Economic-Engineering Simulation of Cotton Ginning Costs

GINMODEL: Program Documentation and User's Guide

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ABSTRACT

A computerized model for estimating cotton ginning costs over a wide range of assumptions has been developed employing an economic-engineering or synthetic-modeling technique. Resulting cost relationships are useful to analyze the economic impact of technological and regulatory changes on the cotton ginning industry. GINMODEL can be used for both policy analysis and for providing management information to the industry.

This documentation presents model assumptions, computational methods, cost categories and cost items in the description section. The technical appendices contains a definition of terms, program flow charts and listings, program setup and execution instructions, input/output data layout, and a sample run showing the input data and resulting output.

Keywords: Cotton ginning, economic-engineering models, computer programs, documentation, technology assessment, costs impacts, gin operating costs.

PREFACE

This report is one in a continuing series of studies designed to develop and report the cost of ginning cotton in the United States. It documents and gives instructions for using GINMODEL, an economic-engineering simulation model for estimating cotton ginning costs. The purpose of a computer program or model documentation is to provide the details which will aid others in using the program but, more importantly, aid those who desire to modify, revise or improve a program. It is hoped that this documentation will provide the readers with adequate information regarding data requirements, model assumptions and program operation to allow development of data sets to simulate ginning costs useful to them. The GINMODEL program is a base from which improvements can be made. This publication is not intended to provide estimates of ginning costs but to provide a tool that can be used to economically and rapidly analyze the impact on ginning costs of various alternatives faced by the cotton ginning industry.

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CONTENTS

ECONOMIC-ENGINEERING SIMULATION OF COTTON GINNING COSTS

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INTRODUCTION

Dynamic change and uncertainty dominate the current economic environment of the U.S. cotton ginning industry. Combined conditions of rapidly rising input costs, chronic excess ginning capacity, large fluctuations in both planted acreage and per acre yields, and shifts in production continue to force gin firms out of business. Recent technological, institutional, and regulatory developments allow, and may force, ginners to look at many alternatives regarding seed cotton handling, storage, gin feeding, bale packaging, operating hours, wage rates and so forth.

Cotton ginners charged U.S. cotton producers 337.7 million dollars ($32.87 per bale) to process their 1976 cotton crop of 10,274,000 bales (2).[2/] Ginning costs account for one-half the total off-farm costs between the farm and mill consumer with farm to gin assembly accounting for 15 percent and merchandising for the other 35 percent (11,21). Ginning costs prior to the 1973 crop year equalled about 20 percent of the revenue producers received for lint and seed (6). The relatively large increase in lint and seed revenue compared to ginning costs during the 1973 through 1976 season reduced this percentage considerably. However, lower lint and seed prices in 1977 coupled with generally higher ginning charges has

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2/ Underscored figures in parentheses refer to items in the References.

pushed the ratio of ginning charge to total revenue back above the 20 percent level. Cotton gins in the United States provided employment for an estimated 92,000 people with a payroll of over $115 million in 1973 (14). Labor related costs account for about 40 percent of total ginning costs (21).

During the past decade, total U.S. cotton production ranged from a low of 7.5 million bales in 1967 to over 14 million bales in 1977 causing average volume per gin to fluctuate from 1,770 in 1967 to an all time high of over 5,200 bales in 1977. Large year to year variations in production create a situation wherein most gins experience only one or two high volume years out of 10; gins operate at much lower volumes or percent utilization levels most of the time and usually at a higher average cost level due to the fixed nature of many cost items. The number of active cotton gins in the U.S. peaked at over 30,000 at the turn of the 20th century and has continually decreased to only 2,689 active gins for the 1977 season (24, 25,26). During the past 10 crop years, the number of active gins decreased by 1,529 (4,218 in 1968 to 2,689 in 1977) or 36 percent.

The basic function of all cotton gins is to separate the lint from the seed, however there is wide diversity in size and age of plants, equipment and labor required, operating procedures, utilization rates and many other factors. Moving from west to east across the Cotton Belt, gins tend to be smaller in size, older, and process lower volumes. Average hourly ginning capacity in 1974 ranged from 12.6 bales in California to 7.7 bales in North Carolina, with an U.S. average of 10.6 bales. Average volume per gin and resulting utilization of seasonal ginning capacity is also much higher in the West even with larger plants, averaging near full

utilization in years of large production compared to less than 30 percent utilization in many South Central and Southeast states based on conventional measurements of capacity utilization (5).

Investment in gin plants range from as little as 50 thousand dollars for older, smaller plants to over 2 million dollars for new high capacity gins (17). Investment requirements for gins of comparable size almost doubled from 1965-66 to 1976-77 (12,23,30). Wage rates for gin labor nearly doubled during the same period. Electrical energy, natural gas and other fuels, repair parts and other input items have shown rapid cost increases in recent years. Revenue received for ginning services has generally increased much more slowly than costs, forcing those gins remaining in operation to become more cost conscious.

In an effort to become more efficient many ginners are considering or have adopted recent technological developments in seed cotton storage and handling systems, gin feeding systems, and bale packaging and handling systems. Ginners have a wide choice of commerically available systems, each with its own capital requirements and impact on hourly and seasonal ginning capacity and volume, labor and energy requirements, cost of inputs such as bagging and ties, and other aspects of gin operation (1,4,13,16,19,28). In addition to deciding which systems to adopt, ginners must evaluate the results of adding the new technology to an existing gin compared to new gin construction (17). Firms that operate more than one gin plant also need to evaluate alternatives regarding the number and size of their gins with varying amounts of seed cotton storage.

Current and proposed regulation such as minimum wage rates, overtime exemptions, California Industrial Welfare Commission's six day week rule,

EPA air quality requirements, the OSHA cotton dust proposal and other Federal, state and local regulations must be considered by ginners (13, 14,18,21,31). The impact of these regulations and of adoption of new technologies will vary considerably from region to region and gin to gin. Many of the problems and alternatives faced by ginners are similiar in nature but the economic impact and best course of action for individual gin firms may differ considerably. Thus, an analytical tool or method is needed to examine impacts and estimate total and per bale costs for various configurations of gin equipment, alternative technologies, and assumptions regarding regulations. Such a tool can be useful for examining impacts on ginning costs of various alternatives faced by the cotton ginning industry (21,28).

This paper describes GINMODEL and gives instructions for its use. The paper is composed of two main sections; 1) Description and 2) Technical Appendices. The first section contains the basic model logic, cost structure, assumptions and computational methods. The Technical Appendices give the technical detail necessary to set-up and run the model and interpret the results. It includes a definition of terms, program flow charts and listings, input data coding requirements and a sample run showing data input required and resulting output.

DESCRIPTION

GINMODEL is a computerized model for estimating cotton ginning costs. The technique used is the economic-engineering, or synthetic model, procedure. This procedure synthesizes production and cost relationships from engineering data or other estimates of production function components. The technique attempts to create, within an assumed framework,

model plants of specific capacity, equipment, labor force, efficiency level, and operational procedures. The framework to which these elements are attached consists of the prevailing managerial techniques, market practices and other institutional aspects common to the industry. Once a plant has been designed and organized into an efficient and workable organization, it becomes possible to attach physical and monetary coefficients to the various inputs, and hence, to calculate total and unit product costs (3).

GINMODEL is programed with most, if not all major items such as gin size, annual processing hours, crew requirements, wage rates, efficiency levels, equipment specifications, dryer fuel types, technology levels, and geographic areas as variables. By providing the appropriate input data relationships (specified in the input section of appendix C) to cover a wide range of operating procedures, GINMODEL can be used to analyze combinations of 1) existing gins; 2) theoretical new gins; and 3) hypothesized technological, institutional and regulatory changes or additions to existing or new gins. Once an input data base is developed for an existing or theoretical gin it is relatively easy to evaluate alternatives from that base by making the necessary changes in the input data and rerunning the model to reflect the alternatives under consideration. GINMODEL is designed to read input data for a gin plant and then develop and print out five sets of cost data for that plant (see appendices C and F). Any number of plants or alternative specifications for a plant can be processed in a single run.

The large variations in annual production requires estimates of operating costs over a wide volume or utilization range for a given size

gin plant to allow construction of an average cost curve. The GINMODEL program is designed to develop costs for 10 utilization-volume levels from 100 percent down to 10 percent. This provides the data needed to plot the "before" and "after" cost curves resulting from adoption of new technology or imposition of a new regulation as well as being able to compare cost-volume relationships among gins with different capacities and locations.

ASSUMPTIONS AND METHODOLOGY

Several basic assumptions regarding gin management and operation are required before and during input data development for a run. The more important assumptions and computational methods are summarized below, others are included in appendices A and C.

Capacity, Utilization and Processing Hours

Rated capacity of cotton gins is generally expressed in bales per hour of the gin stands, although in many gin plants some other equipment such as suction, overhead cleaners and conveyors, or press may be the limiting factor. Actual production per hour and total bales for the season will depend on many factors, such as quality and condition of the crop, condition of gin, crew ability, hours of operation, ownership of the cotton and gin, and so forth. Most previous ginning cost research has used 906 hours as the maximum number of processing hours, and an efficiency or through-put rate of 85 percent of rated capacity (6,10,12,23,30).

The 906 processing hours were based on typical harvesting patterns using trailers and no other seed cotton storage (30). The use of seed cotton storage allows harvesting to proceed at a faster rate than ginning and may improve the efficiency of harvesting, assembly and ginning. Many gins do not normally operate as many as 900 hours per season but a few

gins using seed cotton storage are operating 2,000 hours or more. The 85 percent efficiency was a "goal" or standard to obtain. Recent research indicates conventional gins usually operate on the average at less than 85 percent of rated capacity and that the type of feeding system can have a major impact on gin through-put or efficiency percentage as does trash and moisture content of the seed cotton and other factors (4,9,15,28). The efficiency level can be adjusted to reflect the impact of trash content on costs. For example, in West Texas during the 1971 and 1975 seasons, seed cotton requirements per bale of lint were 35 percent greater than normal. This in effect would reduce an 85 percent efficiency level to about 62 percent with resulting reductions in seasonal volume and increases in labor and energy requirements and costs per bale.

To allow simulation of ginning costs over wide ranges of rated capacities, efficiency levels and annual processing hours, these three factors are all read in as variables in GINMODEL.

GINMODEL maximum, or 100 percent utilization, annual volume for a given gin for a run depends on three factors; 1) rated capacity in bales per hour; times 2) average efficiency percentage of rated capacity obtained over the season; times 3) total number of processing hours. The 100 percent utilization volume and processing hours are reduced in 10 percent increments from 100 to 10 percent and costs are developed at each of the 10 utilization levels. For example, a gin rated at 14 bales per hour capacity operating at 85 percent efficiency for 906 hours would process 10,781 bales at its 100 percent capacity utilization level, 9,703 at 90 percent, 8,625 at 80 percent and so forth, down to 1,078 at 10 percent. Changing any one of these three factors results in a change in the seasonal volume levels.

Capital Requirements

A maximum of 15 capital asset items can be specified in the input data. Original costs, salvage value percentage, years of life, hours to wearout, and a fixed repair rate are entered for each item (see appendix F, sample run). This feature allows for grouping of assets such as land, land improvements, buildings, equipment, and for the addition of such things as a universal density press, module feeder or air pollution control equipment. It also allows for using different salvage values, years of life and repair rates for each item if desired.

Cost Categories

This model departs from the conventional definition of fixed and variable cost items by specifying fixed and variable components for almost all cost items. The fixed cost components for a specified plant do not vary in total annual dollar cost regardless of seasonal volume levels; the variable components do vary with volume processed but not necessarily in direct proportion to volume.

The relationship between the fixed and variable components of a cost item such as labor depends on several factors and will vary considerably from gin to gin and area to area (22). The GINMODEL structure allows considerable flexibility in specifying fixed and variable proportions of most cost items depending on the management and operating practices followed or being considered by the specific gin under study. These component categories are summarized in table 1 and explained in the following discussion of each cost item.

Capital Costs

Depreciation and interest are based on the standard present value

Table 1 -- Summary of GINMODEL total dollar cost structure[1/]

Cost items	Total dollar cost depends on: Fixed component(s)	Total dollar cost depends on: Variable component(s)
Depreciation	Years to obsolesence	Hours of use
Interest		
Capital investment	Years of useful life and interest rate	None
Working capital	Interest rate times 25 percent of total fixed cost excluding depreciation and interest	Interest rate times 25 percent of total variable cost excluding variable depreciation
Insurance	Property insurance; percent of capital investment	Commodity insurance; bales ginned
Property taxes	Percent of capital investment	None
Management		
Gin manager Superintendent Office manager	Annual salary for each title including insurance SS, WC, housing, auto, and other fringe benefits	Per bale bonus over a specified annual volume level for each title
Labor		
Ginners-full time	Annual salary or base pay for each title including insurance, SS, WC, housing auto, and other fringe benefits	Overtime hours worked by seasonal crew, if applicable
Other gin employees-full time		
Seasonal office	None	Processing hours and variable non-processing hours, overtime hours, wage rates, fringe benefits, and number of employees
Seasonal gin crew	Fixed non-processing hours, wage rates, fringe benefits, and number of employees	
Energy		
Electrical power	Demand or horsepower charge	Kilowatt hours consumed above that allowed under demand charge
Dryer fuel	Minimum or meter charge	Consumption
Bagging and ties	None	Bales ginned
Repairs	Percent of capital investment	Bales ginned
Miscellaneous	Annual dollar value	Bales ginned
Total	Sum of above items	Sum of above items

1/ The fixed and variable total dollar cost structure is given in appendix F output data set 2, TD-MATRIX.

annuity formula[3/] rather than on the average investment concept to allow full recovery of capital investment (27). Years of life and interest rate are used in the standard annuity formula to develop annual capital costs. Depreciation is based on the straight line method using years of life to wearout or obsolesence, whichever comes first. Annual processing hours times years to obsolesence is compared to hours to wearout; if hours to wearout is smaller, annual processing hours are divided into hours to wearout to determine years of life for depreciation. Depreciation is subtracted from annual capital costs and the balance is average annual interest on capital investment. When high annual hours of use causes depreciation over shorter time than years to obsolesence, depreciation is divided into fixed and variable categories. Fixed depreciation cost is equal to depreciation "as if" the item was depreciated over years to obsolesence and variable depreciation cost is the additional depreciation due the shorter life. This allows a way to estimate capital costs recovery over fewer years if volumes can be increased by such means as seed cotton storage. If desirable, a salvage value, as a percent of original cost, can be specified for each capital asset item.

Insurance and Taxes

Property insurance is capital asset cost times the co-insurance percentage times an insurance rate for all capital items except land and is considered a fixed cost. Seed cotton or product insurance is read in as

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3/ $P = R \left(\frac{1-(1+i)^{-n}}{i}\right)$

Where: P = present value
R = payment per conversion period
i = discount rate per conversion period
n = number of conversion periods

a variable cost per bale ginned. All insurance related to employees is included with the various employee costs.

Property taxes are capital asset cost times a property tax rate and are assumed to be a fixed cost.

The above capital costs are developed for each of the up to 15 capital asset items and then summarized into totals for the plant. Costs, both fixed and variable, are developed for each of the 10 utilization levels. The totals are placed into the total dollar (TD) cost matrix (see appendix F, sample run output data set 2).

Labor and Management

Gins typically have some annual salaried management and office employees, although all do not. They may or may not have a superintendent, head ginner and other employees hired on a year around, full time basis. When employed full time these employees may be salaried or hourly. The bulk of the gin crew is normally seasonal hourly employees. The number of employees in each title, length of employment, and basis for pay depends on many factors. Among the more important are gin size, geographic region, normal annual volume, and ownership or management philosphy. Gins in the West tend to have more full time year around salaried employees than gins in the South (22). Mississippi Delta gins tend to have mainly seasonal hourly employees except for a manager. West Texas gins tend to have one or more year around ginners or other employees, ususally paid by the hour, rather than an annual salary as in California. Hourly wage rates and salaries also vary widely both within and among geographic regions. Recent studies show employee salaries, wages and related costs average 30 to 40 percent of total gin operating costs (5,8,20,21,29).

In order to realistically represent and develop cost estimates for the wide array of labor relationships commonly found, the following categories of employees are specified, but it is not necessary to have employees in each.

Title	Bases for pay
1. Gin manager	Salaried full time, year around
2. Office manager	Salaried full time, year around
3. Superintendent	Salaried full time, year around
4. Salaried ginners	Salaried full time, year around
5. Salaried other gin employees	Salaried full time, year around
6. Seasonal office crew	Hourly seasonal
7. Seasonal gin crew	
a. Ginners	Hourly seasonal
b. Assistant ginners	Hourly seasonal
c. Head press operators	Hourly seasonal
d. Other gin crew members	Hourly seasonal

Labor requirements and wage or salary basis must be determined outside the model itself and considered as a group to insure adequate management and operating labor for the specified plant under consideration. Specification of the number of seasonal office employees should consider whether or not there is a salaried office manager or bookkeeper. The number of hourly seasonal gin employees will depend to some extent on the number of salaried ginners and other salaried employees. The computational procedures for the 100 percent and 9 reduced utilization levels for each of the labor-management titles are discussed below.

Gin Manager, Office Manager and Superintendent

For each title a specified annual cost including salary, social security tax (SS), workmen's compensation (WC) and other insurance, housing, automobile and other allowances is read in. This is considered a fixed cost and is placed into the total dollar cost matrix for each item at all 10 utilization levels. A gin usually will not have more than one employee

in each of the above three titles. If a gin has more than one employee in any of these titles the total annual costs for all employees in that title would be read in.

In addition some gins pay the above employees a bonus or commission based on volume or profit. To accommodate this variation, a base annual volume level and a per bale adjustment rate above the base volume are also read in for each title (7). A check is made to see if volume processed is greater than the base volume, and if such is the case, the difference is multiplied by the adjustment rate. The adjustment amount for each title is considered to be a variable cost and is placed into the variable cost section of the total dollar cost matrix. There is no reduction in the fixed cost at volume levels less than the specified base; only increased costs for volumes over the base. This feature allows for increasing total cost (average cost per bale may decrease) with volume increasing changes such as might be possible through seed cotton storage. At the rate of utilization where volume processed is less than the base volume, the variable cost for each of these three titles become zero. The fixed total dollar cost remains constant at all levels of utilization.

Salaried Year Around Ginners and Others

For each of these two titles, the following input is read in: number of employees, specified annual salary or cost per employee (excluding overtime if paid), and a hourly adjustment wage rate for overtime hours worked. Specified salary or annual cost must be estimated outside the model and should include all insurance and other allowances similiar to the gin manager, office manager and/or superintendent. If more than one employee is included in a title, costs should be averaged for the number specified.

These costs are considered fixed at all levels of utilization and are placed into the total dollar matrix for each item. If these salaried employees are paid extra for overtime work during the ginning season, overtime pay is assumed to be a variable cost. Overtime hours worked by these salaried employees are assumed equal to the overtime hours worked by the seasonal crew (developed in the next section) and the overtime wage rate equals 1.5 times the hourly adjustment wage rate read in. These costs decrease with decreases in utilization rate since overtime hours decrease.

Seasonal Office and Seasonal Gin Crew

Most gins hire their seasonal crew at least a few days before they expect to gin large volumes of cotton. Crews are typically paid for eight hour shifts both early and late in the season and for 12 hour shifts during the peak harvest. As seed cotton receipts exceed the capacity of a one shift operation, a second shift is added provided labor is available (12,23,30). The second shift typically operates until receipts drop to or below one shift capacity and any backlog of cotton on trailers is processed. Changes in the wage and hour laws affecting the hours for which gins must pay overtime, the difficulty of obtaining night crews and the use of seed cotton storage may change this historic practice.

This model divides the hours that a seasonal crew is on duty and paid into three categories; 1) processing hours are the actual hours processing cotton at the efficiency percentage of rated capacity specified; 2) variable non-processing hours are hours the crew is on duty and paid but not processing cotton due to such factors as short delays between trailers or modules, paid lunch breaks, minor breakdowns, preventive maintenance,

lubrication and/or other short delays; and 3) fixed non-processing hours are hours the crew is paid but not processing any cotton due to crew training, no seed cotton available, weather delays, major breakdown and/or choke-ups. All of these values must be determined outside the model for the 100 percent utilization level and read in. Fixed non-processing hours are considered fixed and stay the same for all levels of utilization. Processing hours vary directly with utilization rates; at a 50 percent utilization rate, processing hours are exactly one-half of the 100 percent processing hours. Variable non-processing hours vary with utilization percentage but are assumed to decrease at a slower rate than processing hours. To accomplish this a reduction percentage is read in to determine the rate at which variable non-processing hours are reduced for each 10 percent reduction from the 100 percent utilization level. For example an eight percent reduction rate would be equivalent to about one hour out of each 12 hour shift. Processing hours and variable non-processing hours equal total variable crew hours for each of the 10 utilization rates and are also used to determine operating hours for electrical energy consumption.

Overtime hours for which the crew is paid at the 100 percent utilization level is determined outside the model structure. Based on a conventional season of 906 processing hours and the overtime exemption allowance in effect during 1976 and 1977, this results in about 208 crew overtime hours. The 48 hour, 14 week exemption effective in January 1978 increased seasonal crew overtime to about 360 hours assuming continuation of two 12 hour shifts operating six days per week (18). An overtime reduction percentage is also read in to reduce overtime hours at less than

100 percent utilization similiar to variable non-processing hours. A 20 percent reduction rate for each 10 percent reduction in utilization level results in no overtime hours at 50 percent or lower utilization. The overtime wage rates are assumed equal to 1.5 times the base hourly wage rate for each job categories.

To determine input data for processing hours, variable and fixed non-processing hours, overtime hours and reduction rates for variable nonprocessing and overtime hours requires a detailed examination of the assumptions regarding hours worked per day, days per week, weeks per season and so forth. The model does not differentiate between day and night shifts. The number of processing hours, variable and fixed non-processing hours and overtime hours are the total hours for all seasonal crews employed.

