A MINICOMPUTER SYSTEM FOR THE
READY-TO-WEAR RETAILER

by

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Minicomputers have been used successfully in industry and their low cost and increasing capabilities have slowly increased their use in business data processing. With only one user, no sophisticated operating system for multi-users need exist. The equipment is physically small, has no special power, temperature or humidity requirements, and can be operated within the business itself to provide useful, timely information.

This paper explores a proposed system for a small-to-medium sized business involving two ladies ready-to-wear stores.

While the main goal is a working system for this business, and all cost justification is based on this business, it is expected that the end product can be used by and sold to other small businesses.

CHAPTER II

DESCRIPTION OF PRESENT OPERATION

2.1 OVERVIEW

Braun's Apparel is a corporation involving two ladies ready-
to-wear stores, both managed by the major stockholders. The first,
opened in 1962, is in a shopping center near Ellsworth Air Force
Base near Rapid City, South Dakota. The second, opened in 1967,
is in the downtown section of Rapid City. The two stores operate
in close conjunction with each other using common bookkeeping and
merchandise receiving facilities. The management takes care of the
majority of the bookkeeping and a certified public accountant handles
the tax matters. Total annual sales are in the neighborhood of
$500,000. Most major functions of the business are currently handled
by the management which allows for very efficient operations, but also
places an excessive workload on a few people and severely limits
ideas of expanding into more than a two store operation.

2.2 PRESENT OPERATION

2.2.1 SALES INFORMATION HANDLING

All customer-involved transactions are recorded on a special form
for charges involving Master Charge and other similar charge plans.
Otherwise a standard sales pad is used with a carbon copy going to
the customer. On this form are recorded the customer's name and
address, if the transaction is not a cash sale, the date, an indication

of cash or check, sales clerk, and finally information concerning the transaction. This information includes quantity, description, price, and tax for sales, or paid on account (POA) and the amount. About 180 items are involved in an average day's business. These forms are then used each night to update the accounts receivable and to complete summaries of that day's business. They are then filed by day/month/year for a duration of seven years.

2.2.2 ACCOUNTS RECEIVABLE

Charge accounts are maintained for customers who wish to charge with a plan other than one like Master Charge. A customer wishing such an account fills out a credit application form. If a charge account is granted, then a ledger card is made for that customer. These cards are stored alphabetically in separate files for each store, which occasionally involves extra bookkeeping if the customer shops the other store. At present free credit is given for 90 days, however interest is occasionally added for delinquent accounts. Posting the day's charge business is done on these ledger cards. Once a month cards are pulled from the files for all customers to whom it is desired to send statements. Cards held back involve customers with no balance due, or customers who have made special arrangements to suppress sending the statement. Statements will show more than one month's transactions, but a typical statement will have only about six entries from the current month. The cards which have been pulled are hand fed into a copying machine and later reinserted into the card

files. The copies are hand folded, stuffed into envelopes - occasionally with advertisements, sealed, stamped, and mailed. Handling of delinquent accounts is accomplished by either a special letter or a note on the statement itself. This process involves manual inspection of the account files and a great deal of manual labor. About 1000 accounts are maintained for each store.

2.2.3 ACCOUNTS PAYABLE

Order copies from the buying process are used to verify each shipment of merchandise, noting discrepencies in merchandise received, late receivement, and postage and insurance. All bills are paid so as to take advantage of all possible discounts for prompt payment. Discounts are figured, allowances for returned goods or improper postage are made, and a check is written and mailed. Checks for paying employees, rent, and utilities are written on regular basis.

2.2.4 INVENTORY AND MERCHANDISE TAGGING

At present the only formal inventory taking involves a yearly physical inventory of merchandise. This procedure has worked fairly well thus far as the management is so closely tied to the total operation. Merchandise is tagged by sales help and management on color-coded-by-size tags which contain the manufacturer, style number, size, and retail price. Special smaller tags are used for items such as jewelry and scarves. Sale items retain their original tags but also are given a bright yellow tag with the sale price. Whenever

possible, tags are crocheted into the garment to keep them with the garment when it is tried on and to make tag switching difficult.

