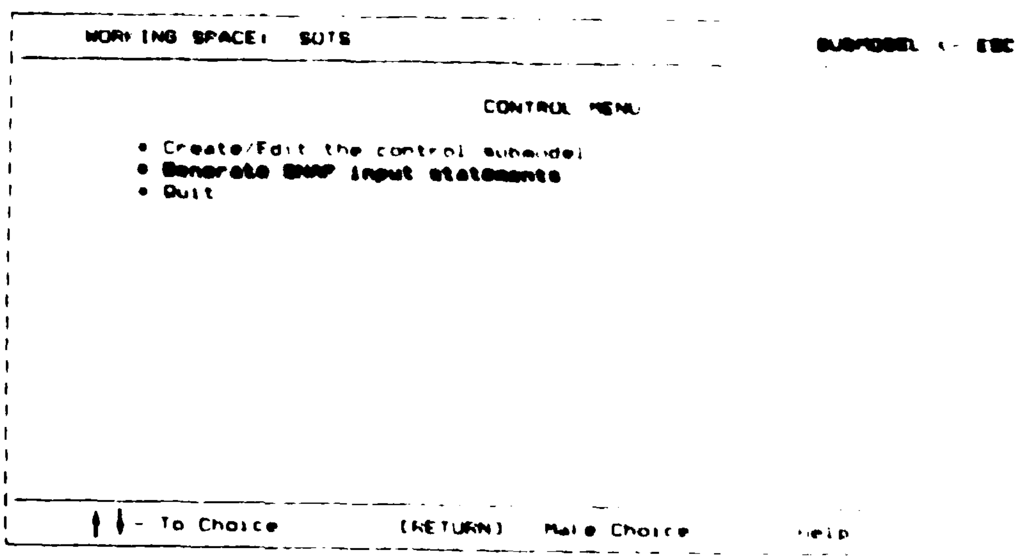


Figure 5.2.1: Control Submodel Menu
(Generate SNAP input statements)

5.3 Quit

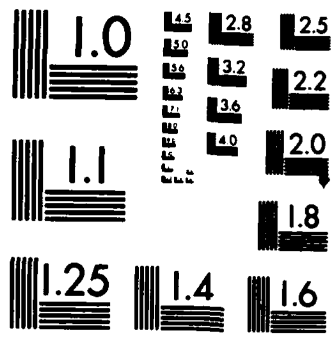
To exit the control submodel section, select the 'Quit' option.

```
WORKING SPACE:  EXAMPLE                                  SUBMODEL <- ESC

                            CONTROL MENU

      • Create Edit the control submodel
      • Generate SNAP input statements
      • Quit

 ↑↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 5.3.1: Control Menu
(Quit)

AD-A181 355 CREATING SECURITY SYSTEM MODELS USING SNAP-PC(U) SANDIA 2/4
NATIONAL LABS ALBUQUERQUE NM C D TOBIN ET AL. MAY 87
SAND86-7105 DE-AC04-76DP00789

UNCLASSIFIED F/G 12/5 NL



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

6.0 WORKING WITH THE ADVERSARY DETECTION SUBMODEL

```
WORKING SPACE:  EXAMPLE                                    MAIN <- ESC

                          SUBMODEL MENU

        * Work with the facility submodel
        * Work with the control submodel
        * Work with the adversary detection submodels
        * Work with the guard submodels
        * Work with the adversary submodels
        * Quit

  ↑↓ - To Choice        [RETURN] - Make Choice     ? - Help
```

Figure 6.0.1: Submodel Menu

The adversary detection submodel describes what happens when a sensor detects the presence of an adversary. The User1 support program allows you to 'draw' the Adversary Detection Diagram and fill in pertinent information on a menu screen and then generate the SNAP input file. Using it, you can create multiple submodels and parameterize them for User2.

When you are ready to create an adversary detection submodel for a facility, choose the option 'Work with the adversary detection submodels' from the 'SUBMODEL MENU'.

6.1 Create an Adversary Detection Submodel

The 'ADVERSARY DETECTION MENU' will then be displayed giving you several options. An explanation of these options is shown in Figure 6.1.1a. To create an adversary detection submodel, you must select the create option on the menu.

```
   WORKING SPACE: EXAMPLE                                   SUBMODEL <-ESC
---------------------------------------------------------------------------

                        ADVERSARY DETECTION MENU

         * Create an adversary detection submodel
         * Edit an adversary detection submodel
         * Generate SNAP input statements
         * List adversary detection submodels
         * Delete an adversary detection submodel
         * Quit

---------------------------------------------------------------------------
      ↓↑ - To Choice         [RETURN] - Make Choice      ? - Help
```

Figure 6.1.1: Adversary Detection Menu
(Create an adversary detection submodel)

QUIT <-- ESC

ADVERSARY DETECTION HELP

Choose to enter the network builder by creating or editing an adversary detection submodel. In addition, from this menu you may translate network symbols into SNAP input statements for a submodel, list or delete submodels.

[RETURN] - To Continue . . . .DONE

Figure 6.1.1a: Adversary Detection Help

The first screen of the network builder will then appear containing a grid and a command line. The grid represents the 48 pages that can be used to construct the submodel. These pages are identified by the letters and numbers bordering the grid. For example, the cursor is in Page D,3 in Figure 6.1.2. The character '*' will mark the pages which currently contain adversary detection submodel information. You can move the cursor around the grid by using the arrow keys and select the page in which you are interested by hitting the return, or enter, key.

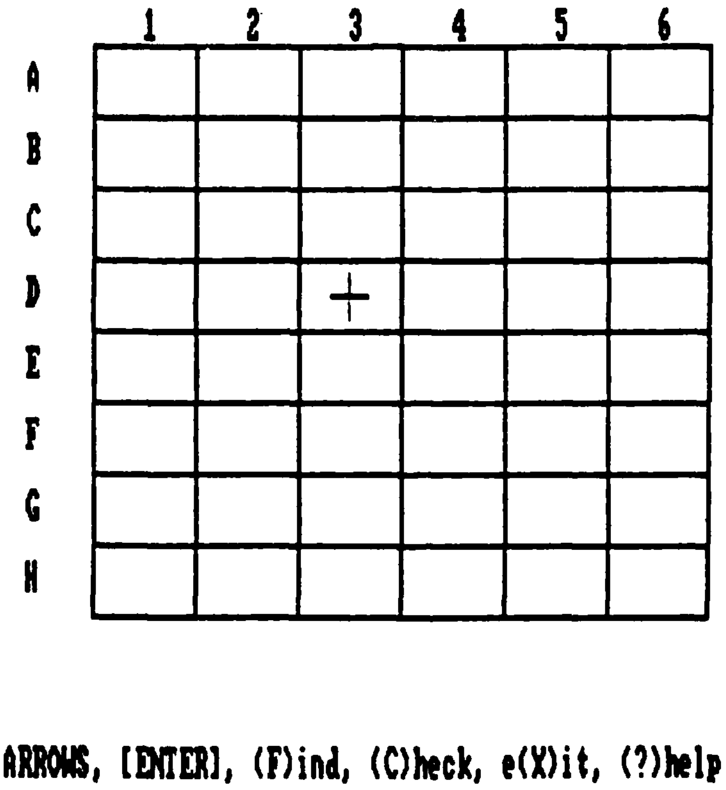


Figure 6.1.2: Adversary Detection Submodel Network Builder Selection Screen

	Description of Display Control Commands
ARROWS	Move cursor from box to box on the screen. Each box is associated with a page on which the network may may be drawn.
[ENTER]	Hitting ENTER selects the page associated with the box that the cursor is in.
(F)ind	Search the network for a node entered from the terminal. The page on which the node occurs will be returned if it is found.
(C)heck	Check if all nodes in the network have been filled. A list containing the label and location of the nodes that have not been filled will be shown on the screen.
(H)elp	Prints this information to the screen.
e(X)it	Causes the program to terminate.

Press any key to continue.

Figure 6.1.2a: Adversary Detection Submodel Network Builder Page Selection Screen Help

Once you have selected the page with which you desire to work, the contents of that page will be displayed on the screen. The page id will appear in the uppermost right corner and a list of options along the bottom of the screen. The commands are described on the help screen, which is listed on the next page.

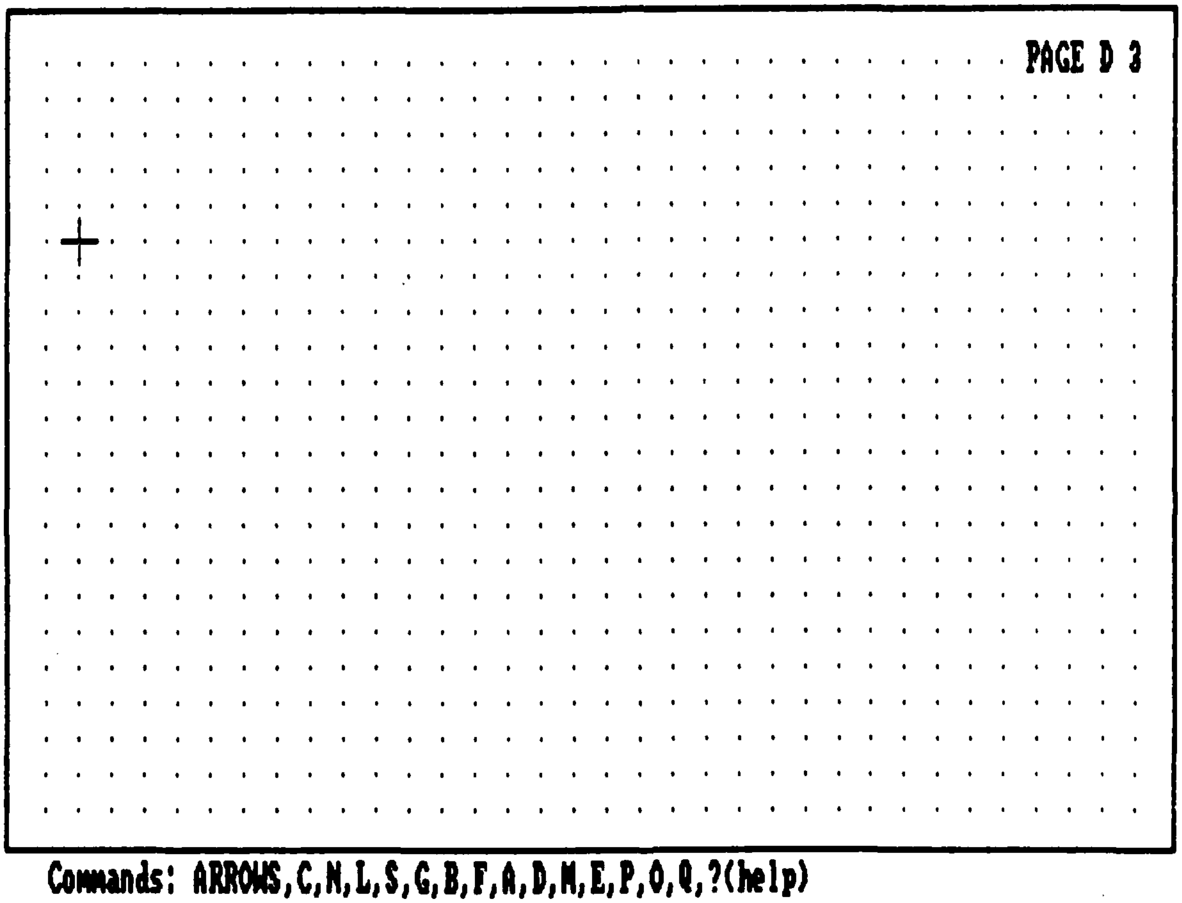


Figure 6.1.3: Adversary Detection Network Builder Page

Description of SNAP Adversary Detection Device Builder Commands

---

ARROWS	Move the crosshair in the appropriate direction.
C)rosshair	Toggle the crosshair speed between fast and slow.
G)oto	Enter a GOTO node at the current crosshair location.
S)ensor	Enter a SENSOR node at the current crosshair location.
B)ranch	Enter the branch drawing mode.
F)ill	Fill node menu at current crosshair location.
L)ogic	Enter a LOGIC node at the current crosshair location.
mo(N)itor	Enter a MONITOR node at the current crosshair location.
D)elete	Delete current item. (Confirmation will be requested).
M)ove	Move the node or text at the current crosshair location.
E)dit	Edit the node under the current crosshair location.
P)rint	Generate a hardcopy of the current facility page on the printer.
O)ptions	Select current display options.
Q)uit	Quit this page of the SNAP network builder.

The ESC key may be used to cancel any command in progress.

Press any key to continue.

Figure 6.1.3a: Adversary Detection Network Builder Help

When a sensor detects the presence of an adversary, it transmits a signal to the guard force that is waiting for the signal. Along its transmission path, the signal may be interrupted at junction loops or switches. To prevent this, other sensors (tamper alarms) can be associated with any detection device. These tamper alarms will alarm if the detection device is disabled. The signal is also subject to logical confounding. In other words, the monitor may be able to tell that some detection device has alarmed, but cannot identify which.

These aspects of the adversary detection submodel are described graphically using the Adversary Detection Diagram. SNAP-PC allows you to interactively 'draw' the diagram. (S)ensor nodes are represented using circles; (L)ogic points, the junction boxes or switches, are squares; and triangles are mo(N)itors. The transmission paths are represented by solid lines, (B)ranches, between the symbols, or nodes.

To add a node to the diagram, position the cursor to where you would like the node placed and then type the letter associated with the node. You will be asked to enter a node label (4 characters maximum). The node symbol and its label will then be displayed on your screen.

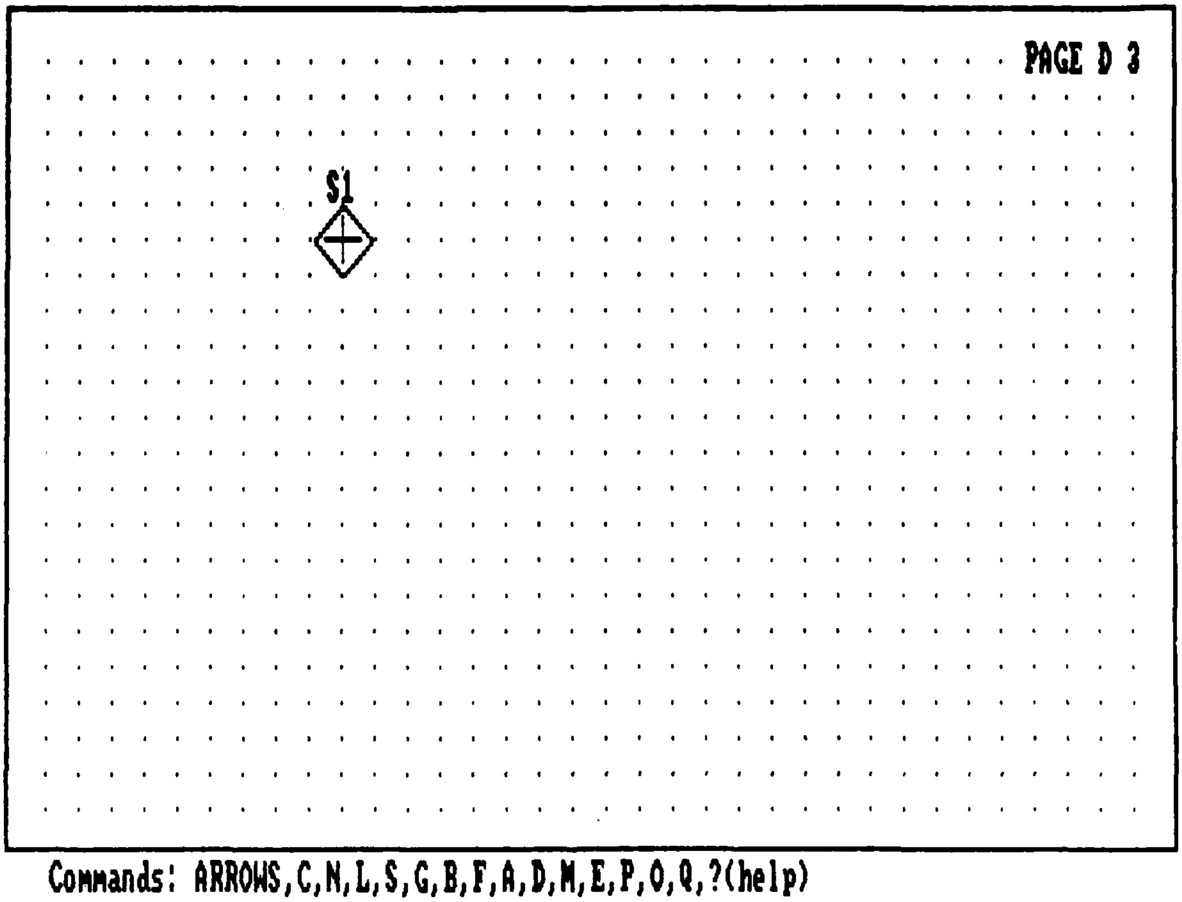


Figure 6.1.4: Node Placement

To show the path a signal takes through a detection sub-model, the nodes are connected by (B)ranches. A branch is created by placing the cursor at the desired beginning point of the branch and then typing [B]. The branch is drawn as you move the cursor around the page. A bend point in the branch can be drawn by typing [SPACE] and continuing. To end the branch you type [RETURN].

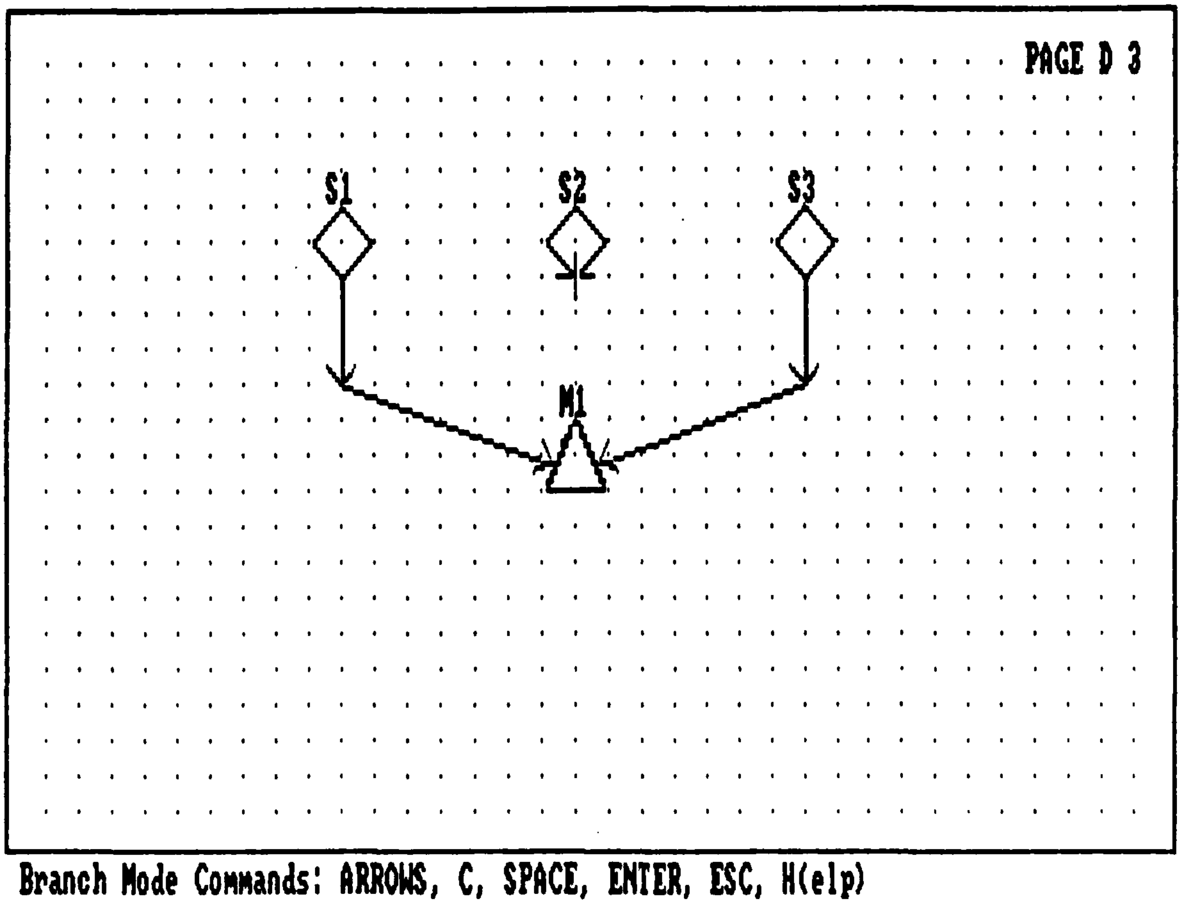


Figure 6.1.5: Branch Mode

Description of Branch Mode Commands

ARROWS	Move the crosshair in the appropriate direction and update the "rubber band" branch from the current origin point to the crosshair location. (The initial origin point is the current crosshair location at the time the line mode is initiated, but it may be updated by the SPACE command. See below.)
C)rosshair	Toggle the crosshair speed between fast and slow.
SPACE	Make the current "rubber band" branch permanent, and then begin entry of a new branch with its origin at the current crosshair location.
ENTER	Make the current "rubber band" branch permanent, and then return to the main command menu.
ESC	Abort entry of the current branch and return to the main command menu.

Press any key to continue.

Figure 6.1.5a: Branch Mode Help

When the submodel is too big to fit onto one page, you can use the (G)oto node to connect pages. The node label of the goto node is the same as the node it connects to. You can see the use of the goto node below as it connects the branch from sensor SEN3 to monitor MON1 on page D,4. You can have multiple goto nodes connecting to the same node.

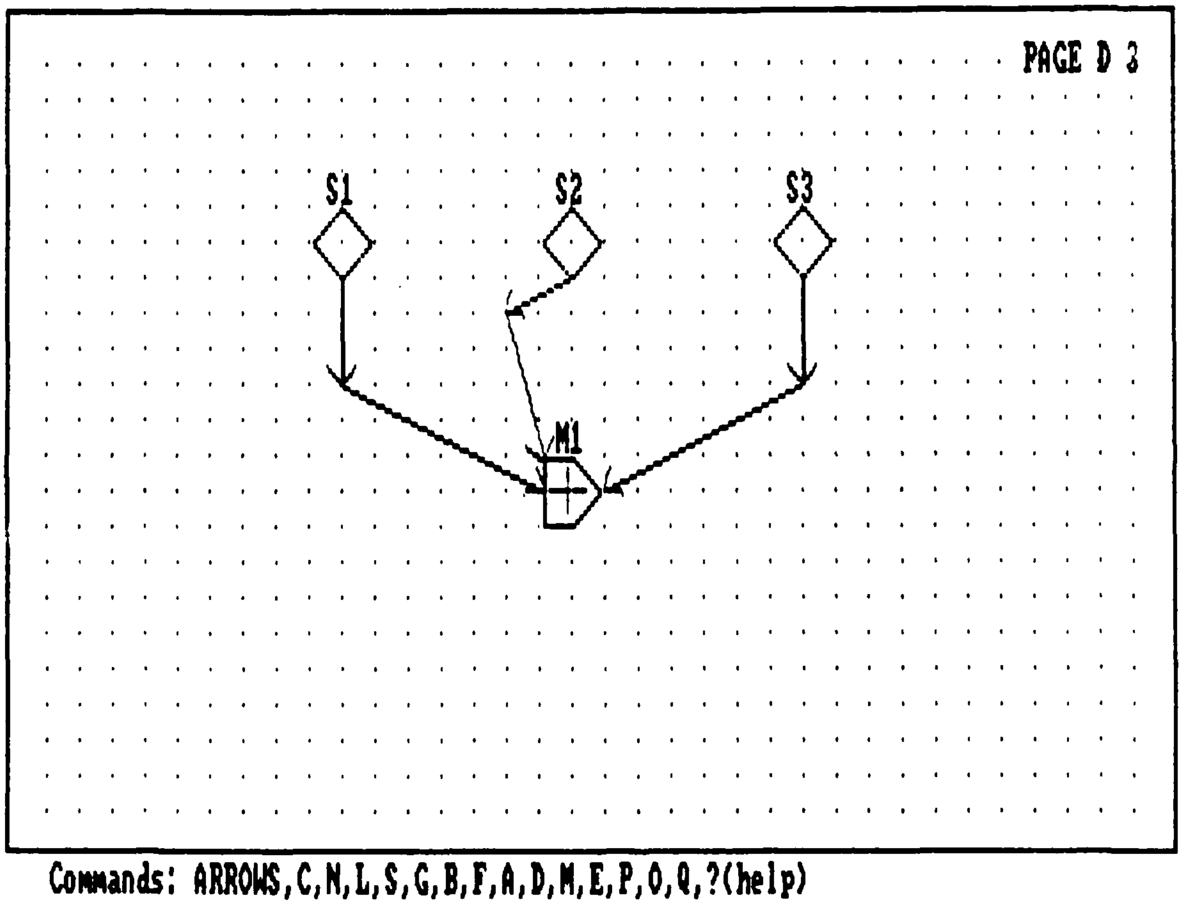
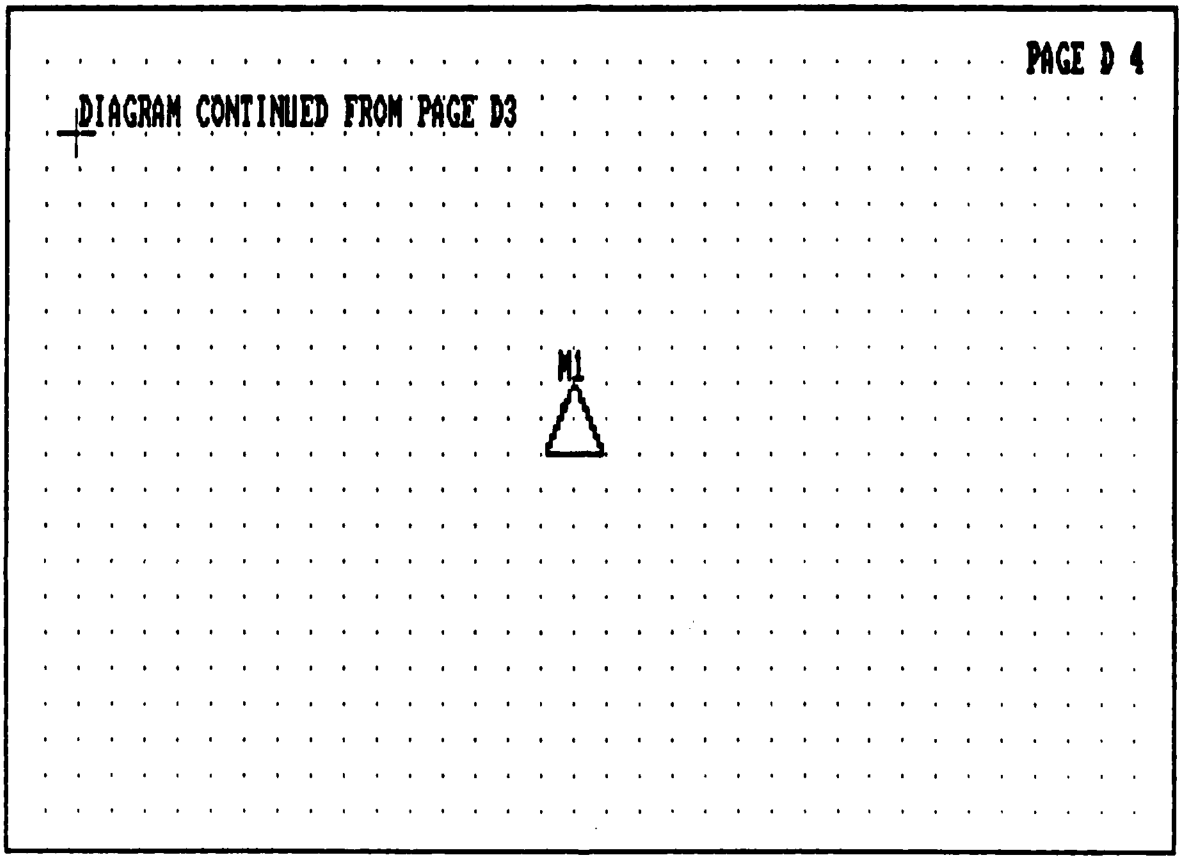


Figure 6.1.6: The Goto Node

To add clarity to your diagram you may enter text by using the (A)nnotation command. It allows you to enter one line of text and place it at the current position of the cursor.



Commands: ARROWS,C,N,L,S,G,B,F,A,D,M,E,P,O,Q,?(help)

Figure 6.1.7: The Goto Node Continuation Page

Once the network is constructed, you will need to supply data for the sensor and monitor nodes. By typing [F] you can enter the fill mode. Then by moving the cursor to the node you wish to fill and typing [RET], a data input menu will be displayed allowing you to enter the required data. Sample sensor and monitor node menus are shown along with their corresponding help screens in Figures 6.1.9 through 6.1.10a.

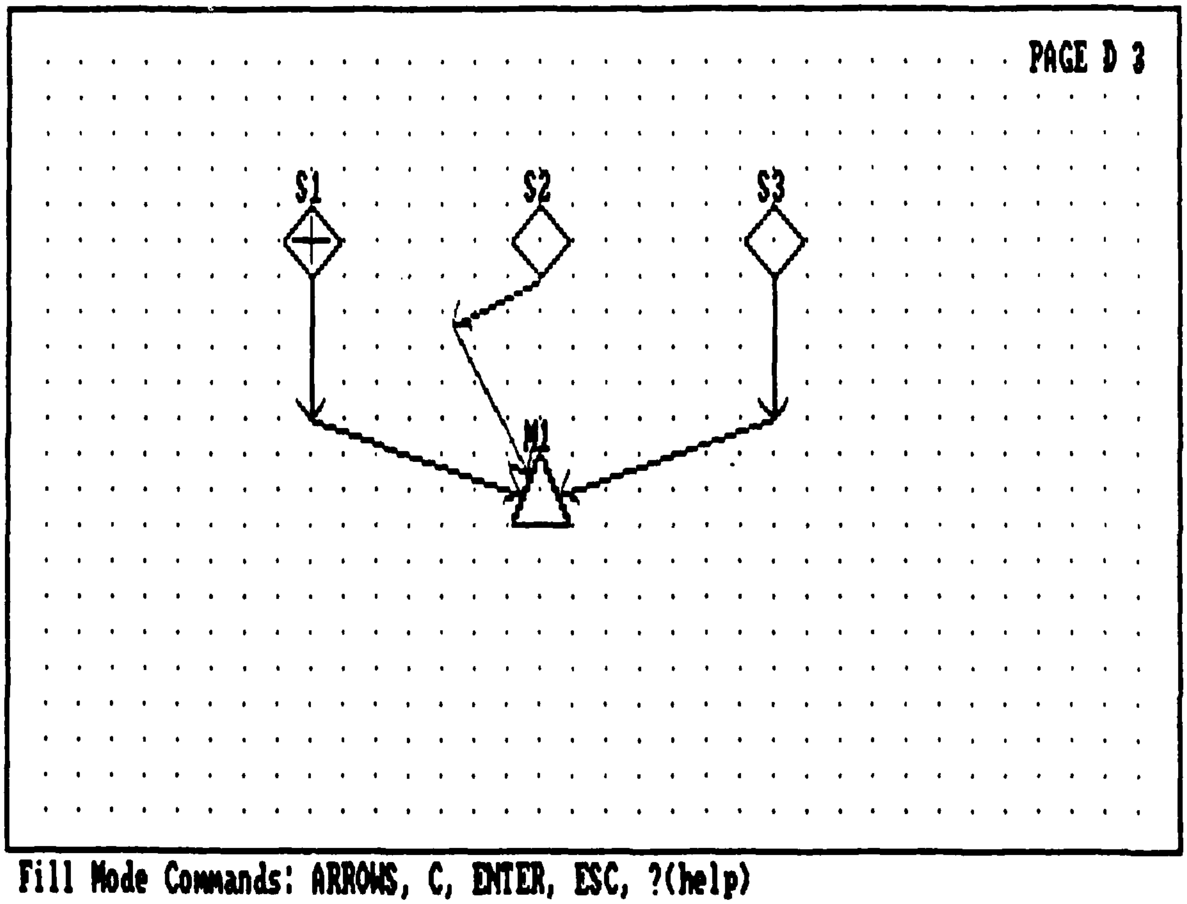


Figure 6.1.8: Fill Mode

Description of Fill Mode Commands

ARROWS	Move the crosshair in the appropriate direction.
C)rosshair	Toggle the crosshair speed between fast and slow.
ENTER	Enter the fill menu of the node which is positioned at the current location of the crosshair. This allows user to fill in the data associated with the node.
ESC	Quit the fill command and return to the main option menu.

Press any key to continue.

Figure 6.1.8a: Fill Mode Help

```
SENSOR NODE: S2                                             NETWORK <- ESC
--------------------------------------------------------------------------

                            SENSOR NODE MENU

    Probability of detection: 1.0

    Signal persistence: PERMANENT

    Enter SAVE to save current values, QUIT to exit without saving:

--------------------------------------------------------------------------
         ↑↓ - To Choice                                    ? - Help
```

Figure 6.1.9: Sensor Node Menu

```
                                                            QUIT <- ESC
--------------------------------------------------------------------------
                        SENSORS STATEMENT HELP
                        ----------------------

          Definition                     Options                Default
          ----------                     -------                -------

  Probability of detection         constant between zero          1.0
                                   and one or a global
                                   variable

