United States
Department of
Agriculture

Forest Service

**Northeastern Forest
Experiment Station**

General Technical
Report NE-196

CORY Version USDA-1 Crosscut-First Simulator User's Guide

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Abstract

CORY USDA-1 (Computer Optimization of Recoverable Yield) is a computer program available for IBM compatible personal computers with 80286 and higher processors that simulates crosscut-first sawing procedures on lumber. The USDA-1 version of CORY is a sawing simulation especially intended for use with the USDA Forest Service's Advanced Gang Rip Simulator (AGARIS) program. Cross-cut boards are easily viewed and printed. Data for individual boards and all boards (summaries) are available based on surface area or piece counts.

The Authors

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Manuscript received for publication 13 September 1994

The computer program described in this publication is available upon request with the understanding that the U.S. Department of Agriculture cannot assure its accuracy, completeness, reliability, or suitability for any other purpose than that reported. The recipient may not assert any proprietary rights thereto nor represent it to anyone as other than a Government-produced computer program.

For a copy of the program write to:

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March 1995

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1. Introduction

The CORY (Computerized Optimization of Recoverable Yield) family of programs models a variety of rough-mill sawing procedures, each differentiated by type of first operation, number of sawing stages, and whether the parts recovered are of fixed or random dimensions. The USDA-1 version of CORY is a crosscut-first sawing simulation, especially intended for use with the USDA Forest Service's Advanced GAng RIp Simulator (AGARIS) program. CORY uses the same ¼-inch kerf widths and board data files. This provides compatibility between the two sawing systems with respect to board processing, thus allowing easy comparison of results from crosscut-first and gang-rip-first operations. CORY's hardware and operating system requirements are the same as AGARIS's.

CORY simulates a three-stage (crosscut, rip, crosscut) sawing process where boards are first edged (if requested) and then crosscut and ripped into parts. A crosscut salvage operation recovers additional parts. A board section may be cut one or more times in each stage. Parts are sawed to specified sizes. The number of cutting bill sizes matches AGARIS's with up to 10 lengths and 3 widths resulting in a possible total of 30 fixed-width, fixed-length part sizes. CORY also will recover secondary random-width, fixed-length pieces that are narrower than the narrowest specified fixed width but no narrower than three-fourths of an inch. CORY offers two yield maximization methods. One maximizes by producing the longest possible parts, the other produces the combination of parts that maximize volume recovery. See Section 4 for a more detailed discussion of program options.

CORY gives special attention to crooked boards. If crook exceeds one-fourth of an inch, board sections are reoriented after each first-stage crosscut, so that cuttings are produced parallel to board section edges. This simulates industry practice and usually results in higher yields.

2. Installation

The distribution diskette contains an installation program for the CORY programs and data from the "1992 Data Bank for Red Oak Lumber" (Gatchell et al. 1992). The lumber is graded according to 1990 NHLA rules (National Hardwood Lumber Association 1990). This program copies the compressed files containing the programs and data to the destination drive and directory. Next, these files are automatically decompressed and the original compressed files removed. You are notified of any problem that arises during installation. After the installation, you are ready to run CORY from the MS DOS prompt.

2.1 Running Install Program

To begin the installation, place the distribution diskette in the floppy drive. Next, make the floppy drive containing the distribution diskette the working drive. At the DOS prompt, type the letter identifying the floppy drive and a colon. Then press Return. On most computers, the floppy drive is A: or B:. For this example, we are using drive A:. At the DOS prompt, we enter:

A:

Then, to run the install program, type:

INSTALL

at the DOS prompt and press Return.

NOTE: If your computer has a CD-ROM drive without a CD in it, a problem may result during the initialization of the install program. On some machines a "Drive XX not ready error" will occur. If this happens, press F to fail the CD-ROM drive access and allow the installation to proceed normally. The occurrence of this error will not affect the installation to any of your hard disks.

The default destination for the CORY programs and data is drive C: in subdirectory \CORY. If this is not okay, press "M" at the install menu (Fig. 2.1) to modify the destination. The install program will prompt you to choose a new destination drive and subdirectory. If C:\CORY is acceptable, just press "C" to continue.