For each of the five seasonal crew titles, the number of employees and hourly base wage rates are read in. Combined social security, workmen's compensation and other fringe costs as a percent of the wage rate are read in for seasonal office employees and for seasonal gin employees. The seasonal gin employee rate is typically higher than the seasonal office rate; office employees come under a different workmen's compensation classification.

The number of seasonal workers employed depends on gin size, region, and technology level as well as management practices. Crew size varies considerably from gin to gin even of the same capacity within a region. The general practice is to have a full crew on duty when the plant is operating. The GINMODEL program assumes a full crew at all utilization levels. Fractional numbers of crew members can be specified for any position. This is useful for operations that may have a salaried year around

ginner but operates with a seasonal hourly ginner on the night shift. Also, it is not uncommon to have part-time employees, especially in the office crew.

Seasonal office employee costs are all considered variable and are calculated as follows:

> Variable seasonal crew hours = (processing hours) + (variable non-processing hours).
>
> Total seasonal office employee costs = [(variable seasonal crew hours) X (number of seasonal office employees) X (base seasonal office wage rate) X (1 + office fringe cost rate)] + [(overtime hours) X (.5) X (base seasonal office wage rate) X (1 + office fringe cost rate)].

The four seasonal gin crew titles are summarized as one cost item -- seasonal gin crew. The seasonal fixed non-processing hours are considered as a fixed cost, and variable seasonal crew hours as variable cost with all overtime hours charged to variable cost. Seasonal gin employee costs are calculated as follows:

> Total dollars per hour base wage for seasonal gin crew = (ginners wage X number of ginners) + (assistant ginners wage X number of assistant ginners) + (head press operators wage X number of head press operators) + (other gin crew members wage X number of other gin crew members).
>
> Total fixed seasonal gin labor costs = (fixed non-processing hours) X (total dollars per hour base wage for seasonal gin crew) X (1 + gin fringe cost rate).
>
> Total variable seasonal gin labor costs = [(variable seasonal crew hours) X (total dollar per hour base wage for seasonal gin crew) X (1 + gin fringe cost rate)] + [(overtime hours) X (.5) X (total dollars per hour base wage for seasonal gin crew) X (1 + gin fringe cost rate)].

Electrical Energy

Electrical energy requirements and costs are based on motor horsepower and total variable hours of operation. Kilowatt demand is developed from needed horsepower which is read in as is connected horsepower (12,23,30).

Costs are calculated by three energy subroutines structured after the rate schedule of major power suppliers in California, West Texas, and the Mississippi Delta. The appropriate subroutine is called based on regional location. Total kilowatt hours, kilowatt hours per bale, average cost per kilowatt hour, total cost and cost per bale are calculated. The minimum demand and/or monthly minimum charges are considered as fixed energy cost and placed in the fixed total dollar cost matrix. The remaining cost is considered variable and placed in the variable total dollar cost matrix. Rates per kilowatt hour for various rate blocks are read in as variables and can be updated to reflect fuel cost adjustments or rate changes.

Addition of energy consuming equipment without increasing rated capacity or efficiency percentage results in increased kilowatt hours per bale ginned. Increasing or decreasing efficiency percentage has an opposite effect on kilowatt hours consumed per bale. An increase in non-processing hours relative to processing hours also increases kilowatt hours per bale.

Dryer Fuel

The program also contains three regional natural gas dryer fuel subroutines based on rate schedules obtained from major suppliers in the three regions. Natural gas consumption per bale is specified outside the model and read in. Total consumption is developed and the appropriate subroutine is called to determine total dollar cost and average cost per unit (thousand cubic feet). Like electrical energy, the minimum demand or meter charge is considered fixed at all 10 utilization levels and the balance as variable for assignment to the total dollar cost matrix.

Not all gins use natural gas for drying cotton, propane and butane are also used. In these cases, consumption per bale and cost per unit (gallon)

are read in, total cost developed and assigned to the variable dryer fuel cost in the total cost matrix. A zero value is assigned to the fixed dryer fuel cost for plants not using natural gas.

Bagging and Ties

Bagging and tie cost per bale is read in, total cost developed and placed in the variable total dollar cost matrix. The same cost per bale is used for all 10 utilization levels. Costs vary depending on material used and type of bales produced. Therefore, bagging and tie cost must be correlated with specifications regarding press type. Press type and wrapping and tying system can also affect crew labor requirements and horsepower requirements which in turn affect energy requirements and costs.

Repairs

Fixed repair cost is investment in each capital asset item times the repair rate and is placed in the fixed total dollar cost matrix. A variable repair cost per bale ginned is also read in, total dollar costs are developed for each utilization level and placed in the variable cost matrix.

Miscellaneous

Miscellaneous cost is also split between fixed and variable components. The fixed component is read in as total dollars, while the variable component is read in as dollars per bale. Total dollar costs are developed and assigned to the fixed and variable categories for each of the 10 utilization levels.

Interest on Working Capital

Interest on working capital is included with fixed and variable components. All fixed costs except interest on capital assets and depreciation are totaled and a read in working capital interest rate is applied to

25 percent of the total. This assumes working capital is required for an average of three months per year. The same procedure and interest rate is applied to the variable cost items.

Total Cost

The total fixed and total variable sections of the total cost matrix are summed up. The fixed and variable components for like cost items in the total dollar (TD) matrix are summed and placed into a total cost (T) matrix (see appendix F output sets 2 and 4). Total dollar costs by cost items in each matrix are divided by bales processed at each utilization level to determine per bale costs shown in the two per bale matrixes, PB and PBT (see appendix F output sets 3 and 4).

LIMITATIONS

Probably the biggest limitation to GINMODEL is the large amount of detailed input data required and the number of decisions that must be made regarding the physical and economic relationships for each gin plant under consideration. However, once a data base is developed it is relatively easy to evaluate alternatives from that base. Also, it is not necessary to use all the detail and options that are included in the program.

GINMODEL simulates ginning costs only, impacts on harvesting, assembling, warehousing and merchandising costs are not measured directly but may be affected by the assumptions underlying the gin specification; of course, harvesting method and the seed cotton handling and transportation system must be taken into consideration when specifying the ginning equipment.

Most electrical power and natural gas companies' rate structures are based on monthly billing with a few on an annual basis. Monthly rate

structures require some assumptions regarding the number of months in which ginning takes place and the percentage ginned or hours of operation each month. Based on previous research (12,23,30), GINMODEL includes a four month ginning season with 2, 10, 47 and 41 percent of the total volume processed each month. Monthly electrical energy and natural gas requirements are assumed to be in direct proportion to volume. These percentages are in effect at all utilization levels and hours of annual operation. The four percentage levels could be easily changed in the program and could be different among the subroutines if desired. However, large scale seed cotton storage to extend the season to more than four months would require additions and/or modifications to the subroutines which are based on monthly rate structures.

GINMODEL was designed to allow simulation of ginning costs in three major cotton producing regions commonly referred to as 1) West Texas, 2) the South, and 3) the West by providing input data reflecting each area. The subroutines for electrical energy and natural gas dryer fuel cost development are based on the rate structures of companies serving a large number of gins in each region. Rates from a different company, within the region or in a different region, but with a similiar rate structure could be substituted on input cards 26, 27 and 28 (see appendices C and F) with no change in the program. If desirable, additional subroutines could be added to simulate the rate structure of additional electrical power and/or natural gas suppliers or completely hypothetical rate structures can be specified.

As with any economic-engineering model, the reliability of the outputs and the conclusions drawn from them depends heavily on the reliability of

the assumptions and technical coefficients. In this context, more reliable input from other researchers and from people such as ginners, ginning engineers and others will help make the GINMODEL program a more useful tool to the cotton ginning industry.

SAMPLE RUN

Input data required and resulting output for a sample gin plant is presented in appendix F. Input cards 24 and 25 printed as the eighth line of each of the five output sets specifies a gin for stripper harvested cotton, with a universal density press, trailer handling and suction unloading. It assumes no seed cotton storage with ginning taking place over a conventional 14 week harvest-ginning season using 1977 rates or time period data.

Although not in the same order as on the input data cards, many of the input data items specified on input cards 26-30 are included in the narrative heading of each output set (see appendices C and F for input/output layout and results of sample run). This sample run is for a conventional West Texas, 14 bale per hour rated capacity gin assumed to operate at 85 percent efficiency. Capital asset interest rate is 9 percent and working capital rate is 10 percent. Property taxes are calculated at 1.4 percent of asset cost; property taxes are 0.65 percent on 90 percent of asset cost. Seed cotton insurance is specified at $0.50 per bale ginned.

The seed cotton dryers consume 250 cubic feet of natural gas per bale (input card 26, and output data set 5, SI-MATRIX). Connected electrical motor nameplate horsepower is 1160 and needed or demand horsepower is 893. Electric energy and natural gas rates for the various rate blocks are present on input cards 26, 27 and 28.

Labor and management specifications call for an annual salaried manager at $14,500 and a superintendent at $11,000 (input card 29) with the

balance of the crew being seasonal employees. The 11 seasonal crew members and their hourly wage rates are: two office employees at $2.75; one ginner at $4.25; one assistant ginner at $3.50; one head press operator at $2.75 and six other seasonal crew members at $2.50 (input card 30). Fringe benefits or costs are specified at 21.7 percent of wage rates for the seasonal gin crew and 5.85 percent for the seasonal office crew (input card 29).

Maximum or 100 percent utilization operating hours are specified at 906 for this sample run (input card 26, column 6-10). The 100 percent variable non-processing crew hours are specified at 122 with an eight percent (9.76 hours) reduction rate for each 10 percent reduction in utilization rate (see output set 5, SI-MATRIX). Overtime crew hours, based on 1977 season, are specified at 208 with a 20 percent (41.6 hours) reduction rate for each 10 percent reduction in utilization rate (see output set 5, SI-MATRIX). The 100 percent utilization volume amounts to 10,781 bales (14 X .85 X 906); volumes, processing hours and costs at the 10 utilization levels are shown on each of the five output sets of appendix F.

Capital asset items start with input card 32 and indicates a total investment requirement of $751,400. Estimated years of life were set at 20 and hours to wearout at 19,000; resulting in combined total hours of use over 20 years at 100 percent utilization of 18,120 hours which is less than hours to wearout. Therefore, in this sample run, all depreciation is fixed. Capital costs and all fixed annual total costs for all fixed cost items are the same at all 10 levels of utilization (appendix F, output data set 2 TD-MATRIX).

Estimated per bale costs range from $30.13 to $154.01 at the 100 and

10 percent utilization levels respectively (see output data set 4 PBT-MATRIX). Average cost curves for individual items or for the totals can be constructed from the per bale data presented in the PBT-MATRIX and the PB-MATRIX.

Estimated total operating capital requirements are $236,907 at 100 percent utilization and $81,956 at 10 percent utilization (see output set 5, SI-MATRIX). Other summaries of total and per bale costs not presented elsewhere are included in the selected items matrix. Physical requirements are estimated for seasonal labor items, electrical energy and dryer fuel. Approximately 63.5 kilowatt hours per bale is required at 100 percent utilization but increases as utilization level decreases to 65 kilowatt hours at the 50 percent level and 77 kilowatt hours at the 10 percent level of utilization.

To estimate the impact on ginning costs of a change due to technology or regulation requires 1) specifying a base data set for a gin plant to establish base or current costs; 2) revising the data set to include the change, 3) running the model using the revised data set, and 4) comparing the resulting outputs. Regional cost differents can be evaluated by specifying comparable data sets for the regions under consideration and then comparing the results. The same procedure is followed to compare alternative size (capacity) gins.

TECHNICAL APPENDICES

The material presented in these appendices may be too technical for many readers. It is intended as a users guide for those who may want to examine the computer program in detail, or place it on line, develop their own input data and run GINMODEL to estimate ginning cost applicable to their own situation.

APPENDIX A - - DEFINITION OF TERMS

DEFINITION OF TERMS

Variables	Definition of Variables
	Main Program
1. A (I,J)	Capital asset item name, 28 space maximum.
2. AI	Capital asset interest rate as percent of C (I).
3. AINS	Capital asset insurance rate as percent of C (I).
4. AINT	Mathematical function subprogram, FORTRAN IV intrinsic function to truncate YL (I) to whole number.
5. AREA	Geographic region; 1=West Texas; 2=South; 3=West.
6. AREAI (I,J)	Label for writing area name rather than just number - 3 items - 12 character names.
7. ATAX	Capital asset tax rate as percent of C (I).
8. BGYN	Base full time ginners per person salary or wage for year excluding overtime.
9. BMGR	Annual bale volume level above which total MGR costs are increased by VMGR value per bale. Suggested base volume levels for BMGR, BOMGR and BSUPT equal RC*.85 * 906 or conventional 100 percent utilization level, but can be any level desired. Fixed MGR, OMGR, SUPT costs are not reduced at volume levels less than BMGR, BOMGR or BSUPT.
10. BOMGR	Annual bale volume level above which total OMGR costs are increased by VOMGR value per bale.
11. BOYN	Base full time other employees per person salary or wage for year excluding overtime.
12. BSUPT	Annual bale volume level above which total SUPT costs are increased by VSUPT value per bale.
13. BT	Bagging and tie cost per bale.
14. C (I)	Capital investment (original cost) of each asset item.
15. CKW	Average electrical energy cost per kilowatt hour used, is the same as SI (31,J).

16.	CODE (I)	Asset type code 1 = land; 2 = building; 3 = machinery or equipment.
17.	CONNHP	Connected electrical motor nameplate horsepower.
18.	CPB	Dryer fuel consumption per bale in unit for type specified, natural gas in thousands of cubic feet, butane and propane in gallons.
19.	DEMHP	Electrical horsepower needed or power requirement. Usually 70 to 80 percent of connected horsepower.
20.	DEP (I)	Depreciation in total dollars annually.
21.	DI (I)	Annual depreciation and interest total dollar cost based on interest rate (AI) and year of life YL(I) using the annuity equation, calculated for each asset item.
22.	DRYF1	Dryer fuel subroutine for AREA 1, West Texas using Pioneer Natural Gas Company rate schedule 21.
23.	DRYF2	Dryer fuel subroutine for AREA 2, the South using Mississippi Valley Gas Company rate schedule.
24.	DRYF3	Dryer fuel subroutine for AREA 3, the West using Southern California Gas Company rate schedule number GNR.
25.	DYA	Price in dollars per gallon for TYPE 2 and 3 (butane and propane) or minimum monthly dollar charge for TYPE 1 (natural gas) dryer fuel.
26.	DYB	Natural gas price in dollars per thousand cubic feet for first block of rate schedule.
27.	DYC	Natural gas price in dollars per thousand cubic feet for second block of rate schedule.
28.	DYD	Natural gas price in dollars per thousand cubic feet for third block of rate schedule.
29.	DYE	Natural gas price in dollars per thousand cubic feet for fourth block of rate schedule. Note: AREA 3, the West has values for DYA and DYB only; AREA 2, the South, is only AREA with DYE value.
30.	ENGY1	Energy subroutine for AREA 1, West Texas using Southwestern Public Service Company rate schedule 166, tariff 4042.12.

31.	ENGY2	Energy subroutine for AREA 2, the South using Delta Electric Power Association rate schedule 58.
32.	ENGY3	Energy subroutine for AREA 3, the West using Southern California Edison Company rate schedule A-7.
33.	EPC	Efficiency percentage; average seasonal processing rate as a percent of rated hourly capacity (RC).
34.	ERA	Energy rates in dollars for ENGY1, ENGY2 and ENGY3 subroutines. For the West, AREA 3, a constant cost factor equal to 30,000 * ERB. For the South, AREA 2 and West Texas, AREA 1, the minimum demand charge rate; based on connected (CONNHP) and needed (DEMHP) horsepower, respectively.
35.	ERB	Electrical energy price in dollars per kilowatt hour for first block of rate schedule.
36.	ERC	Electrical energy price in dollars per kilowatt hour for second block of rate schedule.
37.	ERD	Electrical energy price in dollars per kilowatt hour for third block of rate schedule.
38.	ERE	Electrical energy price in dollars per kilowatt hour for fourth block of rate schedule. Note: South AREA 2 has only 3 rate blocks, ERE is left blank.
39.	FD (I)	Fixed depreciation; annual dollar cost assuming straight line method and life of Y (I) years.
40.	FDFC	Fixed annual dryer fuel cost.
41.	FEC	Fixed annual electrical energy and/or demand cost, minimum dollar charge per year.
42.	FM	Miscellaneous fixed dollar cost per year.
43.	FNPH	Fixed non-processing seasonal crew hours per year at all levels of utilization.
44.	FUEL (I,J)	Label for writing fuel TYPE rather than just number - 3 items - 12 character names.
45.	GYN	Number of yearly full time salaried or hourly ginners employed.

46.	H (I)	Hours to wearout; total hours of productive life for machinery or equipment assets (A(I,J)) with type CODE 3.
47.	HL (I)	Hours of total use over years of life of asset.
48.	HSAGI	Hourly base wage rate for seasonal assistant ginners.
49.	HSGI	Hourly base wage rate for seasonal ginners.
50.	HSHP	Hourly base wage rate for head press employees.
51.	HSOF	Hourly base wage rate for seasonal office employees.
52.	HSOG	Hourly base wage rate for other members of seasonal gin crew.
53.	I	Loop control integer.
54.	ID (I)	Identification or assumptions for gin plant specified; not used in calculations, just read in as data and printed on each output set for identification only.
55.	INS (I)	Annual property insurance cost (AINS*PI*C(I)) for each asset.
56.	INT (I)	Annual interest cost, DI (I) - DEP (I) for each asset.
57.	J	Loop control integer.
58.	K	Counter to decrease XK (I) and control decimal printing in selected items matrix.
59.	MGR	Manager's annual base dollar cost to gin including salary, insurance, payroll taxes, housing, auto allowance, etc.. If more than one employed, read in total dollars for all employees with this title.
60.	NA	Number of asset items for this specified gin with a maximum of 15. One data card required for each asset.
61.	NPP	Reduction percentage from SI (22,1) for each 10 percent reduction in processing hours to reduce variable non-processing hours, usually at a slower rate than processing hours (less than 10 percent);

still have some variable non-processing hours at all 10 levels of utilization.

62. OMGR — Office manager's annual base dollar cost to gin including salary, insurance, payroll taxes, housing, auto allowance, etc.. If more than one employed, read in total dollars for all employees with this title.

63. OTP — Reduction percentage from SI (26,1) for each 10 percent reduction in processing hours to reduce overtime seasonal crew hours. Reduction rate usually faster than reduction in processing hours; a 20 percent reduction rate would result in no overtime at 50 percent utilization. Programmed to never become negative.

64. OVOL — One (1) percent of annual volume.

65. OYN — Number of yearly full time salaried or hourly "other" gin crew members employed.

66. PB (I,J) — Per bale cost from dividing TD (I,J) by VOL (J), 33 X 10 matrix.

67. PBDEM — Kilowatt hours required per bale, same as SI (30,J).

68. PBT (I,J) — Per bale cost from dividing T (I,J) by VOL (J), 17 X 10 matrix.

69. PHR (I) — Variable processing hours or hours of annual operation at EPC * RC. PHR (1) read in as 100 percent or maximum processing hours per year for given plant specified. Same as SI (21,J).

70. PI — Percent of assets insured (exclude land); 90 percent co-insurance.

71. R (I) — Fixed repair rate as percent of C (I) investment.

72. RC — Rated capacity of gin (gin stands or other limiting factor) in bales per hour.

73. REP (I) — Fixed repair cost in total dollars annually.

74. RNPHR — Reduction factor (hours) that the variable non-processing seasonal crew hours are reduced for each 10 percent decrease in variable processing hours.

75.	ROTH	Reduction factor (hours) that the overtime seasonal crew hours are reduced for each 10 percent decrease in variable processing hours.
76.	S (I)	Salvage value as percent of C (I).
77.	SAGIN	Seasonal assistant ginners, number in crew.
78.	SAM	Specified volume level for current calculations, same as VOL (J) to pass volume to subroutines.
79.	SCINS	Seed cotton insurance rate, dollars per bale.
80.	SGIN	Seasonal ginners, number in crew.
81.	SGVPC	Total dollar variable processing cost for seasonal gin crew.
82.	SHPN	Seasonal head press, number in crew.
83.	SI (I,J)	Selected items in dollar and physical units, 34 X 10 matrix. See definition of selected items matrix for description of individual items.
84.	SIID (I,J)	Label for selected items (SI) matrix - 27 items - 20 character names.
85.	SOFN	Seasonal office employees, number in crew.
86.	SOGN	Seasonal other members of crew, number in crew.
87.	SSWCG	Social security, workmen's compensation and other fringe costs as percent of wages for seasonal hourly employees except office.
88.	SSWCO	Social security, workmen's compensation and other fringe costs as percent of wages for seasonal hourly office employees.
89.	SUPT	Superintendent's annual base dollar cost to gin including salary, insurance, payroll taxes, housing, auto allowance, etc.. If more than one employed, read in total dollars for all employees with this title.
90.	SV (I)	Salvage value in dollars for asset C (I).
91.	T (I,J)	Total dollar cost fixed and variable combined, 17 X 10 matrix.
92.	TAX (I)	Property taxes in total dollars annually for asset C (I).

93. TD (I,J) — Total dollar cost fixed and variable separate, 33 X 10 matrix.

94. TDLB (I,J) — Label for cost items fixed and variable separate - 33 items - 20 character names.

95. TLB (I,J) — Label for cost items fixed and variable combined - 17 items - 20 character names.

96. TMSLO (I,J) — Total dollar cost related to management, office and labor, SI (I,J) + SI (2,J) + (3,J).

97. TOT (I) — Total annual cost of depreciation, property taxes, insurance and interest.

98. TOTDF — Total units of dryer fuel for season, same as SI (32,J).

99. TOTKW — Total kilowatt hours used per season at specified volume level J, same as SI (29,J).

100. TSGN — Total seasonal gin employees in crew.

101. TSHW — Total dollars per hour base wage for seasonal crew.

102. TYPE — Dryer fuel type 1=natural gas, 2=butane, and 3=propane.

103. VD (I) — In this program variable depreciation is annual dollar cost in addition to FD (I) due to year to wearout YL (I) being less than year to obsolescence Y (I).