2.2.5 BUYING

This is another function assumed entirely by the management. Four or five trips to market in Minneapolis, Minnesota are made each year to partially accomplish this function. This form of buying is supplemented by buying from salesmen making more or less regular trips to Rapid City. As the stores have grown, this function has become more difficult due to the amount of information which must be recalled from memory, as an item inventory does not exist. All decisions are based on remembering the history of performance for all of the various lines, styles, size range breakdowns, and colors.

2.2.6 PAYROLL

Each of the approximately 15 employees has a calendar on a bulletin board in the store on which he records the number of hours worked each day. These calendars are then used every two weeks to calculate wages. Tax is then figured and payroll checks are written.

2.2.7 PERFORMANCE EVALUATION

A. STORE PERFORMANCE

Records are kept of total sales by day, accumulative for month, and accumulative for year for each store. These records are then later used for reference and for comparison purposes.

B. VENDOR AND ITEM PERFORMANCE

Although some records exist, such as order copies, this process is mainly a mental one and leaves much to be desired.

C. SALES PERSONNEL PERFORMANCE

No records are maintained, but time is spent observing the sales girls in selling and other storekeeping activities.

CHAPTER III

DESIRED AUTOMATED SYSTEM

3.1 OVERVIEW

As Braun's Apparel has grown, the management has been forced into an ever increasing time commitment. It is desired to free them to a certain degree to give them more time for management and more time for their own. If the business is to expand beyond a two store operation, some reorganization will be necessary. It is also desired to provide readily available information concerning the business. Some of the typical questions the management would like to have answers for are:

What is the total amount of accounts receivable for store X?

Which accounts involve more than X dollars?

Which accounts are delinquent?

What is the total amount of accounts payable?

How did vendor X's merchandise perform during time Y?

How did style X perform durying time Y?

How many of style X did we buy last year?

How many of style X went on sale?

What sizes and colors of style X did we buy last year?

Access to accounts receivable information should be nearly immediate.

3.2 PROPOSED OPERATION

3.2.1 SALES INFORMATION HANDLING

_Charge plans such as Master Charge would continue as in the past.
All other charge and cash business would be recorded on the form shown
in Figure 3-1. This is a two-part form with one copy going to the
customer. A portion of the merchandise tags would be removed and
spindled with each store copy of all charge and cash sales. All
customer credits would be recorded on a two-part form identical to
the one in Figure 3-1 except that the form would have a different
color, the charge, check and cash boxes would become adjustment,
return and payment, and the CHARGE NO. 00000 would become CREDIT NO.
00000. These forms and tags would then be used at the end of the day
to update the accounts receivable file, the inventory file, and a file
summarizing the total business. A brief report of that day's business
would be printed, and this report together with the forms would be
filed and stored as described in 2.2.1. Two plastic cards with the
customer's name, address, and account number embossed thereon will be
made for all customers who have a charge account with the store. One
copy of this card will be kept on a Rolodex file in each store. This
card will serve two primary functions. First, it will provide an
almost error free method of recording the proper customer ID on each
transaction. Secondly, it will allow management to carefully control
customers to whom credit is extended. For example, if an account is
delinquent, the card can be simply removed from the file and the sales

Braun's
APPAREL

VILLA RANCHAERO 601 ST. JOE ST		CHARGE	☐
ELLSWORTH A.F.B. RAPID CITY, S.D.		CHECK	☐
S.D., 57701	57701	CASH	☐
(605) 923-2205	(605) 343-5585		

X _____
CUSTOMER SIGNATURE

ITEM	QUAN	DESCRIPTION	PRICE	AMOUNT

DATE	SOLD BY	AUTHORIZED BY	SUB TOTAL	
			SALES TAX	
CHARGE NO. 00000			TOTAL	

Information from this area will be taken
from the credit card and will include:

1) Account Number
2) Store
3) Name
4) Address

Figure 3-1 CHARGE FORM

person does not have to be involved in credit decisions. An added
advantage is that the customer does not have to carry the card or
worry about losing it.

