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Systems

IBM 3741
Models 3 and 4
Programmable Work Station
General Information

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Preface

This publication provides general information about the IBM 3741 Programmable Work Station and its capabilities. This publication is intended for company executives, system analysts, data processing managers, programmers, and installation managers.

This publication is divided into the following chapters:

- *Chapter 1. IBM 3741 Models 3 and 4 Programmable Work Station* is an introduction to the new functions of the Programmable Work Station and the application control language.
- *Chapter 2. Functional Description* describes the new functions of the programmable work station.
- *Chapter 3. Application Control Language* provides general information on the control statements and instructions of the application control language used to implement programmable work station applications.
- *Chapter 4. Sample Applications* provides examples of applications that can be used on the IBM 3741 Programmable Work Station.

This publication assumes the reader is familiar with the IBM 3740 Data Entry System and data processing concepts. It is also assumed that the reader is familiar with the operation of the IBM 3741 Data Station, Models 1 and 2.

Related Publications

- *IBM 3740 Data Entry System System Summary and Installation Manual – Physical Planning*, GA21-9152.
- *IBM 3741 Data Station Reference Manual*, GA21-9183.
- *IBM 3741 Data Station Operator's Guide*, GA21-9131.
- *The IBM Diskette for Standard Data Interchange*, GA21-9182.
- *IBM 3741 Models 3 and 4 Programmable Work Station Programming Reference Manual*, GA21-9194.

Third Edition (August 1974)

This is a major revision of, and obsoletes, the previous edition GA21-9196-1. Changes are continually made to the specifications herein; any such changes will be reported in subsequent revisions or Technical Newsletters. Changes are indicated by a vertical line to the left of the change.

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IBM 3741 Programmable Work Station

Chapter 1. IBM 3741 Models 3 and 4 Programmable Work Station

The IBM 3741 Models 3 and 4 Programmable Work Station offers you significant additional functions beyond the scope of the 3741 Models 1 and 2 Data Station. These new functions are made possible through a programming facility called *Application Control Language (ACL)*, which opens the door to new data entry applications as well as to improved ways to accomplish existing jobs. The work station has these new functions:

- *Expanded arithmetic* functions including add, subtract, multiply, and divide operations which make possible additional field totals, zero balancing, and crossfooting operations.
- *Data checking* operations, including range checking, limit checking, table search, and diskette file search.
- *Data manipulation* capabilities which allow you to reformat data for display on the operator's display screen, for writing data onto a diskette, or for printing out data on a printer.
- *Additional keyboard and display* functions which allow you to display messages that include operator response alternatives and error messages that result from data checking within your ACL program.
- *Additional diskette access* methods which allow it to:
  - Process multiple data sets
  - Read and write on two drives
  - Create and maintain data set indices that provide fast access to online data.
- *Overlapped printing* which allows the work station operator to key data while previously-keyed data is being printed by one of three available printers.

The work station has all these functions in addition to the capabilities now available in the 3741 Data Station. The 3741 Model 4 also has the communication facility currently available on the 3741 Model 2. All optional features available for the Models 1 and 2 are available for the Models 3 and 4, respectively. Models 3 and 4 have the same physical requirements as Models 1 and 2, respectively.

The card input/output feature allows attachment of the following to the work station:

- IBM 129 Card Data Recorder (80-column card).
- IBM 5496 Data Recorder (96-column card).

The 3741 Programmable Work Station can be employed in many environments. In the central keypunch room, it can expand the key entry function to automatically include all or part of the data editing operation that follows data entry for a given application. For example, you can program the work station to verify data fields against internally stored tables or verify that a numeric field falls between prescribed high and low limits.

The 3741 Programmable Work Station can perform a broad range of functions of which data capture is a by-product. For example, the work station can be used in a remote sales warehouse to perform the order entry function. The work station operator enters the customer number, shipping information, and item numbers and quantities. The work station can be programmed to access customer and item files, make the necessary calculations, and format and print the sales invoices or order acknowledgements. At the same time, it can be used to store these transactions for later use by the central or host system for billing and accounts receivable, inventory control, and management and sales analysis. A more detailed discussion of possible work station applications can be found in Chapter 4 of this manual.

These numerous data entry functions are accomplished on the work station using the application control language – ACL. ACL provides you with the ability to control all input and output functions and arithmetic and logical operations and to guide the operator through the application, step by step. You program the work station the same way you do your central processing or host system. An experienced application programmer familiar with data entry devices and operations will find ACL an excellent tool for implementing work station applications.