104. VDFC — Variable annual dryer fuel cost.

105. VEC — Variable annual electrical energy cost, total charge minus minimum (FEC).

106. VGYN — Base hourly adjustment rate for full time year around ginners to adjust BGYN (the fixed part) for the additional hours worked during season (variable part). If left blank or 0 would mean BGYN is salaried or fixed with no adjustment. Additional hours equal total overtime hours for seasonal crew paid at 1½ times the VGYN rate. If no overtime worked by seasonal crew there is no variable cost for the full time year around employees. The SSWCG rate is not applied to this overtime; assume BGYN to include all benefits, usually great enough to cover maximum

		social security and workmen's compensation contributions. Assume additional costs all variable.
107.	VM	Miscellaneous variable dollar cost per bale ginned.
108.	VMGR	Variable management per bale adjustment, in dollars, to increase total cost above specified volume for BMGR.
109.	VNPC	Total dollar variable non-processing cost for seasonal gin crew.
110.	VOL (I)	Volume array for 10 utilization levels 100 percent to 10 percent by 10 percent increments. The 100 percent utilization volume level is (VOL(1)) = RC*EPC * PHR (1).
111.	VOMGR	Variable office manager per bale adjustment, in dollars, to increase total cost above specified volume for BOMGR.
112.	VOYN	Base hourly adjustment rate for full time year around other employees to adjust the BOYN (the fixed part) for the additional hours worked during season (variable part). If left blank or 0 would mean BOYN is salaried or fixed with no adjustment. Additional hours equal total overtime hours for seasonal crew paid at 1½ times the VOYN rate. If no overtime worked by seasonal crew there is no variable cost for full time year around other employees. The SSWCG rate is not applied to this overtime; assume BOYN to include all benefits, usually great enough to cover maximum social security and workmen's compensation contributions. Assume additional costs all variable.
113.	VR	Variable dollars repair cost per bale ginned.
114.	VSUPT	Variable superintendent per bale adjustment, in dollars, to increase total cost above specified volume for BSUPT.
115.	VTCH	Total variable seasonal crew hours for current calculations, same as SI (23,J).
116.	WI	Working capital interest rate percentage.
117.	XK (I)	Percent utilization - 100 to 10 by 10.

118.	Y (I)	Years of life until obsolete or usual life for capital recovery.
119.	YL (I)	Years of life used to calculate capital recovery, years to wearout or obsolescence which ever comes first. Truncated to whole years.

The following additional variables are used in the subroutines but not in the main program.

Subroutine ENGY1

120.	BLKC	Consumed kilowatt hours at rates ERB and ERC.
121.	BLKCD	Consumed kilowatt hours at rates ERB, ERC and ERD, or BLKC + BLKD.
122.	BLKD	Consumed kilowatt hours at ERD rate.
123.	CHARGE	Total electrical energy (dryer fuel) cost for season in dollars.
124.	CHMIN	Minimum annual electrical energy charge.
125.	COSTX	Total dollar charge associated with energy consumed (PCHG + QCHG).
126.	COST1	Cost associated with ERB and ERC rate blocks.
127.	COST2	Cost associated with ERD rate block.
128.	DEMKW	Kilowatt demand equals horsepower needed times .7457.
129.	PCHG	Total dollar charge associated with PKWH.
130.	PKWH	Period with 12 percent of seasonal total kilowatt hours consumed (2 percent + 10 percent months).
131.	QCHG	Total dollar charge associated with QKWH.
132.	QKWH	Period with 88 percent of seasonal total kilowatt hours consumed (41 percent + 47 percent months).

Subroutine ENGY2

133.	BLOCK1	Consumed kilowatt hours at rate ERB.
134.	BLOCK2	Consumed kilowatt hours at rates ERB and ERC.

135.	COST	Total dollar charge associated with energy consumed.
		Subroutine ENGY3
136.	DEMCHG	Monthly demand charge while ginning.
137.	DEMX	VDEM kilowatt hours less 30,000; unit break for kilowatt hours consumed.
138.	QDEM	Kilowatt demand times 300; unit break for kilowatt hours consumed.
139.	VDEM	Kilowatt demand times 150; unit break for kilowatt hours consumed.
140.	WCHG	Charge associated with WKWH consumption.
141.	WKWH	Month with 2 percent of seasonal total kilowatt hours consumed.
142.	XCHG	Charge associated with XKWH consumption.
143.	XKWH	Month with 10 percent of seasonal total kilowatt hours consumed.
144.	YCHG	Charge associated with YKWH consumption.
145.	YKWH	Month with 47 percent of seasonal total kilowatt hours consumed.
146.	ZCHG	Charge associated with ZKWH consumption.
147.	ZKWH	Month with 41 percent of seasonal total kilowatt hours consumed.
		Subroutine DRYF1
148.	BLKA	Cost for the first 50,000 cubic feet per month in dollars.
149.	BLKAB	Cost for the first 100,000 cubic feet per month in dollars for DRYF1. Cost for the first 500,000 cubic feet per month in dollars for DRYF2.
150.	WCHG	Charge associated with WDF consumption.
151.	WDF	Month with 2 percent of seasonal total natural gas consumption.
152.	XCHG	Charge associated with XDF consumption.

153.	XDF	Month with 10 percent of seasonal total natural gas consumption.
154.	YCHG	Charge associated with YDF consumption.
155.	YDF	Month with 47 percent of seasonal total natural gas consumption.
156.	ZCHG	Charge associated with ZDF consumption.
157.	ZDF	Month with 41 percent of seasonal total natural gas consumption.

Subroutine DRYF2

158.	BLKABC	Cost for first 1,000,000 cubic feet per month in dollars. Note: AREA 2, the South, is only area with 5 rate blocks.

Subroutine DRYF3

No new variable introduced with this subroutine.

Definition of Selected Items Matrix

	TOTAL: LBR, MGR, OFF	Variable TMSLO(I,J) added after the SIID labels and SI matrix were set up. It includes all labor and management related costs SI(1,J) + SI(2,J) + SI(3,J). Both total dollar and per bale values are developed with TMSLO (2,J) printed between SI(7,J) and SI(8,J).
I	SIID(I,J)	Definition of SIID(I,J) and SI(I,J) values.
1.	TOTAL MANAGEMENT	Total dollar costs for manager and superintendent T(5,J) + T(6,J).
2.	TOTAL OFFICE	Total dollar costs for office manager plus seasonal office employee T(7,J) + T(10,J).
3.	TOTAL LABOR	Total dollar costs for seasonal gin crew labor, salaried ginners and other salaried gin employees. T(8,J) + T(9,J) + T(11,J).
4.	FIXED OPERATING CAP	Total dollar fixed operating capital required, include all fixed cost items except depreciation and interest on investment. Sum of TD(4,J) through TD(15,J).

5. VARI OPERATING CAP	Total dollar variable operating capital required, include all variable cost items except variable depreciation. Sum of TD(19,J) through TD(31,J).
6. TOTAL OPERATING CAP	Total dollar operating capital required SI(4,J) + SI(5,J).
7. TOTAL FIXED INTEREST	Total dollar fixed interest cost TD(2,J) + TD(3,J).
8.-14. SAME AS 1.-7. ABOVE	SI(8 to 14,J) values are the SI(1 to 7,J) values divided by VOL(J) to express costs on a per bale basis.
15. V TOTAL HOURS	Total variable seasonal gin crew hours paid for, include both variable processing hours and variable non-processing hours times number of season gin crew members SI(23,J) * TSGN.
16. V TOTAL HR PER BALE	Total variable seasonal gin crew hours per bale SI(15,J)/VOL(J).
17. PROCESSING HOURS	Total seasonal gin crew processing hours per season PHR(J) * TSGN.
18. PROCESSING HR/BALE	Total seasonal gin crew processing hours per bale SI(17,J)/VOL(J).
19. V NON-PROCESS HOURS	Total seasonal gin crew variable non-processing hours per season SI(22,J) * TSGN.
20. V NON-PROC HR/BALE	Total seasonal gin crew variable non-processing hours per bale SI(19,J)/VOL (J).
21. CREW PROCESSING HR	Variable processing crew hours. Hours the plant is assumed to operate at RC * EPC to determine annual volume. The same as PHR(J).
22. V CREW NON-PROC HR	Variable non-processing crew hours. Hours seasonal crew labor is paid but not processing any cotton. Read in 100 percent utilization value and then reduce by RNPHR for each 10 percent reduction in PHR(J).

23.	V TOTAL CREW HOURS	Variable total seasonal crew hours both variable processing and variable non-processing SI(22,J) + PHR(J) (which is the same as SI(21,J)). This is the total hours that are used to determine electrical energy consumption. Seasonal crew is also paid for the fixed non-processing hours (FNPH) at all levels of utilization.
24.	PROCESS OVERTIME HR	Processing overtime crew hours included in PHR(J) or (SI)21,J). Developed from SI(26,J).
25.	V NON-PROC OVTIME HR	Non-processing overtime crew hours included in SI(22,J). Developed from SI (26,J).
26.	TOTAL CREW OVTIME HR	Overtime seasonal crew hours. Hours seasonal crew is paid overtime at 1½ times regular rates. Read in 100 percent utilization value and then reduce by ROTH for each 10 percent reduction in PHR(J).
27.	TOTAL OFFICE HOURS	Total seasonal office crew hours SI(23,J) * SOFN.
28.	OFFICE HR/BALE	Total seasonal office crew hours per bale SI(27,J) / VOL(J).
29.	KWHR TOTAL	Total kilowatt hours of electrical energy used per season, same as TOTKW for each volume level.
30.	KWHR PER BALE	Average kilowatt hours of electrical energy used per bale, same as PBDEM for each volume level.
31.	COST PER KWHR	Average cost per kilowatt hours of electrical energy used, same as CKW for each volume level.
32.	DRYER FUEL TOTL UNIT	Total units (1,000 of cubic feet if natural gas, gallons if butane or propane) of dryer fuel used per season, same as TOTDF for each volume level.
33.	DRYER FUEL UNT/BALE	Average units of dryer fuel used per bale SI(32,J) / VOL(J).
34.	DRYER FUEL COST/UNIT	Average cost per unit of dryer fuel consumed T(15,J)/SI(32,J).

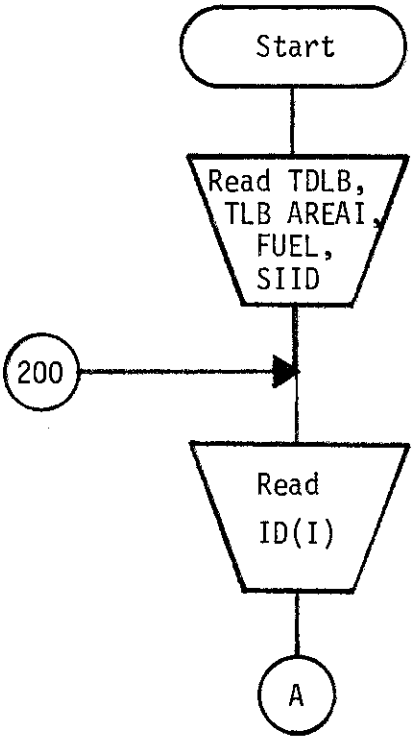
APPENDIX B - - PROGRAM DESCRIPTION AND FLOW CHARTS

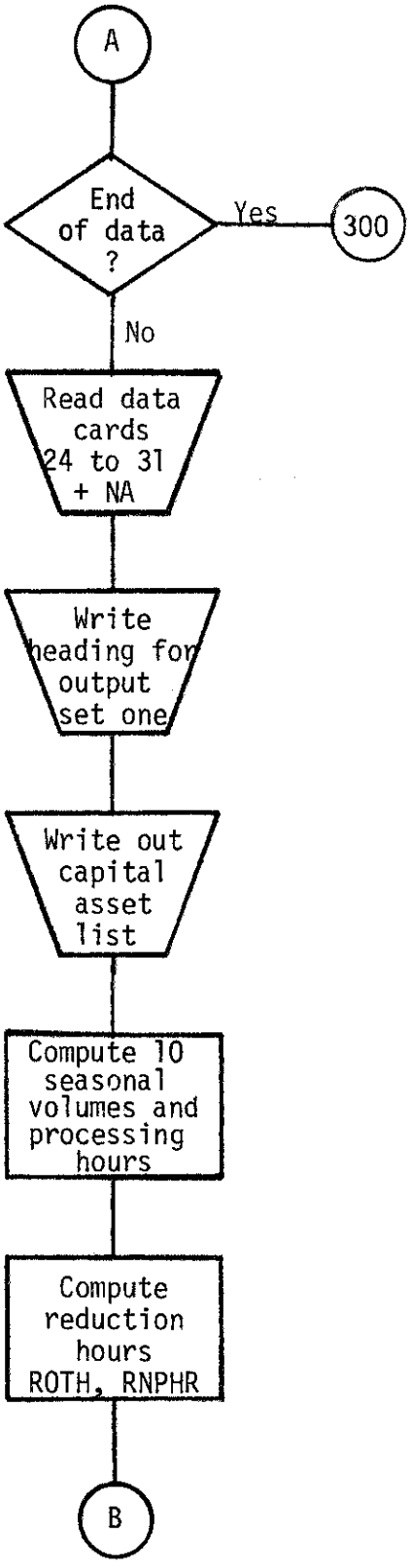
PROGRAM DESCRIPTION AND FLOW CHARTS

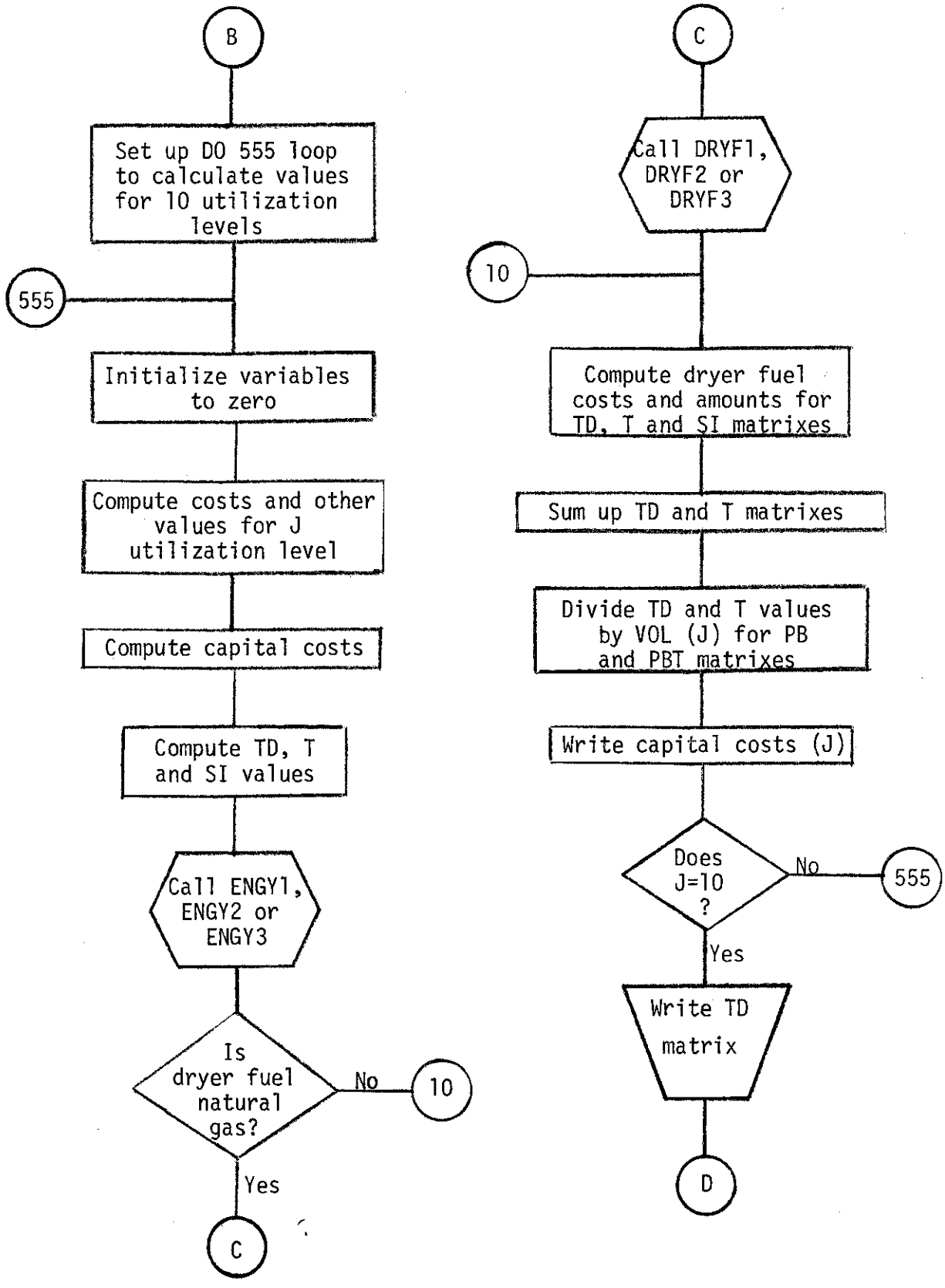
Main Program

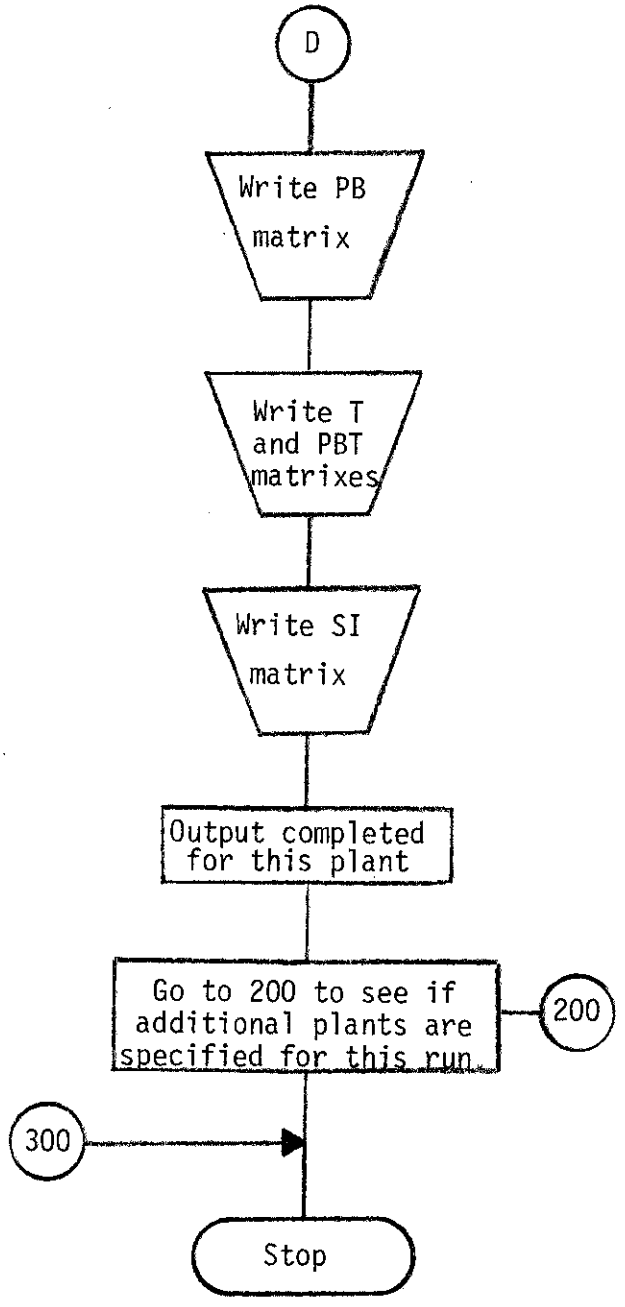
This main program reads in cost item names for the output matrixes and reads all input data. Volumes, utilization rates, total and per bale costs, and selected physical requirements are calculated. Appropriate electrical energy and dryer fuel subroutines are called based on geographic area specified. Five sets of output data are printed for each plant with common identification-plant specification information printed on each set.

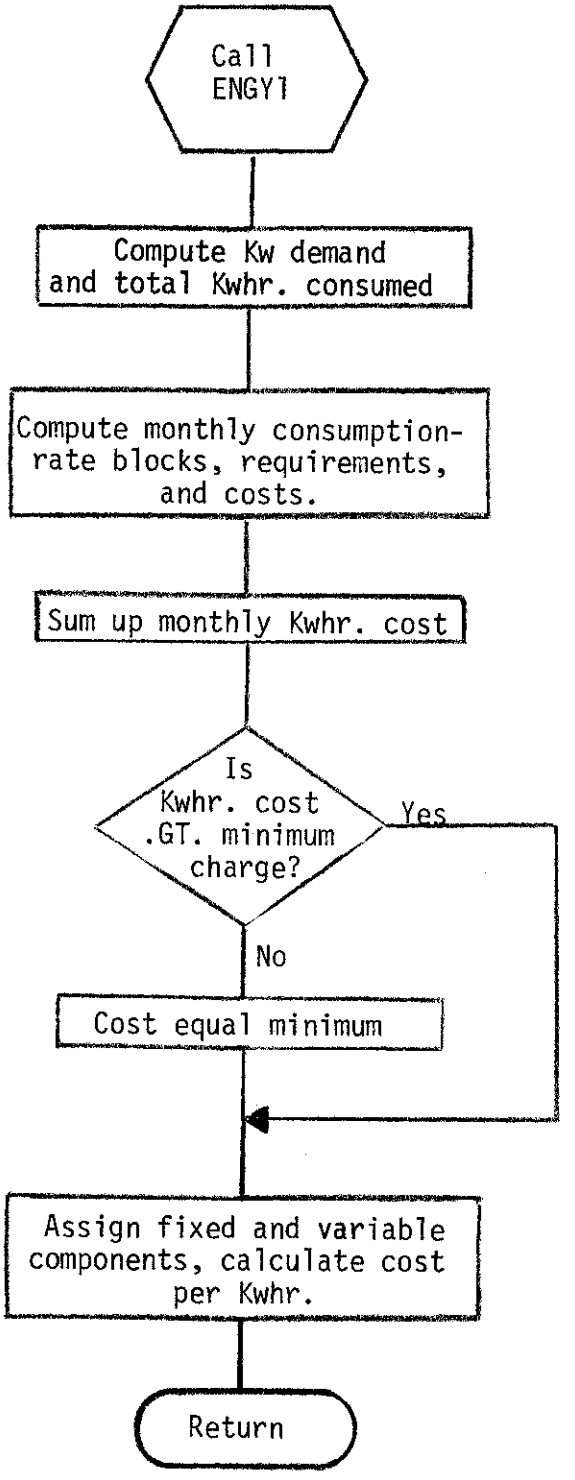
A capital asset list, and capital costs at 10 utilization levels are printed. Matrixes of total dollar and per bale fixed and variable costs, combined total dollar and per bale costs by cost items, and selected total and per bale costs and physical requirements are all printed by the main program for each plant specified in a run. Any number of gin plants can be specified in a run.






