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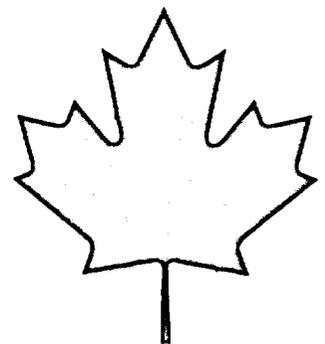
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Market Studies of United States

no. 15

Canadian Forestry Machinery and Equipment
in the Southeastern United States





Sandwell

REPORT G5176/1
DATE: 23 AUGUST 1982

DEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA, ONTARIO

MARKET STUDY
CANADIAN FORESTRY MACHINERY & EQUIPMENT
IN THE SOUTHEASTERN UNITED STATES

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SUMMARY

1. The Department of External Affairs, Ottawa, Ontario commissioned Sandwell International Incorporated to conduct a marketing study of forestry machinery and equipment in the southeastern United States to determine potential markets for Canadian manufactured equipment.
2. The availability for harvesting of large volumes of southern pine timber and its rapid regeneration rate have attracted the forest products industry to the southeastern United States. This area should sustain continual industry growth until the year 2000.
3. High taxation rates on timberlands and ownership speculating in timber values have changed the character of typical timberland ownership in the last ten (10) years. The typical landowner now employs intensive silvicultural management practices, such as pre-commercial and commercial thinnings, pruning, and artificial regeneration with genetically superior trees, in order to maximize the yield and quality of their timber. These silvicultural methods have generated a need for small, highly mobile, multi-purpose harvesting machines.
4. Harvesting methods have also changed in the last ten years because of the lack of available personnel, the high costs of labor, and the desirability of higher production rates. Timber is now being harvested as whole stems and transported to a log processing area to select the maximum yield of each stem. The average diameter of a harvested tree has decreased because new technology has made practical the utilization of smaller sized trees and because present silvicultural methods produce more smaller trees.
5. The stumpage costs for southern pine timber are expected to increase significantly during the next ten (10) years. The combination of smaller trees, high labor costs, and increasing stumpage costs will affect the harvesting equipment selection. Smaller mobile equipment with shearing devices, accumulation attachments, and other labor saving devices will be required. Conversion equipment must be capable of processing small logs at higher speeds and convert, more efficiently, timber with more taper.
6. No reasons were found why Canadian manufactured forestry machinery and equipment could not obtain an increased market share in the southeastern United States. While there are no import quotas on machinery or equipment, there is a duty assessment on some classifications. The favorable exchange rate between the Canadian and American currency will more than pay for the duty assessment where it is applied.



The type of machinery that will be promoted must be compatible with the climate conditions in the south - hot and humid weather - and environmental conditions - sandy and rocky soil with possible slopes up to twenty (20) degrees. The caliber of maintenance on the machinery and equipment is below that normally experienced in Canada. The equipment should be rugged, capable of unintentional abuse, and easily serviceable. The only specialized equipment design requirements are restrictions on equipment noise levels, the requirement for mobile equipment to have rollover protection, and approved spark arrestors on the exhaust system. It is significant that several manufacturers said the markets for logging and harvesting equipment have remained good this last year despite the general recession.

7. The primary factors that affect the sale of equipment and machinery in descending order of precedence are: proven performance on southern pine and in southern forests, price, reliability, and the manufacturer's support after the sale. To overcome the problem of proven performance, Canadian manufacturers should participate in dynamic demonstrations organized by certain forestry schools and state forestry commissions throughout the study area. This should allow potential purchasers to operate the machinery, or at least see it perform. Another possibility is to organize a cooperative effort with forestry schools and vocational schools that manage their own forests and that train equipment operators. These schools will test equipment for the manufacturer and demonstrate them for local individuals. All of these methods provide direct contact with potential clients.

Participation in major equipment shows has limited value due to the large population attending, the limitation of dynamic demonstration, and the difficulties of reaching the decision making individual. Advertising in trade magazines is even more ineffective for reaching clients.

A relatively unused marketing technique that can be highly effective is to submit subject matter concerning new technology and new installations to trade magazines for use as feature articles. The magazines are constantly looking for articles and this exposure is free.

8. The introduction and sales of the new technology electronic scanning and control devices for sawmill equipment require special marketing techniques. The majority of the sawmill owners and managers are skeptical of new electronic equipment because they do not have the personnel to maintain the equipment. Current equipment has no provision for testing control devices against a standard. Quality control programs in sawmills have received renewed emphasis. Sawmill managers and owners are regularly attending industry seminars during which new devices and processes are discussed. Manufacturers that desire penetration of this market should participate in these seminars and demonstrate the flexibility of the control devices, the ease of troubleshooting, and the ability to modify programs.



9. Although the population of potential purchasers of forestry machinery and equipment is very large, the size can be reduced for successful promotions by limiting marketing to those persons who can make purchasing decisions. Since the majority of the forest products corporations do not maintain company logging crews, the marketing efforts should be directed to the independent contract loggers. The American Pulpwood Association and the various state forestry commissions will provide names and addresses of the contract loggers. The primary target for log and lumber processing equipment is the owners, managers, and plant engineers of the sawmill operations. A list of these is included in this report. A secondary potential are executives at the corporate level of large forest products companies who are responsible for multiple operations.



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INTRODUCTION

Sandwell International Incorporated was commissioned by the Department of External Affairs, Ottawa, Ontario to conduct a marketing study of Canadian Forestry Machinery and Equipment in the southeastern United States. The physical boundaries for the study were established as the twelve (12) state Southern Pine distribution area, essentially the states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

The objective of the marketing study was to identify market potentials within the identified study area for Canadian Forestry Machinery and Equipment and to recommend marketing and promotional methods for those items for which a market potential existed. Sandwell not only considered the existing markets for competitive equipment, but also those that are in the process of developing or that could develop due to governmental regulations, changes in silvicultural practices, and market revisions within the forest products industry. During the course of the study, it became apparent that these various external factors will create markets for modified designs of existing equipment and new technology. Canadian Manufacturers who can respond to these developing needs will obtain a proportionate share of these emerging markets. The stress of the report, however, was to determine marketing potential for current machinery and design.

The study was conducted in the following manner. The Department of External Affairs, provided Sandwell with a list of Canadian forestry equipment manufacturers and requested that the manufacturers send Sandwell promotional literature on their range of products manufactured. This equipment information was utilized as the basis for determining the possible penetration into existing markets. Secondly, state and federal forestry organizations and corporate management were interviewed to determine trends in the forest products industry as they relate to equipment design and equipment purchasing. The corporate personnel were asked to identify the desirable features of current equipment and the sales techniques that were most effective to them and that would influence them to purchase equipment either of existing or of new technology. They were also asked what type of equipment that is not currently available which will be needed to service future requirements due to anticipated trends in the industry. Finally, several U.S. forestry equipment manufacturers were interviewed to identify the sales techniques that they found most effective and to obtain any comments about competitive Canadian products. This group also included several types of advertising media.



During the conduct of the study, it became evident that a single best marketing approach for all types of forestry equipment does not exist. Rather, certain groups of equipment should be marketed to individuals who have the authority to make or at least influence purchasing decisions. For instance, most major timber holding and consuming corporations, for reasons to be discussed later in the Logging Equipment section, have completely discontinued company logging and, instead, utilize contract loggers. Although there usually exists a corporate timber and logging manager, he can only recommend the purchase of a particular piece of equipment to the contract logger. Therefore, for harvesting equipment such as skidders, feller/bunchers, etc., the marketing approach must be made to a large number of owners and operators of contract logging companies. Conversely, sawmill equipment, particularly components that stand alone such as headrigs, edgers, etc. should be marketed directly through sawmill owners and to consulting engineering firms. The details of these marketing recommendations and actual client identification is discussed in the equipment sections.

It is important for any Canadian manufacturer of forestry equipment that desires to sell their products in the southeastern United States to understand the unique nature of this marketing area, particularly the major differences in the timber resources and labor force from the Canadian and western United States areas. The forests of the southeast generally contain trees of smaller diameter and greater density per acre than other areas. The trees are fast growing and because of widely ranging site quality, the wood is extremely variable in fiber density. The trees are more crooked and have more limbs than other sections of the United States and Canada and tend to be vine covered. The forests are generally accessible to existing roads which eliminates the enormous costs of logging road construction and requires different equipment for log removal. Although stumpage costs have lagged behind other areas of the country, recent trends have reversed this condition which will change the harvesting practices of most firms. The labor force which will operate and maintain the forest equipment is distinctive. Their background is mainly agrarian which tends to result in poorer preventative maintenance and operator abuse or, at least, unintentional overloading of equipment. These factors require equipment design that is heavier than normal practice and as maintenance free as possible. For instance, the air cooled diesel engine is normally a selling point because of its operating efficiency and lower fuel costs compared to conventional diesels. Most southern operators however, resist the air cooled engine because of the potential fire hazard from material that adheres to the engine block and which can ignite if not regularly cleaned off. The climate is hot and extremely humid which requires oversize cooling system design. All these general factors must be considered in order to make a successful market penetration.

FOREST RESOURCES REVIEW

Although the timber growing stock is generally evenly distributed across the United States, recent expansion of the forest products industry has been concentrated in the southern states. The principal reason for this trend has been the availability of commercial species, particularly southern pine, and new technology which permits economical and functional utilization of small diameter, fast growing trees. Table 1 shows the distribution of growing stock in 1979. Although the western forests have seventy (70) percent of the U. S. softwood inventory, the majority of the western forests are controlled by states and the federal government as parks, recreational areas, and wilderness areas and are not available for commercial harvesting. Other distinct disadvantages of western wood products facilities compared to the south are the higher labor costs, higher stumpage costs, poorer accessibility to the wood base, and the distance that finished products must be hauled to the primary wood products consumption centers - the eastern United States. The harvest of timber in the south has been projected to increase by eighty (80) percent over the next fifty (50) years.

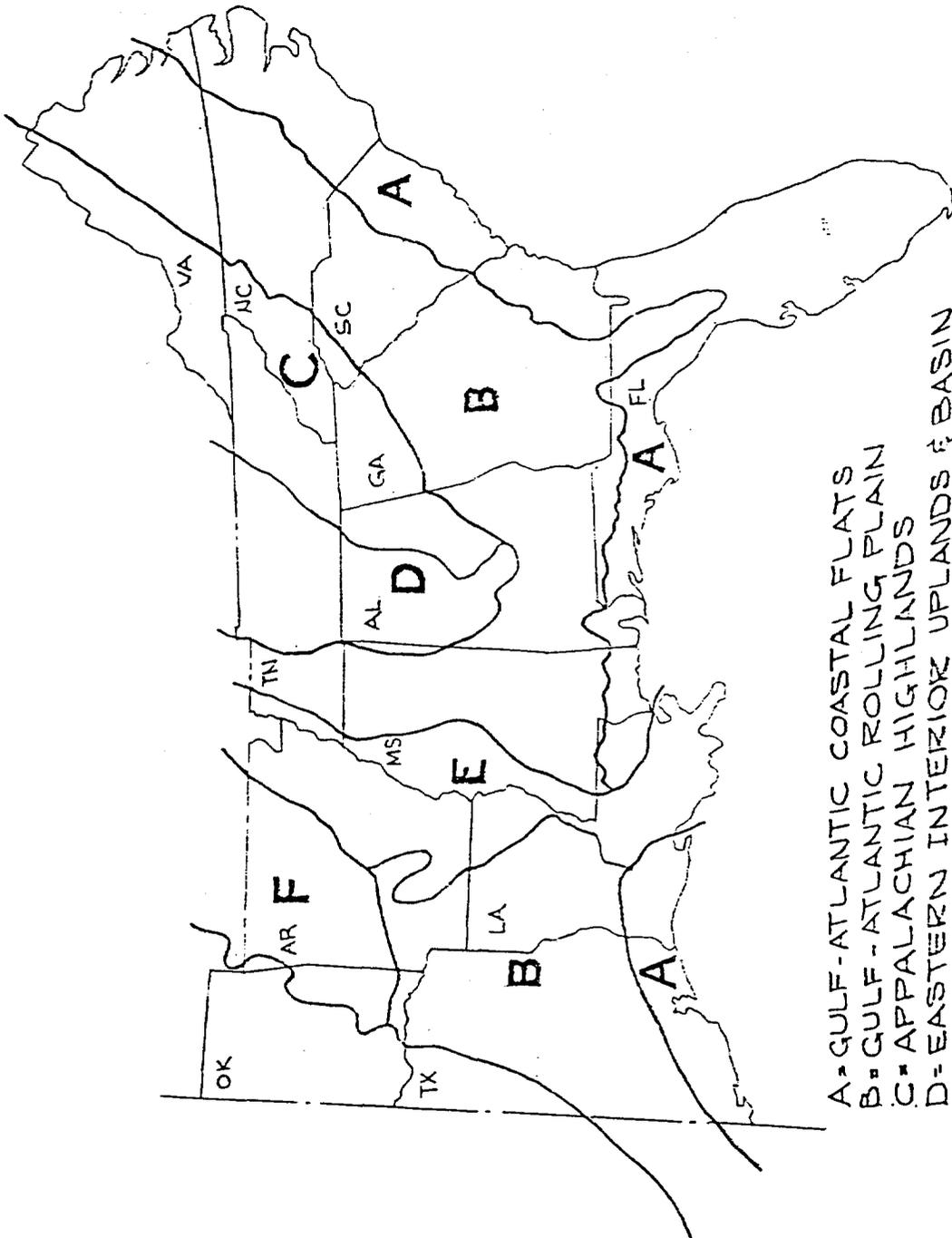
Table 1 - Distribution of U.S. Timber Growing Stock (1979)
in Billions of Cubic Feet¹

<u>Section</u>	<u>All Species</u>	<u>Softwoods</u>	<u>Hardwoods</u>
North	176	46	130
South	203	100	103
Rocky Mountain	100	90	10
Pacific Coast	<u>236</u>	<u>201</u>	<u>35</u>
Total	<u>715</u>	<u>437</u>	<u>278</u>

Species Distribution

Figure 1 is a physiographic representation of the study's geographic area and shows the wide range of topographical conditions across which the timber base is distributed. The biosphere of natural succession is for natural stands particularly on poor site index to revert to mixed hardwoods. Because of aggressive artificial regeneration policies and intensive silvicultural management over the last thirty (30) years, the southern forest instead is nearly evenly distributed between hardwoods and softwoods.

¹ U. S. Department of Agriculture, Forest Service, Survey of Forest Resources.



- A - GULF-ATLANTIC COASTAL FLATS
- B - GULF-ATLANTIC ROLLING PLAIN
- C - APPALACHIAN HIGHLANDS
- D - EASTERN INTERIOR UPLANDS & BASIN
- E - LOWER MISSISSIPPI ALLUVIAL PLAIN
- F - OZARK-QUACHITA HIGHLANDS

APPROVED

FIGURE 1
PHYSIOGRAPHIC REGIONS

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Of the softwood growing volume, four (4) species of southern pine predominate both in growth and in harvest. Loblolly Pine (Pinus taeda) makes up sixty (60) percent of the softwood inventory because it is tolerant to nearly all site conditions and is genetically preferable for growth rate, fiber length and suitability for conversion to lumber and veneer. Shortleaf Pine (Pinus echinata) is the second most widely distributed pine because of the compatibility with multiple site conditions. It generally is not utilized for reforestation because of its poor form and high pitch content. The volume of these two pine species is estimated to be fifty-seven million acres. The other two commercial species are Longleaf Pine (Pinus palustris) and Slash Pine (Pinus elliottii) which are generally confined to coastal areas and make up about twenty-five million acres.

Although the hardwood volume in the southern states is considerable, the hardwood timber harvest is quite low and therefore not a significant factor in the forestry equipment market. In certain localized areas specific hardwoods are selectively cut for lumber. There has been a slight increase in the harvest of hardwoods for pulpwood.

