United States
Department of
Agriculture

Forest Service

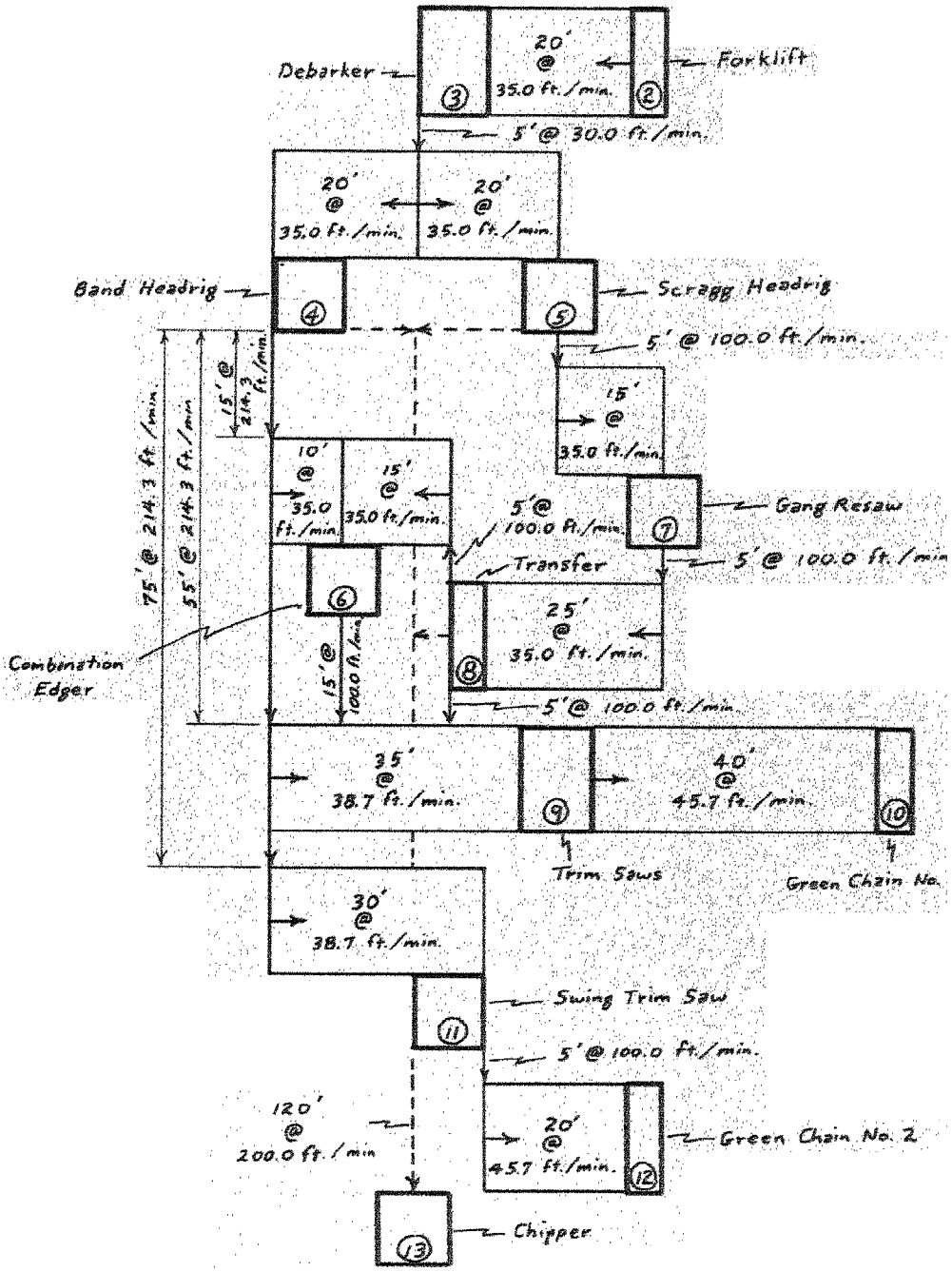
**Northeastern Forest
Experiment Station**

General Technical
Report NE-94

1984

DESIM User's Manual:
A Procedural Guide for Designing and Simulating Hardwood Sawmill Systems

Edward L. Adams



The Author

Edward L. Adams is a forest products technologist with the Northeastern Forest Experiment Station's Forestry Sciences Laboratory at Princeton, West Virginia. He received a B.S. degree in forest management and an M.S. degree in forest mensuration at West Virginia University. He worked for the USDA Forest Service in Oregon from 1960 to 1963 and joined the Northeastern Station in 1968.

Manuscript received for publication 16 April 1984

Abstract

A procedural guide for using the DESIM computerized system for designing and simulating the operation of hardwood sawmill systems. Instructions are provided for: (1) setting up the DESIM system on the computer, (2) obtaining the necessary data forms, (3) filling out the data forms to represent a proposed sawmill system, (4) getting the data from these forms into a sawmill data file, and (5) simulating the operation of the proposed sawmill. This user guide makes the system relatively easy to use for even complex sawmill situations.

DESIM User's Manual: A Procedural Guide for Designing and Simulating Hardwood Sawmill Systems

Contents

Introduction

DESIM[1] (DEsign SIMulator), a computerized system for designing and simulating the operation of hardwood sawmills, can be used to design new mills or to plan the modification of existing mills. It can handle complex situations and a wide variety of different products. And, once a mill has been designed and simulated, the design can easily be changed and simulated again to investigate different possibilities.

The DESIM system consists of three computer programs and two support data files. The first program provides data sheets for recording the required sawmill information. The second program provides an interactive question and answer procedure for getting the information from the data sheets into a sawmill data file. And, the third program uses this data file to realistically simulate the operation of the proposed sawmill. DESIM was designed to make it as easy as possible to use.

This paper provides a systematic procedure for using the system. However, it is important that you have a good general understanding of the system before working through the procedure. To gain this understanding, I suggest reading "DESIM: A System for Designing and Simulating Hardwood Sawmill Systems" (Adams 1984). This suggested paper provides a general discussion of the system and what it will do.

Along with the need for a general understanding of the system, several other requirements must be met before using the system. First, you must have available a large mainframe computer such as those available at most universities. The largest program in the system requires 1.6 megabytes of internal storage to run. Second, because the system uses the GASP-IV FORTRAN-based simulation language, the GASP-IV package (Pritsker 1974, 1977) must be available at your computer facility. Third, a conversational monitor system (CMS) computer terminal must be available and connected to the computer either directly or through a data communication modem. And fourth, you must obtain a copy of the DESIM computer tape. This tape is available from the Forestry Sciences Laboratory, Northeastern Forest Experiment Station, P.O. Box 152, Princeton, West Virginia 24740.

---

[1]The computer programs described in this publication are available on request with the understanding that the U.S. Department of Agriculture cannot assure their accuracy, completeness, reliability, or suitability for any other purpose than that reported. The recipient may not assert any proprietary rights thereto nor represent them to anyone as other than Government-produced computer programs.

Procedure

Once the above requirements have been met you are ready to work through the DESIM procedure, which is discussed as follows:

1. SETTING UP DESIM—Provides instructions for getting the DESIM computer tape information into your user files and setting up the necessary control files.
2. SETTING UP A SAWMILL SYSTEM—Discusses the preliminary work required to set up a proposed sawmill system to be simulated.
3. RUNNING FORMS PROGRAM—Provides instructions for obtaining the necessary data forms to be filled out for the sawmill system.
4. FILLING OUT DATA FORMS—Provides instructions for filling out the data forms correctly to reflect the sawmill system.
5. CREATING RAW MATERIAL DATA FILES—Provides instructions for creating any needed raw material data files.
6. RUNNING DESIGN PROGRAM—Discusses the running of the DESIGN program to get the information from the data forms into a mill data file.
7. RUNNING THE SIMULATION (SIMU) PROGRAM—Discusses the running of the SIMU program to simulate the actual operation of the proposed sawmill system.
8. MODIFYING THE SAWMILL SYSTEM—Discusses the procedure for modifying a sawmill system after it has been simulated.

If this systematic procedure is followed carefully, little difficulty should be encountered when using the system. Actually, after using the system several times, you will find it surprisingly easy to use. This is especially true when you consider its capabilities.

1. Setting Up DESIM

This section provides the procedure for transferring files from the DESIM computer tape to your CMS files and for developing the computer control files needed to use the DESIM system. If you are not familiar with the procedures for transferring computer files or for setting up programs to run on the computer, this section will mean little to you. However, consultants at your computer center can use this section to set up the system for you.

If you are using an IBM[2] computer, see Appendix A for detailed instructions, job control language (JCL), and execution (EXEC) statements required to set up the system. For other computers, you or a consultant must set up the system based on the following discussion.

[2]The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture or the Forest Service of any product or service to the exclusion of others that may be suitable

In this discussion, IBM file designations will be used. Each file designation consists of a file name, file type, and file mode. For example, the file "FORMS FORTRAN A1" has a file name of "FORMS", a file type of "FORTRAN", and a file mode of "A1." If you are not using an IBM computer, you may have to change these designations to meet the requirements of your computer.

1.1 Tape to CMS file. The DESIM system is on a 9-track computer tape at a density of 1600 bits per inch. It is in a nonlabeled, fixed block format with a record length of 80 and a block size of 6000. The information on the tape consists of five files (three computer programs and two data files). Use the following procedure to move the tape information to CMS files.

- FORMS Program—Move this program from the first tape file location to the CMS file with the designation "FORMS FORTRAN A1."
- DESIGN Program—Move this program from the second tape file location to the CMS file with the designation "DESIGN FORTRAN A1."
- SIMULATION Program—Move this program from the third tape file location to the CMS file with the designation "SIMU FORTRAN A1."
- Equipment Data File—Move this file from the fourth tape file location to the CMS file with the designation "EQ DATA A1."
- Lumber Grade Data File—Move this file from the fifth tape file location to the CMS file with the designation "LGR DATA A1."

1.2 CMS Execution Files. To facilitate the running of the three DESIM computer programs, CMS EXEC files and JCL files should be created. The EXEC files execute the CMS command procedure necessary for running the programs from the CMS terminal. The JCL files provide the required job control statements when the programs are sent to a multiple virtual storage (MVS) operating system for processing. The discussion of the files required for each DESIM program follows:

- FORMS Program—Create an EXEC file that will submit the "FORMS FORTRAN A1" file and the required JCL file to the MVS operating system for running. In generating the JCL file, if time and region parameters are required, set time equal to 1 minute and set region equal to 150K. If you want the resulting output sent directly to a printer, this should also be specified in the JCL file. If the output is sent to the user reader file, you must then manually enter the required information at the terminal to send the output to a printer.

- DESIGN Program—This program requires only an EXEC file for the CMS system. Since it is not sent to MVS operating system, no JCL file is required.

In creating the EXEC file, assignments must be made for the input-output unit numbers used in the program. The assignments by unit numbers are:

03—"MILL DATA A1" file input (disk)
04—"EQ DATA A1" file input (disk)
05—Terminal input (keyboard)
06—Terminal output (video screen)
09—"MIL2 DATA A1" file output (disk)
11—"MAT1 DATA A1" file input (disk)
12—"MAT2 DATA A1" file input (disk)
13—"MAT3 DATA A1" file input (disk)
14—"MAT4 DATA A1" file input (disk)
15—"MAT5 DATA A1" file input (disk)
16—"GAS DATA A1" file output (disk)

Once assignments have been made for the input-output unit numbers, enter statements for loading and running the DESIGN program. Following these statements, enter statements to perform the following:

—Determine if a "MILL DATA A1" file exists
—Erase the "MILL DATA A1" file if it exists
—Rename the "MIL2 DATA A1" file to "MILL DATA A1"
—Determine if a "GASP DATA A1" file exists
—Erase the "GASP DATA A1" file if it exists
—Rename the "GAS DATA A1" to "GASP DATA A1"

- SIMULATION Program—Create an EXEC file that submits to the MVS operating system the following files:

—Required JCL file
—SIMU FORTRAN A1
—GASP DATA A1
—MILL DATA A1
—LGR DATA A1

In generating the JCL file, if time and region parameters are required, set time equal to 5 minutes and set region equal to 1600K. If you plan to check the simulated output before having it printed, also specify in the JCL that the output is to be sent to the reader file.

2. Setting Up a Sawmill Situation

Whether designing a new mill or planning the modification of an existing mill, the entire sawmill situation must be considered. Include not only the physical attributes of the mill, but also the raw material inputs, the product outputs, and the processing procedures. In this section, I will discuss a procedure for setting up such a sawmill situation when using DESIM to help evaluate a mill design or modification.

2.1 Diagram proposed mill. Start by drawing the mill layout roughly to scale. Figure 1 shows a sample layout. Notice in this figure that the machine centers have been labeled and numbered. When numbering the machines, use numbers 2 through 30. The number "1" cannot be used. Also notice that the lengths and speeds of both the conveyors and buffers (surge decks) have been indicated. By drawing such a diagram, you can make sure that the link ups between machines have been properly considered. And, the information on the diagram will be readily available when needed later.