  Signal persistence               TEMPORARY, PERMANENT        PERMANENT

  @xx    - where xx is a number, may be entered in most fields to note
           parameters
  *      - denotes fields which cannot be defaulted
  ESC    - will cancel any changes made to this menu screen during this
           session
--------------------------------------------------------------------------
   [RETURN] - To Continue                                        . . .DONE
```

Figure 6.1.9a: Sensors Statement Help

```
MONITOR NODE: M1                                              NETWORK <- ESC
----------------------------------------------------------------------------

                             MONITOR NODE MENU

List guard WAIT nodes to signal:

#



Enter SAVE to save current values, QUIT to exit without saving:







----------------------------------------------------------------------------
        ↑↓ - To Choice                                      ? - Help
```

Figure 6.1.10: Monitor Node Menu

```
                                                               QUIT <- ESC
----------------------------------------------------------------------------

                              MONITORS HELP
                              -------------

              Definition                      Options          Default
              ----------                      -------          -------

 List of guard WAIT node labels                                   **

 @xx    - where xx is a number, may be entered in most fields to note
          parameters
 *      - denotes fields which cannot be defaulted
 ESC    - will cancel any changes made to this menu screen during this
          session



----------------------------------------------------------------------------
   [RETURN] - To Continue                                          . . .DONE
```

Figure 6.1.10a: Monitors Help

To aid in the construction of the adversary detection submodel, there are several support options available. You may [E]dit, [D]elete, or [M]ove objects on the page. You may change the screen display [O]ptions and check the status of the network builder. Or you may print a copy of the page to your EPSON-compatible printer.

The delete option allows you to remove a node, branch, or text from the diagram. Simply place the cursor at the location of the object you wish to delete and type [D]. As a safety precaution, the object you are about to delete will flash and you will be asked to verify your choice.

If you wish to change the node label of a node, just place the cursor on the desired node and type [E]. You will then be asked to enter the new node label.

To get a hard copy of your diagram you may use the (P)rint option. By typing [P] you can get a copy of the current page.

You may move a node or text around a page by placing the cursor on the object you wish to move and typing [M]. The object you selected will flash and will follow the cursor as you move about the page. Type [RETURN] to fix the object in its new location or type [ESC] to return the object to its original location.

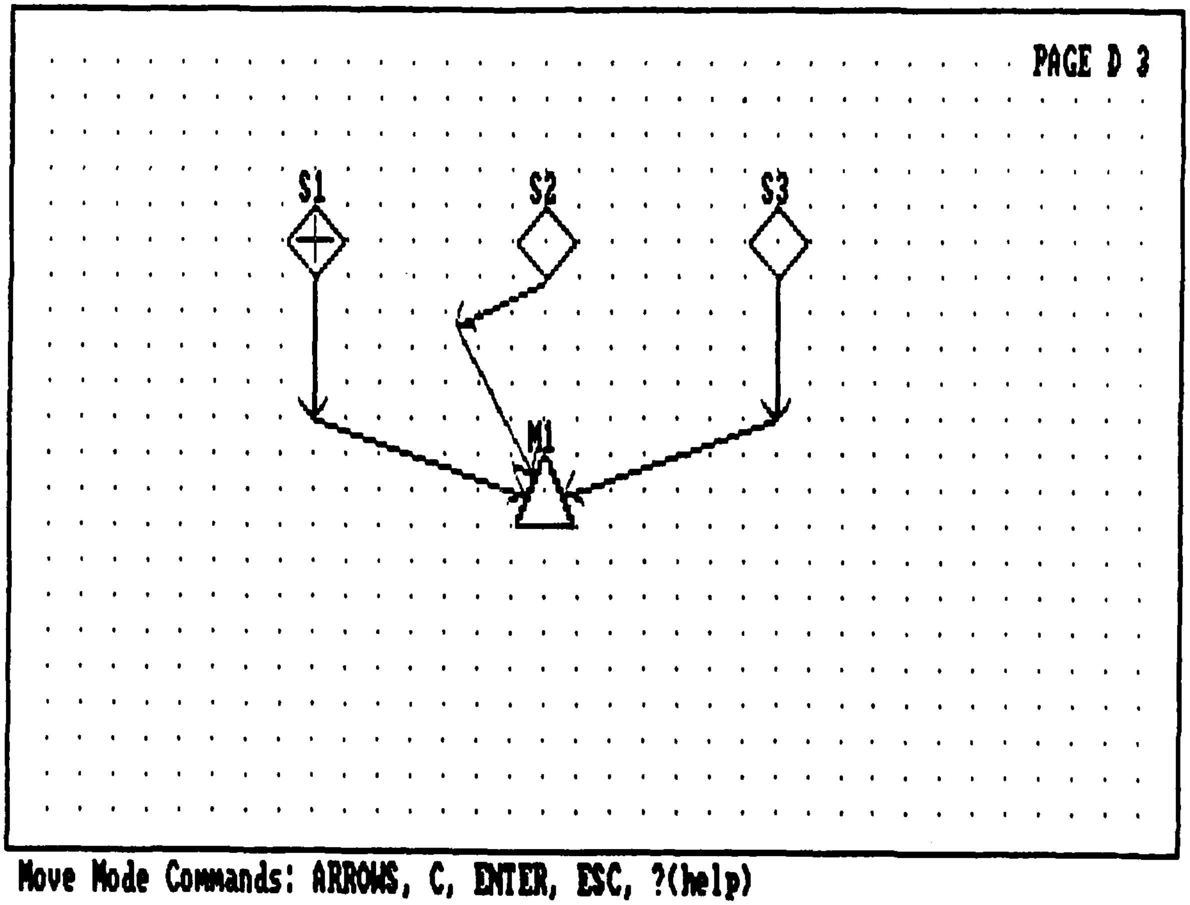


Figure 6.1.11: Move Mode

Description of Move Mode Commands

ARROWS	Move the crosshair and associated node or text in the appropriate direction.
C)rosshair	Toggle the crosshair speed between fast and slow.
ENTER	Complete the move command by fixing the location of the node or text associated with the crosshair at its current location. End move mode and return to the main command menu.
ESC	Abort the current move command and return the node or text associated with the crosshair to its position prior to the start of the move command. End move mode and return to the main command menu.

Press any key to continue.

Figure 6.1.11a: Move Mode Help

By typing [O] you can enter the display (O)ption mode. You can toggle the display of the grid points, the annotation, and the SNAP labels. You may also check on the status of the adversary detection submodel network builder by the [S]tatus option. An example of a status report for the facility submodel network builder is shown in Figure 4.1.9 and is explained in Section 4.1.

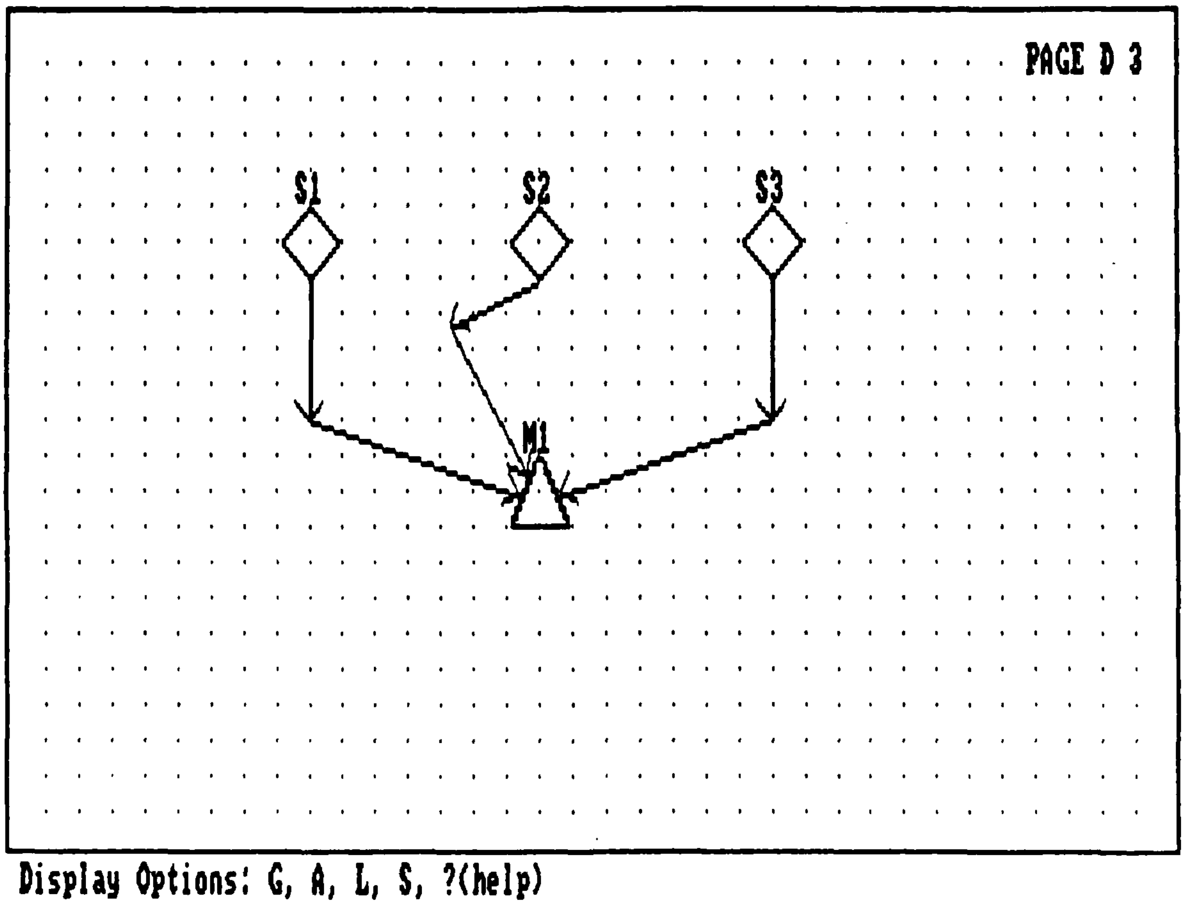


Figure 6.1.12: Display Options

Description of Display Option Commands

G)rid Toggle the grid display on or off.

A)nnotation Toggle the display of annotation on or off.

L)abel Toggle the display of SNAP node labels on or off.

S)tatus Display a report on the status of the display options, status of the current display page and status of the overall facility.

All display option commands return to the main command menu upon completion.

Press any key to continue.

Figure 6.1.12a: Display Options Help

Once you have completed a page you can exit from it by typing [Q]. The display control menu will then be displayed. An asterisk indicates what pages have been used to construct the submodel.

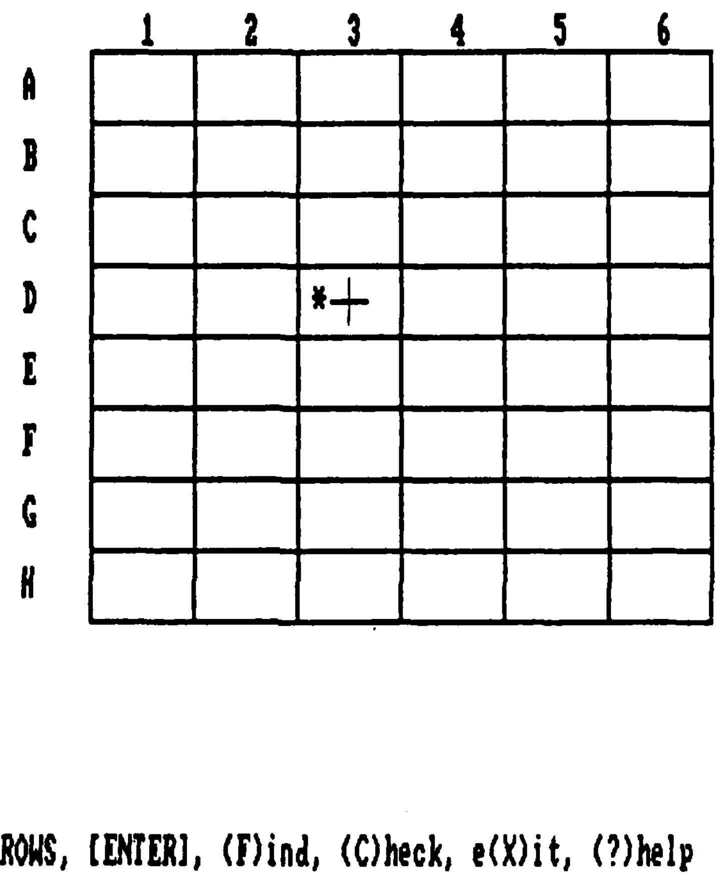
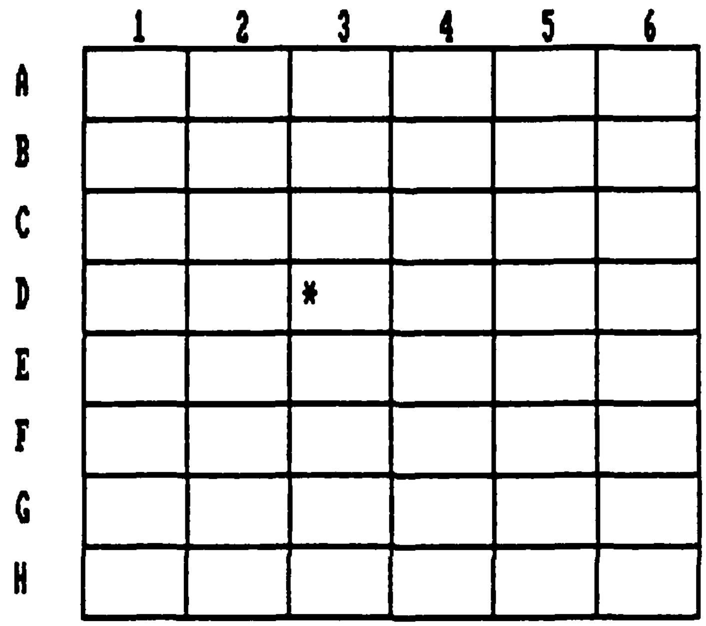


Figure 6.1.13: Display Control Menu After Constructing Network

To help verify that you have supplied all the data required, you may (C)heck the network for unfilled nodes by typing [C]. The program will then give you a listing of all the nodes that have been drawn but not filled.



Node S1, on page D, 3 has not been filled. Hit a key to continue.

Figure 6.1.14: Check Option

If you are interested in editing a node and you do not know which page contains the node, you may (F)ind it by typing [F]. You will then be asked for the node label. After entering the label the program will return with the page number containing the node. If the label is associated with a goto node, several locations for the node may appear.

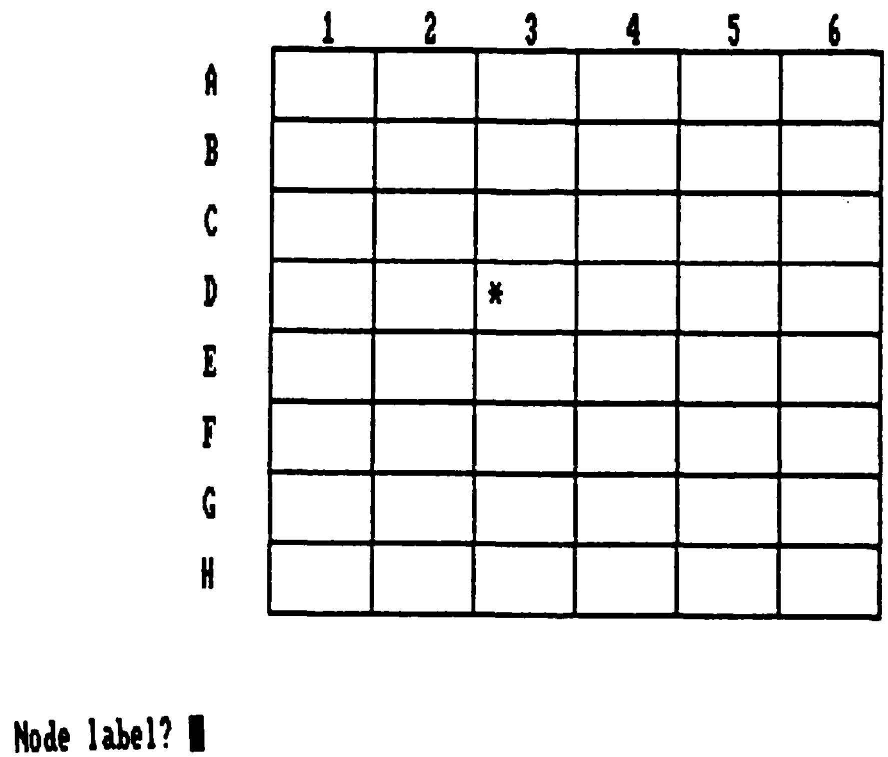


Figure 6.1.15: Find Option

When you are ready to exit the adversary detection submodel network builder, you may type [X]. A screen will appear giving you the option to save the submodel or quit without saving. By entering a name, the submodel will be saved and will be identified by that name. You may then enter a description for the submodel. After entering a description, you will return to the 'ADVERSARY DETECTION MENU'.

```
WORKING SPACE: EXAMPLE                                    MAIN <- ESC
---------------------------------------------------------------------

             ADVERSARY DETECTION SUBMODEL FILE NAME MENU

      Enter a name for this file:                        DET2
       or type QUIT to leave this menu

---------------------------------------------------------------------
[RETURN] - To Continue
```

Figure 6.1.16: Adversary Detection Submodel File Name Menu

```
WORKING SPACE: EXAMPLE                                        MAIN <- ESC

                 ADVERSARY DETECTION SUBMODEL FILE NAME MENU

      Enter a line of description for file:                       DET2
      Or hit return to keep.

      Adversary detection submodel with three sensors.


[RETURN] - To Continue
```

Figure 6.1.17: Adversary Detection Submodel Description

6.2 Edit an Adversary Detection Submodel

If you wish to change an existing adversary detection submodel, select the edit option on the adversary detection menu.

```
WORKING SPACE:  EXAMPLE                                    SUBMODEL <-ESC
--------------------------------------------------------------------------

                      ADVERSARY DETECTION MENU

        * Create an adversary detection submodel
        * Edit an adversary detection submodel
        * Generate SNAP input statements
        * List adversary detection submodels
        * Delete an adversary detection submodel
        * Quit

--------------------------------------------------------------------------
   ↑↓- To Choice          [RETURN] - Make Choice     ? - Help
```

Figure 6.2.1: Adversary Detection Menu
(Edit an Adversary detection submodel)

After you select the submodel you wish to edit from a list of those that you have created, Figure 6.2.2, you will re-enter the adversary detection submodel network builder. When you exit the network builder after your edit session, you may save the changes under the current name, create a new file, or overwrite an existing file by entering the name of an existing file.

```
WORKING SPACE:  EXAMPLE                                        MAIN <- ESC
--------------------------------------------------------------------------

              ADVERSARY DETECTION SUBMODEL SELECTION MENU

   NAME                            DESCRIPTION
   ----                            -----------

 DET1      detection submodel with only one sensor
 DET2      detection submodel with three sensors
  QUIT      Quit this menu

--------------------------------------------------------------------------
   ↑↓ - To Choice          [RETURN] - Make Choice     ? - Help
```

Figure 6.2.2: Adversary Detection Submodel Selection Menu

```
                                                               QUIT <- ESC
--------------------------------------------------------------------------

              ADVERSARY DETECTION SUBMODEL SELECTION HELP
              -------------------------------------------

     Use the arrow keys to select the adversary detection submodel with
     which you want to work.

--------------------------------------------------------------------------
  [RETURN] - To Continue                                         . . .DONE
```

Figure 6.2.2a: Adversary Detection Submodel Selection Help

6.3 Generate SNAP Input Statements

You may generate the SNAP input statements for any of the adversary detection submodels you have created. Select the 'Generate SNAP input statements' option on the 'ADVERSARY DETECTION MENU', Figure 6.3.1. You may then choose from a list of the names of the submodels that you have built. The file that is generated ('name'.DSM) is located in your working space subdirectory.

```
WORKING SPACE:  EXAMPLE                                   SUBMODEL <-EBC

                       ADVERSARY DETECTION MENU

      * Create an adversary detection submodel
      * Edit an adversary detection submodel
      * Generate SNAP input statements
      * List adversary detection submodels
      * Delete an adversary detection submodel
      * Quit

  ↑↓ - To Choice        [RETURN] - Make Choice     ? - Help
```

Figure 6.3.1: Adversary Detection Menu
(Generate SNAP input statements)

6.4 List Adversary Detection Submodels

The list option will display the name and description of all the current adversary detection submodels.

```
WORKING SPACE:  EXAMPLE                                   SUBMODEL <-ESC

                     ADVERSARY DETECTION MENU

        * Create an adversary detection submodel
        * Edit an adversary detection submodel
        * Generate SNAP input statements
        * List adversary detection submodels*
        * Delete an adversary detection submodel
        * Quit

    ↑↓ - To Choice        [RETURN] - Make Choice     ? - Help
```

Figure 6.4.1: Adversary Detection Menu (List adversary detection submodels)

```
WORKING SPACE:  EXAMPLE                                   MAIN <- ESC

              ADVERSARY DETECTION SUBMODEL DESCRIPTIONS

    NAME                         DESCRIPTION
    ----                         -----------

 DET1      detection submodel with only one sensor
 DET2      detection submodel with three sensors

 [RETURN] - To Continue                                      . . .DONE
```

Figure 6.4.2: Adversary Detection Listing

6.5 Delete an Adversary Detection Submodel

If you wish to delete a submodel, select the 'Delete an adversary detection submodel' option. Then select the submodel you wish to delete from the displayed list. You will be asked to verify your choice.

```
WORKING SPACE:  EXAMPLE                                  SUBMODEL <-ESC
-----------------------------------------------------------------------

                      ADVERSARY DETECTION MENU

          * Create an adversary detection submodel
          * Edit an adversary detection submodel
          * Generate SNAP input statements
          * List adversary detection submodels
          * Delete an adversary detection submodel
          * Quit

-----------------------------------------------------------------------
   ↑ ↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 6.5.1: Adversary Detection Menu
(Delete an adversary detection submodel)

```
WORKING SPACE:  EXAMPLE                                       MAIN <- ESC

              ADVERSARY DETECTION SUBMODEL DELETION MENU

   NAME                         DESCRIPTION
   ----                         -----------

 DET1       detection submodel with only one sensor
 DET2       detection submodel with three sensors
  QUIT       Quit this menu

   ↑↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 6.5.2: Adversary Detection Submodel Deletion Menu

```
                                                              QUIT <- ESC

              ADVERSARY DETECTION SUBMODEL DELETION HELP
              ------------------------------------------

   Use the arrow keys to select the adversary detection submodel you
   wish to delete.

 [RETURN] - To Continue                                          . . .DONE
```

Figure 6.5.2a: Adversary Detection Submodel Deletion Help

6.6 Quit

To exit the adversary detection submodel section, select the 'Quit' option.

It is important to remember that you can build multiple adversary detection submodels for one facility and that each submodel is identified with a name, given it at the time of creation. You always have the option of editing any submodel at anytime.

```
WORKING SPACE:  EXAMPLE                                    SUBMODEL <-ESC
--------------------------------------------------------------------------

                       ADVERSARY DETECTION MENU

         * Create an adversary detection submodel
         * Edit an adversary detection submodel
         * Generate SNAP input statements
         * List adversary detection submodels
         * Delete an adversary detection submodel
         * Quit

--------------------------------------------------------------------------
   ↑↓ - To Choice         [RETURN] - Make Choice      ? - Help
```

Figure 6.6.1: Adversary Detection Menu (Quit)

7.0 WORKING WITH THE GUARD AND ADVERSARY SUBMODELS

The guard submodel is used to describe the movement of guard forces through a facility. It represents the normal patrol route of guard forces and the movement of the forces when adversaries are detected. The submodel also describes how auxiliary guard forces react to an adversary attack. You may construct multiple guard submodels to represent different patrol and defense plans. Each submodel can be parameterized to allow User2 to perform sensitivity analysis on certain variables.

The adversary submodel describes the attack logic of the adversary. For instance, an adversary force may sneak into a facility trying to avoid detection, or they may try to overtake a facility by force. You may construct multiple adversary submodels to represent different attack plans and parameterize them for User2.

Most of the guard and adversary submodels are built graphically by combining a series of nodes and branches to form a network to describe the flow of the forces through the facility. Chapter IV of the SNAP User's Manual describes the guard and adversary submodels in detail. In addition to the network portion of the submodel, there are five submodel statements that are not created graphically. They are the engagement, combinations, PENG, DENG, and BASE (for a guard submodel) or objective (for an adversary submodel) statements. Each of these is entered in a menu driven fashion. The procedure for entering these statements is given in Section 7.1.

7.1 Create a Guard Submodel

This section will focus on describing how to construct a guard submodel. It is identical to the procedure used to construct an adversary submodel, with the exception of a small number of nodes which may be created in one submodel type, but not the other.

Once you have selected to work with the guard submodel, the 'GUARD MENU' will be displayed. Select the 'Create a guard submodel' option.

```
 WORKING SPACE:  EXAMPLE                               SUBMODEL <-ESC
 ---------------------------------------------------------------------

                              GUARD MENU

         * Create a guard submodel
         * Edit a guard submodel
         * Generate SNAP input statements
         * List guard submodels
         * Delete a guard submodel
         * Quit

 ---------------------------------------------------------------------
   ↑↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 7.1.1: Guard Menu
(Create a guard submodel)

```
                                                        QUIT <- ESC

                          GUARD SUBMODEL HELP
                          -------------------

   Choose to enter the network builder by creating or editing a guard
   submodel.  In addition, from this menu you may translate network symbols
   into SNAP input statements for a submodel, list or delete submodels.

 [RETURN] - To Continue                                        . . .DONE
```

Figure 7.1.1a: Guard Submodel Help

The network builder page selection screen will appear on your console. It contains a grid which represents the pages available for submodel construction and a command line. The pages are identified by the letters and numbers bordering the grid. You may move the cursor around the grid by using the arrow keys and select the page you wish to use by typing [RETURN]. For example, the cursor is pointing to page C,2 in Figure 7.1.2. A description of all the commands is shown in Figure 7.1.2a. Each will be discussed later in this section.

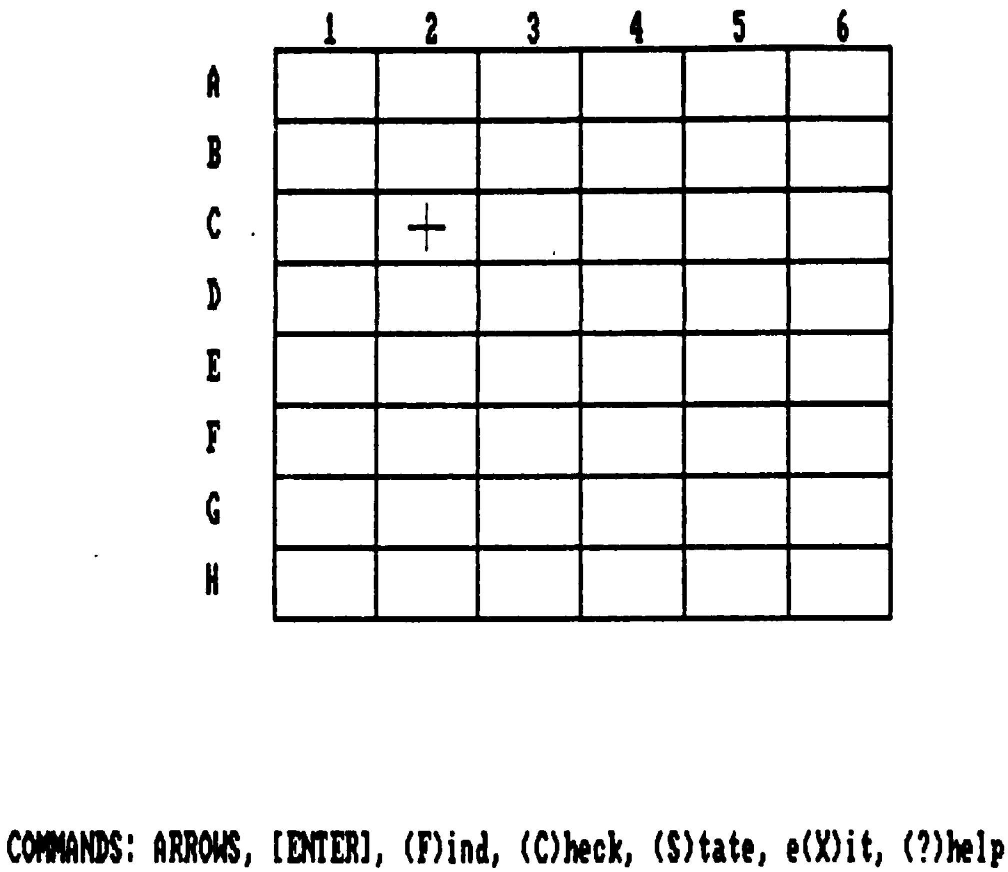


Figure 7.1.2: Network Builder Page Selection Screen

Description of Display Control Commands	
ARROWS	Move cursor from box to box on the screen. Each box is associated with a page on which the network may may be drawn.
[ENTER]	Hitting ENTER selects the page associated with the box that the cursor is in.
(F)ind	Search the network for a node entered from the terminal. The page on which the node occurs will be returned if it is found.
(C)heck	Check if all nodes in the network have been filled. A list containing the label and location of the nodes that have not been filled will be shown on the screen.
(S)tate	Define Statements associated with this submodel.
(H)elp	Prints this information to the screen.
e(X)it	Causes the program to terminate.

Press any key to continue.

Figure 7.1.2a: Network Builder Page Selection Screen Help

The contents of the page you selected will be displayed on the screen. The page id will appear in the uppermost right corner and a list of available options will be written along the bottom of your screen. The commands are described in the help file, which is listed in Figures 7.1.3a and 7.1.3b. The basic network commands [D]elete, [M]ove, [E]dit, [P]rint, and [O]ptions are the same as those for the facility submodel and adversary detection submodel network builders.

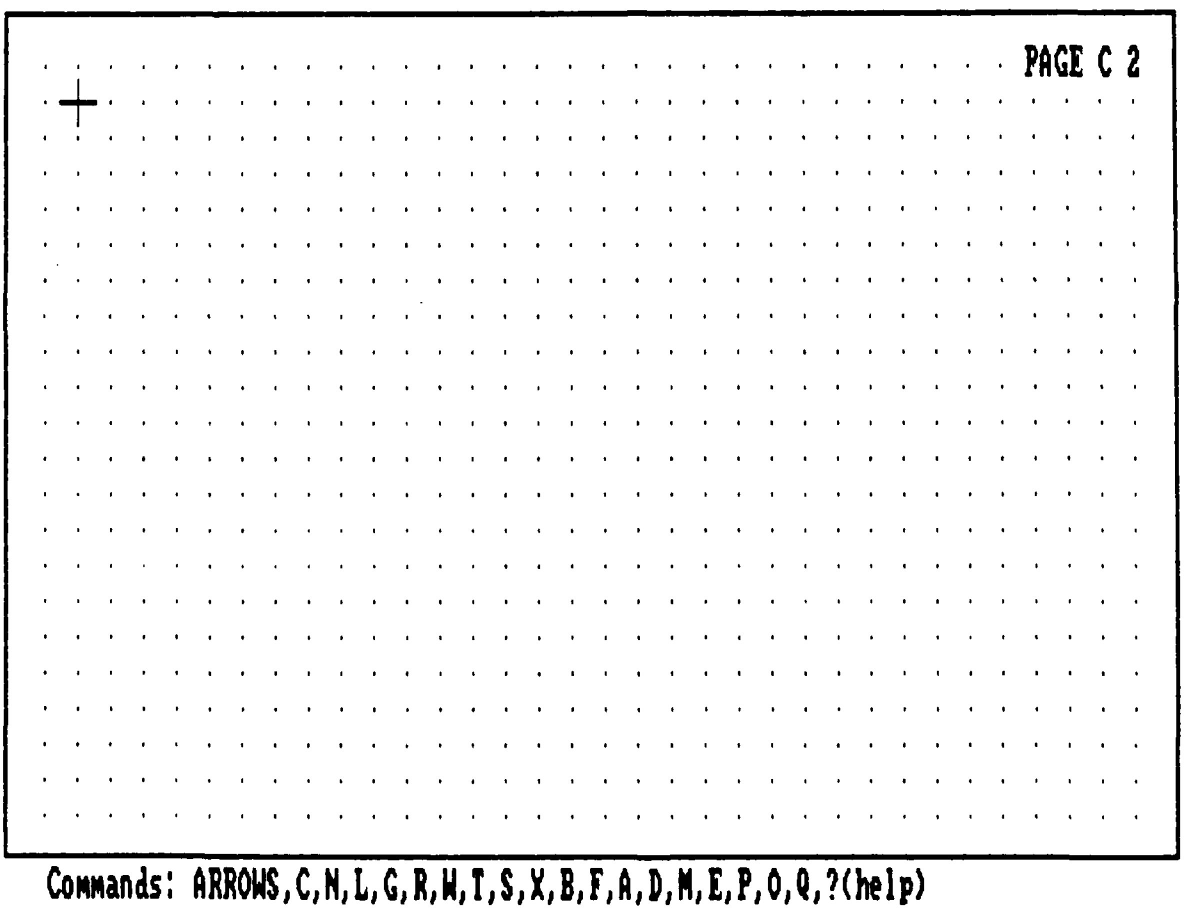


Figure 7.1.3: Submodel Network Builder Page

Description of SNAP Guard Subnetwork Builder Commands

ARROWS	Move the crosshair in the appropriate direction.
C)rosshair	Toggle the crosshair speed between fast and slow.
e(N)ter	Enter an ENTER node at the current crosshair location.
a(L)locate	Enter an ALLOCATE node at the current crosshair location.
G)oto	Enter a GOTO node at the current crosshair location.
R)tb	Enter a RTB node at the current crosshair location.
W)ait	Enter a WAIT node at the current crosshair location.
T)ask	Enter a TASK node at the current crosshair location.
S)ignal	Enter a SIGNAL node at the current crosshair location.
e(X)it	Enter an EXIT node at the current crosshair location.
B)ranch	Enter the branch drawing mode.