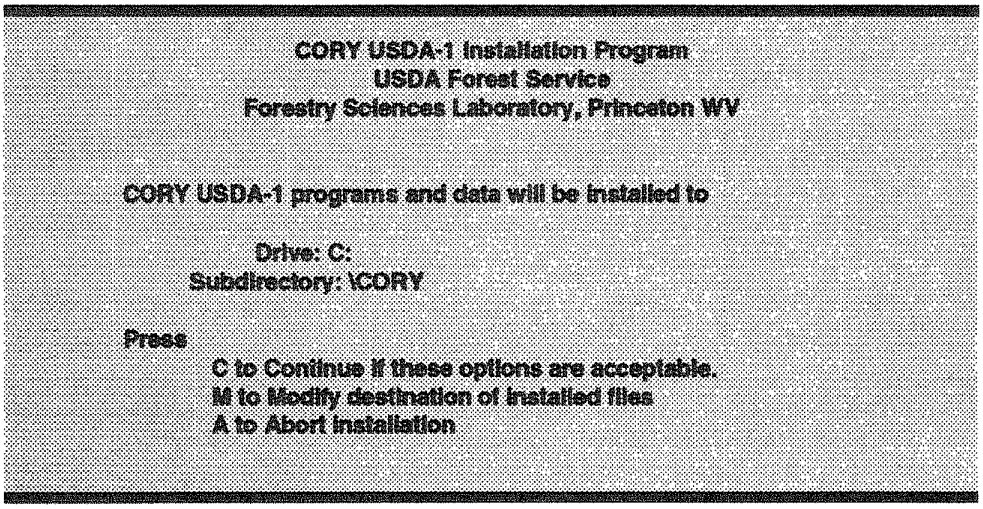

Figure 2.1. Installation program menu.

2.2 Configuring Your System

The CONFIG.SYS file defines devices and run time parameters for your personal computer system. When installation is complete, you should check to see that your CONFIG.SYS file includes the following lines:

FILES = 20
BUFFERS = 20

The sequence, location, and spacing of the lines are not important. It is only important that the values for the FILES and BUFFERS settings are at least 20. If the settings are less than 20, you must edit the CONFIG.SYS file and correct the settings. Once you have finished editing, you must re-boot your computer. Revised CONFIG.SYS parameters will not take effect until this is done.

For more information on the installation procedure, refer to the "AGARIS User's Guide" (Thomas et al. 1994).

3. Running CORY USDA-1:

The USDA-1 version of CORY is designed to execute using the same procedures as AGARIS with few exceptions as noted. For a description of the procedures, see Section 3 of the AGARIS User's Guide. To run CORY, make the CORY install directory the working directory and type **CORY** at the DOS prompt. For example, if you accepted the default install destination you would enter

CD \CORY

followed by

CORY

at the C:\CORY DOS prompt.

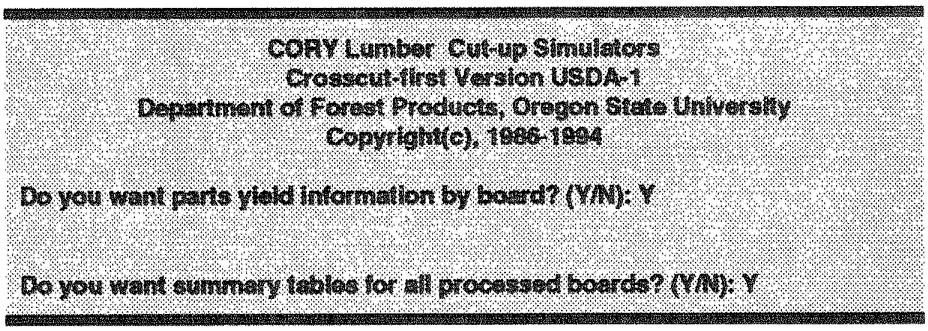

Figure 3.1. Startup options screen

The startup options screen shown in Figure 3.1 is displayed when CORY starts. Answer each of the questions by entering "Y" for yes and "N" for no. If you desire a detailed list of primary and salvage cuttings for each board and their accumulated yields for all boards, then answer "Y" to the first question. If you want a table showing primary and salvage part quantities by width and length group as well as their total surface area, answer "Y" to the second question. Answering these two questions will cause the runtime options screen to be displayed (Fig. 3.2). CORY is supplied with a default options list. If you are running CORY for the first time, you will see the exact options that are shown in Figure 3.2.

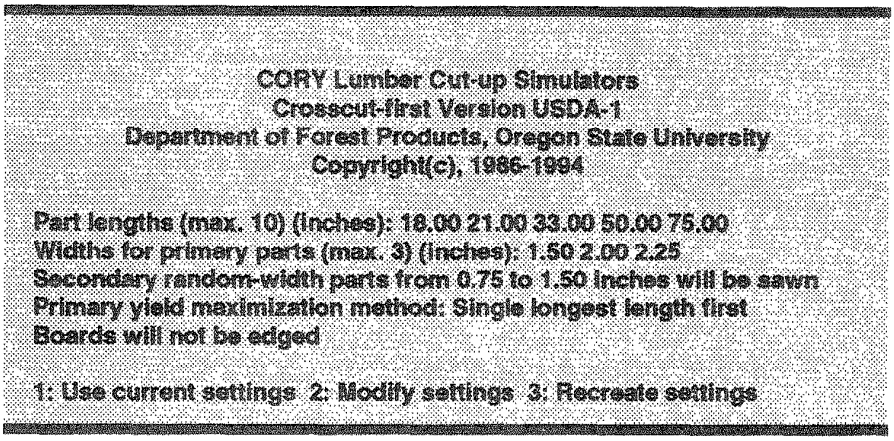

Figure 3.2. Runtime options screen.