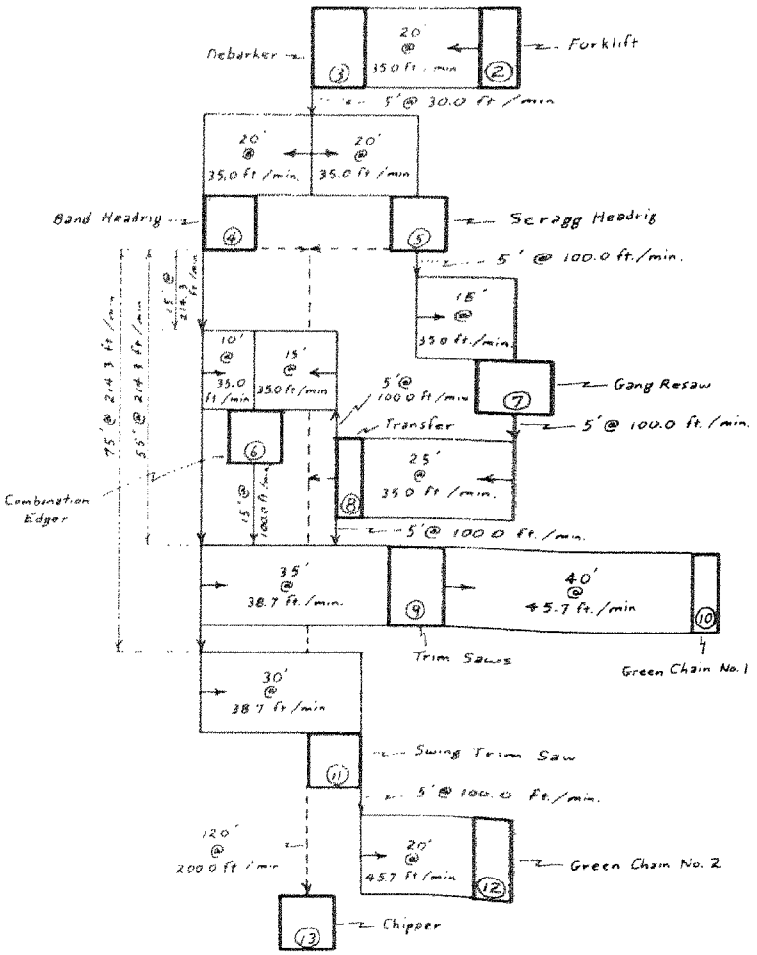


Figure 1.—Sample sawmill layout.

2.2 Raw material considerations. Do not underestimate the importance of raw material inputs when designing a new or planning the modification of an existing sawmill. The species, quality, and sizes of raw material to be processed are very important when determining the best new or modified mill for a given sawmill situation. Raw material inputs to the DESIM system can be: (1) actual piece data, (2) sawlog frequency distributions, and/or (3) bolt frequency distributions. If the necessary raw material inputs are not available for a given sawmill situation, you will have to collect the data and process it into one or more of the three types of raw material inputs.

For each log and/or bolt deck considered in a design, one of the three types of raw material input data will be required. There is no limit to the number of these input decks that can be considered. However, each deck can accept only one data set from only one of the three input data types.

2.3 Processing and product considerations. Before you get involved in the mechanics of filling out data forms, you should decide exactly how the material is going to be processed through the proposed mill to produce the desired products. In making these decisions, do not miss any processing steps or mill products. This is an important part of the process and will take time. As you make a processing decision, write it down as an instruction. This list of instructions can then be used later when filling out data forms to assure that you do not miss anything. For the sawmill in Figure 1, these instructions might include:

- Forklift (2)
  —All logs sent to debarker (3).
- Debarker (3)
  —All logs $\leq$12 inches in scaling diameter leaving the debarker (3) will go to the Scragg headrig (5). However, if the Scragg buffer is full, these logs can go to the band headrig (4).
  —All logs $>$12 inches will go to the band headrig (4).
- Band headrig (4)
  —All logs are to be sawed around for grade to either a tie or cant for resawing.
  —Fifty percent of all Grade 2 and Grade 3 logs $\geq$16 inches in scaling diameter and $\geq$9 feet in length will be sawed to 7- by 9-inch ties.
  —All logs that do not fit the above category will be sawed to a cant for resawing. Those $\leq$16 inches in scaling diameter will be sawed to 6-inch-thick cants. Those $>$16 inches in scaling diameter will be sawed to 8-inch-thick cants. None of these cants can be wider than 12 inches.
  —All square-edged boards produced on the band headrig (4) will be sent to the trimsaws (9).
  —All wane-edge boards will be sent to the combination edger (6).
  —Ties will be sent to the swing trimsaw (11).
  —Cants will be sent to the gang side of the combination edger (6).
  —Slabs will be sent to the chipper (13).

- Scragg headrig (5)
  —All logs processed by the Scragg headrig (5) will be processed into 6-inch-thick 2-sided cants and sent to the gang resaw (7).
  —Slabs will be sent to the chipper (13).
- Combination edger (6)
  —All parts sent to trimsaws (9).
- Gang resaw (7)
  —The square-edged boards sent from the gang resaw (7) to the transfer station (8) will be transferred to the trimsaws (9).
  —The wane-edged boards sent from the gang resaw (7) to the transfer station (8) will be transferred to the combination edger (6).
  —The slabs sent from the gang resaw (7) to the transfer station (8) will be transferred to the chipper (13).
- Transfer station (8)
  —The wane-edged boards sent to combination edger (6).
  —The square-edged boards sent to trimsaws (9).
- Trimsaws (9)
  —All parts sent to green chain No. 1 (10).
- Swing trimsaw (11)
  —All ties sent to green chain No. 2 (12).

You may have noticed that neither bark nor sawdust were considered in the above instructions. These products are not considered in the DESIM process because they do not usually affect the production and flow of the primary products in a sawmill operation. Also, the routing and chipping of trimming and edging material are not considered for the same reason. However, the trimming and edging volumes are included in the simulated chip yields.

3. Running FORMS Program

The FORMS program is set up so that you can specify the data forms wanted as well as the number of each needed. This is done by taking the "FORMS FORTRAN A1" file into the edit mode on your CMS terminal. When this is done, you will find a listing of the 22 different data forms. The statements in the listing appear as:

```
FORM NO. 1—RAW MATERIAL ACTUAL PIECE DATA
IFOR1=1
FORM NO. 2—MILL DESIGN
IFOR2=1
  ⋮
FORM NO. 22—CRITERIA FOR ROUTING MATERIAL
IFOR22=1
```

The statement "IFOR1 = 1" below the statement "FORM NO. 1—RAW MATERIAL ACTUAL PIECE DATA" indicates that only one Form No. 1 will be produced. If five of these forms are needed, change "IFOR1 = 1" to "IFOR1 = 5". But, if you do not need this form, change "IFOR1 = 1" to "IFOR1 = 0". Repeat the procedure for each form in the listing. I should point out that until you become familiar with the DESIM system, it will be difficult for you to know exactly how many of each form you will need. However, if at any time more forms are needed, rerun the FORMS program.

Once the "FORMS FORTRAN A1" file has been changed to indicate the forms required, save it in your CMS file. At this point, run the FORMS program by entering the word "FORMS" at the CMS terminal. Upon completion of the run, the forms output will be sent to your CMS reader file. You can then send the forms to the printer.

4. Filling Out Data Forms

The following discussion deals with the filling out of the 22 different data forms. In using the DESIM system you will fill out only the forms needed to represent your proposed sawmill situation. Samples of each form are shown in Appendix B. Some of these forms will be referred to as the various inputs are discussed.

4.1 Form No. 1—Raw material actual piece data. Use this form only if actual piece data is used as raw material input to the sawmill situation. As many as five different data sets of this type can be included as input. However, only one data set can be used as input at a given point in the mill. A discussion of the information required on the form follows:

- DATA SET NO.—Number (1 through 5) of the particular data set of this type.
- MATERIAL TYPE CODE—These codes are:
  1—Long-length pieces to be bucked into standard sawlogs (can also include standard logs).
  2—Long-length pieces to be bucked into standard sawlogs and bolts (can also include standard sawlogs and bolts).
  3—Standard sawlogs only.
  4—Bolts only.
- PIECE NUMBER—The log or bolt identification number. If a long-length piece has four logs and/or bolts in it, the logs and/or bolts are listed separately on the form with the same PIECE NUMBER for each (see shaded area on Form No. 1 in Appendix B).

- SPECIES CODE—Codes for the 12 species available in the DESIM system are:

  1—Northern red oak
  2—Black oak
  3—Scarlet oak
  4—White oak
  5—Chestnut oak
  6—Sugar maple
  7—Red maple
  8—Yellow-poplar
  9—Basswood
  10—Black cherry
  11—Yellow birch
  12—Beech

- GR—Grades 1 through 3 are the standard USDA Forest Service hardwood factory-lumber log grades. Grade 4 is used for subfactory logs. And, Grade 5 is used to indicate bolts. The lumber grade yields for sawlogs processed in the DESIM system are based on log Grades 1 through 4. Therefore, when the proposed sawmill is to produce grade lumber, these standard log grades must be used.

- SMALL DIAM.—Scaling or small-end diameter of log or bolt in inches.

- LARGE DIAM.—Large end or butt diameter of log or bolt in inches.

- LENGTH—Length of log or bolt in feet.

- CO—This code identifies individual logs and bolts when they are not part of a long-length piece. And, for long-length pieces, it identifies the position of the different logs and/or bolts (see shaded area on Form No. 1 in Appendix B). The codes are:

  1—A log or bolt that is not part of a long-length piece.
  4—The small-end log or bolt of a long-length piece.
  6—An intermediate log or bolt of a long-length piece.
  9—The large-end log or bolt of a long-length piece.

  The large-end piece is always entered first, and the small-end piece entered last for a long-length piece.

4.2 Form No. 2—Log species, grade, and size distributions. Use this form when frequency distributions are used as sawlog inputs to the proposed sawmill situation. As many as five separate data sets of this type can be used. Each of these data sets can have distributions for as many as five species. As with the actual piece data, only one data set can be used as input at a given point in the mill. A discussion of the information required on this form follows:

- DATA SET NO.—Number (1 through 5) of the particular data set of this type.
- SPECIES—The following information is needed for each species in the data set.
  - CODE NO.—Code number of species for which log frequency distributions are included. (See species codes given in instructions for Form No. 1.)
  - PERCENT—The number of logs, in percent, of each species found in the data set.
  - LOG TAPER/FOOT—Average log taper, in inches, per foot used to calculate butt diameters of logs generated from these distributions.
  - PERCENT OF LOG GRADE—The number of logs, in percent, found in each log grade for a species. Grades 1 through 3 are standard USDA Forest Service hardwood factory-lumber logs. And, Grade 4 represents subfactory logs.
  - PERCENT OF LOGS BY DIAMETER CLASS—The number of logs, in percent, found in each diameter class from 8 to 24 inches for a given species and grade.
  - PERCENT OF LOGS BY LENGTH CLASS—The number of logs, in percent, found in each length class from 8 to 16 feet for a given species and grade.

4.3 Form No. 3—Bolt species and size distributions. The instructions for filling out this form are the same as those for Form No. 2. The only difference is that bolt-grade percentages are not required. As many as five separate data sets of this type can be used. Each data set can have bolt frequency distributions for as many as five species. As with sawlog frequency distributions, only one data set can be used as input at a given point in the mill.

4.4 Form No. 4—Mill design. Use this form to record preliminary information for the proposed sawmill situation and to record the data set numbers and types when actual piece data are used as raw material input. A discussion of the required information follows:

- PROJECT NAME—Name or designation of the proposed sawmill situation.
- PROJECT NO.—Number of the particular approach for a given sawmill situation. Several different approaches may be tried for a given situation. By numbering these approaches, the output for the different runs can be identified at a later date.
- NUMBER OF RUNS—The number of simulated runs wanted for a given approach to a sawmill situation. Each run is made with a different set of random numbers. This allows you to check the operation of the mill as factors such as processing times, down times, and raw materials vary according to frequency distributions.

- RUN TIME—The operating time, in minutes, for each simulated run of the proposed sawmills. For example, for an 8-hour operating shift, the RUN TIME would be 480 minutes minus break times and other scheduled down times.
- PURGE TIME—The number of minutes before quitting time that the headrig or headrigs are to be shut down to allow the material following the headrig to be purged from the system. When this time occurs while a headrig is processing a log or bolt, the processing of that log or bolt will be finished before the headrig shuts down.
- UNBLOCKED MILL RUN? (N/Y) Enter:

  Y—If the machines are not to be blocked. In this instance, surge decks are allowed to expand to accommodate the material being sent to them. The DESIM output then indicates how long the surge decks must be to prevent blocking.

  N—If the machines are to be blocked when the down stream surge decks are full. The DESIM output then indicates how many times each machine was blocked and the total time they were blocked.

- ACTUAL LOG AND/OR BOLT DATA—If no actual piece data are used as input to the proposed sawmill situation, nothing is entered here. However, if actual piece data are used, the "DATA SET NO." and the "MATERIAL TYPE CODE" for each data set are entered here.

4.5 Form Nos. 5 to 19—Machine data. Much of the information on the MACHINE DATA forms is the same, so the discussion of Forms 5 through 19 is combined. When the explanation differs for a given piece of information, that difference will be shown by form number. As stated in the following discussion, some information will be required only on certain forms.

- MACHINE NO.—The machine number taken from the proposed sawmill layout diagram.
- MACHINE NAME—The machine name taken from the proposed sawmill layout diagram. Where there is more than one machine of a given type, you might want to add numbers to the names. For example, if you have two headrigs, you might name them Headrig No. 1 and Headrig No. 2. These names are used to identify the DESIM output to the individual pieces of equipment.

- MACHINE CODE—On most forms, this code is already given. However, on Form Nos. 5, 7, 8, and 11 you must supply the code.

  FORM NO. 5—The machine codes are:

  1—Forklift.
  2—Crane.

  FORM NO. 7—The machine codes are:

  4—For debarkers with processing time related to area of log or bolt (rosserhead, etc.).
  5—For debarkers with processing time related to length of log or bolt (ring-type, etc.).

  FORM NO. 8—The machine codes are:

  6—Circular saw headrig.
  7—Bandsaw headrig.
  8—Circular saw headrig with vertical edger.
  9—Bandsaw headrig with vertical edger.

  FORM NO. 11—The machine codes are:

  12—Standard edger.
  13—Combination edger (board and gang cant).

- RAW MATERIAL CODE—These codes are used only on Form No. 5. Use to indicate the type of raw material data providing material to the input machine. The codes are:

  0—Actual piece data.
  1—Log frequency distribution data.
  2—Bolt frequency distribution data.