B
Set up DO 555 loop to calculate values for 10 utilization levels
555
Initialize variables to zero
Compute costs and other values for J utilization level
Compute capital costs
Compute TD, T and SI values
Call ENGY1, ENGY2 or ENGY3
Is dryer fuel natural gas?
No
10
Yes
C
C
Call DRYF1, DRYF2 or DRYF3
10
Compute dryer fuel costs and amounts for TD, T and SI matrixes
Sum up TD and T matrixes
Divide TD and T values by VOL (J) for PB and PBT matrixes
Write capital costs (J)
Does J=10 ?
No
555
Yes
Write TD matrix
D



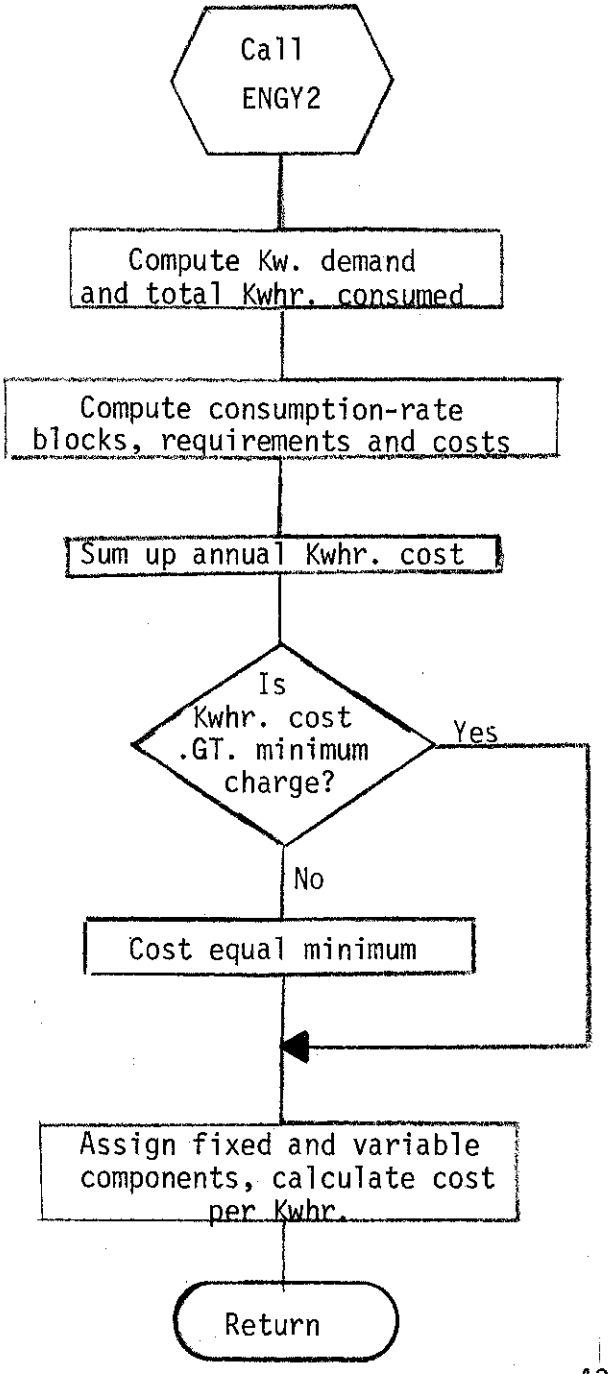


Subroutine ENGY1

This program calculates electrical energy requirements and costs for West Texas, AREA 1 based on horsepower and operating hours using Southwestern Public Service Company rate schedule 166, tariff 4042.12.

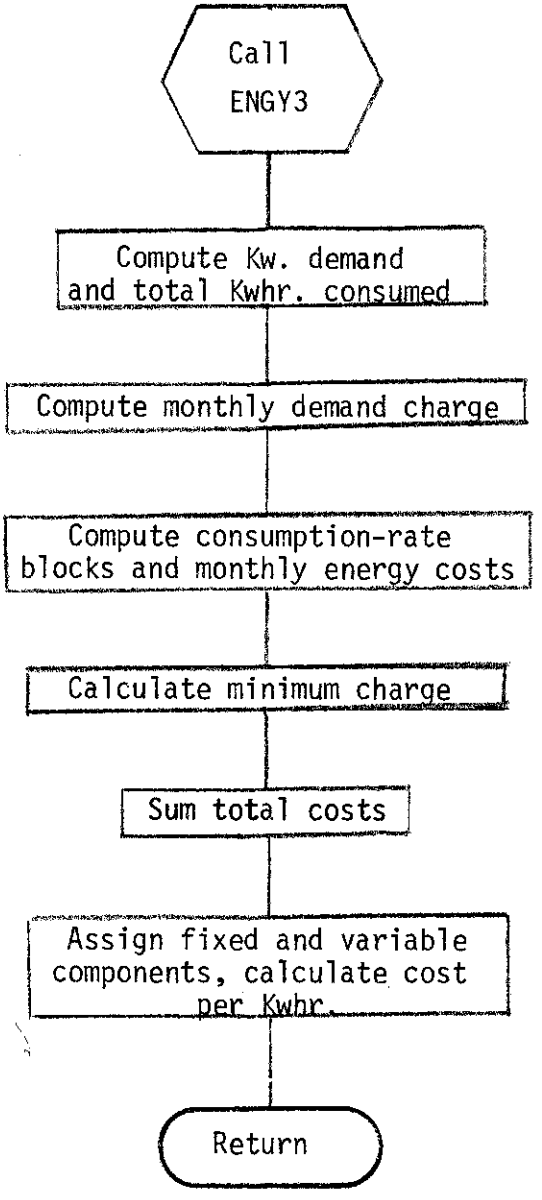
Subroutine ENGY2

This program calculates electrical energy requirements and costs for the South, AREA 2 based on horsepower and operating hours using Delta Electric Power Association rate schedule 58.



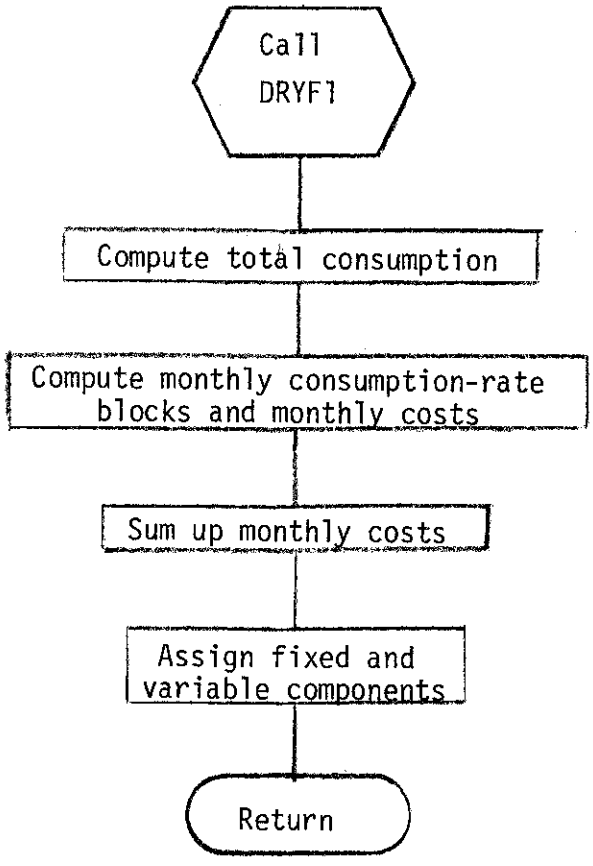
Subroutine ENGY3

This program calculates electrical energy requirements and costs for the West, AREA 3 based on horsepower and operating hours using Southern California Edison Company rate schedule A-7.



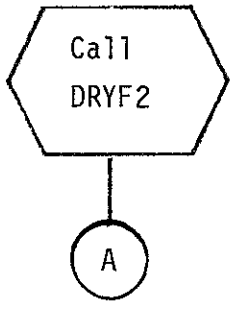
Subroutine DRYF1

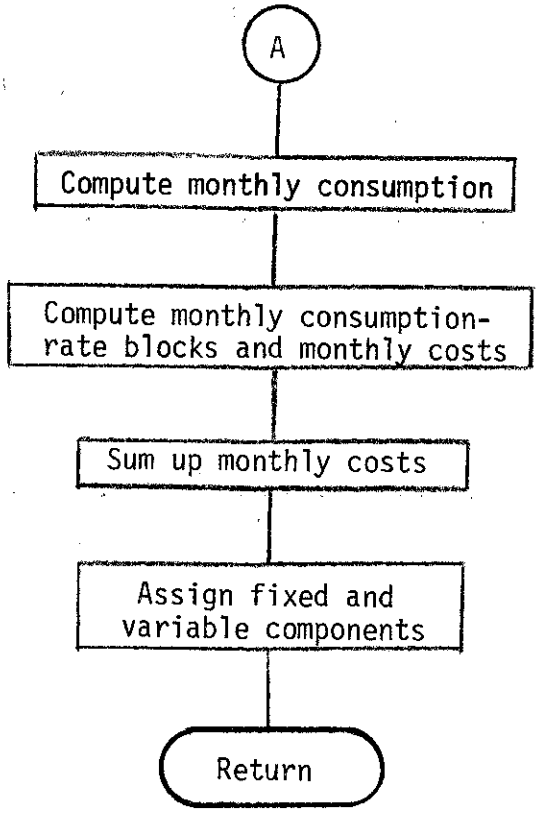
This program calculates total natural gas consumption and costs for West Texas, AREA 1 based on Pioneer Natural Gas Company rate number 21.



Subroutine DRYF2

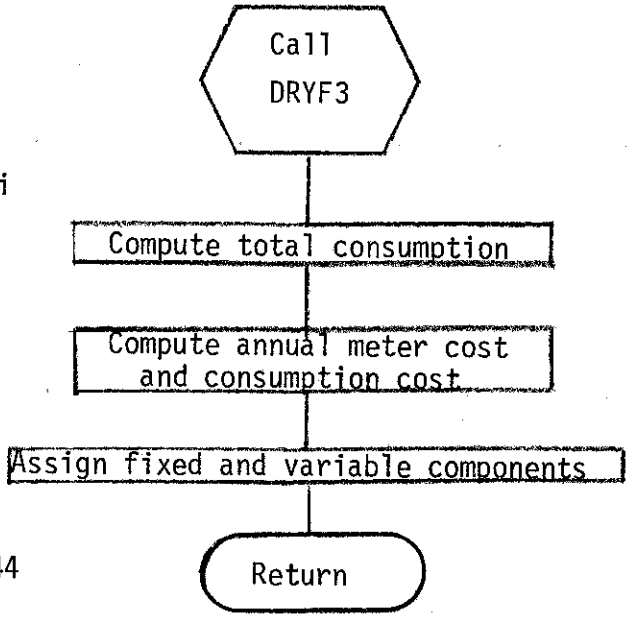
This program calculates total natural gas consumption and costs for the South, AREA 2 based on Mississippi Valley Gas Company rate structure.





Subroutine DRYF3

This program calculates total natural gas consumption and costs for the West, AREA 3 based on Southern California Gas Company rate schedule No. GNR.



APPENDIX C - - INPUT/OUTPUT

INPUT/OUTPUT

Input

GINMODEL inputs read in as data are arranged in the following order and formats (see sample run input data appendix F).

Cards 1-9 ((TDLB(I,J), J=1,5), I=1,33) with a 20A4 format reads 4-20 character cost item labels from each card for use on the TD matrix and PB matrix of the output. Note: the maximum A format word length on this computer is 4 characters.

Cards 10-14 ((TLB(I,J), J=1,5), I=1,17) with a 20A4 format read 4-20 character labels from each card for use on the T matrix, TDT matrix and PBT matrix of the output.

Card 15 ((AREAI(I,J), J=1,3), I=1,3) with a 9A4 format reads 3-12 character geographic area names for use on the output to identify area by name rather than number.

Card 16 ((FUEL(I,J), J=1,3), I=1,3) with a 9A4 format reads 3-12 character dryer fuel names for use on the output to identify dryer fuel type by name rather than number.

Cards 17-23 ((SIID(I,J), J=1,5), I=1,27) with a 20A4 format reads 4-20 character labels from each card for use on the SI matrix of the output.

Cards 1-23 are read in only once for a run and provide the cost item label names for all plants specified in a run. When more than one plant specification is processed in a run, a data card set starting with card 24 is included for each plant specified.

Cards 24-25 (ID(I), I=1,32) with an A4 format reads 128 characters of plant specification-identification information about the particular

gin plant under consideration. The data on cards 24 and 25 are for identification only, they are not used in any calculations, but just written as the 8th line of each of the 5 output sets. Actual numberical data for cost calculation starts on card 26 and are arranged as follows.

	Column	Variable	Format
Card 26:	1-2	AREA	I2
	3-5	EPC	F3.2
	6-10	PHR(1)	F5.0
	11-15	AI	F5.3
	16-20	WI	F5.3
	21-25	AINS	F5.3
	26-30	ATAX	F5.3
	31-35	SCINS	F5.3
	36-40	PI	F5.3
	41-43	TYPE	I3
	44-51	CPB	F8.3
	52-58	DYA	F7.4
	59-65	DYB	F7.4
	66-72	DYC	F7.4
	73-79	DYD	F7.4
Card 27:	1-7	DYE	F7.4

Note: card 27 of the sample run input data is blank as there is no DYE value for West Texas, AREA 1.

Card 28:	1-5	RC	F5.1
	6-10	CONNHP	F5.1
	11-15	DEMHP	F5.1
	16-20	BT	F5.2
	21-25	FM	F5.0
	26-30	VM	F5.2
	31-35	VR	F5.2
	36-43	ERA	F8.2
	44-51	ERB	F8.5
	52-59	ERC	F8.5
	60-67	ERD	F8.5
	68-75	ERE	F8.5
Card 29:	1-5	MGR	F5.0
	6-10	SUPT	F5.0
	11-15	OMGR	F5.0
	16-20	VMGR	F5.3
	21-25	VSUPT	F5.3
	26-30	VOMGR	F5.3
	31-35	BMGR	F5.0

	Column	Variable	Format
	36-40	BSUPT	F5.0
	41-45	BOMGR	F5.0
	46-50	SI(22,1)	F5.0
	51-55	FNPH	F5.0
	56-60	SI(26,1)	F5.0
	61-65	NPP	F5.3
	66-70	OTP	F5.3
	71-75	SSWCG	F5.4
	76-80	SSWCO	F5.4
Card 30:	1-5	SOFN	F5.2
	6-10	SGIN	F5.2
	11-15	SAGIN	F5.2
	16-20	SHPN	F5.2
	21-25	SOGN	F5.2
	26-30	HSOF	F5.2
	31-35	HSGI	F5.2
	36-40	HSAGI	F5.2
	41-45	HSHP	F5.2
	46-50	HSOG	F5.2
	51-55	GYN	F5.2
	56-60	OYN	F5.2
	61-65	BGYN	F5.0
	66-70	BOYN	F5.0
	71-75	VGYN	F5.2
	76-80	VOYN	F5.2
Card 31:	1-5	NA	I5
Cards 32 to 31 + NA:	1-28	A(I,J)	7A4
	29-30	CODE(I)	F2.0
	31-38	C(I)	F8.0
	39-42	S(I)	F4.2
	43-45	Y(I)	F3.0
	46-52	H(I)	F7.0
	53-57	R(I)	F5.3

Output

The output of the GINMODEL program consist of five separate sets of information for each gin plant specified during a run (see sample run output data appendix F). The first set of output is two to four pages long depending on the number of asset items specified. The other four sets are one page each. Costs are developed on an annual basis to represent one

ginning season.

The first eight lines printed on each of the five output sets are identical plant specification-identification information. The first seven lines are mainly input data with enough narrative to identify the main operational and organizational characteristics of the gin plant being considered. Line eight is the identification-specification data read in as ID(I) on input cards 24 and 25.

The first output set is a listing of the capital asset items and associated capital costs at each of the 10 utilization levels. Capital costs are the same for all 10 levels of the sample run, but will be different if the plant machinery and equipment specification data calls for the combined annual hours of use to exceed the hours to wearout. When this happens, depreciation and interest costs for each utilization level are based on years to wearout rather than years to obsolesence.

The ** TD-MATRIX **, the second set of output, shows annual values for bales ginned, processing hours, total dollar fixed, and total dollar variable costs for each of the 10 utilization levels. Definitions of and procedures used to determine fixed and variable components of the various cost items are included in the assumptions and methodology section of the text.

The third set of output, the ** PB-MATRIX ** is simply the ** TD-MATRIX ** divided by the bales ginned to express costs on a per bale basis.

The next page, the fourth set of output is labeled **** T-MATRIX **. The ** TDT-MATRIX ** section is combined fixed and variable portions of like cost items of the ** TD-MATRIX **. Likewise, the ** PBT-MATRIX ** is the ** TDT-MATRIX ** divided by the bales ginned to express these combined costs on a per bale basis.

The fifth and last output set is the ** SI-MATRIX **. This matrix of selected items gives total dollar and per bale costs for combinations of labor and management presented in the other matrixes and develops operating capital requirements. Also shown are several measurements of total hours and hours per bale for the seasonal gin and seasonal office crew. Similar total and per bale data are generated for electrical energy and dryer fuel consumption and costs. Detailed definitions of the ** SI-MATRIX ** items are given under Definition of Selected Items Matrix section of appendix A.

APPENDIX D - - PROGRAM SETUP AND EXECUTION

PROGRAM SETUP AND EXECUTION

GINMODEL is programed in FORTRAN IV level G and has been run on the IBM 370/145 computer system at Texas Tech University. The card reader input unit is 5 and the line printer output unit is 6. Cards were punched on an IBM 029 keypunch.

The card deck for a run is arranged in the sequence illustrated in figure 1 and shown below:

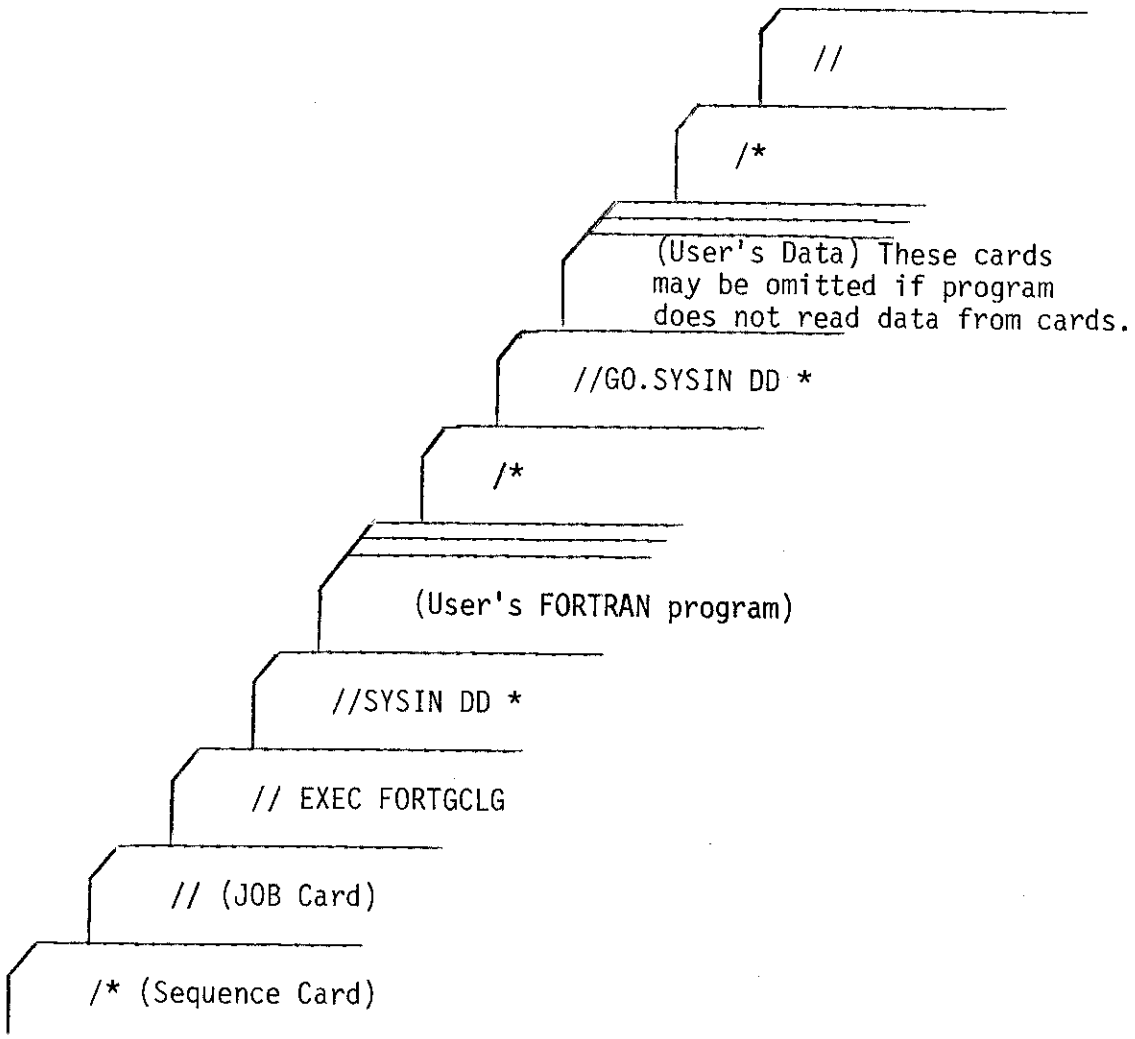
A. Sequence card
B. Control cards
    1. Job card
    2. // EXEC FORTGCLG
    3. //SYSIN DD *
C. Main program deck (as listed in appendix E)
D. Subroutine decks (as listed in appendix E)
    1. ENGY1
    2. ENGY2
    3. ENGY3
    4. DRYF1
    5. DRYF2
    6. DRYF3
E. Control cards
    1. /*
    2. //GO.SYSIN DD *
F. Data (as described in appendix C and listed in appendix F)
G. Control cards
    1. /*
    2. //

The // EXEC FORTGCLG card in the control section tells the computer to compile, link and execute the program. The //SYSIN DD * card causes the program and subroutines to be compiled. All linkages to execute the FORTRAN program and subroutines are then compiled. The //GO.SYSIN DD * card then causes the program to be executed using the data cards that follow. All initializing of values to zero is done in the main program. In a run to simulate seven gin plants, the Central Processing Units (CPU) compile and execution time is approximately 1 minute and 40 seconds.