Timber Ownership Identification

The four primary sources of wood fiber in the United States, excluding imports, are the National Forests, other public forests, industrially owned lands, and private non-commercial landowners. Table 2 shows the distribution of ownership of commercial forests in 1979, as compiled by the U.S. Forest Service. The large volume of commercial forests contained in the National Forests and other public forests is misleading because only a portion of this timber volume is available for harvesting due to restrictions of volume and dedication of large areas for recreational purposes and wilderness areas. Table 3 is a summary of the reported commercial landholding of the nine largest industrial corporations. The significant feature of this table is that International Paper, the largest forest land owner in the United States, only owns approximately 1.5% of the commercial forest area. Most corporations also purchase timber cutting rights on additional land to expand their fee base. For instance, International Paper is reported to have cutting rights on an additional 1.5 million acres.

Table 2 - Distribution of Ownership of U.S. Commercial Forests (1979)
in Millions of Acres

<u>Type of Ownership</u>	<u>Acreage</u>	<u>Percent Contribution of Annual Timber Supply</u>
National Forests	89	15
Other Federal and Public Lands	47	5
Industrially Owned Lands	68	30
Other Private	<u>283</u>	50
Total	<u>487</u>	

Table 3 - Timberland Ownership of Major U.S. Forest
Products Companies (1980) in Millions of Acres

<u>Company</u>	<u>Acreage</u>
International Paper	7.1
Weyerhaeuser Company	5.9
Georgia Pacific	4.1
St. Regis	3.2
Champion International	3.0
Scott Paper	1.8
Great Northern	2.7
Boise Cascade	2.6
Crown-Zellerbach	<u>1.7</u>
Total	<u>32.1</u>

In the last ten years, the total area of commercial forests in the southeastern states has increased by less than one (1) percent. Demand for agricultural land and residential housing has more than kept pace with the conversion of land to forest plantations or natural regeneration. There has however been a significant change in the character of the forest ownership. The rate at which forest products corporations have purchased land has decreased over the last five (5) years because the cost of land has increased to approximate the value as agricultural land. The trend in new ownership has come instead from investment seeking groups such as banktrusts, private investment groups, and foreign interests. In 1980, the U. S. Department of Agriculture reported that approximately three (3) percent of all privately held agricultural land in the U.S. is in Georgia, South Carolina, and Alabama. In Georgia the volume of land owned by foreign interests is now equal to that of any one of the three (3) largest land-owning timber corporations - Union Camp Corporation, Georgia Kraft Corporation, or Continental Can Corporation. This change of ownership affects the type of silvicultural management and the availability of timber/fiber resources to the market.

Another influence on the timber supply by the type of forest land ownership is that approximately forty-eight (48) percent of the private non-industrial forest owners do not operate their forest lands primarily for timber production. Of the remaining fifty-two (52) percent, a little more than one-half are able or willing to perform basic silvicultural practices. The reasons that private non-industrial forest landowners do not utilize proper development and management practices on their land is generally lack of funding and the need for more favorable property taxation for timber producing land. In Georgia, as in most of the survey states, the forest land is taxed at a base rate on a county basis and then an ad valorem tax is added by the state based on the age and condition of the tree crop. This results in a widely ranging tax rate per acre which in Georgia is from \$0.34 to \$19.10 per acre.



Silvicultural and Harvesting Trends

In the last twenty years, softwood inventory in the southeastern U.S. has increased by two hundred billion board feet. Present harvest rates for softwood sawtimber exceed the growth rate by five (5) percent and it is projected that harvest rates (or at least demand) will rise by eighty (80) percent over the next fifty (50) years.¹ The majority of current average timber growth levels in the southeast is only one-half that of fully stocked natural stands and well below production from plantations maintained with modern silvicultural techniques and genetically improved trees. The forest products companies and other enlightened forest landowners have recognized these facts and have changed their forest management techniques which in turn will create increased demand for forestry equipment.

New management practices will include fertilization, plantations with close spacing, and early thinning followed by several commercial thinnings. Maximum fiber yield per acre is becoming a major consideration due to the high costs of land and the desire to maximize yield. In every state except Mississippi there has been a major conversion from shortwood to tree length harvesting. In some cases, the limbs and tops are mechanically crushed and transported with the commercial portions of the stem into the mill's woodyards for processing as fuel. Over eighty (80) percent of the harvesting is by mechanical shear rather than by chainsaw, except in Mississippi. This is due to the decreasing availability of labor, the extremely high cost of Workmen's Compensation to maintain harvesting crews, and the better efficiency of mechanical harvesting methods. Technology advances have now allowed the utilization of smaller diameter logs for conversion to lumber and plywood. Therefore, harvesting equipment is required to operate in forests that are closely spaced with little maneuvering room, and to process small diameter trees at faster rates to achieve higher output levels. This trend will force modification of existing equipment design to produce miniature skidders and harvesters with multi-purpose attachments that are highly maneuverable and which will not damage the remaining trees during successive thinning operations.

Each forest products company has a unique harvesting philosophy based on the intended end-use of the timber resources so it is difficult to identify overall trends in crop rotation. Corporations such as Union Camp, Georgia Kraft, and Alabama Kraft which are paper oriented, tend to use a philosophy of maximum fiber yield per acre which results in one (1) commercial thinning at age fifteen (15), and clearcutting at age thirty (30). Multi-product corporations such as Georgia Pacific and International Paper manage their timber lands to produce plywood and sawtimber quality trees. Their typical rotation is pre-commercial thinning at age ten (10), and commercial thinnings at ages twenty (20) and thirty (30) and clearcutting at age seventy-five (75). The operations of pre-commercial thinning and extension of the ultimate stand age at final harvest from sixty (60) to seventy-five (75) years are identified recent trends. Firms such as bank trusts and other private ownership tend to operate more like the multi-product forest industry firms.

¹ "Timber Demand: The Future is Now", Forest Products Research Society.
P. 80-29.



The yield of timber per acre is improved in grade and diameter from thinning operations. For fiber yield to be increased at the same time, harvesting and conversion methods for small diameter trees removed during thinning are required. The concern for overall recovery has produced a demand for harvesting equipment that can efficiently collect large volumes of small trees and conversion facilities such as small chippers to convert the fiber to chips. This is forcing the logging contractor to handle multiple products. The cost of the additional equipment becomes a major factor.

The U.S. Forest Service has analyzed the end uses for timber harvests in the southeast and made projections of future trends. Table 4 is the analysis of the average breakdown of 1980 harvests for both the softwoods and hardwoods. The reader should be cautioned that this is an average for twelve (12) states and could vary significantly for specific local geographic areas. Even though the current recession has distorted produce demand, the eventual return to a normal economy is expected to increase the percentage demand for plywood veneer logs to thirty-five (35) percent of the softwood timber harvest. Lumber demand is predicted to remain at twenty-seven (27) percent because the volume of lumber per housing unit will decline and offset increasing demand. Pulpwood demand is predicted to increase at the rate of one (1) percent per year, until economics allocates to which end-use the fiber resource goes. As softwood stumpage costs and softwood pulpwood prices increase, the utilization of hardwood for pulp will increase.

Table 4 - Analysis of 1980 Pine and Hardwood Harvest ¹

End-use	Percent Consumption	
	Pine	Hardwoods
Sawlogs	27	54
Veneer Logs	28	2
Pulpwood	42	44
Other	3	-

Since the advent of the 1973 oil embargo, the United States rediscovered wood energy. At the present time, it is estimated that two (2) percent of the nation's energy requirement is now supplied by some kind of wood energy. Forest products companies have lead the way producing internally nearly fifty (50) percent of the energy they consume. Table 5 shows the relationship of wood and bark to the main stem wood of plantation grown southern pine. The significance of this table is that from 33 to 112 pounds of wood and bark are potentially available for fuel from each 6 to 12 inch dbh pine tree. This volume does not take into consideration cull and diseased trees normally left in the woods. Present harvesting methods are to utilize a limbing gate to physically remove the branches by crushing. If these branches and tops from the merchantable timber could be processed in a small woods chipper, the value as fuel could significantly improve the land owner's yield.

¹ Complete Tree Utilization of Southern Pine, Proceedings of Symposium, New Orleans.



Table 5 - Proportions of Wood, Bark, and Needles
in Plantation Grown Loblolly Pine¹

Distribution of Wood, Bark, & Needles in Percent

<u>dbh</u>	<u>Total Tree*</u> <u>Dry Weight (lbs)</u>	<u>Wood</u>		<u>Bark & Needles</u>		
		<u>Main</u>	<u>Branches</u>	<u>Main</u>	<u>Branches</u>	<u>Needles</u>
		<u>Stem</u>		<u>Stem</u>		
6	147	50	19	8	4	4
8	337	57	13	8	4	5
10	565	59	11	7	4	6
12	887	60	10	7	4	5

* Includes Roots

Another source of fuel is the brush and undergrowth which could be harvested at additional benefits rather than just fuel value. Logging wastes and brush harvesting would eliminate the need for brush control burning, foliage spraying, and portions of site preparation for additional savings.

¹ Southern Forest Experiment Station, Athens, Georgia.

LOGGING AND HARVESTING EQUIPMENT

History of Southern Logging

Logging in the southeastern states is in its infancy compared to the logging experience of the U.S. west coast and Canadian provinces. The terrain is more varied and the trees are generally smaller so the logging techniques have evolved through trial and error and communication of successful efforts from one operator to another.

The first piece of mechanized equipment introduced to the southern logging industry was the chainsaw which replaced handsaws and axes. Trees were felled and bucked in the woods and transported to yards by animal power. The development of the big stick loader mounted on a truck changed the entire transport concept and extended the range in which timber conversion facilities could operate. Farm tractors with winches replaced log transport by animals and in the early 1960's, the first skidders were developed. Shortly thereafter, the knuckle boom hydraulic loader was introduced and permitted log sorting as well as expedited truck loading. The gradual reduction of available wood crews and the need for higher production harvesting methods have resulted in the development of mechanical harvesting machines. These machines generally have hydraulic shearing devices for cutting the trees at ground level and directional felling devices. More sophisticated equipment has become available which have tree accumulating devices in the shear (feller-bunchers), or accumulating carriages (feller-forwarders), and mechanical delimiting devices.

In the south, shearing devices have replaced up to eighty (80) percent of the traditional chainsaw harvesting. The only state that reported less than fifty (50) percent replacement was Mississippi. The large mechanized harvesters have had a limited acceptance from southern loggers because the typical contractor does not have the capital to purchase equipment of this nature, and the density of the forests does not facilitate the utilization of large size equipment unless clear-cutting mature stands. Large corporations such as Weyerhaeuser and Georgia-Pacific have been the only markets for the larger machines and have used them extensively in Oklahoma and Arkansas.

Description of Logging Methods

Logging methods and the resulting demand for harvesting equipment are dependent upon the desired end-use for the timber, terrain, accessibility of the timber, and size of the trees to be harvested.

The trend has been to change from bucking logs in the woods to conventional dimension lumber lengths, or four (4) or five (5) foot lengths for pulpwood, to retaining whole tree lengths up to fifty-four (54) feet. The breakdown of the tree length stems is then done at a remote site where the logs can be merchandised to the highest yield. Tree length hauling also has the advantage of lower transportation costs.



As shown in Figure 1, the terrain in the study area varies from swamp land to mountainous areas. The prevailing timber site is on sandy-clay soil with a gently rolling profile up to twenty (20) degrees. Traction is only a problem after prolonged rainy spells. The logging applications in swampy or mountainous areas are so specialized and low in volume that specific machinery marketing cannot be justified. The majority of the mobile vehicles sold in the south have high flotation rubber tires because traction in the woods is generally good and there is not much environmental pressure for erosion control and prevention of stream pollution. Tracked vehicles have high maintenance costs due to excessive track wear in the sandy soils and poor track service because of rocks and stumps. Generally tracked vehicles are only utilized in swamps or where alternate strips of solid land and bogs must be crossed.

The typical logging system in the south is to fell the trees by either shearing or with power chainsaw depending on the size of the trees. The largest popular size shear can handle a twenty (20) inch diameter tree but requires a vehicle of relatively large capacity. The smaller mobile fellers are limited to a ten (10) to twelve (12) inch diameter maximum shear. The trees are delimited either with saws or by pushing the trees through a delimiting gate. Not one of the logging contractors contacted during this study had a mechanical delimitter or could foresee the need for such an attachment. The branches of all the southern pines fracture easily in a delimiting gate, and this system is considerable cheaper than a separate attachment.

Feller-bunchers are particularly applicable for harvesting plantation timber since the trees tend to be uniform in size, distributed evenly, and generally of the same species.

Thinning has become a major silvicultural practice for increasing the quality of final harvest and can also increase the cubic yield if the immature trees are collected and utilized. Several thinning methods are practiced depending on the desired results but care must be exercised when thinning with mobile equipment to ensure that the remaining trees are not damaged during the thinning operation. The most common thinning method is row thinning where entire rows of a stand are removed. This method can tolerate fairly large shearing machines and skidders because maneuverability is not required. A combination of row and random thinning creates serious demands on equipment selection, as the mobile equipment must remove one row and also randomly cut trees from rows on either side. Small, highly maneuverable machines are necessary for this thinning method which is generally used for the second commercial thinning of a stand.

Profile of Logging Contractors

There are two general types of logging contractors - corporate harvesting crews and independent contract loggers. Most corporations have discontinued company logging operations except for specialized logging areas such as in swamps or other environmentally sensitive areas and where there are insufficient independent loggers. Logging in swamps and mountainous areas requires specialized equipment, usually expensive, which the independent logger is unwilling or unable to purchase. Corporations also justify small logging divisions for research and development purposes to test new harvesting equipment and to evaluate current logging costs in order to deal with the contract loggers. Of the major timber holding companies operating in the study area, Weyerhaeuser Company, Union Camp Corporation, and Hiwassee Land Company maintain the largest corporate logging divisions and tend to purchase the more mechanical and larger harvesting equipment. Each corporation generally has one knowledgeable person who has the authority to purchase equipment or who deals directly with his corporation's independent loggers and can influence their purchase of equipment. A list of those identified during interviews is included in Appendix 2 of this report. Marketing efforts, to be effective, must reach these individuals.

The two main reasons corporations have employed increasing numbers of contract loggers are the reduced numbers of individuals who are willing to work in the woods and the extremely high cost of Workman's Compensation Insurance. Table 6 is a summary of Workman's Compensation Rates by states for Logging and Lumbering Workers. Texas actually reduced rates intentionally to encourage employment.

Table 6 - Summary of Workers' Compensation Insurance Rates by
State for Logging and Lumbering Workers
(\$ per \$100 of Payroll)¹

<u>State</u>	<u>1974</u>	<u>1978</u>	<u>1980</u>
Alabama	\$ 9.37	\$10.52	\$12.42
Arkansas	15.26	18.26	22.00
Florida	13.60	32.59	27.69
Georgia	13.52	16.10	22.16
Louisiana	29.90	39.68	52.10
Mississippi	23.24	34.59	44.36
North Carolina	10.47	16.54	28.59
Oklahoma	26.34	32.26	53.35
South Carolina	9.23	16.03	22.29
Tennessee	14.08	19.61	17.43
Texas	27.06	41.90	14.98
Virginia	8.86	15.37	23.69

The American Pulpwood Association conducted a survey of Southern pulpwood producers in 1981 and came up with the following profile which is significant when determining marketing approaches. The survey purposely excluded high volume producers with multi-product capability when pulpwood made up less than fifty (50) percent of the company's total output.

¹ American Pulpwood Association Technical Release, 81-R-9.



According to the survey, the average southern pulpwood contractor employs 2.6 employees not including the owner and operates one shift crew. Seventy-five (75) percent of the contractors deliver to a single market; however, they are highly mobile and are willing to shift to alternate consumers based on price and other considerations. The average weekly output was fifty-two (52) cords per week, although the range was five to eight hundred cords depending on the degree of mechanization. Fifty (50) percent of the operators surveyed produced less than twenty-five (25) cords per week. The states of Louisiana, Mississippi, and Texas had the lowest output per manweek which correlates with their high degree of manual harvesting technology. It is also significant that less than twenty (20) percent of the producers were capable of delivering long wood. A significant harvesting factor throughout the study area were the farmers who maintained small timber plots. These operators are highly seasonal, working only after the traditional agricultural season, and utilizing farm equipment dually as timber harvesting equipment. They provide a significant market potential for attachments to conventional farm equipment.