Press any key to continue.

Figure 7.1.3a: Submodel Network Builder Page Help

F)ill	Fill node menu at current crosshair location.
A)nnotate	Enter text at the current crosshair location.
D)elete	Delete current item. (Confirmation will be requested).
M)ove	Move the node or text at the current crosshair location.
E)dit	Edit the node under the current crosshair location.
P)rint	Generate a hardcopy of the current facility page on the printer.
O)ptions	Select current display options.
Q)uit	Quit this page of the SNAP network builder.

The ESC key may be used to cancel any command in progress.

Press any key to continue.

Figure 7.1.3b: Submodel Network Builder Page Help

You are now ready to begin building your network. Use the arrow keys to move the cursor to the location where you wish to enter a node. Type the letter corresponding to the appropriate node and then enter the node label in the field which will appear in place of the command line. Once the label has been entered the node will be drawn in the indicated location.

You should keep in mind that nodes are drawn on the screen left justified to the position of the cursor. You should also try not to draw too many nodes onto one page. You have 48 pages available to construct your submodel.

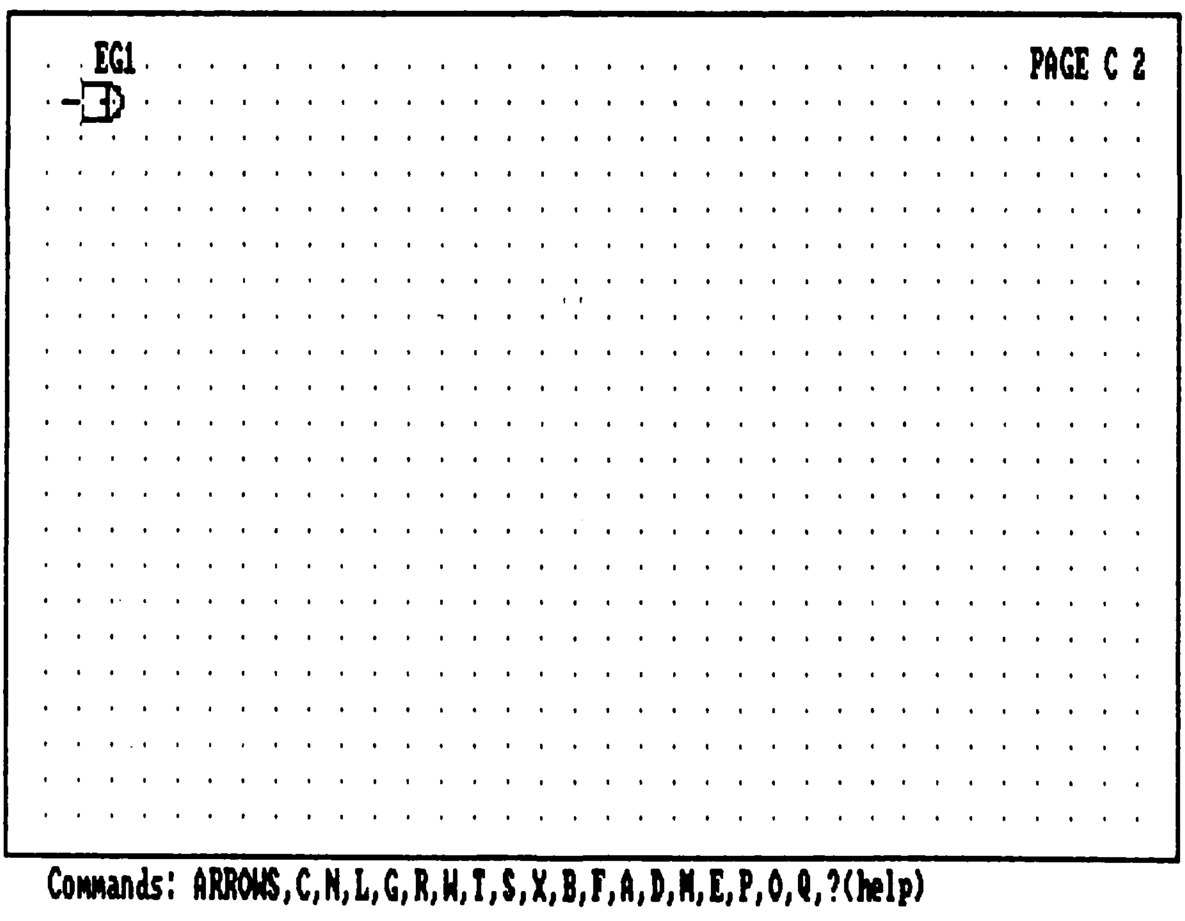


Figure 7.1.4: Submodel Node Placement

Continue constructing the network by adding branches and nodes. There is no contiguous restriction for building the network, so you can add a node or branch anywhere at anytime. Since a branch has direction representing the flow of logic, each branch segment must begin at the endpoint of the branch segment preceding it or at a node. These branch segments can be drawn in any order as long as the final branch connecting the nodes is contiguous and does not consist of branches whose directions differ.

A branch that does not have an end node will be coded as a RETURN branch. For more information concerning RETURN branches, reference the SNAP User's Manual, page 48.

In some cases you may want to specify the sequence in which the branches will be taken. To accomplish this you have the option of ranking your branches when you are inside the network builder. Each branch may have a rank between -99 and 100, with a default ranking of 0. The lower the rank the higher the priority.

Other restrictions on branches are that they can only contain 20 bend points, they cannot emanate from a goto or exit node, and there cannot be any more than 99 branches leaving a single node.

To input a branch move the cursor to the point where the branch is to begin and type [B]. Then by moving the cursor the branch is drawn. To place bend points on a branch type [SPACE] at the desired location and continue on with the branch. To end the branch, type [RETURN] at the desired location.

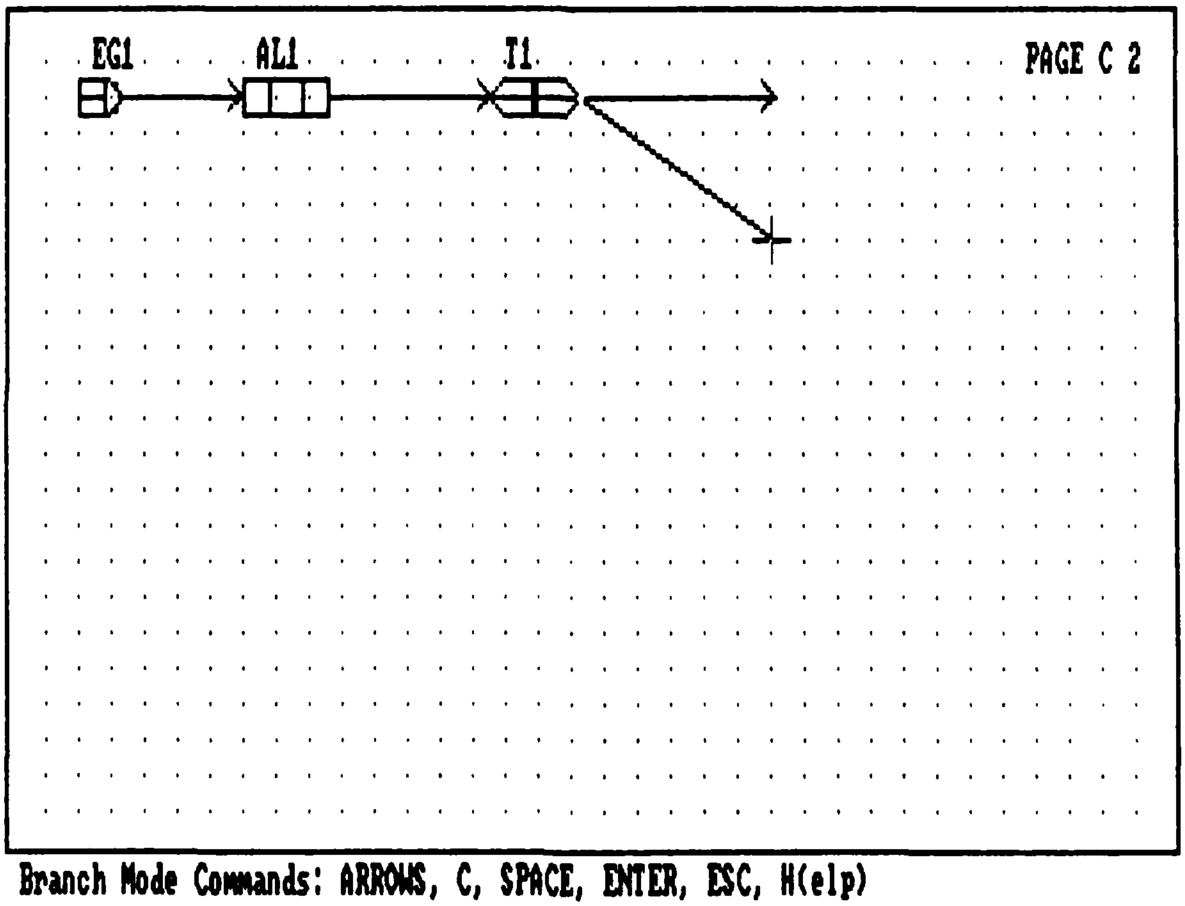


Figure 7.1.5: Branch Mode

	Description of Branch Mode Commands
ARROWS	Move the crosshair in the appropriate direction and update the "rubber band" branch from the current origin point to the crosshair location. (The initial origin point is the current crosshair location at the time the line mode is initiated, but it may be updated by the SPACE command. See below.)
C)rosshair	Toggle the crosshair speed between fast and slow.
SPACE	Make the current "rubber band" branch permanent, and then begin entry of a new branch with its origin at the current crosshair location.
ENTER	Make the current "rubber band" branch permanent, and then return to the main command menu.
ESC	Abort entry of the current branch and return to the main command menu.

Press any key to continue.

Figure 7.1.5a: Branch Mode Help

The goto node is used to continue a network from one page to another. In the example below the branches leaving task node, T9, actually connect with the nodes T10 and T14 on some other page. The goto node is used to show this relationship. The label for the goto node must be the same as the node it points to. It is not necessary, however, that the goto node point to a node on another page. You may use it to point to a node on the same page. This capability reduces the number of long branches you may need on a page. In the example shown in Figure 7.1.6, task node T2 is connected to task node T4 through the use of a goto node.

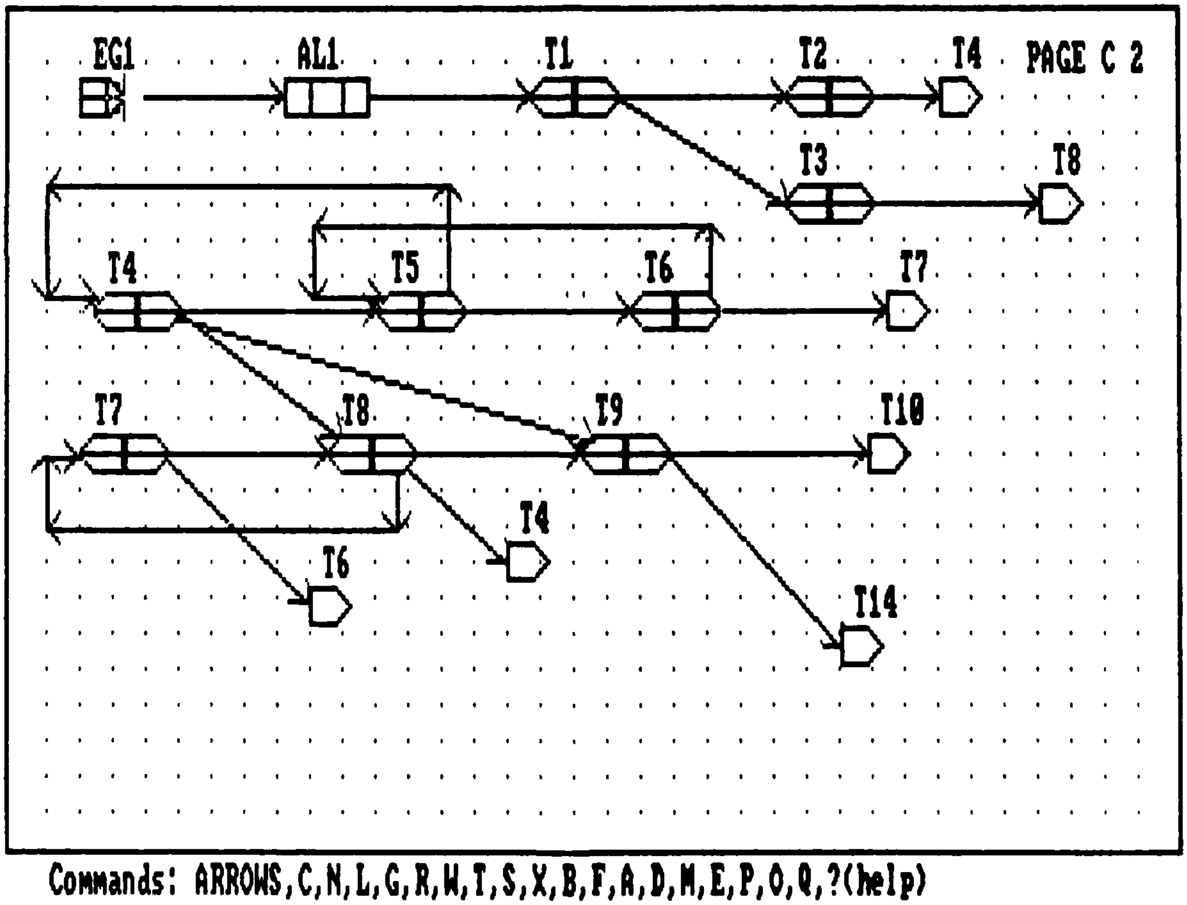


Figure 7.1.6: The Goto Node

You may enter a line of text on your page by using the (A)nnotation command. The text is left-justified at the current location of the cursor.

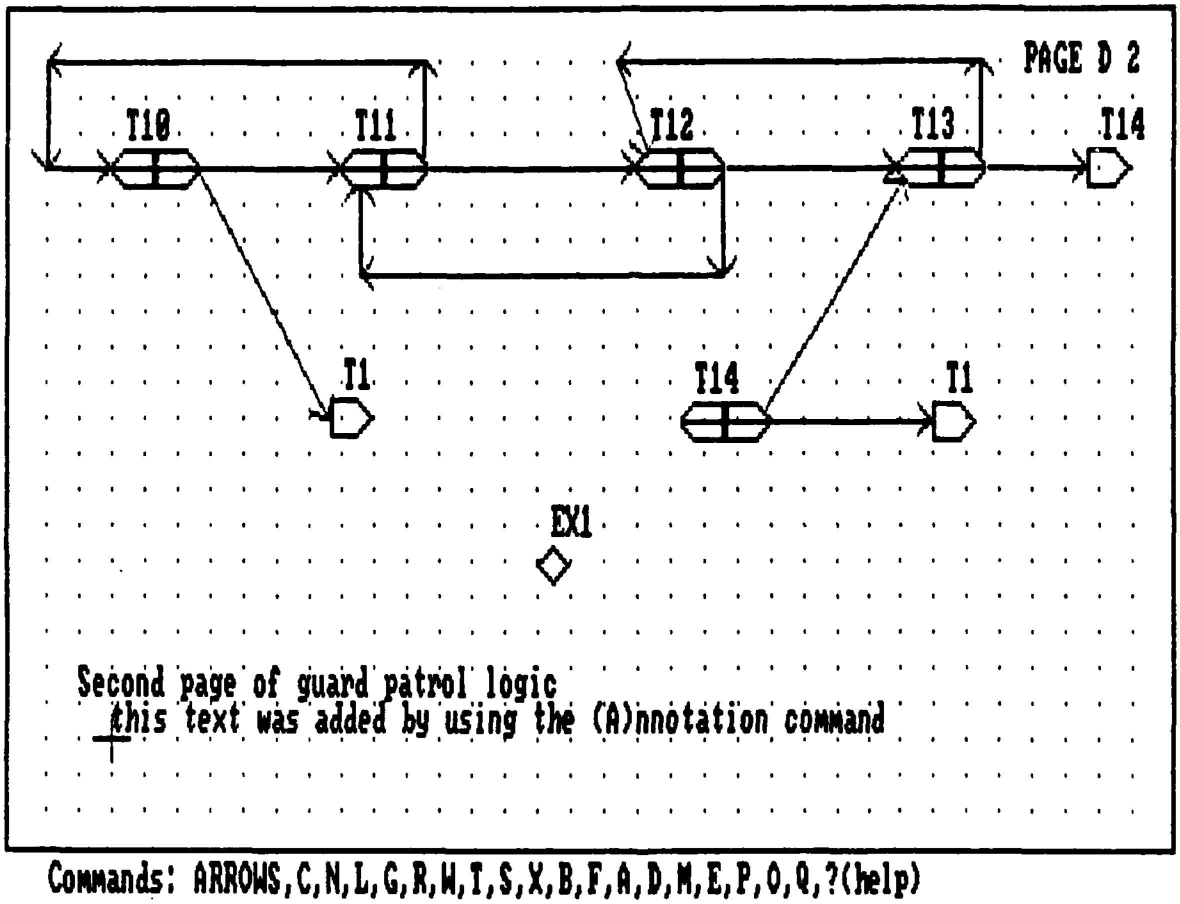


Figure 7.1.7: Network Annotation

At some time during the construction of your network you must supply supporting data for every node, except the goto nodes. By typing [F] you will enter the (F)ill mode.

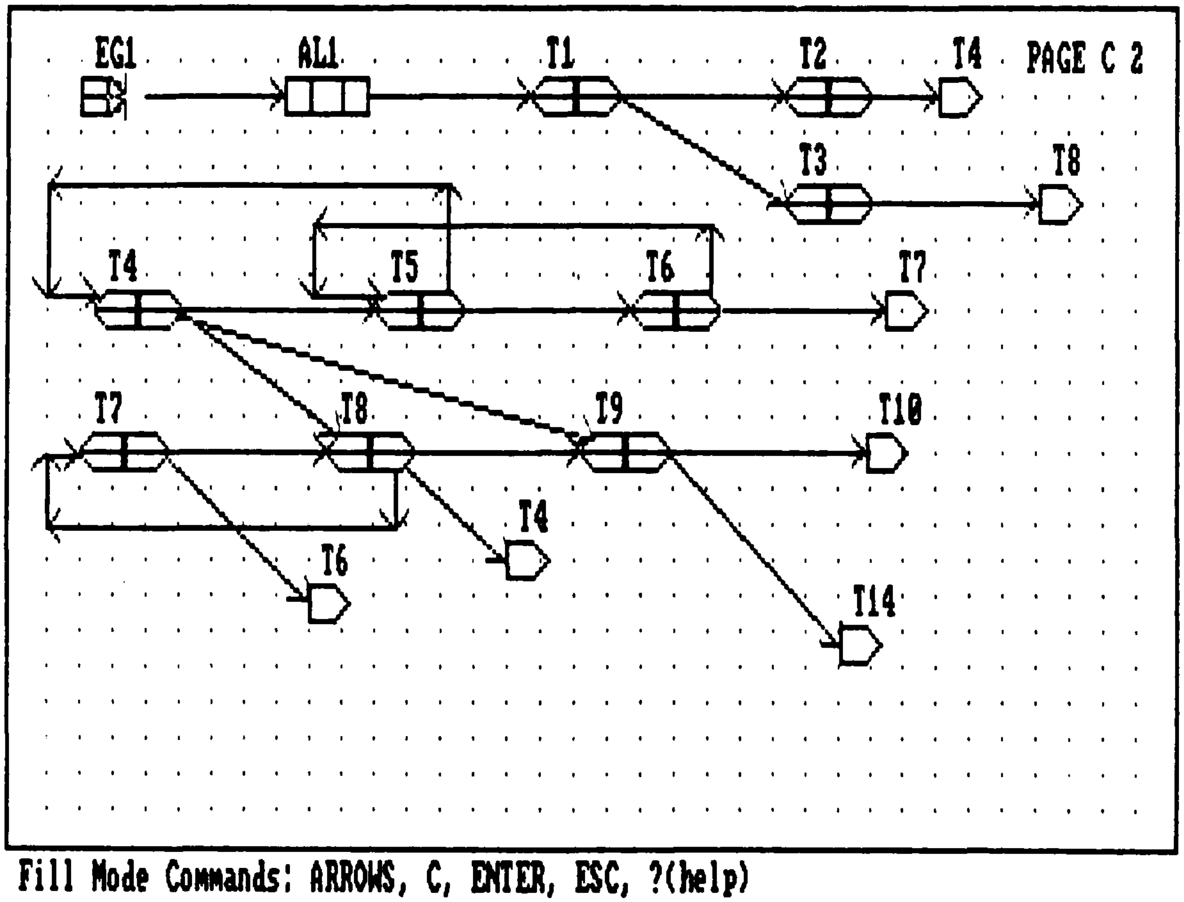


Figure 7.1.8: Fill Mode

Description of Fill Mode Commands

ARROWS	Move the crosshair in the appropriate direction.
C)rosshair	Toggle the crosshair speed between fast and slow.
ENTER	Enter the fill menu of the node which is positioned at the current location of the crosshair. This allows user to fill in the data associated with the node.
ESC	Quit the fill command and return to the main option menu.

Press any key to continue.

Figure 7.1.8a: Fill Mode Help

The new set of commands directs you to move the cursor to the node that you wish to fill and to type [RETURN]. The data input menu that is shown will depend on the type of submodel that you are building.

The data input menu for all seven node types is shown on the next several pages. Each menu is followed by its corresponding help screen. Note the difference between the guard and adversary enter node menus.

```
                                                    NETWORK <- ESC

                        GUARD ENTER NODE MENU

   Label: EG1   Comment:

   Time of arrival (minutes): 0.0

   Initial facility location:

   Maximum number of branches to be taken: 1

   Do you wish to define branches? NO

   Enter SAVE to save current values, QUIT to exit without saving:

        ↑↓ - To Choice                                 ? - Help
```

Figure 7.1.9: Guard Enter Node Menu

QUIT <- ESC

GUARD ENTER NODE HELP

Definition	Options	Default
Time of arrival (minutes)	a constant	0
Initial facility location	a facility label	blank
Maximum number of branches to be taken	positive integer	1

@xx - where xx is a number, may be entered in most fields to note parameters
**** - denotes fields which cannot be defaulted
ESC - will cancel any changes made to this menu screen during this session

[RETURN] - To Continue . . .DONE

Figure 7.1.9a: Guard Enter Node Help

NETWORK <- ESC

ADVERSARY ENTER NODE MENU

Label: AE1 Comment:

Size of force: 1 Type of weapon: HG

Proficiency: 0

Time of arrival (minutes): 0.0

Initial facility location:

Maximum number of branches to be taken: 1

Do you wish to define branches? NO

Enter SAVE to save current values, QUIT to exit without saving:

↑↓ - To Choice ? - Help

Figure 7.1.10: Adversary Enter Node

QUIT <- ESC

ADVERSARY ENTER NODE HELP

Definition	Options	Default
Force size	integer	1
Weapon type	HG-handgun SG-shotgun SA-semi-automatic SM-submachine gun FA-fully automatic NW-no weapon	HG
Proficiency	-100 to 100	0

[RETURN] - To Continue . . . MORE

QUIT <- ESC

Time of arrival (minutes)	a constant	0
Initial facility location	a facility label	blank
Maximum number of branches to be taken	postive integer	1

@xx - where xx is a number, may be entered in most fields to note parameters
**** - denotes fields which cannot be defaulted
ESC - will cancel any changes made to this menu screen during this session

[RETURN] - To Continue . . . DONE

Figure 7.1.10a: Adversary Enter Node Help

```
                                                         NETWORK <- ESC
-------------------------------------------------------------------------

                          ALLOCATE NODE MENU

   Label: AL1   Comment:

   Base label: **

   Number of guards being allocated: 0

   Maximum number of branches to be taken: 1

   Do you wish to define branches? NO

   Enter SAVE to save current values, QUIT to exit without saving:



-------------------------------------------------------------------------
        ↑ ↓ - To Choice                                  ? - Help
```

Figure 7.1.11: Allocate Node Menu

```
                                                          QUIT <- ESC
-------------------------------------------------------------------------
                          ALLOCATE NODE HELP
                          ------------------

          Definition                      Options                Default
          ----------                      -------                -------
 Base label                          label of a BASE               **

 Number of guards being              integer >= 0 or global        0
   allocated                            variable

 Maximum number of branches          positive integer              1
   to be taken

 @xx    - where xx is a number, may be entered in most fields to note
          parameters
 ****   - denotes fields which cannot be defaulted
 ESC    - will cancel any changes made to this menu screen during this
          session

-------------------------------------------------------------------------
   [RETURN] - To Continue                                      . . .DONE
```

Figure 7.1.11a: Allocate Node Help

```
                                                        NETWORK <- ESC
----------------------------------------------------------------------

                            RTB NODE MENU

   Label: RTB  Comment:

   Base label: **

   Maximum number of branches to be taken:  1

   Do you wish to define branches? NO

   Enter SAVE to save current values, QUIT to exit without saving:






----------------------------------------------------------------------
          ↑ ↓ - To Choice                              ? - Help
```

Figure 7.1.12: RTB Node Menu

```
                                                         QUIT <- ESC
----------------------------------------------------------------------
                            RTB NODE HELP
                            -------------

                Definition                 Options           Default
                ----------                 -------           -------

  Base label                          label of a BASE           **

  Maximum number of branches          positive integer           1
    to be taken

  @xx    - where xx is a number, may be entered in most fields to note
           parameters
  ****   - denotes fields which cannot be defaulted
  ESC    - will cancel any changes made to this menu screen during this
           session



----------------------------------------------------------------------
  [RETURN] - To Continue                                    . . .DONE
```

Figure 7.1.12a: RTB Node Help

```
                                                              NETWORK <- ESC
---------------------------------------------------------------------------

                          SIGNAL NODE MENU

    Label: SIGN Comment:

    Signal specification: **          **      **

    Maximum number of branches to be taken: 1

    Do you wish to define branches? NO

    Enter SAVE to save current values, QUIT to exit without saving:

---------------------------------------------------------------------------
          ↓↑ - To Choice                                  ? - Help
```

Figure 7.1.13: Signal Node Menu

QUIT <- ESC

SIGNAL NODE HELP

Definition	Options	Default
Signal specification	See next page	**
Maximum number of branches to be taken	positive integer	1

@xx - where xx is a number, may be entered in most fields to note parameters
**** - denotes fields which cannot be defaulted
ESC - will cancel any changes made to this menu screen during this session

[RETURN] - To Continue . . .MORE

QUIT <- ESC

The SIGNAL specification takes one of two general forms.

RS1	RS2	RS3
LOGIC POINT or WAIT node label	TEMPORARY PERMANENT	TISV TRAN blank
ADVERSARY GUARD	Facility Location or Force Identifier	TISV TRAN Network node label where force goes

[RETURN] - To Continue . . .DONE

Figure 7.1.13a: Signal Node Help

```
                                                     NETWORK <- ESC
---------------------------------------------------------------------

                          EXIT NODE MENU

   Label: EX1   Comment:

   Stop option:

   Enter SAVE to save current values, QUIT to exit without saving:










---------------------------------------------------------------------
          ↑ ↓ - To Choice                              ? - Help
```

Figure 7.1.14: Exit Node Menu

```
                                                       QUIT <- ESC
---------------------------------------------------------------------
                             EXIT NODE HELP
                             --------------

                Definition                 Options          Default
                ----------                 -------          -------

   Stop option                          blank or STOP        blank


   @xx    - where xx is a number, may be entered in most fields to note
            parameters
   ****   - denotes fields which cannot be defaulted
   ESC    - will cancel any changes made to this menu screen during this
            session




---------------------------------------------------------------------
  [RETURN] - To Continue                                    . . .DONE
```

Figure 7.1.14a: Exit Node Help

NETWORK <- ESC

TASK NODE MENU

Label: T12 Comment:

Facility location: Mode:

Task time: CON(0) Auxiliary action:

Win engagement label: Start engagement label:

Maximum number of branches to be taken: 1

Define engagement pointers: NO

Do you wish to define branches? NO

Enter SAVE to save current values, QUIT to exit without saving:

↑ ↓ - To Choice ? - Help

Figure 7.1.15: Task Node Menu

QUIT <- ESC

TASK NODE HELP

Definition	Options	Default
Facility location	facility label or blank	blank (no change)
Mode	Guard: PATROL, NEUTRALIZE, blank Adversary: ENTER, PENETRATE, EXIT, blank	blank (no change)
Task time	See User's Guide	CON(0)

[RETURN] - To Continue . . .MORE

Figure 7.1.15a: Task Node Help

			QUIT <- ESC
Auxiliary action	ACTIVATE(LBL) DISABLE(LBL) SET(GLBL,value) CALL(MLBL) MARK(TIMR) RECORD(TIMR)	blank (no auxiliary action)	
Win engagement label	blank, CONTINUE STOP, node label	blank	
Start engagement label	blank, or node label	blank	
[RETURN] - To Continue			. . .MORE

			QUIT <- ESC
Maximum number of branches to be taken	positive integer	1	

@xx - where xx is a number, may be entered in most fields to note parameters
**** - denotes fields which cannot be defaulted
ESC - will cancel any changes made to this menu screen during this session

[RETURN] - To Continue . . .DONE

Figure 7.1.15a: Task Node Help (continued)

NETWORK <- ESC

WAIT NODE MENU

Label: W1 Comment:

Auxiliary action:

Win engagement label: Start engagement label:

Maximum number of branches to be taken: 1

Define triggers to release the force: NO

Define engagement pointers: NO

Do you wish to define branches? NO

Enter SAVE to save current values, QUIT to exit without saving:

↑ ↓ - To Choice ? - Help

Figure 7.1.16: Wait Node Menu

```
                                                          QUIT <- ESC
-----------------------------------------------------------------------
                              WAIT NODE HELP
                              --------------

          Definition                 Options                  Default
          ----------                 -------                  -------

 Auxiliary action                 MERGE,TRANSFER, or blank      blank

 Win engagement label             blank                         blank
                                  CONTINUE
                                  STOP
                                  Node label

 Start engagement label           blank or node label           blank


 Maximum number of branches       positive integer                1
   to be taken

-----------------------------------------------------------------------
   [RETURN] - To Continue                                     . . .MORE
```

```
                                                          QUIT <- ESC
-----------------------------------------------------------------------

 Define triggers to release       See HELP under trigger
   the force                        menu

 Define engagement pointers       See HELP under engagement
                                    pointer menu

 @xx     - where xx is a number, may be entered in most fields to note
           parameters
 ****    - denotes fields which cannot be defaulted
 ESC     - will cancel any changes made to this menu screen during this
           session

-----------------------------------------------------------------------
   [RETURN] - To Continue                                     . . .DONE
```

Figure 7.1.16a: Wait Node Help

The wait node triggers define the conditions that must exist to release the forces at the wait node. To describe the triggers, answer '<u>yes</u>' to the define trigger question. You must follow the format for triggers exactly as shown in the trigger help information or a SNAP input error will be detected at the time of execution. You must supply a trigger for every wait node.

```
WAIT NODE W1                                  LISTING MENU <- ESC

            RELEASE TRIGGER MENU

Trigger:
*


    Exit release trigger menu:        NO




↑↓- To Choice                                   ? - Help
```

Figure 7.1.17: Release Trigger Menu

```
QUIT <- ESC
-----------------------------------------------------------------------
                         TRIGGER HELP
                         ------------

           TRIGGER                              WAIT FOR
           -------                              --------

     GUARD,facility label                guard at facility location

     ADVERSARY,facility label            adversary at facility location

     ADD,ADD label                       ADD to be triggered

     SIGNAL                              signal from another force

     TINC, value or global               a period of time in munites
       variable

     ENGAGEMENT,facility label           engagement at facility location
-----------------------------------------------------------------------
 [RETURN] - To Continue                                     . . .MORE
```

```
QUIT <- ESC
-----------------------------------------------------------------------

      Triggers may be combined with an .AND. operator to form combined
 triggers (e.g., GUARD,SP1.AND.ADD,M1).  Multiple triggers (OR conditions)
 may be specified by separating (possibly combined) triggers with .OR.
 operators (e.g., GUARD,SP.AND.ADD,M1.OR.TINC,2).

      Any trigger, except TINC, can be preceded by a "NOT." operator.
 The "NOT." applies only to the trigger immediately following.

      EXAMPLES
      --------

               (GUARD,SP1.OR.NOT.ENGA,SP6)

               (NOT.ADD,S1)

               (NOT.GUA,SP2.AND.NOT.ENGA,SP2.OR.TINC,5)

-----------------------------------------------------------------------
 [RETURN] - To Continue                                     . . .MORE
```

Figure 7.1.17a: Trigger Help

```
                                                        QUIT <- ESC
-----------------------------------------------------------------------
  @xx    - where xx is a number, may be entered in most fields to note
           parameters
  ****   - denotes fields which cannot be defaulted
  ESC    - will cancel any changes made to this menu screen during this
           session
-----------------------------------------------------------------------
  [RETURN] - To Continue                                      . . .DONE
```