The author did the programing but is not a trained computer programmer. Areas that would improve the GINMODEL program's efficiency are recognized by the author, other areas would no doubt be discovered by a professional programmer.

FORTRAN DECK SETUP

A FORTRAN program should be submitted in the following form.



NOTE: The User's data and preceding two cards (i.e. /* and //GO.SYSIN DD *) may be omitted if program does not read data cards.

Figure 1

Source: Texas Tech University, Computer Services, "User Publications Series, Procedures and JCL," January 1978.

APPENDIX E - - PROGRAM LISTING

Main Program

```
C-----COTTON GIN MODELS REVISED SEPT 1977 AND DOCUMENTED APRIL 1978
      DIMENSION ID(32),A(15,7),CODE(15),C(16),S(15),Y(15),H(15),R(15),PH
     2R(10),XK(10),VOL(10),TDLB(33,5),TC(33,10),TLB(17,5),T(17,10),SV(16
     3),HL(16),DEP(16),TAX(16),TOT(16),REP(16),PB(33,10),PBT(17,10),CI(1
     46),FD(16),VD(16),YL(16),                    FUEL(5,3),TMSLC(2,10),
     5          AREAI(3,3),SI(34,10),SIID(27,5)
      REAL INT(16),INS(16),          MGR,NPP
      INTEGER AREA, TYPE
      COMMON DEMHP,CONNHP,J,CKW,SAM,PBDEM,TOTKW,RC,ERA,ERB,ERC,ERD,ERE,F
     2EC,VEC,EPC,VTCH,TYPE,CPB,DYA,DYB,DYC,DYD,DYE,FDFC,VDFC,TOTCF
C-----READ IN COST ITEMS NAMES FOR OUTPUT SETS
    5 READ(5,6)((TDLB(I,J),J=1,5),I=1,33)
    6 FORMAT(20A4)
      READ(5,6)((TLB(I,J),J=1,5),I=1,17)
      READ(5,101)((AREAI(I,J),J=1,3),I=1,3)
  101 FORMAT(9A4)
      READ(5,102)((FUEL(I,J),J=1,3),I=1,3)
  102 FORMAT( 9A4)
      READ(5,6) ((SIID(I,J),J=1,5),I=1,27)
C-----BEGIN READING DATA CARDS 24 TO 31+NA FOR INDIVIDUAL PLANT
C-----READ IDENTIFICATION PLANT SPECIFICATION INFORMATION 2 CARDS
  200 READ(5,1,END=300)(ID(I),I=1,32)
    1 FORMAT(20A4/12A4)
      READ(5,3)AREA,EPC,PHR(1),AI,WI,AINS,ATAX,SCINS,PI,TYPE,CPB,DYA,DYB
     2,DYC,DYD,DYE
    3 FORMAT(I2  ,F3.2,F5.0,6F5.3,I3,F8.3,4F7.4/F7.4)
      READ(5,4)RC,CONNHP,DEMHP,BT,FM,VM,VR,ERA,ERB,ERC,ERD,ERE
    4 FORMAT(3F5.1,F5.2,F5.0,2F5.2,F8.2,4F8.5)
      READ(5,7)MGR,SUPT,OMGR,VMGR,VSUPT,VOMGR,BMGR,BSUPT,BOMGR,SI(22,1),
     2FNPH,SI(26,1),NPP,OTP,SSWCG,SSWCO
    7 FORMAT(3F5.0,3F5.3,6F5.0,2F5.3,2F5.4)
      READ(5,8)SOFN,SGIN,SAGIN,SHPN,SOGN,HSOF,HSGI,HSAGI,HSHP,HSOG,GYN,O
     2YN,BGYN,BOYN,VGYN,VOYN
    8 FORMAT(12F5.2,2F5.0,2F5.2)
      READ(5,19)NA
   19 FORMAT(I5)
C-----NA IS NUMBER OF CAPITAL ASSET ITEMS FOR PLANT SPECIFIED
      DO 22 I=1,NA
   22 READ(5,20)(A(I,J),J=1,7),CODE(I),C(I),S(I),Y(I),H(I),R(I)
   20 FORMAT(7A4,F2.0,F8.0,F4.2,F3.0,F7.0,F5.3)
C-----READ CAPITAL ASSET DATA MAXIMUM OF 15 ITEMS
C-----WRITE HEADING FOR EACH OUTPUT SET
      WRITE(6,103) (AREAI(AREA,J),J=1,3),RC,EPC,AI,WI,ATAX,AINS,PI,SCINS
     2 ,(FUEL(TYPE,J),J=1,3),DEMHP,CONNHP,NPP,OTP,GYN,OYN,SOFN,HSOF,SGIN
     3,HSGI,SAGIN,HSAGI,SHPN,HSHP,SOGN,HSOG,SSWCG,SSWCO,FNPH
  103 FORMAT(1H1,'AREA-',3A4,', RATED CAPACITY ',F4.1,' BALE/HR, EFFICIE
     2NCY ',F4.2,' ; INTEREST RATES: CAPITAL ASSETS ',F4.3,', WORKING CA
     3PITAL ',F4.3,' ;',/, 1X,'TAXES ',F4.3,' ; ',F4.3,' INSURANCE ON ',
     4F4.3,' CO INSURANCE, SEED COTTON INSURANCE ',F5.3,' PER BALE; DRYE
     5R FUEL TYPE-',3A4,';',/,1X,'HORSEPOWER NEEDED ',F6.1,' , CONNECTED
     6 HORSEPOWER ',F6.1,';',/,1X,'REDUCTION IN NON-PROCESSING HOURS ',
     7F5.3,' AND REDUCTION IN OVERTIME HOURS ',F5.3,' FOR EACH 10% REDUC
     8TION IN VOLUME:',/,1X,F4.2,' SALARIED GINNER, ',F5.2,' SALARIED OT
     9HER GIN EMPLOYEES: NUMBER OF SEASONAL EMPLOYEES AND HOURLY WAGE RA
     1TES: ',F5.2,' OFFICE ',F5.2,' ,',/,1X,F5.2,' GINNERS ',F5.2,' : ',
     1           F5.2,' ASSISTANT GINNERS ',F5.2,' , ',F5.2,' HEAD PRESS
     2 ',F5.2,' , ',F5.2,' OTHER GIN ',F5.2,' ; ',/,1X,'SEASONAL FRINGE
     3COST: GIN ',F5.4,' , OFFICE ',F5.4,' ;FIXED SEASONAL CREW HOURS ',
```

```
     4F5.0,' .')
      WRITE(6,2)(ID(I),I=1,32     )
    2 FORMAT(/,1X,32A4,/)
C-----WRITE OUT CAPITAL ASSET LIST AS READ IN
      WRITE(6,24)
   24 FORMAT(/,6X,'CAPITAL ASSET ITEMS     TYPE ORIGINAL SALVAGE LIFE HOU
     2RS TO FIXED RATE     '/' NUMBER          NAME          CODE  COST  P
     3ERCENT YEARS WEAROUT  REPAIRS  ')
      DO 30 I=1,NA
      WRITE(6,25)I,(A(I,J),J=1,7),CODE(I),C(I),S(I),Y(I),H(I),R(I)
   25 FORMAT(I3,1X,7A4,F3.0,F9.0,F5.2,F5.0,F9.0,F9.3)
   30 CONTINUE
C-----DEVELOP 10 LEVELS OF PROCESSING HOURS AND VOLUMES FROM 100 TO 10
C-----BY 10 PERCENT UTILIZATION LEVELS
      I=0
      OVOL=RC*EPC*PHR(1)/100.
      DO 15 K=10,100,10
      I=I+1
       XK(I)=110 -K
      VOL(I)=OVOL*XK(I)
      PHR(I)=PHR(1)*XK(I)/100.
      SI(21,I)=PHR(I)
   15 CONTINUE
C-----HOURS TO REDUCE SEASONAL CREW OVERTIME AND VARIABLE
C-----NON-PROCESSING HOURS FOR EACH 10% REDUCTION IN UTILIZATION RATE
      ROTH=OTP*SI(26,1)
      RNPHR=NPP*SI(22,1)
C-----LOOP TO DEVELOP CAPITAL COST, OPERATING COSTS AND WRITE CAPITAL
C-----COST AT 10 LEVELS OF UTILIZATION
      DO 555 J=1,10
       C(16)=0.
      SV(16)=0.
      DEP(16)=0.
      INT(16)=0.
      TAX(16)=0.
      INS(16)=0.
      TOT(16)=0.
      REP(16)=0.
      FD(16)=0.
      VD(16)=0.
      DEP(16)=0.
      TD(16,J)=0.
      TD(32,J)=0.
      T(17,J)=0.
      SI(4,J)=0.
      SI(5,J)=0.
      TD(20,J)=0.0
      TD(21,J)=0.0
      TD(22,J)=0.0
C-----CAPITAL COST DEVELOPMENT LOOP
      DO 36 I=1,NA
      SV(I)=C(I)*S(I)
      FD(I)=(C(I)-SV(I))/Y(I)
      IF(CODE(I).EQ.1.)FD(I)=0.
      YL(I)=H(I)/PHR(J)
C-----AINT IS INTRINSIC FORTRAN FUCTION TO TRUNCATE YEARS OF LIFE TO
C-----WHOLE NUMBER
      YL(I)=AINT(YL(I))
```

```
      IF(YL(I).GT.Y(I)) YL(I)=Y(I)
      IF(CODE(I).LE.2.) YL(I)=Y(I)
      HL(I)=YL(I)*PHR(J)
C-----CAPITAL RECOVERY ANUITY EQUATION
       DI(I)=(C(I)-SV(I))/((1.-(1./(1.+AI)**YL(I)))/AI)+(C(I)*S(I)*AI)
      DEP(I)=(C(I)-SV(I))/YL(I)
      IF(CODE(I).EQ.1.)DEP(I)=0.
C-----FIXED DEPRECIATION BASED ON YEARS TO OBSOLESCENCE; VARIABLE
C-----DEPRECIATION IS DUE TO ASSET WEARING OUT BEFORE BECOMING OBSOLETE
      VD(I)=DEP(I)-FD(I)
      INT(I)=DI(I)-DEP(I)
      TAX(I)=C(I)*ATAX
      REP(I)=R(I)*C(I)
      INS(I)=AINS*PI*C(I)
      IF(CODE(I).EQ.1.) INS(I)=0.
C-----SUM UP CAPITAL COSTS
      TOT(I)=DEP(I)+TAX(I)+INT(I)+INS(I)
      C(16)=C(16)+C(I)
      SV(16)=SV(16)+SV(I)
      DEP(16)=DEP(16)+DEP(I)
       INT(16)=INT(16)+INT(I)
      TAX(16)=TAX(16)+TAX(I)
      INS(16)=INS(16)+INS(I)
      TOT(16)=TOT(16)+TOT(I)
      REP(16)=REP(16)+REP(I)
      FD(16)=FD(16)+FD(I)
      VD(16)=VD(16)+VD(I)
   36 CONTINUE
C-----OPERATING COST DEVELOPED AND PLACED INTO MATRIX
C-----TD IS TOTAL DOLLARS COST FIXED AND VARIABLE SEPARATE
C-----T IS TOTAL DOLLARS COST FIXED AND VARIABLE COMBINED
      TD(2,J)=INT(16)
      TD(4,J)=INS(16)
      TD(5,J)=TAX(16)
      T(4,J)=TD(5,J)
      TD(1,J)=FD(16)
      TD(17,J)=VD(16)
      T(1,J)=TD(1,J)+TD(17,J)
      TD(28,J)=BT*VOL(J)
      T(13,J)=TD(28,J)
      TD(15,J)=FM
      TD(31,J)=VM*VOL(J)
      T(16,J)=TD(31,J)+TD(15,J)
      TD(13,J)=REP(16)
      TD(29,J)=VR*VOL(J)
      T(14,J)=TD(13,J)+TD(29,J)
      TD(19,J)=SCINS*VOL(J)
      T(3,J)=TD(19,J)+TD(4,J)
      TD(6,J)=MGR
      TD(7,J)=SUPT
      TD(8,J)=OMGR
C-----VARIABLE COST COMPONENT FOR MANAGER, SUPERINTENDENT AND OFFICE
C-----MANAGER
      IF(VOL(J).GT.BMGR)TD(20,J)=VMGR*(VOL(J)-BMGR)
      IF(VOL(J).GT.BSUPT)TD(21,J)=VSUPT*(VOL(J)-BSUPT)
      IF(VOL(J).GT.BOMGR)TD(22,J)=VOMGR*(VOL(J)-BOMGR)
      T(5,J)=TD(6,J)+TD(20,J)
      T(6,J)=TD(7,J)+TD(21,J)
```

```
      T(7,J)=TD(8,J)+TD(22,J)
C-----SI IS SELECTED ITEMS MATRIX
      SI(1,J)=T(5,J)+T(6,J)
      SI(22,J)=SI(22,1)-((J-1)*RNPHR)
C-----PREVENT NON PROCESSING  VARIABLE AND OVERTIME HOURS FROM BECOMING
C-----NEGATIVE
      IF(SI(22,J).LE.0.)SI(22,J)=0.0
      SI(26,J)=SI(26,1)-((J-1)*ROTH)
      IF(SI(26,J).LE.0.)SI(26,J)=0.0
      SI(23,J)=SI(22,J)+PHR(J)
      SI(24,J)=SI(26,J)*PHR(J)/SI(23,J)
      SI(25,J)=SI(26,J)*SI(22,J)/SI(23,J)
      SAM=VOL(J)
      VTCH =SI(23,J)
C-----CALL ELECTRICITY AND DRYER FUEL SUBROUTINES BASED ON AREA AND
C-----DRYER FUEL TYPE
      GO TO (811,812,813),AREA
  811 CALL ENGY1
      GO TO 814
  812 CALL ENGY2
      GO TO 814
  813 CALL ENGY3
C-----ELECTRICAL ENERGY VALUES FOR TD,T, AND SI MATRIXES
  814 SI(31,J)=CKW
      SI(30,J)=PBDEM
      SI(29,J)=TOTKW
      TD(12,J)=FEC
      TD(27,J)=VEC
      T(12,J)=TD(12,J)+TD(27,J)
      GO TO (830,831,831),TYPE
  830 GO TO(840,841,842),AREA
  840 CALL DRYF1
      GO TO 835
  841 CALL DRYF2
      GO TO 835
  842 CALL DRYF3
C-----NATURAL GAS VALUES FROM SUBROUTINES
  835 TD(14,J)=FDFC
      TD(30,J)=VDFC
      SI(32,J)=TOTDF
      GO TO 845
C-----CALCULATE DRYER FUEL COST AND TOTAL CONSUMPTION IF NOT NATURAL GAS
  831 TD(14,J)=0.0
      SI(32,J) =CPB*VOL(J)
      TD(30,J)=SI(32,J) *CYA
C-----DRYER FUEL VALUES ALL FUELS
  845 T(15,J)=TD(14,J)+TD(30,J)
      SI(34,J)=T(15,J)/SI(32,J)
      SI(33,J)=SI(32,J)/VOL(J)
C-----CALCULATE SEASONAL GIN CREW SIZE AND COSTS
      TSGN=SGIN+SAGIN+SHPN+SCGN
      TSHW=SGIN*HSGI+SAGIN*HSAGI+SHPN*HSHP+SCGN*HSCG
      VNPC     =SI(22,J)*TSHW*(1.+SSWCG)+SI(25,J)*.5*TSHW*(1.+SSWCG)
      SGVPC    =PHR(J)*TSHW*(1.+SSWCG)+SI(24,J)*.5*TSHW*(1.+SSWCG)
      TD(26,J)=VNPC+SGVPC
      TD(11,J)=FNPH*TSHW*(1.+SSWCG)
      SI(15,J)=SI(23,J)*TSGN
      SI(16,J)=SI(15,J)/VOL(J)
```

Main Program -- Continued

```
      SI(17,J)=PHR(J)*TSGN
      SI(18,J)=SI(17,J)/VOL(J)
      SI(19,J)=SI(22,J)*TSGN
      SI(20,J)=SI(19,J)/VCL(J)
      SI(27,J)=SI(23,J)*SCFN
      TD(25,J)=SI(27,J)*HSOF*(1.+SSWCO)+SI(26,J)*.5*SCFN*HSOF*(1.+SSWCO)
      SI(28,J)=SI(27,J)/VCL(J)
      TD(9,J)=GYN*BGYN
C-----DEVELOP VARIABLE COST COMPONENT FOR SALARIED YEAR AROUND GINNERS
C-----AND OTHER SALARIED GIN EMPLOYEES
      TD(10,J)=OYN*BOYN
      TD(23,J)=VGYN*SI(26,J)*GYN*1.5
      TD(24,J)=VOYN*OYN*SI(26,J)*1.5
      T(8,J)=TD(9,J)+TD(23,J)
      T(9,J)=TD(10,J)+TD(24,J)
      T(10,J)=TD(25,J)
      T(11,J)=TD(11,J)+TD(26,J)
      SI(2,J)=T(7,J)+T(10,J)
      SI(3,J)=T(8,J)+T(9,J)+T(11,J)
C-----DEVELOP REQUIRED OPERATING CAPITAL AND INTEREST ON IT
      TMSLO(1,J)=SI(1,J)+SI(2,J)+SI(3,J)
      TMSLO(2,J)=TMSLO(1,J)/VOL(J)
      DO 60 I=4,15
   60 SI(4,J)=SI(4,J)+TD(I,J)
      DO 61 I=19,31
   61 SI(5,J)=SI(5,J)+TD(I,J)
      SI(6,J)=SI(4,J)+SI(5,J)
      TD(3,J)=SI(4,J)*WI*.25
      TD(18,J)=SI(5,J)*WI*.25
      SI(7,J)=TD(2,J)+TD(3,J)
      T(2,J)=TD(2,J)+TD(3,J)+TD(18,J)
C-----ADD UP TD AND T MATRIX
      DO 100 I=1,33
      IF(I.LT.16) TD(16,J)=TD(16,J)+TD(I,J)
      IF(I.GT.16.AND.I.LT.32) TD(32,J)=TD(32,J)+TD(I,J)
      IF(I.EQ.33) TD(33,J)=TD(16,J)+TD(32,J)
      IF(I.LT.17) T(17,J)=T(17,J)+T(I,J)
C-----DEVELOP PER BALE MATRIX PB AND PBT FROM TD AND T MATRIXES
      PB(I,J)=TD (I,J)/VOL(J)
      IF(I.LT.18)PBT(I,J)=T(I,J)/VOL(J)
      IF(I.GT.7.AND.I.LT.15) SI(I,J)=SI(I-7,J)/VOL(J)
  100 CONTINUE
C-----WRITE CAPITAL COST FOR J UTILIZATION LEVEL
      WRITE(6,63) XK(J)
   63 FORMAT(//,1X,'CAPITAL COST- ',F4.0,'% UTILIZATION',/)
      WRITE(6,32)
   32 FORMAT(1X,'CAPITAL ASSET ITEMS',12X,'TYPE    INVEST   SALVAGE',
     2'  YRS   TTL HRS  - - - - - - - - ANNUAL DOLLAR COST - - - - - - - -
     3     FIXED',/,32X,'CODE       COST     VALUE LIFE    OF USE    ',
     4'DEPREC  INTEREST       TAX    INSURE     TOTAL   REPAIRS',/)
      DO 33  I=1,NA
   33 WRITE(6,34)(A(I,K),K=1,7),CODE(I),C(I),SV(I),YL(I),HL(I),DEP(I),
     2INT(I),TAX(I),INS(I),TOT(I),REP(I)
   34 FORMAT(1X,7A4,2X,F5.0,  2F10.0,F5.0,7F10.0)
      WRITE(6,35)C(16),SV(16),DEP(16),INT(16),TAX(16),INS(16),TOT(16),
     2REP(16)
   35 FORMAT(/,6X,'TOTALS',T37,2F10.0,15X,6F10.0 )
  555  CONTINUE
```