The work station, when not operating under ACL program control, can also function exactly like the 3741 Data Station.

An optional ACL Translator feature is available to translate the ACL source programs you code into machine readable object code for the work station. The ACL Translator is required only on work stations being used to generate object programs. It is recommended that work stations that have the ACL Translator feature also be equipped with the optional 3741 Record Insert feature for easy source program maintenance.

Chapter 2. Functional Description

The 3741 Programmable Work Station, coupled with the Application Control Language (ACL), provides you with new functions not available in the 3741 Data Station. These new functions include:

- Additional display and keyboard facilities
- New data set access methods
- Expanded printer operations
- Table search facilities
- Expanded self-check number options

The purpose of this section is to describe these new facilities to aid you in designing and implementing your applications using the work station.

Display and Keyboard Facilities

The 3741 Data Station provides operator guidance by displaying prompting messages on line 5 of the display screen. The 3741 Programmable Work Station expands this prompting facility and offers these new capabilities:

- Allows you to use the last 30 positions of line 5 and all 40 positions of line 6 for the prompting message and display of the data entered.
- Allows you to specify multiple prompting messages of varying lengths for each data record to be entered, limited only by the storage available within your ACL program.
- Allows you to enter data, then:
  - Move the data to any location on lines 2, 3, or 4 of the display screen.
  - Move the data and the prompting message to lines 2, 3, or 4.
  - Move the data to a general purpose register to 1) perform an arithmetic operation, 2) compare it to the entries in a table, 3) compare it with a pre-defined upper and lower limit, or 4) use it as a search argument when searching a data set for an equal record.
- Allows you to display fill characters along with the prompting message to tell the operator how many positions of data are to be entered. The work station displays dashes (–) or periods (.). The dashes indicate to the operator that the data is to be numeric and periods indicate alphabetic.
- In addition to displaying new records currently being keyed or records to be updated, lines 2, 3, and 4 of the display screen can now be used to display:
  - Messages to the operator such as an error message indicating that a quantity entered exceeds a pre-defined limit (as specified in your ACL program).
  - Records read from a diskette in a format that is easier to read than the format of the actual diskette record.

Examples of the formatting capabilities of ACL are shown in Chapter 4 of this manual.

Data Set Access Methods

The 3741 Programmable Work Station uses the same data set label conventions as the 3741 Data Station. Diskettes can be interchanged between the Models 1 and 2 and the Models 3 and 4. On the Models 3 and 4, the data sets are used to store both ACL programs and data sets. During execution of an ACL program, *four* data sets can be accessed by the program at one time.

The ACL programming facility allows you to access data sets by *three* methods:

- Sequential or consecutive
- Random by relative record number
- Key indexed

All diskette data sets have the same physical characteristics, regardless of the access method used. A data set could be processed by any of the three access methods providing it meets the logical requirements of that method.

The sequential method requires that the records or 128-position sectors be processed sequentially or consecutively, based on the physical disk address. This method, which is also used by the 3741 Data Station, allows you to:

- Write records into a new data set.
- Write or add records at the end of an existing data set.
- Read records from an existing data set.
- Read and update records in an existing data set.
- Read and update records in an existing data set plus add new records at the end of an existing data set.

The relative record number method allows you to perform the same read and update operations as you do with the sequential method. The difference is that the search for each record is done in a direct manner, thereby reducing the diskette search time. You identify the records to be processed by specifying a relative record number during the read operation.

The key indexed method requires that the records in an existing data set be processed randomly by the selection of a search argument up to 16 positions in length. The search argument can be a control field or a data element within each record of a data set. The key indexed method requires that the records in the data set be arranged in ascending sequence, according to the search argument or control field . For example, the data set might be sequenced by employee number, product code, or customer number. When you are using the key indexed method, the work station control program automatically builds an index table in storage for the data set to be accessed. When a search argument is specified by your ACL program, a search is first made in the index table. The index table points to the appropriate track or tracks in the data set where the corresponding record should be found. The work station then goes directly to the specified tracks, thereby saving the time it normally takes to read all of the records from the beginning of the data set to the appropriate record. If the record is not present, a record-not-found condition is posted for appropriate action by your ACL program. For example, assume that a work station operator keys a specific customer number that is used to find that customer's master record. The customer number is compared to the index table, which directs the read operation to the appropriate tracks. If the record is found, the content of the record could be displayed on the screen. If the record is not found, your ACL program could display a record-not-found message.

The key indexed method allows you to read records randomly from an existing data set as well as read and update records randomly from an existing data set.