Figure 7.1.17a: Trigger Help (continued)

At the time you supply data for a node you will have the option to define the branches that emanate from it. By answering '<u>yes</u>' to the define branches question, a list of all branches leaving that node will be displayed on the screen. You may cursor to the branch you wish to define and select it by typing [RETURN].

```
 BRANCHES FROM NODE     T8                                   NODE MENU <- ESC
-----------------------------------------------------------------------------
     TO                                                              FOR-
 TYPE NODE                        COMMENT                    RANI    TION
  DEC T9                                                       3      0.0
  DEC T4                                                       1      0.0
  DEC T7                                                       2      0.0
            Quit Branch Editing Session and Save
-----------------------------------------------------------------------------
     ↑ ↓ - To Choice          [RETURN] - Make Choice          ? - Help
```

Figure 7.1.18: Branch Selection List Menu

```
                                                              QUIT <- ESC
--------------------------------------------------------------------------
                          BRANCH SELECTION HELP
                          ---------------------

     Arrows - move up or down the list one item at a time.

     PgUp - move up the list a page at a time.

     PgDn - move down the list a page at a time.

     Home - move to the top of the list.

     End  - move to the bottom of the list.

     RETURN - Fill/Edit branch currently selected.

--------------------------------------------------------------------------
  [RETURN] - To Continue                                        . . .DONE
```

Figure 7.1.18a: Branch Selection Help

The branch input menu for a regular branch will be displayed for all new branches. If there is only one branch leaving the node, you will enter this menu directly, skipping the branch listing menu. If you change the branch type to decision, DEC, or probability, PRO, additional data is required. The decision and probability branch menus are displayed in Figures 7.1.20 and 7.1.21.

```
                                              BRANCH LISTING <- ESC
-------------------------------------------------------------------

     Define branch from node AL1  to node T1

  Comment:

  Portion of force to take this branch: 0.0

  Branch type, (REG, DEC, PRO): REG

  Branch ranking: 0



  Exit branch menu: NO

-------------------------------------------------------------------
        ↑↓ - To Choice                              ? - Help
```

Figure 7.1.19: Regular Branch Menu

```
                                                  BRANCH LISTING <- ESC

      Define branch from node T1   to node T2

   Comment:

   Portion of force to take this branch: 0.0

   Branch type, (REG, DEC, PRO): PRO

   Probability for branch: .50

   Branch ranking: 0


   Exit branch menu: NO


         ↑ ↓ - To Choice                              ? - Help
```

Figure 7.1.20: Probability Branch Menu

```
                                                  BRANCH LISTING <- ESC

      Define branch from node T5   to node T6

   Comment:

   Portion of force to take this branch: 0.0

   Branch type, (REG, DEC, PRO): DEC

   Condition for branch:
(FI.IS.ACT)

   Branch ranking: 2

   Exit branch menu: NO

         ↑ ↓ - To Choice                              ? - Help
```

Figure 7.1.21: Decision Branch Menu

QUIT <- ESC

BRANCH HELP

Definition	Options	Default
Portion of the force to take this branch	0 - all available <1 - fraction of force >1 - number of individuals to send	0
Branch Type	REGULAR or DECISION or PROBABILISTIC	Reg
Ranking is used to determine the order in which branches are to be evaluated. Lower the ranking the higher the priority.	-99 to 100	0

[RETURN] - To Continue . . .MORE

QUIT <- ESC

DECISION Branching

Condition to test. If it is true, the branch is taken	See User's Guide	**

PROBABILISTIC Branching

Probability of selecting this branch	constant or global variable between 0 and 1	0.5

@xx - where xx is a number, may be entered in most fields to note parameters
** - denotes fields which cannot be defaulted
ESC - will cancel any changes made to this menu screen during this session

[RETURN] - To Continue . . .DONE

Figure 7.1.21a: Branch Help

To enter the wait and task node engagement pointers you must answer 'YES' to the define engagement pointers question. The list of engagement pointers will appear initially blank. To add an engagement pointer to the list type [A].

```
 ENGAGEMENT POINTERS FOR NODE  T12                        NODE MENU <- ESC
---------------------------------------------------------------------------
        FACILITY                          ENGAGEMENT
NO.     LOCATION          RANGE            LABEL
  1      SAVE













---------------------------------------------------------------------------
      ↑↓ - To Choice   A - ADD   D - DEL   <RET> - EDIT        ? - Help
```

Figure 7.1.22: Engagement Pointer Selection List Menu

```
                                                              QUIT <- ESC
---------------------------------------------------------------------------
                           ENGAGEMENT POINTER SELECT HELP
                           ------------------------------
     Arrows - move up or down the list one item at a time.

     PgUp - move up the list a page at a time.

     PgDn - move down the list a page at a time.

     Home - move to the top of the list.

     End  - move to the bottom of the list.

     A - Add an engagement pointer to list above current line.

     D - Delete engagement pointer currently selected.

     RETURN - Edit engagement pointer currently selected.

---------------------------------------------------------------------------
  [RETURN] - To Continue                                         . . .DONE
```

Figure 7.1.22a: Engagement Pointer Selection Help

An input menu will be displayed allowing you to enter the data associated with the new engagement pointer. The range must be specified as an integer. To save and exit the menu you must type [RETURN] in the last data field.

```
ENGAGEMENT POINTERS FOR NODE  T12                    LISTING MENU <- ESC

                        ENGAGEMENT POINTER MENU

   Facility location:       **

   Range (meters): 10

   Label for engagement processing:


      ↑↓- To Choice                                     ? - Help
```

Figure 7.1.23: Engagement Pointer Menu

```
                                                            QUIT <- ESC

                          ENGAGEMENT POINTER HELP
                          -----------------------

              Definition                   Options              Default
              ----------                   -------              -------
   Facility location                   facility label             **

   Range                               distance in meters         10

   Label for engagement processing     PENG label            as specified on
                                                             ENGAGEMENT card

   RETURN - in last field to return to NODE MENU with updated information
   @xx    - where xx is a number, may be entered in most fields to note
            parameters
   ****   - denotes fields which cannot be defaulted
   ESC    - will cancel any changes made to this menu screen during this
            session

    [RETURN] - To Continue                                       . . .DONE
```

Figure 7.1.23a: Engagement Pointer Help

Once you leave the data input menu, the engagement pointer list will be displayed containing the updated information. You may continue to add new engagement pointers or edit or delete old pointers. To save the changes you made during the session select the 'SAVE' option.

```
   ENGAGEMENT POINTERS FOR NODE  T12                          NODE MENU <- ESC

          FACILITY                              ENGAGEMENT
NO.       LOCATION            RANGE               LABEL
 1          03                  10                 FG1
 2          SAVE

        ↑↓ - To Choice   A - ADD   D - DEL   <RET> - EDIT        ? - Help
```

Figure 7.1.24: Engagement Pointer Selection List Menu After Input

There are several support commands available to aid you in the construction of your submodel. These commands are [D]elete, [M]ove, [E]dit, [P]rint, and [O]ptions.

The delete command allows you to remove a node, branch or annotation from a page. To delete an item place the cursor in the middle of the node or branch, or at the beginning of a text string and type [D]. The item selected for deletion will begin to flash and you will be asked to verify the selection. Answer yes to the query and the item will be deleted.

The edit command allows you to change the node label of a node. You can change the label by placing the cursor in the middle of the node you wish to edit and type [E]. Then enter the new label in the field which appears. The node will be redrawn with the new label.

The print command is used to print a hard copy of the current page. By typing [P] and verifying that you want a copy, the page is printed.

The move command is used to move a node from one position to another. Place the cursor in the middle of the node you wish to move and type [M]. You can then move the node around the page using the arrow keys. Type [RETURN] to fix the node at its new location.

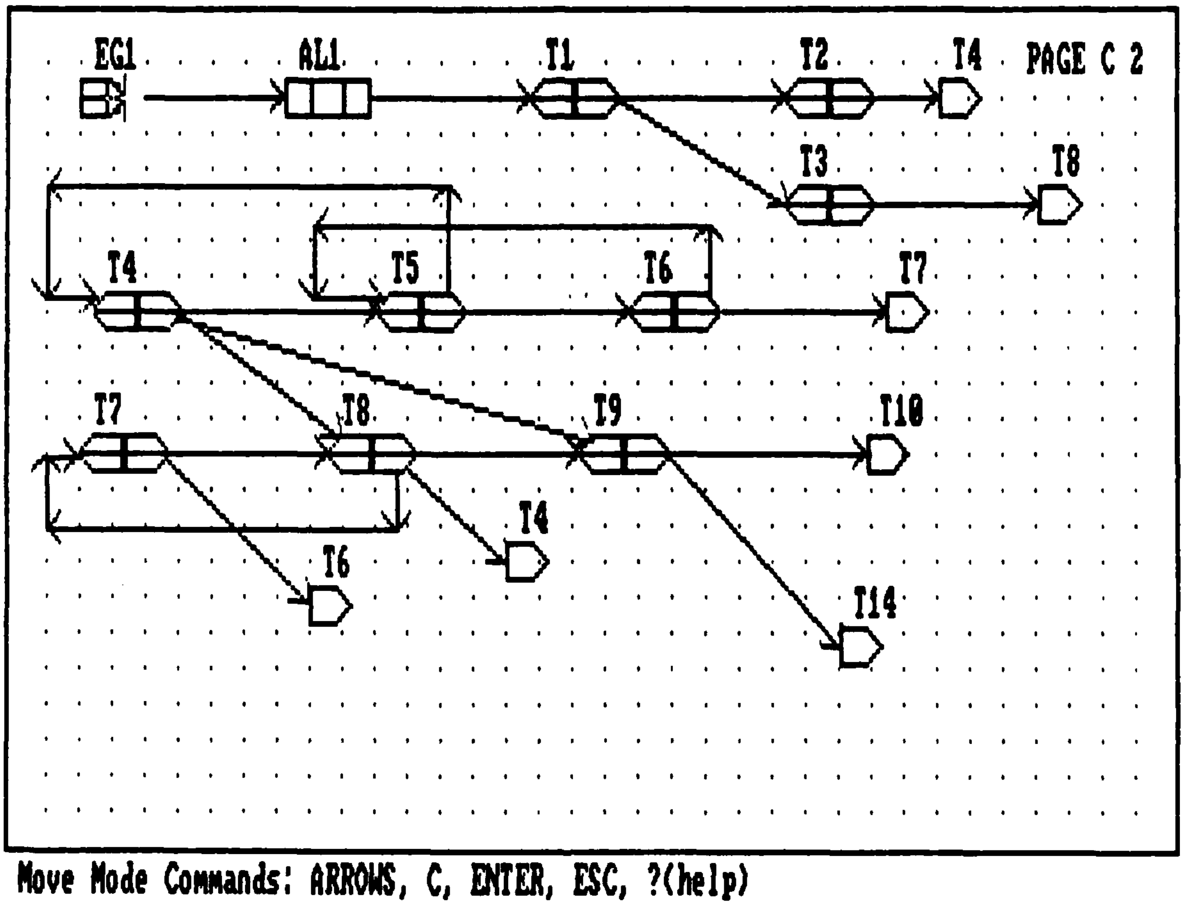


Figure 7.1.25: Move Mode

Description of Move Mode Commands

ARROWS	Move the crosshair and associated node or text in the appropriate direction.
C)rosshair	Toggle the crosshair speed between fast and slow.
ENTER	Complete the move command by fixing the location of the node or text associated with the crosshair at its current location. End move mode and return to the main command menu.
ESC	Abort the current move command and return the node or text associated with the crosshair to its position prior to the start of the move command. End move mode and return to the main command menu.

Press any key to continue.

Figure 7.1.25a: Move Mode Help

The display [O]ption command toggles the display of the grid, the node labels, and the annotation.

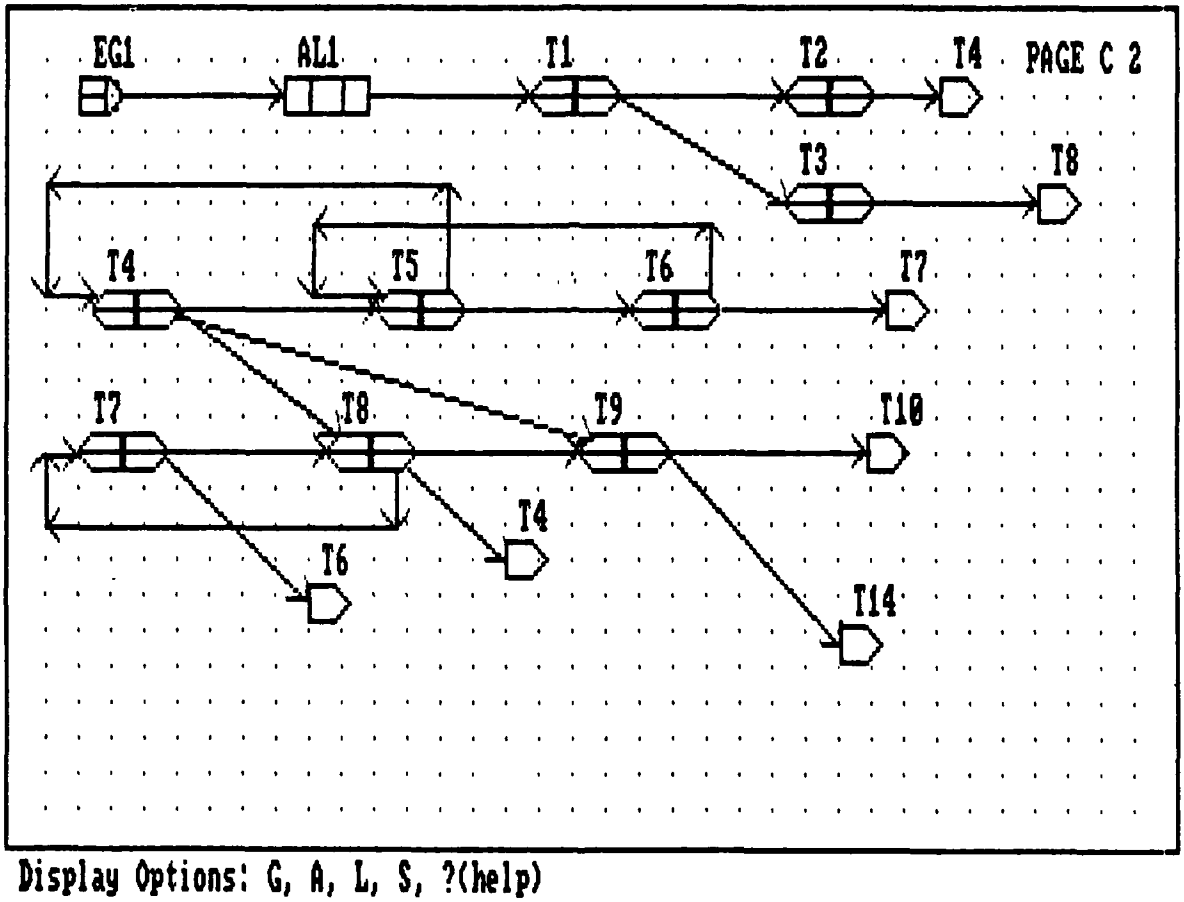


Figure 7.1.26: Display Options Mode

```
            Description of Display Option Commands
            ------------------------------------

G)rid       Toggle the grid display on or off.

A)nnotation Toggle the display of annotation on or off.

L)abel      Toggle the display of SNAP node labels on or off.

S)tatus     Display a report on the status of the display options,
            status of the current display page and status of the
            overall facility.

All display option commands return to the main command menu upon completion.
```

Press any key to continue.

Figure 7.1.26a: Display Options Mode Help

You may also display the status of your submodel. This option gives you a summary of the network status, page status, and display status. The network status consists of the number of branches, nodes, and annotations currently in the submodel and the number of bytes free in memory. Since memory is dynamically allocated, the size of your submodel is limited only by the amount of memory you have on your microcomputer. As shown in Figure 7.1.27, the number of bytes free will always read 65000 until you have less than that amount available.

Network: C:\SNAP\USER1\SCRATCH

Network Status	Page Status	Display Status
40 Branches	Page No. D, 3	Grid: ON
25 Nodes	28 Branches	Annotation: ON
2 Annotations	18 Nodes	Nodes: ON
65000 Bytes Free	0 Annotations	Node Labels: ON

Press any key to continue.

Figure 7.1.27: Network Status Diagram

Once you have completed the construction of the graphical portion of your submodel, exit the current page by typing [Q]. The page selection screen will be displayed. Pages with submodel information on them are denoted by an asterisk.

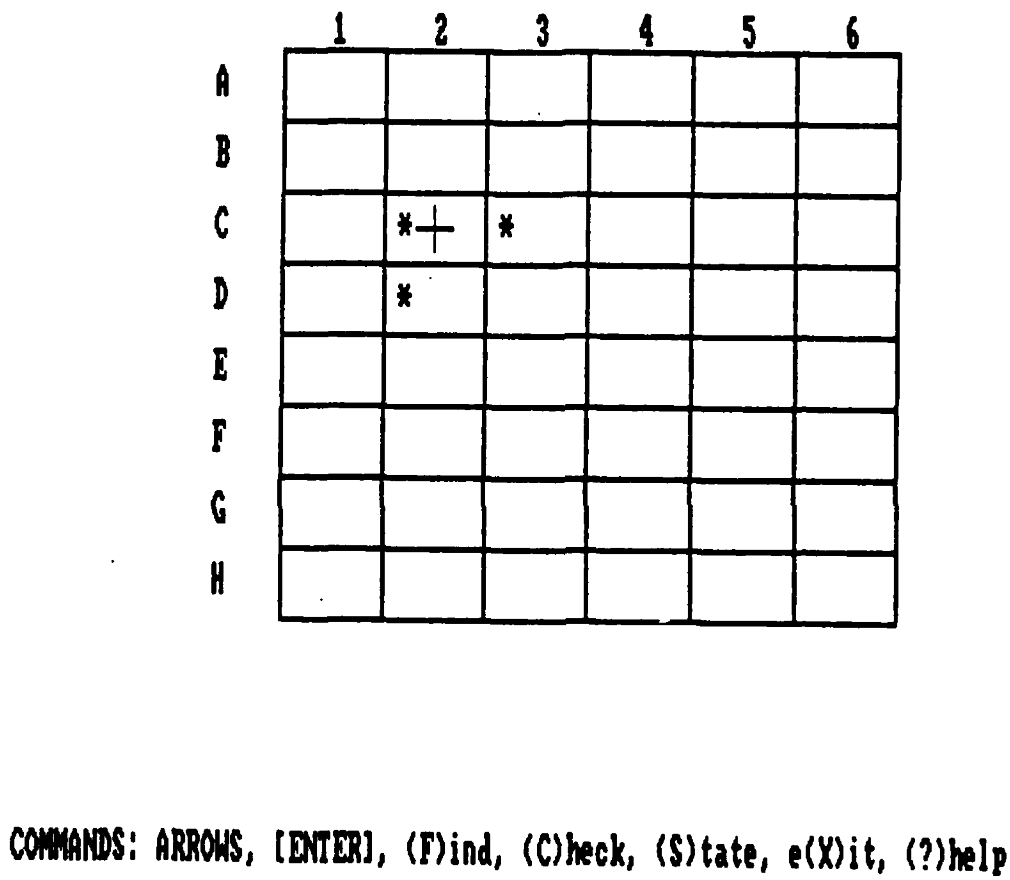


Figure 7.1.28: Network Builder Page Selection Screen After Network Construction

To verify that you have supplied the data for each node, you can perform a check on the network by typing [C]. A message will be displayed at the bottom of the screen each time an empty or unfilled node is found. You must hit any key to continue the search. When it has completed, the message 'Finished search. Hit any key to continue' will be displayed. You must fill every node before you can generate a valid SNAP input statement file.

	1	2	3	4	5	6
A						
B						
C		*	*			
D		*				
E						
F						
G						
H						

Node T6, on page C, 2 has not been filled. Hit a key to continue.

Figure 7.1.29: Check Option

To find the page on which a node is located, you may use the (F)ind command. By typing [F] and entering the node label in the field that is displayed, the program will return the page identifier in which the node is found. If a node is associated with goto nodes, the program returns the page identifier for all goto nodes and the node itself.

	1	2	3	4	5	6
A						
B						
C		*	*			
D		*				
E						
F						
G						
H						

Node label? ▮

Figure 7.1.30: Find Option

To complete the submodel you must supply the engagement, combination, PENG, DENG, BASE and objective statements. To enter the statement definition mode you must type [S] while on the page selection screen. The 'STATEMENT DEFINITION MENU' will be displayed. The guard and adversary statement definition menus are shown in Figures 7.1.31 and 7.1.32. The two submodel menus differ only in the third statement type. For a guard submodel you must define BASE statements and for an adversary submodel you must define an objective statement.

```
                                                  PAGE SELECT <- ESC

                      STATEMENT DEFINITION MENU

     -> Define engagement statement
     -> Define combinations statement
     -> Define BASE statements
     -> Define PENG statements
     -> Define DENG statements
     -> Quit statement definition menu

     ↑ ↓ - To Choice                                   ^ - Help
```

Figure 7.1.31: Guard Statement Definition Menu

```
                                                    PAGE SELECT <- ESC
-----------------------------------------------------------------------

                  STATEMENT DEFINITION MENU


    -> Define engagement statement
    -> Define combinations statement
    -> Define objective statement
    -> Define PENG statements
    -> Define DENG statements
    -> Quit statement definition menu

-----------------------------------------------------------------------
    ↑ ↓ - To Choice                                        ? - Help
```

Figure 7.1.32: Adversary Statement Definition Menu

```
                                                           QUIT <- ESC
-----------------------------------------------------------------------

                  STATEMENT DEFINITION HELP
                  -------------------------

     There are five statement types associated with the submodel.
     Submodels will not necessarily contain all of the statements,
     you need only to create the statements associated with your
     own model.  Move the highlighted block to the statement
     category you desire to create/edit and hit [RETURN].

-----------------------------------------------------------------------
   [RETURN] - To Continue                                    . . .DONE
```

Figure 7.1.32a: Statement Definition Help

The procedure for supplying the BASE, PENG and DENG statements are identical. The PENG statement will be used as an example. Select the PENG statement option to list all of the defined PENG statements. It will initially be blank. To add PENG statements to the list type [A].

```
 PENG STATEMENT DEFINITION                          STATE. DEF. <- ESC
-----------------------------------------------------------------------
          PENG       CORRESPONDING         TIME
NO.       LABEL          DENG            INTERVAL
 1         SAVE









-----------------------------------------------------------------------
    ↑↓ - To Choice   A - ADD   D - DEL   [RET] - EDIT        ? - Help
```

Figure 7.1.33: PENG Statement Selection List Menu

```
                                                        QUIT <- ESC
-----------------------------------------------------------------------
                       PENG STATEMENT SELECT HELP
                       --------------------------

    Arrows - move up or down the list one item at a time.

    PgUp - move up the list a page at a time.

    PgDn - move down the list a page at a time.

    Home - move to the top of the list.

    End  - move to the bottom of the list.

    A - Add a peng statement to list above current line.

    D - Delete peng statement currently selected.

    RETURN - Edit peng statement currently selected.

-----------------------------------------------------------------------
  [RETURN] - To Continue                                     . . .DONE
```

Figure 7.1.33a: PENG Statement Select Help

A menu containing default values will be displayed allowing you to enter the data associated with the PENG statement. To save the statement, type [RETURN] in the last data field. The list of PENG statements will now show the updated status. To add another PENG statement, you need only type [A]. It is imperative to SNAP that the PENG statements be in a particular order. When adding statements to a list remember that the new statement is inserted into the list prior to the line highlighted by the cursor. From the listing menu you may also delete a PENG statement (type [D]) or edit (type [RET]) an existing statement.

```
                                              LISTING MENU <- ESC
-----------------------------------------------------------------
                    PENG STATEMENT MENU
   PENG label: *
   Corresponding DENG label: *
   Time interval till next change: 1.E20









-----------------------------------------------------------------
   ↑ ↓ - To Choice                                  ? - Help
```

Figure 7.1.34: PENG Statement Menu

QUIT <- ESC

PENG STATEMENT HELP

Definition	Options	Default
PENG label	4 characters max	**
DENG label	label of DENG in same (GURAD or ADVESARY) section	**
Time interval till next change of characteristic	numeric (minutes)	1.E20

@xx - where xx is a number, may be entered in most fields to note parameters
**** - denotes fields which cannot be defaulted
ESC - will cancel any changes made to this menu screen during this session

[RETURN] - To Continue . . . DONE

Figure 7.1.34a: PENG Statement Help

The data input menus for the DENG and BASE statements are given on the next several pages. The procedure for supplying them is identical to that for the PENG statement.

```
                                                LISTING MENU <- ESC
-------------------------------------------------------------------

                         DENG STATEMENT MENU

    DENG label: *                  Posture: STANDING

    Exposure while firing: 100     Exposure while loading: 100

    Percent time delay: 0

    Self posture firing degradation: 0

    Illumination firing degradation: 0

    Suppression status: NO

    Tactic: ASSAULT

-------------------------------------------------------------------
     ↑↓ - To Choice                               ? - Help
```

Figure 7.1.35: DENG Statement Menu

QUIT <- ESC

DENG STATEMENT HELP

Definition	Options	Default
DENG label	4 characters max	**
Posture	CROUCHING, STANDING, OR PRONE	STANDING
Exposure while firing	numeric (0-100)	100
Exposure while loading	numeric (0-100)	100
Percent time delaying	numeric (0-100)	0

[RETURN] - To Continue . . .MORE

QUIT <- ESC

Self posture firing degradation	numeric (0-100)	0
Illumination firing degradation	numeric (0-100)	0
Suppression status	YES,NO	NO
Tactic	ASSAULT,DEFENSE	ASSAULT

@xx - where xx is a number, may be entered in most fields to note parameters
** - denotes fields which cannot be defaulted
ESC - will cancel any changes made to this menu screen during this session

[RETURN] - To Continue . . .DONE

Figure 7.1.35a: DENG Statement Help

LISTING MENU <- ESC

BASE STATEMENT MENU

BASE label: a

Initial number of guards at base: 1.0

Type of weapons: NW

Proficiency: 0.0

↑ ↓ - To Choice ? - Help

Figure 7.1.36: BASE Statement Menu

QUIT <- ESC

BASE ELEMENT HELP

Definition	Options	Default
BASE label	4 characters max	**
Initial number of guards in the BASE	integer	1.0
Weapon type	HG-handgun SG-shotgun SA-semi-automatic SM-submachine gun FA-fully automatic NW-no weapon	HG
Proficiency	-100 to 100	0.0

[RETURN] - To Continue . . .MORE

Figure 7.1.36a: BASE Statement Help

Unlike the PENG, DENG, and BASE statements which may have multiple statements per submodel, only one of the engagement, combination, and objective statement can exist in a submodel. The combination statement is not required for all submodels. To supply these statements, select the statement type from the 'STATEMENT DEFINITION MENU'. A data input menu containing the defaults will be displayed. By typing [RETURN] in the last data field you exit the menu and return to the 'STATEMENT DEFINITION MENU'.

```
                                                STATE. DEF. <- ESC
-------------------------------------------------------------------
                     ENGAGEMENT STATEMENT MENU

   Force size at which the force loses the engagement: 0
   PENG label for default engagement: *

-------------------------------------------------------------------
     ↑↓ - To Choice                                   ? -- Help
```

Figure 7.1.37: Engagement Statement Menu

QUIT <- ESC

ENGAGEMENT STATEMENT HELP

Definition	Options	Default
Force size at which the force loses the engagement	number or global variable	0
PENG label for default engagement	a defined PENG label	**

@xx - where xx is a number, may be entered in most fields to note parameters

**** - denotes fields which cannot be defaulted

ESC - will cancel any changes made to this menu screen during this session

[RETURN] - To Continue . . .DONE

Figure 7.1.37a: Engagement Statement Help

```
                                                        STATE. DEF. <- ESC
--------------------------------------------------------------------------

                     COMBINATION STATEMENT MENU


Force combination:
*










--------------------------------------------------------------------------
     ↑↓ - To Choice                                         ? - Help
```

Figure 7.1.38: Combination Statement Menu

```
                                                           QUIT <- ESC
--------------------------------------------------------------------------
                      COMBINATIONS STATEMENT HELP
                      ---------------------------

           Definition                    Options              Default
           ----------                    -------              -------

 List of force IDs                 positive integers             **

 @xx    - where xx is a number, may be entered in most fields to note
          parameters
 ****   - denotes fields which cannot be defaulted
 ESC    - will cancel any changes made to this menu screen during this
          session







--------------------------------------------------------------------------
   [RETURN] - To Continue                                       . . .DONE
```

Figure 7.1.38a: Combination Statement Help

```
                                                       STATE. DEF. <- ESC
-------------------------------------------------------------------------

                      OBJECTIVE STATEMENT MENU

Adversary mission objective: SABOTAGE

Facility locations:
*











-------------------------------------------------------------------------
        ↑ ↓ - To Choice                                    ? - Help
```

Figure 7.1.39: Objective Statement Menu

```
                                                            QUIT <- ESC
-------------------------------------------------------------------------
                         OBJECTIVE STATEMENT HELP
                         ------------------------

             Definition                  Options                Default
             ----------                  -------                -------

 Mission objective                   SABOTAGE or THEFT          SABOTAGE

 List of facility locations          defined facility              **
   that must be reached to             location
   satisfy objectives

 @xx    - where xx is a number, may be entered in most fields to note
          parameters
 ****   - denotes fields which cannot be defaulted
 ESC    - will cancel any changes made to this menu screen during this
          session

-------------------------------------------------------------------------
    [RETURN] - To Continue                                    . . .DONE
```

Figure 7.1.39a: Objective Statement Help

Once you have supplied all the statement information you may exit the statement definition mode by quitting from the 'STATEMENT DEFINITION MENU'.

If you have completed working with the submodel, you may leave from the graphical network builder by typing [X]. You will then be asked to supply a name under which the guard submodel will be saved. If you type [ESC] or enter quit in the name field, you will exit without saving any of the changes you have made. If you were editing an existing submodel, the name of that submodel would appear in the data field and, by typing [RETURN], you would save the updates to the submodel. If you supply a new submodel name, the updates will be stored under the new name and the old submodel will remain unchanged. If the new name is the same as an existing submodel, you may choose to re-enter the name or overwrite the old submodel.

```
WORKING SPACE: EXAMPLE                                      MAIN <- ESC
-----------------------------------------------------------------------
                      GUARD SUBMODEL FILE NAME MENU

        Enter a new name for this file:
         hit return for the default,
         or type QUIT to leave this menu without saving the new data.

-----------------------------------------------------------------------
  [RETURN] - To Continue
```

Figure 7.1.40: Guard Submodel File Name Menu

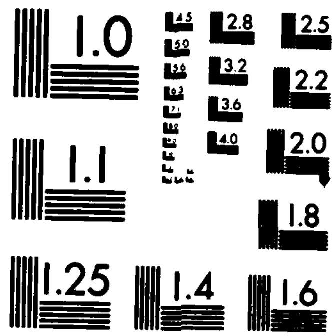
After you have entered the name for the submodel, you will be asked to supply a description to be associated with the submodel. A specific description will help identify what is contained in the submodel.

```
WORKING SPACE:  EXAMPLE                                    MAIN <- ESC
-----------------------------------------------------------------------

                    GUARD SUBMODEL FILE NAME MENU

      Enter a line of description for file:                DAY_ONE
      Or hit return to keep.

      Daytime guard patrol procedures with one patrolling force

-----------------------------------------------------------------------
   [RETURN] - To Continue
```

Figure 7.1.41: Guard Submodel File Name Description Menu

AD-A181 355 CREATING SECURITY SYSTEM MODELS USING SNAP-PC(U) SANDIA 3/4
NATIONAL LABS ALBUQUERQUE NM C D TOBIN ET AL. MAY 87
SAND86-7105 DE-AC04-76DP00789

UNCLASSIFIED F/G 12/5 NL



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

7.2 Edit a Guard Submodel

To edit an existing submodel choose the edit option on the 'GUARD MENU'.

```
  WORKING SPACE:  EXAMPLE                                  SUBMODEL <-ESC
-------------------------------------------------------------------------

                              GUARD MENU

        * Create a guard submodel
        * Edit a guard submodel
        * Generate SNAP input statements
        * List guard submodels
        * Delete a guard submodel
        * Quit

-------------------------------------------------------------------------
   ↑ ↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 7.2.1: Guard Menu
(Edit a guard submodel)

Then select from the list the submodel you wish to edit.