Main Program -- Continued

```
C-----COMPLETED CALCULATION AND PRINTING OF 10 CAPITAL COST LEVELS AND
C-----CALCULATED ALL OTHER COST
C-----WRITE HEADING FOR ANNUAL TOTAL DOLLAR TABLE TO MATRIX
      WRITE(6,103) (AREAI(AREA,J),J=1,3),RC,EPC,AI,WI,ATAX,AINS,PI,SCINS
     2 ,(FUEL(TYPE,J),J=1,3),DEMHP,CCNNHP,NPP,OTP,GYN,OYN,SOFN,HSOF,SGIN
     3,HSGI,SAGIN,HSAGI,SHPN,HSHP,SOGN,HSOG,SSWCG,SSWCO,FNPH
      WRITE(6,42) (ID(I),I=1,32),(XK(I),I=1,10),(VOL(I),I=1,10),
     2(PHR(I),I=1,10)
   42 FORMAT(/,1X,32A4,//,
     11X,'** TO-MATRIX **',
     212X,'- - - - - - - - - - - - - - - - - - - - PERCENT CAPACITY UTILIZAT
     3ION - - - - - - - - - - - - - - - - - - - -',/,
     421X,10F11.0,//,
     55X,'BALES PER SEASON',10F11.0,/,
     65X,'PROCESSING HOURS',10F11.0,//,
     728X,'. . . . . . . . . . . . . . . . . . . . . . . . TOTAL DOLLAR COST
     8. . . . . . . . . . . . . . . . . . . . . . . .',/ ,
     95X,'FIXED COST ITEMS',/ )
C-----WRITE ANNUAL TOTAL DOLLAR FIXED AND VARIABLE COSTS TO MATRIX
      DO 44 I=1,33
      IF(I.NE.16)GO TO 45
      WRITE(6,47)(TDLB(I,J),J=1,5),(TD(I,J),J=1,10)
   47 FORMAT(/,1X,5A4,10F11.0, //,5X,'VARIABLE COST ITEMS',/)
      GO TO 44
   45 IF(I.LT.32)GO TO 46
      WRITE (6,48)(TDLB(I,J),J=1,5),(TD(I,J),J=1,10)
   48 FORMAT(/,1X,5A4,10F11.0)
      GO TO 44
   46 WRITE(6,43)(TDLB(I,J),J=1,5),(TD(I,J),J=1,10)
   43 FORMAT(1X, 5A4,10F11.0)
   44 CONTINUE
C-----WRITE HEADING FOR PER BALE FIXED AND VARIABLE COSTS PB MATRIX
      WRITE(6,103) (AREAI(AREA,J),J=1,3),RC,EPC,AI,WI,ATAX,AINS,PI,SCINS
     2 ,(FUEL(TYPE,J),J=1,3),DEMHP,CCNNHP,NPP,OTP,GYN,OYN,SOFN,HSOF,SGIN
     3,HSGI,SAGIN,HSAGI,SHPN,HSHP,SOGN,HSOG,SSWCG,SSWCO,FNPH
      WRITE(6,70) (ID(I),I=1,32),(XK(I),I=1,10),(VOL(I),I=1,10),
     2(PHR(I),I=1,10)
   70 FORMAT(/,1X,32A4,//,
     11X,'** PB-MATRIX **',
     212X,'- - - - - - - - - - - - - - - - - - - - PERCENT CAPACITY UTILIZAT
     3ION - - - - - - - - - - - - - - - - - - - -',/,
     421X,10F11.0,//,
     55X,'BALES PER SEASON',10F11.0,/,
     65X,'PROCESSING HOURS',10F11.0,//,
     728X,'. . . . . . . . . . . . . . . . . . . . . . . PER BALE COST  .
     8. . . . . . . . . . . . . . . . . . . . . . . .',/ ,
     95X,'FIXED COST ITEMS',/ )
      DO 71 I=1,33
      IF(I.NE.16) GO TO 72
C-----WRITE PER BALE FIXED AND VARIABLE COSTS PB MATRIX
      WRITE(6,73)(TDLB(I,J),J=1,5),(PB(I,J),J=1,10)
   73 FORMAT(/,1X,5A4,10F11.2,//,5X,'VARIABLE COST ITEMS',/)
      GO TO 71
   72 IF(I.LT.32) GO TO 74
      WRITE(6,75)(TDLB(I,J),J=1,5),(PB(I,J),J=1,10)
   75 FORMAT(/,1X,5A4,10F11.2)
      GO TO 71
   74 WRITE(6,76)(TDLB(I,J),J=1,5),(PB(I,J),J=1,10)
```

```
   76 FORMAT(1X,5A4,10F11.2)
   71 CONTINUE
C-----WRITE HEADING FOR COMBINED TOTAL DOLLAR AND PER BALE COSTS
      WRITE(6,103) (AREAI(AREA,J),J=1,3),RC,EPC,AI,WI,ATAX,AINS,PI,SCINS
     2 ,(FUEL(TYPE,J),J=1,3),DEMHP,CONNHP,NPP,OTP,GYN,OYN,SOFN,HSOF,SGIN
     3,HSGI,SAGIN,HSAGI,SHPN,HSHP,SCGN,HSOG,SSWCG,SSWCO,FNPH
      WRITE(6,49) (ID(I),I=1,32),(XK(I),I=1,10),(VOL(I),I=1,10),
     2(PHR(I),I=1,10)
   49 FORMAT(/,1X,32A4,//,
     11X,'**** T-MATRIX **',
     211X,'- - - - - - - - - - - - - - - - - - - PERCENT CAPACITY UTILIZAT
     3ION - - - - - - - - - - - - - - - - - -',/,
     421X,10F11.0,//,
     55X,'BALES PER SEASON',10F11.0,/,
     65X,'PROCESSING HOURS',10F11.0,//,
     71X,'** TDT-MATRIX **',
     811X,'. . . . . . . . . . . . . . . . . . . . TOTAL DOLLAR COST
     9. . . . . . . . . . . . . . . . . . . . .',//)
C-----WRITE COMBINED TOTAL DOLLAR COSTS T MATRIX
      DO 51 I=1,16
   51 WRITE(6,43) (TLB(I,J),J=1,5),(T(I,J),J=1,10)
      DO 52 I=17,17
   52 WRITE(6,48) (TLB(I,J),J=1,5),(T(I,J),J=1,10 )
      WRITE(6,50)
   50 FORMAT(/,1X,'** PBT-MATRIX **',
     211X,'. . . . . . . . . . . . . . . . . . . . PER BALE COST  .
     3. . . . . . . . . . . . . . . . . . . . .',//)
C-----WRITE COMBINED PER BALE COSTS PBT MATRIX
      DO 54 I=1,16
   54 WRITE(6,53)(TLB(I,J),J=1,5),(PBT(I,J),J=1,10 )
   53 FORMAT(1X,5A4,10F11.2)
      DO 55 I=17,17
   55 WRITE(6,56)(TLB(I,J),J=1,5),(PBT(I,J),J=1,10)
   56 FORMAT(/,1X,5A4,10F11.2)
C-----WRITE HEADING FOR SELECTED ITEM SI MATRIX
      WRITE(6,103) (AREAI(AREA,J),J=1,3),RC,EPC,AI,WI,ATAX,AINS,PI,SCINS
     2 ,(FUEL(TYPE,J),J=1,3),DEMHP,CONNHP,NPP,OTP,GYN,OYN,SOFN,HSOF,SGIN
     3,HSGI,SAGIN,HSAGI,SHPN,HSHP,SCGN,HSOG,SSWCG,SSWCO,FNPH
      WRITE(6,104)(ID(I),I=1,32),(XK(I),I=1,10),(VOL(I),I=1,10),
     2(PHR(I),I=1,10)
  104 FORMAT(/,1X,32A4,//,
     11X,'** SI-MATRIX **',
     212X,'- - - - - - - - - - - - - - - - - - - PERCENT CAPACITY UTILIZAT
     3ION - - - - - - - - - - - - - - - - - -',/,
     421X,10F11.0,//,
     55X,'BALES PER SEASON',10F11.0,/,
     65X,'PROCESSING HOURS',10F11.0,//,
     728X,'. . . . . . . . . . . . . . . . . . . TOTAL DOLLAR COST
     8. . . . . . . . . . . . . . . . . . . .'   )
C-----WRITE SELECTED ITEMS SI MATRIX
C-----NOTE:  TMSLO WAS ADDED AFTER THE SIID LABELS AND SI MATRIX WERE
C-----SET UP
      WRITE(6,114) (TMSLO(1,J),J=1,10)
  114 FORMAT(1X,'TOTAL: LBR, MGR, OFF',10F11.0)
      DO 105 I=1,7
  105 WRITE(6,43) (SIID(I,J),J=1,5),(SI(I,J),J=1,10)
      WRITE(6,118)
  118 FORMAT(/,
```

Main Program -- Continued

```
     728X,'. . . . . . . . . . . . . . . . . . . . . . . . PER BALE COST  .
     8. . . . . . . . . . . . . . . . . . . . . . . . . . .'   )
      WRITE(6,115) (TMSLC(2,J),J=1,10)
  115 FORMAT(1X,'TOTAL: LBR, MGR, OFF',10F11.2)
      DO 106 I=8,14
C-----WRITE SAME SIID LABELS FOR PER BALE COSTS
  106 WRITE(6,76)  (SIID(I-7,J),J=1,5),(SI(I,J),J=1,10)
      WRITE(6,107)
  107 FORMAT(/,28X,51('. ')      )
C-----WRITE PHYSICAL UNITS RELATING TO SEASONAL LABOR
      DO 108 I=15,28
  108 WRITE(6,76)  (SIID(I-7,J),J=1,5),(SI(I,J),J=1,10)
      WRITE(6,107)
C-----WRITE LAST 6 LINES USING GO TO FOR FORMAT DECIMAL SELECTION
      DO 109 I=29,34
      K=I-28
      GO TO (110,111,112,110,112,112),K
  110 WRITE(6,43)  (SIID(I-7,J),J=1,5),(SI(I,J),J=1,10)
      GO TO 109
  111 WRITE(6,76)  (SIID(I-7,J),J=1,5),(SI(I,J),J=1,10)
      GO TO 109
  112 WRITE(6,113) (SIID(I-7,J),J=1,5),(SI(I,J),J=1,10)
  113 FORMAT(1X,5A4,10F11.5)
  109 CONTINUE
C-----COMPLETED FIVE SETS OF OUTPUT FOR SPECIFIED PLANT
C-----GO READ DATA FOR NEW PLANT SPECIFICATION AND REPEAT ALL OF ABOVE
      GO TO 200
  300 WRITE(6,301)
  301 FORMAT(/,1X,'THANK YOU.  PLEASE CALL AGAIN.')
      STOP
      END
```

Subroutine ENGY1

```
      SUBROUTINE ENGY1
      COMMON DEMHP,CONNHP,J,CKW,SAM,PBDEM,TOTKW,RC,ERA,ERB,ERC,ERD,ERE,F
     2EC,VEC,EPC,VTCH,TYPE,CPB,DYA,DYB,DYC,DYD,DYE,FDFC,VDFC,TOTDF
C-----CALCULATE WEST TEXAS, AREA 1 ELECTRICITY COSTS
C-----BASED ON KW DEMAND, MONTHLY CONSUMPTION WITH SEASONAL MINIMUM
C-----CALCULATE KW DEMAND AND TOTAL KWH CONSUMED
      DEMKW=DEMHP*.7457
      TOTKW=DEMKW*VTCH
      PBDEM=TOTKW/SAM
      CHMIN=DEMKW*ERA
C-----CALCULATE MONTHLY CONSUMPTION-RATE BLOCKS
      COST1=(ERB*200.)+(ERC*400.)
      BLKC=600.
      BLKD=(((DEMKW-10.)*100.)+800.)*2.
      BLKCD=BLKC+BLKD
      COST2=BLKD*ERD
C-----COMBINED 10% AND 2% MONTHS AND 41 AND 47 PERCENT
C-----PROCESSING MONTHS PROBABLY SHOULD BE SEPARATED.
      PKWH=TOTKW*.12
      QKWH=TOTKW*.88
C-----CALCULATE BIMONTHLY ENERGY CONSUMPTION AND COST
      PCHG=((PKWH-BLKC)*ERD)+COST1
      IF (QKWH-BLKCD)600,600,601
  600 QCHG=((QKWH-BLKC)*ERD)+COST1
      GO TO 615
  601 QCHG=((QKWH-BLKCD)*ERE)+COST1+COST2
C-----SUM UP MONTHLY CHARGE.
  615 COSTX=PCHG+QCHG
C-----BE SURE COST FOR ENGERY CONSUMED IS GREATER THAN MINIMUM CHARGE.
      IF (COSTX-CHMIN)616,616,617
  616 CHARGE=CHMIN
      GO TO 618
  617 CHARGE=COSTX
  618 CKW=CHARGE/TOTKW
C-----ASSIGN FIXED AND VARIABLE COMPONENTS
      FEC=CHMIN
      VEC=CHARGE-CHMIN
   89 RETURN
      END
```

Subroutine ENGY2

```
      SUBROUTINE ENGY2
      COMMON DEMHP,CONNHP,J,CKW,SAM,PBDEM,TOTKW,RC,ERA,ERB,ERC,ERD,ERE,F
     2EC,VEC,EPC,VTCH,TYPE,CPB,DYA,DYB,DYC,DYD,DYE,FDFC,VDFC,TOTDF
C-----CALCULATE SOUTH AREA 2 ELECTRICITY COSTS
C-----BASED ON CONNECTED HORSEPOWER, SEASONAL CONSUMPTION WITH A
C-----SEASONAL MINIMUM
      DEMKW=DEMHP*.7457
      TOTKW=DEMKW*VTCH
      PBDEM=TOTKW/SAM
C-----DEVELOP RATE BLOCKS
      BLOCK1=CONNHP*100.
      BLOCK2=CONNHP*200.
      CHMIN=CONNHP*ERA
      IF(TOTKW-BLOCK2)130,130,140
  130 IF(TOTKW-BLOCK1)131,131,141
  131 COST=TOTKW*ERB
C-----BE SURE COST OF ENGERY CONSUMED IS GREATER THAN MINIMUM CHARGE
      IF (COST-CHMIN)132,132,133
  141 COST=((TOTKW-BLOCK1)*ERC)+(BLOCK1*ERB)
      IF (COST-CHMIN)132,132,133
  132 CHARGE=CHMIN
      GO TO 150
  133 CHARGE=COST
      GO TO 150
  140 CHARGE=((TOTKW-BLOCK2)*ERD)+(BLOCK1*ERC)+(BLOCK1*ERB)
  150 CKW=CHARGE/TOTKW
C-----ASSIGN FIXED AND VARIABLE COMPONENTS
      FEC=CHMIN
      VEC=CHARGE-CHMIN
  155 RETURN
      END
```

Subroutine ENGY3

```
      SUBROUTINE ENGY3
      COMMON DEMHP,CONNHP,J,CKW,SAM,PBDEM,TOTKW,RC,ERA,ERB,ERC,ERD,ERE,F
     2EC,VEC,EPC,VTCH,TYPE,CPB,DYA,DYB,DYC,DYD,DYE,FDFC,VDFC,TOTDF
C-----CALCULATE WEST AREA 3 ELECTRICITY COSTS
C-----BASED ON KW DEMAND, MONTHLY CONSUMPTION WITH MONTHLY MINIMUM
C-----CALCULATE KW DEMAND AND TOTAL KWH CONSUMED
      DEMKW=DEMHP*.7457
      TOTKW=DEMKW*VTCH
      PBDEM=TOTKW/SAM
C-----CALCULATE MONTHLY DEMAND CHARGE
      DEMCHG=((DEMKW-200.)*1.05)+260.
C-----CALCULATE CONSUMPTION RATE BLOCKS
      VDEM=DEMKW*150.
      DEMX=VDEM-30000.
      QDEM=DEMKW*300.
C-----PERCENT VOLUME PROCESSED MONTHLY
      WKWH=TOTKW*.02
      XKWH=TOTKW*.10
      YKWH=TOTKW*.47
      ZKWH=TOTKW*.41
C-----CALCULATE MONTHLY ENGERY COST
      WCHG=WKWH*ERB
      IF(XKWH-30000.)201,201,202
  201 XCHG=XKWH*ERB
      GO TO 203
  202 XCHG=((XKWH-30000.)*ERC)+ERA
  203 IF(YKWH-30000.)204,204,205
  204 YCHG=YKWH*ERB
      GO TO 208
  205 IF(YKWH-QDEM)206,206,207
  206 IF(YKWH-VDEM)220,220,221
  220 YCHG=((YKWH-30000.)*ERC)+ERA
      GO TO 208
  221 YCHG=((YKWH-VDEM)*ERD)+(DEMX*ERC)+ERA
      GO TO 208
  207 YCHG=((YKWH-QDEM)*ERE)+(VDEM*ERD)+(DEMX*ERC)+ERA
  208 IF(ZKWH-30000.)209,209,210
  209 ZCHG=ZKWH*ERB
      GO TO 213
  210 IF(ZKWH-QDEM)211,211,212
  211 IF(ZKWH-VDEM)240,240,241
  240 ZCHG=((ZKWH-30000.)*ERC)+ERA
      GO TO 213
  241 ZCHG=((ZKWH-VDEM)*ERD)+(DEMX*ERC)+ERA
      GO TO 213
  212 ZCHG=((ZKWH-QDEM)*ERE)+(VDEM*ERD)+(DEMX*ERC)+ERA
C-----CALCULATE MAXIMUM CHARGE
  213 IF((DEMKW/2.)-200.)214,214,215
  214 CHMIN=260.*8.
      GO TO 216
  215 CHMIN=(((DEMKW/2.)-200.)*1.05)+260.)*8.
C-----SUM TOTAL CHARGE
  216 CHARGE=WCHG+XCHG+YCHG+ZCHG+(DEMCHG*4.)+CHMIN
      CKW=CHARGE/TOTKW
C-----ASSIGN FIXED AND VARIABLE COMPONENTS
      FEC=(DEMCHG*4.)+CHMIN
      VEC=WCHG+XCHG+YCHG+ZCHG
  260 RETURN
      END
```

Subroutine DRYF1

```
      SUBROUTINE DRYF1
      COMMON DEMHP,CONNHP,J,CKW,SAM,PBDEM,TOTKW,RC,ERA,ERB,ERC,ERD,ERE,F
     2EC,VEC,EPC,VTCH,TYPE,CPB,DYA,DYB,DYC,DYD,DYE,FDFC,VDFC,TOTDF
C-----CALCULATE WEST TEXAS AREA 1 NATURAL GAS COSTS
C-----BASED ON MONTHLY CONSUMPTION AND MONTHLY MINIMUM
      TOTDF=CPB*SAM
C-----ASSUMED PERCENT OF CROP PROCESSED IN EACH OF 4 MONTHS
      WDF=TOTDF*.02
      XDF=TOTDF*.10
      YDF=TOTDF*.47
      ZDF=TOTDF*.41
C-----CONSUMPTION-RATE BLOCKS FOR EACH MONTH
      BLKA=50.*DYB
      BLKAB=BLKA+50.*DYC
      IF(WDF-100.)300,300,301
  300 IF(WDF-50.)302,302,303
C-----NATURAL GAS COST EACH MONTH
  302 WCHG=WDF*DYB
      IF (DYA.GT.WCHG)WCHG=DYA
      GO TO 309
  303 WCHG=((WDF-50.)*DYC)+BLKA
      GO TO 309
  301 WCHG=((WDF-100.)*DYD)+BLKAB
  309 IF(XDF-100.)310,310,311
  310 IF(XDF-50.)312,312,313
  312 XCHG=XDF*DYB
      IF(DYA.GT.XCHG)XCHG=DYA
      GO TO 319
  313 XCHG=((XDF-50.)*DYC)+BLKA
      GO TO 319
  311 XCHG=((XDF-100.)*DYD)+BLKAB
  319 IF(YDF-100.)320,320,321
  320 IF(YDF-50.)322,322,323
  322 YCHG=YDF*DYB
      IF(DYA.GT.YCHG)YCHG=DYA
      GO TO 329
  323 YCHG=((YDF-50.)*DYC)+BLKA
      GO TO 329
  321 YCHG=((YDF-100.)*DYD)+BLKAB
  329 IF(ZDF-100.)330,330,331
  330 IF(ZDF-50.)332,332,333
  332 ZCHG=ZDF*DYB
      IF(DYA.GT.ZCHG)ZCHG=DYA
      GO TO 339
  333 ZCHG=((ZDF-50.)*DYC)+BLKA
      GO TO 339
C-----SUM UP MONTHLY COSTS
  331 ZCHG=((YDF-100.)*DYD)+BLKAB
  339 CHARGE=WCHG+XCHG+YCHG+ZCHG+(DYA*8.)
C-----MINIMUM CHARGE
      FDFC=DYA*12.
      VDFC=CHARGE-FDFC
      RETURN
      END
```

Subroutine DRYF2

```
      SUBROUTINE DRYF2
      COMMON DEMHP,CONNHP,J,CKW,SAM,PBDEM,TOTKW,RC,ERA,ERB,ERC,ERD,ERE,F
     2EC,VEC,EPC,VTCH,TYPE,CPB,DYA,DYB,DYC,DYD,DYE,FDFC,VDFC,TOTDF
C-----CALCULATE SOUTH AREA 2 NATURAL GAS COST
C-----BASED ON MONTHLY CONSUMPTION AND MONTHLY MINIMUM
      TOTDF=CPB*SAM
C-----ASSUMED PERCENT OF CROP PROCESSED IN EACH OF 4 MONTHS
      WDF=TOTDF*.02
      XDF=TOTDF*.10
      YDF=TOTDF*.47
      ZDF=TOTDF*.41
C-----CONSUMPTION-RATE BLOCKS FOR EACH MONTH
      BLKA=40.*DYB+DYA
      BLKAB=BLKA+450.*DYC
      BLKABC=BLKAB+500.*DYD
      IF(WDF-1000.)400,400,401
  400 IF(WDF-500.)402,402,403
  402 IF(WDF-50.)404,404,405
  404 IF(WDF-10.)406,406,407
C-----NATURAL GAS COST EACH MONTH
  406 WCHG=DYA
      GO TO 409
  407 WCHG=((WDF-10.)*DYB)+DYA
      GO TO 409
  405 WCHG=((WDF-50.)*DYC)+BLKA
      GO TO 409
  403 WCHG=((WDF-500.)*DYD)+BLKAB
      GO TO 409
  401 WCHG=((WDF-1000.)*DYE)+BLKABC
  409 IF(XDF-1000.)410,410,411
  410 IF(XDF-500.)412,412,413
  412 IF(XDF-50.)414,414,415
  414 IF(XDF-10.)416,416,417
  416 XCHG=DYA
      GO TO 419
  417 XCHG=((XDF-10.)*DYB)+DYA
      GO TO 419
  415 XCHG=((XDF-50.)*DYC)+BLKA
      GO TO 419
  413 XCHG=((XDF-500.)*DYD)+BLKAB
      GO TO 419
  411 XCHG=((XDF-1000.)*DYE)+BLKABC
  419 IF(YDF-1000.)420,420,421
  420 IF(YDF-500.)422,422,423
  422 IF(YDF-50.)424,424,425
  424 IF(YDF-10.)426,426,427
  426 YCHG=DYA
      GO TO 429
  427 YCHG=((YDF-10.)*DYB)+DYA
      GO TO 429
  425 YCHG=((YDF-50.)*DYC)+BLKA
      GO TO 429
  423 YCHG=((YDF-500.)*DYD)+BLKAB
      GO TO 429
  421 YCHG=((YDF-1000.)*DYE)+BLKABC
  429 IF(ZDF-1000.)430,430,431
  430 IF(ZDF-500.)432,432,433
  432 IF(ZDF-50.)434,434,435
```