The runtime options screen has three choices available: 1) execute the program using the displayed options, 2) modify the current options list, and 3) create a new options list. To run CORY with the current parameters, enter "1" (Use current settings). CORY will then provide a list of board data files that can be analyzed. See Sections 6 and 7 of the AGARIS User's Guide for more details. If the parameters are unsuitable, they may be changed. To change all settings, enter "3" (Recreate settings) and refer to Section 4 "Creating New Options List" or for a detailed discussion refer to the AGARIS User's Guide. To modify only selected parameters, enter "2" (Modify settings) and refer to Section 5 "Modifying Existing Options List" or to the AGARIS User's Guide.

4. Creating New Options List:

Creating a new options list for CORY is similar to that for AGARIS. However, CORY requires fewer and slightly different inputs and, therefore, uses fewer and slightly different input screens. All the necessary procedures and screens are described in this section.

When entering measurements for lengths and widths, enter the measurement to the nearest 0.25 inch. Any measurement not entered in this manner will be rounded **down** to the nearest 0.25 inch. If you enter an unwanted value, it may be changed after creating the new options list and before executing the program by using option "2" (Modify settings) from the runtime options screen (Fig. 3.2) discussed in Section 3.

4.1 Part Lengths

CORY produces only fixed-length cuttings. These fixed lengths are specified in the part length specification screen, an example of which is shown in Figure 4.1. You are first prompted for the number of desired lengths (maximum of 10). After entering this number, you are repeatedly prompted for individual lengths until the part-length list is complete. For example, in Figure 4.1 three lengths were requested and 22.50, 27.75, and 44.25-inch lengths were specified in response to the program's prompts.

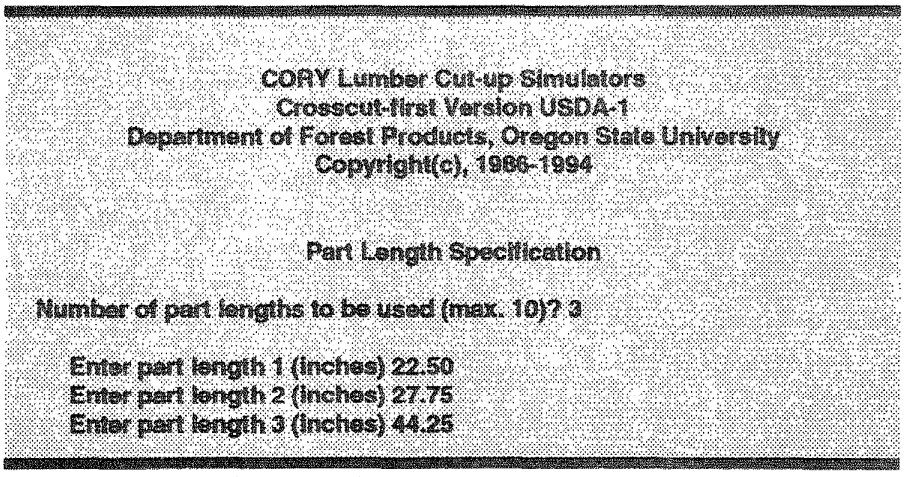

Figure 4.1. Part length specification screen.

4.2 Part Widths

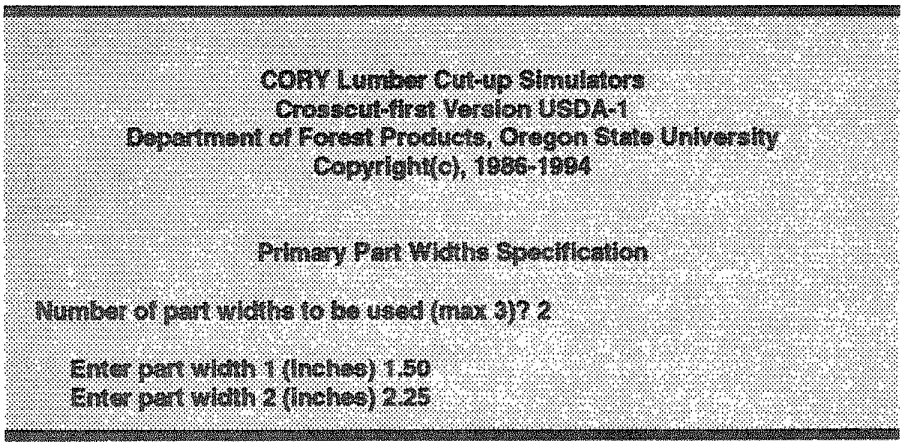

Figure 4.2. Primary part widths specification screen.