Specialized logging contractors or multi-disciplinary contractors often tend to be larger in size than the pulpwood contractor and to be more mechanized. The average of the logging contractors interviewed by Sandwell during the course of this study operated approximately \$250,000 worth of equipment consisting of two (2) skidders, a knuckle boom loader, and two (2) road quality truck and trailers.

Several sources concurred that the average contractor was forty-two (42) years old with almost nine (9) years of education and has been in the business approximately twelve (12) years. An interesting trend however was that producers of four hundred (400) or more cords of pulpwood or timber per week were generally older and had more education, and had been in the business the least amount of time.

There is no single source for identifying all the independent logging companies that make up the market potential for log harvesting equipment. The American Pulpwood Association, Washington, D.C., will, for a fee, supply their directory of members. The State Forestry Commissions maintain a more complete registry of logging contractors and will generally supply such documentation to inquirers at little cost. These state inventories are generally quite extensive, describing the operations in detail and listed approximately fifty (50) percent more operations than the American Pulpwood Association directory. Another useful source of logging contractors is the Directory of the Forest Products Industry, published annually by Miller Freeman Publications. This directory emphasizes large logging contractors and corporate logging groups. A summary of these various state forestry commissions is listed in Appendix 3.

Types of Logging Equipment

The actual forestry machinery utilized in an operation is usually a compromise between what is silviculturally desired, what is operationally feasible, and what machines the contractor has available. The equipment that a contractor will purchase is influenced by the type of logging operations in which the contractor intends to participate. The following is a description of the logging equipment that is currently being sold in the southeastern states.



The actual sales volumes of various forestry machinery is difficult to establish due to the proprietary nature of the information. Two (2) equipment surveys will be referenced in this study and although they do not agree in quantities, the trends are the same. The variance is apparently due to the sampling medium. The first reference is the "1980 Pulpwood Producers Census - Southwest and Southeast Technical Divisions, American Pulpwood Association." This census sampled the responses of six thousand association members but did not include high volume contractors who produce less than fifty (50) percent pulpwood. The second inventory is the "Statistical Review of Forest Machinery Sales" which is published by the Farm and Industrial Equipment Institute. The data source for this document is supplied by equipment manufacturers and the accuracy is affected by the reported sales information from only a portion of the total manufacturers who are members of the institute.

- a. Feller-Bunchers. The function of a feller-buncher is to grasp a single tree, shear it at ground level, accumulate a number of sheared trees, and then lower them to the ground in a bunch. Smaller sized machines in this category may have only the shearing head and no accumulation feature. The shearing head and feller-buncher head is normally fitted to a conventional prime mover.

The most popular type of prime mover is a front end loader chassis with four (4) wheel drive, rubber tired, and with articulated frame steering. It is normally powered by a diesel engine in the sixty (60) to one hundred seventy-five (175) horsepower range. The price range is from \$60,000 to \$125,000. These machines have a relatively fast ground speed, are reasonably maneuverable, and are ideally suited for clear-cutting operations on flat ground. They are generally too large for thinning and relatively unstable on steep terrain. The stability can be improved by adding a knuckle boom attachment, however this option increases the machine cost by \$50,000 which makes it non-competitive.

A second type of prime mover, and less popular, is a tracked crawler loader with independent track drive. It is usually powered by a diesel engine in the forty (40) to eighty (80) horsepower range. The approximate price range is \$60,000 to \$100,000. This machine has low ground pressure and is relatively stable which make it ideally suited for soft soil conditions or operations on steep terrain. It has a very slow ground speed and high maintenance cost due to track wear.

A recent introduction has been a smaller chassis, rubber tired prime mover sometimes fitted with tracks over the wheels. The machines have independent wheel drives to make them highly maneuverable. They are usually diesel powered in the thirty (30) to fifty (50) horsepower range. The machines were specifically developed for thinning operations. The price range is from \$40,000 to \$90,000. They are very narrow and maneuverable and ideal for flat terrain. Their instability on steep terrain is a definite disadvantage. The two recognized manufacturers of these machines are Mor-Bell (South African design and marketed by Morbark Industries) and Makeri (Finnish design by Makeri Oy and marketed by Forrex, Incorporated). These machines received the largest amount of interest at recent equipment shows and demonstrations.



- b. Skidders. Skidders are used to transport felled trees singly or in bunches to a landing. When a gate type delimeter is being used, the skidder will push the trees through the gate to break off the limbs by fracturing. Skidders are subjected to the severest service and the most operator abuse of all forest machinery. They operate over rough skid trails at the highest possible speeds transmitting tremendous stress to the machine components. The constant environment of dust and various debris combined with the usual oil leaks increases the risk of engine fires and makes insurance coverage for skidders the highest of all forestry equipment.

The typical skidder is a four wheel drive, rubber tired machine with articulated frame steering and is powered by a seventy (70) to two hundred (200) horsepower diesel engine. The machines come in various sizes so they are suitable for all types of harvesting operations and most terrains. The machines can cause ground damage in soft or wet soil conditions but can be fitted with low ground pressure tires to overcome these specific conditions. Per the APA report, rubber tired skidders make up seventy-seven (77) percent of all skidders in operation.

Tracked crawler-type skidders make up less than three (3) percent of operating machines due to their slow ground speed and expensive track maintenance costs. They are generally utilized only for specialized soil conditions.

A third type of skidder is a two-wheel drive farm or industrial tractor fitted with a skidding attachment. The machines are normally diesel powered (fifty (50) to one hundred (100) horsepower) and are priced from \$15,000 to \$35,000 for the complete tractor and skidding attachment. The attachment can be purchased separately and utilized on an existing tractor. This provides the farmer the opportunity to expand the utilization of his farm equipment during the non-agricultural seasons. The low cost of this equipment makes it attractive to small landholders as well as farmers for harvesting on a small scale. APA estimates that eighteen (18) percent of the operating skidders are of this type.

Another type which is used primarily in swampy areas is the low ground pressure (less than 4 psi) tracked vehicle. These machines are equipped with gasoline or diesel powered engines in the range of one hundred fifty (150) to two hundred fifty (250) horsepower and are priced from \$60,000 to \$175,000. The initial cost and the cost of track and undercarriage maintenance makes them prohibitive for other than specialty logging.

Skidders are equipped with either of two types of log transport equipment. Approximately two-thirds of the existing skidders have a cable winch powered by a power take-off. Chokers are set on the various logs to be skidded and the logs are winched to the stationary skidder. Because of smaller logs, speed of operation, and compatibility of handling log stacks produced by feller-bunchers, there has been a trend to convert to hydraulic grapples instead of cable winches. The standard hydraulic grapple has been the scissor type with dual hydraulic cylinders.



- c. Loaders. The traditional big stick loaders are gradually being replaced by knuckle boom loaders particularly as more and more contractors convert to whole tree logging. The market for knuckle boom loaders is extremely competitive with most suppliers offering identical features. The main difference appears to be reliability and serviceability.
- d. Portable Slashers. Portable pulpwood slashers have been developed for high volume pulpwood operations. These machines are equipped with circular or chain saws to buck whole tree stems to pulpwood lengths. Generally the units are equipped with an adjustable even-ending device and backstop and a knuckle boom loader for feeding stems and stacking/loading pulpwood. This type unit only appeals to the large volume, well-capitalized contractors because of their high initial cost and requirement for a large number of skidders to keep the slasher operating at capacity.
- e. Delimbers. Because of the brittleness of the southern pine wood, removal of the limbs from small diameter trees is normally accomplished by pushing the stems through a delimiting gate. This method produces satisfactory results and is inexpensive. Delimiting of larger trees is normally accomplished with chainsaws. The additional cost to install a mechanical delimiting device on mechanical harvesters has not been justified and there has been little marketing success.
- f. Logging and Pulpwood Trucks. The rapid increase in fuel costs due to the 1973 oil embargo has caused a trend to convert from single axle gasoline powered trucks to larger diesel tractors and trailers. The APA study reported that seventy percent of the logging contractors are currently utilizing diesel rigs. Of the remaining gasoline operating rigs, eighty (80) percent are over six (6) years old. As the tree length harvesting method becomes more popular, there will be more demand for large trailers and diesel tractors.

There is considerable interest in live-floor transport trailers for the hauling of multiple type products - wood chips, sawdust, hogged fuel, and bark. This type of self-unloading trailers will become increasingly important for transporting residual materials that will be chipped for fuel in the woods and unloading at woodyards that either do not have a separate fuel truck unloading facility or have an already congested receiving facility.

Future Logging and Harvesting Equipment Design Considerations

The interviews of logging contractors and corporate executives conducted during this study indicated that existing equipment design will not meet the future requirements for log harvesting. As plantation grown trees and multiple thinning operations become more established, there will be a demand for smaller, more maneuverable skidders and harvesting equipment. The units should be multi-purpose with interchangeable attachments. The units will be required to be faster and capable of operating on all terrains. The driving force will be small diesel engines. Cost will continue to be a major determinant so the future machines must be cost competitive as well as serviceable. A second type of machinery that will be required will be high speed tree planters that are capable of operating on various terrains.



Other design considerations that will become more important in the future will involve increased personnel and environmental protection. Standards for acceptable noise levels of operating machinery will be lowered developing a requirement for noise reduction in design of equipment. The requirement for the protection of plant life as well as reduction of the potential of stream pollution resulting from logging operations will result in changes in design particularly to low ground pressure equipment with improved wear-resistance. Finally, emission levels from all types of engines but particularly diesels will come under scrutiny and will require improved design.

The purchasers of logging equipment said the most important purchasing factor is the initial equipment cost. Design efforts should be made to reduce costs while increasing operating reliability.

MARKETING OF LOGGING MACHINERY

The current marketing of forest harvesting machinery has generally involved demonstrations at large census expositions, participation in specialized shows sponsored by organizations or the manufacturer's own company, advertising in various trade magazines, and client contact. Because of the large cross-section of potential clients, the sales efforts have been generalized. As described earlier, the majority of the corporations with large timber holding and timber consuming industries have converted to contract logging. There is generally a senior staff member who controls corporate equipment purchases and influences equipment selection of the contract loggers (See Appendix 2). These contract loggers are extremely varied in size and solvency and are a difficult market to cover completely. The final market group are farmers and small landholders who are again scattered and infrequent equipment purchasers.

The latter two market groups above are unique in the forest industry to their approaches to equipment selection and susceptibility to marketing techniques. The loggers and landholders generally have an agricultural background and traditionally have purchased equipment from local dealers because that is the way their fathers did. They are unwilling to experiment with a new design or technology because they do not have the capital to speculate. Every one of the contractors that were interviewed said they wanted to see or operate a piece of equipment in the woods generally on the type of terrain and in the category of forests where they would be utilized before they would buy a new machine. On the other hand, they had no concern about buying a duplication of their present equipment from their local dealer.

A second major factor is that the majority of these independent logging contractors work on a very small profit margin which makes operating time of their equipment extremely critical. They expect extensive dealer support of spare parts as well as light maintenance support. The majority of the contractors have no preventative maintenance program or even a service shop. The distance to the dealer support sites is critical as it was found that given a choice, contractors were unwilling to go even thirty (30) miles when another dealer was closer.



Identification of the market leaders for the various types of forestry machinery was difficult due to the lack of reliable statistics and the biased nature of the sampling. The Statistical Review from the Farm and Industrial Equipment Institute includes equipment sales by type for only those firms who are members and financially support the institute. The American Pulpwood Association statistics are also limited to member response. It is significant that even in today's recessive market, the estimate of skidder sales from these two sources and equipment manufacturers was 2,500 to 3,500 per year. The second interesting fact was that for specific geographic areas, a single dealer will totally dominate the market. Moving sixty (60) to one hundred (100) miles away, a dealer for a completely different equipment manufacturer could be the major force. No non-North American manufacturer was found to have obtained a significant portion of the forestry equipment market although there has been recent interest in the Finnish line of Makeri feller-bunchers and the Mor-Bell multi-purpose machines.

Evaluation of Current Marketing Methods

According to both equipment manufacturers and clients, the most effective marketing approach for forestry machinery is direct personal contact with prospective buyers. Since the majority of the market is the numerous small logging contractors, the best method of producing this client contract is for an equipment manufacturer to obtain an aggressive and strong dealer organization. The salesmen of these dealerships must have the local acceptance of the contractors and know their sales area. The dealers who were interviewed during this study were all willing to accept another line of attachments or equipment despite being already tied to another manufacturer. A list of equipment dealers in the study area is shown in Appendix 4. Any effective market penetration of Canadian goods must be supported by dealer organizations.

Most equipment manufacturers felt that equipment shows and exhibitions had only limited sales value. Most shows have become static displays due to the shows moving into large indoor facilities or the lack of space to operate machinery. The most positive statement about these shows was that the exposure offset a negative connotation of not being there. The effectiveness of the display significantly decreases as the exhibit changes from an operating display, to a graphic display, to an audio-visual demonstration. The increasing costs of transport of equipment to these shows as well as the cost of exhibitor space makes participation in such shows marginal. The one show that was mentioned as being the biggest and most effective by logging contractors was the Exposition sponsored by the Southern Forest Products Association. A list of sponsors of trade shows and demonstrations is shown in Appendix 5.

Various organizations sponsor live demonstrations of forestry machinery. These demonstrations are generally held in a forested area and have an extremely positive effect by allowing large numbers of potential clients to observe and possibly operate new equipment in the actual environment in which they will be used. These demonstrations were identified by both the equipment manufacturers and contractors as being the most effective marketing method.



The various organizations that sponsor these demonstrations do most of the advertising and promotion so that the cost to the demonstrators is low compared to other marketing methods. All the state forestry commissions indicated they presently sponsored demonstrations. A list of the commissions is shown in Appendix 3. Several Forestry Schools in the study area either sponsor the demonstrations themselves for exposure or through agricultural extension services. It is important that participating equipment manufacturers provide thoroughly qualified equipment operators to demonstrate the equipment and that the equipment is properly adjusted for the environment in which it will be shown. The second consideration is that provision for proper crowd control be made and adequate insurance be obtained.

Another successful modification of the university sponsored demonstration is the establishment of permanent testing facilities at schools having test forests. For instance, both John Deere and Caterpillar have established a liaison with the Berry College School of Forestry in Rome, Georgia, in which they loan equipment to the school for use on the school's forests. The school evaluates new equipment and attachments and also sponsors demonstrations for the manufacturers. The manufacturers are allowed to organize the equipment demonstration as well as bring in clients from around the world. Berry College regularly has groups up to a thousand persons for these demonstration on the 34,000 acres of managed forest lands. Those schools having test forests and who indicated willingness to participate in cooperative efforts are noted in Appendix 6.

The forestry schools of Mississippi State, Louisiana State, Clemson, and Texas A & M sponsor a Forestry and Harvesting Training Center in Long Beach, Mississippi. The Center regularly schedules short term seminars in such topics as Thinning Southern Pine Plantations, Heavy Equipment Operator Training, Hydraulics, Pulpwood Production, and Wood Material Transportation Systems. The directors actively pursue support from manufacturers in the form of instructors and actual equipment. It does provide the equipment manufacturers direct exposure to potential clients at very little cost.

Finally, advertising was felt by most manufacturers as being the least effective compared to other marketing methods. Because the readership of each magazine varies, care must be taken to select the correct magazine for a particular advertising campaign. A list of potential trade magazines and their general emphasis is shown in Appendix 7. The use of reader response cards for improving advertising has not proven effective according to several magazine editors.

Market Gaps for Forestry Machinery

The trends for future equipment requirements have already been discussed. There exists potential markets for forestry machinery of the current design provided that proper marketing efforts are made. The following summarizes those specific equipment types where equipment markets exist.



- a. Skidders. The estimates of annual skidders sales in the United States were between 2,500 and 3,500. The American Pulpwood Association estimates that more than fifty (50) percent of the operating skidders are more than four (4) years old, which means a significant inventory of skidders is building for potential replacement. Two of the interviewed dealers who handled both forestry equipment and agricultural equipment said that the continuing sales of forestry equipment during this past year have carried the dealerships. With the proper selection of dealers, there is no reasons that Canadian manufacturers cannot achieve a significant portion of this market with current equipment design. The only specific features that must be included is SAE approved roll-over protection structures and U.S. Forest Service spark arrestors. There is a definite interest in the smaller sized models.