```
WORKING SPACE:  EXAMPLE                                          MAIN <- ESC
----------------------------------------------------------------------------
                     GUARD SUBMODEL SELECTION MENU

   NAME                          DESCRIPTION
   ----                          -----------

 DAY_ONE   Daytime guard patrol procedures with one patrolling force
 DAY_TWO   Daytime guard patrol procedures with two patrolling forces
 NGHT_ONE  nighttime guard patrolling procedures w/ one patrol force
 NGHT_TWO  nighttime guard patrol procedures w/ two patrolling forces
  QUIT      Quit this menu

----------------------------------------------------------------------------
   ↑ ↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 7.2.2: Guard Submodel Selection Menu

```
                                                                 QUIT <- ESC
----------------------------------------------------------------------------
                     GUARD SUBMODEL SELECTION HELP
                     -----------------------------

     Use the arrow keys to select the guard submodel with which you
     want to work.

----------------------------------------------------------------------------
   [RETURN] - To Continue                                          . . .DONE
```

Figure 7.2.2a: Guard Submodel Selection Help

7.3 Generate SNAP Input Statements

You may generate the SNAP input statements by selecting the 'Generate SNAP input statements' option from the 'GUARD MENU'.

```
WORKING SPACE:  EXAMPLE                                  SUBMODEL <-ESC

                              GUARD MENU

        * Create a guard submodel
        * Edit a guard submodel
        * Generate SNAP input statements
        * List guard submodels
        * Delete a guard submodel
        * Quit

    ↑↓ - To Choice        [RETURN] - Make Choice     ? - Help
```

Figure 7.3.1: Guard Menu
(Generate SNAP input statements)

A submodel selection menu will appear which allows you to select the submodel for which you wish to generate statements. The file that is generated ('name'.GSM) is located in your working space subdirectory.

```
WORKING SPACE:  EXAMPLE                                          MAIN <- ESC

                         GUARD SUBMODEL SELECTION MENU

   NAME                          DESCRIPTION
   ----                          -----------

 DAY_ONE    Daytime guard patrol procedures with one patrolling force
 DAY_TWO    Daytime guard patrol procedures with two patrolling forces
 NGHT_ONE   nighttime guard patrolling procedures w/ one patrol force
 NGHT_TWO   nighttime guard patrol procedures w/ two patrolling forces
  QUIT       Quit this menu

 ↑ ↓ - To Choice          [RETURN] - Make Choice       ? - Help
```

Figure 7.3.2: Guard Submodel Selection Menu

7.4 List Guard Submodels

To get a listing of all the guard submodels that currently exist, select the 'list' option.

```
WORKING SPACE:  EXAMPLE                                   SUBMODEL <-ESC

                              GUARD MENU

        * Create a guard submodel
        * Edit a guard submodel
        * Generate SNAP input statements
        * List guard submodels
        * Delete a guard submodel
        * Quit

↑↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 7.4.1: Guard Menu
(List guard submodels)

```
WORKING SPACE:  EXAMPLE                                   MAIN <- ESC

                     GUARD SUBMODEL DESCRIPTIONS

   NAME                          DESCRIPTION
   ----                          -----------

DAY_ONE    Daytime guard patrol procedures with one patrolling force
DAY_TWO    Daytime guard patrol procedures with two patrolling forces
NGHT_ONE   nighttime guard patrolling procedures w/ one patrol force
NGHT_TWO   nighttime guard patrol procedures w/ two patrolling forces

[RETURN] - To Continue                                      . . .DONE
```

Figure 7.4.2: Guard Submodel Listing - Sample

7.5 Delete a Guard Submodel

If you wish to delete a submodel from your working space, you may select the delete option on the 'GUARD MENU'.

```
WORKING SPACE: EXAMPLE                                    SUBMODEL <-ESC

                              GUARD MENU

        * Create a guard submodel
        * Edit a guard submodel
        * Generate SNAP input statements
        * List guard submodels
        * Delete a guard submodel
        * Quit

↑↓ - To Choice          [RETURN] - Make Choice      ? - Help
```

Figure 7.5.1: Guard Menu
(Delete a guard submodel)

You may then select which submodel you wish to delete from a list of submodels. You will be asked to verify your selection.

```
 WORKING SPACE:  EXAMPLE                                          MAIN <- ESC
-----------------------------------------------------------------------------

                         GUARD SUBMODEL DELETION MENU

     NAME                         DESCRIPTION
     ----                         -----------

  DAY_ONE    Daytime guard patrol procedures with one patrolling force
  DAY_TWO    Daytime guard patrol procedures with two patrolling forces
  NGHT_ONE   nighttime guard patrolling procedures w/ one patrol force
  NGHT_TWO   nighttime guard patrol procedures w/ two patrolling forces
   QUIT       Quit this menu

-----------------------------------------------------------------------------
    ↑ ↓ - To Choice          [RETURN] - Make Choice     ? - Help
```

Figure 7.5.2: Guard Submodel Deletion Menu

```
                                                                  QUIT <- ESC
-----------------------------------------------------------------------------

                         GUARD SUBMODEL DELETION HELP
                         ----------------------------

     Use the arrow keys to select the guard submodel you wish to delete.

-----------------------------------------------------------------------------
    [RETURN] - To Continue                                          . . .DONE
```

Figure 7.5.2a: Guard Submodel Deletion Help

7.6 Quit

To quit working with the guard submodel, select the quit option.

```
WORKING SPACE:  EXAMPLE                                    SUBMODEL <-ESC
--------------------------------------------------------------------------

                          GUARD MENU

       * Create a guard submodel
       * Edit a guard submodel
       * Generate SNAP input statements
       * List guard submodels
       * Delete a guard submodel
       * Quit

--------------------------------------------------------------------------
   ↑↓ - To Choice          [RETURN] - Make Choice     ? - Help
```

Figure 7.6.1: Guard Menu
(Quit)

8.0 GIVING USER2 CONTROL

To give User2 more flexibility during the analysis of his security system, you can allow him the option of altering some of the data elements in your SNAP model. To do this, you must parameterize your model and build the prompt query databases.

When you parameterize your model, you identify those data elements that User2 wants to study within the framework of the security system you have modeled. The prompt query databases provide the organization for the prompts and the allowed responses User2 will see when he resolves your model. For each parameterized submodel there is a Master Prompt Query Database and a Prompt Query Set Database. The Master Prompt Query Database defines the complete set of prompts that supports the submodel. The Prompt Query Set Database defines subsets of the prompts from which User2 can select to study particular aspects of the security system. These subsets are defined by you, perhaps at User2's request.

8.1 Parameterizing Your Model

Figure 8.1.1 shows a data screen for a guard submodel that has been parameterized. The '@1' signifies that the 'Number of guards being allocated' field will be replaced by User2's response to prompt number 1 in the Master Prompt Query Database. In a like manner, '@124' is associated with prompt number 124.

```
                                                    NETWORK <- ESC
------------------------------------------------------------------

                      ALLOCATE NODE MENU

   Label: AL1  Comment:

   Base label: @1

   Number of guards being allocated: @1

   Maximum number of branches to be taken:  1

   Do you wish to define branches? NO

   Enter SAVE to save current values, QUIT to exit without saving:

------------------------------------------------------------------
        ↑↓ - To Choice                            ? - Help
```

Figure 8.1.1 Parameterized Allocate Node - Sample

The number of data elements that you may parameterize is limited to the number of digits you can place in a data field. For example, a data field five spaces wide could contain the parameter id, @9999. The parameter id's do not need to be in numeric order in your submodel and they do not have to be sequential. In other words, you can enter '@124' in one field and '@1' in the next, and not parameterize any other data elements in your model. You may also parameterize mulitple data elements with the same parameter id. User2 will be prompted once per session, and his response will be used everywhere the parameter id is found in your model.

8.2 Building the Master Prompt Query Databases

The Master Prompt Query Database contains all of the prompts (questions), comments, and permitted responses that will be issued during a User2 prompt-query session. You need to build one Master

Prompt Query Database for every submodel that you parameterize. The naming convention follows: 'submodel name'.Xsq, where X is a 'g' for a guard submodel, 'a' for an adversary submodel, 'c' for a control submodel, and 'd' for an adversary detection submodel. The Master Prompt Query Database associated with the submodel containing the allocate node shown in Figure 8.1.1 is shown in Figure 8.2.1. The legend for Figure 8.2.1 identifies each of the fields of the Master Prompt Query Database.

```
@1[a],1[b]:
 1[c],"ENTER SIZE OF GUARD PATROL?",2[d],1[e],5[f]:
@2[a],0[b];
 0,"  HG - HANDGUNS",1;
 0,"  SG - SHOTGUNS",1;
 0,"  SA - SEMIAUTOMATICS",1;
 0[c]," SM - SUBMACHINEGUNS",1;
 0,"  FA - FULLY AUTOMATIC",1;
 0,"  NW - NO WEAPONS",1;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY GUARD PATROL FORCE ?",HG[d],HG,SG,SA,SM,FA,NW;
@3,1;
 2[c],"ENTER THE PROFICIENCY OF THE GUARD PATROL?",50.0[d],0.0[e],100.00[f];
@4,1;
 0,"  HG - HANDGUNS",0;
 0,"  SG - SHOTGUNS",0;
 0,"  SA - SEMIAUTOMATICS",0;
 0,"  SM - SUBMACHINEGUNS",0;
 0,"  FA - FULLY AUTOMATIC",0;
 0,"  NW - NO WEAPONS",0[h];
 0,"ENTER THE TYPE OF WEAPONS",1[h];
 3[c]," USED BY AUGMENTATION FORCE ?",HG,HG[g],SG[g],SA[g],SM[g],FA[g],NW[g];
```

Figure 8.2.1: Prompt Query File - Sample

Legend (Figure 8.2.1)

a - Prompt number, corresponds to the submodel.

b - User key, identifies the question as being restricted to the long form only and not issued on the short form;

User key = 1, prompt is issued on long or short form,

User key = 0, prompt is issued on long form only.

c - Question type code, identifies the type of response that is expected (alpha, integer, or real);

Question type code = 0, comment line which preceeds the prompt with which it should be issued,

Question type code = 1, integer response expected,

Question type code = 2, floating point response expected,

Question type code = 3, alpha response expected.

d - Prompt default value, used as the response if the prompt is not issued.

e - Lower bound of response, the minimum value that User2 can supply when responding to this prompt.

f - Upper bound of response, the maximum value that User2 can supply when responding to this prompt.

g - Alpha range of responses, the options from which User2 may choose to select.

h List print key - identifies the comment print or no-print status when a response set is listed;

List print key = 1, comment is printed,

List print key = 0, comment is not printed.

The Master Prompt Query Database was designed to give you control over how the menu screen that will contain the prompts and permitted responses will appear to User2. Figure 8.2.2 shows what User2 will see when he is prompted for parameter id Number One. As you can see, you will want to limit the number of lines of comments that you write so as to keep the prompt on one page.

If User2 enters a number outside the permitted range, he will be told he is outside the range and prompted to enter another response. The alpha range of responses is displayed on a menu in such a way that User2 will use the arrow keys to move the cursor to the desired response.

```
GUARD SUBMODEL:  DAY_ONE     QUERY SET:  PATROL          [redacted]
--------------------------------------------------------------------

        ENTER SIZE OF GUARD PATROL?

        Can be between  1          and  5          , inclusive.

        Default is: 2

--------------------------------------------------------------------
[RETURN] - For Default    Value [RETURN] - For New Value
```

Figure 8.2.2: User2 Prompt Menu - Sample

The Master Prompt Query Database file can be created by any word processing package, such as WordStar™. The format you need to use when you are building the file is best described as list-directed input. The individual fields on each line are separated by commas, the total line may be up to 130 characters long, and the line must end with a semicolon.

Since you will test your model before you hand it over to User2, you will be able to do any fine-tuning of the prompt's appearance on the terminal screen. If the User2 Support Program cannot read the Master Prompt Query Database file, it will note where it stopped reading the file and write a debug message to the file, 'ERROR.RPT' on the User2 subdirectory. The process of building the User2 subdirectories and testing your submodel is explained in detail in Sections 9.0 and 10.0.

The vast majority of the options and restrictions on the format of the Master Prompt Query Database are explained in the legend accompanying Figure 8.2.1. The remainder of this section will deal with some of the finer points you may want to know.

The questions and comments (See Legend for Figure 8.2.1, item c) must be enclosed within double quotes and can be up to 60 characters long. You should type them exactly as you want them to appear, including question marks, periods, and other grammatical notation.

You may have as many as 10 alpha response choices, each one up to 8 characters long. However, since the line is limited to 130 characters, you will have to make some compromise between the two limits. You may try entering the query on your screen as a comment, thus allowing you to enter more alpha response choices on the line associated with the question code. Or, you may abbreviate the responses choices and explain the abbreviations in the comments, as is shown in Figure 8.2.1. In the majority of instances, you will never be limited by these restrictions because most response choice lists are short and the choices are seldom longer than two character each.

The user key (See Legend for Figure 8.2.1, item b) can be used to isolate a set of prompts within the Master Prompt Query Database that is of special interest. During the query-response session, User2 will select to review either the long or the short form of the prompts. Under the short form, the prompts with user key equal to 0 will not be asked.

The list print key (item h) can be used to control the amount of detail that User2 sees when the responses are listed for review. After User2 finishes the query-response session in the User2 Support Program, he can list the comments, prompts, and responses to his microcomputer terminal. As shown in Figure 8.2.1, the comments are often repetitive. By setting the list print key equal to 0 on a comment line, you can inhibit the comment from being printed during the review.

8.3 Building the Prompt Query Set Databases

A Prompt Query Set Database identifies the sets of prompts for a single parameterized submodel from which User2 may choose. The naming convention follows: 'submodel name'.Xs_, where X is 'g' for a guard submodel, 'c' for a control submodel, 'd' for an adversary detection submodel, and 'a' for an adversary submodel. Figure 8.3.1 shows the Prompt Query Set Database associated with the submodel and Master Prompt Query Database shown in Figures 8.1.1 and 8.2.1.

PATROL[a] Sets the characteristics of the guard patrol.[b]

1,2,3,;[c]

TOTAL[a] Sets patrol characteristics and other parameters.[b]

1,2,3/
4;[c]

DEFAULT[a] Automatically select default parameters, if any exist.[b]

0;[c]

Figure 8.3.1: Prompt Query Set - Sample

Legend (Figure 8.3.1)

a - Name of the prompt query set.

b - Description of the prompt query set.

c - List of the prompt numbers that should be issued for a prompt query set. A prompt number of "0" signifies that the default values should be used and no prompts issued. The list of prompt numbers must end in a ";". The list of prompt numbers can be provided on more than one line, to signify continuation end the line with a "/".

The advantage of setting up numerous sets within the Prompt Query Set Database becomes greater as the number of prompts increases. By breaking the prompts into distinct groups you can allow User2 to study aspects of his security system, such as the patrol route or the advesary weaponry, without having to answer all of the questions each time he creates a response set. The unasked prompts will be defaulted when the model is resolved.

The format of the Prompt Query Set Database is explained in detail in the legend that accompanies Figure 8.3.1. Each line is limited to 80 characters. The line that contains the set name and description should be entered exactly as you want User2 to see it. The prompt numbers should be separated by commas and end with a semicolon (see the legend for details). Up to ten prompt query sets can be defined in the Prompt Query Set Database.

All guard, adversary, control, and adversary detection submodels must have an associated Prompt Query Set Database and Master Prompt Query Database. If the submodel has not been parameterized and therefore requires no prompts, the Master Prompt Query Database file is empty and the Prompt Query Set Database should show one prompt query set with the question list showing only a "0". This is similar to the last set shown in Figure 8.3.1.

9.0 SETTING UP THE SNAP-PC SUBDIRECTORY

Before you can test your model and before User2 can perform analyses with your model, you must set up a User2 work area or subdirectory and move the model into that subdirectory.

9.1 User2 Subdirectory Structure

The structure of the User2 Subdirectory is similar to the User1 working space. Figure 9.1.1 shows the SNAP-PC subdirectory tree structure using sample User2 subdirectories, U2_user and U2_exmpl.

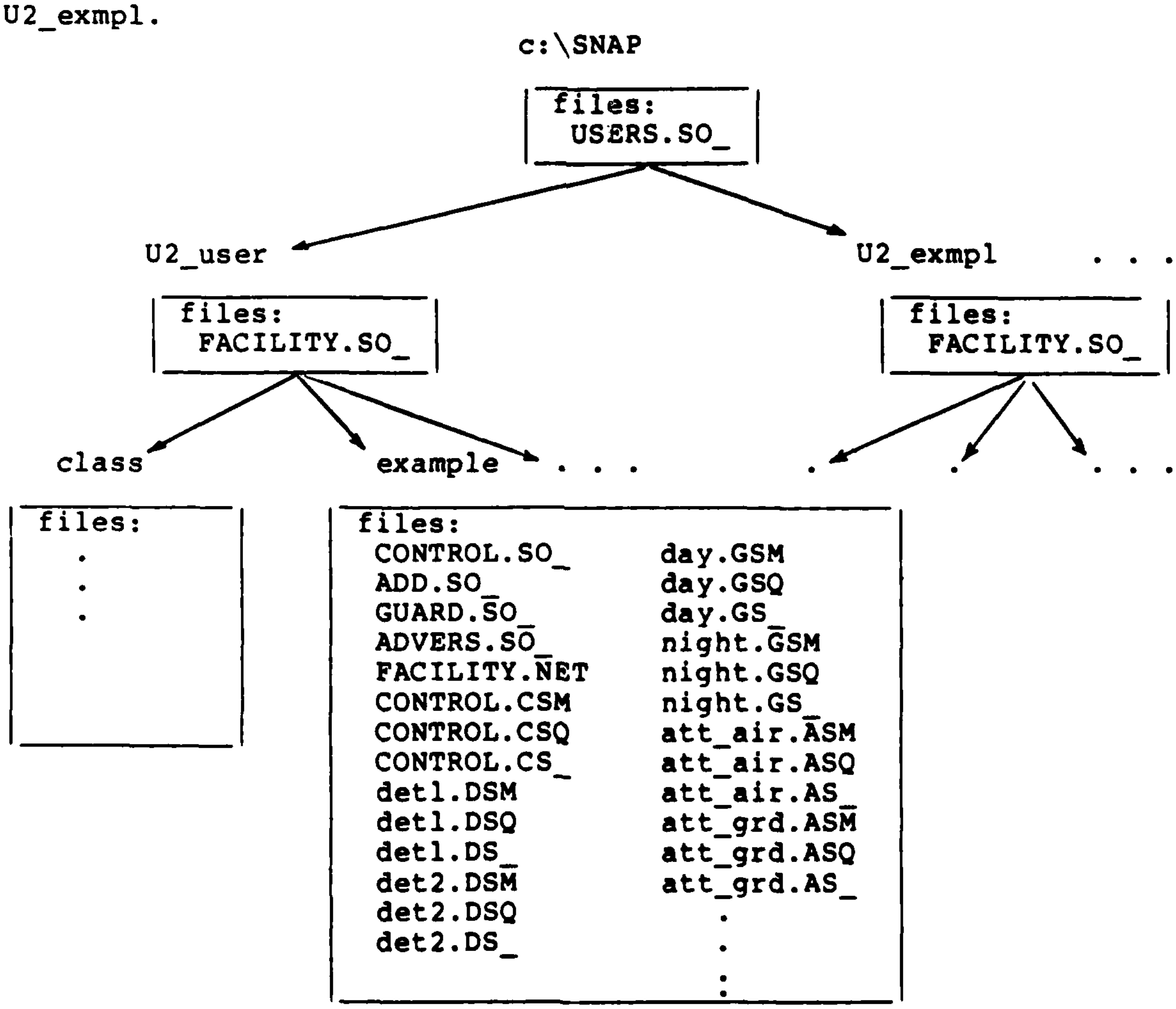


Figure 9.1.1: User2 Subdirectory Structure Sample

All of the characters in lower case are examples of subdirectory or file names that you will supply. In the main directory (C:\SNAP) the file USERS.SO_ must contain a list of the User2 subdirectories and a description of each. For this example, USERS.SO_ is shown in Figure 9.1.2. The contents of USERS.SO_ are displayed when User2 is asked to select a user subdirectory. It can be created with a text editor such as WordStar™.

```
user     User work space for SNAP-PC course May 1986
exmpl    Example work space
  .                                  .
  .                                  .
  .                                  .
```

Figure 9.1.2: File USERS.SO_ Sample

In a similar manner the file FACILITY.SO_ under each User2 subdirectory, contains the list of facilities or models that reside under the subdirectory. Figure 9.1.3 displays an example of this file for user subdirectory U2_user.