After you enter the last length, the primary part widths specification screen is immediately displayed (Fig. 4.2). Like the specification of cutting lengths, the program first prompts you for the number of desired cutting widths (maximum of three) and then prompts you for each specific width. The example in Figure 4.2 shows that two widths of 1.50 and 2.25 inches were requested.

4.3 Secondary Part Widths

Once the last fixed width has been entered, the program prompts you for the choice of producing secondary random-width parts (Fig. 4.3). These are considered secondary parts because they have a maximum possible width equal to the narrowest specified fixed width and because CORY recovers fixed-width parts before considering random-width cuttings. For instance, if the choice is between recovering a 30" x 2.0" fixed-width part and a 50" x 1.5" random-width cutting, the 30" x 2.0" part will be selected even though it is shorter and contains less material. If you want secondary random-width cuttings, enter a "Y" as shown in Figure 4.3 and the program will prompt you for the narrowest acceptable random-width. The minimum for this value is three-fourths of an inch. In the sample screen, all the secondary random width cuttings will be between 0.75 and 1.50 inches, the smallest primary part width. The next screen to appear is the primary yield maximization method selection screen (Fig. 4.4).

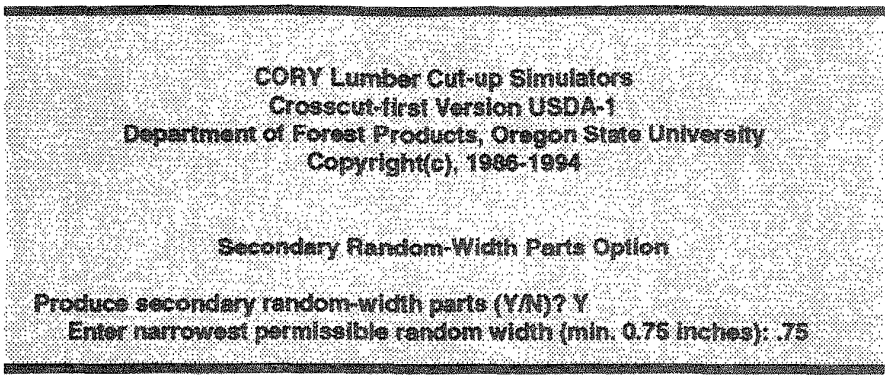

Figure 4.3. Secondary random-width parts option screen.

4.4 Primary Yield Maximization Method

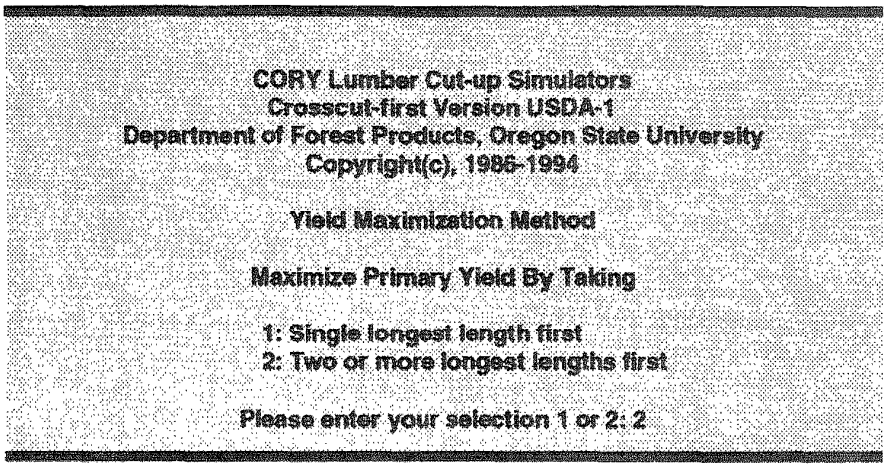

Figure 4.4. Primary yield maximization method screen.