- RAW MATERIAL DATA SET—This data set number is taken from Form Nos. 1, 2, or 3, and entered only on Form No. 5 to indicate the data set providing material to the input machine.

- HEADRIG ORDER NO.—This number is required only on Form Nos. 8, 9, and 10. Besides the machine number, each headrig also must be given a headrig order number. The actual order is not important so long as the numbers run consecutively from 1 through 5.

- PROCESSING TIMES AND RATES—The information can be by species or for all species combined. If you do not wish to use the processing times and/or feed rates in the equipment data file or if the file does not have the information required for the machine you are using, you must provide your own on the form. However, if you use the equipment data file information, enter only the TIME CODE and SPECIES CODE information in this processing times and rates section. You can determine what information is available in the equipment data file by obtaining a listing of EQ DATA A1.

  - TIME CODE—These codes are:

    0—Times and rates are different by species.
    1—Times and rates are the same for all species.

  - SPECIES CODE—If a "1" has been entered for the TIME CODE, only one set of processing times and rates must be considered. So a "1" is entered as the SPECIES CODE. If a "0" has been entered for the TIME CODE, individual species codes are entered for each set of processing times and rates data for the species to be processed. The species codes are shown in the discussion of Form No. 1.

  - PROCESSING TIME—Enter time in minutes on Form Nos. 5, 15, 16, 18, and 19. On Form No. 7, if the processing time is for a rosserhead-type debarker, it is entered as minutes per 10 square feet of surface area.

  - FEED RATE—Enter rate as feet per minute on Form Nos. 7, 9 to 14, and 17. On Form No. 6, this rate is entered as inches per minute.

  - PROCESSING TIME DISTRIBUTION—The parameters for lognormal frequency distributions include: (1) mean, (2) minimum value, (3) maximum value, and (4) standard deviation. If the required lognormal parameters for any of the following times are not available in the equipment data file or if you do not wish to use the available parameters, you must develop your own.

    To develop satisfactory lognormal parameters, your data set should contain at least 30 observations. Once the data have been collected, the simple procedure discussed here can be used to provide the parameters. First, calculate a constant by multiplying the smallest value in the data set by 0.95. Second, transform each value in the data set by subtracting the constant and taking the natural log of the result. Third, for this transformed data, calculate the mean and standard deviation. This can be done on any calculator that has a mean and standard deviation routine. These are the required lognormal mean and standard deviation parameters. Fourth, the required minimum value parameter is obtained by subtracting the above constant from the smallest value in the untransformed data and taking the natural log of the result. Finally, the required maximum value parameter is obtained by subtracting the constant from the largest value in the untransformed data and taking the natural log of the result. An example of this procedure is shown in Appendix E.

••• LOAD TIME—This input is required on Form Nos. 6 to 10 and 12 to 14. The lognormal parameters for this time are based on the time required to load material into a machine. Since load time is not a factor for some machines, it is not required on all forms.

••• BOARD LOAD TIME—This time distribution is used only on Form No. 11 for edgers and combination edgers. The lognormal parameters are based on the times required to load boards into the edger; that is, the time from when a board leaves the edger until the next board hits the saws. These times should only reflect the situation when boards are readily available to the operator.

••• CANT LOAD TIME—This time distribution is used only on Form No. 11 for combination edgers. The lognormal parameters are based on the time to load cants into the combination edger; that is, the time from when a cant leaves the edger until the next cant hits the saws. These times should only reflect the situation when cants are readily available to the operator.

••• TURN TIME—This time distribution is used only on Form No. 8 for band and circular headrigs. The lognormal parameters are based on the time required to turn logs or bolts on the carriage. This time starts when the carriage stops for the piece to be turned and stops when the piece has been turned and the carriage starts forward.

••• SLAB TIME—This time distribution is used only on Form No. 8 for band and circular headrigs. The lognormal parameters are based on the time required to slab a log or bolt divided by the length and the resulting value multiplied by 10 to scale it for calculation purposes. The time begins when the carriage starts forward and ends when the carriage returns and stops.

••• LINE TIME—This time distribution is used only on Form No. 8 for band and circular headrigs. The lognormal parameters are based on the time required to saw a line divided by the length of the log or bolt and the resulting value multiplied by 10 to scale it for calculation purposes. The time begins when the carriage starts forward and ends when the carriage returns and stops.

••• DOWN TIME—This input is required on Form Nos. 5 to 19. The lognormal parameters for this time are based on the nonscheduled down times for a machine. These down times include only those resulting from (1) the machine or operator not being ready, (2) the machine's surge deck being down, or (3) the machine's down stream conveyors being down. Times are not included when the machine is idle from lack of available material to process or the machine is blocked because the system following it is jammed.

•• PERCENT DOWN—This input is required on Form Nos. 5 to 19 and is the frequency that the machine is expected to go down. In other words, at 5 percent, the machine will go down an average of 5 out of every 100 times a piece is to be processed. Once the machine goes down, the down time lognormal frequency distribution discussed above is used to determine how long it will be down.

•• PRODUCT LENGTH DISTRIBUTION—This input is required only on Form No. 19 for machine centers producing special products. It allows up to five different product lengths in inches. For each length, the user must also supply the percentage of products wanted. This is set up to allow the cutting of long pieces into shorter products such as headers and half headers used in coal mines.

4.6 Form No. 20—Headrig sawing instructions. This form provides the instructions for breaking down log and/or bolts into various products. At least one set of instructions is required for each headrig. However, as many as 100 sets can be included for a given headrig. With these instructions, you can specify different processing procedures for different species, grades, and/or sizes of raw material. To illustrate the use of this form, Appendix C shows the filled out forms needed to set up the processing procedure discussed for the band headrig in section 2.3 (Processing and Product Considerations). I should point out that when there is more than one set of sawing instructions and a given species, grade, and/or size of raw material does not fit the criteria for any of them, the first set of sawing instructions will be used on that given raw material. A discussion of the information required on this form follows:

- HEADRIG ORDER NO.—The order number of the headrig for which the sawing instructions apply. Note that this is not the equipment number.
- INSTRUCTION SET NO.—The sequential number of the instruction set. There can be as many as 100 different sets for a given headrig.
- SAWING PATTERN CONTROL—This section is used to designate the species, grade, and/or size raw material to be processed by the specified sawing pattern.

•• SAW CODE—The code designations for the desired sawing pattern. Appendix D shows diagrams of the available sawing patterns by code. The codes by headrig type are:

Band and circular headrigs:

1—Saw around (all).
2—Saw around to timber.
3—Saw around to cant for resaw.
4—Slab around to timber (slabs to chipper).
5—Slab around to timber (slabs to resaw).
6—Slab around to cant for resaw (slabs to chipper).
7—Slab around to 2-sided cant for resaw (slabs to chipper).
8—Slab around to cant for resaw (slabs to resaw).
9—Slab around to 2-sided cant for resaw (slabs to resaw).
10—Live saw.

12—Saw around to 2-sided cant for resaw.
13—Same as code 3 but with even number pieces in cant.
14—Same as code 6 but with even number pieces in cant.
15—Same as code 8 but with even number pieces in cant.
16—Saw around to 3-sided cant for resaw.
17—Slab around to 3-sided cant for resaw (slabs to chipper).
18—Slab around to 3-sided cant for resaw (slabs to resaw).

Scragg Headrig:

4—Two passes to timber (slabs to chipper).
5—Two passes to timber (slabs to resaw).
6—Two passes to cant for resaw (slabs to chipper).
7—One pass to 2-sided cant for resaw (slabs to chipper).
8—Two passes to cant for resaw (slabs to resaw).
9—One pass to 2-sided cant for resaw (slabs to resaw).
14—Same as code 6 but with even number pieces in cant.
15—Same as code 8 but with even number pieces in cant.

Gang Headrig:

11—Gang saw.

•• SP CODE—The species code for raw material to be processed by the set of sawing instructions if species is to be used as a decision criteria.

•• GR—The grade of raw material to be processed by the set of sawing instructions if grade is to be used as a decision criteria.

•• UPPER DIAM.—The upper diameter limit, in inches, (small end) of raw material to be processed by the set of sawing instructions if it is to be used as a decision criteria.

•• LOWER DIAM.—The lower diameter limit, in inches, (small end) of raw material to be processed by the set of sawing instructions if it is to be used as a decision criteria.

•• UPPER LGTH—The upper length limit, in feet, of the raw material to be processed by the set of sawing instructions if it is to be used as a decision criteria.

•• LOWER LGTH—The lower length limit, in feet, of the raw material to be processed by the set of sawing instructions if it is to be used as a decision criteria.

•• CRI. CODE—Additional criteria codes used in combination with the above decision criteria. Enter a code here if the set of sawing instructions to be used on a given species, grade, and/or size of log or bolt is to be picked from two or more sets of sawing instructions. These codes indicate whether the set of sawing instructions is to be picked on a sequential or percentage basis. For example, let us say that all Grade 3 red oak logs less than 16 inches in diameter are to be processed by three different sets of sawing instructions on a sequential basis. The first log fitting this description will be processed by the first set, the second log by the second set, the third log by the third set, the fourth log by the first set, and so on. On a percentage basis, the set of sawing instructions will be chosen according to the percentages entered for the different sets. The codes are:

1—Enter when raw material fitting a given set of decision criteria is to be processed by two or more different sets of sawing instructions on a sequential basis.
2—Enter when raw material fitting a given set of decision criteria is to be processed by two or more different sets of sawing instructions on a percentage basis.

•• PERCENT—The percentage of the raw material (for a given set of decision criteria) that is to be processed by a given set of sawing instructions when a CRI. CODE of 2 has been used.

• SAWING DIMENSIONS—The following information provides the saw kerfs and product sizes for processing the log and/or bolts:

•• BOARD MIN. LGTH—The minimum board length, in feet, allowed when processing a log or bolt.

•• SAW KERF—One or more of the following saw kerfs to the thousandths of an inch are required.

••• HDRIG—A headrig saw kerf is always required.

••• CANT—If cants are to be resawed, a resaw saw kerf is required. This resaw can be either a gang, centerline, or linebar.

••• SLAB—If slabs are to be resawed, the saw kerf for the slab resaw is required.

•• BOARD THICKNESS—The following information sets the board thicknesses:

••• ROUGH CANT—If cants are to be produced and sent to a resaw, enter the rough thickness, in inches, of resulting boards. Or, if timbers are to be produced from the centers of the log, enter their width. For example, if 6- by 8-inch timbers are to be produced, enter 8.000. But if neither cants nor timbers are to be produced from the centers of the logs or bolts, enter 0.000.

••• ROUGH SLAB—If slabs are to be produced and sent to a resaw, enter the rough thickness, in inches, of the resulting boards. If the logs or bolts are to be sawed around to a cant or timber, enter the rough thickness of the resulting side boards. Or, if the logs or bolts are to be sawed around (all) or live sawn, enter the rough thickness of the resulting boards.

••• NOMINAL CANT—Enter the nominal thickness, in inches, for the rough thickness entered under "ROUGH CANT."

••• NOMINAL SLAB—Enter the nominal thickness, in inches, for the rough thickness entered under "ROUGH SLAB."

•• MAXIMUM CANT WIDTH—Enter the maximum width, in inches, of cants to be sent to a resaw. This can also be used to limit the size of a cant that is to be produced and split on the headrig. An example of this would be an 8- by 12-inch (plus saw kerf) cant that is produced and split on the headrig into two 6- by 8-inch cants. In this situation, the maximum cant width would be 12 inches plus the saw kerf. If there are no restrictions on cant widths, this value will be "0."

•• ALLOWABLE BOARD WIDTH—Enter up to 30 board widths, in inches, that will be allowed in the processing of logs or bolts. Enter them in increasing order of widths.

•• ALLOWABLE CANT THICK.—Enter up to 30 cant thicknesses, in inches, that will be allowed in the processing of logs or bolts. If timbers are to be produced, these would be the allowable thicknesses of the timbers. Enter them in increasing order of thickness.

4.7 Form No. 21—Conveyor and buffer information. In the discussion of this form, the terms conveyor and buffer are used. Conveyor is a straight-line conveyor from a machine center or transfer station feeding directly into the following machine center or buffer. Buffer is a cross transfer chain located just ahead of a machine center that is used to store pieces to be processed by the machine.

Most of the information required on this form comes directly from a sawmill layout diagram. But, when several machines are sending material to one machine, the task of filling out this form can be difficult. Consider the situation where machine No. 12 is fed by two buffers. One of these buffers receives material from both machine No. 5 and machine No. 6. And, the other buffer receives material from both machine No. 8 and machine No. 10. An example of this situation is shown on Form No. 21 in Appendix B. I suggest you work through this example as you consider the inputs that follow.

• MACHINE NO.—Enter the machine number of the machine receiving material. Since raw material input stations such as forklifts or cranes do not receive material, their number will not be entered here.

- NUMBER BUFF. OR CONV. FEEDING—Enter the number of buffers feeding the machine designated under "MACHINE NO." If no buffers feed the machine, enter the number of conveyors feeding it. There is no limit to the number of conveyors or buffers that can be used other than the physical limitations of an actual sawmill layout.
- NUMBER MACHINE TO EACH—Enter the number of different machines feeding each conveyor or buffer.
- SENDING MACHINE NO.—For each buffer or conveyor feeding the machine, enter the sending machine number.
- TRANSFER CODE—For each sending machine, enter the transfer code. The codes are:

  1—The sending machine is the only one providing material to the particular buffer of the receiving machine.
  2—The sending machine and a go-around conveyor system providing material to the particular buffer of the receiving machine.
  3—More than one machine sending material to the particular buffer of the receiving machine.
  4—Only a go-around conveyor system providing material to the particular buffer of the receiving machine.
  5—The sending machine is the only one providing material to a conveyor feeding the receiving machine.
  7—More than one sending machine providing material to a conveyor feeding the receiving machine.