Multiple Diskette Data Sets

The application control language allows you to use a data set spanning multiple diskettes during the execution of your ACL program. The data sets can be processed in random or sequential order. Multiple diskette data sets require special operator instructions and built in safeguards in your ACL program.

Printer Operations

The following printers can be attached to your work station:

- The IBM 3713 (single direction character printer – 40 characters per second).
- The IBM 3715 (bi-directional character printer – 40 or 80 characters per second).
- The IBM 3717 (line printer – 120 to 155 lines per minute).

You can specify the following printer operations in your ACL program:

- Concurrent keying, processing, and reading and writing on the diskette
- Horizontal and vertical forms control
- Data editing

Keying, processing and printing operations, and reading and writing on the diskette can all be specified within the same ACL program. Horizontal forms control is provided through the use of data format statements within your ACL program. Single, double, and triple spacing and skipping to a specific line number on your print form can be specified during a print operation.

In addition, you can specify the following format commands for editing during printing:

- Comma and decimal point insertion
- Blank insertion
- Floating or fixed currency sign
- Asterisk protect or asterisk fill
- Zero suppression or zero fill
- Minus sign control

The same type of data format statements can be used to format data during other input/output operations, including diskette and display.

Table Operations

Tables can be maintained in storage or in a data set and loaded into storage when needed. Maximum length of a table entry is 16 positions. You can specify the following table operations in your ACL programs:

- Search for an equal entry in a non-sequential table.
- Search for an equal entry or the next higher entry in a table sequenced in ascending order.
- Read a specific entry from a table.
- Write a specific entry into a table.

For example, a single table could be used to validate general ledger account numbers as they are keyed by the operator. Your ACL program could search the table and, if an equal entry is not found, could notify the operator by displaying an "invalid number" message on the operator display screen. See Figure 1.

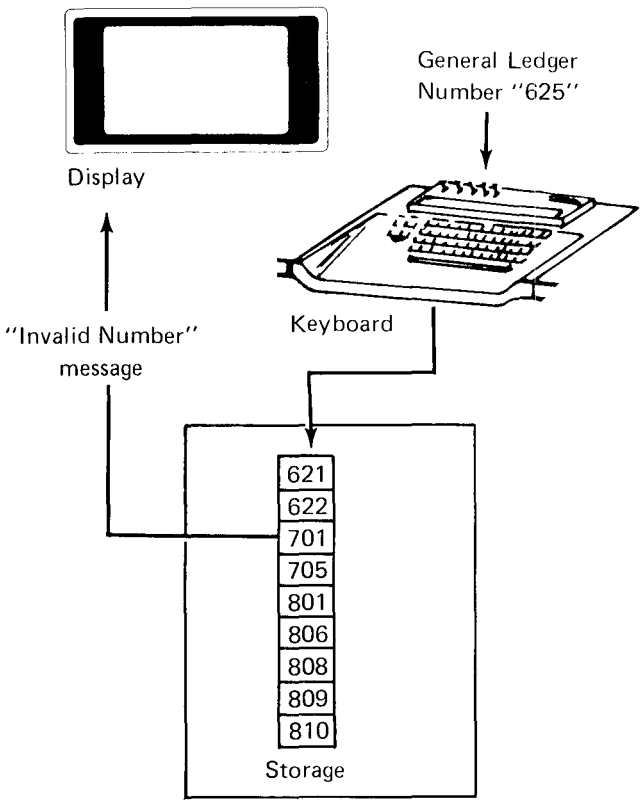


Figure 1. Table Search for Equal Entry

Figure 2 illustrates the use of two tables. Table I contains discount codes. Table II contains their corresponding discount percentages. The discount code could be keyed by the operator, and your ACL program could then extract the corresponding discount percentage from Table II.

Self-Check Numbers

The application control language provides the ability to check or generate self-check numbers. In addition to the standard modulus 10 and 11, you can specify any modulus from 2 to 127, as well as the characteristics of the algorithm you wish to use.