In arriving at a sawing solution, CORY considers each board as a collection of clear areas, where a clear area is simply a rectangular portion of the board that is bounded by disallowable defects or by the edge of the board. CORY must make decisions by choosing cutting sizes that best utilize the available clear areas. You may direct CORY to use either of two methods to accomplish this. One method fits the longest possible cutting length into a clear area, the other uses the longest possible combination of lengths. For example, consider a 75-inch clear area that is being sawed with a cutting bill containing lengths of 34, 40, and 70 inches. When maximizing for the longest cutting length, CORY will place a 70 inch cutting in the clear area and waste 5 inches (disregarding kerf); alternatively, if maximizing for the longest combination of parts, CORY will use the 34- and 40-inch cuttings and waste 1 inch. Select one of the two methods by entering either a "1" for the longest length option or "2" for the longest combination options.

Once the maximization method selection has been entered, go to Section 4.5 to define board edging.

4.5 Edging Specifications

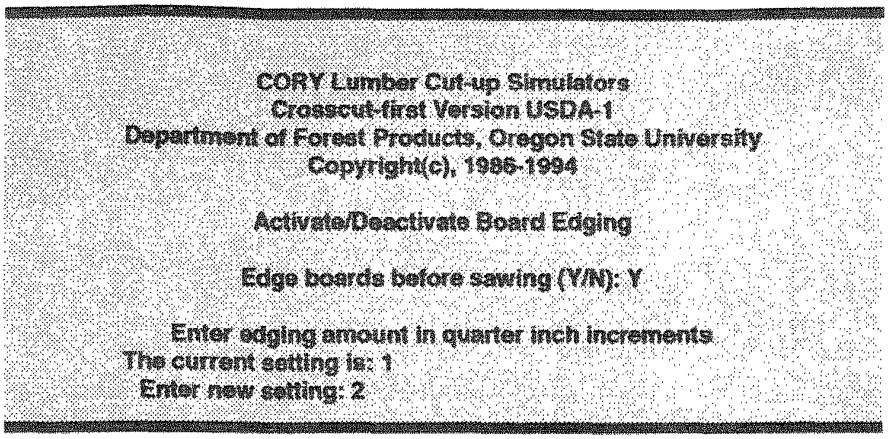

Figure 4.5. Activate/deactivate board edging screen.

CORY can edge boards before sawing. To do so, respond with a "Y" to the question shown in Figure 4.5 and enter the amount to be removed in ¼-inch units when prompted by the program. Each side of the board will be edged.

If you do not want to edge the boards, enter "N". After the edging options have been specified, the runtime options screen (Fig. 3.2) is displayed. If you entered a parameter incorrectly or wish to change a parameter, select option "2" from Figure 3.2. To use your current settings in a CORY run, select "1" (Use current settings) and refer to Section 6.

5. Modifying Existing Options List:

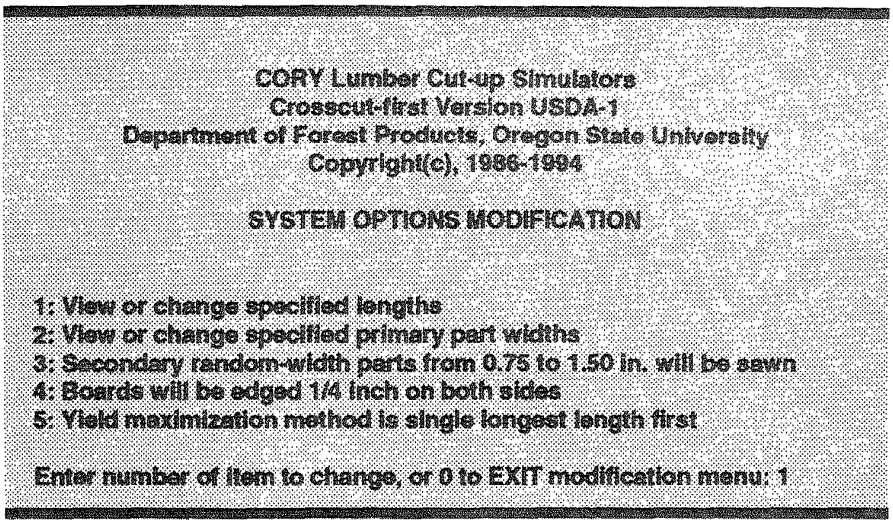

Figure 5. System options modification screen.

An example of the system option's modification screen is shown in Figure 5. Notice that it contains fewer items than the corresponding AGARIS screen, but operates in the same general manner. To modify an existing option, enter its number to invoke the option's own modification screen and then make the desired changes. When you are done editing the system options, enter 0 to exit.

5.1 Part Lengths

To change the number and sizes of the cutting bill lengths, enter "1". This will bring up the specified part lengths modification screen (Fig. 5.1). A specific length is changed by entering its item number and then its new length. Enter 0 to exit and return to the system option modification screen (Fig. 5). The part lengths are automatically resorted in ascending order when you exit.