3.2.2 ACCOUNTS RECEIVABLE

Credit applications will function as at present. If an
application is accepted an entry will be made into the customer file.
With the plastic cards described above, the total credit picture
will be more centralized, with a smoother handling of customers
shopping between stores. Free credit will be extended for the current
month with interest automatically computed and added on thereafter.
Decisions for suppressing a customer statement generation will be
retained. Statements will be printed on a monthly basis on a pre-
printed form as shown in Figure 3-2. The message refered to on the
back of the form will explain the interest computation. After the
entire system is in operation, postage meters and mailing machines
will be studied to perhaps further automate sending statements.
Statements requiring special attention will be printed as a group
separate from the others, allowing a speed-up of handling delinquent
accounts. If an account has more transactions during a month than
are possible to print on one form, two will be used. Posting will
be done by entering the information from the tags and forms at the
console. This will speed up the present method by eliminating the
search and replacement of ledger cards and entering coded rather

VILLA RANCHERO
ELLSWORTH A.F.B.
SOUTH DAKOTA 57701
(605) 923-2205

Braun's
APPAREL

601 ST. JOE STREET
RAPID CITY
SOUTH DAKOTA 57701
(605) 343-2530

YOUR ACCOUNT NUMBER

YOUR BILLING DATE

MINIMUM AMOUNT DUE TO AVOID FINANCE CHARGE ▼

AMOUNT DUE ▼

PLEASE PLACE ADDRESS CORRECTIONS HERE

THIS SPACE FOR ADVERTISING MESSAGE

PLEASE REMOVE THIS PORTION AND RETURN WITH YOUR REMITTANCE ◄ ─ ─ KEEP THIS PORTION FOR YOUR RECORDS

DATE	STORE	ITEM	DESCRIPTION	CHARGES	CREDITS
FIGURED ON YOUR PREVIOUS BALANCE	WE ADD FINANCE CHARGE	WE ADD YOUR PURCHASES	WE SUBTRACT CREDITS	WE SUBTRACT PAYMENTS	YOUR NEW BALANCE

ANY TRANSACTIONS OCCURING AFTER THE BILLING DATE WILL APPEAR ON YOUR NEXT STATEMENT

TO AVOID ADDITIONAL FINANCE CHARGES PAYMENT OF YOUR NEW BALANCE MUST BE RECEIVED BEFORE

ANNUAL PERCENTAGE RATE =

STORES
D DOWNTOWN BRAUN'S
V VILLA RANCHAERO BRAUN'S

NOTICE: SEE REVERSE SIDE FOR IMPORTANT INFORMATION

Figure 3-2 STATEMENT FORM

than full information. Search programs will be available to retrieve specific information from this file and generate reports.

3.2.3 ACCOUNTS PAYABLE

Bills for rent and utilities will be handled as at present. Checks for employees will be done with a payroll program. Bills from merchandise vendors will be processed in connection with the inventory system.

3.2.4 INVENTORY AND MERCHANDISE TAGGING

Merchandise tags will be three-part and machine printed as shown in Figure 3-3. At the time of the sale, one part will be removed and spindled with the sales form. If an item is returned, one part of the remaining two will be spindled with the credit form. The third portion will be used to generate a new tag. To begin with, a machine to produce a print only tag will be used. A print/punch tag will probably be used eventually to speed up posting and reduce errors. An average of about 180 items are sold and returned in one day, and it is felt the print/punch ticket and a reader for it are not justified at this time. The tag will retain the present color coding for the size system presently used. Some special merchandise, such as jewelry, will retain present tagging methods and will not be included in the inventory. Until print/punch tickets are used, sale tags will consist of a yellow adhesive tag placed in the area indicated in Figure 3-3. These tags will be easy to apply and