```
example   Sample facility from SNAP User's Manual, August 1986
class     SNAP-PC class example model
big_sol   SNAP-PC class big model
  .
  .                       .
  .                       .
```

Figure 9.1.3: File FACILITY.SO_ Sample

The facility, or model, subdirectory contains all the files and submodels necessary to perform the SNAP analyses. The file FACILITY.NET contains the SNAP statements representing your facility submodel. In this form it is ready to be joined with the other submodels and used in a SNAP analysis.

Those files in the subdirectory whose extension begins with 'C' correspond to the control submodel. CONTROL.CSM contains the SNAP input statement for the submodel, CONTROL.CSQ contains the Master Prompt Query Database for the submodel, and CONTROL.CS_ contains the Prompt Query Set Database.

The same convention follows for the adversary detection, guard, and adversary submodels. Those files whose extension begins with 'D' correspond to the adversary detection submodels, those files whose extension begins with 'G' correspond to the guard submodels, and those files whose extension begins with 'A' correspond to the adversary submodels. Note that the adversary detection, guard, and adversary submodels are named by you when you create them using the Userl Support Program and that more than one of each may exist.

The files CONTROL.SO_, ADD.SO_, GUARD.SO_ and ADVERS.SO_ contain lists of the names and descriptions of the control, adversary detection, guard and adversary submodels that you created with the Userl Support Program. Since there is only one Control Submodel per model, the file CONTROL.SO_ must be created but the others already exist in your working space. Figures 9.1.4 through 9.1.7 show examples of these files.

CONTROL	Control Submodel for SNAP Example

Figure 9.1.4: File CONTROL.SO_ Sample

det1	Detection using one sensor
det2	Detection using three sensors
.	.
.	.
.	.

Figure 9.1.5: File ADD.SO_ Sample

day_one	Daytime guard patrol procedures with one patrolling force
nght_one	Nighttime guard patrolling procedures with one patrol force
nght_two	Nighttime guard patrol procedures with two patrolling forces
day_two	Daytime guard patrol procedures with two patrolling forces
.	.
.	.
.	.

Figure 9.1.6: File GUARD.SO_ Sample

att_air	Adversary attack from the air
att_grd	Adversary attack from the ground
.	.
.	.
.	.

Figure 9.1.7: File ADVERS.SO_ Sample

9.2 Moving Your Model to a User2 Subdirectory

Your first steps to moving your model to a User2 Subdirectory is to create the necessary subdirectories in the form shown in Figure 9.1.1. If you are placing the model into a new user area, you will need to make the new user subdirectory and create or supplement the file USERS.SO_ with the name of the new user subdirectory, i.e., user for subdirectory U2_user. If you are placing the model in an existing User2 subdirectory, you will not need to create the subdirectory or alter the USERS.SO_ file. The standard DOS command for making a subdirectory is [mkdir 'subdirectory name']. This should be done from within the parent directory. (After creating a subdirectory, it may be entered from the parent directory by typing [cd 'subdirectory name'].

If you are moving a new model into the User2 area, you will need to make the model subdirectory under the User2 subdirectory and augment or create the FACILITY.SO_ file to reflect the new model. In the sample structure shown in Figure 9.1.1 one model subdirectory is EXAMPLE. If you are supplementing a model that already exists in the desired User2 Subdirectory, you will not need to create the new model subdirectory or alter the USERS.SO_ or FACILITY.SO_ files.

After you have created the necessary subdirectories you are ready to copy the submodels and supporting files into the facility subdirectory. This is done by using the DOS copy commands [copy 'old file name' 'new file name']. Typically, the copy command file name includes the path or subdirectory tree structure. You will find the submodels you created on the path C:\SNAP\USER1\XXX where XXX is the name of your User1 model working space. To support animation you will also need the facility schematic in file 'FACILITY.FFB' to be placed in the model subdirectory. In addition, the User1 subdirectory contains the files ADD.SO_, GUARD.SO_ and ADVERS.SO_. After copying them you may need to alter them to satisfy User2's needs. You will need to create CONTROL.SO_ for User2. The Master Prompt Query Database files and Prompt Query Set Database files must also be placed in the facility subdirectory. You must create them using a text editor; hence, you may wish to create them in the facility subdirectory.

After structuring the subdirectories as described in Section 9.1 and placing the submodels in the facility subdirectory, you are ready to begin testing your model. Section 10.0 describes the testing process.

10.0 TESTING YOUR MODEL

To test your model you must first set up a User2 subdirectory. Section 9.0 gives you detailed instructions for setting up this subdirectory.

10.1 Executing the User2 Support Program

You must execute the User2 Support Program in order to test your model. To run your model, you must go through the process of selecting the submodels that you want to use. This process is detailed in the User2 manual, Evaluating Security Systems Using SNAP-PC and will not be repeated here. If you follow the suggested modeling approach in Section 1.0, you will debug your model prior to parameterizing it. Therefore, when you select the submodels, you will only have the default prompt response option available when you select the prompt-query set for each submodel. This will eliminate the need to build a response set at this time. You may wish to reference Sections 8.0 and 9.0 concerning setting up prompt query files for a better understanding of the default prompt response option.

Once you have selected all four submodels, you may attempt to execute a run. When you select the execute option on the User2 'OPTION SELECTION MENU', you will be asked to supply information concerning the run. This includes tracing information which is vital to debugging models. For a complete explanation of the User2 Support Program you should reference the manual Evaluating Safeguards Systems Using SNAP-PC.

10.2 Debugging Your Model

When you begin the debugging process, it is a good idea to have the echo check option on the SNAP information statement in the Control Submodel set to (C)omplete. This will be helpful in debugging SNAP input errors. Input errors are associated with the SNAP statements, and if they occur, the simulation cannot begin. Appendix G in the SNAP User's Manual has a list of non-fatal and fatal input errors. After you have corrected the input errors, you should set the echo check option to (N)one.

Now that the input errors have been corrected, the execution of the simulation will be attempted. While it is executing, run time errors may be detected. A list of these errors is given in Appendix G of the SNAP User's Manual. If an error occurs, you may be able to determine from the error message what has caused the problem. However, more times than not, the problem will have to be investigated before the cause can be determined. The text trace and the animation are good tools to use to speed your investigation. These give you a time sequenced account of the events which occurred during the simulation prior to the time of failure.

10.3 Verification and Validation of Your Model

Once the model has been debugged, you must verify and validate the performance of the model. Verification consists of determining if the model executes on the computer as you intended. Validation is the task of determining if your model is a reasonable representation of your system. This involves a comparison of model and system structure along with a validation check on input data.

10.4 Debugging Your Prompt Query Databases

After you have debugged your model, you may parameterize it for User2. Once the model is parameterized, you must again move it over to a User2 subdirectory to test. The testing includes debugging the prompt query databases you created when you parameterized the model. To test a prompt query database you should go through the User2 shell and try to create a response set. If there is an error in the Master Prompt Query Database or the Prompt Query Set Database, a message will be displayed on the screen at the time you select the prompt query database. To help in debugging these errors the file, 'ERROR.RPT' is created in the User2 subdirectory containing information describing the errors. Fix the error that is identified and try again to create a response set. Every prompt file you create should be tested in the same manner.

11.0 PREPARING THE MODEL FOR USER2

Now that you have completed testing your model and feel comfortable with the analyses that can be done with it, you are ready to make it available for User2. In addition to installing the model in User2's subdirectory, you must provide enough information to insure effective analysis with the model.

11.1 Documenting the Model

You should document the model to support a clear understanding of the activities and interactions in the system and, hence, support User2's efforts to draw accurate conclusions from the SNAP analysis. Each submodel should be supported with a list of modeling assumptions and a description of the model logic. Specifically, a discussion of the differences between submodels of the same type should be documented.

In addition, you should document the Master Prompt Query Databases and Prompt Query Set Databases. This should include a description of the use of each parameter and the implication of changing its value. The default values and the range of acceptable values should also be discussed. The prompt query sets should be documented to support User2's selection. This will insure User2's understanding the parameters for which he will be prompted and the default values that will be used for the prompts that are not issued.

Your documentation should also include an estimate of the minimum number of iterations of the simulation that should be executed and an estimate of the length of time it will take to run each iteration on an IBM PC AT. These topics will be discussed in Sections 11.2 and 11.3. Appendix C provides sample documentation for the model that has been shown throughout this manual.

11.2 Computing the Number of Iterations That Must Be Run

The number of iterations of the simulation is proportional to the level of accuracy or confidence you desire from the analysis. The more iterations that are executed, the greater the likelihood that the performance measures of the simulation (probability of system win) accurately reflect the modeled system. For instance, if the analysis predicts the probability of system win to be .90 after 20 iterations, you can be 54% confident that the true probability lies between .85 and .95. Whereas, if the analysis is performed with 100 iterations and the probability of system win is .90, you can be 90% confident that the true probability lies between .85 and .95. Table 11.2.1 shows the relationship between the number of iterations that are performed and the level of confidence that you can have in the performance measures of the analysis.

Table 11.2.1 Number of Iterations Versus Confidence Level

Iterations	Probability Of System Win	Confidence Interval On Probability Of System Win	Confidence Level
10	.1	.05 - .15	40%
	.3	.25 - .35	28%
	.5	.45 - .55	25%
	.7	.65 - .75	28%
	.9	.85 - .95	40%
20	.1	.05 - .15	54%
	.3	.25 - .35	37%
	.5	.45 - .55	35%
	.7	.65 - .75	37%
	.9	.85 - .95	54%
30	.1	.05 - .15	65%
	.3	.25 - .35	45%
	.5	.45 - .55	42%
	.7	.65 - .75	45%
	.9	.85 - .95	65%
40	.1	.05 - .15	69%
	.3	.25 - .35	51%
	.5	.45 - .55	46%
	.7	.65 - .75	51%
	.9	.85 - .95	69%
50	.1	.05 - .15	75%
	.3	.25 - .35	55%
	.5	.45 - .55	53%
	.7	.65 - .75	55%
	.9	.85 - .95	75%
60	.1	.05 - .15	80%
	.3	.25 - .35	60%
	.5	.45 - .55	55%
	.7	.65 - .75	60%
	.9	.85 - .95	80%
80	.1	.05 - .15	85%
	.3	.25 - .35	67%
	.5	.45 - .55	63%
	.7	.65 - .75	67%
	.9	.85 - .95	85%
100	.1	.05 - .15	90%
	.3	.25 - .35	70%
	.5	.45 - .55	69%
	.7	.65 - .75	70%
	.9	.85 - .95	90%

Table 11.2.1 Number of Iterations versus Confidence Level (continued)

Iterations	Probability Of System Win	Confidence Interval On Probability Of System Win	Confidence Level
200	.1	.05 - .15	98%
	.3	.25 - .35	88%
	.5	.45 - .55	85%
	.7	.65 - .75	88%
	.9	.85 - .95	98%
300	.1	.05 - .15	99.5%
	.3	.25 - .35	93.0%
	.5	.45 - .55	91.5%
	.7	.65 - .75	93.0%
	.9	.85 - .95	99.5%

From your understanding of the system and the information supplied in Table 11.2.1, you should guide User2 in his decision of the number of iterations to perform.

11.3 Length of a Run

To assist User2 in his efforts to use his PC effectively, you should estimate the minimum and maximum time it will take to simulate one iteration of the SNAP model. At the time User2 starts a SNAP analysis, the numbers you have provided will be multiplied by the number of iterations he has requested to estimate the length of time the PC will be occupied executing the run. The time estimates are reported to the user and he is given the chance to abort the run and possibly execute it at another time. The minimum and maximum time estimates should be determined by clocking several runs of the model. After you have made the estimates, you should edit the 'general run information' in the control submodel to reflect these values.

GLOSSARY

Adversary Detection Submodel - The adversary detection submodel describes the sensor system present at the facility. This would include the sensors, logic points, and monitor point.

Adversary Submodel - The adversary submodel defines the attack process that the adversary forces will use to reach their objective.

Case - See Run.

Control Submodel - The control submodel defines and initializes the variables that are used in other portions of the model to control actions within the simulation. These variables are often referred to as global variables.

Facility Submodel - Typically, a facility environment consists of buildings, doorways, fences, open spaces, etc. The facility submodel defines the environment and the relationships between the pieces of the environment.

Global Variable - See Control Submodel.

Guard Submodel - The guard submodel outlines the guard actions during normal patrols and when the facility is under attack.

Iteration - An iteration is one execution of the simulation where only one set of random numbers is used. Typically, a SNAP analysis run includes several iterations.

Master Prompt Query File - The Master Prompt Query File is created by User1 and contains the complete set of prompts that may be issued during a query-response session for a submodel. The naming convention for the Master Prompt Query File is as follows: submodel name.Xsq, where X is 'g' for a guard submodel, 'a' for an adversary submodel, 'c' for a control submodel, and 'd' for an adversary detection submodel.

Model - A model is a description of the security system that is being analyzed. For the purpose of SNAP analysis a model will include a description of the facility (or environment) to be analyzed, descriptions of the possible guard and adversary movement, descriptions of the possible detection systems at the facility, and definition of the model controlling variables that will affect the SNAP analysis.

Parameterization - Parameterization is the process of building a model with missing data elements, that can be supplied at a later time by User2.

Prompt Query Set - A Prompt Query Set defines subsets of the queries in the Master Prompt Query File. The subsets are identified by name to User2 and defined by User1. The naming convention for the files associated with the Prompt Query Set is as follows: submodel name.Xs_, where X is 'g' for a guard submodel, 'c' for a control submodel, 'a' for an adversary submodel, and 'd' for an adversary detection submodel.

Prompt Response Set - The Prompt Response Set contains the responses that User2 has given during a query-response session.

Run - A run is an execution of a SNAP analysis using one of each of the five submodels.

Sensitivity Analysis - Sensitivity Analysis is the process of evaluating the sensitivity of the system's performance to changes to procedures, task times, etc. This is done by executing the SNAP analysis under a variety of responses to the prompts, usually varying only one parameter at a time.

SNAP - SNAP (Safeguards Network Analysis Procedure) is a simulation based analysis technique used to evaluate fixed site security systems.

SNAP-PC - SNAP-PC is a combination of programs useable on IBM-PC compatible micro-computers. These programs include SNAP, a User1 interface program and a User2 interface program. The User1 interface program supports the development of SNAP models. The User2 interface program supports the analysis of SNAP models.

Submodels - Submodels are components of a model. Five different types of submodels comprise a SNAP-PC model. They are the facility submodel, the control submodel, adversary detection submodels, guard submodels, and adversary submodels. A SNAP analysis or run is comprised of one of each of the five submodels.

User1 - User1 is a SNAP-PC user who is responsible for building models and developing Prompt Query Sets for the models he has developed.

User2 - User2 is a SNAP-PC user who is interested in performing SNAP analyses on a security system.

User2 Subdirectory - The User2 Subdirectory is the directory that has been defined for a specific user. Typically it will be named to correspond to the user's name, i.e., Mark, Smith. A User2 subdirectory can contain one or more models. The User2 subdirectories were established so that a user can work with a model without disturbing the work of other users with access to the same micro-computer.

Working Space - A working space is the area that is used by User1 to build and define a model. Within the computer, the working space is a subdirectory. Each working space contains only one facility submodel and only one control submodel and any number of guard, adversary and adversary detection submodels. Typically the working space name correseponds to the name of the facility.

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APPENDIX A

Nodes and Statements for Each Submodel

NODES AND STATEMENTS FOR EACH SUBMODEL

Control Submodel

General Run Information Statement	-	one required
Parameter Statements	-	as many as needed
Global Variable Statements	-	as many as needed
Global Flag Statements	-	as many as needed
Force Flag Statements	-	as many as needed
Macro Statements	-	as many as needed
Timer Statements	-	as many as needed

Facility Submodel

Space Nodes	-	as many as needed
Barrier Nodes	-	as many as needed
Target Nodes	-	as many as needed

Adversary Detection Device Submodel

Sensor Nodes	-	as many as needed
Logic Nodes	-	as many as needed
Monitor Nodes	-	as many as needed

Guard Submodel

Engagement Statements	-	one required
Combinations Statements	-	one, as required
BASE Statements	-	as many as needed
PENG Statements	-	as many as needed in specific order
DENG Statements	-	as many as needed
Enter Nodes	-	as many as needed
Allocate Nodes	-	as many as needed

RTB Nodes	- as many as needed
Wait Nodes	- as many as needed
Task Nodes	- as many as needed
Signal Nodes	- as many as needed
Exit Nodes	- as many as needed
Branch Types	- as many as needed
Regular	
Decision	
Probabilistic	

Adversary Submodel

Engagement Statement	- one required
Combinations Statement	- one, as required
Objective Statement	- one required
PENG Statements	- as many as needed in specific order
DENG Statements	- as many as needed
Enter Nodes	- as many as needed
Wait Nodes	- as many as needed
Task Nodes	- as many as needed
Signal Nodes	- as many as needed
Exit Nodes	- as many as needed
Branch Types	- as many as needed
Regular	
Decision	
Probabilistic	

APPENDIX B

Modeling Limited Ammunition Supply

MODELING LIMITED AMMUNITION SUPPLY

Modeling limited ammunition supply has been identified as an immediate need of the current SNAP-PC users. This is not explicitly designed into SNAP but can be modeled in two fashions with the PENG and DENG statements. Using one approach, the force that has exhausted their ammunition supply will be fired upon at an increased rate; in the other, they will be fired upon at the same rate as when they are loading their weapons.

For both approaches one or several PENG statements must be used to represent the period of time that the force has ammunition followed by a PENG statement defining the length of time the force is without ammunition. You can model a scenario where a force runs out of ammunition by specifying a length of time greater than the length of the simulation run. A shorter duration can be used to model getting ammunition from casualties or another source.

The DENG statement associated with the lack of ammunition time period should either show a suppression status of 'yes' or a percent time delay of '100'. If a suppression status of 'yes' is specified, the force will not fire during the time period and the opposing force will fire at an increased rate. If the percent time delay is '100', the force will not fire and their exposure is the same as their exposure while loading.

With either approach, you will be able to study the effects of limited ammunition supply. This aspect becomes increasingly important as the length of individual engagements or the number of engagements increases.

APPENDIX C

Documentation of Sample Model

DOCUMENTATION OF SAMPLE MODEL

This model is based on a SNAP example first presented in Chapter IX of the SNAP User's Manual. The model includes a small facility with only one building and one target. The model includes two alternative sensor submodels, four guard submodels and two adversary attack submodels. Preliminary analysis with this model shows that at least 100 iterations should be executed to insure accurate interpretation of the model outputs.

Facility Submodel

The facility consists of a building with one entrance surrounded by a patrolled area. Figure C.1 shows the facility submodel. Space nodes I1 through I5 represent the areas of interior patrols. Space nodes O1 through O5 represent the areas of the exterior patrols; barrier D1 is the doorway to the building. Target node TAR1 represents the target with a sensor, S2. Exterior space nodes O1 and O3 also have sensors. Space and barrier nodes LADR, ROOF, and CUT are used to describe the path an adversary will take as he tries to reach the target.

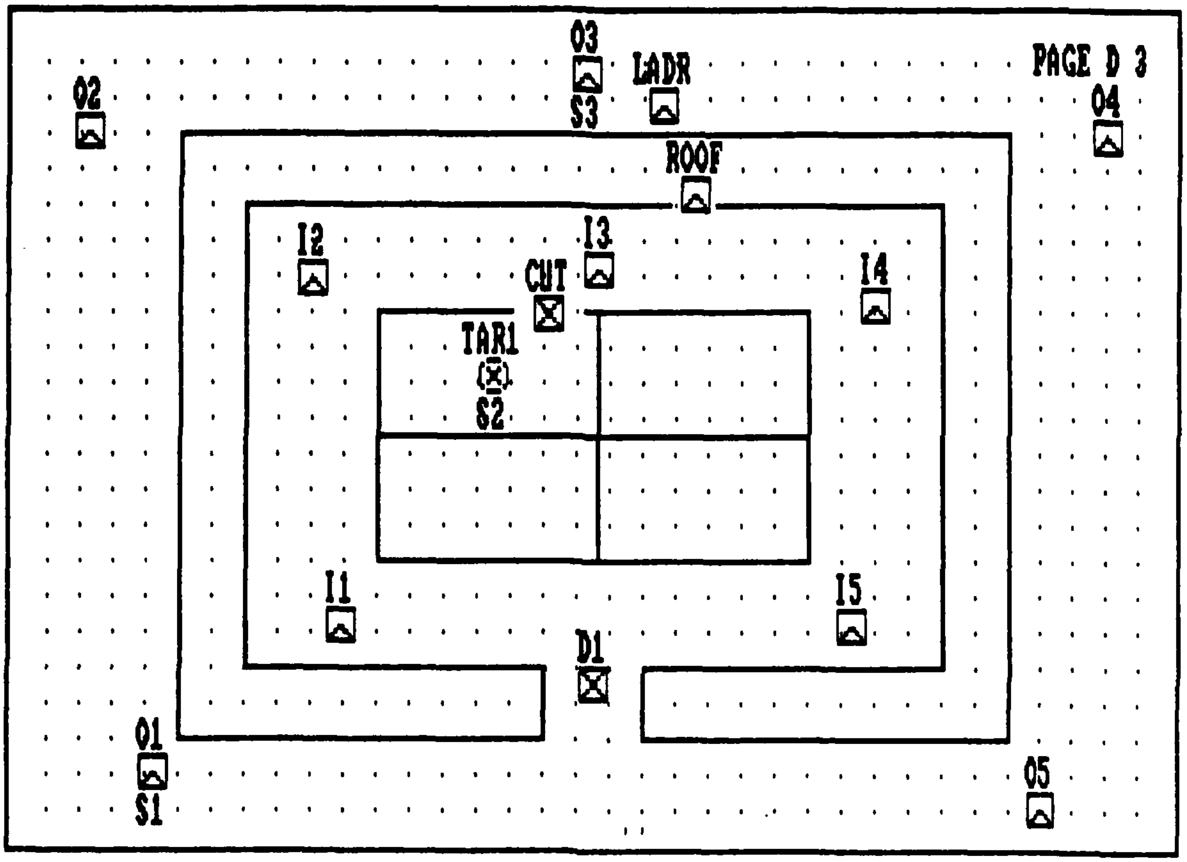

Figure C.1: Facility Submodel

Control Submodel

The control submodel defines the data distributions that are used by the model and the global variables. The control submodel was not parameterized and, therefore, has no prompts. The data that is defined in the control submodel will be discussed in the following sections.

Adversary Detection Submodel

Two adversary detection submodels have been developed to support this model. The first is DET1 and includes only one active sensor (S2) and one monitor point (M1). Figure C.2 shows this adversary detection submodel. Sensor nodes S1 and S3 are included in the diagram, but do not affect the simulation of the model. The second adversary detection submodel, DET2, includes two additional active sensors on exterior space nodes O1 and O3. Figure C.3 shows this adversary detection submodel.

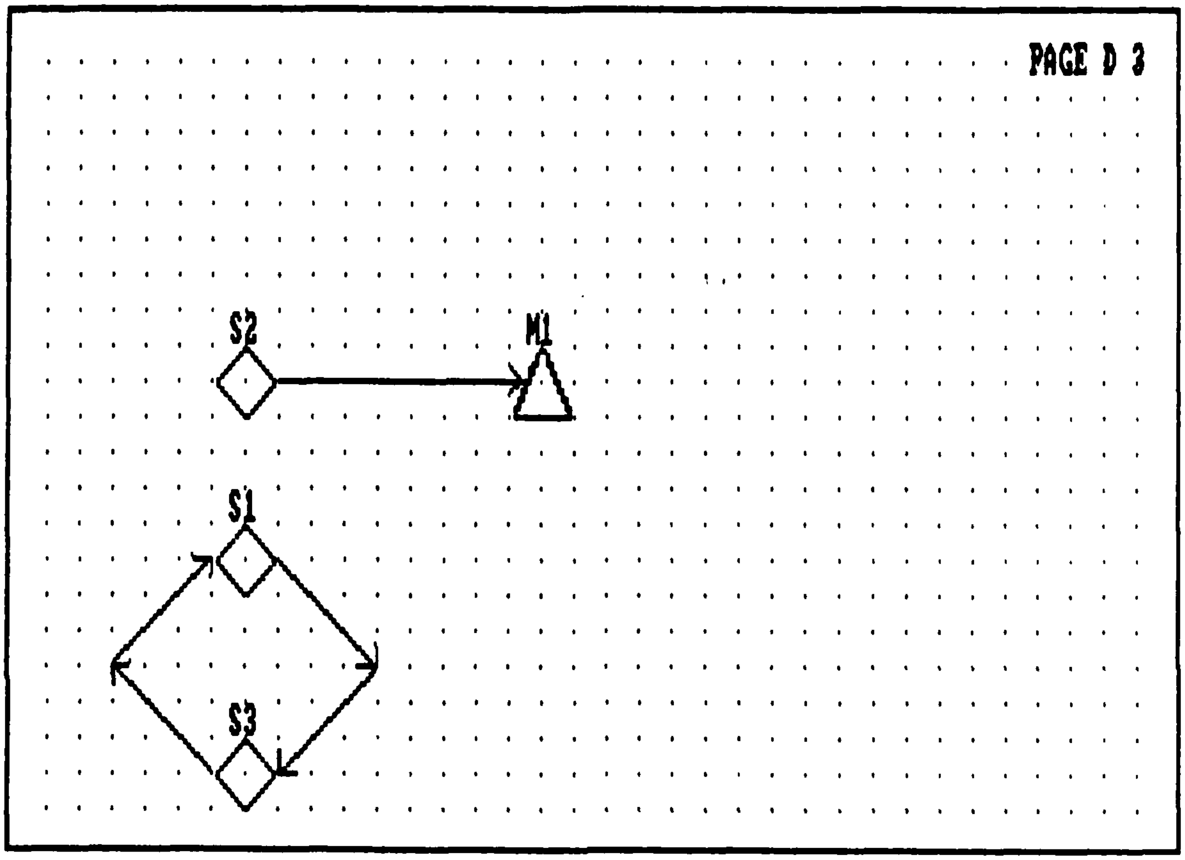

Figure C.2: Adversary Detection Submodel - DET1

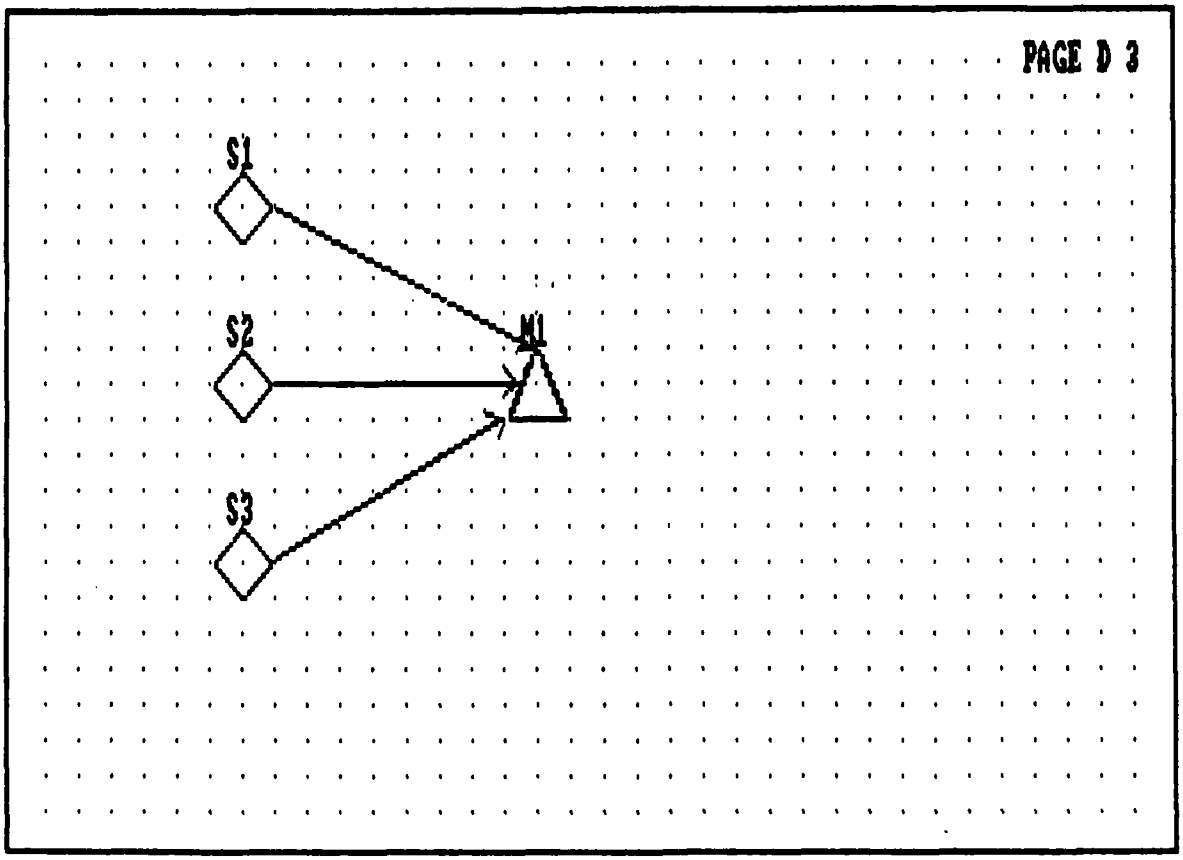

Figure C.3: Adversary Detection Submodel - DET2

Associated with both submodels are prompt query sets allowing you to define the probability of sensor detection and the signal persistence as permanent or temporary. The default probability of detection for all sensors is .95 and the default signal persistence for all sensors is permanent.

Submodel DET1 has only two prompt query sets: SENSORS or DEFAULT. SENSORS prompts for both the probability of detection and the signal persistence for sensor S2. Selecting DEFAULT causes the default responses for both prompts to be used to resolve the model.

Submodel DET2 has four prompt query sets: SENSORS, EXTER, INTER or DEFAULT. SENSORS issues prompts for all three sensors. EXTER prompts only for information associated with sensors S1 and S3. INTER prompts only for information for sensor S2. DEFAULT does not issue any prompts and uses the default values for all responses.

Guard Submodel

Four guard submodels have been developed to support the analysis. In general the guards patrol the inside and outside of the building. Normal interior patrolling is accomplished by traveling through spaces I1 through I5 in either a clockwise or counterclockwise direction (chosen randomly). The time to travel through each space is triangularly distributed with a minimum of one, mode of 1.5, and maximum of 2.5. If adversaries are detected, the guards double their rate of travel. Normal exterior patrolling is accomplished by traveling through spaces O1 through O5 in either a clockwise or counterclockwise direction (chosen randomly). The time to travel through each space is triangularly distributed with a minimum of two, mode of 2.5, and maximum of 3.5. If adversaries are detected, the guards double their rate of travel.

Guard submodel DAY ONE includes a single patrol that patrols both the exterior and interior of the building. In addition, if a sensor is triggered, the guard force hears it whether they are on interior or exterior patrol. The prompts define the number in the patrolling force, the weaponry they carry and their proficiency. In addition, the prompts define the weaponry used by the augmentation force. Table C.1 shows the default values for each prompt.

Table C.1

Guard Submodel DAY_ONE

Prompts

Prompt	Default Value
Size of Patrol	2
Patrol Weaponry	Handguns
Patrol Proficiency	50%
Augmentation Force Weaponry	Handguns

Three prompt query sets allow selection of the patrol prompts, excluding augmentation force weaponry; all prompts; or a default set, issuing no prompts.

Guard submodel DAY TWO includes separate interior and exterior patrols. As with DAY_ONE interior and exterior patrols are alerted when a sensor is triggered. Table C.2 defines the prompts and their default values.

Table C.2

Guard Submodel DAY_TWO

Prompts

Prompt	Defualt Value
Size of Interior Patrol	1
Size of Exterior Patrol	1
Patrol Weaponry	Handguns
Patrol Proficiency	50%
Augmentation Force Weaponry	Handguns

Three prompt query sets allow selection of the patrol prompts, excluding augmentation force weaponry; all prompts; or a default set, issuing no prompts.

Guard submodel NGHT ONE, like DAY_ONE allows for only one guard force to patrol both the interior and exterior. NGHT_ONE varies from DAY_ONE in the manner patrols are alerted when a sensor is triggered. Only an interior patrol is alerted by a sensor triggering. The prompts and prompt query set associated with NGHT_ONE are identical to those defined for DAY_ONE.

Guard submodel NGHT TWO, like DAY_TWO allows for two guard forces. It varies from DAY_TWO in that only the interior patrol is alerted when a sensor it triggered. The prompts and prompt query set associated with NGHT_TWO are identical to those defined for DAY_TWO.

Adversary Submodel

The adversary's objective is to sabotage the target. Two adversary submodels have been defined to support this objective. In both cases the adversary cuts through the roof of the building taking a fixed amount of time based on a uniform distribution with a minimum of four minutes and a maximum of nine minutes. After cutting through the roof, they sabotage the target.

Adversary submodel ATT GRD begins with three adversaries entering at space node 03 and climbing a fire escape ladder to the roof one at a time. The time that is required to cross space 03 is one minute. The time that each adversary takes to climb the ladder is normally distributed with a mean of .333 minutes and a standard deviation of .1 minutes. If guards appear while they are climbing the ladder, they will engage the guard force. Table C.3 shows the prompts and default values associated with this submodel.

Table C.3

Adversary Submodel ATT_GRD

Prompts

Prompt	Defualt
Adversary Weaponry	Handguns
Adversary Proficiency	50%
Time to Sabotage Target	6 minutes

Four prompt query sets have been defined. The first, ATTACK, supports prompts for adversary weaponry and proficiency. Prompt query set MISSION prompts for only the sabotage time. TOTAL issues all three prompts. DEFAULT issues no prompts and supplies default values for all prompts.

Adversary submodel ATT AIR assumes the adversaries are attacking the site from the air and do not need to climb the ladder. Hence, they are immediately placed on the roof. The prompts and prompt query sets defined for ATT_GRD are also used for ATT_AIR.

APPENDIX D

Complete Model - Example

COMPLETE MODEL - EXAMPLE

This appendix contains a complete copy of the model that has been used as an example throughout this manual. In addition, you will find all of the master prompt query databases and prompt query set databases. All of the information shown reflect the default responses to the queries.

Facility Submodel

Figure D.1 shows the graphical facility submodel. Figure D.2 displays the facility submodel echo report providing detailed information on the submodel.

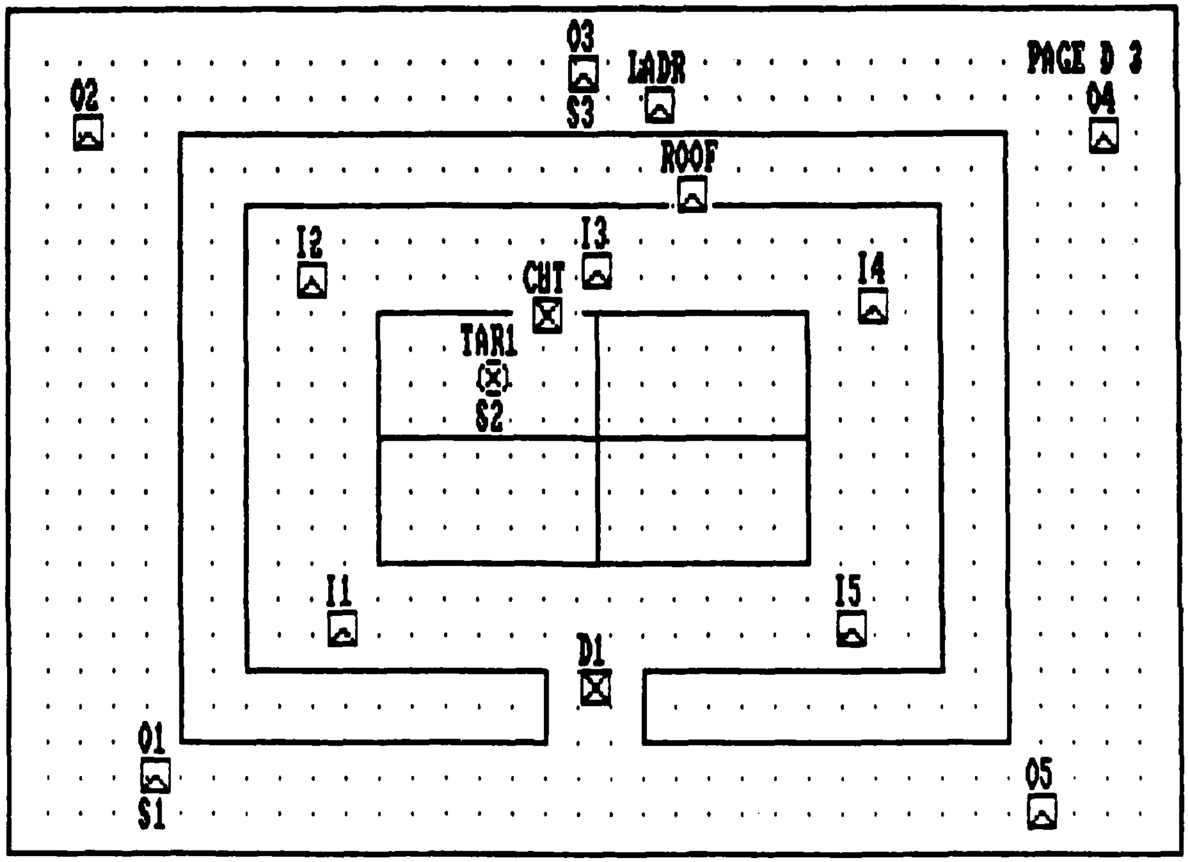

Figure D.1: Facility Submodel

```
******************************************
*                                        *
*  ECHO CHECK FOR THE FACILITY SUBMODEL  *
*                                        *
******************************************
```

** FACILITY LOCATIONS **

NODE LABEL	STATISTICS COLLECTION OPTION	NODE TYPE	ACTIVE / DISABLED	ADJACENT NODES	ADD LABELS
D1	NO	BARRIER	ACT		
CUT	NO	BARRIER	ACT		
ROOF	NO	SPACE			
LADR	NO	SPACE			
O5	NO	SPACE			
O4	NO	SPACE			
O3	NO	SPACE			S3
O2	NO	SPACE			
O1	NO	SPACE			S1
I3	NO	SPACE			
I4	NO	SPACE			
I5	NO	SPACE			
I1	NO	SPACE			
I2	NO	SPACE			
TAR1	NO	TARGET			S2

Figure D.2: Facility Submodel Echo Report

Control Submodel

Figure D.3 displays the echo report of the control submodel. Figure D.4 shows the prompt query set database for the control submodel.

```
*********************************************
*                                           *
*  ECHO CHECK FOR THE  CONTROL  SUBMODEL    *
*                                           *
*********************************************
```

** PARAMETER SETS **

SET NUMBER	PARAMETER ONE	TWO	THREE	FOUR
4	1.000	1.500	2.50	.000
5	.500	.750	1.25	.000
6	.333	.000	.100E+21	.100
8	2.000	2.500	3.50	.000
9	1.000	1.250	1.75	.000

** STATUS VARIABLES **

STATUS LABEL	VARIABLE TYPE	INITIAL VALUE
IPI	GLOBAL VAR.	4.000
OPI	GLOBAL VAR.	8.000
ALRM	REGULAR FLAG	DISABLED
FI	FORCE FLAG	DISABLED

** TIMER CARDS **

TIMER LABEL	OPTION	ALPHANUMERIC IDENTIFIER
TT1	TSM	TIM FRM ALRM TO ENG

** MACRO CARDS **

MACRO LABEL	DOB ACTIONS
MAC1	SET(IPI , 5.000)
	SET(OPI , 9.000)
MAC2	MTT1)
	AALRM)

Figure D.3: Control Submodel Echo Report

DEFAULT   Automatically select default parameters, if any exist.
0;

Figure D.4: Control Submodel Prompt Query Set Database

Adversary Detection Submodel

Figures D.5 through D.12 display the graphical diagrams for both adversary detection submodels, DET1 and DET2. They also show the associated echo reports, prompt query set databases, and master prompt query databases.

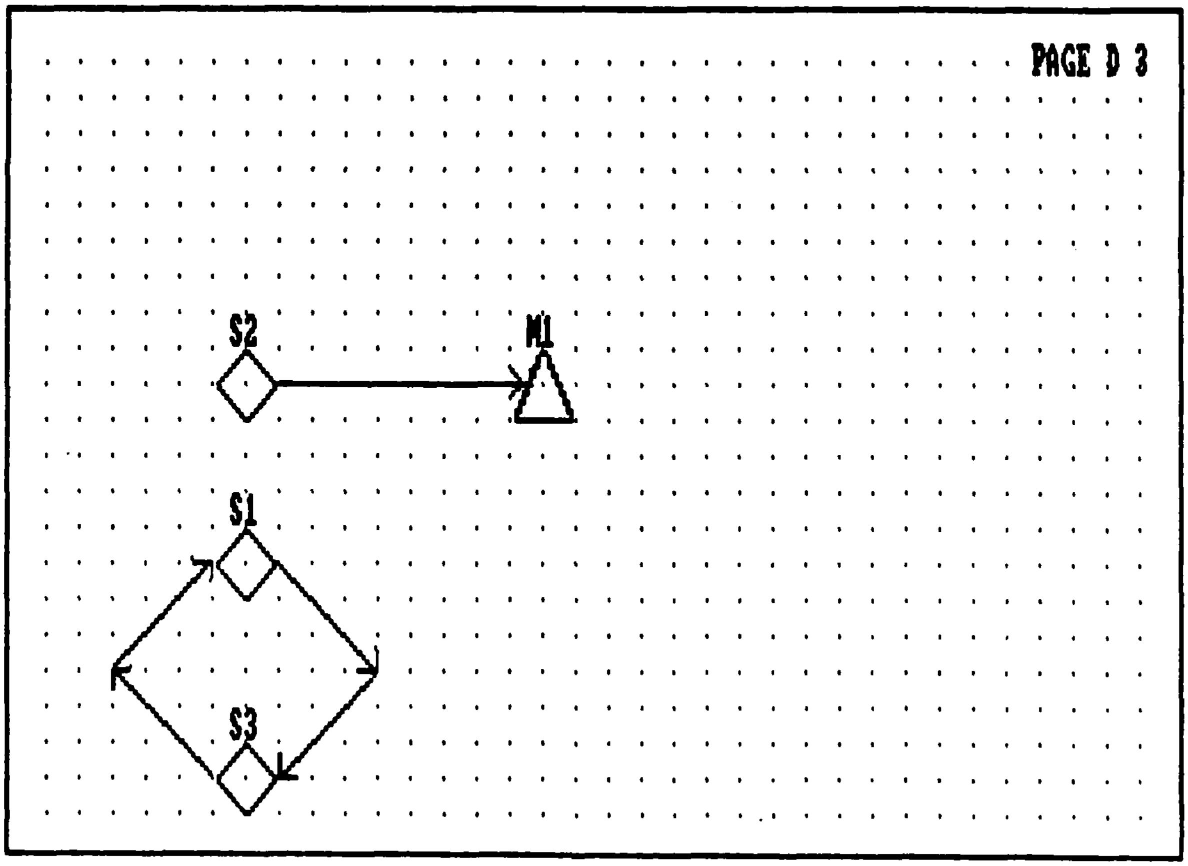

Figure D.5: Adversary Detection Submodel DET1

```
******************************************
*                                        *
*  ECHO CHECK FOR THE DETECTION SUBMODEL *
*                                        *
******************************************
```

** ADVERSARY DETECTION DEVICES **

ADD LABEL	ADD TYPE	TEMPORARY/ PERMANENT	PROBABILITY OF DETECTION	INFORMATION RECEIVER
S3	SENSOR	PERM	1.000	S1
S1	SENSOR	PERM	1.000	S3
S2	SENSOR	PERM	.950	M1
M1	MONITOR			W1

Figure D.6: Adversary Detection Submodel DET1 Echo Report

```
SENSORS   Sets the sensor specifications.
1,2;
DEFAULT   Automatically select default parameters, if any exist.
0;
```

Figure D.7: Adversary Detection Submodel DET1 Prompt Query Set Database

```
@1,1;
 0,"ENTER THE PROBABILITY OF",1;
 2," DETECTION FOR SENSOR S2?",.95,.40,1.0;
@2,1;
 0,"ENTER THE SIGNAL PERSISTENCE",1;
 3," OF SENSOR S2 ?",PER,PER,TEM;
```

Figure D.8: Adversary Detection Submodel DET1 Master Prompt Query Database

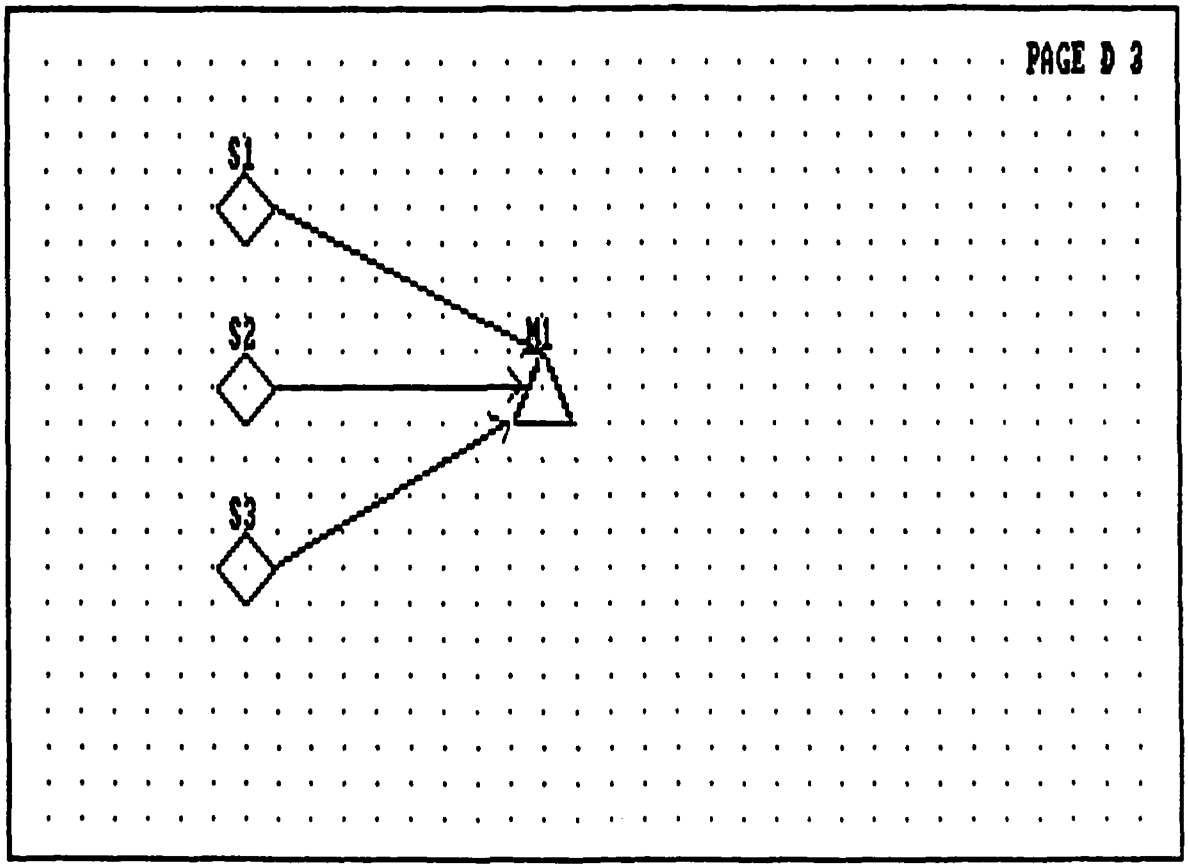

Figure D.9: Adversary Detection Submodel DET2