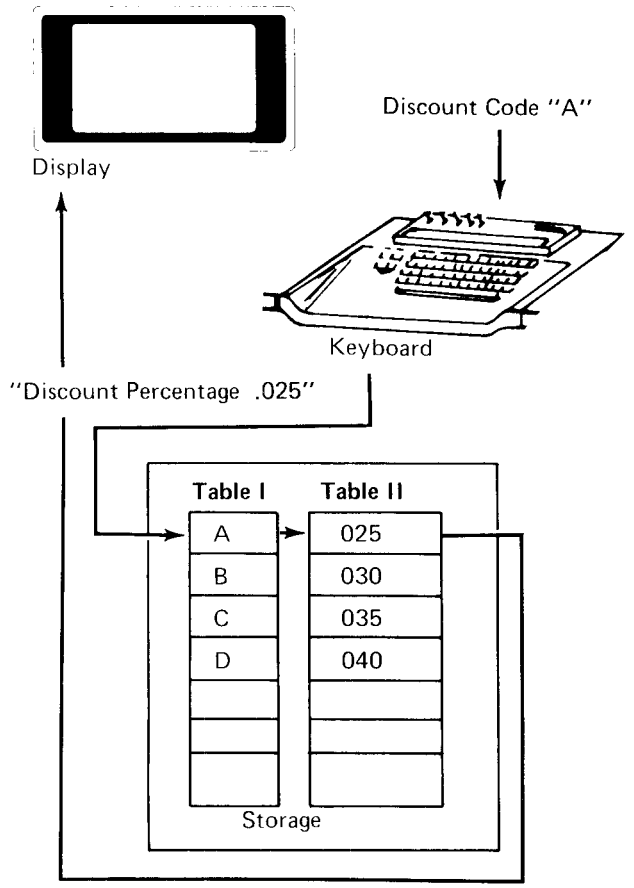


Figure 2. Search Table for Equal Entry — Read from Second Table

ACL Program Structure

The 3741 Programmable Work Station has 4,096 positions of storage. The first 1,024 positions of storage are allocated for system control. This block of storage also contains twenty-six 16-position general purpose registers (referenced A through Z). These registers are used to perform all arithmetic operations and certain logical functions (such as range check), and can also be used for formatting data on the display, diskette, and printer. An indicator table containing 255 indicators (part of which are used by the work station control program) is also included in this storage block. Ninety-nine indicators can be assigned in your ACL program.

The remainder of the storage (3,072 positions) consists of twenty-four 128-position buffers. Buffers 1 and 2 are assigned to the display unit for input and output operations. The remaining 22 buffers can be used for your input and output areas for data sets and the printer, and for storing operator prompting messages, tables, data set indexes, and program instructions. An optional 8K (K equals 1,024 bytes) storage feature provides an additional 32 buffers.

Figure 3 shows the structure of a typical ACL program. Buffers allocated to specific functions are examples only and should not be considered fixed requirements for an ACL program, except for buffers 1 and 2.

Program Development

You define your application programs in the same way you define programs for your host computer system. A detailed flowchart of the program, print report layouts, and diskette record layouts will provide the documentation you need to code your program or programs.

The programs are coded in application control language, using both control statements and instructions. Control statements are used to define the name of the program, the characteristics of the diskette data sets to be used (such as access method), the characteristics of the printer (such as forms length), and the messages to be issued to the operator, along with the type of data to be entered via the keyboard. Instructions are written to tell the work station which operations are to be performed and in what sequence. These operations include multiply, divide, subtract, add, display message, accept data from the keyboard, read and write diskette records, search diskette data sets, perform table searches, etc.