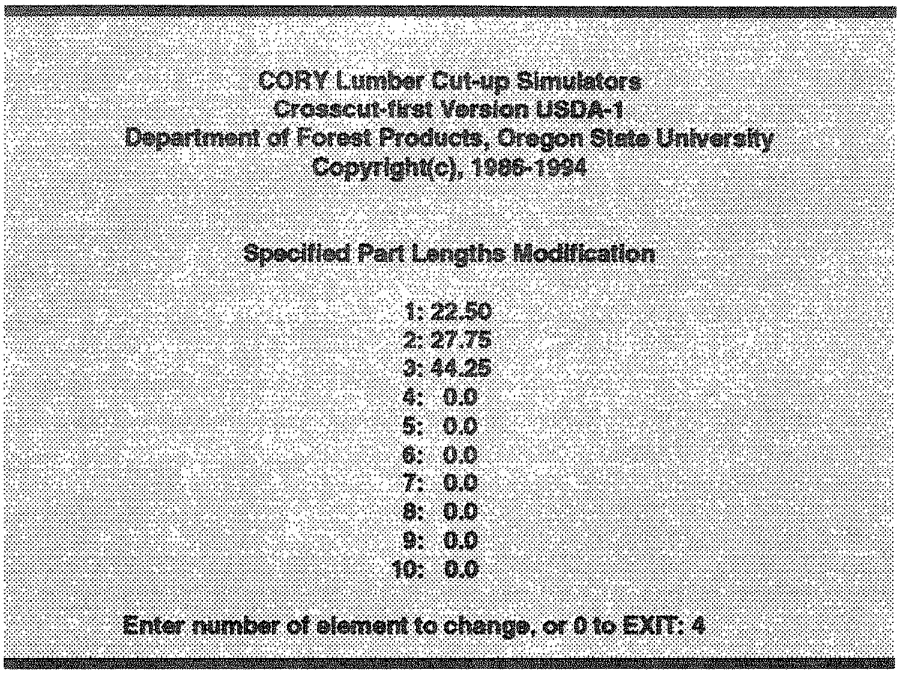

Figure 5.1. Specified part lengths modification screen.

5.2 Part Widths

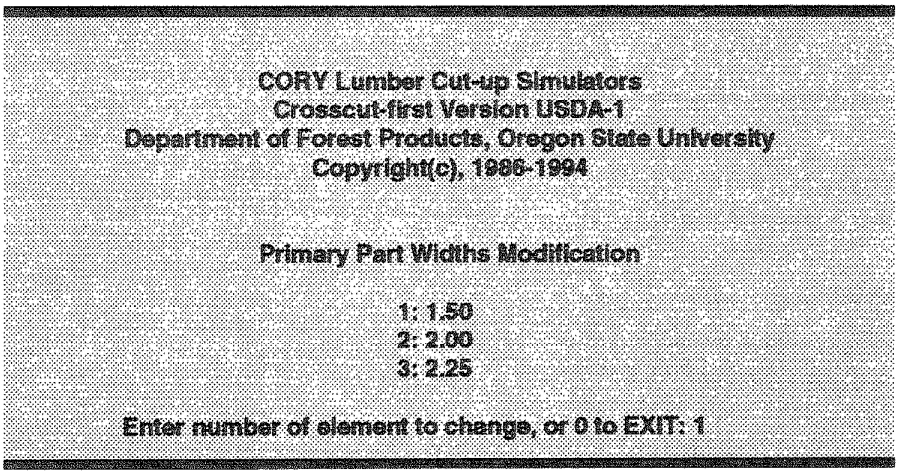

Figure 5.2. Primary part widths modification screen.

Entering "2" at the system options modification screen begins the modification of fixed widths by invoking the primary part widths modification screen shown (Fig. 5.2). The procedure for input in this screen is identical to that for the specified part lengths modification screen. Simply enter the number of the width to change and enter the new value. Enter "0" at the prompt to return to the system options modification screen (Fig. 5).