- BUFFER LENGTH—Enter the length, in feet, for the particular buffer feeding the receiving machine. If no buffer is used, no entry is required.
- BUFFER SPEED—Enter the speed, in feet per minute, for the particular buffer feeding the receiving machine. If no buffer is used, no entry is required.
- CONVEYOR LENGTH—Enter the length, in feet, of the conveyor feeding the particular buffer or receiving machine. No entry is required if material is sent from sending machine directly to the receiving machine buffer without the use of a conveyor.
- CONVEYOR SPEED—Enter the speed, in feet per minute, of the conveyor feeding the particular buffer or receiving machine. No entry is required if material is sent from sending machine directly to the receiving machine buffer without the use of a conveyor.

4.8 Form No. 22—Criteria for routing material. Use this form to set up the routing of the different types of material through the proposed sawmill. Each line on the form represents a set of routing instructions. A discussion of the required information follows. Much of this information can be taken from the sawmill diagram plus the process and products considerations that should have been set up at the beginning of the design process. As many as 100 separate routing possibilities can be included for a given sawmill design.

- FROM NO.—Enter the machine number of the machine sending the material.
- TO NO.—Enter the machine number of the machine receiving the material.
- TYPE CODE—This code indicates the type of material being routed. The codes are:

  1—Long-length piece (made up of standard sawlogs).
  2—Long-length piece (made up of standard sawlogs and/or bolts).
  3—Standard sawlogs.
  4—Bolts.
  5—Unedged boards.
  6—Edged boards.
  7—Timbers.
  8—Cants for resaw.
  9—Railroad ties.
  10—Slabs for chipper.
  11—Chips.
  12—Special products (headers, half headers, etc.)
  13—Slabs for resaw.
  14—Cants (2- and 3-sided) for resaw.

- ROUTE CODE—This code indicates how the material is going to be routed. A given type, species, grade, and/or size of material can be routed to as many as three different machines on a priority basis, alternating basis, or percentage basis. If a given piece of material is to be sent to two machines on a priority basis, this code will indicate the two sets of routing instructions and the priorities will be designated under "PRI." For example see Form No. 22 in Appendix B. As these pieces are produced, they will always be routed according to the first instruction set unless the buffer for the receiving machine is full. Then the second instruction set will be used. As soon as the machine buffer related to the first instruction set is less than or equal to 75 percent full, these pieces will again be routed according to the first instruction set. When given pieces of material are routed to two or three different machines on an alternating basis, a different set of routing instructions will be used each time. And, when given pieces of material are routed on a percentage basis, the instruction sets are picked according to the percentages that have been assigned. The codes for this procedure are:

ERRATA SHEET -- GTR-NE-94

(Insert new pages 21 & 22)

0—Enter if no criteria other than material type are to be used or if only species, grade, and/or size along with material type are to be used to route the piece. This code must be used when routing 2-sided and 3-sided cants for resaw (type code 14) and slabs for resaw (type code 13). This material cannot be routed on a priority, alternating, or percentage basis.
1—Enter if pieces are also to be routed on a priority basis (see lines 1 and 2 on Form No. 22 in Appendix B).
2—Enter if pieces are also to be routed on an alternating basis (see lines 3 and 4 on Form No. 22 in Appendix B).
3—Enter if pieces are also to be routed on a percentage basis (see lines 5 and 6 on Form No. 22 in Appendix B).

- GRADE—Enter grade of piece if grade is to be used as a routing criteria.
- SPECIES CODE—Enter species of the piece if species is to be used as a routing criteria.
- WIDTH—Enter width (small-end diameter for logs or bolts), in inches, if width is to be used as a routing criteria.
- WD. CODE—The width codes are:

1—Enter if only indicated width is to be routed.
2—Enter if only widths less than the indicated width are to be routed.
3—Enter if only widths equal to or greater than the indicated widths are to be routed.

- THICKNESS—Enter thickness, in inches, if thickness is to be used as a routing criteria.
- TH. CODE—The thickness codes are:

1—Enter if only indicated thickness is to be routed.
2—Enter if only thicknesses less than the indicated thickness are to be routed.
3—Enter if only thicknesses equal to or greater than the indicated thickness are to be routed.

- LENGTH—Enter length, in feet, if length is to be used as a routing criteria.

- LN. CODE—The length codes are:

  1—Enter if only indicated length is to be routed.
  2—Enter if only lengths less than the indicated length are to be routed.
  3—Enter if only lengths equal to or greater than the indicated length are to be routed.

- PRI.—If a "ROUTE CODE" of 1 has been entered for as many as three different routing possibilities (for the same routing criteria), enter the routing priority for each possibility. These routing priorities will be entered as 1 through 2 or through 3 depending on the number of possibilities. For an example, see lines 1 and 2 on Form No. 22 in Appendix B.

- ALT.—If a "ROUTE CODE" of 2 has been entered for up to three different routing possibilities for the same routing criteria, enter an alternate number 1 for each possibility in the set. If there is another set of routing possibilities for other routing criteria, enter an alternate number 2. In other words, a different alternate number must be used for each set of routing possibilities. For an example, see lines 3 and 4 on Form No. 22 in Appendix B.

- PERCENT—If a "ROUTE CODE" of 3 has been entered for as many as three different routing possibilities (for the same routing criteria), enter the corresponding percentage for each possibility. These percentages must total 100 for the different possibilities. For an example, see lines 5 and 6 on Form No. 22 in Appendix B.

5. Creating Raw Material Data Files

If actual piece data is to be used as raw material input and this information has been entered on forms (Form No. 1), the information from these forms must be input to your CMS file. The first data set is designated as "MAT1 DATA A1." If there is more than one data set, the second one is designated as "MAT2 DATA A1" and so on. These file designations must be used to correspond to the JCL that has been set up for the DESIGN program.

6. Running DESIGN Program

Once the sawmill layout has been drawn, the data forms filled out, and the raw material data files created (if needed), you are ready to run the DESIGN program. This is done by entering "DESIGN" at the CMS terminal. Through the terminal you will be asked questions and prompted for the answers. The answers to most of the questions will come directly from the data forms. When prompted for the answers, the data fields will be indicated on the screen. These fields correspond to the fields used on the data forms. When entering data into the fields, a ":" or a "_" (that is, not to contain a letter or number) indicates that you must space over

- LN. CODE—The length codes are:

  1—Enter if only indicated length is to be routed.
  2—Enter if only lengths less than the indicated length are to be routed.
  3—Enter if only lengths equal to or greater than the indicated length are to be routed.

- PRI.—If a "ROUTE CODE" of 1 has been entered for as many as three different routing possibilities (for the same routing criteria), enter the routing priority for each possibility. These routing priorities will be entered as 1 through 2 or through 3 depending on the number of possibilities. For an example, see lines 1 and 2 on Form No. 22 in Appendix B.

- ALT.—If a "ROUTE CODE" of 2 has been entered for up to three different routing possibilities for the same routing criteria, enter an alternate number 1 for each possibility in the set. If there is another set of routing possibilities for other routing criteria, enter an alternate number 2. In other words, a different alternate number must be used for each set of routing possibilities. For an example, see lines 3 and 4 on Form No. 22 in Appendix B.

- PERCENT—If a "ROUTE CODE" of 3 has been entered for as many as three different routing possibilities (for the same routing criteria), enter the corresponding percentage for each possibility. These percentages must total 100 for the different possibilities. For an example, see lines 5 and 6 on Form No. 22 in Appendix B.

5. Creating Raw Material Data Files

If actual piece data is to be used as raw material input and this information has been entered on forms (Form No. 1), the information from these forms must be input to your CMS file. The first data set is designated as "MAT1 DATA A1." If there is more than one data set, the second one is designated as "MAT2 DATA A1" and so on. These file designations must be used to correspond to the JCL that has been set up for the DESIGN program.

0—Enter if no criteria other than material type are to be used or if only species, grade, and/or size along with material type are to be used to route the piece. This code must be used when routing 2-sided and 3-sided cants for resaw (type code 14) and slabs for resaw (type code 13). This material cannot be routed on a priority, alternating, or percentage basis.
1—Enter if pieces are also to be routed on a priority basis (see lines 1 and 2 on Form No. 22 in Appendix B).
2—Enter if pieces are also to be routed on an alternating basis (see lines 3 and 4 on Form No. 22 in Appendix B).
3—Enter if pieces are also to be routed on a percentage basis (see lines 5 and 6 on Form No. 22 in Appendix B).

- GRADE—Enter grade of piece if grade is to be used as a routing criteria.
- SPECIES CODE—Enter species of the piece if species is to be used as a routing criteria.
- WIDTH—Enter width (small-end diameter for logs or bolts), in inches, if width is to be used as a routing criteria.
- WD. CODE—The width codes are:

  1—Enter if only indicated width is to be routed.
  2—Enter if only widths less than the indicated width are to be routed.
  3—Enter if only widths equal to or greater than the indicated widths are to be routed.

- THICKNESS—Enter thickness, in inches, if thickness is to be used as a routing criteria.
- TH. CODE—The thickness codes are:

  1—Enter if only indicated thickness is to be routed.
  2—Enter if only thicknesses less than the indicated thickness are to be routed.
  3—Enter if only thicknesses equal to or greater than the indicated thickness are to be routed.

- LENGTH—Enter length, in feet, if length is to be used as a routing criteria.

6. Running DESIGN Program

Once the sawmill layout has been drawn, the data forms filled out, and the raw material data files created (if needed), you are ready to run the DESIGN program. This is done by entering "DESIGN" at the CMS terminal. Through the terminal you will be asked questions and prompted for the answers. The answers to most of the questions will come directly from the data forms. When prompted for the answers, the data fields will be indicated on the screen. These fields correspond to the fields used on the data forms. When entering data into the fields, a ":" or a " " (that is, not to contain a letter or number) indicates that you must space over

one space before entering the required information. For example, ":::_1.25" indicates that you space over four spaces before entering the 1.25. Also, when entering a number containing a decimal point, the decimal point must also be entered. And, if a value for a given piece of information is to be "0", it is not necessary to enter anything in that field.

Once a given set of data has been punched in at the CMS terminal and the return key pressed, you have the opportunity to check the information on the screen to see if it is correct and in the right fields. If it is correct, you press the space bar and then press the return key again. At this point you will be asked the next question. However, if the information is not correct or it is in the wrong field, press "E" and then press the return key. At this point you will be asked the same question again and prompted for the correct information.

When you have answered all the questions, the DESIGN program produces both the "MILL DATA A1" file and the "GASP DATA A1" file required by the SIMU program to simulate the operation of the proposed sawmill system.

7. Running SIMU Program

To run the SIMU program, enter "SIMU" at the CMS terminal. The operation of the sawmill system is then simulated and the resulting output sent back to the user's CMS reader file. The user can either look at the output on the terminal screen or have it sent to the printer. Since the output is rather long, I suggest that it be sent to the printer.

8. Modifying a Sawmill System

Once a sawmill system has been set up and simulated, you may wish to modify it to determine what effect the change will have on the operation of the system. These modifications can include anything in the system including: (1) raw material inputs, (2) adding or deleting machines, (3) machine data, (4) conveyor and/or surge deck systems, (5) processing instructions, and (6) routing instructions. After determining exactly what you wish to change, run the DESIGN program again. However, first if you wish to retain the original "MILL DATA A1" file for possible future use, make a copy file of this information under another name. You might use a designation such as "MILL1 DATA A1". A copy file is necessary because after rerunning the DESIGN program, the original "MILL DATA A1" file will be changed to reflect the modifications. When ready to make the modifications, run the DESIGN program. You will be asked if this is a new design. After entering "N" for no, you will be asked a series of questions and be prompted for the information needed to make the required modifications. When all of the questions have been answered, the modified "MILL DATA A1" is produced and the old "MILL DATA A1" file is erased. At this point you run the SIMU program again to obtain the output for the simulated operation of the modified sawmill system.

Literature Cited

Adams, Edward L. **DESIM: A system for designing and simulating hardwood sawmill systems.** Gen. Tech. Rep. NE-89. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1984. 10 p.

Pritsker, A. Alan B. **The GASP IV simulation language.** New York: John Wiley & Sons; 1974. 451 p.

Pritsker, A. Alan B. **The GASP IV user's manual.** 2d. ed. W. Lafayette, IN: Pritsker & Associates, Inc.; 1977. 100 p.

Appendix A—IBM System

Instructions for getting the DESIM computer-type information into your user files and setting up the control files for using the system

1. Setting up DESIM

This section provides the procedures for transferring files from the DESIM computer tape to your CMS files and for setting up the computer control files needed to use the DESIM system.

1.1 Tape to CMS File

The DESIM system is on a 9-track computer tape at a density of 1600 bits per inch. It is in a nonlabeled fixed-block format with a record length of 80 and a block size of 6000. This information consists of three computer programs and two support data files.

To move the programs and data files to your CMS files, the computer tape is first submitted to the computer center tape library. Next, on the CMS terminal, create a file designated "GET CNTL A1" and input the following statements:

```
//BVVVV J@B       WWWWW,XXXXXXX
/*PRI@RITY       STANDARD
/*L@NGKEY        YYYYYYY
/*R@UTE PRINT    VM1.ZZZZZZZ
//STEP1 EXEC      PGM=IEBGENER
//SYSPRINT DD     SYS@UT=A
//SYSUT1 DD       DISP=(@LD,KEEP),
//                V@L=SER=DESIM1,
//                UNIT=TAPE,
//                DCB=(RECFM=FB,LRECL=80,BLKSIZE=6000,DEN=3),
//                LABEL=(1,NL)
//SYSUT2 DD       SYS@UT=B
//SYSIN DD        DUMMY
//
```

In the first statement, "VVVV" is to be replaced with your user's box number, "WWWWW" is to be replaced with your user's account number, and "XXXXXXX" is to be replaced with your name. In the LONGKEY statement, "YYYYYYY" is to be replaced with your password. In the ROUTE PRINT statement, "ZZZZZZZ" is to be replaced with your CMS user's identification (ID) name.