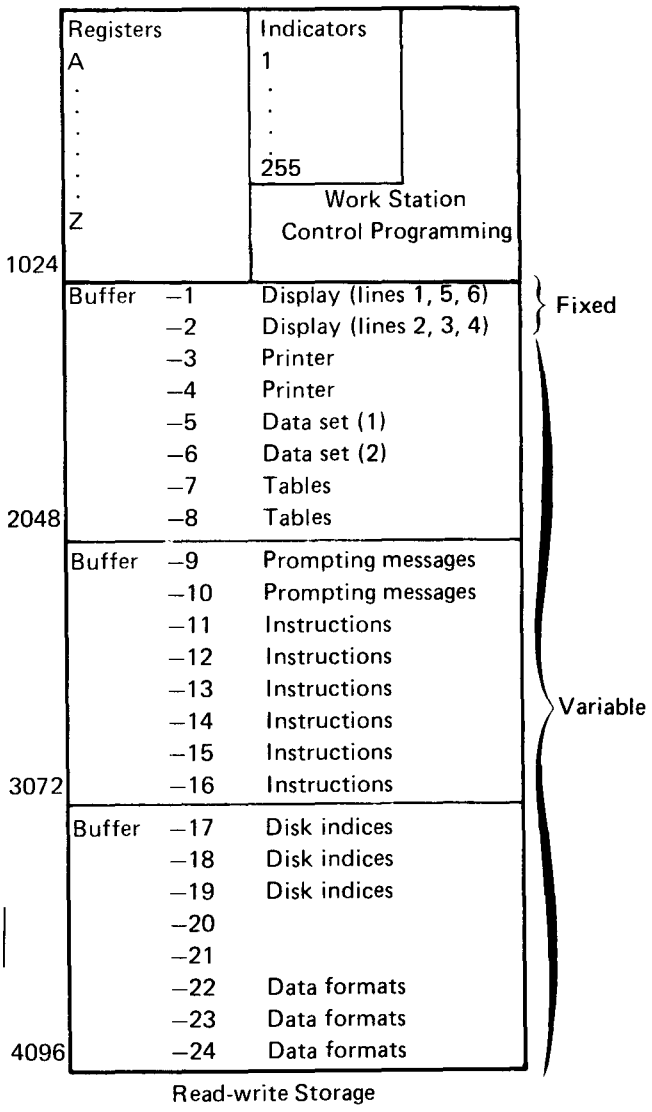


Figure 3. ACL Program Structure (4K)

The following paragraphs explain the general form of the control statements and instructions contained in ACL.

ACL Control Statements

Control Statement	Function
.NAME	Defines the name of the program.
.DATASET	Defines the diskette data sets to be used in the program and the access method to be used for each data set.
.PRINTER	Defines the model of printer to be used, the forms size and the overflow line.
.SELF CHECK	Defines the self check modulus and the characteristics of the algorithm to be used.
.REGISTER	Specifies the initial contents of registers.
.BUFFER	Specifies the initial contents of buffers.
.FIELD	Defines the operator prompting message to be displayed, the type of data to be entered via the keyboard, and the disposition of the keyed data in storage, on the screen, or both.
.FORMAT	Defines the formatting of data to and from the registers during input and output operations.
.END	Defines the end of the program.

ACL Instructions

The programmer specifies the operations to be executed by the application program by coding a series of ACL instructions. The instructions are grouped in categories based on function.

Arithmetic Operations

Function	Instruction
Replace	$R_1 = R_2$
Add	$R_1 = R_2 + R_3$
Subtract	$R_1 = R_2 - R_3$
Multiply	$R_1 = R_2 * R_3$
Divide	$R_1 = R_2 / R_3$
Shift Right	
– Shift Right and pad with leading blanks	$R_1 = R_2$ R KK
– Shift Right, pad with leading zeros, and restore the sign to the low order position of a numeric field	$R_1 = R_2$ RS KK
– Shift Right, pad with leading zeros, restore the sign to the low order position, and round up in the low order or units position of a numeric field	$R_1 = R_2$ RR KK
Shift Left	
– Shift Left and insert low order blanks	$R_1 = R_2$ L KK
– Shift Left, insert low order zeros, and move the sign of the low order position of a numeric field	$R_1 = R_2$ LS KK
Load Constant	$R_1 = \pm$KKKKK

Notes:

1. R_1, R_2, and R_3 can be any register A–Z. R_2 and R_3 can also be a constant (0–9), except in the Divide instruction where R_2 can only be a register.
2. KK is a constant (1–15) which specifies the number of characters to be shifted.
3. KKKKK is a constant (0–65535).

Logical (Branching) Operations

Function	Instruction
Branch if register is/is not zero or blank	IF R_1 IS/NOT 0
Branch if register is/is not minus	IF R_1 IS/NOT -
Branch if register is/is not absolute number	IF R_1 IS/NOT AN
Branch if register is/is not signed number	IF R_1 IS/NOT SN
Branch if register 1 is equal to register 2	IF $R_1 = R_2$
Branch if register 1 is less than register 2	IF $R_1 < R_2$
Branch if register 1 is greater than register 2	IF $R_1 > R_2$
Branch if printer is/is not busy	IF PRT IS/NOT BSY
Branch if indicator number is/is not on	IFIn IS/NOT ON
Branch if indicator number is/is not on and reset if on	IFIRn IS/NOT ON
Branch if Format number is/is not the last one used	IF FMTn IS/NOT
Branch if register is/is not Self Check	IF R_1 IS/NOT CHK
Branch if card I/O unit is/is not busy	IF CRDR IS/NOT BSY
Unconditional branch	GOTO
Branch and return	RGO
Skip next instruction if character equal	SCE
Skip next instruction if character not equal	SCN

Notes:
1. R_1 and R_2 are registers A–Z for branching operations.
2. n is the indicator or format number.