ITEM

VENDOR NUMBER

STYLE NUMBER

PRICE

COLOR CODE

AREA FOR SALE TAG

COLOR OF TAG INDICATES SIZE

Braun's
11B   1175
5301 12 1400

SIZE 13

PRICE $ 14⁰⁰

Braun's
11B   1175
5301 12 1400

SIZE 13

PRICE $ 14⁰⁰

Braun's
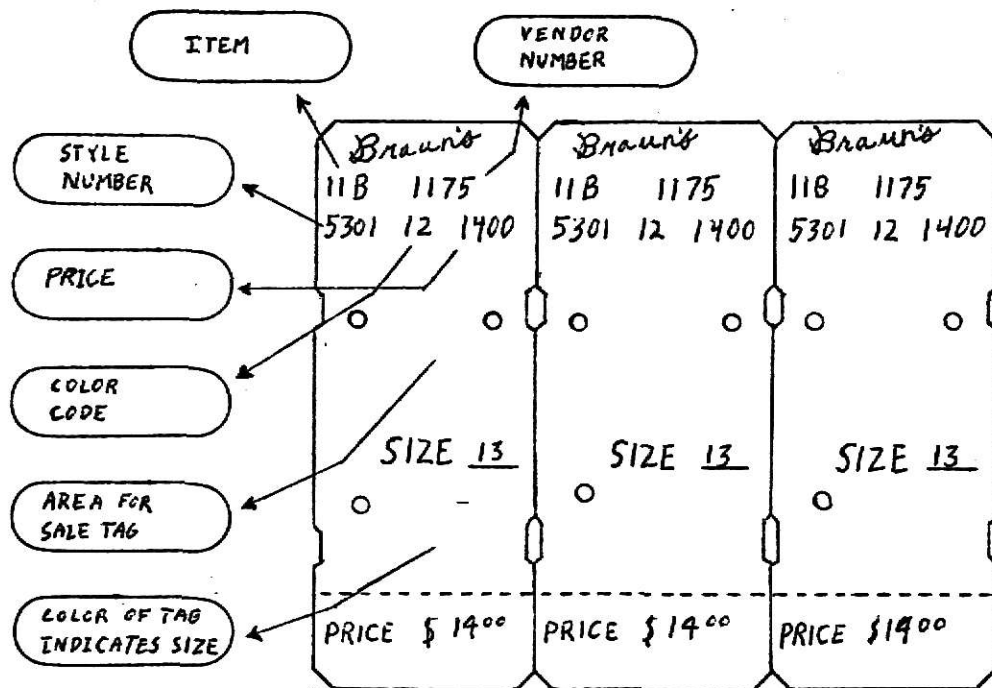11B   1175
5301 12 1400

SIZE 13

PRICE $14⁰⁰

Figure 3-3   MERCHANDISE TAG

difficult to switch. The color code for the merchandise itself is shown in Figure 3-4. The coding for the item breakdown of the merchandise will consist of three characters. Some merchandise needs a three-level breakdown and will be handled by a single digit to express the item number, such as 1 to indicate fall and winter coats; a letter to show a subdivision, such as C to indicate leather; and finally a digit to show a further subdivision, such as 1 to indicate a length of 30" to 36". Most items require only a two level breakdown, and will have a two-digit number to express the item number, and a letter to show a subdivision. A chart for this has been agreed upon, but is too lengthy to be shown in full. Style numbers are four-digit numbers defined by the manufacturer, and the vendor number will be assigned by a simple numerical scheme. Information from the order copy obtained in the buying process will be used to update an on-order file. This file will contain the vendor, a start shipment date, a complete shipment date, style number, color breakdown, size breakdown, item description, wholesale price, total wholesale price, due date to receive discount, discount rate, returns, and postage and insurance adjustments. As shipments are received, this file will be updated. As checks are written to pay for the merchandise, entries will be deleted, and the order copies filed. Also as shipments are received an inventory file will be updated. This file will contain all merchandise tag information, the date of entry, the quantity in stock, quantity sold this month, quantity sold

SOLIDS MAJOR COLORS	SOLIDS MINOR COLORS	SOLIDS MINOR COLORS	CHECKS
0. No Color	10. Assorted		30. Assorted
1. White	11. Off-White	21. Bone	31. White
2. Black	12. Grey	22. Silver	32. Black
3. Red	13. Wine	23. Pink	33. Red
4. Blue/Navy	14. Royal	24. Powder	34. Blue
5. Green	15. Lime	25. Mint	35. Green
6. Yellow	16. Gold	26. Maize	36. Yellow
7. Brown	17. Rust	27. Beige	37. Brown
8. Purple	18. Plum	28. Lilac	38. Purple
9. Orange	19. Coral	29. Peach	39. Orange