Subroutine DRYF2 -- Continued

```
  434 IF(ZDF-10.)436,436,437
  436 ZCHG=DYA
      GO TO 439
  437 ZCHG=((ZDF-10.)*DYB)+DYA
      GO TO 439
  435 ZCHG=((ZDF-50.)*DYC)+BLKA
      GO TO 439
  433 ZCHG=((ZDF-500.)*DYD)+BLKAB
      GO TO 439
  431 ZCHG=((ZDF-1000.)*DYE)+BLKABC
C-----SUM UP MONTHLY COSTS
  439 CHARGE=WCHG+XCHG+YCHG+ZCHG+(DYA*8.)
C-----MINIMUM CHARGE
      FDFC=DYA*12.
      VDFC=CHARGE-FDFC
      RETURN
      END
```

Subroutine DRYF3

```
      SUBROUTINE DRYF3
      COMMON DEMHP,CONNHP,J,CKW,SAM,PBDEM,TOTKW,RC,ERA,ERB,ERC,ERD,ERE,F
     2EC,VEC,EPC,VTCH,TYPE,CPB,DYA,DYB,DYC,DYD,DYE,FDFC,VDFC,TOTDF
C-----CALCULATE WEST AREA 3 NATURAL GAS COST
C-----BASED ON SEASONAL CONSUMPTION AND MONTHLY MINIMUM
      TOTDF=CPB*SAM
C-----METER COST
      FDFC=DYA*12.
C-----ANNUAL NATURAL GAS COST
      VDFC=TOTDF*DYB
      RETURN
      END
```

APPENDIX F -- SAMPLE RUN

SAMPLE RUN

Input Data

```
Read                Card
Statement           Number
  5 READ(5,6)          1 DEPRECIATION FIXED  INTEREST BUILD EQUIPINTEREST WORK FIXED INSURANCE BUILD EQUI
    (TDLB(I,J)         2 TAXES PROPERTY      GIN MANAGER FIXED   SUPERINTENDENT FIXEDOFFICE MANAGER FIXED
                       3 GINNERS SAL FIXED   OTHER GIN SAL FIXED SEASONAL GIN CREW F ENERGY FIXED
                       4 REPAIRS FIXED       DRYER FUEL FIXED    MISCELLANEOUS FIXED TOTAL FIXED
                       5 DEPRECIATION VARI   INTEREST WORK VARI  SEED COTTON INSUR   GIN MANAGER VARI
                       6 SUPERINTENDENT VARI OFFICE MANAGER VARI GINNERS SAL VARI     OTHER GIN SAL VARI
                       7 SEASONAL OFFICE     SEASONAL GIN CREW V ENERGY VARIABLE     BAGGING TIES
                       8 REPAIRS VARIABLE    DRYER FUEL          MISCELLANEOUS VARI  TOTAL VARIABLE
                       9 TOTAL FIXED AND VARI
   READ(5,6)          10 DEPRECIATION        INTEREST            INSURANCE           TAXES
     TLB(I,J)         11 GIN MANAGER         SUPERINTENDENT      OFFICE MANAGER      GINNERS SALARIED
                      12 OTHER GIN SALARIED  SEASONAL OFFICE     SEASONAL GIN CREW   ENERGY
                      13 BAGGING TIES        REPAIRS             DRYER FUEL          MISCELLANEOUS
                      14 GRAND TOTAL
   READ(5,101)        15 WEST TEXAS  SOUTH       WEST
   READ(5,102)        16 NATURAL GAS BUTANE      PROPANE
   READ(5,6)          17 TOTAL MANAGEMENT    TOTAL OFFICE        TOTAL LABOR         FIXED OPERATING CAP
     SIID(I,J)        18 VARI OPERATING CAP  TOTAL OPERATING CAP TOTAL FIXED INTERESTV TOTAL HOURS
                      19 V TOTAL HR PER BALE PROCESSING HOURS    PROCESSING HR/BALE  V NON-PROCESS HOURS
                      20 V NON-PROC HR/BALE  CREW PROCESSING HR  V CREW NON-PROC HR  V TOTAL CREW HOURS
                      21 PROCESS OVERTIME HR V NON-PROC OVTIME HRTOTAL CREW OVTIME HRTOTAL OFFICE HOURS
                      22 OFFICE HR/BALE      KWHR TOTAL          KWHR PER BALE       COST PER KWHR
                      23 DRYER FUEL TOTL UNITDRYER FUEL UNT/BALE DRYER FUEL COST/UNIT
200 READ(5,1)END      24 STRIPPER HARVEST UD PRESS TRAILER HANDLING SUCTION UNLOADING NU SEEDCOTTON STORA
    ID(I)             25 GE 14 WEEK SEASON 1977 RATES 3 78 DOCUMENTATION
   READ(5,3)          26  1 85  906   90  100.0065   14  500  900  1     250    40.  17041  16041  15041
                      27
   READ(5,4)          28   14011600 8930  375 3000  245  268    1000    7695    5995    5695    3695
   READ(5,7)          29 1450011000       200   50    0107821078210782  122  292  208   80  200 2170  585
   READ(5,8)          30   200  100  100  100  600  275  425  350  275  250    0    0    0    0    0    0
   READ(5,19)         31     7
 22 READ(5,20)        32 LAND                              1   14000 100 20
    I=1 to NA         33 GIN BUILDING                      2  160000     20          10
                      34 GIN MACHINERY                     3  292800     20  19000   10
                      35 UD PRESS                          3  225000     20  19000   10
                      36 OUTSIDE EQUIPMENT                 3   44000     20  19000   10
                      37 TOOLS                             3    3000     20  19000   10
                      38 OFFICE BUILDINGS AND EQUIPTM      2   12600     20          10

NUMBER OF CARDS IS        38
```

Note: Only one set of data cards 1 to 23 are required for a run regardless of the number of plants specified. Cards 24 to 31 + NA (NA equals 7 for this sample run) are required for each plant specified in a run. Several plant specifications or alternatives regarding a specific plant can be processed during a single run by using a data set consisting of cards 24 to 31 + NA for each plant specified or alternatives desired.

SAMPLE RUN

Output Data Set 1 Capital Costs

AREA-WEST TEXAS , RATED CAPACITY 14.0 BALE/HR, EFFICIENCY 0.85 ; INTEREST RATES: CAPITAL ASSETS .090, WORKING CAPITAL .100 ;
TAXES .014 ; .006 INSURANCE ON .900 CO INSURANCE, SEED COTTON INSURANCE 0.500 PER BALE; DRYER FUEL TYPE-NATURAL GAS ;
HORSEPOWER NEEDED 893.0 , CONNECTED HORSEPOWER 1160.0:
REDUCTION IN NON-PROCESSING HOURS 0.080 AND REDUCTION IN OVERTIME HOURS 0.200 FOR EACH 10% REDUCTION IN VOLUME;
0.0 SALARIED GINNER, 0.0 SALARIED OTHER GIN EMPLOYEES: NUMBER OF SEASONAL EMPLOYEES AND HOURLY WAGE RATES: 2.00 OFFICE 2.75 ,
1.00 GINNERS 4.25 ; 1.00 ASSISTANT GINNERS 3.50 , 1.00 HEAD PRESS 2.75 , 6.00 OTHER GIN 2.50 ;
SEASONAL FRINGE COST: GIN .2170 , OFFICE .0585 ;FIXED SEASONAL CREW HOURS 292. .

STRIPPER HARVEST UD PRESS TRAILER HANDLING SUCTION UNLOADING NO SEEDCOTTON STORAGE 14 WEEK SEASON 1977 RATES 3 78 DOCUMENTATION

NUMBER	CAPITAL ASSET ITEMS NAME	TYPE CODE	ORIGINAL COST	SALVAGE PERCENT	LIFE YEARS	HOURS TO WEAROUT	FIXED RATE REPAIRS
1	LAND	1.	14000.	1.00	20.	0.	0.0
2	GIN BUILDING	2.	160000.	0.0	20.	0.	0.010
3	GIN MACHINERY	3.	292800.	0.0	20.	19000.	0.010
4	UD PRESS	3.	225000.	0.0	20.	19000.	0.010
5	OUTSIDE EQUIPMENT	3.	44000.	0.0	20.	19000.	0.010
6	TOOLS	3.	3000.	0.0	20.	19000.	0.010
7	OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.0	20.	0.	0.010

CAPITAL COST- 100.% UTILIZATION

CAPITAL ASSET ITEMS	TYPE CODE	INVEST COST	SALVAGE VALUE	YRS LIFE	TTL HRS OF USE	ANNUAL DOLLAR COST DEPREC	INTEREST	TAX	INSURE	TOTAL	FIXED REPAIRS
LAND	1.	14000.	14000.	20.	18120.	0.	1260.	196.	0.	1456.	0.
GIN BUILDING	2.	160000.	0.	20.	18120.	8000.	9527.	2240.	936.	20703.	1600.
GIN MACHINERY	3.	292800.	0.	20.	18120.	14640.	17435.	4099.	1713.	37887.	2928.
UD PRESS	3.	225000.	0.	20.	18120.	11250.	13398.	3150.	1316.	29114.	2250.
OUTSIDE EQUIPMENT	3.	44000.	0.	20.	18120.	2200.	2620.	616.	257.	5693.	440.
TOOLS	3.	3000.	0.	20.	18120.	150.	179.	42.	18.	388.	30.
OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.	20.	18120.	630.	750.	176.	74.	1630.	126.
TOTALS		751400.	14000.			36870.	45170.	10520.	4314.	96873.	7374.

CAPITAL COST- 90.% UTILIZATION

CAPITAL ASSET ITEMS	TYPE CODE	INVEST COST	SALVAGE VALUE	YRS LIFE	TTL HRS OF USE	ANNUAL DOLLAR COST DEPREC	INTEREST	TAX	INSURE	TOTAL	FIXED REPAIRS
LAND	1.	14000.	14000.	20.	16308.	0.	1260.	196.	0.	1456.	0.
GIN BUILDING	2.	160000.	0.	20.	16308.	8000.	9527.	2240.	936.	20703.	1600.
GIN MACHINERY	3.	292800.	0.	20.	16308.	14640.	17435.	4099.	1713.	37887.	2928.
UD PRESS	3.	225000.	0.	20.	16308.	11250.	13398.	3150.	1316.	29114.	2250.
OUTSIDE EQUIPMENT	3.	44000.	0.	20.	16308.	2200.	2620.	616.	257.	5693.	440.
TOOLS	3.	3000.	0.	20.	16308.	150.	179.	42.	18.	388.	30.
OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.	20.	16308.	630.	750.	176.	74.	1630.	126.
TOTALS		751400.	14000.			36870.	45170.	10520.	4314.	96873.	7374.

Output Data Set 1 Capital Costs -- Continued

CAPITAL COST- 80.% UTILIZATION

CAPITAL ASSET ITEMS	TYPE CODE	INVEST COST	SALVAGE VALUE	YRS LIFE	TTL HRS OF USE	ANNUAL DOLLAR COST DEPREC	INTEREST	TAX	INSURE	TOTAL	FIXED REPAIRS
LAND	1.	14000.	14000.	20.	14496.	0.	1260.	196.	0.	1456.	0.
GIN BUILDING	2.	160000.	0.	20.	14496.	8000.	9527.	2240.	936.	20703.	1600.
GIN MACHINERY	3.	292800.	0.	20.	14496.	14640.	17435.	4099.	1713.	37887.	2928.
UD PRESS	3.	225000.	0.	20.	14496.	11250.	13398.	3150.	1316.	29114.	2250.
OUTSIDE EQUIPMENT	3.	44000.	0.	20.	14496.	2200.	2620.	616.	257.	5693.	440.
TOOLS	3.	3000.	0.	20.	14496.	150.	179.	42.	18.	388.	30.
OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.	20.	14496.	630.	750.	176.	74.	1630.	126.
TOTALS		751400.	14000.			36870.	45170.	10520.	4314.	96873.	7374.

CAPITAL COST- 70.% UTILIZATION

CAPITAL ASSET ITEMS	TYPE CODE	INVEST COST	SALVAGE VALUE	YRS LIFE	TTL HRS OF USE	ANNUAL DOLLAR COST DEPREC	INTEREST	TAX	INSURE	TOTAL	FIXED REPAIRS
LAND	1.	14000.	14000.	20.	12684.	0.	1260.	196.	0.	1456.	0.
GIN BUILDING	2.	160000.	0.	20.	12684.	8000.	9527.	2240.	936.	20703.	1600.
GIN MACHINERY	3.	292800.	0.	20.	12684.	14640.	17435.	4099.	1713.	37887.	2928.
UD PRESS	3.	225000.	0.	20.	12684.	11250.	13398.	3150.	1316.	29114.	2250.
OUTSIDE EQUIPMENT	3.	44000.	0.	20.	12684.	2200.	2620.	616.	257.	5693.	440.
TOOLS	3.	3000.	0.	20.	12684.	150.	179.	42.	18.	388.	30.
OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.	20.	12684.	630.	750.	176.	74.	1630.	126.
TOTALS		751400.	14000.			36870.	45170.	10520.	4314.	96873.	7374.

CAPITAL COST- 60.% UTILIZATION

CAPITAL ASSET ITEMS	TYPE CODE	INVEST COST	SALVAGE VALUE	YRS LIFE	TTL HRS OF USE	ANNUAL DOLLAR COST DEPREC	INTEREST	TAX	INSURE	TOTAL	FIXED REPAIRS
LAND	1.	14000.	14000.	20.	10872.	0.	1260.	196.	0.	1456.	0.
GIN BUILDING	2.	160000.	0.	20.	10872.	8000.	9527.	2240.	936.	20703.	1600.
GIN MACHINERY	3.	292800.	0.	20.	10872.	14640.	17435.	4099.	1713.	37887.	2928.
UD PRESS	3.	225000.	0.	20.	10872.	11250.	13398.	3150.	1316.	29114.	2250.
OUTSIDE EQUIPMENT	3.	44000.	0.	20.	10872.	2200.	2620.	616.	257.	5693.	440.
TOOLS	3.	3000.	0.	20.	10872.	150.	179.	42.	18.	388.	30.
OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.	20.	10872.	630.	750.	176.	74.	1630.	126.
TOTALS		751400.	14000.			36870.	45170.	10520.	4314.	96873.	7374.

CAPITAL COST- 50.% UTILIZATION

CAPITAL ASSET ITEMS	TYPE CODE	INVEST COST	SALVAGE VALUE	YRS LIFE	TTL HRS OF USE	ANNUAL DOLLAR COST DEPREC	INTEREST	TAX	INSURE	TOTAL	FIXED REPAIRS
LAND	1.	14000.	14000.	20.	9060.	0.	1260.	196.	0.	1456.	0.
GIN BUILDING	2.	160000.	0.	20.	9060.	8000.	9527.	2240.	936.	20703.	1600.
GIN MACHINERY	3.	292800.	0.	20.	9060.	14640.	17435.	4099.	1713.	37887.	2928.
UD PRESS	3.	225000.	0.	20.	9060.	11250.	13398.	3150.	1316.	29114.	2250.
OUTSIDE EQUIPMENT	3.	44000.	0.	20.	9060.	2200.	2620.	616.	257.	5693.	440.
TOOLS	3.	3000.	0.	20.	9060.	150.	179.	42.	18.	388.	30.
OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.	20.	9060.	630.	750.	176.	74.	1630.	126.
TOTALS		751400.	14000.			36870.	45170.	10520.	4314.	96873.	7374.

Output Data Set 1 Capital Costs -- Continued

CAPITAL COST- 40.% UTILIZATION

CAPITAL ASSET ITEMS	TYPE CODE	INVEST COST	SALVAGE VALUE	YRS LIFE	TTL HRS OF USE	ANNUAL DOLLAR COST DEPREC	INTEREST	TAX	INSURE	TOTAL	FIXED REPAIRS
LAND	1.	14000.	14000.	20.	7248.	0.	1260.	196.	0.	1456.	0.
GIN BUILDING	2.	160000.	0.	20.	7248.	8000.	9527.	2240.	936.	20703.	1600.
GIN MACHINERY	3.	292800.	0.	20.	7248.	14640.	17435.	4099.	1713.	37887.	2928.
UD PRESS	3.	225000.	0.	20.	7248.	11250.	13398.	3150.	1316.	29114.	2250.
OUTSIDE EQUIPMENT	3.	44000.	0.	20.	7248.	2200.	2620.	616.	257.	5693.	440.
TOOLS	3.	3000.	0.	20.	7248.	150.	179.	42.	18.	388.	30.
OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.	20.	7248.	630.	750.	176.	74.	1630.	126.
TOTALS		751400.	14000.			36870.	45170.	10520.	4314.	96873.	7374.

CAPITAL COST- 30.% UTILIZATION

CAPITAL ASSET ITEMS	TYPE CODE	INVEST COST	SALVAGE VALUE	YRS LIFE	TTL HRS OF USE	ANNUAL DOLLAR COST DEPREC	INTEREST	TAX	INSURE	TOTAL	FIXED REPAIRS
LAND	1.	14000.	14000.	20.	5436.	0.	1260.	196.	0.	1456.	0.
GIN BUILDING	2.	160000.	0.	20.	5436.	8000.	9527.	2240.	936.	20703.	1600.
GIN MACHINERY	3.	292800.	0.	20.	5436.	14640.	17435.	4099.	1713.	37887.	2928.
UD PRESS	3.	225000.	0.	20.	5436.	11250.	13398.	3150.	1316.	29114.	2250.
OUTSIDE EQUIPMENT	3.	44000.	0.	20.	5436.	2200.	2620.	616.	257.	5693.	440.
TOOLS	3.	3000.	0.	20.	5436.	150.	179.	42.	18.	388.	30.
OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.	20.	5436.	630.	750.	176.	74.	1630.	126.
TOTALS		751400.	14000.			36870.	45170.	10520.	4314.	96873.	7374.

CAPITAL COST- 20.% UTILIZATION

CAPITAL ASSET ITEMS	TYPE CODE	INVEST COST	SALVAGE VALUE	YRS LIFE	TTL HRS OF USE	ANNUAL DOLLAR COST DEPREC	INTEREST	TAX	INSURE	TOTAL	FIXED REPAIRS
LAND	1.	14000.	14000.	20.	3624.	0.	1260.	196.	0.	1456.	0.
GIN BUILDING	2.	160000.	0.	20.	3624.	8000.	9527.	2240.	936.	20703.	1600.
GIN MACHINERY	3.	292800.	0.	20.	3624.	14640.	17435.	4099.	1713.	37887.	2928.
UD PRESS	3.	225000.	0.	20.	3624.	11250.	13398.	3150.	1316.	29114.	2250.
OUTSIDE EQUIPMENT	3.	44000.	0.	20.	3624.	2200.	2620.	616.	257.	5693.	440.
TOOLS	3.	3000.	0.	20.	3624.	150.	179.	42.	18.	388.	30.
OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.	20.	3624.	630.	750.	176.	74.	1630.	126.
TOTALS		751400.	14000.			36870.	45170.	10520.	4314.	96873.	7374.

CAPITAL COST- 10.% UTILIZATION

CAPITAL ASSET ITEMS	TYPE CODE	INVEST COST	SALVAGE VALUE	YRS LIFE	TTL HRS OF USE	ANNUAL DOLLAR COST DEPREC	INTEREST	TAX	INSURE	TOTAL	FIXED REPAIRS
LAND	1.	14000.	14000.	20.	1812.	0.	1260.	196.	0.	1456.	0.
GIN BUILDING	2.	160000.	0.	20.	1812.	8000.	9527.	2240.	936.	20703.	1600.
GIN MACHINERY	3.	292800.	0.	20.	1812.	14640.	17435.	4099.	1713.	37887.	2928.
UD PRESS	3.	225000.	0.	20.	1812.	11250.	13398.	3150.	1316.	29114.	2250.
OUTSIDE EQUIPMENT	3.	44000.	0.	20.	1812.	2200.	2620.	616.	257.	5693.	440.
TOOLS	3.	3000.	0.	20.	1812.	150.	179.	42.	18.	388.	30.
OFFICE BUILDINGS AND EQUIPTM	2.	12600.	0.	20.	1812.	630.	750.	176.	74.	1630.	126.
TOTALS		751400.	14000.			36870.	45170.	10520.	4314.	96873.	7374.

SAMPLE RUN

Output Data Set 2 TD-MATRIX

AREA-WEST TEXAS , RATED CAPACITY 14.0 BALE/HR, EFFICIENCY 0.85 ; INTEREST RATES: CAPITAL ASSETS .090, WORKING CAPITAL .100 ;
TAXES .014 ; .006 INSURANCE ON .900 CO INSURANCE, SEED COTTON INSURANCE 0.500 PER BALE; DRYER FUEL TYPE-NATURAL GAS ;
HORSEPOWER NEEDED 893.0 , CONNECTED HORSEPOWER 1160.0;
REDUCTION IN NON-PROCESSING HOURS 0.080 AND REDUCTION IN OVERTIME HOURS 0.200 FOR EACH 10% REDUCTION IN VOLUME;
0.0 SALARIED GINNER, 0.0 SALARIED OTHER GIN EMPLOYEES; NUMBER OF SEASONAL EMPLOYEES AND HOURLY WAGE RATES: 2.00 OFFICE 2.75 ,
1.00 GINNERS 4.25 ; 1.00 ASSISTANT GINNERS 3.50 , 1.00 HEAD PRESS 2.75 , 6.00 OTHER GIN 2.50 ;
SEASONAL FRINGE COST: GIN .2170 , OFFICE .0585 ;FIXED SEASONAL CREW HOURS 292. .