Display and Keyboard Operations

Function	Instruction
Issue prompting message on display and accept data from keyboard	ENTR

Diskette Operations

Function	Instruction
Read or search and read disk record	READ
Write disk record	WRT
Extend data set and write disk record	WRTE
Delete a disk record	WRTS
Close all files and post normal end-of-job halt message	EXIT
Open data set	OPEN
Close data set	CLOZ
Wait on pending input and output operations	WAIT

Printer Operations

Function	Instruction
Print a line with skipping or spacing	PRNT
Skip to line number or space	PCTL

Table Operations

Function	Instruction
Search table for equal entry	TBFX
Search table for equal or high entry	TBFN
Read table entry	TBRD
Write table entry	TBWT

Internal Data Movement Operations

Function	Instruction
Move partial content from register to register	MVER
Move partial content from register to register with offset	MOFF
Load data buffer to register	LOAD
Store data in register to buffer	STOR
Move data from buffer to buffer	MOVE
Exchange content of two buffers	EXCH
Move data from buffer to register	GETB
Move data from register to buffer	PUTB
Read blocked record from buffer	RBLK
Write blocked record to buffer	WBLK
Read from buffer	REFM
Write to buffer	WRFM
Zone bytes in register	ZONE

Miscellaneous Operations

Function	Instruction
Execute checkpoint option and write checkpoint record in defined data set	CKPT
Insert defined character in buffer	ICBF
Set on indicators	SON
Set off indicators	SOFF
Generate self-check number	GSCK
Execute program chain	EXEC
Assign step number	ORG
No operation	NOP
Read card	CRDR
Punch card	CRDP

Programming Aids

Once the program is coded in application control language, it is keyed into a diskette data set. The data set is then read by the ACL Translator feature. The code you write is translated into machine readable code. If you precede instructions with symbolic labels, the ACL Label Processor converts these labels to step numbers for internal processing. During translation, your code may be listed on the printer and displayed on the operator display unit. ***Error messages*** are printed if the ACL control statement or instruction is found to be in error. To aid you in correcting the program, the message indicates the statement or instruction in error and the type of error detected.

The 3741 Programmable Work Station can trace the execution of the translated program. The ***Trace*** function displays and/or prints a listing indicating the results of arithmetic and logical operations as well as the sequence of branches executed.

This section describes typical 3741 Programmable Work Station applications, in the following general areas.

- Programmable data entry
- Transaction processing
- Batch pre-processing

The applications used as examples in this section are actual situations but are provided for illustration purposes only. Your installation will design and write programs to meet your specific needs.

The sample applications described in this chapter are:

- Warehouse Order Entry
- Automotive Insurance New Policy Data Entry
- Construction Job Site Reporting
- Debit Insurance Route Control

WAREHOUSE ORDER ENTRY

Application Description

A customer order initiates many activities in the business cycle. It is advantageous to accurately record data at the earliest opportunity and to use this data for all appropriate applications. The 3741 Programmable Work Station offers the functions necessary to achieve these objectives in a warehouse order entry environment. This work station sample application provides the ability to:

- Perform validity checks on customer and item information.
- Extend and accumulate totals.
- Record each transaction on the diskette for later transmission to the home office.
- Control vertical and horizontal printing.
- Overlap printing and key entry functions.
- Print order forms on multiple part continuous forms.

Figure 4 shows the data flow for the application and Figure 5 illustrates the procedure steps taken on a work station during the data entry operation.

Advantages

Some advantages of using the 3741 Programmable Work Station for warehouse order entry are:

- Validation of customer and item codes helps eliminate errors during data recording.
- Operator efficiency is enhanced by programmed insertion of order number, date, item number, and description.
- Better customer service can be attained because of improved local control of orders and inventory.
- Fewer errors get into the home office because of the data checking facilities of the work station.