There is a significant market for skidding attachments suitable for attachment to farm equipment. These light to medium duty attachments allow the farmer and small timberholder to utilize his farm equipment year around at minimal equipment costs. The existing U.S. manufacturers have not taken advantage of this market except in local geographic areas. Proper exposure and dealer support will allow generous penetration of this market.

Another marketing advantage over U.S. manufacturers could be obtained by including integral fire suppression systems as standard equipment. Skidders have the highest insurance rates of any forest equipment and the provision of a fire suppression systems reduces the insurance premiums significantly.

Metric equipment, however, will be a problem for all but the largest equipment operators. The small contractors are unwilling to maintain separate sets of metric and standard tools.

- b. Skidder and Feller-Buncher Attachments. The market for attachments is extremely competitive with a few independent manufacturers producing identical attachments for various equipment lines, for instance, John Deere and Caterpillar offer the same attachment under different brand names. Separate attachments such as shearing heads or combined feller-buncher units must be capable of mounting on different chassis and utilize various hydraulic systems.

Several Canadian manufacturers of accessories have innovative designs which would generate market interest if properly advertised. For instance, one manufacturer of grapples with a parallelogram design has had only marginal market success even though the single hydraulic cylinder and the self-locking feature would have general interest. The market for grapple equipped skidders is increasing due to the general diameter reduction of the average southern pine logs and because less time and labor is involved for grasping and releasing loads.

There is also a market requirement for feller-buncher heads specially designed for small diameter trees. Because the log content in these small trees is low compared to branch and top volume, a simple, but high speed mechanical delimeter (Makeri type) would generate sales.



- c. Merchandised Tree Planters. The emphasis on regenerating pine plantations through artificial regeneration has created a market for mechanized tree planters. A single manufacturer, R. A. Whitfield Company, in Mableton, Georgia claims to have over eighty (80) percent of the merchandised tree planters in the study area. They claimed they did no advertising other than participate in the American Tree Farmer program, and his company is operating at capacity. They said they were aware of competitive Canadian Machines, however, the Whitfield machine required fewer operators and was "safer" on the normal southern terrains.

Marketing Prospects of Current Canadian Manufacturing Logging and Harvesting Equipment

- a. Skidders. The potential for skidder sales in the southeastern United States is probably the highest of any logging equipment, because the attrition rate of the equipment is so high and replacement is continuous. The market is extremely intense due to competition, and service dealerships are of the utmost importance. Several of the Canadian manufacturers are also international companies and have the dealership organizations already in effect.

The largest existing market for skidders is the small chassis, 4-wheel drive, articulating frame, rubber tired models. Several Canadian skidder manufacturers have models of this type. The primary problem, disregarding the marketing aspect, has been the inflexibility of supplying the units with the air cooled engines, and the requirement for minor modifications to make the units more compatible with their operating environment. The potential skidder purchaser is more likely to request a General Motors water cooled diesel engine for reasons discussed elsewhere in this report. The likelihood that the units will be operated on irregular terrain and in a humid, dusty environment must be accounted for in the design of oil and fuel systems and for the fire protection.

There is a small specialized market for tracked skidders and those with superwide tires for operations in the marshy area of the southeast. Several Canadian manufacturers make equipment that could address this market.

Because of the large number of small operators who desire to utilize farm equipment for seasonal or intermittent harvesting operations, there is a market for tractor conversions that will provide cable winch attachments. This market area has not been captured by any single U.S. equipment.

- b. Feller bunchers and Loaders. The immediate market potential for these larger, multi-purpose units is limited to only a few of the largest land management companies. Although several Canadian manufacturers produce equipment of this type, there will be extreme competition from similar U.S. equipment.
- c. Attachments. There are numerous U.S. manufacturers of attachments, feller/buncher heads, grapples, buckets, etc. which make this market extremely competitive. There is a continual replacement factor that keeps this market area stronger than the prime movers to which they are added. Several Canadian manufacturers have unique designs for their attachments which could provide a catalyst for obtaining a portion of this market.



- d. Reforestration Equipment. There are no exclusive U.S. manufacturers of this type of equipment. Several Canadian manufactures do produce tree planting equipment that, if modified to become compatible with the environment and topographic conditions of the southeastern U.S., could obtain a successful market penetration.



LOG AND LUMBER PROCESSING EQUIPMENT

Industry Background

The development of the forest products industry in the south, particularly sawmills, has been the result of the availability on coniferous forests and the concentration of the markets for lumber in the eastern U.S. The available softwood timberbase in the west has been physically depleted and harvesting of the remaining volume is restricted due to governmental controls. Stumpage costs of timber in the south have significantly trailed the west coast. A number of the forest products corporations also have large landholdings in the south and the economics of utilizing this "fee" timber is extremely attractive. Finally, new technology has become available for profitable conversion of small logs. The generally good site indices of the southern forests, as well as the genetic development of fast growing trees, have shortened harvesting cycles and made timber growing more profitable.

The profit performance of the forest products industry has been extremely variable in the last ten years due to external factors such as the energy crisis, fluctuating interest rates, and ultimately the demand from the building industry. The initial sawmills in the south were close to the timber resource and their consuming market. They were generally small in size and portable so that they could be moved on demand. They generally had a single headrig with circular saws for primary and secondary breakdown. The second generation of sawmills were larger, permanent installations with more sophisticated secondary breakdown systems. Since timber availability was not a problem, the expansion concept of the sawmilling industry was to build multiple small to medium sized sawmills throughout the timber area. The primary design consideration was high production without regard for recovery. The external factors mentioned above that affect the lumber market have now caused major revisions to the design of timber converting facilities.

The increasing cost of stumpage and the competition from other wood fiber utilizing industries have had a major effect on sawmill design. The lumber recovery factor (LRF - lumber production in board feet per gross cubic feet of incoming logs) has become a primary design factor. Secondly, the profitability of the traditional small sawmills has become unsatisfactory due to low productivity and high labor costs causing a trend to centralize sawmill activities into larger, modern facilities. Finally, the character of the sawlog has significantly changed to a smaller, more tapered log. Efficient facilities must be capable of processing these smaller logs at faster rates but also must be more sophisticated because the lumber recovery factor is extremely critical for small logs. Any conversion error is magnified by the small logs and higher piece rate. The introduction of electronic devices to scan logs and make conversion decisions, more accurately than an operator, have become increasingly important.



Sawmill design has become an art, no longer permitting blanket duplication of another facility. In order to remain profitable and react to essentially nineteen (19) variables¹ that affect operations, sawmills must be more versatile. They must be capable of changing lengths or cutting metric to meet the market demands. The operator must now have a basic understanding of economics and electronics in order to stay in business very long.

Profile of Sawmill Operations

The Forest Industries magazine "Directory of the Forest Products Industry 1981 Annual Lumber Review" reported that there were slightly more than twelve hundred sawmills of various sizes operating in this study area. Approximately fifty (50) percent of these mills have an annual lumber production of one to twenty-five million board feet. Mills producing more than twenty-five million board feet make up thirty percent (30) of the remaining population. Generally the larger volume mills are owned by forest products companies and the smaller production mills by private owners. Because the potential for immediate equipment sales appears better at the larger mills (those over 25 MMBF/A), a listing is included of these in Appendix 8. A complete list can be obtained from the editors of Forest Industries magazine.

The corporate sawmills are operated as a method of maximizing timber utilization. The stems are usually graded for several end-uses so that return can be maximized. The corporate sawmills tend to have a structured organization with defined areas of responsibility of production, maintenance, engineering, and quality control. Decision making for equipment purchases comes from either a department head or the general manager. The smaller mills normally have a manager who may be the owner. Decisions for equipment purchase are generally made only by the owner.

As with the forest machinery, adequate preventative maintenance is a problem in sawmills. The assigned maintenance men and electricians, except in larger mills, do not have the technical skills to maintain and repair the modern equipment. Corporate staff generally maintain specialists at a central site who travel from mill to mill for troubleshooting services. The equipment vendors are generally required to provide both operator and maintenance training along with the supply of equipment. This becomes an advantage for the particular supplier, as once satisfied with a machine, the operators, particularly the smaller ones, tend to purchase from the same manufacturer.

Sawmill personnel have little resistance to metric equipment as they generally have had exposure to European equipment. Some mills are already cutting metric sized lumber for export.

¹ Small Log Sawmills, Ed Williston, Miller Freeman Publications.



Description of Sawmill Equipment

The lumber production process can be broken down to several distinct operations. Log Merchandising consists of the receipt and storage of incoming timber, debarking, the sawing or bucking of the stems to merchandisable lengths, sorting, and transport of logs to a conversion facility. The merchandiser supplies logs not only to the sawmill, but also may supply pulpwood and plyblocks to their respective facilities. The conversion facility consists of Primary Breakdown Equipment which opens one or more faces of the log with a saw or chipping heads and can then convert the stem completely to rough lumber or some form for secondary breakdown. Secondary Breakdown Equipment consists of resaws, edgers, and combination chipper-saw edgers. Finishing Equipment includes the dry kilns, planers, and trimming equipment and energy generating sources for providing hot gases to the kilns. Sawmills, depending on the size and intended end-product, will generally have equipment from each of the above types.

Logs used to be delivered to the sawmill woodyard having been bucked to merchandisable lengths in the woods. The trends to smaller diameter trees and tree length logging have required the modification of existing woodyards and the installation of log processing equipment at most sawmills to process larger volumes of small logs. The log processor or utilization center for combined sawmill and plywood facilities can be complex with extensive grading and sorting equipment to maximize the utilization of each stem. Operator decisions are being replaced by electronic scanning and computer controlled positioning and sawing equipment.

Log processors are two basic types - linear or transverse -determined by the desired production rate. The linear system is more popular for sawmill design because it permits the range of length cuts required for lumber manufacture. In a linear system, the stem is conveyed past one or more saws which cut the stem to multiple log length depending on a position against a stop. The primary disadvantage of this type of processor is production is limited to a maximum of eighty to one hundred linear feet per minute (fpm). Transverse processing systems have fixed saws in a staggered arrangement through which single or multiple stems are conveyed by multi-strand chain transfers. Although the transverse system can achieve production rates of three to four hundred feet per minute, the primary disadvantage is the limited number of possible length combinations. This system is generally used for pulpwood production.

Although debarkers of various designs are available for sawmill log processing, the most popular is the ring debarker because of its moderate price and relatively high rate of production. The gradual trend to smaller diameter stems have made these advantages more important. The ring debarkers can damage the ends of logs if there is extreme diameter variation and requires extensive preventative maintenance to have a reasonable operational efficiency. The ultimate output is limited to approximately two hundred fifty feet per minute. For production rates beyond this speed, the sawmill operator only has an option to add multiple units. Two recent sawmill installations have utilized a drum type debarker that has previously been exclusively used for pulpwood due to the damage to the ends of the logs as they rub together and impact the drum in passage. The drum has been modified from a typical pulpwood design to be smaller in diameter. The sawlogs are processed in sixteen (16) or more foot lengths to minimize damage. This design developed in Scandanavia is yet to be proven.



The primary breakdown of small diameter softwood logs (five to twenty inch) to dimension lumber can be accomplished by various logics which will produce different lumber recovery rates. The simplest but least efficient is live sawn logic which means the log remains in one place and the cuts take place through and through. Another cutting logic is sawing with split-taper (parallel to the log's central axis or with full taper (parallel to one of the outside faces of the log). The primary breakdown may only produce a cant by any of the above logics which will be resawn during the secondary sawing operations. Diagrams of these various sawing logics are shown in Figure 7. Computer programs to determine the best opening face (BOF) for establishing an initial sawline to develop maximum yield by any of the sawing logics have replaced the operator decision-making function. Generally cant sawing provides better yields than line sawing but the computer is capable of analyzing all combinations to determine maximum yield for a given log of which the diameter, length, and taper have been determined separately.

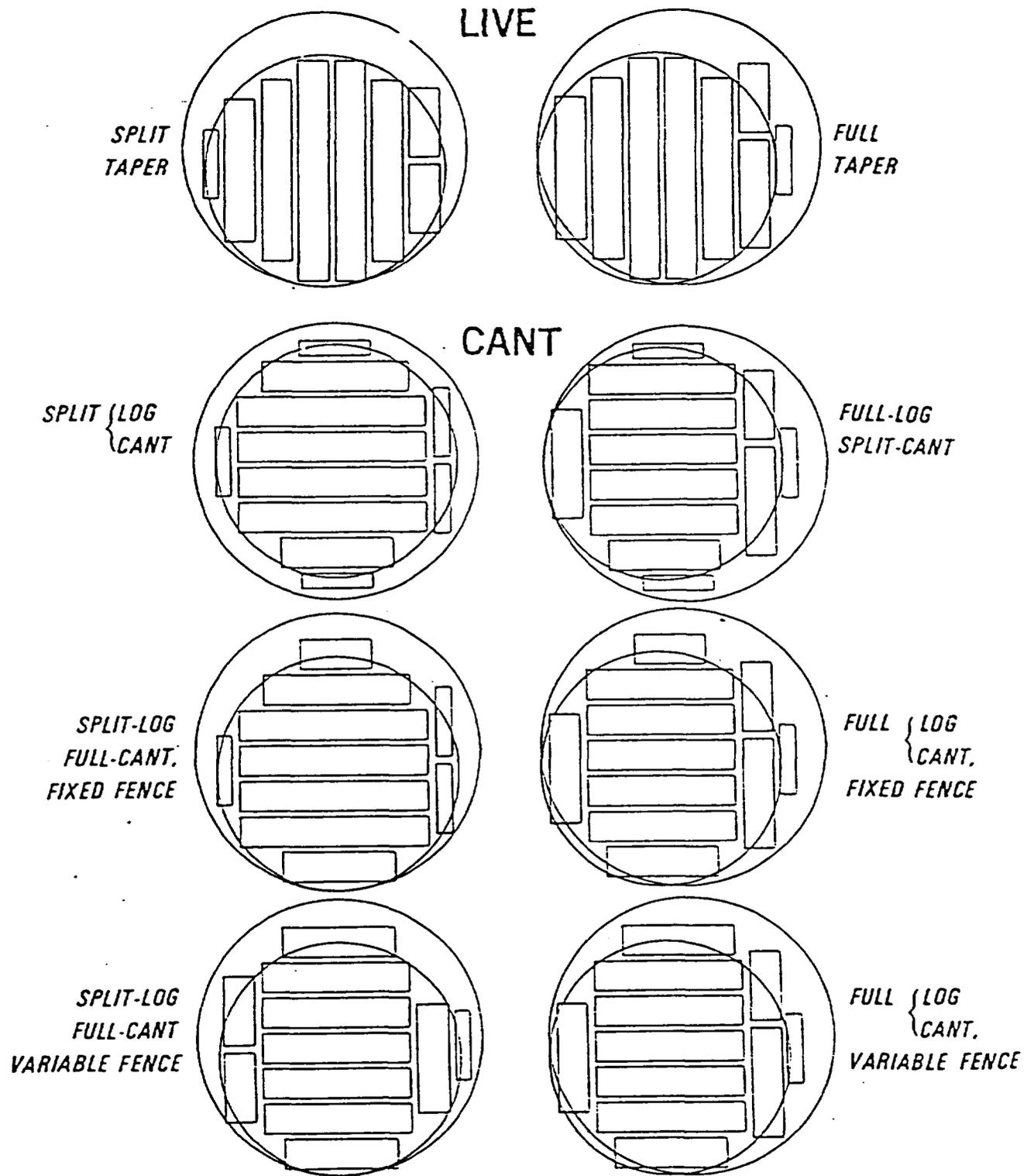
The headrig sawing systems that accomplish the primary breakdown can be a single saw or multiple saws in parallel or paired in series and combined with chipping heads. Traditionally, circular saws have been utilized for southern pine operations because of the ease of saw sharpening, poor sawing quality of the wood due to heavy pitch content and hard knots, and heavy metal contamination in the logs. Band saws have not had much acceptance due to a general feeling in the industry that qualified band saw filers are not available and the lack of reliable metal detectors to protect the saws. Normal practice has been to utilize .220 to .250 inch oversize allowance for shrinkage, planing, and sawing accuracy.