```
*******************************************
*                                         *
*  ECHO CHECK FOR THE DETECTION SUBMODEL  *
*                                         *
*******************************************
```

** ADVERSARY DETECTION DEVICES **

ADD LABEL	ADD TYPE	TEMPORARY/ PERMANENT	PROBABILITY OF DETECTION	INFORMATION RECEIVER
S1	SENSOR	PERM	.950	M1
S3	SENSOR	PERM	.950	M1
S2	SENSOR	PERM	.950	M1
M1	MONITOR			W1

Figure D.10: Adversary Detection Submodel DET2 Echo Report

```
SENSORS   Sets all sensor specifications.
1,2,3,4,5,6;
EXTER     Set exterior sensor specifications.
3,4,5,6;
INTER     Set interior sensor specifications.
1,2;
DEFAULT   Automatically select default parameters, if any exist.
0;
```

Figure D.11: Adversary Detection Submodel DET2 Prompt Query Set Database

```
@1,1;
 0,"ENTER THE PROBABILITY OF",1;
 2," DETECTION FOR SENSOR S2?",.95,.40,1.0;
@2,1;
 0,"ENTER THE SIGNAL PERSISTENCE",1;
 3," OF SENSOR S2 ?",PER,PER,TEM;
@3,1;
 0,"ENTER THE PROBABILITY OF",1;
 2," DETECTION FOR SENSOR S1?",.95,.40,1.0;
@4,1;
 0,"ENTER THE SIGNAL PERSISTENCE",1;
 3," OF SENSOR S1 ?",PER,PER,TEM;
@5,1;
 0,"ENTER THE PROBABILITY OF",1;
 2," DETECTION FOR SENSOR S3?",.95,.40,1.0;
@6,1;
 0,"ENTER THE SIGNAL PERSISTENCE",1;
 3," OF SENSOR S3 ?",PER,PER,TEM;
```

Figure D12: Adversary Detection Submodel DET2 Master Prompt Query Database

Guard Submodel

Figures D.13 throught D.28 display the four guard submodels.

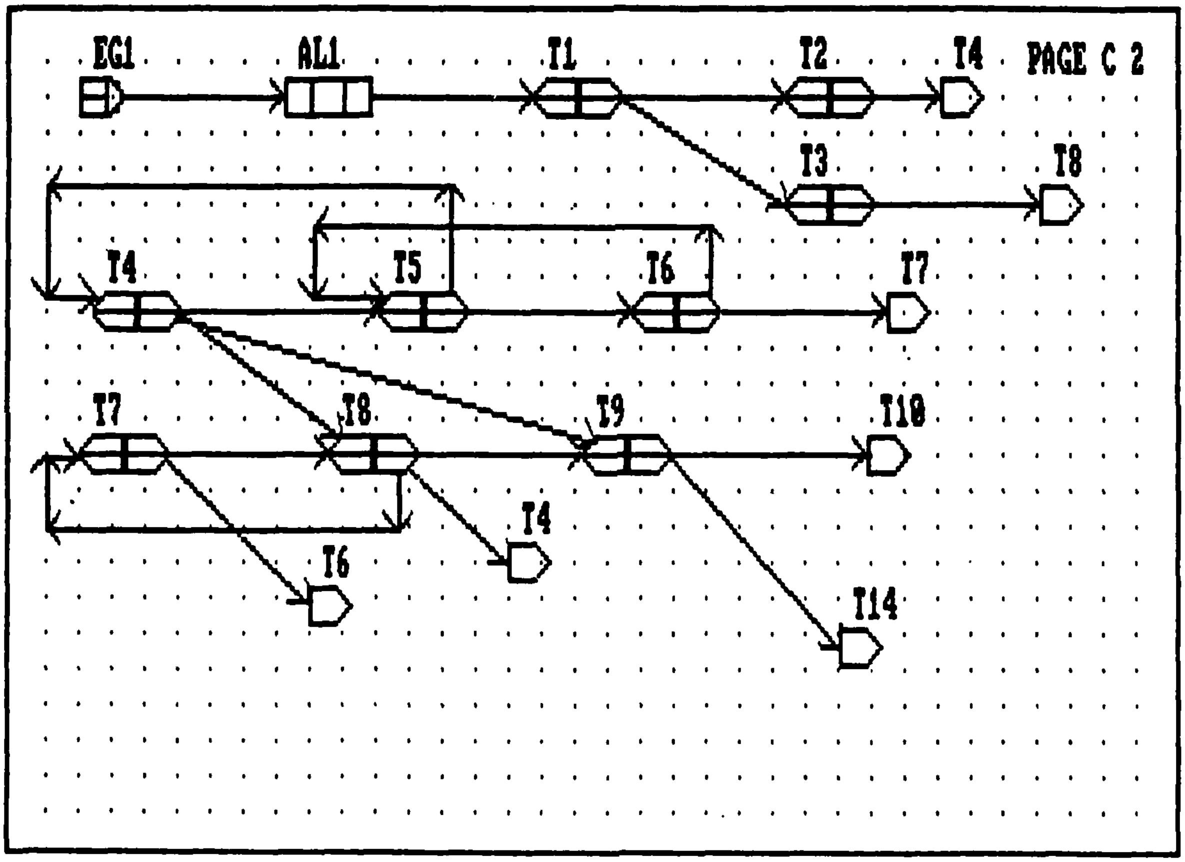

Figure D.13a: Guard Submodel DAY_ONE

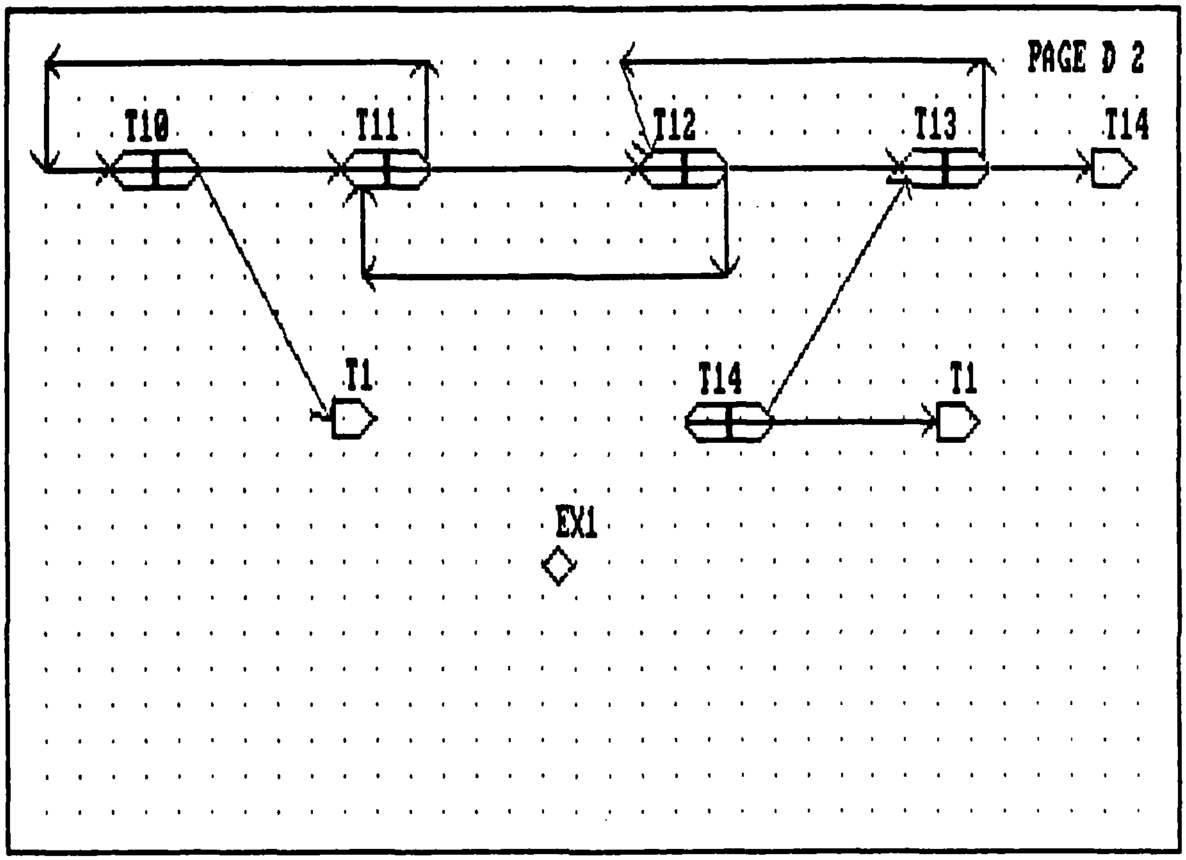

Figure D.13b: Guard Submodel DAY_ONE (continued)

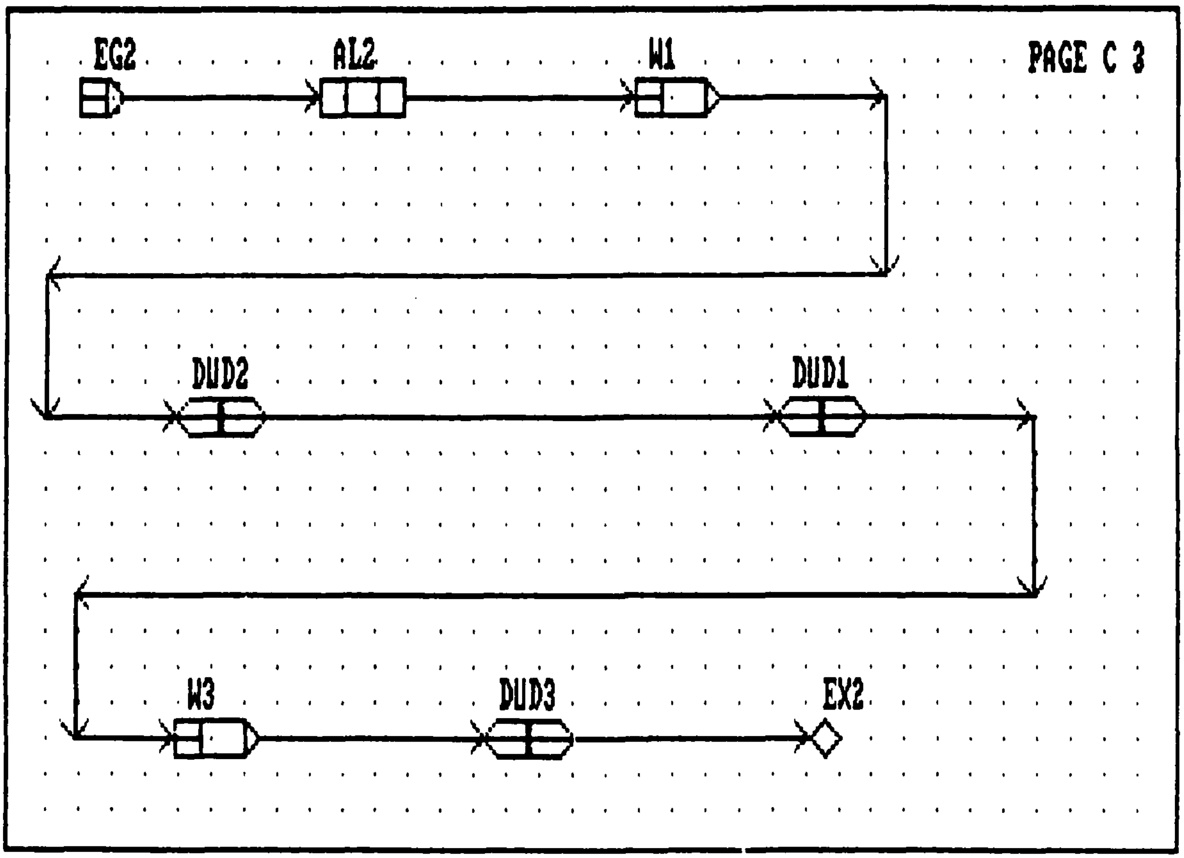

Figure D.13c: Guard Submodel DAY_ONE (continued)

```
*******************************************
*                                         *
*  ECHO CHECK FOR THE  GUARD    SUBMODEL  *
*                                         *
*******************************************
```

** GUARD ENGAGEMENT CARD **

TERMINATION CONDITION		DEFAULT FEBL
SIZE.LE.	.0	FG1

** GUARD FENG CARDS **

FENG LABEL	DENG LABEL	TINC VALUE
FG1	DG1	1.00
FG2	DG2	1.00

** GUARD DENG CARDS **

DENG LABEL	POSTURE	EXPOSURE WHILE FIRING	EXPOSURE WHILE RELOADING	PERCENT TIME DELAY	SELF POSTURE	ILLUMINATION	SUPPRES- SION	TACTIC
DG1	CROUCHING	50.0	30.0	.0	.0	50.0	NO	ASSAULT
DG2	STANDING	30.0	100.0	.0	.0	.0	NO	ASSAULT

** GUARD BASE NODES **

NODE LABEL	NUMBER OF GUARDS	WEAPON TYPE	PROFICIENCY
B1	5.	PISTOLS	50.0
B2	1.	PISTOLS	.0

** GUARD ENTER NODES **

NODE LABEL	TIME OF ARRIVAL	FACILITY LOCATION	MXTAK
EG1	.00	D1	1
EG2	.00	****	1

** GUARD ALLOCATE NODES **

NODE LABEL	BASE LABEL	MXTAK	SIZE
AL1	B1	1	2.
AL2	B2	1	0.

Figure D.14a: Guard Submodel DAY_ONE Echo Report

** GUARD TASK NODES **

TASK LABEL	FACIL NODE	MODE	TASK	TIME DISTRIBUTION	DOB DESIGNATION	ELBL	SLBL	MXTAK
T1	D1	PATR		CON(.300)				1
T2	****			CON(.000)	ACT (FI)			1
T4	I1			TRI(IPI ,1)				1
T5	I2			TRI(IPI ,1)				1
T6	I3			TRI(IPI ,1)		EX1		1
T7	I4			TRI(IPI ,1)				1
T8	I5			TRI(IPI ,1)				1
T9	D1			CON(.300)				1
T14	O5			TRI(OPI ,1)				1
T13	O4			TRI(OPI ,1)				1
T12	O3			TRI(OPI ,1)		EX1		1
T11	O2			TRI(OPI ,1)				1
T10	O1			TRI(OPI ,1)				1
T3	****			CON(.000)	DIS (FI)			1
DUD2	****			CON(.000)	CALL(MAC2)			1
DUD1	****			CON(.000)	CALL(MAC1)			1
DUD3	****			CON(.000)	RECO(TT1)			1

TASK LABEL	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
T6	TAR1	4.000	PG2
T12	O3	10.000	PG1
	LADR	12.000	PG1
	ROOF	20.000	PG1

** GUARD WAIT NODES **

NODE LABEL	TRIGGERS	MERGE/ TRANSFER	ELBL	SLBL	MXTAK	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
W1	ADD M1 TRIGGERED				1			
W3	ENGAGEMENT AT TAR1				1			

** GUARD SIGNAL NODES **

NODE LABEL	SIGNAL OPTION	MXTAK
	NO SIGNAL NODES	

Figure D.14b: Guard Submodel DAY_ONE Echo Report (continued)

```
PATROL      Sets the characteristics of the guard patrol.
1,2,3;
TOTAL       Sets patrol characteristics and other parameters.
1,2,3/
4;
DEFAULT     Automatically select default parameters, if any exist.
0;
```

Figure D.15: Guard Submodel DAY_ONE Prompt Query Set Database

```
@1,1;
 1,"ENTER SIZE OF GUARD PATROL?",2,1,5;
@2,0;
 0,"   HG - HANDGUNS",1;
 0,"   SG - SHOTGUNS",1;
 0,"   SA - SEMIAUTOMATICS",1;
 0,"   SM - SUBMACHINEGUNS",1;
 0,"   FA - FULLY AUTOMATIC",1;
 0,"   NW - NO WEAPONS",1;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY GUARD PATROL FORCE ?",HG,HG,SG,SA,SM,FA,NW;
@3,1;
 2,"ENTER THE PROFICENCY OF THE GUARD PATROL?",50.0,0.0,100.0;
@4,1;
 0,"   HG - HANDGUNS",0;
 0,"   SG - SHOTGUNS",0;
 0,"   SA - SEMIAUTOMATICS",0;
 0,"   SM - SUBMACHINEGUNS",0;
 0,"   FA - FULLY AUTOMATIC",0;
 0,"   NW - NO WEAPONS",0;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY AUGMENTATION FORCE ?",HG,HG,SG,SA,SM,FA,NW;
```

Figure D.16: Guard Submodel DAY_ONE Master Prompt Query Database

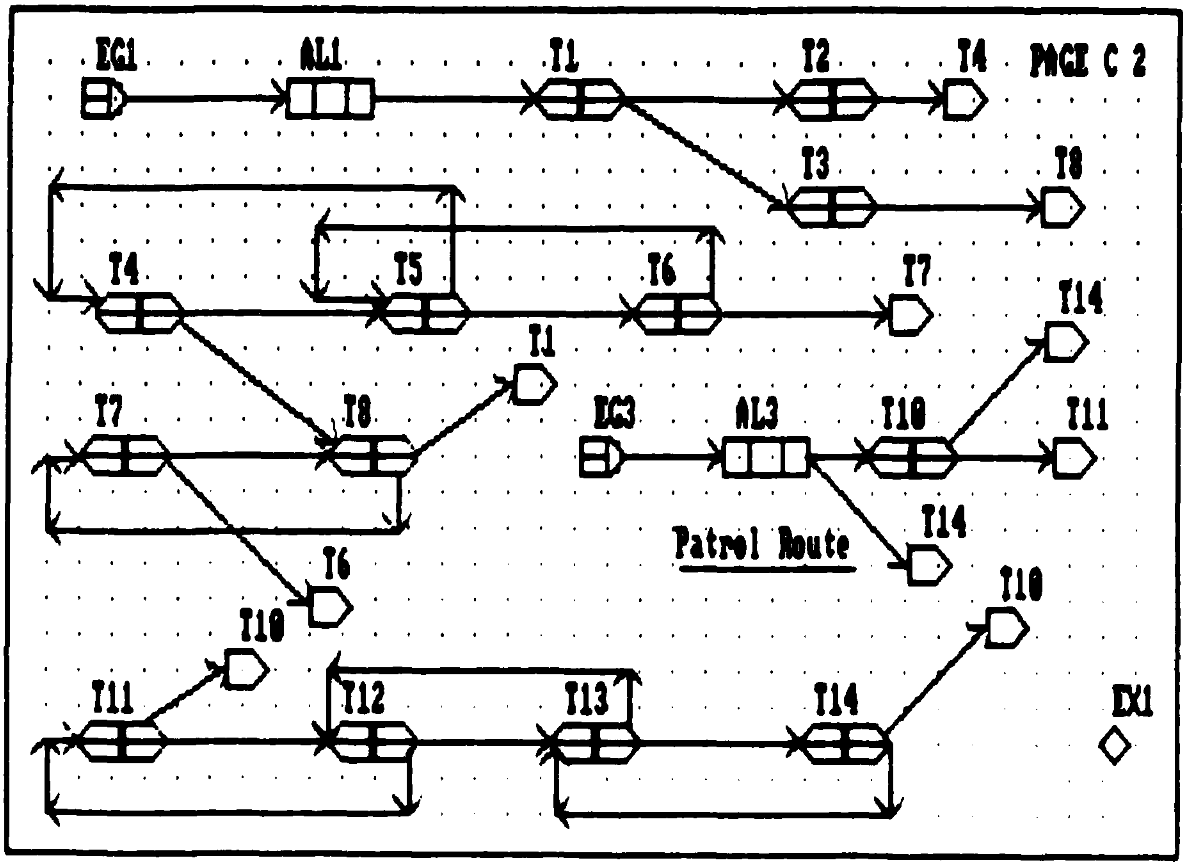

Figure D.17a: Guard Submodel DAY_TWO

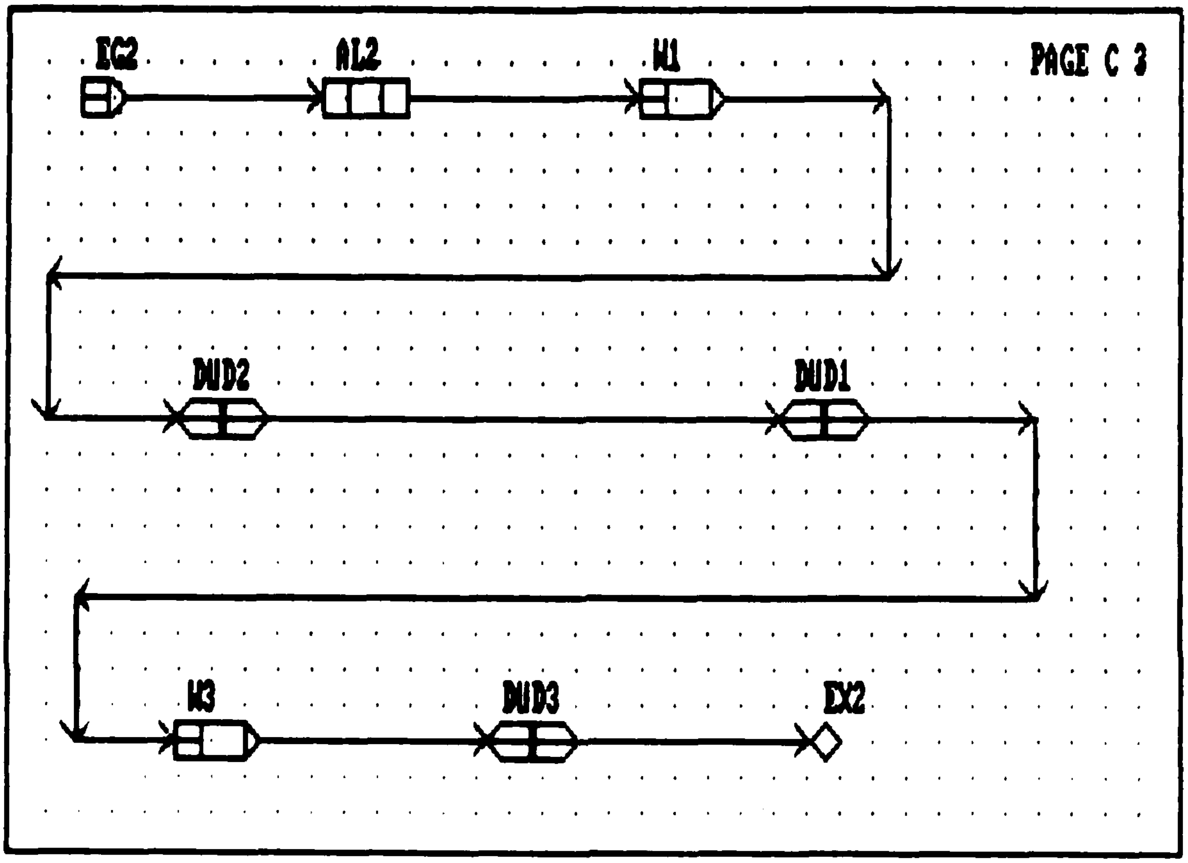

Figure D.17b: Guard Submodel DAY_TWO (continued)

```
******************************************
*                                        *
*  ECHO CHECK FOR THE  GUARD    SUBMODEL  *
*                                        *
******************************************
```

** GUARD ENGAGEMENT CARD **

TERMINATION CONDITION	DEFAULT PEBL
SIZE.LE. .0	PG1

** GUARD PENG CARDS **

PENG LABEL	DENG LABEL	TINC VALUE
PG1	DG1	1.00
PG2	DG2	1.00

** GUARD DENG CARDS **

DENG LABEL	POSTURE	EXPOSURE WHILE FIRING	EXPOSURE WHILE RELOADING	PERCENT TIME DELAY	SELF POSTURE	ILLUMINATION	SUPPRES-SION	TACTIC
DG1	CROUCHING	50.0	30.0	.0	.0	50.0	NO	ASSAULT
DG2	STANDING	30.0	100.0	.0	.0	.0	NO	ASSAULT

** GUARD BASE NODES **

NODE LABEL	NUMBER OF GUARDS	WEAPON TYPE	PROFICIENCY
B1	5.	PISTOLS	50.0
B2	1.	PISTOLS	.0

** GUARD ENTER NODES **

NODE LABEL	TIME OF ARRIVAL	FACILITY LOCATION	MXTAK
EG1	.00	D1	1
EG3	.00	O1	1
EG2	.00	****	1

** GUARD ALLOCATE NODES **

NODE LABEL	BASE LABEL	MXTAK	SIZE
AL1	B1	1	1.
AL3	B1	1	1.
AL2	B2	1	0.

Figure D.18a: Guard Submodel DAY_TWO Echo Report

** GUARD TASK NODES **

TASK LABEL	FACIL NODE	MODE	TASK TIME DISTRIBUTION	DOB DESIGNATION	ELBL	SLBL	MXTAK
T1	D1	PATR	CON(.300)				1
T2	****		CON(.000)	ACT (FI)			1
T4	I1		TRI(IPI ,1)				1
T5	I2		TRI(IPI ,1)				1
T6	I3		TRI(IPI ,1)		EX1		1
T7	I4		TRI(IPI ,1)				1
T8	I5		TRI(IPI ,1)				1
T3	****		CON(.000)	DIS (FI)			1
T14	O5		TRI(OPI ,1)				1
T10	O1		TRI(OPI ,1)				1
T11	O2		TRI(OPI ,1)				1
T12	O3		TRI(OPI ,1)		EX1		1
T13	O4		TRI(OPI ,1)				1
DUD2	****		CON(.000)	CALL(MAC2)			1
DUD1	****		CON(.000)	CALL(MAC1)			1
DUD3	****		CON(.000)	RECO(TT1)			1

TASK LABEL	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
T6	TAR1	4.000	PG2
T12	O3	10.000	PG1
	LADR	12.000	PG1
	ROOF	20.000	PG1

** GUARD WAIT NODES **

NODE LABEL	TRIGGERS	MERGE/ TRANSFER	ELBL	SLBL	MXTAK	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
W1	ADD M1 TRIGGERED				1			
W3	ENGAGEMENT AT TAR1				1			

** GUARD SIGNAL NODES **

NODE LABEL	SIGNAL OPTION	MXTAK
	NO SIGNAL NODES	

Figure D.18b: Guard Submodel DAY_TWO (continued)

```
PATROL     Sets the characteristics of the guard patrol.
1,2,3,5;
TOTAL      Sets patrol characteristics and other parameters.
1,2,3/
4,5;
DEFAULT    Automatically select default parameters, if any exist.
0;
```

Figure D.19: Guard Submodel DAY_TWO Prompt Query Set Database

```
@1,1;
 1,"ENTER SIZE OF INTERIOR GUARD PATROL?",1,1,5;
@2,0;
 0,"   HG - HANDGUNS",1;
 0,"   SG - SHOTGUNS",1;
 0,"   SA - SEMIAUTOMATICS",1;
 0,"   SM - SUBMACHINEGUNS",1;
 0,"   FA - FULLY AUTOMATIC",1;
 0,"   NW - NO WEAPONS",1;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY GUARD PATROL FORCE ?",HG,HG,SG,SA,SM,FA,NW;
@3,1;
 2,"ENTER THE PROFICENCY OF THE GUARD PATROL?",50.0,0.0,100.0;
@4,1;
 0,"   HG - HANDGUNS",0;
 0,"   SG - SHOTGUNS",0;
 0,"   SA - SEMIAUTOMATICS",0;
 0,"   SM - SUBMACHINEGUNS",0;
 0,"   FA - FULLY AUTOMATIC",0;
 0,"   NW - NO WEAPONS",0;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY AUGMENTATION FORCE ?",HG,HG,SG,SA,SM,FA,NW;
@5,1;
 1," ENTER SIZE OF EXTERIOR GUARD PATROL?",1,1,5;
```

Figure D.20: Guard Submodel DAY_TWO Master Prompt Query Database

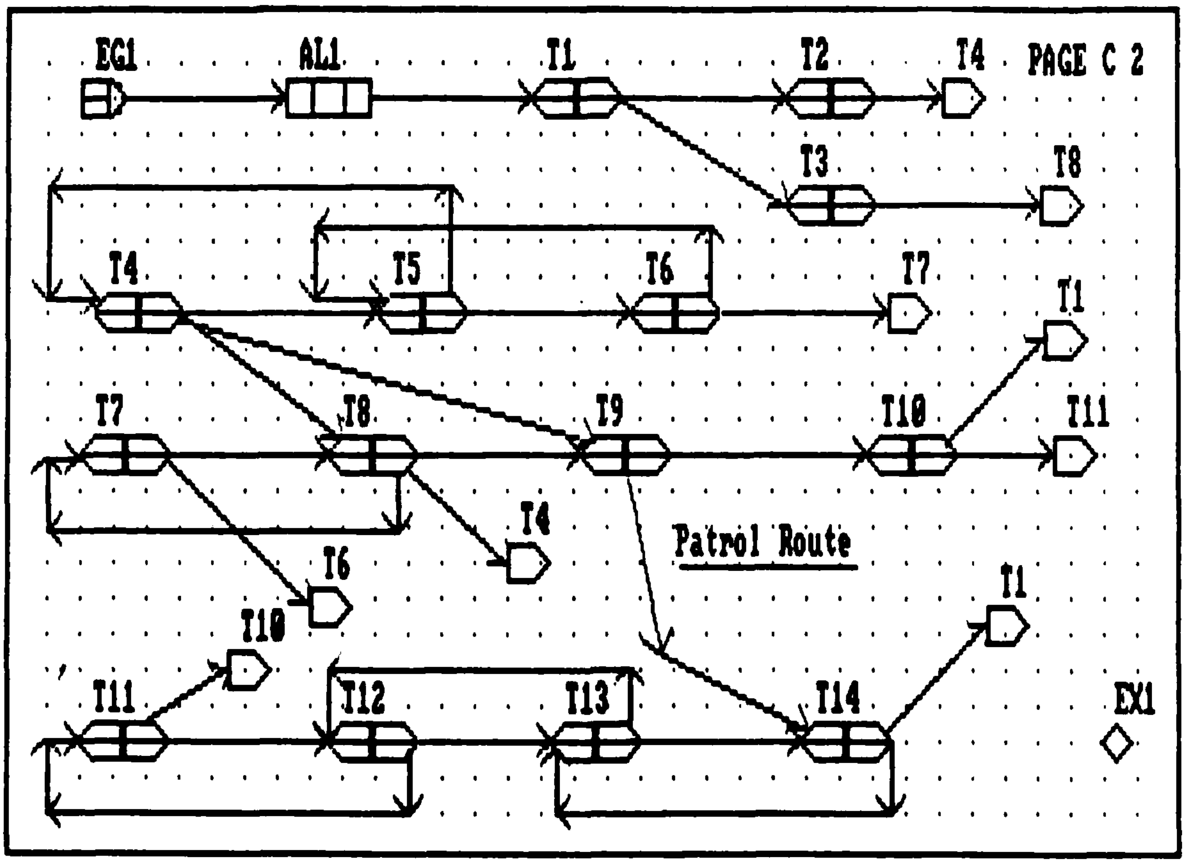

Figure D.21a: Guard Submodel NGHT_ONE

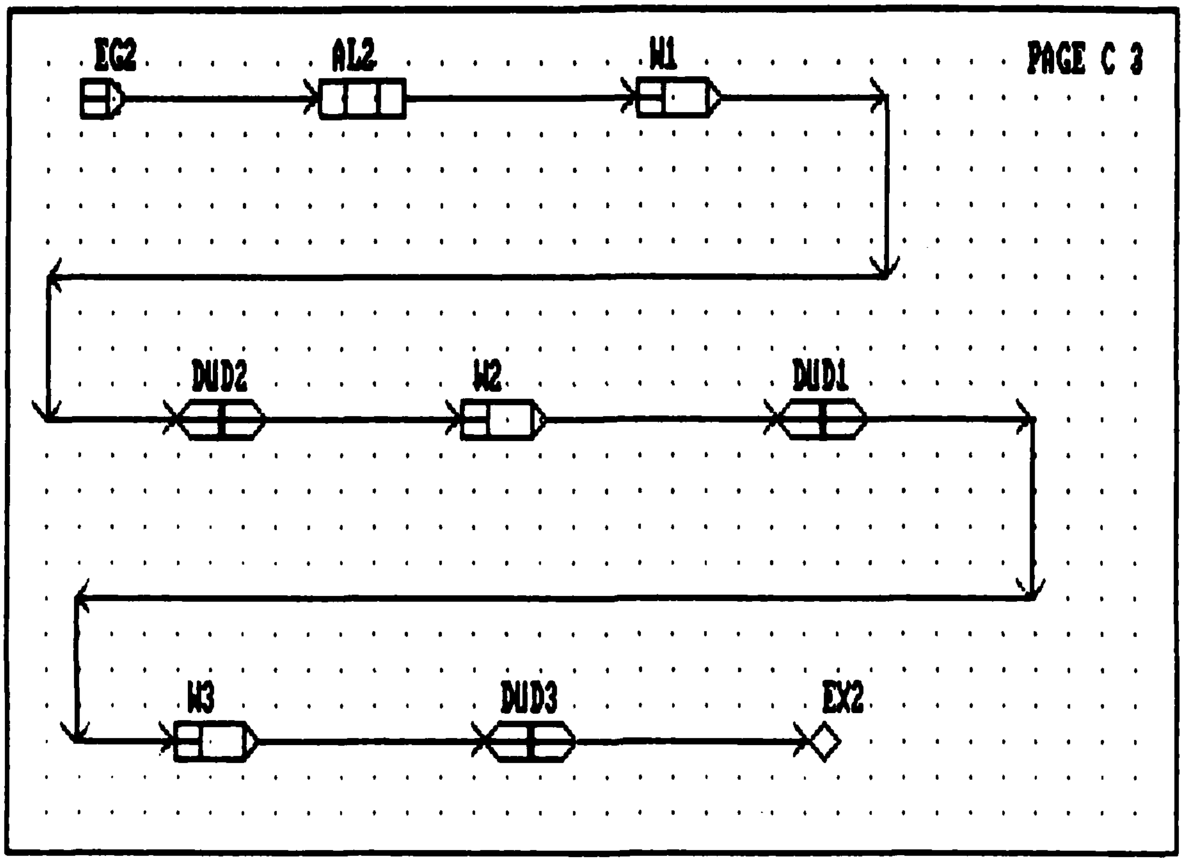

Figure D.21b: Guard Submodel NGHT_ONE (continued)