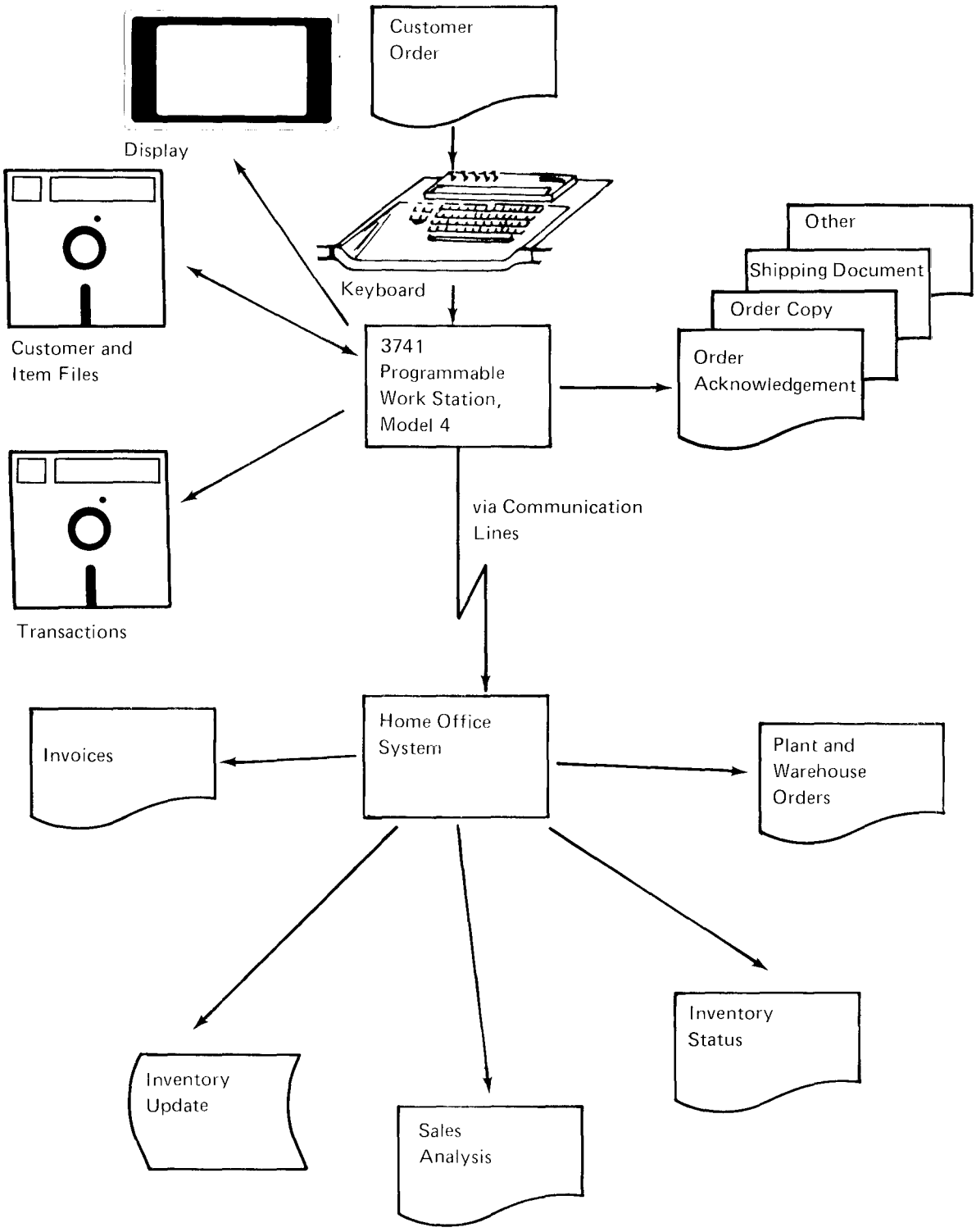
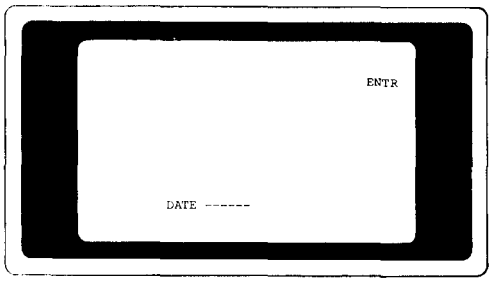
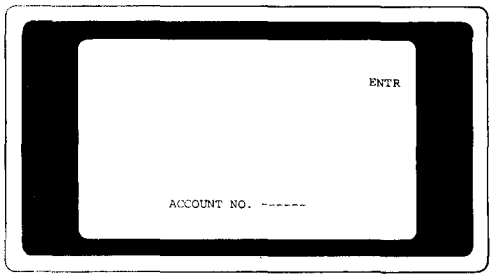


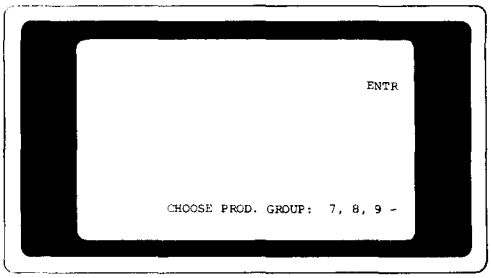
Figure 4. Warehouse Order Entry Data Flow



After the program is loaded, the operator is prompted for today's date. When the date is accepted by the program, it is stored and is automatically printed (by program control) on each invoice. Notice that the program name is displayed in the upper right hand corner of the display.