The majority of the southern sawmills still utilize manually operated secondary breakdown equipment. Several larger firms are now experimenting with optimizing edgers and trimmers but the acceptance has been reserved. The sawmill operators are skeptical of the scanners and computers because there is limited opportunity to analyze a particular setup and to modify the basic program is difficult and lengthy. Suppliers told Sandwell that the larger the operation the less likely that the electronic equipment would be tuned or maintained.

Lumber finishing equipment in the south is fairly typical in the industry. Although there has been some interest in converting gas or oil fired kilns to wood-fired heat sources, the majority of the firms have not converted due to the capital costs and the lack of availability of smaller sized heat sources. Planing is exclusively done with conventional knife planers.

Future Sawmill Equipment Design Considerations

The present trend in the southern sawmill industry is to modernize existing facilities rather than construct new mills and to consolidate small capacity mills into more centralized complexes. The reason for this trend is the extremely high construction costs of the ancillary facilities. The economics of a modernized mill are therefore more attractive and can be justified on smaller production volumes.



APPROVED

FIG. 7 - THE EIGHT BASIC SAWING METHODS

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SANDWELL

A

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With the cost of timber continually increasing and the desire to maximize profits/production, all levels of sawmills are implementing extensive quality control programs and reassessing their primary breakdown systems. The primary emphasis has been the reduction of lumber target sizes by utilizing thinner kerf saws and rigorous maintenance of the alignment of machine centers. For instance, a saw kerf reduction of .010 inch increases lumber recovery by approximately one (1) percent. Some kerf reduction is possible by utilizing thinner rim circular saws; however, the largest improvement can be obtained by converting to band saws. The introduction of improved metal detection systems to protect the band saws have overcome the reluctance of many operators to convert. The attraction of saw kerf modifications is that it provides the best incremental return for very little capital expenditure.

The conversion to thinner kerf saws will have very little permanent effect unless improvements are made to the transport system at the primary breakdown. At the very least, the operator must maintain alignment of the tracks and rails. More capital intensive improvements would be to install overhead dogging or sharp chain transport systems to provide positive alignment of the log through the sawing process. Southern sawmill operators have traditionally considered maximum piece count as the measure of effectiveness. They are gradually accepting the lower production rates of these more positive transport systems because of their significantly higher lumber yields.

The recent introduction of electronic and laser scanning and optimizing systems has had a significant effect on sawmill operations. The systems are ideally suited for southern pine logs which tend to have large amounts of sweep and taper. The systems have not had major acceptance because of the lack of effective transport systems that can maintain the alignment of the logs as indicated by the scanning equipment, and because the scanning equipment cannot be easily maintained nor the programs verified.

As another function of economics, most small log dimension sawmill operators now are analyzing the possibility of manufacturing one inch thickness lumber instead of chips from the slab portions of the log. Even at current log prices, one inch lumber is more profitable than chips. The problem however, is that one inch lumber is more difficult to handle than dimension lumber, occupies more kiln space, and breaks up easier in the planer. There will be a considerable market for properly designed material handling equipment.

The Forest Products Laboratory in Madison, Wisconsin has developed a process called EGAR (Edge-Glue-and-Rip) which produces premium priced wide boards from multiple narrow width boards typically produced from small logs. If such a machine were combined with an end-gluing operation, there would be multiple opportunities to upgrade the return of a sawmill.

The increased demand of lumber with known structural integrity has created a potential for machine graded stress rated lumber. At the present time, the only accepted stress analyzing machine being utilized in the South is produced by Raute Oy, a Finnish concern. The general belief among lumber consumers is that there is a major untapped market for stress rated lumber and therefore, the machines to accomplish the grading.



Although abrasive planing has achieved some success on the west coast, there are no similar operations in the south. The reason for this absence is that no one is willing to gamble on the potential benefits of reduced sawing tolerances and grade improvements versus the costs of an abrasive planing operation. The potential, however, exists.

MARKETING OF LOG AND LUMBER PROCESSING EQUIPMENT

The marketing of sawmill equipment is easier than logging equipment if, for no other reason, the number of potential clients is significantly less and the clients are more identifiable. The larger corporations normally have an individual who is responsible for long range planning for the forest products divisions and who maintains information on new equipment design. A list of these key individuals who were identified in this study is shown in Appendix 9. At the mill level, the mill managers, owners, and/or mill engineers are the target for sales approaches particularly for replacement components such as debarkers, hogs, saws, etc. Because these individuals will have a wide range of educational and background experience, sales methods must be tailored on an individual basis.

Current marketing techniques have generally consisted of personal sales contacts with the mill managers, owners, and mill engineers. Since sawmill projects can vary from replacement of a single piece of equipment to whole systems, a secondary sales target is the consulting engineering firms, similar to Sandwell, who are hired by the sawmill owners or principals to design the larger projects and scope equipment specifications.

Other marketing techniques consist of participation in traditional industrial shows with static displays and advertising in various trade magazines. The problem with both of these marketing methods is that the population is too large and the decision-making individuals are generally not approached.

As with the logging equipment, the size of the operation and capitalization is directly proportional to the acceptance of new manufacturers and technology. The management almost in total replied that a major factor in equipment selection would be the demonstrated performance on similar southern pine timber. This resistance must be addressed in the marketing presentation.

Evaluation of Current Marketing Methods

The results of this Market Study indicate the direct personal contact with the potential clients is the most effective marketing approach for sawmill related equipment. There are no dealerships, so equipment manufacturers must be represented by knowledgeable sales representatives who know their client base and can reach the decision-making individuals.

The second most effective marketing technique is communications with consulting engineering firms who work in the sawmill industry. The consultants are easier to contact, tend to be more technically oriented than the general sawmill manager, and tend to make analytical evaluations of equipment prior to recommending equipment to a client. The clients are more likely to accept the recommendation of a new manufacturer or technology from the consultant rather than from a sales representative.



Participation in Equipment and Trade shows for sawmill equipment has the same drawbacks as with logging equipment. Actual operating demonstrations of equipment are difficult to organize because of the physical size of the machinery and the requirements for supporting equipment. The most successful demonstrations appear to be combinations of static displays and models with moving parts that can be dynamically displayed. In Atlanta alone there are three model making companies.

Advertising in magazines and trade journals also has limited effectiveness based on the ability of the article to reach the target individuals. The best advertising is the various feature articles written by the editors of these magazines which discuss new installations and identify outstanding features and specific equipment. The editors are always looking for feature material and this becomes good free advertising.

One marketing technique that has not been exploited is computer simulation. Sandwell International for instance, through one of its affiliates, has developed a computer program to simulate the primary and secondary breakdown functions for a sawmill. The program allows the demonstrator to vary the log input by diameter and length and also the various types of breakdown equipment to determine the effects on productivity and grade. The simulation is an effective tool not only for sales of equipment but also conceptual mill design.

Market Gaps For Log and Lumber Processing Equipment

The southern sawmill industry has been depressed by the recent recession and the continuing high interest rates. Although expansion projects have virtually stopped, there continues to be a demand for replacement components such as ring debarkers, chippers, screens, conveyors, and hogs. Some of the larger corporations are continuing the preparation of design engineering of projects that will improve recovery and although the equipment purchases will not be made immediately, the specifications are being written and vendors being solicited. It is extremely important for vendors of new technology or design to be making client contacts with consulting engineering firms.

The current gas glut has calmed the energy picture for the short term. Some of the more enlightened wood products firms are continuing to look for wood and municipal waste fired heat sources to replace natural gas and oil fired units for kiln and dryer operations. They are looking for relatively small (six to fifteen million Btu per hour) units that can operate automatically. Several Canadian manufacturers have such units but the marketing efforts have not reached the correct mill personnel. The utilization of field produced chips for both pulp and fuel has developed the need for classifying equipment to remove the large amounts of grit that is brought in with the chips. Conventional chip washers are not satisfactory, particularly for fuel, because it increases the fuel moisture content.



The continually increasing pressure for improved lumber recovery and reduced operating costs will force the mill operators to accept the new technology of electronic scanning devices and controls. The reluctance has been the lack of understanding and technical skills to operate such devices. The devices presently on the market do not have the capacity to permit a quality control technician to analyze why the controls directed a certain action and to compare that with a pre-determined setting. It is suggested that potential suppliers of scanners, controls, and optimizing systems participate in industry seminars on lumber quality control or through university sponsored events and that the ease of checking the action program be stressed. The ability to easily alter the program due to a change in market conditions is also extremely important to develop the confidence of the potential buyer. The market has just begun for these automated controls and the companies that put forth the effort at this time can capture a major portion of a potentially large market area.

There is a large market requirement for a log scanning metal detector that could be utilized to protect thin rim or band saws.

Because of the trend to modernize sawmills, there is a demand for new headrigs that have positive feed works and sufficient speed to utilize smaller diameter logs efficiently and economically.

Marketing Prospects of Current Canadian Manufactured Log and Lumber Processing Equipment

- a. Log Processing Equipment. This section concerns only equipment for the debarking of logs, cutting to length and sorting of blocks, and processing fuels and chips. Several Canadian manufacturers already have sales representatives and service centers in the southeastern United States.

There is a recent trend for lumber producing companies to require totally engineered equipment packages from the equipment supplier rather than maintain an internal engineering staff. Several established Canadian companies are capable of this full service requirement. Those that do not have the staff should coordinate the engineering with a competent consulting engineering firm.

Debarkers. The primary sizes of ring debarkers that will be purchased are twenty-four (24") and thirty (30") diameter models with feed speeds in the range of 200-300 fpm. A major determinant however, will be the ability of the debarker to process a minimum diameter log (perhaps five (5) inch) and short lengths of eight (8) feet with the same operating efficiency.

Cut-off Saws. Several lumber producers indicated a need for pre-engineered, high speed cycling cut-off saws similar to those offered by several Canadian firms.



- b. Fuel Processing. With the increased emphasis on wood as a fuel, there will be an improved demand for fuel preparation equipment. The traditional hammer and knife hogs have high maintenance costs and poor operating efficiency due to high sand content in the bark of southern species and metal contamination. The new lines of heavy duty bark shredders have a definite market potential.

- c. Lumber Processing Equipment. Present predictions are that there will be few new sawmill facilities built in the Southeast. Therefore, the need for sawmill equipment will be for modernizing and upgrading existing sawmills. The trend is to reduce the labor to lumber produced ratio. This will be accomplished by reducing waste to obtain the optimum amount of product from the raw material, with a minimum of labor.

Saws. The trend is to reduce saw kerf at all sawing stations. Canadian saw manufacturing companies must emphasize and educate the clients to their line of available thin-kerf saws. Band saws will also receive some renewed interest.

Electronic Scanning, Computing and Control. New electronic log scanning devices are being incorporated in most new mills and added to some existing sawmills to reduce the need for the sawyer to select the best opening face. Log profiles are transmitted to a computer which has been programmed to select the best method of log breakdown for a particular log profile and a particular end product size. These systems reduce waste by eliminating operator error and also reduce labor costs by not requiring such an experience operator. These devices are generally available to control all sawing operations. Several Canadian firms have equipment to meet this market area.



CONCLUSIONS

1. The availability of a large timberbase of southern pine and the rapid regeneration rate of these forests will sustain a continual growth of the forest products industry in the south. This industry expansion will generate an increasing demand for forestry machinery and equipment.
2. Changes in timberland ownership have resulted in more intensive silvicultural management of the forests. Mixed hardwood stands are being converted to southern pine plantations which are thinned at intervals to increase the eventual volume of the stands. Landowners who desire to recover the fiber of these successive thinnings require smaller, more maneuverable, and versatile harvesting equipment.
3. Harvesting methods are changing from logging with chain saws and manual handling to mechanized felling machines with mechanical shears, and in some cases, bunching attachments to assist loading and transport. Since the average tree is decreasing in diameter, harvesting methods have changed from cutting to length in the woods to transporting whole tree stems to the mill logyards where the stems are cut for multiple uses.
4. The average individual who will purchase logging equipment is an independent operator that operates a small crew and several skidders, a knuckle boom loader, two (2) to three (3) trucks, and logs under contract for a forest products company. The large corporations contract the majority of their logging requirements to these contractors due to labor costs and availability. Corporate logging crews are generally utilized only for environmentally sensitive areas or for evaluating new equipment or harvesting methods. Identification of logging contractors is available from the various State Forestry Commissions and organizations such as the American Pulpwood Association.
5. Marketing of logging equipment in the south is accomplished primarily through equipment dealerships. They provide extensive client contact, spare parts, and light maintenance support for machines after the sale. Suppliers participate in logging shows and demonstrations, as well as utilizing extensive advertising, to reach their potential clients. The logging contractors, as well as equipment manufacturers, agreed that direct client contact was the most effective marketing technique for logging equipment, and that advertising was the least effective.
6. The census of sawmill operations in the study area consists mainly of medium to large size sawmills. The trend has been to consolidate smaller mills into larger, more efficient modernized facilities rather than construct entirely new mills.
7. New sawmill design will incorporate thin kerf saws or band saws, improved transport systems to maintain closer dimensional tolerances, and electronic scanning and computer networks that will reduce operator decisions.



8. The client base for sawmill equipment sales can be reached through direct contact with the owners and managers, but also through communications with consulting engineering firms that are involved in the design of facilities and equipment specifications. Participation in equipment shows and advertising have limited benefits for the promotion of new technology or new manufacturers.
9. Both logging contractors and sawmill operators are very suspect of new equipment that has not been proven in the southern pine producing area. To be successful, any marketing plan must overcome this basic consideration.
10. The following marketing techniques are considered to be the most effective for penetrating the southern markets:

a. Logging and Harvesting Equipment

- i. Selection of a Local Equipment Dealership. It is important to establish a close client contact to present new equipment and to provide spare parts and light maintenance support.
- ii. Participation in Equipment Demonstrations. Since most equipment shows now allow only static displays, it is difficult to demonstrate the capabilities of machinery. It is recommended that equipment suppliers participate in demonstrations organized by various forestry schools and trade groups. These shows are held on Demonstration Forests and permit the maximum exposure to the potential clientele.
- iii. Affiliation with Forestry Schools and Vocational Schools. Various forestry schools have their own test forests which receive intensive silvicultural management. They are willing to cooperate with equipment manufacturers to test and demonstrate equipment.
- iiii. Utilize Trade Magazine Feature Articles. Most trade magazines are constantly searching for subject matter and are willing to use articles on new technology or innovative installations.

b. Log and Lumber Processing Equipment

- i. Direction of Marketing to Target Individuals. This study identified that only certain individuals have the authority to make purchase decisions. Sales efforts must be directed to these individuals for replacement machines or entire new process lines. Since the trend is to upgrade existing facilities, the local managers, owners, and engineers will have a major impact on equipment selection.



- ii. Increased Communications with Consultants. Most of the sawmill operations, including the large corporations, do not have an engineering staff to accomplish engineering and equipment specification. They instead utilize consultants. Consulting engineering firms tend to be objective when analyzing new equipment and more influential with the client to accepting new technology.

- iii. Increased Participation in Seminars. With the increased emphasis on quality control and advanced control systems, manufacturers have the opportunity to communicate directly with clients during seminars. This close contact is not only necessary to present new technology to the persons responsible for making purchase selections, but also will overcome some of the reluctance to buy the mysterious "black boxes".

- iiii. Trade Magazine Feature Articles. The publishment of articles concerning new installations and technology is the most cost effective advertising method and reaches a wide client base.