PLAIDS	DOTS	STRIPES	PRINTS
40. Assorted	50. Assorted	60. Assorted	70 Assorted
41. White	51. White	61. White	71. White
42. Black	52. Black	62. Black	72. Black
43. Red	53. Red	63. Red	73. Red
44. Blue	54. Blue	64. Blue	74. Blue
45. Green	55. Green	65. Green	75. Green
46. Yellow	56. Yellow	66. Yellow	76. Yellow
47. Brown	57. Brown	67. Brown	77. Brown
48. Purple	58. Purple	68. Purple	78. Purple
49. Orange	59. Orange	69. Orange	79. Orange

Figure 3-4 COLOR CHART

this year, and the quantity put on sale. Programs will be available
to search these files for specific information and to generate reports.

3.2.5 BUYING

This function will be changed only in that the information from
the inventory will be available.

3.2.6 PAYROLL

This function will remain about the same except for a simple
program to do the calculations.

3.2.7 PERFORMANCE EVALUATION

A. STORE PERFORMANCE

The business summary file will allow retrievals of the information
on a daily and monthly basis.

B. VENDOR AND ITEM PERFORMANCE

Programs in the inventory section will provide the information.

C. PERFORMANCE OF EMPLOYEES

The daily posting would include a posting to a file of total
sales for each person. The file could be searched at will for
individual cases or for periodic report generation.

CHAPTER IV

SOFTWARE SPECIFICATION

4.1 _ INFORMATION FILES

4.1.1 OVERVIEW

The main structure used for file organization will be linked
lists. This will allow reasonably easy updating while retaining a
given order, such as alphabetical, and capability of dynamic
allocation and freeing of file storage areas for efficient storage
management. The links will be simply record numbers which when used
with a beginning address of the file will hash into a physical
address of the record. Wherever such dynamic ordering capabilities
are not needed, files will be structured as simple arrays. The total
size requirements for these files is estimated to be 585,000 16-bit,
2-byte words.

4.1.2 ACCOUNTS RECEIVABLE

A. CUSTOMER FILE

This file is actually composed of two separate files. The
first, the account number file, will be stored in simple array
fashion of two words per entry which will consist of the account
number and a link to the rest of the information for that number.
Space will be reserved for 2000 entries and this file will require
4000 words. The second is the main customer file which will need
2000 entries of 40 words each for a total of 80,000 words. 35 words

will be used for the customers name and address. A carriage return

will be used to delimit fields within this area and a special

character, such as an asterisk, will terminate the information.

Thus a total of 67 characters of information will be available for

the name and address. Two words will be used for the previous

balance, and one word each will be used for the account number which

will be recorded as a negative if that customer has made arrangements

for having no statement sent, a link to that customers first entry in

the transaction file, and a link to the next entry in this file.

B. TRANSACTION FILE

It is estimated that each customer will have an average of six

entries in this file per month. Each entry will need five words,

thus this file requires $(2000)(6)(5) = 60,000$ words. Entries will

consist of two words for the store where the transaction occured

and the three-byte item number or other transaction description

such as POA, and one word each for the date (month/day), the amount

(negative indicates a return), and a link to the next transaction

for that customer.

4.1.3 INVENTORY

A. ON-ORDER FILE

At any given time up to 100 orders can be outstanding. The

on-order file is composed of three separate levels, where individual

orders are stored on the first level, items at the second level, and

color and size combinations at the third level. The 100 nodes at the first level will consist of 12 words each for a total of 1200 words. Each node will contain eight bytes for the order copy number, one word each for a start shipment date, a complete shipment date, a due date, an adjustment for returns, an adjustment for postage, and a link to the next order, and one byte each for the vendor number and the discount rate. At the second level, eight words each will be used for a maximum of 2500 nodes of item information for a total of 20,000 words. Two words will hold the item code and the vendor number, one word each will be used for the style number, the retail price, a link to the first related entry at the third level, a link to the next entry at the second level with the same item code, a link to the next entry at the second level with the same vendor number, and a link to the next entry at the second level with the same order number. The third level will have room for 25,000 entries of three words each for a total of 75,000 words. One byte each for size, color, number ordered, number received, and one word as a link to the next entry at the third level with the same style number will be used.