Once the above statements have been input to "GET CNTL A1", the file must be saved. It will be modified and used several times for moving the programs and data files from the DESIM tape to your CMS file. The procedure for doing this is:

- FORMS PROGRAM—Through the CMS terminal, submit the "GET CNTL A1" file to the multiple virtual storage (MVS) operating system of the mainframe computer. As soon as the run has been completed, the FORMS program will be passed to your CMS reader file. Move the program to your CMS file by reading it from the reader file with the designation "FORMS FORTRAN A1".
- DESIGN PROGRAM—Modify the "GET CNTL A1" file by changing "LABEL=(1,NL)" to "LABEL=(2,NL)". Submit "GET CNTL A1" to the MVS operating system. The DESIGN program will be returned to the reader file. Move the program to your CMS file with the designation "DESIGN FORTRAN A1".
- SIMULATION PROGRAM—Modify the "GET CNTL A1" file by changing "LABEL=(2,NL)" to "LABEL=(3,NL)". Submit "GET CNTL A1" to the MVS operating system. The SIMU program will be returned to the reader file. Move the program to your CMS file with the designation "SIMU FORTRAN A1".
- EQUIPMENT DATA FILE—Modify the "GET CNTL A1" file by changing "LABEL=(3,NL)" to "LABEL=(4,NL)". Submit "GET CNTL A1" to the MVS operating system. The data file will be returned to the reader file. Move the data file to your CMS file with the designation "EQ DATA A1".
- LUMBER GRADE DATA FILE—Modify the "GET CNTL A1" file by changing "LABEL=(4,NL)" to "LABEL=(5,NL)". Submit "GET CNTL A1" to the MVS operating system. The data file will be returned to the reader file. Move the data file to your CMS file with the designation "LGR DATA A1".

At this point the "GET CNTL A1" file can be erased. You now have three computer programs and two data files in your CMS file designated as follows:

FORMS FORTRAN A1

DESIGN FORTRAN A1

SIMU FORTRAN A1

EQ DATA A1

LGR DATA A1

1.2 CMS EXEC Files

To run the three DESIM computer programs, CMS EXEC files and support JCL files must be generated. The EXEC files execute the CMS command procedure necessary for running the programs. The JCL files provide the required job control statements when the computer programs are sent to the MVS system for processing. The EXEC files and support JCL files for each DESIM program are listed below:

- FORMS PROGRAM—For this program, an EXEC file and three JCL files must be generated. They are:

```
FORMS EXEC A1 (file designation)
   &CØNTRØL ØFF
   STACKSPL PU
   &READ VARS &PU1 &PU2 &PU3 &PU4 &PU5
   CP SP PUN CLASS J CØNT TØ SYSTEM
   PUNCH FØRMS CNTL1 A1 (NØH
   PUNALL //FØRT.SYSIN  DD  *
   PUNCH FØRMS FØRTRAN A1 (NØH
   PUNCH FØRMS CNTL2 A1 (NØH
   PUNCH END CNTL A1 (NØH
   CP SP PUN CLØSE
   CP SP PUN &PU1 &PU2 &PU3 &PU4 &PU5
   CP QUERY PUNCH ALL
   &EXIT
FORMS CNTL1 A1 (file designation)
   //BVVVV JØB          WWWWW,XXXXXXX,TIME=1,REGIØN=150K
   /*PRIØRITY          STANDARD
   /*LØNGKEY           YYYYYYY
   /*JØBPARM           LINES=50
   /*RØUTE PRINT       VM1.ZZZZZZZ
   //STEP1 EXEC        FTG1CLG,REGIØN=150K,TIME=1
   //FØRT.SYSLIN DD    UNIT+SYSDA,SPACE=(CYL,(5,5))
FORMS CNTL2 A1 (file designation)
   //GØ.FT06F001 DD    SYSØUT=(A,,F)
   //GØ.FT07F001 DD    SYSØUT=(B,,G)
   //GØ.FT08F001 DD    DUMMY
   //GØ.SYSIN DD       *
END CNTL A1 (file designation)
   /*
   //
```

After the above files have been generated and saved in your CMS file, the FORMS program can be run by simply entering "FORMS" at the CMS terminal. The EXEC program then submits the FORMS program and required JCL statements to the MVS system for running. Upon completion of the run, the output (data forms) is returned to your CMS reader file and must then be sent to a printer.

- DESIGN PROGRAM—This program requires only an EXEC file. No JCL files are required because the program is not sent to the MVS system. It is run on the CMS system. The required EXEC file is:

```
DESIGN EXEC A1 (file designation)
  FØRTGI DESIGN
  FI 03 DISK MILL DATA A1 (RECFM F LRECL 80 BLKSIZE 80)
  FI 04 DISK EQ DATA A1 (RECFM F LRECL 80 BLKSIZE 80)
  FI 05 TERM
  FI 06 TERM
  FI 09 DISK MIL2 DATA A1 (RECFM F LRECL 80 BLKSIZE 80)
  FI 11 DISK MAT1 DATA A1 (RECFM F LRECL 80 BLKSIZE 80)
  FI 12 DISK MAT2 DATA A1 (RECFM F LRECL 80 BLKSIZE 80)
  FI 13 DISK MAT3 DATA A1 (RECFM F LRECL 80 BLKSIZE 80)
  FI 14 DISK MAT4 DATA A1 (RECFM F LRECL 80 BLKSIZE 80)
  FI 15 DISK MAT5 DATA A1 (RECFM F LRECL 80 BLKSIZE 80)
  FI 16 DISK GAS DATA A1 (RECFM F LRECL 80 BLKSIZE 80)
  GLØBAL TXTLIB FØRTXLIB
  LØAD DESIGN (CLEAR
  START
  EXSERV STATE MILL DATA A1
  &IF &RETCØDE NE 0 &GØTØ -LABL
  ERASE MILL DATA A1
  -LABL
  RENAME MIL2 DATA A1 MILL DATA A1
  EXSERV STATE GASP DATA A1
  &IF &RETCØDE NE 0 &GØTØ -LABE
  ERASE GAS3 DATA A1
  -LABE
  RENAME GAS DATA A1 GASP DATA A1
  ERASE DESIGN LISTING A1
  ERASE DESIGN TEXT A1
```

After the above EXEC file has been generated and saved in your CMS file, the DESIGN program can be run by simply entering "DESIGN" at the CMS terminal. The EXEC file starts the running of the DESIGN program making available to it: (1) the old "MILL DATA A1" file if it exists, (2) the "EQ DATA A1" file, and (3) up to five raw material data files. The EXEC file then provides for the generation of a new mill data file (MIL2 DATA A1), erases the old mill data file (MILL DATA A1), and renames "MIL2 DATA A1" to "MILL DATA A1". The EXEC file also provides for the generation of the "GASP DATA A1" file required by the SIMU program.

- SIMU PROGRAM—For this program, an EXEC file and two JCL files must be generated. They are:

```
SIMU EXEC A1 (file designation)
  &CØNTRØL ØFF
  STACKSPL PU
  &READ VARS &PU1 &PU2 &PU3 &PU4 &PU5 &PU6 &PU7 &PU8
  CP SP PUN CLASS J CØNT TØ SYSTEM
  PUNCH SIMU CNTL1 A1 (NØH
  PUNALL //FØRT.SYSIN_ DD_*
  PUNCH SIMU FØRTRAN A1 (NØH
  PUNCH SIMU CNTL2 A1 (NØH
  PUNCH GASP DATA A1 (NØH
  PUNCH MILL DATA A1 (NØH
  PUNCH LGR DATA A1 (NØH
  PUNCH END CNTL A1 (NØH
  CP SP PUN CLØSE
  CP SP PUN &PU1 &PU2 &PU3 &PU4 &PU5 &PU6 &PU7 &PU8
  CP QUERY PUNCH ALL
  &EXIT

SIMU CNTL1 A1 (file designation)
  //BVVVV JØB WWWWW,XXXXXXX,TIME=5,REGIØN=1500K
  /*LØNGKEY   YYYYYYY
  /*PRIØRITY   STANDARD
  /*JØBPARM   LINES=50
  /*RØUTE PRINT VM1.ZZZZZZZ
  //STEP1 EXEC FTG1CLG,LIB='VPI.GASP4.FIXED.FØRMAT',
    REGIØN=1500K,TIME=5
  //FØRT.SYSLIN DD UNIT=SYSDA,SPACE=(CYL,(5,5))
SIMU CNTL2 A1 (file designation)
  /*
  //GØ.FT06F001 DD SYSØUT=(A,,F)
  //GØ.FT07F001 DD SYSØUT=(B,,G)
  //GØ.FT08F001 DD DUMMY
  //GØ.SYSIN DD *
```

After the above files have been generated and saved in your CMS file, the SIMU program can be run by simply entering "SIMU" at the CMS terminal. The EXEC file then submits the SIMU program, the necessary JCL statements, and the required data files to the MVS operating system. The output is then returned to your CMS reader file.

Appendix B—DESIM Data Forms

FORM NO. 1 (_ _ OF _ _)

RAW MATERIAL ACTUAL PIECE DATA

DATA SET NO. .... _
MATERIAL TYPE CODE .... _

PIECE NUMBER	SPECIES CODE	GR	SMALL DIAM.	LARGE DIAM.	LENGTH	CO
1	1	1	17.2	21.5	12.6	1
2	1	5	7.7	9.7	6.2	1
3	1	2	13.3	15.2	8.3	9
3	1	3	10.6	13.3	12.3	6
3	1	3	8.3	10.6	10.3	6
3	1	5	7.3	8.3	6.0	6
3	1	5	6.5	7.3	6.0	4
4	1	2	16.4	17.1	12.7	1
5	4	3	9.7	11.4	10.3	9
5	4	5	7.7	9.7	6.2	4
6	6	3	13.3	14.7	8.3	9
6	6	3	10.6	13.3	12.3	6
6	6	3	8.9	10.6	8.3	6
6	6	5	6.9	8.6	6.0	4

FORM NO. 2 (_ _ OF _ _)

LOG SPECIES,GRADE AND SIZE DISTRIBUTIONS

DATA SET NO. .... _

SPECIES :
CODE NO. .... _ _
PERCENT .... _ _ _ . _
LOG TAPER / FOOT .... _ . _ _ _

PERCENT OF LOG GRADE 1 .... _ _ _ . _

PERCENT OF LOGS BY DIAMETER CLASS :

8	9	10	11	12	13	14	15	16	17
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

18	19	20	21	22	23	24
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

PERCENT OF LOGS BY LENGTH CLASS :

8	9	10	11	12	13	14	15	16
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

PERCENT OF LOG GRADE 2 .... _ _ _ . _

PERCENT OF LOGS BY DIAMETER CLASS :

8	9	10	11	12	13	14	15	16	17
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

18	19	20	21	22	23	24
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

PERCENT OF LOGS BY LENGTH CLASS :

8	9	10	11	12	13	14	15	16
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

PERCENT OF LOG GRADE 3 .... _ _ _ . _

PERCENT OF LOGS BY DIAMETER CLASS :

8	9	10	11	12	13	14	15	16	17
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

18	19	20	21	22	23	24
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

PERCENT OF LOGS BY LENGTH CLASS :

8	9	10	11	12	13	14	15	16
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

PERCENT OF LOG GRADE 4 .... _ _ _ . _

PERCENT OF LOGS BY DIAMETER CLASS :

8	9	10	11	12	13	14	15	16	17
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

18	19	20	21	22	23	24
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

PERCENT OF LOGS BY LENGTH CLASS :

8	9	10	11	12	13	14	15	16
::: _ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

```
                                                        FORM NO.  3   ( _ _ OF _ _ )
BOLT SPECIES AND SIZE DISTRIBUTION

 DATA SET NO. .... _

   SPECIES :
    CODE NO. .... _ _
    PERCENT .... _ _ _ . _
    BOLT TAPER / FOOT .... _ . _ _ _

     PERCENT OF BOLTS BY DIAMETER CLASS :
            4          5          6          7          8          9          10         11         12         13
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _
            14         15         16         17         18         19         20
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _

     PERCENT OF BOLTS BY LENGTH CLASS :
            4          5          6          7          8          9          10         11         12
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _

   SPECIES :
    CODE NO. .... _ _
    PERCENT .... _ _ _ . _
    BOLT TAPER / FOOT .... _ . _ _ _

     PERCENT OF BOLTS BY DIAMETER CLASS :
            4          5          6          7          8          9          10         11         12         13
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _
            14         15         16         17         18         19         20
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _

     PERCENT OF BOLTS BY LENGTH CLASS :
            4          5          6          7          8          9          10         11         12
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _

   SPECIES :
    CODE NO. .... _ _
    PERCENT .... _ _ _ . _
    BOLT TAPER / FOOT .... _ . _ _ _

     PERCENT OF BOLTS BY DIAMETER CLASS :
            4          5          6          7          8          9          10         11         12         13
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _
            14         15         16         17         18         19         20
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _

     PERCENT OF BOLTS BY LENGTH CLASS :
            4          5          6          7          8          9          10         11         12
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _

   SPECIES :
    CODE NO. .... _ _
    PERCENT .... _ _ _ . _
    BOLT TAPER / FOOT .... _ . _ _ _

     PERCENT OF BOLTS BY DIAMETER CLASS :
            4          5          6          7          8          9          10         11         12         13
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _
            14         15         16         17         18         19         20
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _

     PERCENT OF BOLTS BY LENGTH CLASS :
            4          5          6          7          8          9          10         11         12
     ::: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _: _ _ _ . _
```

FORM NO. 4 (_ _ OF _ _)

MILL DESIGN

FOR THIS MILL DESIGN ENTER :

PROJECT NAME	PROJECT NO.	NUMBER RUNS	RUN TIME	PURGE TIME
_ _ _ _ _ _ _ _ _ _ _ _ _ : : : :	_ _ _ _	_ _ _ _	_ _ _ _	_ _ _ _