Submitted by:

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Approved by:

N. L. Adkins



APPENDIX 1
GLOSSARY OF TERMS

REPORT G5176/1
MARKET STUDYDEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA ONTARIOMARKETING STUDY OF CANADIAN
FORESTRY MACHINERY AND EQUIPMENT
IN THE SOUTHEASTERN UNITED STATESDATE: 23 AUGUST 1982APPENDIX 1 - GLOSSARY OF TERMS

annum or year	A
board feet	BF
cubic feet	cu ft
days	D
diameter at breast height	dbh
etcetera	etc.
feet	ft
feet per minute	fpm
figure	fig.
gallons	gal
horsepower	hp
hours	h
inches	in.
maximum	max
million British thermal units	MB
million board feet	MMBF
minimum	min
minutes	min
months	mo
number	no.
percent	%
square feet	sq ft
square inches	sq in.
thousand board feet	MBF
United States	US
yards	yd
years	yr



APPENDIX 2

LIST OF CORPORATE CONTACTS FOR FOREST HARVESTING EQUIPMENT



REPORT G5176/1
MARKET STUDY

DEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA ONTARIO

MARKETING STUDY OF CANADIAN
FORESTRY MACHINERY AND EQUIPMENT
IN THE SOUTHEASTERN UNITED STATES

DATE: 23 AUGUST 1982

APPENDIX 2 - LIST OF CORPORATE CONTACTS FOR FOREST HARVESTING EQUIPMENT

Mr. Gordon Rogers
General Mgr - Eastern Carolina Region
Champion International Corporation
P. O. Box 309
Roanoke Rapids, NC 27870

Phone (919) 537-0531

Mr. Don R. Taylor
General Manager - Gulf States Region
Champion International Corporation
P. O. Box 191
Huntsville, Texas 77340

Phone (713) 291-3381

Mr. Frank Abbey
Continental Forest Industries
P. O. Box 8969
Savannah, Georgia 31402

Phone (912) 236-7137

Mr. Glen Plummer
Georgia Kraft Company
P. O. Box 1551
Rome, Georgia 30161

Phone (404) 232-0851

Mr. Joe Watkins
Georgia-Pacific Corporation
P. O. Box 705
Pooler, Georgia 31322

Phone (912) 964-2260

Mr. Joe Strickland
International Paper Company
P. O. Box 400650
Dallas, Texas 75240

Phone (214) 934-4536

Mr. Charles Margiotta
ITT-Rayonier Incorporated
P. O. Box 728
Fernandina Beach, Florida 32034

Phone (904) 261-3631



Mr. L.O. Wright
Union Camp Corporation
P. O. Box 1391
Savannah, Georgia 31402

Phone (912) 236-5771 Ext. 7638

Mr. Johnny Lee
Union Camp Corporation
P. O. Box 38
Chapman, Alabama 36015

Phone (205) 376-2241



APPENDIX 3
GOVERNMENTAL AGENCIES



REPORT G5176/1
MARKET STUDY

DEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA ONTARIO

MARKETING STUDY OF CANADIAN
FORESTRY MACHINERY AND EQUIPMENT
IN THE SOUTHEASTERN UNITED STATES

DATE: 23 AUGUST 1982

APPENDIX 3 - GOVERNMENTAL AGENCIES

STATE FORESTRY COMMISSIONS

Alabama State Forestry Commission
513 Madison Avenue
Montgomery, AL 36130
Mr. C. W. Moody - State Forester

Arkansas Forestry Commission
P. O. Box 4523, Asher Station
Little Rock, AR 72214
Mr. Michael P. Mety - State Forester

Florida Department of Agriculture & Consumer Services
Division of Forestry
Collins Building
Tallahassee, FL 32304
Mr. John M. Bethea - Director

Georgia Forestry Commission
P. O. Box 819
Macon, GA 31202
Mr. A. R. Shirley - Director

Louisiana Forestry Commission
P. O. Box 1628
Baton Rouge, LA 70821
Mr. D. L. McFatter - State Forester

Mississippi Forestry Commission
908 Robert E. Lee Building
Jackson, MS 39201
Mr. Jack Holman - State Forester

North Carolina Division of Forest Resources
P. O. Box 27687
Raleigh, NC 27611
Mr. H. J. Green - Director

Oklahoma Division of Forestry
Capitol Building - Room 122
Oklahoma City, OK 73105
Mr. Jim Riley - Director



South Carolina State Commission of Forestry
P. O. Box 21707
Columbia, SC 29221
Mr. Leonard A. Kilian, Jr. - State Forester

Tennessee Division of Forestry
4711 Trousdale Drive
Nashville, TN 37219
Mr. Max J. Young - State Forester

Texas Forest Service
College Station, TX 77843
Mr. Paul R. Kramer - Director

Virginia Division of Forestry
P. O. Box 3758
Charlottesville, VA 22903
Mr. Fred W. Walker - Director

U. S. FOREST SERVICE

U.S. Department of Agriculture
Forest Service - Region 8
Suite 806
1720 Peachtree Road, N.W.
Atlanta, GA 30309

Southern Forest Experiment Station
T-10210 Postal Service Building
701 Loyola Avenue
New Orleans, LA 70113

Southeastern Forest Experiment Station
P. O. Box 2570
233 Post Office Building
Asheville, NC 28802