5.3 Secondary Part Widths

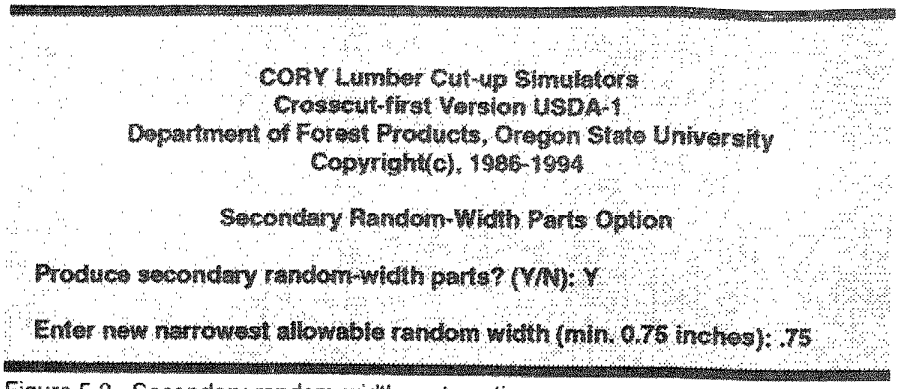

Figure 5.3. Secondary random-width parts option screen.

To modify the secondary random-width part selection, enter "3" at the system options modification screen (Fig. 5). As shown in Figure 5.3, the program requests your preference for producing these parts. Entering an "N" causes CORY to produce only fixed-width parts, whereas a "Y" will cause CORY to produce both fixed and random-width parts. Answering "Y" will cause the program to ask for a new minimum allowable random width. Enter this value (which must be equal to or greater than three-fourths of an inch), or hit return to use the current width.

5.4 Edging Specification

Entering "4" at the system options modification screen (Fig. 5) causes the activate/deactivate board edging screen to appear as shown in Figure 5.4. Select "N" to avoid edging boards and "Y" to edge them. Selecting "Y" causes the program to prompt for an edging allowance that is entered in ¼-inch units.

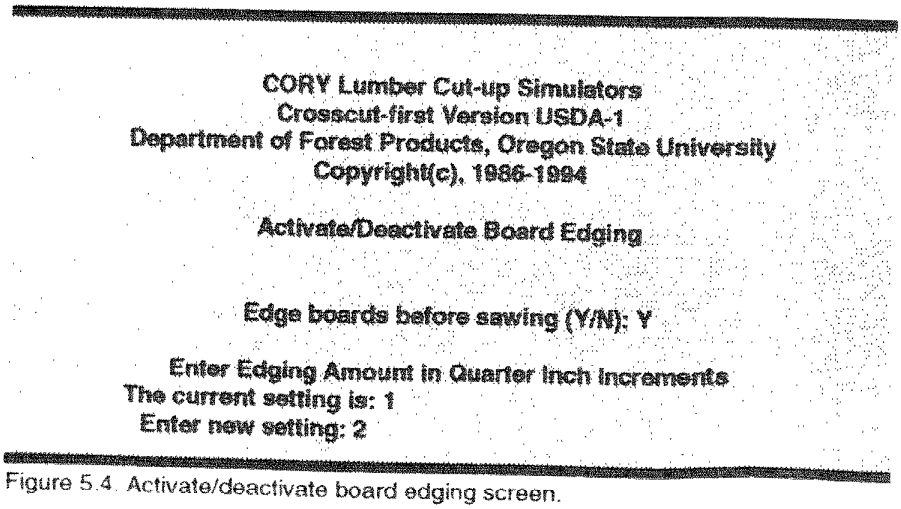

Figure 5.4. Activate/deactivate board edging screen.

5.5 Primary Yield Maximization Method

Entering "5" in the system options modification screen causes the primary yield maximization method screen to appear as in Figure 5.5. Select "1" if you want to take the longest part length first. Enter "2" to take 2 or more longest lengths first. For a more detailed description of this option, refer to Section 4.4.

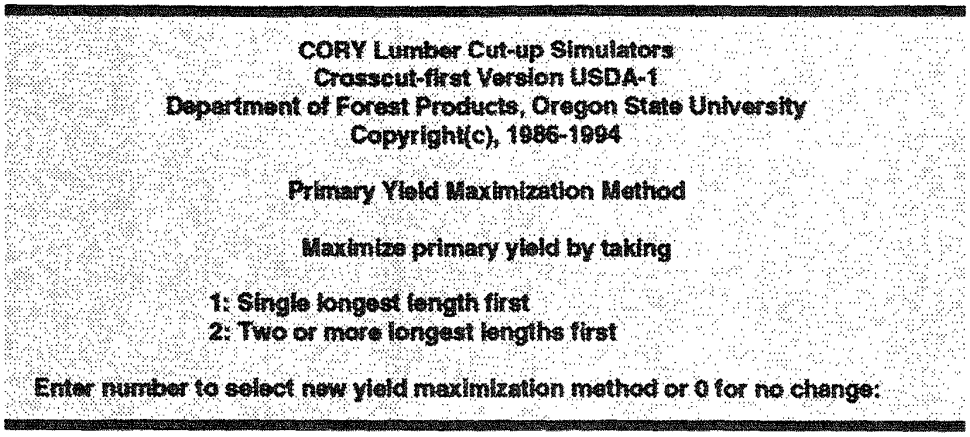

Figure 5.5. Primary yield maximization method screen.