DO YOU WANT AN UNBLOCKED MILL RUN ? (N / Y) .... _

ACTUAL LOG AND/OR BOLT DATA

MATERIAL TYPE CODE :
1 = LONG LENGTH (LOGS)
2 = LONG LENGTH (LOGS AND/OR BOLTS)
3 = LOGS
4 = BOLTS

DATA SET NO. .... _ MATERIAL TYPE CODE .... _

DATA SET NO. .... _ MATERIAL TYPE CODE .... _

DATA SET NO. .... _ MATERIAL TYPE CODE .... _

DATA SET NO. .... _ MATERIAL TYPE CODE .... _

DATA SET NO. .... _ MATERIAL TYPE CODE .... _

FORM NO. 5 (_ _ OF _ _)

MACHINE DATA (RAW MATERIAL INPUT STATION - FORKLIFT OR CRANE)

MACHINE NO. .... _ _
MACHINE NAME .... _
MACHINE CODE (1 OR 2) .... _ _
RAW MATERIAL CODE .... _
RAW MATERIAL DATA SET .... _

PROCESSING TIMES AND RATES :
TIME CODE .... _

SPECIES CODE .... _ _
PROCESSING TIME (MINUTES) .... _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

```
                     ******** LOGNORMAL DISTRIBUTION **********
                     MEAN        MIN.        MAX.        SD
DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _
```

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
PROCESSING TIME (MINUTES) .... _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

```
                     ******** LOGNORMAL DISTRIBUTION **********
                     MEAN        MIN.        MAX.        SD
DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _
```

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
PROCESSING TIME (MINUTES) .... _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

```
                     ******** LOGNORMAL DISTRIBUTION **********
                     MEAN        MIN.        MAX.        SD
DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _
```

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
PROCESSING TIME (MINUTES) .... _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

```
                     ******** LOGNORMAL DISTRIBUTION **********
                     MEAN        MIN.        MAX.        SD
DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _
```

PERCENT DOWN ....: _ _ . _ _ _

FORM NO. 6 (_ _ OF _ _)

MACHINE DATA (BUCK SAW)

MACHINE NO. .... _ _
MACHINE NAME .... _
MACHINE CODE 3

PROCESSING TIMES AND RATES :
TIME CODE .... _

SPECIES CODE .... _ _
FEED RATE (INCHES / MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (INCHES / MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (INCHES / MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (INCHES / MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

```
                                                       FORM NO. 7   ( _ _ OF _ _ )
MACHINE DATA (DEBARKER)

 MACHINE NO. .... _ _
 MACHINE NAME ....  _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
 MACHINE CODE (4 OR 5) .... _ _

 PROCESSING TIMES AND RATES :
 TIME CODE .... _

 SPECIES CODE .... _ _
  PROC. TIME (MIN./10 SQ. FT. FOR MACHINE CODE 4) .... : _ _ _ . _ _
     OR
  FEED RATE (FT./MIN. FOR MACHINE CODE 5) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                          ******** LOGNORMAL DISTRIBUTION  **********
                          MEAN         MIN.          MAX.          SD
      LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

      DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  PROC. TIME (MIN./10 SQ. FT. FOR MACHINE CODE 4) .... : _ _ _ . _ _
     OR
  FEED RATE (FT./MIN. FOR MACHINE CODE 5) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                          ******** LOGNORMAL DISTRIBUTION  **********
                          MEAN         MIN.          MAX.          SD
      LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

      DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  PROC. TIME (MIN./10 SQ. FT. FOR MACHINE CODE 4) .... : _ _ _ . _ _
     OR
  FEED RATE (FT./MIN. FOR MACHINE CODE 5) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                          ******** LOGNORMAL DISTRIBUTION  **********
                          MEAN         MIN.          MAX.          SD
      LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

      DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _
```

FORM NO. 8 (_ _ OF _ _)

MACHINE DATA (BAND OR CIRCULAR HEADRIG)

MACHINE NO. .... _ _
MACHINE NAME .... _
MACHINE CODE (6,7,8,OR 9) .... _ _
HEADRIG ORDER NO. .... _

PROCESSING TIMES AND RATES :
TIME CODE .... _

SPECIES CODE .... _ _
PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION **********			
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
TURN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
SLAB TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
LINE TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION **********			
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
TURN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
SLAB TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
LINE TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION **********			
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
TURN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
SLAB TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
LINE TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

FORM NO. 9 (_ _ OF _ _)

MACHINE DATA (SCRAGG HEADRIG)

MACHINE NO. .... _ _
MACHINE NAME .... _
MACHINE CODE 10
HEADRIG ORDER NO. .... _

PROCESSING TIMES AND RATES :
TIME CODE .... _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

```
                                                         FORM NO. 10   ( _ _ OF _ _ )
MACHINE DATA (GANG HEADRIG)

 MACHINE NO. .... _ _
 MACHINE NAME ....  _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
 MACHINE CODE .... 11
 HEADRIG ORDER NO. .... _

 PROCESSING TIMES AND RATES :
 TIME CODE .... _

 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                                ******** LOGNORMAL DISTRIBUTION   **********
                                MEAN          MIN.          MAX.            SD
       LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

       DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                                ******** LOGNORMAL DISTRIBUTION   **********
                                MEAN          MIN.          MAX.            SD
       LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

       DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                                ******** LOGNORMAL DISTRIBUTION   **********
                                MEAN          MIN.          MAX.            SD
       LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

       DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                                ******** LOGNORMAL DISTRIBUTION   **********
                                MEAN          MIN.          MAX.            SD
       LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

       DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _
```

```
                                                       FORM NO. 11   ( _ _ OF _ _ )
MACHINE DATA (EDGER OR COMBINATION EDGER)

 MACHINE NO. .... _ _
 MACHINE NAME ....  _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
 MACHINE CODE (12 OR 13) .... _ _

 PROCESSING TIMES AND RATES :
 TIME CODE .... _

 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) :
           BOARD      CANT
      _ _ _ . _ _: _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                                    ******** LOGNORMAL DISTRIBUTION  **********
                                    MEAN          MIN.          MAX.          SD
      BOARD LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

      CANT LOAD TIME ..... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

            DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) :
           BOARD      CANT
      _ _ _ . _ _: _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                                    ******** LOGNORMAL DISTRIBUTION  **********
                                    MEAN          MIN.          MAX.          SD
      BOARD LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

      CANT LOAD TIME ..... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

            DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) :
           BOARD      CANT
      _ _ _ . _ _: _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                                    ******** LOGNORMAL DISTRIBUTION  **********
                                    MEAN          MIN.          MAX.          SD
      BOARD LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

      CANT LOAD TIME ..... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

            DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _
```

FORM NO. 12 (_ _ OF _ _)

MACHINE DATA (CENTER-LINE RESAW)

MACHINE NO. .... _ _
MACHINE NAME .... _
MACHINE CODE 14

PROCESSING TIMES AND RATES :
TIME CODE .... _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION	**********		
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION	**********		
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION	**********		
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION	**********		
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

MACHINE DATA (LINE-BAR RESAW)

MACHINE NO. .... _ _
MACHINE NAME .... _
MACHINE CODE 15

PROCESSING TIMES AND RATES :
TIME CODE .... _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
FEED RATE (FT./MIN.) .... : _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

	******** LOGNORMAL DISTRIBUTION			**********
	MEAN	MIN.	MAX.	SD
LOAD TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

FORM NO. 14 (_ _ OF _ _)

MACHINE DATA (GANG RESAW)

```
MACHINE NO. .... _ _
MACHINE NAME ....  _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
MACHINE CODE .... 16

PROCESSING TIMES AND RATES :
TIME CODE .... _

SPECIES CODE .... _ _
 FEED RATE (FT./MIN.) .... : _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                        ******** LOGNORMAL DISTRIBUTION  **********
                        MEAN          MIN.          MAX.          SD
     LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _


SPECIES CODE .... _ _
 FEED RATE (FT./MIN.) .... : _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                        ******** LOGNORMAL DISTRIBUTION  **********
                        MEAN          MIN.          MAX.          SD
     LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _


SPECIES CODE .... _ _
 FEED RATE (FT./MIN.) .... : _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                        ******** LOGNORMAL DISTRIBUTION  **********
                        MEAN          MIN.          MAX.          SD
     LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _


SPECIES CODE .... _ _
 FEED RATE (FT./MIN.) .... : _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                        ******** LOGNORMAL DISTRIBUTION  **********
                        MEAN          MIN.          MAX.          SD
     LOAD TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _
```

FORM NO. 15 (_ _ OF _ _)

MACHINE DATA (TRIM SAWS)

```
MACHINE NO. .... _ _
MACHINE NAME ....  _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
MACHINE CODE .... 17

PROCESSING TIMES AND RATES :
TIME CODE .... _

SPECIES CODE .... _ _
 PROCESSING TIME (MINUTES) .... _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION  **********
                         MEAN          MIN.          MAX.          SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _


SPECIES CODE .... _ _
 PROCESSING TIME (MINUTES) .... _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION  **********
                         MEAN          MIN.          MAX.          SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _


SPECIES CODE .... _ _
 PROCESSING TIME (MINUTES) .... _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION  **********
                         MEAN          MIN.          MAX.          SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _


SPECIES CODE .... _ _
 PROCESSING TIME (MINUTES) .... _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION  **********
                         MEAN          MIN.          MAX.          SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _
```

FORM NO. 16 (_ _ OF _ _)

MACHINE DATA (GREEN CHAIN)

MACHINE NO. .... _ _
MACHINE NAME .... _
MACHINE CODE 18

PROCESSING TIMES AND RATES :
TIME CODE .... _

SPECIES CODE .... _ _
PROCESSING TIME (MINUTES) .... _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

******** LOGNORMAL DISTRIBUTION **********

	MEAN	MIN.	MAX.	SD
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
PROCESSING TIME (MINUTES) .... _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

******** LOGNORMAL DISTRIBUTION **********

	MEAN	MIN.	MAX.	SD
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
PROCESSING TIME (MINUTES) .... _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

******** LOGNORMAL DISTRIBUTION **********

	MEAN	MIN.	MAX.	SD
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
PROCESSING TIME (MINUTES) .... _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

******** LOGNORMAL DISTRIBUTION **********

	MEAN	MIN.	MAX.	SD
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

SPECIES CODE .... _ _
PROCESSING TIME (MINUTES) .... _ _ _ . _ _

PROCESSING TIME DISTRIBUTION :

******** LOGNORMAL DISTRIBUTION **********

	MEAN	MIN.	MAX.	SD
DOWN TIME	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _	: _ _ . _ _ _

PERCENT DOWN ....: _ _ . _ _ _

```
                                              FORM NO. 17    ( _ _ OF _ _ )
MACHINE DATA (CHIPPER)

 MACHINE NO. .... _ _
 MACHINE NAME ....  _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
 MACHINE CODE .... 19

 PROCESSING TIMES AND RATES :
 TIME CODE .... _

 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION  **********
                         MEAN        MIN.        MAX.         SD
      DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION  **********
                         MEAN        MIN.        MAX.         SD
      DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION  **********
                         MEAN        MIN.        MAX.         SD
      DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION  **********
                         MEAN        MIN.        MAX.         SD
      DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _


 SPECIES CODE .... _ _
  FEED RATE (FT./MIN.) .... : _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION  **********
                         MEAN        MIN.        MAX.         SD
      DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _
```

FORM NO. 18 (_ _ OF _ _)

MACHINE DATA (TRANSFER)

```
MACHINE NO. .... _ _
MACHINE NAME ....  _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
MACHINE CODE .... 20

PROCESSING TIMES AND RATES :
TIME CODE .... _

SPECIES CODE .... _ _
 PROCESSING TIME (MINUTES) .... _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                        ******** LOGNORMAL DISTRIBUTION   **********
                        MEAN          MIN.          MAX.            SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _


SPECIES CODE .... _ _
 PROCESSING TIME (MINUTES) .... _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                        ******** LOGNORMAL DISTRIBUTION   **********
                        MEAN          MIN.          MAX.            SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _


SPECIES CODE .... _ _
 PROCESSING TIME (MINUTES) .... _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                        ******** LOGNORMAL DISTRIBUTION   **********
                        MEAN          MIN.          MAX.            SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _


SPECIES CODE .... _ _
 PROCESSING TIME (MINUTES) .... _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                        ******** LOGNORMAL DISTRIBUTION   **********
                        MEAN          MIN.          MAX.            SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _


SPECIES CODE .... _ _
 PROCESSING TIME (MINUTES) .... _ _ _ . _ _

 PROCESSING TIME DISTRIBUTION :
                        ******** LOGNORMAL DISTRIBUTION   **********
                        MEAN          MIN.          MAX.            SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

 PERCENT DOWN ....: _ _ . _ _ _
```

FORM NO. 19 (_ _ OF _ _)

```
MACHINE DATA (SPECIAL PRODUCTS)

 MACHINE NO. .... _ _
 MACHINE NAME .... _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
 MACHINE CODE .... 21

 PROCESSING TIMES AND RATES :
 TIME CODE .... _

 SPECIES CODE .... _ _
  PROCESSING TIME (MINUTES) .... _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION **********
                         MEAN         MIN.          MAX.          SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _

  PRODUCT DISTRIBUTION :
                                      1             2             3             4             5
   PRODUCT LENGTH (INCHES) .... : _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _

                   PERCENT .... : _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _

 SPECIES CODE .... _ _
  PROCESSING TIME (MINUTES) .... _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION **********
                         MEAN         MIN.          MAX.          SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _

  PRODUCT DISTRIBUTION :
                                      1             2             3             4             5
   PRODUCT LENGTH (INCHES) .... : _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _

                   PERCENT .... : _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _

 SPECIES CODE .... _ _
  PROCESSING TIME (MINUTES) .... _ _ _ . _ _

  PROCESSING TIME DISTRIBUTION :
                         ******** LOGNORMAL DISTRIBUTION **********
                         MEAN         MIN.          MAX.          SD
     DOWN TIME .... : _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _: _ _ . _ _ _

  PERCENT DOWN ....: _ _ . _ _ _

  PRODUCT DISTRIBUTION :
                                      1             2             3             4             5
   PRODUCT LENGTH (INCHES) .... : _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _

                   PERCENT .... : _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _: _ _ _ . _ _
```