APPENDIX 4

FORESTRY EQUIPMENT DEALERS



REPORT G5176/1
MARKET STUDY

DEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA ONTARIO

MARKETING STUDY OF CANADIAN
FORESTRY MACHINERY AND EQUIPMENT
IN THE SOUTHEASTERN UNITED STATES

DATE: 23 AUGUST 1982

APPENDIX 4 - FORESTRY EQUIPMENT DEALERS

ALABAMA

Alabama Machinery Company
Athens, AL 35611

Joe Money Machinery
Birmingham, AL 35201

Anderson Tractor Co., Inc.
Troy, AL 36081

Kennamer Manufacturing
Gunnerville, AL 35976

Atmore Farm & Power Equipment Co. Inc
Atmore, AL 36502

Kenworth of Birmingham, Inc.
Birmingham, AL 35201

Bruce Ford Tractor Inc.
Selma, AL 36701

King Power & Equipment Co.
Lafayette, AL 36862

Buford Equipment Company
Montgomery, AL 36106

Leary & Owens Equipment Co., Inc.
Montgomery, AL 36108

Clarklift of Alabama, Inc.
Birmingham, AL 35234

North Alabama Industrial Equipment Co.
Athens, AL 35611

Cotton-Hutcheson, Inc.
Evergreen, AL 36401

Peterman Agricultural Company
Peterman, AL 36471

East Alabama Trucks, Inc.
Pittsview, AL 36871

Power Lift, Inc.
Enterprise, AL 36331

Eaton Corporation
Northport, AL 35401

Sessions Sales & Service
Forest Home, AL 36030

E.E. Everette Associates, Inc.
Eight Mile, AL 36613

Standridge Tractor Company
Hayden, AL 35079

Forestry Equipment Co. of
Alabama, Inc.
Prichard, AL

Thompson Equipment Company
Alton, AL 35015

H.C. Davis Forestry Supply
Jackson Gap, AL 36861

Thompson Tractor Company, Inc.
Birmingham, AL 35217

Jeffcoat Equipment Inc.
Dothan, AL 36302

Timberjack Inc.
Northport, AL 35476



Timber Machinery Inc.
Montgomery, AL 36111

Tractor and Equipment Company
Birmingham, AL 35201

Young & Vann
Birmingham, AL 35201



ARKANSAS

Anthony Tractor Company
Fordyce, AR 71742

Ark-La Tractor Co., Inc.
Taylor, AR 71861

W. B. Brown Machinery Company
Gurdon, AR 71743

Clarklift of Arkansas, Inc.
Little Rock, AR 72209

Fallin Tractor Co., Inc.
Magnolia, AR 71753

H. Jack Flanders Company
Little Rock, AR 72205

G & S Mfg. Inc.
Hope, AR 71801

Lyons Machinery Co.
Little Rock, AR 72219

Marianna Ford Tractor, Inc.
Marianna, AR 72360

Meyers Ford Tractor
Marianna, AR 72360

Midco Arkansas Co.
Little Rock, AR 72203

Razorback International, Inc.
Pine Bluff, AR 71611

J.A. Riggs Tractor Co.
Little Rock, AR 72203

Smith Equipment Company
Gurdon, AR 71743

Stihl Southwest, Inc.
Malvern, AR 72104

Suttle Equipment, Inc.
DeQueen, AR 71832

Timberline International, Inc.
Hot Springs, AR 71901

Tri-State Mill Supply
Crossett, AR 71635

West-Ark Equipment Company
Russellville, AR 72801

Whiting Equipment
Little Rock, AR 72209



FLORIDA

Beard Equipment Co.
Panama City, FL 32401

Partner Southeast, Inc.
Jacksonville, FL 32217

Brookins Tractor Corporation
Chiefland, FL 32626

Ring Power Corp.
Jacksonville, FL 32216

Case Power & Equipment Co.
Jacksonville, FL 32216

Tidewater Equipment Co., Inc.
Perry, FL 32347

Coastal Power Products
Jacksonville, FL 32216

Webco Corporation of Jacksonville
Jacksonville, FL 32205

Cummins Florida, Inc.
Tampa, FL 33610

Dewind Machinery Company
Ft. Lauderdale, FL 33307

Eaton Corporation of Florida
Perry, FL 32347

Flint Equipment Company
Tallahassee, FL 32301

Florida-Georgia Tractor Co., Inc.
Jacksonville, FL 32201

Hackney Brothers, Inc.
Lake City, FL 32055

H. F. Mason, Inc.
Jacksonville, FL 32216

Hollander's Hydraulics
Gainesville, FL 32601

Industrial Tractor Co., Inc.
Jacksonville, FL 32205

Jacksonville Ford Tractor
Jacksonville, FL 32205

M & M Truck Sales & Service
Jacksonville, FL 32207

Mims Equipment, Inc.
Chiefland, FL 32626

North Florida Clarklift, Inc.
Jacksonville, FL 32205

GEORGIA

Albany Kenworth, Inc.
Albany, GA 31701

The Bailey Company, Inc.
Dalton, GA 37020

Bell-Kennon Tractor Co., Inc.
Moultrie, GA 31768

Blalock Machinery & Equip. Co., Inc.
College Park, GA 30349

Bocats, Inc/Southeast Sales & Service
Cairo, GA 31728

Brooks Machinery
Norcross, GA 30071

Can-Car, Inc.
Waycross, GA 31501

Carlton Company
Albany, GA 31702

Case Power & Equipment
Norcross, Ga 30093

Case Power & Equipment
Savannah, GA 31403

Case Power & Equipment
Tifton, GA 31794

Clarklift-Bobcat of Albany
Albany, GA 31705

Clarklift of Atlanta
Atlanta, GA 30318

Columbus Tractor & Machinery Co.
Columbus, GA 31902

Crawford Country Equipment Co.
Roberto, GA 31078

Cummins
Atlanta, GA 30315

Davis Tractor Company
Sandersville, GA 31082

Dixie Engine Company
Stone Mountain, GA 30086

Dixon Motor Company
Claxton, GA 30417

Fincher Ford Tractor Corp.
Savannah, GA 31403

Flint Equipment Company
Albany, GA 31701

Forest Services, Inc.
Macon, GA 31202

Frank Albert Machinery Co.
Augusta, GA 30906

General GMC Truck, Inc.
Atlanta, GA 30316

Georgia Mack, Inc.
Albany, GA 31702

Hancock Tractor Company
Thomasville, GA 31792

Hiab Cranes & Loaders
Fairburn, GA 30213

Jenkins Ford Tractor Co., Inc.
Augusta, GA 30906

Kennon Tractor Company
Tifton, GA 31794

Kenworth of Savannah
Savannah, GA 31408

Knight Equipment Co., Inc.
Thomasville, GA 31792

Kolb and Company
Atlanta, GA 30336

Lambert Ford Tractor, Inc.
Griffin, GA 30223

Letts Industries, Inc., Tree Div.
Norcross, GA 30093



Meir & White Equipment Co.
Austell, GA 30001

Midco Southern Company
Marietta, GA 30061

Mid State Clarklift
Columbus, GA 31907

Nalley Motor Trucks
Atlanta, GA 30315

Peach State Machinery
Doraville, GA 30362

Pineland Tractor Company
Savannah, GA 31412

Reid, Inc.
Waycross, GA 31501

Reliable Tractor, Inc.
Tifton, GA 31794

Richards Development Co.
Carrollton, GA 30117

Rimes Tractor and Equipment
Baxley, GA 31513

Roberson Tractor Co.
Nashville, GA 31639

Rome Tractor Company
Rome, GA 30161

Stith Equipment Co.
Forest Park, GA 30050

Southeastern Equipment Co., Inc.
Augusta, GA 30906

Tidewater Companies, Inc.
Brunswick, GA 31521

Tidewater Equipment Company
Brunswick, GA 31520

Tilton Equipment Company
Atlanta, GA 30341

Timber Equipment Company
Rome, GA 30161

Timber Harvesters, Inc.
Albany, GA 31706

Tree Farmer Equipment Co., Inc.
Waycross, GA 31501

Tri-State Tractor Co.
Atlanta, GA 30301

Ward Tractor, Inc.
Marietta, GA 30062

West Georgia Equipment Co., Inc.
Palmetto, GA 30268

Worten & Blount Machinery Co.,
Inc.
Waycross, GA 31501

Yancey Brothers Co.
Atlanta, GA 30335

LOUISIANA

Ag-Con Equip. Co., Inc.
Monroe, LA 71203

Alexandria Ford Tractor, Inc.
Alexandria, LA 71306

Boyce Machinery Co., Inc.
Reserve, LA 70084

Byles Welding & Tractor Co.
Many, LA 71449

Case Power & Equipment
Monroe, LA 71203

Columbia Equip. Co. Inc.
Bossier City, LA 71112

Eaton Corporation, F&CED
Alexandria, LA 71301

Forklift Equipment Inc.
Slidell, LA 70458

Fremar Distributing, Inc.
Freeport, LA 71108

Furlow-Laughlin Equip. Co., Inc.
Baton Rouge, LA 70821

Head & Engquist Equip. Inc.
Baton Rouge, LA 70805

H.P. Equip. Co., Inc.
Pineville, LA 71360

Hydradyne Hydraulics Inc.
Harvey, LA 70059

Industrial Lift Trucks Inc.
Lafayette, LA 70507

Lift & Equip. Service, Inc.
New Orleans, LA 70152

Louisiana Lift Truck, Inc.
Houma, LA 70361

Louisiana Machinery Co., Inc.
Shreveport, LA 71107

Louisiana Oil & Tire
Delhi, LA 71232

Midco Louisiana Co.
Baton Rouge, LA 70895

Midsouth Power Equipment
Monroe, LA 71201

Minton Equipment Co., Inc.
Alexandria, LA 71301

Norwell Equipment Company
Shreveport, LA 71103

Patrick-Miller Tractor Co., Inc.
Many, LA 71449

Reeves Equipment, Inc.
Arcadia, LA 71001

River City Ford Tractor, Inc.
Shreveport, LA 71109

Sanders Tractor
Winnfield, LA 71483

Scott Truck & Tractor Co. of LA, Inc
Monroe, LA 71203

C. J. Simoneaux's Hydraulic Sales &
Service
Labadieville, LA 70732

Southern Equipment & Tractor Co., Inc.
Bossier City, LA 71111

Superior Hydraulics
Broussard, LA 70518

Timberjack, Inc.
Alexandria, LA 71301

Winn Industrial Equipment Corp.
Winnfield, La 71483

MISSISSIPPI

Barton Equipment Co. of Tupelo, Inc.
Tupelo, MS 38801

B & G Equipment, Inc.
Philadelphia, MS 39350

Can-Car, Inc.
McComb, MS 39648

Capitol White Trucks
Jackson, MS 39208

Case Power & Equipment
Tupelo, MS 38801

Coastal Machinery Co., Inc.
Gulfport, MS 39501

Cummins Mid-South
Jackson, MS 39204

D-M Equipment Company
McComb, MS 39648

Forestry Equipment Sales
Louisville, MS 39339

Gilchrist Machinery Co., Inc.
Jackson, MS 39208

Hughes Brothers Tire & Diesel Service
Walnut, MS 38683

Hughes-Henry Equipment Co.
Jackson, MS 39208

Loggers Equipment Co., Inc.
Flowood, MS 39208

Log Hog Sales & Service
Brookhaven, MS 39601

Lovitt Equipment Co., Inc.
Hattiesburg, MS 39401

McComb Diesel, Inc.
McComb, MS 39648

McComb Equipment Company
McComb, MS 39648

McNeil Tractor Company
Laurel, MS 39440

Metro Equipment Company
Jackson, MS 39208

Mississippi Clarklift, Inc.
Jackson, MS 39208

Mississippi Road Supply Company
Jackson, MS 39205

Mississippi Rubber and Specialty Co.
Jackson, MS 39312

Murphy's International, Inc.
Bonnevill, MS 38829

Rebel Truck Sales
Jackson, MS 39207

Rose Machinery, Inc.
Greenwood, MS 38930

S & S International
Jackson, MS 39204

Scribner Equipment Co.
Amory, MS 38821

Stribling-Clements, Inc.
Greenwood, MS 38930

Stribling-Puckett, Inc.
Jackson, MS 39207

Taylor & Jeanes, Inc.
Jackson, MS 39205

Tree Farmer Equipment Co.
Meridian, MS 39301

Tubb-Williamson, Inc.
Jackson, MS 39216

Waters Truck & Tractor Co., Inc.
Columbus, MS 39701

Whitehead Equipment Co.
Pearl, MS 39208

The Wright Company
Tupelo, MS 38801

NORTH CAROLINA

Associated Agents
Greensboro, NC 27407

Arden Equipment Co., Inc.
Arden, NC 28704

Carem Equipment Co.
Raleigh, NC 27609

Carswell Distributing Co.
Winston-Salem, NC 27105

Carolina/Kenworth
Charlotte, NC 28213

Carolina Tractor & Equipment Co.
Charlotte, NC 28213

Case Power & Equipment
Raleigh, NC 27607

Case Power & Equipment
Charlotte, NC 28213

Comer Equipment Co.
Goldsboro, NC 27530

Cooper Kenworth
Durham, NC 27701

Cottle Equipment Co.
Wilmington, NC 28402

E. F. Craven
Greensboro, NC 27420

Cummins Carolinas Inc.
Charlotte, NC 28206

Diehl Equipment Co.
Raleigh, NC 27612

Dur-Ral Ford Trucks Sales, Inc.
Raleigh, NC 27620

Farm Equipment Co. of Asheville
Asheville, NC 28802

Garrett Ford Tractor Company
Hendersonville, NC 28739

Goforth Supply, Co.
Olin, NC 28660

Gregg Distributing Company
Stokesdale, NC 27357

Herring International Truck Center
Wilson, NC 27893

Industrial Truck Sales & Service, Inc.
Greensboro, NC 27402

Marion Equipment Co., Inc.
Logging Division
Marion, NC 28752

Mid-Atlantic Stihl
Durham, NC 27705

Mitchell Distributing Co.
Charlotte, NC 28232

R.W. Moore Equipment Co.
Raleigh, NC 27611

North Carolina Equipment Co.
Raleigh, NC 27602

G.G. Parsons Trucking Co.
N. Wilkesboro, NC 28659

Gregory Poole Equipment Co.
Raleigh, NC 27602

RimTrax
Salisbury, NC 28144

S & M Equipment Corp.
Greenville, NC 27834

Tidewater Equipment Co. of NC
Washington, NC 27889

Tractor Trailer Truck Parts Co.
New Bern, NC 28560

Tri-County Tractor Co., Inc.
Sanford, NC 27330

Tulloss Industrial Equipment Co., Inc.
Murfreesboro, NC 27855



H.E. Wilson Industries, Inc.
Burlington, NC 27215

Wooten Equipment Co.
Greensboro, NC 27410

Wrenn Brothers
Charlotte, NC 28230

OKLAHOMA

Smith Equipment Co.
Idabel, OK 74745



SOUTH CAROLINA

Case Power & Equipment
West Columbia, SC 29169

Cherokee Kenworth
Columbia, SC 29201

Clarklift of Charleston
Charleston, SC 29410

Clarklift of Columbia
Columbia, SC 29206

Coleman Co., Inc.
Greenville, SC 29608

Easom Truck Sales, Inc.
Greenville, SC 29604

Fairfield Tractor Co., Inc.
Columbia, SC 29201

Greenville Ford Tractor Sales
Greenville, SC 29602

Holley Tractor & Equipment Co., Inc.
Aiken, SC 29801

Jeff Hunt Machinery Co.
Columbia, SC 29202

Kenworth of Greenville, Inc.
Greenville, SC 29673

M & H Machinery Co., Inc.
Walterboro, SC 29488

Neel Tractor Company
Newberry, SC 29108

Piedmont Clarklift
Greenville, SC 29606

Pioneer Logging Machinery, Inc.
Lexington, SC 29072

Sea Coast Equipment, Inc.
Charleston, SC 29405

Senn Trucking Company
Newberry, SC 29108

Sun Machinery Company
Columbia, SC 29202

Sun Products Corporation
Spartanburg, SC 29304

Tidewater Equipment Co. of SC
Conway, SC 29526

Tree Farmer Equipment Co., Inc.
Moncks Corner, SC 29461

Van Lott, Inc.
West Columbia, SC 29169

W & W Trucks & Tractor Co.
Moncks Corner, SC 29461

Western Carolina Tractor Company
Columbia, SC 29290

TENNESSEE

The Bailey Co., Inc.
Nashville, TN 37208

BC Tractor Sales, Inc.
Hollow Rock, TN 38342

Bocats, Inc./Southeast Sales
Columbia, TN 38401

Central South Turf Dist., Inc.
Nashville, TN 37211

Contractors Equipment Co.
Memphis, TN 38118

Cummins Mid-South, Inc.
Memphis, TN 38116

Cunningham & Sons Implement
Dickson, TN 37055

Davidson Equipment, Inc.
Nashville, TN 37204

Hiwassee Equipment Co.
Charleston, TN 37310

Knoxville Mack Distributors
Knoxville, TN 37914

Memphis Blow Pipe Co.
Memphis, TN 38114

Memphis Concrete Silo Co.
Memphis, TN 38112

Midco Machinery Sales & Service
Memphis, TN 38116

Midco Equipment Co.
Memphis, TN 38117

Power Tool Company
Johnson City, TN 37601

Road Builders Equipment Co.
Memphis, TN 38101

Stowers Machinery Corp.
Knoxville, TN 37914

Taylor Machinery Co.
Memphis, TN 38116

Thompson & Green Machine Co., Inc.
LaVergne (Nashville), TN 37086

W.W. Williams Co.
Knoxville, TN 37922

Woodlands Equipment Co., Inc.
Charleston, TN 37310

United Road Machinery Co.
Memphis, TN 38104



TEXAS

Amarillo Ford Tractor, Inc.
Amarillo, TX 79102

Anderson Machinery Co.
Corpus Christi, TX 78408

Briggs-Weaver, Inc.
Houston, TX 77029

Chamco Services, Inc.
Longview, TX 75604

Control Equipment, Inc.
Wichita Falls, TX 76301

Darr Equipment Co.
Dallas, TX 75220

Datsun Lift of San Antonio
San Antonio, TX 78220

Dubose Ford Tractor & Equipment
Nacogdoches, TX 75961

W.A. Dubose & Sons
Lufkin, TX 75901

Equipment Headquarters, Inc.
Beaumont, TX 77702

ES Lift Trucks Unlimited, Inc.
Harlingen, TX 78550

George Bane, Inc.
Tyler, TX 75712

Gilco Forklift Company
Houston, TX 77087

Houston Tractor Equipment, Inc.
Houston, TX 77026

Industrial Forklift Trucks, Inc.
Abilene, TX 79601

Jackson Ford Tractor, Inc.
McKinney, TX 75069

Jasper Ford Tractor
Jasper, TX 75951

Log Hog Sales & Service
Corrigan, TX 75939

Miller Power Saws
Tyler, TX 75701

Mustang Tractor
Houston, TX 77001

Piney Woods Tractor & Implement
Lufkin, TX 75901

Shaw Equipment Co.
Dallas, TX 75222

Taylor Country Ford Tractor, Inc.
Abilene, TX 79602

Texarkana Mack Sales, Inc.
Texarkana, TX 75501

Timberjack, Inc.
Lufkin, TX 75901

Tom's Tractor Co., Inc.
Texarkana, TX 75501

Walter Terry Distributors
Houston, TX 77023



VIRGINIA

Alvan Tractor Company
Springfield, VA 22150

Allstate Equipment Co., Inc.
Norfolk, VA 23517

Beatley Equipment, Inc.
Richmond, VA 23222

Bemiss Equipment Corporation
Richmond, VA 23261

Blue Ridge Kenworth, Inc.
Abington, VA 24210

Buhrman & Sons, Inc.
Richmond, VA 23220

Carter Machinery
Salem, VA 24153

Case Power & Equipment
Ashland, VA 23005

Cavalier Logger Sales, Inc.
Franklin, VA 23851

Clarklift of Virginia Corp.
Norfolk, VA 23502

Cody Equipment Co.
Wyse, VA 24293

Cummins Mid-Atlantic
Richmond, VA 23234

Goodman Truck & Tractor
Amelia, VA 23002

Hampton Roads Tractor & Equipment Co.
Norfolk, VA 23501

Industrial Trucks, Inc.
Richmond, VA 23230

James River Equipment, Inc.
Richmond, VA 23228

McIntyre Equipment Corp.
Richmond, VA 23227

Millard's Machinery, Inc.
Martinsville, VA 24112

Phillips Machinery, Inc.
Richmond, VA 23228

Roanoke Equipment Co.
Salem, VA 24153

Shelton-Witt Equipment Corp.
Salem, VA 24153

Shenandoah Equipment Co.
Fishersville, VA 22939

Tidewater Supply Company
Norfolk, VA 23501

Trent Equipment Company
Lynchburg, VA 24502

Truck Enterprises, Inc.
Harrisonburg, VA 22801

Virginia Bearings & Supply Company
Richmond, VA 23225

Virginia Tractor Co., Inc.
Richmond, VA 23261

Western Branch Diesel, Inc.
Portsmouth, VA 23705

Yale Industrial Trucks-Richmond, Inc.
Richmond, VA 23224



APPENDIX 5

LIST OF SPONSORS OF TRADE SHOWS & DEMONSTRATIONS



REPORT G5176/1
MARKET STUDY

DEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA ONTARIO

MARKETING STUDY OF CANADIAN
FORESTRY MACHINERY AND EQUIPMENT
IN THE SOUTHEASTERN UNITED STATES

DATE: 23 AUGUST 1982

APPENDIX 5 - LIST OF SPONSORS OF TRADE SHOWS & DEMONSTRATIONS

Auburn University
Department of Forestry
Auburn, AL 36830

Mississippi Forestry Association
620 North State Street
Jackson, MS 39202

Berry College
Forestry Department
Rome, Georgia 30161

Southeastern Lumber Manufacturers
Association
P. O. Box 1606
Forest Park, Georgia 30051

Duke University
School of Forestry &
Environmental Studies
Durham, NC 27706

Southern Forest Products Association
P. O. Box 52468
New Orleans, LA 70152

Forest Industries
500 Howard Street
San Francisco, CA 94105

Timber Harvesting Magazine
P. O. Box 2268
Montgomery, AL 36197

Forest Products Research Society
2801 Marshall Court
Madison, WI 53705

University of Georgia
School of Forest Resources
Athens, GA 30602

Forestry and Harvesting
Training Center
Gulf Park Campus
Long Beach, MS 39560

Virginia Polytechnic Institute
and State University
School of Forestry
Blacksburg, VA 24061

Lumber Manufacturers Association
of Virginia Inc.
Box U
Sandston, VA 23150



APPENDIX 6

LIST OF UNIVERSITIES & COLLEGES OFFERING FORESTRY CURRICULUM



PROJECT G5176
MARKET STUDY

DEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA CANADA

MARKETING STUDY OF CANADIAN
FORESTRY MACHINERY AND EQUIPMENT
IN THE SOUTHEASTERN UNITED STATES

DATE: 23 AUGUST 1982

APPENDIX 6 - LIST OF UNIVERSITIES & COLLEGES OFFERING FORESTRY CURRICULUM

University of Arkansas
Department of Forestry
Monticello, AR 71655

Degrees Offered - B

University of Florida
School of Forest Resources
& Conservation
Gainsville, FL 32611

Degrees Offered - B, M, D

Auburn University
Department of Forestry
Auburn, AL 36830

Degrees Offered - B, M, D

University of Georgia
School of Forest Resources
Athens, GA 30602

Degrees Offered - B, M, D

Stephan F. Austin State
University
School of Forestry
Nacogdoches, TX 75961

Degrees Offered - B, M, D

Louisiana Tech University
School of Forestry
Ruston, LA 71270

Degrees Offered - B

Berry College
Forest Department
Rome, Georgia

Clemson University
College of Forest &
Recreation Resources
Clemson, SC 29631

Degrees Offered - B, M

Louisiana State University
School of Forestry &
Wildlife Management
Baton Rouge, LA 70803

Degrees Offered - B, M, D

Duke University
School of Forestry &
Environmental Studies
Durham, NC 27706

Degrees Offered - M, D

Mississippi State University
School of Forest Resources
Mississippi State, MS 39762

Degrees Offered - B, M, D

North Carolina State University
School of Forest Resources
Raleigh, NC 27650

Degrees Offered - B, M, D



APPENDIX 7

TRADE MAGAZINES & POTENTIAL READERSHIP



REPORT G5176/1
MARKET STUDY

DEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA ONTARIO

MARKETING STUDY OF CANADIAN
FORESTRY MACHINERY AND EQUIPMENT
IN THE SOUTHEASTERN UNITED STATES

DATE: 23 AUGUST 1982

APPENDIX 7 - TRADE MAGAZINES & POTENTIAL READERSHIP

American Forests
1319 Eighteenth Street, N.W.
Washington, DC
(F, CE)

Southern Lumberman
2916 Sidco Drive
Nashville, TN 37204
(SO)

American Logger and Lumberman
101 West Street
Hillsdale, NJ 07642
(LC, SO)

Timber Harvesting
P. O. Box 2268
Montgomery, AL 36197
(LC)

Forest Farmer
P. O. Box 95385
Atlanta, GA 30347
(F)

Timber Mart-South, Inc.
P. O. Box 1278
Highlands, NC 28741
(LC, SO)

Forest Industries
500 Howard Street
San Francisco, CA 94105
(LC, SO, CE)

Timber Processing
P. O. Box 2268
Montgomery, AL 36197
(SO)

Journal of Forestry
5400 Groszenor Lane
Bethesda, MD
(F, CE)

Wood Tick
Wadley, GA 30477
(LC)

The Logger and Lumberman
210 N. Main Street
Wadley, GA 30477
(LC, SO)

Logging Management Magazine
300 W. Adams Street
Chicago, IL 60606
(LC, CE)

READERSHIP LEGEND

- F - Foresters
- LC - Logging Contractors
- SO - Sawmill Operators
- CE - Corporate Executives

Southern Loggin' Times
P. O. Box 2268
Montgomery, AL 36197
(LC)



APPENDIX 8

SAWMILLS EXCEEDING PRODUCTION OF 25 MMBF/A OR 100 MBF/8 HOUR SHIFT



REPORT G5176/1
MARKET STUDY

DEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA ONTARIO

MARKETING STUDY OF CANADIAN
FORESTRY MACHINERY AND EQUIPMENT
IN THE SOUTHEASTERN UNITED STATES

DATE: 23 AUGUST 1982

APPENDIX 8 - SAWMILLS EXCEEDING PRODUCTION OF 25 MMBF/A OR 100 MBF/8 HOUR SHIFT

ALABAMA

Abbeville

Alabama Forest Products Inc.,
A Great Northern Nekoosa Co.
Box 639, Abbeville, AL 36310

Albertville

East Highlands Co., Forest Products
Div., Sub of Bowater Inc.
Box 746, Albertville, AL 35950

Bellamy

American Can Co., Allison Lumber
Products Div.
Box 1, Bellamy, AL 36901

Brewton

T.R. Miller Mill Co. Inc.
Deer St., Box 708,
Brewton, AL 36426

Chapman

Union Camp Corporation
Building Products Div.
Box 38, Chapman, AL 36015

Citronelle

Georgia-Pacific Corporation
Southern Division
Box 278, Citronelle, AL 36522

Fayette

Georgia-Pacific Corporation
Crossett Division
Fayette, AL 35545
Mailing address: Box 659,
Belk, AL 35545

Fulton

Scotch Lumber Company
Fulton, AL 36446

Hamilton

W.T. Vick Lumber Company
Box 367, Hamilton, AL 35570

Jackson

M.W. Smith Lumber Co. Inc.
Box 667, Jackson, AL 36545

Lafayette

East Alabama Lumber Co. Inc.
910 - 9th Avenue, SE,
Lafayette, AL 36862

Maplesville

Hammermill Paper Co.,
Southern Forest Products Div.
Box 63, Maplesville, AL 36750