```
*******************************************
*                                         *
*  ECHO CHECK FOR THE  GUARD   SUBMODEL   *
*                                         *
*******************************************
```

** GUARD ENGAGEMENT CARD **

TERMINATION CONDITION		DEFAULT PEBL
SIZE.LE.	.0	PG1

** GUARD PENG CARDS **

PENG LABEL	DENG LABEL	TINC VALUE
PG1	DG1	1.00
PG2	DG2	1.00

** GUARD DENG CARDS **

DENG LABEL	POSTURE	EXPOSURE WHILE FIRING	EXPOSURE WHILE RELOADING	PERCENT TIME DELAY	SELF POSTURE	ILLUMINATION	SUPPRES-SION	TACTIC
DG1	CROUCHING	50.0	30.0	.0	.0	50.0	NO	ASSAULT
DG2	STANDING	30.0	100.0	.0	.0	.0	NO	ASSAULT

** GUARD BASE NODES **

NODE LABEL	NUMBER OF GUARDS	WEAPON TYPE	PROFICIENCY
B1	5.	PISTOLS	50.0
B2	1.	PISTOLS	.0

** GUARD ENTER NODES **

NODE LABEL	TIME OF ARRIVAL	FACILITY LOCATION	MXTAK
EG1	.00	D1	1
EG2	.00	****	1

** GUARD ALLOCATE NODES **

NODE LABEL	BASE LABEL	MXTAK	SIZE
AL1	B1	1	2.
AL2	B2	1	0.

Figure D.22a: Guard Submodel NGHT_ONE Echo Report

** GUARD TASK NODES **

TASK LABEL	FACIL NODE	MODE	TASK TIME DISTRIBUTION	DOB DESIGNATION	ELBL	SLBL	MXTAK
T1	D1	PATR	CON(.300)				1
T2	****		CON(.000)	ACT (FI)			1
T4	I1		TRI(IPI ,1)				1
T5	I2		TRI(IPI ,1)				1
T6	I3		TRI(IPI ,1)		EX1		1
T7	I4		TRI(IPI ,1)				1
T8	I5		TRI(IPI ,1)				1
T9	D1		CON(.300)				1
T14	O5		TRI(OPI ,1)				1
T13	O4		TRI(OPI ,1)				1
T12	O3		TRI(OPI ,1)		EX1		1
T11	O2		TRI(OPI ,1)				1
T10	O1		TRI(OPI ,1)				1
T3	****		CON(.000)	DIS (FI)			1
DUD2	****		CON(.000)	CALL(MAC2)			1
DUD1	****		CON(.000)	CALL(MAC1)			1
DUD3	****		CON(.000)	RECO(TT1)			1

TASK LABEL	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
T6	TAR1	4.000	PG2
T12	O3	10.000	PG1
	LADR	12.000	PG1
	ROOF	20.000	PG1

** GUARD WAIT NODES **

NODE LABEL	TRIGGERS	MERGE/ TRANSFER	ELBL	SLBL	MXTAK	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
W1	ADD M1 TRIGGERED				1			
W2	GUARD AT I1				1			
	.OR.GUARD AT I2							
	.OR.GUARD AT I3							
	.OR.GUARD AT I4							
	.OR.GUARD AT I5							
W3	ENGAGEMENT AT TAR1				1			

** GUARD SIGNAL NODES **

NODE LABEL	SIGNAL OPTION	MXTAK
	NO SIGNAL NODES	

Figure D.22b: Guard Submodel NGHT_ONE Echo Report (continued)

```
PATROL     Sets the characteristics of the guard patrol.
1,2,3;
TOTAL      Sets patrol characteristics and other parameters.
1,2,3/
4;
DEFAULT    Automatically select default parameters, if any exist.
0;
```

Figure D.23: Guard Submodel NGHT_ONE Prompt Query Set Database

```
@1,1;
 1,"ENTER SIZE OF GUARD PATROL?",2,1,5;
@2,0;
 0,"   HG - HANDGUNS",1;
 0,"   SG - SHOTGUNS",1;
 0,"   SA - SEMIAUTOMATICS",1;
 0,"   SM - SUBMACHINEGUNS",1;
 0,"   FA - FULLY AUTOMATIC",1;
 0,"   NW - NO WEAPONS",1;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY GUARD PATROL FORCE ?",HG,HG,SG,SA,SM,FA,NW;
@3,1;
 2,"ENTER THE PROFICENCY OF THE GUARD PATROL?",50.0,0.0,100.0;
@4,1;
 0,"   HG - HANDGUNS",0;
 0,"   SG - SHOTGUNS",0;
 0,"   SA - SEMIAUTOMATICS",0;
 0,"   SM - SUBMACHINEGUNS",0;
 0,"   FA - FULLY AUTOMATIC",0;
 0,"   NW - NO WEAPONS",0;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY AUGMENTATION FORCE ?",HG,HG,SG,SA,SM,FA,NW;
```

Figure D.24: Guard Submodel NGHT_ONE Master Prompt Query Database

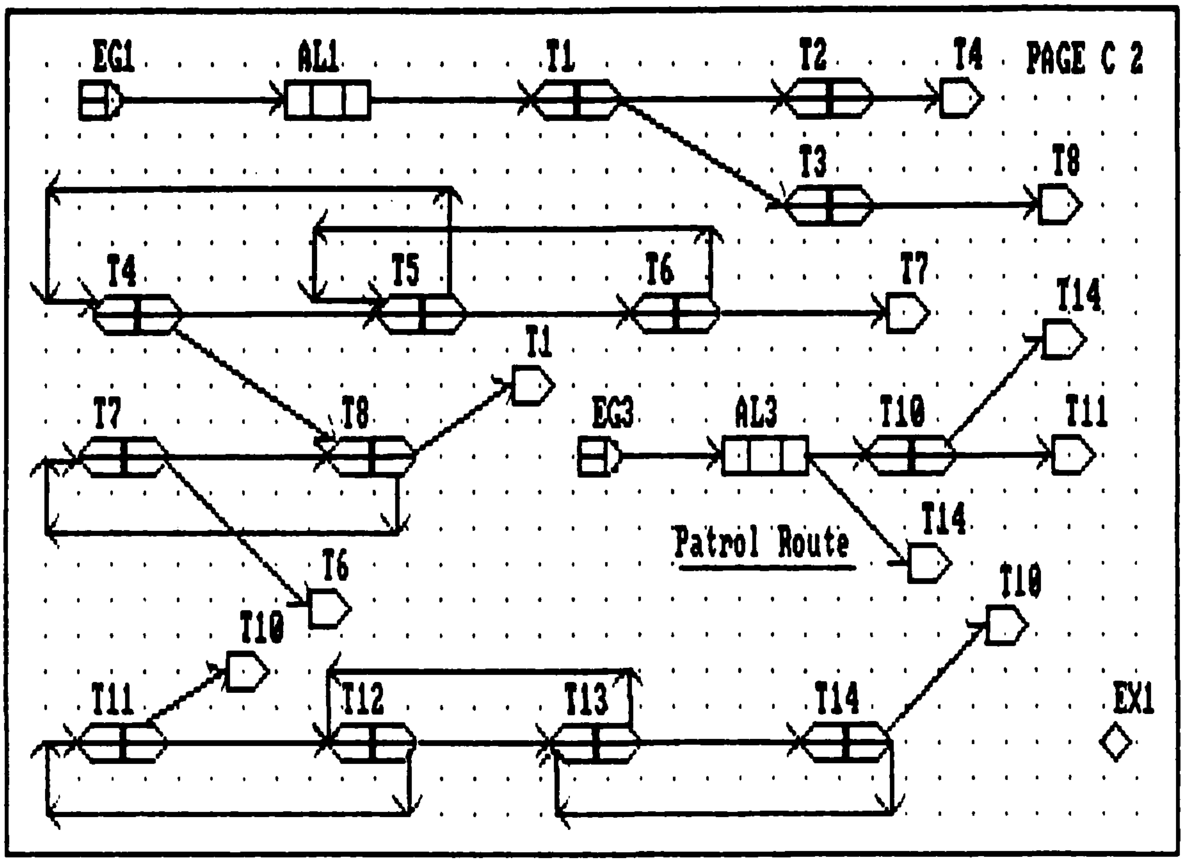

Figure D.25a: Guard Submodel NGHT_TWO

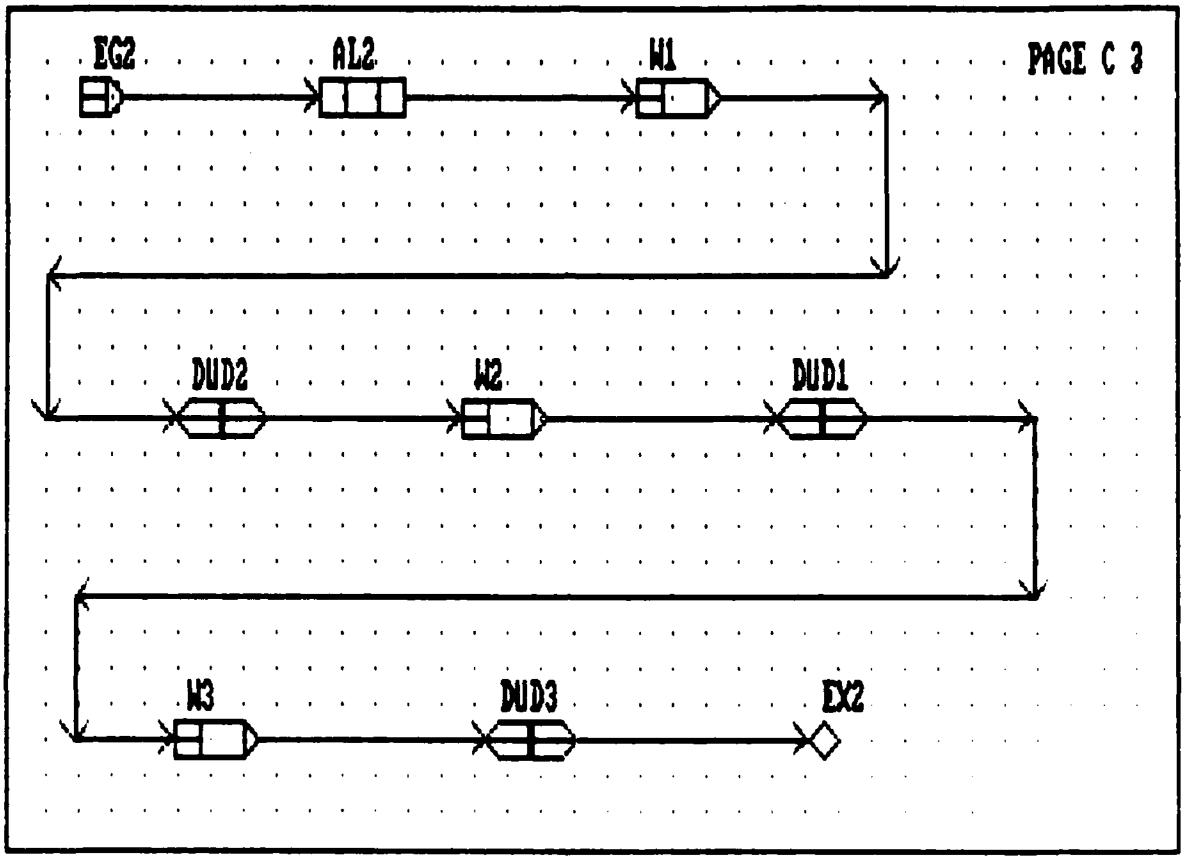

Figure D.25b: Guard Submodel NGHT_TWO (continued)

```
*****************************************
*                                       *
*  ECHO CHECK FOR THE  GUARD   SUBMODEL *
*                                       *
*****************************************
```

** GUARD ENGAGEMENT CARD **

TERMINATION CONDITION	DEFAULT PEBL
SIZE.LE. .0	PG1

** GUARD PENG CARDS **

PENG LABEL	DENG LABEL	TINC VALUE
PG1	DG1	1.00
PG2	DG2	1.00

** GUARD DENG CARDS **

DENG LABEL	POSTURE	EXPOSURE WHILE FIRING	EXPOSURE WHILE RELOADING	PERCENT TIME DELAY	SELF POSTURE	ILLUMINATION	SUPPRES-SION	TACTIC
DG1	CROUCHING	50.0	30.0	.0	.0	50.0	NO	ASSAULT
DG2	STANDING	30.0	100.0	.0	.0	.0	NO	ASSAULT

** GUARD BASE NODES **

NODE LABEL	NUMBER OF GUARDS	WEAPON TYPE	PROFICIENCY
B1	5.	PISTOLS	50.0
B2	1.	PISTOLS	.0

** GUARD ENTER NODES **

NODE LABEL	TIME OF ARRIVAL	FACILITY LOCATION	MXTAH
EG3	.00	D1	1
EG1	.00	D1	1
EG2	.00	****	1

** GUARD ALLOCATE NODES **

NODE LABEL	BASE LABEL	MXTAH	SIZE
AL3	B1	1	1.
AL1	B1	1	1.
AL2	B2	1	0.

Figure D.26a: Guard Submodel NGHT_TWO Echo Report

** GUARD TASK NODES **

TASK LABEL	FACIL NODE	MODE	TASK TIME DISTRIBUTION	DUB DESIGNATION	ELBL	SLBL	MXTA
T14	O5		TRI(OPI ,1)				1
T10	O1		TRI(OPI ,1)				1
T11	O2		TRI(OPI ,1)				1
T12	O3		TRI(OPI ,1)		EX1		1
T13	O4		TRI(OPI ,1)				1
T1	D1	PATR	CON(.300)				1
T2	****		CON(.000)	ACT (FI)			1
T4	I1		TRI(IPI ,1)				1
T5	I2		TRI(IPI ,1)				1
T6	I3		TRI(IPI ,1)		EX1		1
T7	I4		TRI(IPI ,1)				1
T8	I5		TRI(IPI ,1)				1
T3	****		CON(.000)	DIS (FI)			1
DUD2	****		CON(.000)	CALL(MAC2)			1
DUD1	****		CON(.000)	CALL(MAC1)			1
DUD3	****		CON(.000)	RECD(TT1)			1

TASK	ENGAGEMENT POINTERS		
LABEL	FLBLE	DISTANCE	PEBL
T12	O3	10.000	PG1
	LADR	12.000	PG1
	ROOF	20.000	PG1
T6	TAR1	4.000	PG2

** GUARD WAIT NODES **

NODE LABEL	TRIGGERS	MERGE/ TRANSFER	ELBL	SLBL	MXTA	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
W1	ADD M1 TRIGGERED				1			
W2	GUARD AT I1				1			
	.OR.GUARD AT I2							
	.OR.GUARD AT I3							
	.OR.GUARD AT I4							
	.OR.GUARD AT I5							
W3	ENGAGEMENT AT TAR1				1			

** GUARD SIGNAL NODES **

NODE LABEL	SIGNAL OPTION	MXTA
	NO SIGNAL NODES	

Figure D.26b: Guard Submodel NGHT_TWO Echo Report (continued)

```
PATROL     Sets the characteristics of the guard patrol.
1,2,3,5;
TOTAL      Sets patrol characteristics and other parameters.
1,2,3/
4,5;
DEFAULT    Automatically select default parameters, if any exist.
 ;
```

Figure D.27: Guard Submodel NGHT_TWO Prompt Query Set Database

```
@1,1;
 1," ENTER SIZE OF INTERIOR GUARD PATROL?",1,1,5;
@2,0;
 0,"   HG - HANDGUNS",1;
 0,"   SG - SHOTGUNS",1;
 0,"   SA - SEMIAUTOMATICS",1;
 0,"   SM - SUBMACHINEGUNS",1;
 0,"   FA - FULLY AUTOMATIC",1;
 0,"   NW - NO WEAPONS",1;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY GUARD PATROL FORCE ?",HG,HG,SG,SA,SM,FA,NW;
@3,1;
 2,"ENTER THE PROFICENCY OF THE GUARD PATROL?",50.0,[illegible];
@4,1;
 0,"   HG - HANDGUNS",0;
 0,"   SG - SHOTGUNS",0;
 0,"   SA - SEMIAUTOMATICS",0;
 0,"   SM - SUBMACHINEGUNS",0;
 0,"   FA - FULLY AUTOMATIC",0;
 0,"   NW - NO WEAPONS",0;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY AUGMENTATION FORCE ?",HG,HG,SG,SA,SM,FA,NW;
@5,1;
 1," ENTER SIZE OF EXTERIOR GUARD PATROL?",1,1,5;
```

Figure D.28: Guard Submodel NGHT_TWO Master Prompt Query Database

Adversary Submodel

Figures D.29 through D.36 show the two adversary submodels.

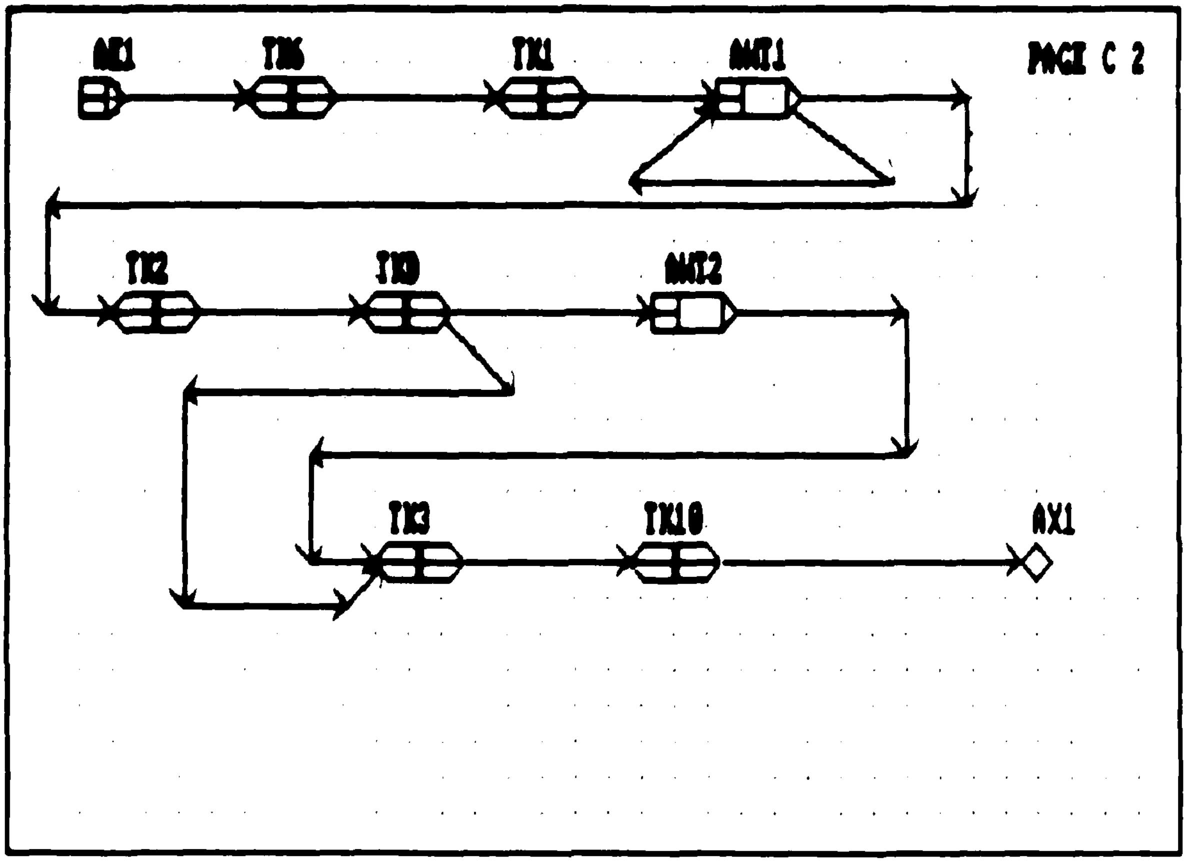

Figure D.29: Adversary Submodel ATT_GRD

```
*********************************************
*                                           *
*  ECHO CHECK FOR THE ADVERSARY SUBMODEL    *
*                                           *
*********************************************
```

** ADVERSARY ENGAGEMENT CARD **

TERMINATION CONDITION	DEFAULT PENG
SIZE.LE. .0	PA1

** ADVERSARY OBJECTIVE **

OBJECTIVE	TARGETS
SABOTAGE	TAR1

** ADVERSARY PENG CARDS **

PENG LABEL	DENG LABEL	TINC VALUE
PA1	DA1	.000
PA2	DA2	.000
PA3	DA3	.000
PA4	DA4	.000

** ADVERSARY DENG CARDS **

DENG LABEL	POSTURE	EXPOSURE WHILE FIRING	EXPOSURE WHILE RELOADING	PERCENT TIME DELAY	SELF POSTURE	ILLUMINATION	SUPPRES-SION	TACTIC
DA1	CROUCHING	50.0	30.0	.0	.0	50.0	NO	ASSAULT
DA2	STANDING	100.0	100.0	.0	80.0	[illegible]	NO	ASSAULT
DA3	CROUCHING	30.0	20.0	.0	.0	30.0	NO	ASSAULT
DA4	STANDING	50.0	40.0	.0	.0	.0	NO	ASSAULT

** ADVERSARY ENTER NODES **

NODE LABEL	SIZE	WEAPON TYPE	PROFICIENCY	TIME OF ARRIVAL	FACILITY LOCATION	MXTAK
AE1	3.	PISTOLS	50.00	.00	****	1

Figure D.30a: Adversary Submodel ATT_GRD Echo Report

** ADVERSARY TASK NODES **

TASK LABEL	FACIL NODE	MODE	TASK TIME DISTRIBUTION	DUR DESIGNATION	ELBL	SLBL	MXTAK
TK6	****	ENTE	UNF(.000, 100.000,1)				1
TK1	O3	ENTE	CON(1.000)		CONT		1
TK2	LADR	ENTE	RNO(6,1)		CONT		1
TKD	ROOF	ENTE	CON(.000)		CONT		1
TK3	CUT	PENE	UNF(4.000, 9.000,1)				1
TK10	TAR1		CON(6.000)		CONT		1

TASK LABEL	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
TK1	O3	10.000	PA1
TK2	O3	10.000	PA2
TKD	O3	10.000	PA3
TK10	I3	4.000	PA4

** ADVERSARY WAIT NODES **

NODE LABEL	TRIGGERS	MERGE/ TRANSFER	ELBL	SLBL	MXTAK	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
AWT1	NOT.ADVERSARY AT LADR		CONT		2	O3	10.0	PA1
AWT2	ADVERSARY AT ROOF	MERGE	CONT		1	O3	20.0	PA3
	.OR.NOT.ADVERSARY AT O3							
	.AND.NOT.ADVERSARY AT LADR							

** ADVERSARY SIGNAL NODES **

NODE LABEL	SIGNAL OPTION	MXTAK
	NO SIGNAL NODES	

Figure D.30b: Adversary Submodel ATT_GRD Echo Report (continued)

```
ATTACK     Sets the parameters of aversary force.
1,2;
MISSION    Sets the mission criteria.
4;
TOTAL      Sets both adversary force parametes and mission criteria.
1,2,4;
DEFAULT    Automatically select default parameters, if any exist.
0;
```

Figure D.31: Adversary Submodel ATT_GRD Prompt Query Set Database

```
@1,1;
 0,"  HG - HANDGUNS",1;
 0,"  SG - SHOTGUNS",1;
 0,"  SA - SEMIAUTOMATICS",1;
 0,"  SM - SUBMACHINEGUNS",1;
 0,"  FA - FULLY AUTOMATIC",1;
 0,"  NW - NO WEAPONS",1;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY THE ADVERSARY FORCE ?",HG,HG,SG,SA,SM,FA,NW;
@2,1;
 2,"ENTER THE PROFICENCY OF THE ADVERSARY FORCE?",50.0,0.0,100.0;
@3,1;
 2,"NOT REALLY A PROMPT QUERY ",0.0,0.0,100.0;
@4,1;
 0,"ENTER THE TASK TIME FOR THE ADVERSARY",1,
 2," FORCE AT THE TARGET LOCATION?",6.0,5.0,20.0;
```

Figure D.32: Adversary Submodel ATT_GRD Master Prompt Query Database

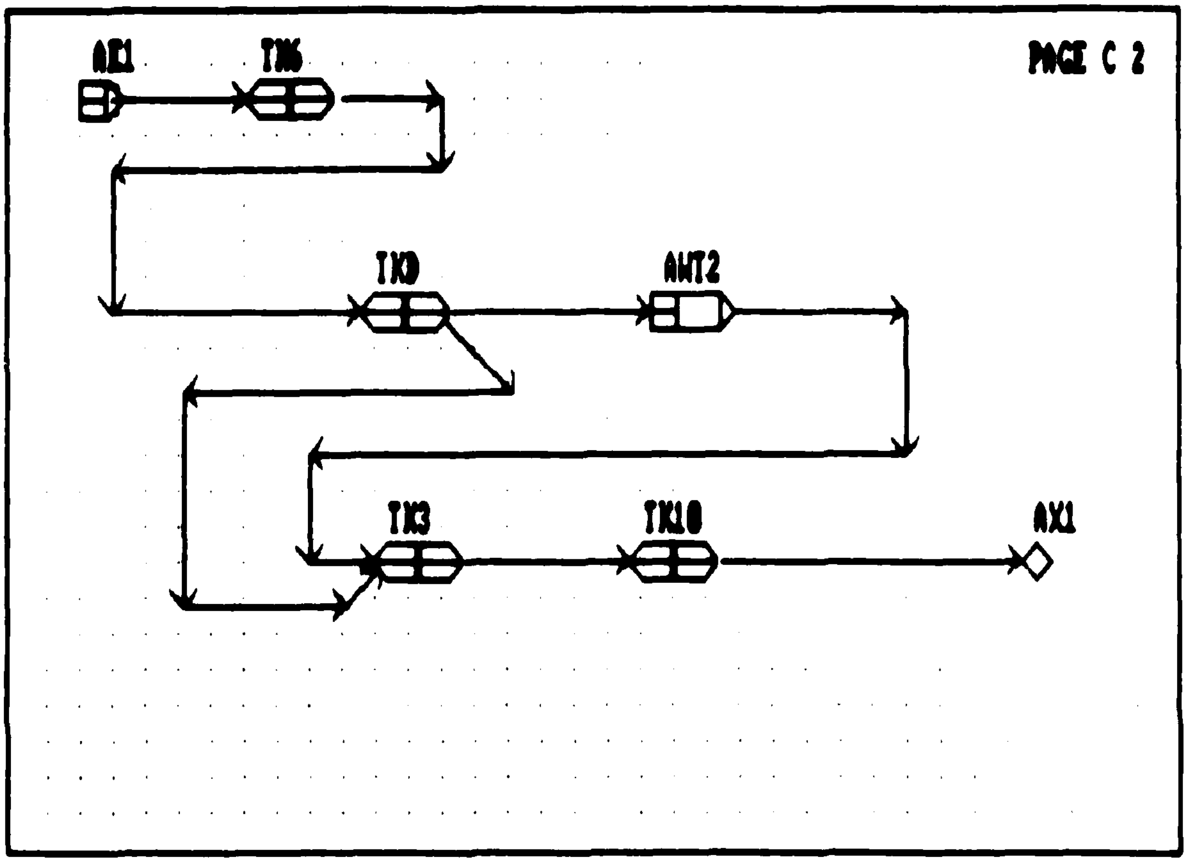

Figure D.33: Adversary Submodel ATT_AIR

```
*****************************************
*                                       *
*  ECHO CHECK FOR THE ADVERSARY SUBMODEL *
*                                       *
*****************************************
```

** ADVERSAR ENGAGEMENT CARD **

TERMINATION CONDITION		DEFAULT PENG
SIZE.LE.	.0	PA1

** ADVERSARY OBJECTIVE **

OBJECTIVE	TARGETS
SABOTAGE	TAR1

** ADVERSARY PENG CARDS **

PENG LABEL	DENG LABEL	TIME VALUE
PA1	DA1	.000
PA2	DA2	.000
PA3	DA3	.000
PA4	DA4	.000

** ADVERSARY DENG CARDS **

DENG LABEL	POSTURE	EXPOSURE WHILE FIRING	EXPOSURE WHILE RELOADING	PERCENT TIME DELAY	SELF POSTURE	ILLUMINATION	SUPPRESSION	TACTIC
DA1	CROUCHING	50.0	30.0	.0	.0	50.0	NO	ASSAULT
DA2	STANDING	100.0	100.0	.0	80.0	50.0	NO	ASSAULT
DA3	CROUCHING	30.0	20.0	.0	.0	50.0	NO	ASSAULT
DA4	STANDING	50.0	40.0	.0	.0	.0	NO	ASSAULT

** ADVERSARY ENTER NODES **

NODE LABEL	SIZE	WEAPON TYPE	PROFICIENCY	TIME OF ARRIVAL	FACILITY LOCATION	MXTAK
AE1	3.	PISTOLS	50.00	.00	****	1

Figure D.34a: Adversary Submodel ATT_AIR Echo Report

** ADVERSARY TASK NODES **

TASK LABEL	FACIL NODE	MODE	TASK TIME DISTRIBUTION	DUR DESIGNATION	ELBL	SLBL	MXTAK
TK6	****	ENTE	UNF(.000, 100.000,1)				1
TKD	ROOF	ENTE	CON(.000)		CONT		1
TK3	CUT	PENE	UNF(4.000, 9.000,1)				1
TK10	TAR1		CON(6.000)		CONT		1

TASK LABEL	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
TKD	03	10.000	PA3
TK10	13	4.000	PA4

** ADVERSARY WAIT NODES **

NODE LABEL	TRIGGERS	MERGE/ TRANSFER	ELBL	SLBL	MXTAK	ENGAGEMENT POINTERS FLBLE	DISTANCE	PEBL
AWT2	ADVERSARY AT ROOF .OR.NOT.ADVERSARY AT 03 .AND.NOT.ADVERSARY AT LADR	MERGE	CONT		1	03	20.0	PA3

** ADVERSARY SIGNAL NODES **

NODE LABEL	SIGNAL OPTION	MXTAK
NO SIGNAL NODES		

Figure D.34b: Adversary Submodel ATT_AIR Echo Report (continued)

```
ATTACK    Sets the parameters of aversary force.
1,2;
MISSION   Sets the mission criteria.
4;
TOTAL     Sets both adversary force parametes and mission criteria.
1,2,4;
DEFAULT   Automatically select default parameters, if any exist.
0;
```

Figure D.35: Adversary Submodel ATT_AIR Prompt Query Set Database

```
@1,1:
 0,"   HG - HANDGUNS",1;
 0,"   SG - SHOTGUNS",1;
 0,"   SA - SEMIAUTOMATICS",1;
 0,"   SM - SUBMACHINEGUNS",1;
 0,"   FA - FULLY AUTOMATIC",1;
 0,"   NW - NO WEAPONS",1;
 0,"ENTER THE TYPE OF WEAPONS",1;
 3," USED BY THE ADVERSARY FORCE ?",HG,HG,SG,SA,SM,FA,NW;
@2,1;
 2,"ENTER THE PROFICENCY OF THE ADVERSARY FORCE?",50.0,0.0,100.0;
@3,1;
 2,"NOT REALLY A PROMPT QUERY ",0.0,0.0,100.0;
@4,1;
 0,"ENTER THE TASK TIME FOR THE ADVERSARY",1,
 2," FORCE AT THE TARGET LOCATION?",6.0,5.0,20.0;
```

Figure D.36: Adversary Submodel ATT_AIR Master Prompt Query Database

Index

Index (continued)

AD-A181 355 CREATING SECURITY SYSTEM MODELS USING SNAP-PC(U) SANDIA NATIONAL LABS ALBUQUERQUE NM C D TOBIN ET AL. MAY 87 SAND86-7105 DE-AC04-76DP00789 4/4

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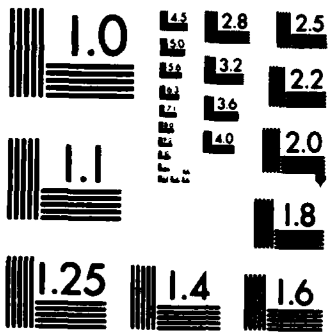
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2.8
2.5
3.2
2.2
3.6
4.0
2.0
1.1
1.8
1.25
1.4
1.6

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