B. INVENTORY FILE

This will be a two-level file with room for 20,000 nodes of seven words each at the first level and 50,000 nodes of 4 words each at the second level for a total of 340,000 words. Nodes at the first level will have two words for the item code and vendor number, and

one word each for the style, the retail price, a link to the first
color-size combination at the second level, a link to the next entry
at the first level with the same item code, and a link to the next
entry at the first level with the same vendor number.

C.   ITEM DESCRIPTION FILE

This file will have 300 entries of eight words each for a
total of 2400 words. Three bytes will hold the item description
or POA, nine bytes will have the description of the item, and one
word each will be used for the link to the first entry for this
item in the on-order file and the inventory file.

D.   COLOR CODE TO COLOR FILE

This file will have 80 entries of six words each for a total
of 480 words. The file will be an array of 12 bytes description
for each color, with the color number serving as an index into the
array.

E.   VENDOR CODE TO VENDOR FILE

This file will have 200 entries of seven words each for a total
of 1400 words. The file will be an array where the vendor number is
an index into the array, and each element has ten bytes for the vendor
name and one word each for links to the first entry in the on-order
file and the inventory file with that vendor number.

4.1.4 BUSINESS SUMMARY FILE

This file will consist of two parts. The first will be a simple array storing the amount of cash sales, charge sales and POA for each of the two stores for the current day, week and year. Thus 24 entries of two words each and a total of 48 words are needed. The second will be an array storing the cash, charges and POA for each day of the month. Thirty entries of eight words for a total of 240 words will be used, using one word each for the date, cash charges and POA for each store.

4.1.5 EMPLOYEE FILE

Each of a maximum of twenty employees will have a twenty word entry for a total of 400 words. Four words for their employee ID, two words each for cash this month, cash this year, charges this month, charges this year, returns this month, returns this year, and one word each for the number of hours this month and number of hours this year will be necessary. The last word will contain their hourly wage.

4.2 PROGRAMS

4.2.1 OVERVIEW

It is estimated that storage for all the programs in the system will require about 100,000 words with about 4000 words for the largest program. As the entire machine will be devoted to this system, it is not expected that time or speed considerations will be prime factors

except in two cases. First, the program to retrieve information from a particular charge account must be able to do its job rapidly since the request will often come via a telephone call with a customer and/or a salesperson waiting for the answer. Secondly, programs like the statement printing program and the inventory report printing program will involve large amounts of printing. This can be done in overnight runs, but a fairly fast printer would be desirable.

4.2.2 ACCOUNTS RECEIVABLE PROGRAMS

A program will be needed to update the customer file by either adding or deleting entries and adjusting the appropriate links. A posting program will be needed at the end of each business day to update the transaction file. This posting will be done by account number. A report program will be used to dump full, partial or summary information for a particular account, or all of the accounts for a store. As this will not require printing on pre-printed forms, or decisions, this program will be separate from the statement printing program.

4.2.3 INVENTORY PROGRAMS

As merchandise is ordered, a program to update the on-order file will be necessary. As it is received, this file will again need revision as well as the inventory file. A third program to generate reports on the on-order file will be necessary. This report will be used in writing checks to the merchandise vendors. Nightly

posting will require that the inventory file be changed. The program
doing this job will be the same one as the one used in posting to the
accounts receivable file. An inventory report generation program will
be required. The inventory file is structured such that it is
searchable by item number or vendor in order to give buyers better
information at market time.

4.2.4 BUSINESS SUMMARY PROGRAMS

After each nights posting, a brief report of cash, charges and
POA for each store will be generated and filed with that day's
sales tickets. At the end of each month a similar report showing
these figures over the entire month will be printed for future
comparisons.