Millport

Weyerhaeuser Co.
Box W, Millport, AL 35576

Mobile

Gulf Lumber Co. Inc.
1850 Conception St., Box 1663,
Mobile, AL 36601

Monroeville

Harrigan Lumber Co. Inc.
Drawer 926, Monroeville, AL 36460

Mount Vernon

Scott Paper Co.,
Mobile River Sawmill Division
Mount Vernon, AL 36560

Pine Hill

MacMillan Bloedel Inc.
Division of MacMillan Bloedel Ltd.
Pine Hill, AL 36769



Vance

Longleaf Milling Co. Inc.,
Sub. of Ray E. Loper Lumber Co. Inc.
Box 213, Vance, AL 35490

Westover

Kimberly-Clark Corp.
Coosa Forest Products Div.
Westover, AL 35185

ARKANSAS

Bearden

Bearden Lumber Co. Inc.
Div. of Anthony Timberlands Inc.
Box 155, Bearden, AR 71720

Crossett

Georgia-Pacific Corp.
Crossett Div.
Box 520, Crossett, AR 71635

Dierks

Weyerhaeuser Co.
Southwest Arkansas Region
Box 38, Dierks, AR 71833

El Dorado

Georgia-Pacific Corp.
Crossett Division
Box 1511, El Dorado, AR 71730

Glenwood

Georgia-Pacific Corp.
Crossett Div.
Box 407, Glenwood, AR 71943

Gurdon

International Paper Co.
Wood Products Businesses
Box 208, Gurdon, AR 71743

Hamburg

P.E. Barnes Lumber Co. Inc.
Rte. 3, Box 7, Hamburg, AR 71646

Hope

Edward Hines Lumber Company
Hope Division
West Ave., B, Box 69,
Hope, AR 71801

Hot Springs

B. G. Wilson Lumber Co. Inc.
Rte. 6, Box 515,
Hot Springs, AR 71901

Huttig

Manville Forest Products Corp.
Huttig, AR 71747

Leola

International Paper Co.,
Wood Products Businesses
Box 95, Leola, AR 72084

H.G. Toler & Son Lumber Co. Inc.
Box 125, Leola, AR 72084

Mountain Pine

Weyerhaeuser Company
Oklahoma/Arkansas Region
Mountain Pine, AR 71956

Murfreesboro

Weyerhaeuser Company
Box 338, Murfreesboro, AR 71958

Nashville

Edward Hines Lumber Company
Box 1630 Nashville, AR 71852

Norman

Lumbermill Properties Ltd.,
Caddo Valley Mills Division
Hwys. 8 & 27 S., Box 98,
Norman, AR 71960

Pine Bluff

W.S. Fox & Sons Inc.
Box 7227, Pine Bluff, AR 71601

Plumberville

Pinecrest Lumber Co.
Box 156, Plumberville, AR 72110

Prescott

Potlatch Corp., Ozan Unit,
Wood Products Group, Southern Div.
Box 619, Prescott, AR 71857

Russellville

Bibler Bros. Inc., Sub. of Nekoosa
Papers Inc., Hwy, 7S., Box 490
Russellville, AR 72801

Stamps

Georgia-Pacific Corp.,
Crossett Division
Box 277, Stamps, AR 71860

Waldo

Deltic Farm & Timber Co. Inc.
Box 409, Waldo, AR 71770

Warren

Potlatch Corp., Southern Div.,
Wood Products Group, Bradley
Unit., Box 390,
Warren, AR 71671

FLORIDACross City

Georgia-Pacific Corp.,
Southern Division
Box 3-F, Cross City, FL 32628

Havanna

Costal Lumber Co.,
Dubarco Division
Box 736, Havanna, FL 32333

Maxville

Gilman Paper Co., Building
Products Division
Maxville, FL 32265

Tampa

Robbins Mfg. Company
Box 437, Tampa, FL 33601

GEORGIAAdel

Del-Cook Lumber Co.
Box 499, Adel, GA 31602

Ailey

H.V. & T.G. Thompson Lumber Co. Inc.
Box 159, Ailey, GA 30410

Alto

Blalock Lumber Co.
Alto, GA 30510
Mailing Address: Box 428,
Cleveland, GA 30528

Appling

Pollard Lumber Co. Inc.
Appling, GA 30802

Augusta

Continental Forest Industries
The Continental Group Inc.,
Building products Division
Box 1437, Augusta, GA 30903

Blackshear

Gilman Paper Co., Building Products
Div., Box 388,
Blackshear, GA 31516

Brooklet

W.M. Sheppard Lumber Co. Inc.
Rte. 2, Brooklet, GA 30415

Camak

ITT Rayonier Inc., Camak Lumber Div.
Box 107, Camak, GA 30807

Cleveland

Blalock Lumber Co.
Box 428, Cleveland, GA 30528

Covington

Williams Bros. Lumber Co.
7250 Washington St.,
Covington, GA 30209

Cuthbert

Burgin Lumber Co. Inc.
Villa Nova St., Box 60,
Cuthbert, GA 31740

Dudley

Gilman Paper Co., Building
Products Div., Box 127,
Dudley, GA 31002

Eatonton

International Paper Co.
Wood Products Businesses
Box 69, Eatonton, GA 31024

Greenville

Georgia Kraft Company
Woodkraft Div.
Rte. 3, Box 10.,
Greenville, GA 30222

Hazlehurst

Continental Forest Industries
The Continental Group Inc.,
Building Products Division
Box 416, Hazlehurst, GA 31539

Thompson Timber Co. Inc.

Baxley Hwy., Box 633,
Hazlehurst, GA 31539

Lumpkin

St. Regis Paper Co.
Allied Operations,
Lumber & Plywood Div.
Randall's Coffin, Box 36A,
Lumpkin, GA 31815

Madison

Georgia Kraft Co.,
Woodkraft Division
Box WK, Madison, GA 30650

Meldrim

Union Camp Corp., Building
Products Div. Higgston Plant
Box N, Meldrim, GA 31318
Mailing Address: Box N,
Vidalia, GA 30474

Pearson

Pearson Wood Products,
Div. of Brunswick Pulp & Paper
Pearson, GA 31642

Swainsboro

St. Regis Paper Co.
Allied Oper., Lumber & Plywood Div.
Box 768, Swainsboro, GA 30401

Thomasville

Balfour Lumber Co. Inc.
W. Clay St., Box 1337,
Thomasville, GA 31792

Valdosta

The Langdale Co.
Madison Hwy., Box 1088,
Valdosta, GA 31601

Washington

Burt Lumber Co. Inc.
Box 220, Washington, GA 30673

Continental Forest Industries, The
Continental Group Inc., Building
Products Div., Sharron Rd.,
Box 670, Washington, GA 30673

Waynesboro

Kimberly-Clark Corp., SE U.S. Forest
Products Div., Box 672,
Waynesboro, GA 30830

LOUISIANAAlexandria

Louisiana-Pacific Corp.
1028 Fenner Street, Box 7798,
Alexandria, LA 71301

Amite

Clemons Bros. Lumber Co.
US 51 South, Box 225,
Amite, LA 70422

Castor

Martin Timber Co. Inc.
Box 99, Castor, LA 71016

Coushatta

Pineville Kraft Corp., Wood Products
Div., Box 582,
Coushatta, LA 71019

De Quincy

Boise Southern Co.,
Box 2000, De Quincy, LA 70633

Dodson

Willamette Industries Inc.,
 Dodson Lumber Division
 Hwy. 167, Dodson, LA 71422

Fisher

Vancouver Plywood Co. Inc.
 Fisher, LA 71426
 Mailing Address: Box 128,
 Florien, LA 71429

Fluker

Conway Guiteau Lumber Co.
 Fluker, LA 70436
 Mailing Address: Box 818,
 Amite, LA 70422

Joyce

Crown Zellerbach, Southern
 Wood Products Div.
 Box 1, Joyce, LA 71440

Natalbany

Batson Lumber Co. Inc.
 Hwy. 51 N, Box 189,
 Natalbany, LA 70451

Newellton

W.E. Parks Lumber Co.
 Box 248, Newellton, LA 71357

Pine Grove

Olson Lumber Co. Inc.
 Hwy. 16 E., Rte. 1, Box 0
 Pine Grove, LA 70453

Varnado

Joe P. Miles & Sons Inc.
 Box 158, Varnado, LA 70467
 Mailing Address: Box 158,
 Bogalusa, LA 70427

Winnfield

Manville Forest Products Corp.
 King St., Box 270,
 Winnfield, LA 71483

MISSISSIPPIAckerman

TMA Forest Products
 Div. of Tennessee River
 Pulp & Paper Co., Hwy. 12, W.
 Box 411, Ackerman, MS 39735

Bay Springs

Georgia-Pacific Corp., Crossett Div.
 Box 570, Bay Springs, MS 39422

Brookhaven

Columbus Lumber Co., Div. of Hill-
 Behan Lbr. Co., Box 536,
 Brookhaven, MS 39601

Bruce

Weyerhaeuser Co.
 Box 577, Bruce, MS 38915

Columbia

Georgia-Pacific Corp., Crossett Div.
 Box 563, Columbia, MS 39429

Crosby

Masonite Corp., Southern Lumber Div.
 Box 608, Crosby, MS 39633

Grenada

Hankins Lumber Co. Inc.
 Drawer H, Grenada, MS 38901

Hattiesburg

Masonite Corp., Southern Lumber Div.
 Box 1922, Hattiesburg, MS 39401

Hazlehurst

Copiah County Mfg. Co.
 Jackson St. Ext., Box 729
 Hazlehurst, MS 39083

Edward Hines Lumber Co.

Hazlehurst Div., Box 767,
 Hazlehurst, MS 39083

Hermanville

Masonite Corp., Southern Lumber Div.
 Box 188, Hermanville, MS 39086

Lumberton

Joe N. Miles & Sons, Inc.
 Box 92, Lumberton, MS 39455

Meridian

American Can Co., Sanders Lumber
 Products Div., 410 - 18th Ave.,
 Box 2171, Meridian, MS 39301

Morton

Molpus Lumber Co.
 Box 310, Morton, MS 39117



New Augusta

Leaf River Forest Products Co.
New Augusta, MS 39462

Philadelphia

Weyerhaeuser Co., Philadelphia
Operation, Box 708,
Philadelphia, MS 39350

Port Gibson

W.E. Park Lumber Co.
Box 309, Port Gibson, MS 39150

Quitman

Masonite Corp., Southern Lumber
Div., Drawer E,
Quitman, MS 39355

Roxie

Georgia-Pacific Corp., Crossett
Div., Box 36, Roxie, MS 39661

Shuqualak

Shuqualaka Lumber Co. Inc.,
Sawmill Division, Box 87,
Shuqualak, MS 39361

Silver Creek

Joe N. Miles & Sons Inc.
Box 114,
Silver Creek, MS 39663

Taylorsville

Georgia-Pacific Corp.,
Crossett Div., Box 627,
Taylorsville, MS 39168

Waynesboro

Longleaf Forest Products Inc.,
Sub of North Pacific Lumber
Co., Box 637, Waynesboro, MS
Waynesboro, MS 39367

Wiggins

International Paper Co., Wood
Products Businesses, Box 37,
Wiggins, MS 39577

NORTH CAROLINA

Creedmoor

Butlet Land & Timber Co. Inc.
Sub. of Butler Lumber Co. Inc.
Creedmoor, NC 27522

Champion Building Products,
Div. of Champion International
Creedmoor, NC 27522

Dudley

Georgia-Pacific Corp., Southern Div.
Box 39, Dudley, NC 28333

Elizabeth City

L.R. Foreman & Sons Inc.
Box 1306,
Elizabeth City, NC 27909

Lewiston

Weyerhaeuser Co., Lewiston Div.
Box 274, Lewiston, NC 27849

Mebane

Mebane Lumber Co. Inc. Bldg. Supply
Div./Mfg. Div., Box 160,
Mebane, NC 27302

New Bern

Weyerhaeuser Co., Box 1391,
New Bern, NC 28560

Plymouth

Weyerhaeuser Co., Box 826,
Plymouth, NC 27962

Riegelwood

Federal Paper Board Co. Inc., Wood
Products Department, Armour Plant
Box 57, Riegelwood, NC 28456

Wade

Wade Wood Inc., Box 168,
Wade, NC 28395



OKLAHOMA

Idabel

Reynolds-Wilson Lumber Co.
Box F, Idabel, OK 74745

Wright City

Weyerhaeuser Co., Oklahoma
Region, Box 269,
Wright City, OK 74766

SOUTH CAROLINA

Allendale

Collum's Lumber Mill Inc.
Barnwell Rd.,
Allendale, SC 29810

Conway

Red Hill Chip Corp.
Div. of New South Forest
Industries, Hwy. 501,
Box 1505, Conway, SC 29526

Florence

Charles Ingram Lumber Co. Inc.
Florence, SC 29503

Holly Hill

Holly Hill Lumber Co.,
Four Holes Div., Box 128,
Holly Hill, SC 29059

Johnston

Continental Forest Industries,
Building Products Div., The
Continental Group Inc.
Rte. 2, Box 488,
Johnston, SC 29832

Newberry

Champion Building Products, Div.
of Champion International,
Newberry, SC 29145
Mailing Address: Box 10,
Silverstreet, SC 29145

Federal Paper Board Co. Inc.

Box 697, Newberry, SC 29108

Sampit

International Paper Co., Wood
Products Businesses,
Sampit, SC 29440,
Mailing Address: Box 807,
Georgetown, SC 29440

Summerville

Westvaco Corp.
Maple St., Box 2078,
Summerville, SC 29483

Walterboro

Holly Hill Lumber Co.,
Walterboro Div., Hwy. 64,
Walterboro, SC 29488

TEXAS

Camden

Champion Building Products, Div. of
Champion International, Farms Rd. 62
Box 77, Camden, TX 75934

Carthage

Louisiana-Pacific Corp., Southern
Div., Box 688, Carthage, TX 75633

Cleveland

Kirby Forest Industries, Inc.
Hwy. 105 E., Box 1571,
Cleveland, TX 77327

Williams Forest Products Corp.

Box 1713, Cleveland, TX 77327

Diboll

Temple-Eastex Inc., Temple Div.,
Drawer N, Diboll, TX 75941

Henderson

International Paper Co., Wood
Products Businesses, Box 709,
Henderson, TX 75652

Huntsville

Walker Bros. Lumber Co. Inc.
Huntsville, TX 77340



Jasper

Louisiana-Pacific Corp.,
Southern Div., Box 730,
Jasper, TX 75951

Owens-Illinois Inc., Forest
Products Div., Box 1000,
Jasper, TX 75951

Livingston

Leggett Lumber Co. Inc.
Box 1049,
Livingston, TX 77351

Marshall

Snider Industries, Lumber Div.
Sue Belle Lake Rd., Box 668,
Marshall, TX 75670

New Boston

International Paper Co., Wood
Products Businesses
New Boston, TX 75570

Silsbee

Kirby Forest Industries Inc.
Div. of Santa Fe Industries
Inc., Box 577,
Silsbee, TX 77656

VIRGINIA

Franklin

Union Camp Corp., Building
Products Div.,
Franklin, VA 23851

Lawrenceville

Butler Lumber Co. Inc.
Lawrenceville, VA 23868

McKenney

Continental Forest Industries
Box 360, McKenney, VA 23872

Waverly

Gray Lumber Co.
Main St., Waverly, VA 23890



APPENDIX 9

LIST OF CORPORATE CONTACTS FOR LUMBER PROCESSING EQUIPMENT



REPORT G5176/1
MARKET STUDY

DEPARTMENT OF EXTERNAL AFFAIRS
OTTAWA ONTARIO

MARKETING STUDY OF CANADIAN
FORESTRY MACHINERY AND EQUIPMENT
IN THE SOUTHEASTERN UNITED STATES

DATE: 23 AUGUST 1982

APPENDIX 9 - LIST OF CORPORATE CONTACTS FOR LUMBER PROCESSING EQUIPMENT

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Augusta, GA 30903

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Georgia-Pacific Corporation
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Crossett, AR 71635

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International Paper Company
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Dallas, TX 75240

Mr. Mike Golasinski
ITT-Rayonier, Incorporated
P. O. Box 45165
Atlanta, GA 30320

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Union Camp Corporation
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Mr. Larry Raines
Union Camp Corporation
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