6. Selecting a Data File

The process of selecting and using a data file is identical to that used in AGARIS. Immediately after you enter "1" (Use current Settings) at the runtime options screen (Fig. 3.2), CORY presents you with a selection of board datafiles that are in the CORY subdirectory. To select a datafile, enter the number associated with the datafile. CORY will begin to process the selected datafile. When processing is complete, a brief message will display along with a prompt asking you to press any key to continue. You will then be given the opportunity to view the results.

7. CORY Results

The process of viewing, displaying, and printing the CORY simulation results is identical to that used in AGARIS. The summary program gives you a menu-driven frontend to all the output from the CORY simulation. To view results, enter the number of the result selection you want from the summary program main menu (Fig. 7).

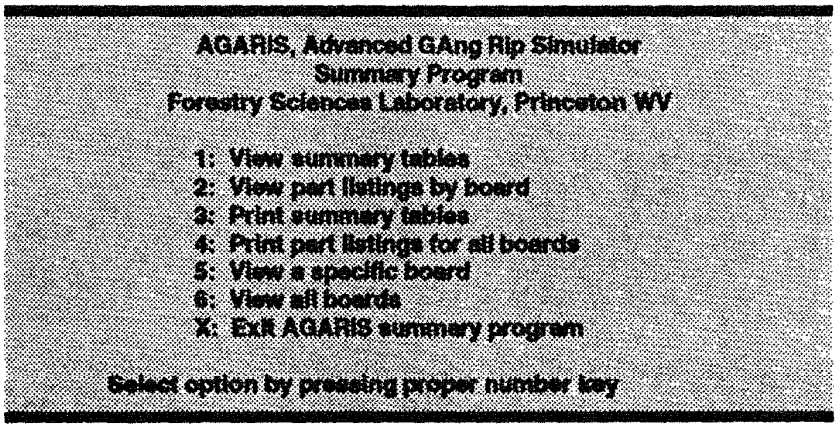

Figure 7. Summary program main menu.

Pressing the "H" key while viewing summary tables or part listings will display a help screen. This screen will inform you of all the options available to you when viewing summary tables or part listings. To print information, select item 3 or 4. You will be asked to select a printer. In most cases, you will select the PRN or LPT1 printer. If this does not work, check to see how your printer and computer are connected. Select item 5 to view a single board plot. The computer will present you with a menu showing the boards that were processed. Enter "S" then the number of the board to select a board. Select item 6 to view all the boards that were processed. The boards will be presented to you in the order they appear in the datafile. Press "X" when viewing board plots to return to the summary program main menu (Fig. 7).

All output files have the same name but different extension than the selected datafile. For example, if you selected the 1COMMON1 datafile and specified that you wanted both report listings and summary tables, the summary tables would be stored in a file named 1COMMON1.SUM and the report listings would be stored in the file 1COMMON.RPT. Information used to generate the board plots would be stored in the file 1COMMON1.PLT.

For more information and examples showing actual results, refer to Section 7 of the "AGARIS User's Guide".

8. Errors

To reduce the likelihood of errors, CORY will not allow sawing parameters that violate certain limits to be entered. For example, if a cutting length of zero or less is entered, CORY will repeatedly prompt the user for the same parameter until a reasonable value is entered. The limits are not overly restrictive and exist primarily to prevent the user from making obvious errors. The user also should be aware of the following two error messages that may be reported.

ERROR: Reading options file.

This error message will sometimes occur if CORY is run after having been interrupted during a previous run.

To recover from this error, erase the file LUT.COR from the subdirectory that contains the CORY program.

To avoid this error, do not interrupt CORY before selecting the board data file to be analyzed.

ERROR: Logic error, report it to program's designers.

This error message is unlikely, but may occur if CORY encounters an unusual and unforeseen circumstance while processing a board.

To recover from this error, the user will have to remove the offending board from the board-data file.

Please record the sawing parameters used and the board data that caused the error, and report it to:

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Forest Research Lab #105
Corvallis, OR 97331-7402

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E-mail: brunnerc@frl.orst.edu

Literature Cited

Gatchell, Charles J.; Weidenbeck, Janice K.; Walker, Elizabeth S. 1992. **1992 data bank for red oak lumber**. Res. Pap NE-669. Radnor PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 47p.

National Hardwood Lumber Association. 1990. **Rules for the measurement and inspection of hardwood and cypress lumber**. Memphis, TN: National Hardwood Lumber Association

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