FORM NO. 20 (_ _ OF _ _)

HEADRIG SAWING INSTRUCTIONS

HEADRIG ORDER NO. **** _

INSTRUCTION SET NO. **** _ _ _
SAWING PATTERN CONTROL :

SAW CODE	SP CODE	GR	UPPER DIAM.	LOWER DIAM.	UPPER LGTH	LOWER LGTH	CRI. CODE	PERCENT
_ _	_ _	_ _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_	_ _ . _

SAWING DIMENSIONS :

BOARD MIN. LGTH	******** SAW KERF ******** HORIG	CANT	SLAB	******** BOARD THICKNESS ******** ***** ROUGH ***** CANT	SLAB	**** NOMINAL **** CANT	SLAB	MAXIMUM CANT WIDTH
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _

ALLOWABLE BOARD WIDTH :

1	2	3	4	5	6	7	8	9	10
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _
11	12	13	14	15	16	17	18	19	20
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _
21	22	23	24	25	26	27	28	29	30
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _

ALLOWABLE CANT THICK. :

1	2	3	4	5	6	7	8	9	10
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _
11	12	13	14	15	16	17	18	19	20
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _
21	22	23	24	25	26	27	28	29	30
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _

HEADRIG ORDER NO. **** _

INSTRUCTION SET NO. **** _ _ _
SAWING PATTERN CONTROL :

SAW CODE	SP CODE	GR	UPPER DIAM.	LOWER DIAM.	UPPER LGTH	LOWER LGTH	CRI. CODE	PERCENT
_ _	_ _	_ _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_	_ _ . _

SAWING DIMENSIONS :

BOARD MIN. LGTH	******** SAW KERF ******** HORIG	CANT	SLAB	******** BOARD THICKNESS ******** ***** ROUGH ***** CANT	SLAB	**** NOMINAL **** CANT	SLAB	MAXIMUM CANT WIDTH
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _

ALLOWABLE BOARD WIDTH :

1	2	3	4	5	6	7	8	9	10
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _
11	12	13	14	15	16	17	18	19	20
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _
21	22	23	24	25	26	27	28	29	30
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _

ALLOWABLE CANT THICK. :

1	2	3	4	5	6	7	8	9	10
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _
11	12	13	14	15	16	17	18	19	20
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _
21	22	23	24	25	26	27	28	29	30
_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _	_ _ . _

FORM NO. 21 (_ _ OF _ _)

CONVEYOR AND BUFFER INFORMATION

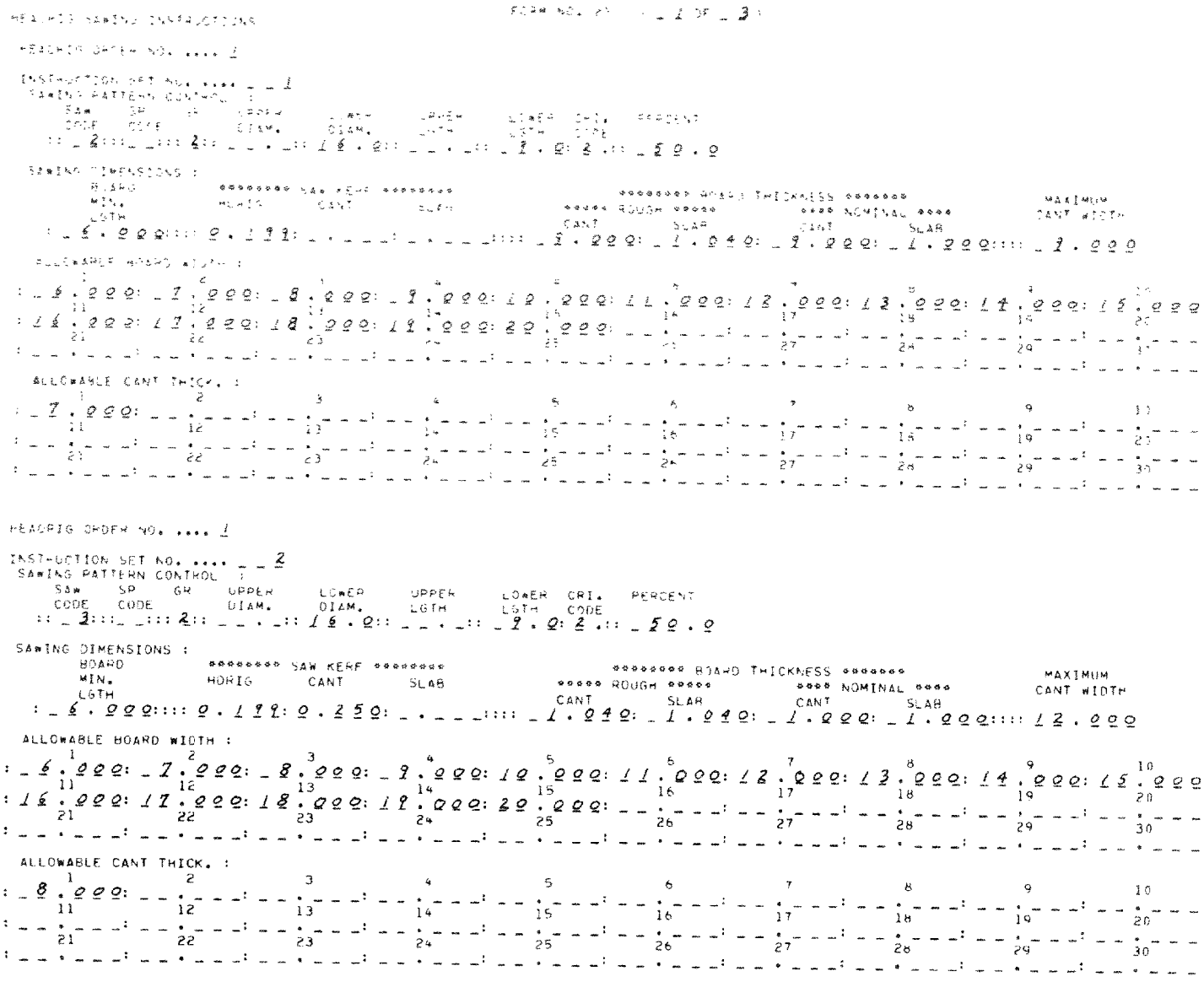
MACHINE NO.	NUMBER BUFF. OR CONV. FEEDING	NUMBER MACHINE TO EACH	SENDING MACHINE NO.	TRANSFER CODE	BUFFER LENGTH	BUFFER SPEED	CONVEYOR LENGTH	CONVEYOR SPEED
12	2	2	_5	3	_20.0	_80.0	_10.5	_60.0
_ _	_	_	_6	3	_20.0	_80.0	_15.0	_60.0
_ _	_	2	_8	3	_15.0	_50.0	_20.0	_80.0
_ _	_	_	10	3	_15.0	_50.0	_40.5	120.0
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _
_ _	_	_	_ _	_	_ _ _ . _	_ _ _ . _	_ _ _ . _	_ _ _ . _

FORM NO. 22 (_ _ OF _ _)

CRITERIA FOR ROUTING MATERIAL

FROM NO.	TO NO.	TYPE CODE	ROUTE CODE	GRADE	SPEC. CODE	WIDTH	WD. CODE	THICKNESS	TH. CODE	LENGTH	LN. CODE	PRI.	ALT.	PERCENT
3	4	8	1			12.000	2					1		
3	5	8	1			12.000	2					2		
3	4	8	2			12.000	2						1	
3	5	8	2			12.000	2						1	
3	4	8	3			12.000	2							75.0
3	5	8	3			12.000	2							25.0

Appendix C—Sample Sawing Instructions (Form No. 20) for a Band Headrig



HEADRIG SAWING INSTRUCTIONS FORM NO. 20 - 1 OF - 3

HEADRIG ORDER NO. 1

INSTRUCTION SET NO. .... - - 1
SAWING PATTERN CONTROL :

SAW CODE	SP CODE	GR	UPPER DIAM.	LOWER DIAM.	UPPER LGTH	LOWER LGTH	CRI. CODE	PERCENT
2		2	- - . -	16.0	- - . -	1.0	2	50.0

SAWING DIMENSIONS :

BOARD MIN. LGTH	SAW KERF HORIG	SAW KERF CANT	SAW KERF SLAB	BOARD THICKNESS ROUGH CANT	BOARD THICKNESS ROUGH SLAB	BOARD THICKNESS NOMINAL CANT	BOARD THICKNESS NOMINAL SLAB	MAXIMUM CANT WIDTH
6.000	0.119	- . - - -	- . - - -	1.000	1.040	1.000	1.000	1.000

ALLOWABLE BOARD WIDTH :

1	2	3	4	5	6	7	8	9	10
6.000	7.000	8.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000
11	12	13	14	15	16	17	18	19	20
16.000	17.000	18.000	19.000	20.000	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -
21	22	23	24	25	26	27	28	29	30
- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -

ALLOWABLE CANT THICK. :

1	2	3	4	5	6	7	8	9	10
7.000	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -
11	12	13	14	15	16	17	18	19	20
- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -
21	22	23	24	25	26	27	28	29	30
- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -

HEADRIG ORDER NO. 1

INSTRUCTION SET NO. .... - - 2
SAWING PATTERN CONTROL :

SAW CODE	SP CODE	GR	UPPER DIAM.	LOWER DIAM.	UPPER LGTH	LOWER LGTH	CRI. CODE	PERCENT
3		2	- - . -	16.0	- - . -	1.0	2	50.0

SAWING DIMENSIONS :

BOARD MIN. LGTH	SAW KERF HORIG	SAW KERF CANT	SAW KERF SLAB	BOARD THICKNESS ROUGH CANT	BOARD THICKNESS ROUGH SLAB	BOARD THICKNESS NOMINAL CANT	BOARD THICKNESS NOMINAL SLAB	MAXIMUM CANT WIDTH
6.000	0.119	0.250	- . - - -	1.040	1.040	1.000	1.000	12.000

ALLOWABLE BOARD WIDTH :

1	2	3	4	5	6	7	8	9	10
6.000	7.000	8.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000
11	12	13	14	15	16	17	18	19	20
16.000	17.000	18.000	19.000	20.000	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -
21	22	23	24	25	26	27	28	29	30
- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -

ALLOWABLE CANT THICK. :

1	2	3	4	5	6	7	8	9	10
8.000	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -
11	12	13	14	15	16	17	18	19	20
- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -
21	22	23	24	25	26	27	28	29	30
- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -	- - . - - -

HEADRIG SAWING INSTRUCTIONS

HEADRIG ORDER NO. 1

INSTRUCTION SET NO. 3

SAWING PATTERN CONTROL :

SAW CODE	SP CODE	GR	UPPER DIAM.	LOWER DIAM.	UPPER LGTH	LOWER LGTH	CRI. CODE	PERCENT
2		2		16.0		9.0	2	50.0

SAWING DIMENSIONS :

BOARD MIN. LGTH	SAW KERF HDWIG	SAW KERF CANT	SAW KERF SLAB	BOARD THICKNESS ROUGH CANT	BOARD THICKNESS ROUGH SLAB	BOARD THICKNESS NOMINAL CANT	BOARD THICKNESS NOMINAL SLAB	MAXIMUM CANT WIDTH
6.000	0.112			2.000	1.000	1.250	1.000	0.000

ALLOWABLE BOARD WIDTH :

1	2	3	4	5	6	7	8	9	10
6.000	7.000	8.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000
11	12	13	14	15	16	17	18	19	20
16.000	17.000	18.000	19.000	20.000					
21	22	23	24	25	26	27	28	29	30

ALLOWABLE CANT THICK. :

1	2	3	4	5	6	7	8	9	10
7.000									
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

HEADRIG ORDER NO. 1

INSTRUCTION SET NO. 4

SAWING PATTERN CONTROL :

SAW CODE	SP CODE	GR	UPPER DIAM.	LOWER DIAM.	UPPER LGTH	LOWER LGTH	CRI. CODE	PERCENT
2		2		16.0		9.0	2	50.0

SAWING DIMENSIONS :

BOARD MIN. LGTH	SAW KERF HDWIG	SAW KERF CANT	SAW KERF SLAB	BOARD THICKNESS ROUGH CANT	BOARD THICKNESS ROUGH SLAB	BOARD THICKNESS NOMINAL CANT	BOARD THICKNESS NOMINAL SLAB	MAXIMUM CANT WIDTH
6.000	0.112	0.250		1.000	1.000	1.000	1.000	12.000

ALLOWABLE BOARD WIDTH :

1	2	3	4	5	6	7	8	9	10
6.000	7.000	8.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000
11	12	13	14	15	16	17	18	19	20
16.000	17.000	18.000	19.000	20.000					
21	22	23	24	25	26	27	28	29	30

ALLOWABLE CANT THICK. :

1	2	3	4	5	6	7	8	9	10
8.000									
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

FORM NO. 20 (3 OF 3)

HEADRIG SAWING INSTRUCTIONS

HEADRIG ORDER NO. 1

INSTRUCTION SET NO. 5

SAWING PATTERN CONTROL :

SAW CODE	SP CODE	GR	UPPER DIAM.	LOWER DIAM.	UPPER LGTH	LOWER LGTH	CRI. CODE	PERCENT
3			15.0					

SAWING DIMENSIONS :