STRIPPER HARVEST UD PRESS TRAILER HANDLING SUCTION UNLOADING NO SEEDCOTTON STORAGE 14 WEEK SEASON 1977 RATES 3 78 DOCUMENTATION

** TD-MATRIX **	PERCENT CAPACITY UTILIZATION									
	100.	90.	80.	70.	60.	50.	40.	30.	20.	10.
BALES PER SEASON	10781.	9703.	8625.	7547.	6469.	5391.	4313.	3234.	2156.	1078.
PROCESSING HOURS	906.	815.	725.	634.	544.	453.	362.	272.	181.	91.
	TOTAL DOLLAR COST									
I FIXED COST ITEMS										
1 DEPRECIATION FIXED	36870.	36870.	36870.	36870.	36870.	36870.	36870.	36870.	36870.	36870.
2 INTEREST BUILD EQUIP	45170.	45170.	45170.	45170.	45170.	45170.	45170.	45170.	45170.	45170.
3 INTEREST WORK FIXED	1673.	1673.	1673.	1673.	1673.	1673.	1673.	1673.	1673.	1673.
4 INSURANCE BUILD EQUI	4314.	4314.	4314.	4314.	4314.	4314.	4314.	4314.	4314.	4314.
5 TAXES PROPERTY	10520.	10520.	10520.	10520.	10520.	10520.	10520.	10520.	10520.	10520.
6 GIN MANAGER FIXED	14500.	14500.	14500.	14500.	14500.	14500.	14500.	14500.	14500.	14500.
7 SUPERINTENDENT FIXED	11000.	11000.	11000.	11000.	11000.	11000.	11000.	11000.	11000.	11000.
8 OFFICE MANAGER FIXED	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9 GINNERS SAL FIXED	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10 OTHER GIN SAL FIXED	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11 SEASONAL GIN CREW F	9062.	9062.	9062.	9062.	9062.	9062.	9062.	9062.	9062.	9062.
12 ENERGY FIXED	6659.	6659.	6659.	6659.	6659.	6659.	6659.	6659.	6659.	6659.
13 REPAIRS FIXED	7374.	7374.	7374.	7374.	7374.	7374.	7374.	7374.	7374.	7374.
14 DRYER FUEL FIXED	480.	480.	480.	480.	480.	480.	480.	480.	480.	480.
15 MISCELLANEOUS FIXED	3000.	3000.	3000.	3000.	3000.	3000.	3000.	3000.	3000.	3000.
16 TOTAL FIXED	150621.	150621.	150621.	150621.	150621.	150621.	150621.	150621.	150621.	150621.
VARIABLE COST ITEMS										
17 DEPRECIATION VARI	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18 INTEREST WORK VARI	4250.	3809.	3368.	2927.	2486.	2045.	1623.	1202.	779.	376.
19 SEED COTTON INSUR	5391.	4852.	4313.	3773.	3234.	2695.	2156.	1617.	1078.	539.
20 GIN MANAGER VARI	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21 SUPERINTENDENT VARI	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22 OFFICE MANAGER VARI	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23 GINNERS SAL VARI	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24 OTHER GIN SAL VARI	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25 SEASONAL OFFICE	6590.	5885.	5179.	4474.	3769.	3063.	2479.	1895.	1311.	726.
26 SEASONAL GIN CREW V	35130.	31370.	27610.	23850.	20090.	16330.	13215.	10101.	6986.	3872.
27 ENERGY VARIABLE	22956.	20326.	17697.	15067.	12437.	9807.	7177.	4548.	1889.	0.
28 BAGGING TIES	40430.	36387.	32344.	28301.	24258.	20215.	16172.	12129.	8086.	4043.
29 REPAIRS VARIABLE	28894.	26005.	23115.	20226.	17336.	14447.	11558.	8668.	5779.	2889.
30 DRYER FUEL	4193.	3762.	3331.	2901.	2470.	2039.	1611.	1188.	764.	337.
31 MISCELLANEOUS VARI	26414.	23773.	21132.	18490.	15849.	13207.	10566.	7924.	5283.	2641.
32 TOTAL VARIABLE	174248.	156169.	138089.	120009.	101929.	83849.	66559.	49272.	31954.	15424.
33 TOTAL FIXED AND VARI	324869.	306789.	288709.	270630.	252550.	234470.	217179.	199892.	182575.	166045.

SAMPLE RUN

Output Data Set 3 PB-MATRIX

AREA-WEST TEXAS , RATED CAPACITY 14.0 BALE/HR, EFFICIENCY 0.85 ; INTEREST RATES: CAPITAL ASSETS .090, WORKING CAPITAL .100 ;
TAXES .014 ; .006 INSURANCE ON .900 CO INSURANCE, SEED COTTON INSURANCE 0.500 PER BALE; DRYER FUEL TYPE-NATURAL GAS ;
HORSEPOWER NEEDED 893.0 , CONNECTED HORSEPOWER 1160.0;
REDUCTION IN NON-PROCESSING HOURS 0.080 AND REDUCTION IN OVERTIME HOURS 0.200 FOR EACH 10% REDUCTION IN VOLUME;
0.0 SALARIED GINNER, 0.0 SALARIED OTHER GIN EMPLOYEES; NUMBER OF SEASONAL EMPLOYEES AND HOURLY WAGE RATES: 2.00 OFFICE 2.75 ,
1.00 GINNERS 4.25 ; 1.00 ASSISTANT GINNERS 3.50 , 1.00 HEAD PRESS 2.75 , 6.00 OTHER GIN 2.50 ;
SEASONAL FRINGE COST: GIN .2170 , OFFICE .0585 ;FIXED SEASONAL CREW HOURS 292. .

STRIPPER HARVEST UD PRESS TRAILER HANDLING SUCTION UNLOADING NO SEEDCOTTON STORAGE 14 WEEK SEASON 1977 RATES 3 78 DOCUMENTATION

	** PB-MATRIX **	PERCENT CAPACITY UTILIZATION									
		100.	90.	80.	70.	60.	50.	40.	30.	20.	10.
	BALES PER SEASON	10781.	9703.	8625.	7547.	6469.	5391.	4313.	3234.	2156.	1078.
	PROCESSING HOURS	906.	815.	725.	634.	544.	453.	362.	272.	181.	91.
		PER BALE COST									
I	FIXED COST ITEMS										
1	DEPRECIATION FIXED	3.42	3.80	4.27	4.89	5.70	6.84	8.55	11.40	17.10	34.20
2	INTEREST BUILD EQUIP	4.19	4.66	5.24	5.99	6.98	8.38	10.47	13.97	20.95	41.90
3	INTEREST WORK FIXED	0.16	0.17	0.19	0.22	0.26	0.31	0.39	0.52	0.78	1.55
4	INSURANCE BUILD EQUI	0.40	0.44	0.50	0.57	0.67	0.80	1.00	1.33	2.00	4.00
5	TAXES PROPERTY	0.98	1.08	1.22	1.39	1.63	1.95	2.44	3.25	4.88	9.76
6	GIN MANAGER FIXED	1.34	1.49	1.68	1.92	2.24	2.69	3.36	4.48	6.72	13.45
7	SUPERINTENDENT FIXED	1.02	1.13	1.28	1.46	1.70	2.04	2.55	3.40	5.10	10.20
8	OFFICE MANAGER FIXED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	GINNERS SAL FIXED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	OTHER GIN SAL FIXED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	SEASONAL GIN CREW F	0.84	0.93	1.05	1.20	1.40	1.68	2.10	2.80	4.20	8.41
12	ENERGY FIXED	0.62	0.69	0.77	0.88	1.03	1.24	1.54	2.06	3.09	6.18
13	REPAIRS FIXED	0.68	0.76	0.85	0.98	1.14	1.37	1.71	2.28	3.42	6.84
14	DRYER FUEL FIXED	0.04	0.05	0.06	0.06	0.07	0.09	0.11	0.15	0.22	0.45
15	MISCELLANEOUS FIXED	0.28	0.31	0.35	0.40	0.46	0.56	0.70	0.93	1.39	2.78
16	TOTAL FIXED	13.97	15.52	17.46	19.96	23.28	27.94	34.93	46.57	69.85	139.70
	VARIABLE COST ITEMS										
17	DEPRECIATION VARI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	INTEREST WORK VARI	0.39	0.39	0.39	0.39	0.38	0.38	0.38	0.37	0.36	0.35
19	SEED COTTON INSUR	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
20	GIN MANAGER VARI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	SUPERINTENDENT VARI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	OFFICE MANAGER VARI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	GINNERS SAL VARI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	OTHER GIN SAL VARI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	SEASONAL OFFICE	0.61	0.61	0.60	0.59	0.58	0.57	0.57	0.59	0.61	0.67
26	SEASONAL GIN CREW V	3.26	3.23	3.20	3.16	3.11	3.03	3.06	3.12	3.24	3.59
27	ENERGY VARIABLE	2.13	2.09	2.05	2.00	1.92	1.82	1.66	1.41	0.88	0.0
28	BAGGING TIES	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
29	REPAIRS VARIABLE	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68
30	DRYER FUEL	0.39	0.39	0.39	0.38	0.38	0.38	0.37	0.37	0.35	0.31
31	MISCELLANEOUS VARI	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45
32	TOTAL VARIABLE	16.16	16.09	16.01	15.90	15.76	15.55	15.43	15.23	14.82	14.31
33	TOTAL FIXED AND VARI	30.13	31.62	33.47	35.86	39.04	43.50	50.36	61.80	84.67	154.01

SAMPLE RUN

Output Data Set 4, T, TDT, and PBT-MATRIXES

AREA-WEST TEXAS , RATED CAPACITY 14.0 BALE/HR, EFFICIENCY 0.85 ; INTEREST RATES: CAPITAL ASSETS .090, WORKING CAPITAL .100 ;
TAXES .014 ; .006 INSURANCE ON .900 CO INSURANCE, SEED COTTON INSURANCE 0.500 PER BALE; DRYER FUEL TYPE-NATURAL GAS ;
HORSEPOWER NEEDED 893.0 , CONNECTED HORSEPOWER 1160.0;
REDUCTION IN NON-PROCESSING HOURS 0.080 AND REDUCTION IN OVERTIME HOURS 0.200 FOR EACH 10% REDUCTION IN VOLUME;
0.0 SALARIED GINNER, 0.0 SALARIED OTHER GIN EMPLOYEES; NUMBER OF SEASONAL EMPLOYEES AND HOURLY WAGE RATES: 2.00 OFFICE 2.75 ,
1.00 GINNERS 4.25 ; 1.00 ASSISTANT GINNERS 3.50 , 1.00 HEAD PRESS 2.75 , 6.00 OTHER GIN 2.50 ;
SEASONAL FRINGE COST: GIN .2170 , OFFICE .0585 ;FIXED SEASONAL CREW HOURS 292. .

STRIPPER HARVEST UD PRESS TRAILER HANDLING SUCTION UNLOADING NO SEEDCOTTON STORAGE 14 WEEK SEASON 1977 RATES 3 78 DOCUMENTATION

	**** T-MATRIX **	PERCENT CAPACITY UTILIZATION									
		100.	90.	80.	70.	60.	50.	40.	30.	20.	10.
	BALES PER SEASON	10781.	9703.	8625.	7547.	6469.	5391.	4313.	3234.	2156.	1078.
	PROCESSING HOURS	906.	815.	725.	634.	544.	453.	362.	272.	181.	91.
I	** TDT-MATRIX **	TOTAL DOLLAR COST									
1	DEPRECIATION	36870.	36870.	36870.	36870.	36870.	36870.	36870.	36870.	36870.	36870.
2	INTEREST	51092.	50651.	50211.	49770.	49329.	48888.	48466.	48044.	47622.	47219.
3	INSURANCE	9704.	9165.	8626.	8087.	7548.	7009.	6470.	5931.	5392.	4853.
4	TAXES	10520.	10520.	10520.	10520.	10520.	10520.	10520.	10520.	10520.	10520.
5	GIN MANAGER	14500.	14500.	14500.	14500.	14500.	14500.	14500.	14500.	14500.	14500.
6	SUPERINTENDENT	11000.	11000.	11000.	11000.	11000.	11000.	11000.	11000.	11000.	11000.
7	OFFICE MANAGER	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	GINNERS SALARIED	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	OTHER GIN SALARIED	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	SEASONAL OFFICE	6590.	5885.	5179.	4474.	3769.	3063.	2479.	1895.	1311.	726.
11	SEASONAL GIN CREW	44192.	40432.	36672.	32912.	29152.	25392.	22277.	19163.	16048.	12934.
12	ENERGY	29615.	26985.	24356.	21726.	19096.	16466.	13837.	11207.	8548.	6659.
13	BAGGING TIES	40430.	36387.	32344.	28301.	24258.	20215.	16172.	12129.	8086.	4043.
14	REPAIRS	36268.	33379.	30489.	27600.	24710.	21821.	18932.	16042.	13153.	10263.
15	DRYER FUEL	4673.	4242.	3811.	3381.	2950.	2519.	2091.	1668.	1244.	817.
16	MISCELLANEOUS	29414.	26773.	24132.	21490.	18849.	16207.	13566.	10924.	8283.	5641.
17	GRAND TOTAL	324869.	306789.	288709.	270630.	252550.	234470.	217179.	199892.	182575.	166045.
	** PBT-MATRIX **	PER BALE COST									
1	DEPRECIATION	3.42	3.80	4.27	4.89	5.70	6.84	8.55	11.40	17.10	34.20
2	INTEREST	4.74	5.22	5.82	6.59	7.63	9.07	11.24	14.85	22.09	43.80
3	INSURANCE	0.90	0.94	1.00	1.07	1.17	1.30	1.50	1.83	2.50	4.50
4	TAXES	0.98	1.08	1.22	1.39	1.63	1.95	2.44	3.25	4.88	9.76
5	GIN MANAGER	1.34	1.49	1.68	1.92	2.24	2.69	3.36	4.48	6.72	13.45
6	SUPERINTENDENT	1.02	1.13	1.28	1.46	1.70	2.04	2.55	3.40	5.10	10.20
7	OFFICE MANAGER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	GINNERS SALARIED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	OTHER GIN SALARIED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	SEASONAL OFFICE	0.61	0.61	0.60	0.59	0.58	0.57	0.57	0.59	0.61	0.67
11	SEASONAL GIN CREW	4.10	4.17	4.25	4.36	4.51	4.71	5.17	5.92	7.44	12.00
12	ENERGY	2.75	2.78	2.82	2.88	2.95	3.05	3.21	3.46	3.96	6.18
13	BAGGING TIES	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
14	REPAIRS	3.36	3.44	3.53	3.66	3.82	4.05	4.39	4.96	6.10	9.52
15	DRYER FUEL	0.43	0.44	0.44	0.45	0.46	0.47	0.48	0.52	0.58	0.76
16	MISCELLANEOUS	2.73	2.76	2.80	2.85	2.91	3.01	3.15	3.38	3.84	5.23
17	GRAND TOTAL	30.13	31.62	33.47	35.86	39.04	43.50	50.36	61.80	84.67	154.01

SAMPLE RUN

Output Data Set 5 SI-MATRIX

AREA-WEST TEXAS , RATED CAPACITY 14.0 BALE/HR, EFFICIENCY 0.85 ; INTEREST RATES: CAPITAL ASSETS .090, WORKING CAPITAL .100 ;
TAXES .014 ; .006 INSURANCE ON .900 CO INSURANCE, SEED COTTON INSURANCE 0.500 PER BALE; DRYER FUEL TYPE-NATURAL GAS ;
HORSEPOWER NEEDED 893.0 , CONNECTED HORSEPOWER 1160.0;
REDUCTION IN NON-PROCESSING HOURS 0.080 AND REDUCTION IN OVERTIME HOURS 0.200 FOR EACH 10% REDUCTION IN VOLUME;
0.0 SALARIED GINNER, 0.0 SALARIED OTHER GIN EMPLOYEES; NUMBER OF SEASONAL EMPLOYEES AND HOURLY WAGE RATES: 2.00 OFFICE 2.75 ,
1.00 GINNERS 4.25 ; 1.00 ASSISTANT GINNERS 2.50 , 1.00 HEAD PRESS 2.75 , 6.00 OTHER GIN 2.50 ;
SEASONAL FRINGE COST: GIN .2170 , OFFICE .0585 ;FIXED SEASONAL CREW HOURS 292. .

STRIPPER HARVEST UD PRESS TRAILER HANDLING SUCTION UNLOADING NO SEEDCOTTON STORAGE 14 WEEK SEASON 1977 RATES 3 78 DOCUMENTATION

	** SI-MATRIX **	PERCENT CAPACITY UTILIZATION 100.	90.	80.	70.	60.	50.	40.	30.	20.	10.
	BALES PER SEASON	10781.	9703.	8625.	7547.	6469.	5391.	4313.	3234.	2156.	1078.
	PROCESSING HOURS	906.	815.	725.	634.	544.	453.	362.	272.	181.	91.
I						TOTAL DOLLAR COST					
	TOTAL: LBR, MGR, OFF	76282.	71816.	67351.	62886.	58420.	53955.	50256.	46557.	42859.	39160.
1	TOTAL MANAGEMENT	25500.	25500.	25500.	25500.	25500.	25500.	25500.	25500.	25500.	25500.
2	TOTAL OFFICE	6590.	5885.	5179.	4474.	3769.	3063.	2479.	1895.	1311.	726.
3	TOTAL LABOR	44192.	40432.	36672.	32912.	29152.	25392.	22277.	19163.	16048.	12934.
4	FIXED OPERATING CAP	66908.	66908.	66908.	66908.	66908.	66908.	66908.	66908.	66908.	66908.
5	VARI OPERATING CAP	169998.	152360.	134721.	117082.	99443.	81804.	64935.	48070.	31175.	15048.
6	TOTAL OPERATING CAP	236907.	219268.	201629.	183990.	166351.	148712.	131843.	114978.	98083.	81956.
7	TOTAL FIXED INTEREST	46842.	46842.	46842.	46842.	46842.	46842.	46842.	46842.	46842.	46842.
						PER BALE COST					
	TOTAL: LBR, MGR, OFF	7.08	7.40	7.81	8.33	9.03	10.01	11.65	14.39	19.88	36.32
8	TOTAL MANAGEMENT	2.37	2.63	2.96	3.38	3.94	4.73	5.91	7.88	11.83	23.65
9	TOTAL OFFICE	0.61	0.61	0.60	0.59	0.58	0.57	0.57	0.59	0.61	0.67
10	TOTAL LABOR	4.10	4.17	4.25	4.36	4.51	4.71	5.17	5.92	7.44	12.00
11	FIXED OPERATING CAP	6.21	6.90	7.76	8.87	10.34	12.41	15.51	20.69	31.03	62.06
12	VARI OPERATING CAP	15.77	15.70	15.62	15.51	15.37	15.18	15.06	14.86	14.46	13.96
13	TOTAL OPERATING CAP	21.97	22.60	23.38	24.38	25.72	27.59	30.57	35.55	45.49	76.02
14	TOTAL FIXED INTEREST	4.34	4.83	5.43	6.21	7.24	8.69	10.86	14.48	21.72	43.45
15	V TOTAL HOURS	9252.00	8348.76	7445.52	6542.28	5639.04	4735.80	3832.56	2929.32	2026.08	1122.84
16	V TOTAL HR PER BALE	0.86	0.86	0.86	0.87	0.87	0.88	0.89	0.91	0.94	1.04
17	PROCESSING HOURS	8154.00	7338.60	6523.20	5707.80	4892.40	4077.00	3261.60	2446.20	1630.80	815.40
18	PROCESSING HR/BALE	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
19	V NON-PROCESS HOURS	1098.00	1010.16	922.32	834.48	746.64	658.80	570.96	483.12	395.28	307.44
20	V NON-PROC HR/BALE	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.15	0.18	0.29
21	CREW PROCESSING HR	906.00	815.40	724.80	634.20	543.60	453.00	362.40	271.80	181.20	90.60
22	V CREW NON-PROC HR	122.00	112.24	102.48	92.72	82.96	73.20	63.44	53.68	43.92	34.16
23	V TOTAL CREW HOURS	1028.00	927.64	827.28	726.92	626.56	526.20	425.84	325.48	225.12	124.76
24	PROCESS OVERTIME HR	183.32	146.27	109.34	72.59	36.09	0.00	0.0	0.0	0.0	0.0
25	V NON-PROC OVTIME HR	24.68	20.13	15.46	10.61	5.51	0.00	0.0	0.0	0.0	0.0
26	TOTAL CREW OVTIME HR	208.00	166.40	124.80	83.20	41.60	0.00	0.0	0.0	0.0	0.0
27	TOTAL OFFICE HOURS	2056.00	1855.28	1654.56	1453.84	1253.12	1052.40	851.68	650.96	450.24	249.52
28	OFFICE HR/BALE	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.23
29	KWHR TOTAL	684555.	617725.	550894.	484063.	417232.	350402.	283571.	216740.	149910.	83079.
30	KWHR PER BALE	63.49	63.66	63.87	64.14	64.50	65.00	65.75	67.01	69.52	77.06
31	COST PER KWHR	0.04326	0.04369	0.04421	0.04488	0.04577	0.04699	0.04879	0.05171	0.05702	0.08015
32	DRYER FUEL TOTL UNIT	2695.	2426.	2156.	1887.	1617.	1348.	1078.	809.	539.	270.
33	DRYER FUEL UNT/BALE	0.25000	0.25000	0.25000	0.25000	0.25000	0.25000	0.25000	0.25000	0.25000	0.25000
34	DRYER FUEL COST/UNIT	1.73362	1.74881	1.76762	1.79180	1.82404	1.86918	1.93991	2.06276	2.30701	3.03120

THANK YOU. PLEASE CALL AGAIN.

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