4.2.5 EMPLOYEE PROGRAMS

A program to give sales summary information on particular
employees and to print hour, rate, deductions, and wage information
for evaluation and payroll information will be required.

4.2.6 MISCELLANEOUS PROGRAMS AND ROUTINES

A variety of routines used by the various programs will exist.
These routines will include input/output drivers, hashing routines,
math routines, and a program to make backup copies of the information
files.

CHAPTER V

HARDWARE SPECIFICATION

5.1 OVERVIEW

Due to the geographical location of Rapid City, South Dakota
(Denver, Colorado is the closest big city and is 400 miles away),
quality and reliability are key considerations. Likewise, the
cost of on-site service will also be important. Although this
study has assumed a word length of 16 bits, this figure is not a
requirement. It was used only because it is fairly standard and
it was necessary to specify size requirements in some manner.
The room in mind for hardware installation is air-conditioned by
means of the unit serving the entire store, but the hardware should
not require narrow limits on temperature and humidity.

5.2 CENTRAL PROCESSING UNIT

The primary consideration here is one of programming ease.
It is expected that programming will be done at the assembly
language level and some of the desirable features would be easy
byte manipulation, powerful input/output instructions, a variety
of addressing techniques including relative, base-displacement,
and indirect, a number of general purpose registers, register-
storage instructions, and an easy to use interrupt handling system.
Availability of good peripherals will also be important although
the buying of hardware will not necessarily be restricted to one

vendor. Core size will depend on a number of the above considerations
as well as word length. Manufacturer supplied software will be an
additional consideration. Thus primary considerations will be
reliability, serviceability, programming ease, and cost.

5.3 BULK STORAGE

It is estimated that information files will occupy somewhat
in excess of 500,000 words and programs another 100,000 words.
Bulk storage is one area that will need room for growth, and it
is desired to be able to store all of the information as one unit.
This would simplify operation of the system and allow easier
production of backup copies. In this respect, either magnetic
tape or disk storage could do the job. Due to the random structure
of the files, the storage device must be able to provide random
access. Given enough time, tape could do the job, but at an
inconvenience to the operator. For example, most of the time spent
posting would be in waiting for the proper spot on the tape.
Copying would require two drives, increasing cost and maintenance.
Disk gives the advantages of random access, high data transfer
rates and lower error rates. Again, production of the backup copies
requires two separate recording media, but hybrid disk drives offer
a solution by providing one fixed disk and one removable cartridge
on the same drive. Copying is then a procedure of copying to the
fixed disk, removing the master cartridge and inserting the backup
cartridge, and copying from the fixed disk to the backup. Most drives

of this nature offer 1.2 million words on the fixed disk and another 1.2 million words on the removable cartridge. This would allow room for the initial system as well as room for future growth.

5.4 CONSOLE

It is expected that all input/output can be done with one terminal. Basic requirements of this terminal are that it includes a keyboard and a printer. A cathode ray tube for rapid display would be a desirable feature, but would not be essential. The paper feed mechanism must be of the pin-feed type as opposed to simply friction-feed so as to prevent misalignment while doing mass printing of pre-printed forms. Printing must be by impact so that ordinary paper can be used and carbon copies produced if desired. Quality, reliability and speed are prime considerations. The five by seven dot matrix printers seem to meet these criteria. They print at a rate of 30 or more characters per second, and have very few moving parts.

5.5 MISCELLANEOUS EQUIPMENT

Additional equipment required will include Rolodex files for storing the plastic charge cards, possibly a machine to emboss these cards, a machine to produce the printed merchandise tags, and a few of the guns used in attaching the tags.

CHAPTER VI

COST JUSTIFICATION

6.1. OVERVIEW

In 6.2, comparisons of time spent in performing the various functions manually as opposed to an automated system are shown in chart form. The figures show some speed-up but not enough to justify the new system, whose estimated cost is explained and shown in 6.3. The main justification comes not from a direct cost savings, but in providing functions previously not realizable and in freeing the management. It is estimated that the business can afford to spend about five to seven percent of sales for the services and information which the proposed system would offer. Using the $500,000 annual sales figure, this amounts to a $25,000 to $35,000 budget for a computer system.