BOARD MIN. LGTH	SAW KERF HDRIG	SAW KERF CANT	SAW KERF SLAB	BOARD THICKNESS ROUGH CANT	BOARD THICKNESS ROUGH SLAB	BOARD THICKNESS NOMINAL CANT	BOARD THICKNESS NOMINAL SLAB	MAXIMUM CANT WIDTH
6.000	0.125	0.250		1.042	1.042	1.000	1.000	12.000

ALLOWABLE BOARD WIDTH :

1	2	3	4	5	6	7	8	9	10
6.000	7.000	8.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000
11	12	13	14	15	16	17	18	19	20
16.000	17.000	18.000	19.000	20.000					
21	22	23	24	25	26	27	28	29	30

ALLOWABLE CANT THICK. :

1	2	3	4	5	6	7	8	9	10
6.000									
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

HEADRIG ORDER NO. 1

INSTRUCTION SET NO. 6

SAWING PATTERN CONTROL :

SAW CODE	SP CODE	GR	UPPER DIAM.	LOWER DIAM.	UPPER LGTH	LOWER LGTH	CRI. CODE	PERCENT
3				16.0				

SAWING DIMENSIONS :

BOARD MIN. LGTH	SAW KERF HDRIG	SAW KERF CANT	SAW KERF SLAB	BOARD THICKNESS ROUGH CANT	BOARD THICKNESS ROUGH SLAB	BOARD THICKNESS NOMINAL CANT	BOARD THICKNESS NOMINAL SLAB	MAXIMUM CANT WIDTH
6.000	0.125	0.250		1.042	1.042	1.000	1.000	12.000

ALLOWABLE BOARD WIDTH :

1	2	3	4	5	6	7	8	9	10
6.000	7.000	8.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000
11	12	13	14	15	16	17	18	19	20
16.000	17.000	18.000	19.000	20.000					
21	22	23	24	25	26	27	28	29	30

ALLOWABLE CANT THICK. :

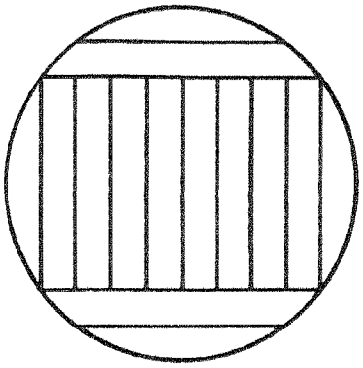
1	2	3	4	5	6	7	8	9	10
8.000									
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

Appendix D—Available Sawing Patterns

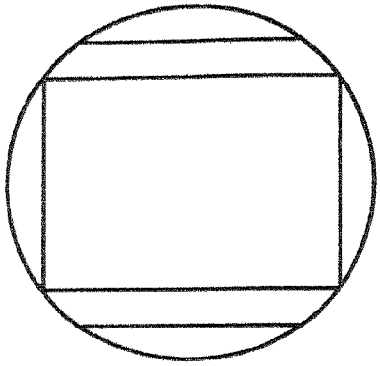
Note: The saw cuts shown in these sawing patterns are:

Headrig
Cant resaw
Slab resaw

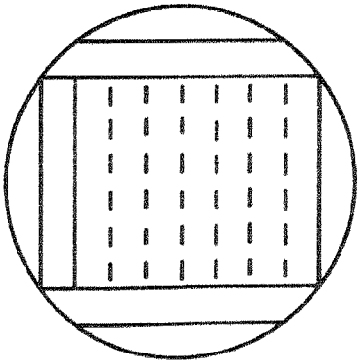
1—Saw around (all)



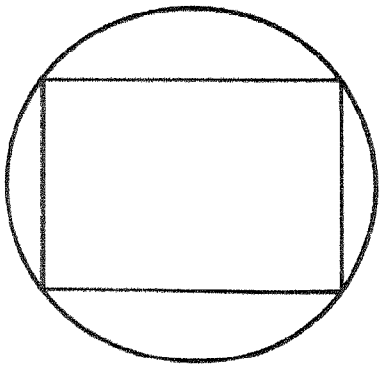
2—Saw around to timber



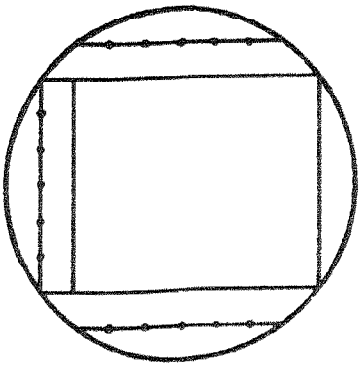
3—Saw around to cant for resaw



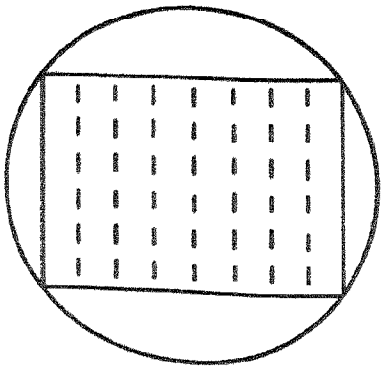
4—Slab around to timber (slabs to chipper)



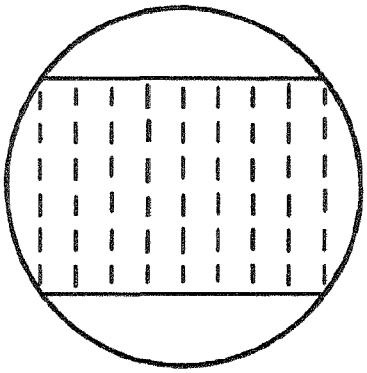
5—Slab around to timber (slabs to resaw)



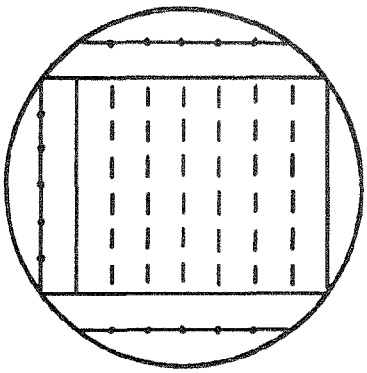
6—Slab around to cant for resaw (slabs to chipper)



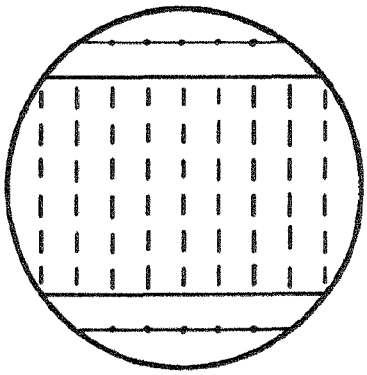
7—Slab around to 2-sided cant for resaw (slabs to chipper)



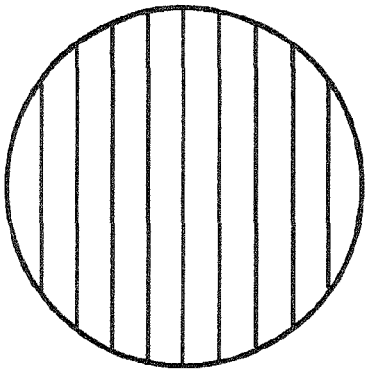
8—Slab around to cant for resaw (slabs to resaw)



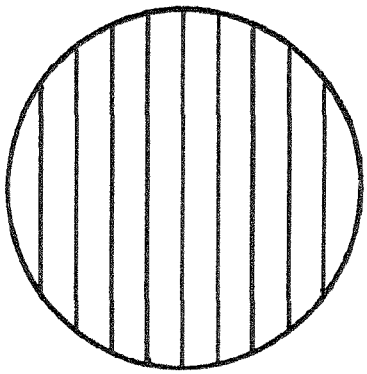
9—Slab around to 2-sided cant for resaw (slabs to resaw)



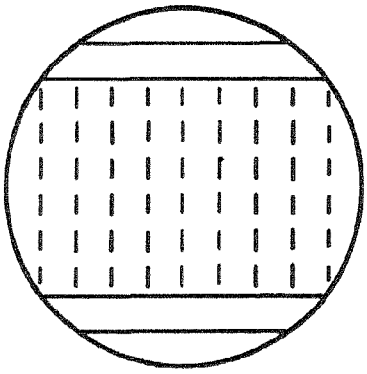
10—Live saw



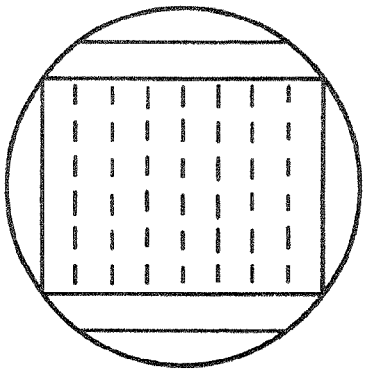
11—Gang saw



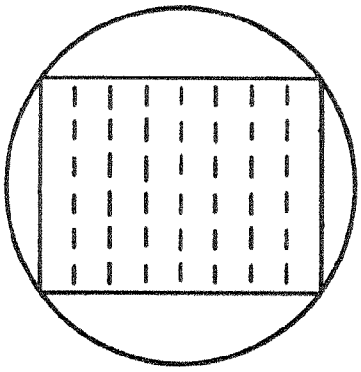
12—Saw around to 2-sided cant for resaw



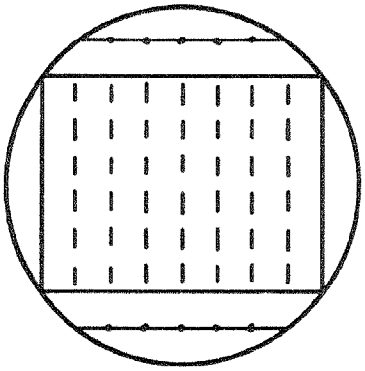
13—Same as code 3 but with even number of pieces in cant



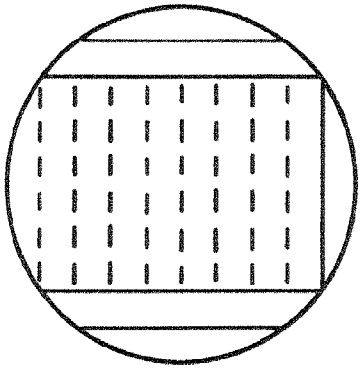
14—Same as code 6 but with even number of pieces in cant



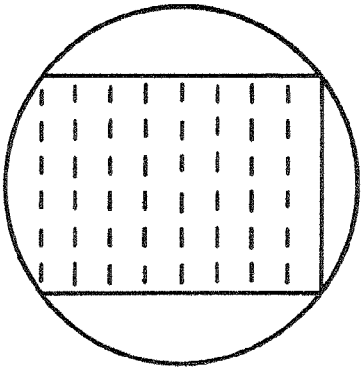
15—Same as code 8 but with even number of pieces in cant



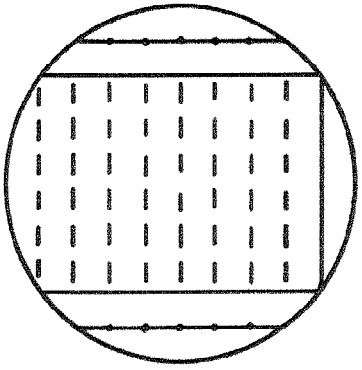
16—Saw around to 3-sided cant for resaw



17—Slab around to 3-sided cant for resaw (slabs to chipper)



18—Slab around to 3-sided cant for resaw (slabs to resaw)



Appendix E—Example Showing a Procedure for Calculating DESIM Lognormal Parameters

X	(X − C)	ln(X − C)	(ln(X − C))²
0.21	0.0960	−2.343407	5.491554
0.14	0.0260	−3.649657	13.319998
0.22	0.1060	−2.244315	5.036950
0.22	0.1060	−2.244315	5.036950
0.16	0.0460	−3.079112	9.480930
0.33	0.2160	−1.532476	2.348483
0.36	0.2460	−1.402423	1.966789
0.16	0.0460	−3.079112	9.480930
0.22	0.1060	−2.244315	5.036950
0.44	0.3260	−1.120857	1.256320
0.19	0.0760	−2.577022	6.641040
0.15	0.0360	−3.324236	11.050544
0.22	0.1060	−2.244315	5.036950
0.31	0.1960	−1.629640	2.655725
0.36	0.2460	−1.402423	1.966789
X_L → 0.67	0.5560	−0.586987	0.344554
0.21	0.0960	−2.343407	5.491554
0.24	0.1260	−2.071473	4.291000
0.21	0.0960	−2.343407	5.491554
0.27	0.1560	−1.857899	3.451787
0.14	0.0260	−3.649657	13.319998
0.24	0.1260	−2.071473	4.291000
0.19	0.0760	−2.577022	6.641040
0.16	0.0460	−3.079112	9.480930
X_s → 0.12	0.0060	−5.115989	26.173340
0.23	0.1160	−2.154164	4.640424
0.16	0.0460	−3.079112	9.480930
0.18	0.0660	−2.718100	7.388065
0.13	0.0160	−4.135164	17.099579
0.16	0.0460	−3.079112	9.480930
Total		−74.979538	212.873428

X = Actual data observations
X_s = Smallest data observation
X_L = Largest data observation
C = Constant (X_s times 0.95)
ln = Natural log

$n = 30$ (number of observations)

$\Sigma[\ln(X - C)] = -74.979538$

$\Sigma[\ln(X - C)]^2 = 212.873428$

DESIM Lognormal Parameters:

$$\text{Mean} = \Sigma[\ln(X - C)]/n = -2.499317$$

$$\text{Standard Deviation} = \sqrt{\frac{\Sigma[\ln(X - C)]^2 - \frac{|\Sigma[\ln(X - C)]|^2}{n}}{n - 1}} = 0.937270$$

$$\text{Minimum Value} = \ln(X_s - C) = -5.115989$$

$$\text{Maximum Value} = \ln(X_L - C) = -0.586987$$