6.2 TIME COMPARISONS

Figure 6-1 shows that an estimated $71\frac{1}{2}$ hours can be saved monthly. At $2.00 per hour, this would mean a savings of about $1700 per year.

6.3 COST OF AUTOMATED SYSTEM

6.3.1 EQUIPMENT COSTS

Figure 6-2 shows estimated equipment costs for the proposed system. Spreading this cost over five years gives an equipment

cost of roughly $4300 per year. Adding $1000 for maintenance brings the total to roughly $5300 per year.

6.3.2 PERSONNEL COSTS

It is estimated that for a developmental period of two to three years, one additional position to handle programming and operating at a salary of about $12,000. After the system is fully operational, this position would reduce to a clerical position with a salary of about $4,000.

6.3.3 SUPPLIES AND ELECTRICITY

Necessary supplies will include plastic charge cards, blank computer paper, and pre-printed charge, credit and statement forms. Not all of the expense for this will be new expense, as sales forms and statement paper already involve a business expense. An estimate of new additional expense for these supplies is $200 yearly.

Figuring an average of 1000 watts for a 60 hour week at two cents per kilowatt-hour, an estimated $60 per year will be required for electricity.

6.4 TOTAL COST

It is estimated that the new system would save about $1700 per year, but would cost an additional $17,560 for the first two to three years and $9560 thereafter, resulting in a difference of $15,860 for the developmental period and $7860 thereafter.

In addition, the system should provide benefits whose value is difficult to measure. Included in this category are collecting interest on overdue accounts, reduction of overdue accounts, more intelligent merchandise buying, fewer customers dissatisfied because of improper inventory, and a reduction in loss of sales due to stock deficiencies.

ITEM	PRESENT (hrs.)	PROPOSED (hrs.)	DIFFERENCE (hrs.)
Bookkeeping	50	10	40
Posting	50	15	35
Statements	20	20	0
Delinquent Accts.	5	1	4
Paying Bills	16	2	14
Inventory	3	24	-21
Tagging	160	160	0
Buying	60	60	0
Payroll	3	2	1
Store Performance	unknown	$\frac{1}{2}$	$-\frac{1}{2}$
Employee "	unknown	1	-1
Total	367	$295\frac{1}{2}$	$71\frac{1}{2}$

Figure 6-1 TIME COMPARISONS

ITEM	COST ESTIMATE
CPU	$6000
Bulk Storage	$10,000-$12,000
Console	$3000
Rolodex Files	$100
Plastic Card Embosser	$600
Tag Printing Machine	$1000
Total	$20,700-$22,700

Figure 6-2 HARDWARE COSTS

CHAPTER VII

SUMMARY

In this study, it was found that there were two main areas in which automation could result in an improvement. The first, accounts receivable, is one which currently functions quite well, but is time consuming and could do a better job of being more thorough in debt collection and in adding interest to delinquent accounts. The second, inventory, is a function which has been done mentally in the past and is in need of some improvement.

In addition, several other areas appeared as candidates for automation. Included in this category are business summary evaluations, store evaluations, employee evaluations and payroll.

The cost of the proposed system is well within the allowable five to seven percent of sales figure. It appears that the desired aspects of a computerized system are realizable, and its implementation is recommended.

A MINICOMPUTER SYSTEM FOR THE
READY-TO-WEAR RETAILER

by

WAYNE LEROY BRAUN

B.A., Augustana College, 1965

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AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

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MASTER OF SCIENCE

Department of Computer Science

KANSAS STATE UNIVERSITY
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This paper is a presentation of a feasibility study of automating a ladies ready-to-wear business with a minicomputer.

The present mode of operation is presented, followed by a proposal for an automated version of the present operation with the inclusion of some additional capabilities. Software is outlined by examining file structure and necessary programs. This is followed by a discussion of the necessary hardware, and a cost justification completes the study.