Next, the program prompts ACCOUNT NO. ———————. When the customer account number is entered, the program searches an index table for the track address of the account number. If the account number is not in the file, the operator is notified by a message and then prompted to enter another account number. If the record is in the file, it is read and used for printing header information on an invoice.



In this application example, it is assumed that the customer is ordering merchandise from a preprinted order sheet and that there are three classes: 7, 8, 9. The operator is prompted to enter the product group number.

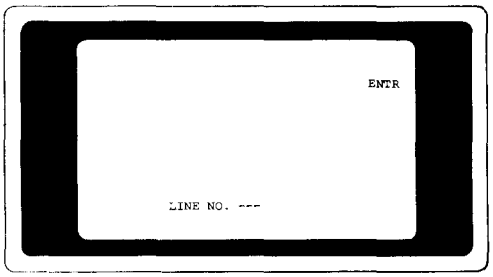
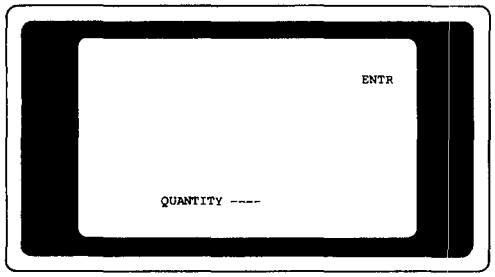
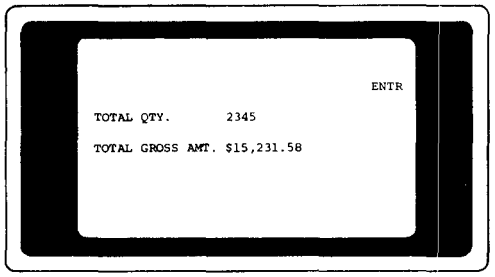


Figure 5. Warehouse Order Entry Example

After the operator selects a product group, a prompt (LINE NO. ———) of the item being ordered is issued to the operator by the program. (The line number is associated with a specific product item and the program requires the line numbers to be entered in ascending order.) The program compares the current line number with the previous line number. A message to the operator occurs if the current line number is not higher than the previous line number and the operator must then enter another line number. If the current line number is higher, as it should be, the program searches the item index table for the disk location of the product ordered. If the product ordered is not in the file, the operator is notified by a message and prompted for another line number. If the product is in the file, the item record is read and stored for later use.



The operator is now prompted for QUANTITY ————. After the quantity is entered, the program takes the price from the item record and determines the total cost by multiplying quantity times price. If the item carries a tax, that amount is calculated. All amounts are accumulated for page and invoice totals. The program then extracts the item description from the item record and assembles an item print line. The print line includes the item description, quantity, item number, cost per item, taxes, and total cost. After the item line is printed, the program checks for page overflow. If the page overflow indicator is on, the program prints page totals, skips the form to the top of the next page, increments the page number by one, and prints header information. The program now prompts LAST ITEM?. If it is the last item, page and invoice totals are printed and the program goes back and prompts ACCOUNT NO. ———————. If it is not the last item number, the program goes back and prompts LINE NO. ———.



The procedure continues until all orders are processed or until the operator terminates the batch. The 3741 Programmable Work Station can be programmed to display batch totals at this time, establishing a control for the batch.

AUTOMOBILE INSURANCE NEW POLICY DATA ENTRY

Application Description

This application is designed to record data at the source: in this case, the Insurance Agency. A 3741 Programmable Work Station program, prepared by the home office for distribution to branches, controls the input format and accuracy. Data accuracy is improved through programmed data checking.

Policy application data is transmitted to the home office daily. There, the policy information is stored in the policy master files and the source data is used to rate the policy. Declarations output is prepared by the home office and transmitted to the agency for printing and mailing.

Figure 6 shows the general data flow for this application and Figure 7 illustrates the procedure steps taken on the work station during the data entry operation.

Advantages

The advantages of using the 3741 Programmable Work Station for insurance new business data entry are:

- One-time recording of all pertinent data saves time and expense.
- Editing data during entry prevents costly errors from entering the home system. Operator efficiency is enhanced because repetitive information is automatically inserted.
- Prompting messages on the display lead the operator through the insurance application form.
- The communication feature permits centralized rating with local printing of declarations.

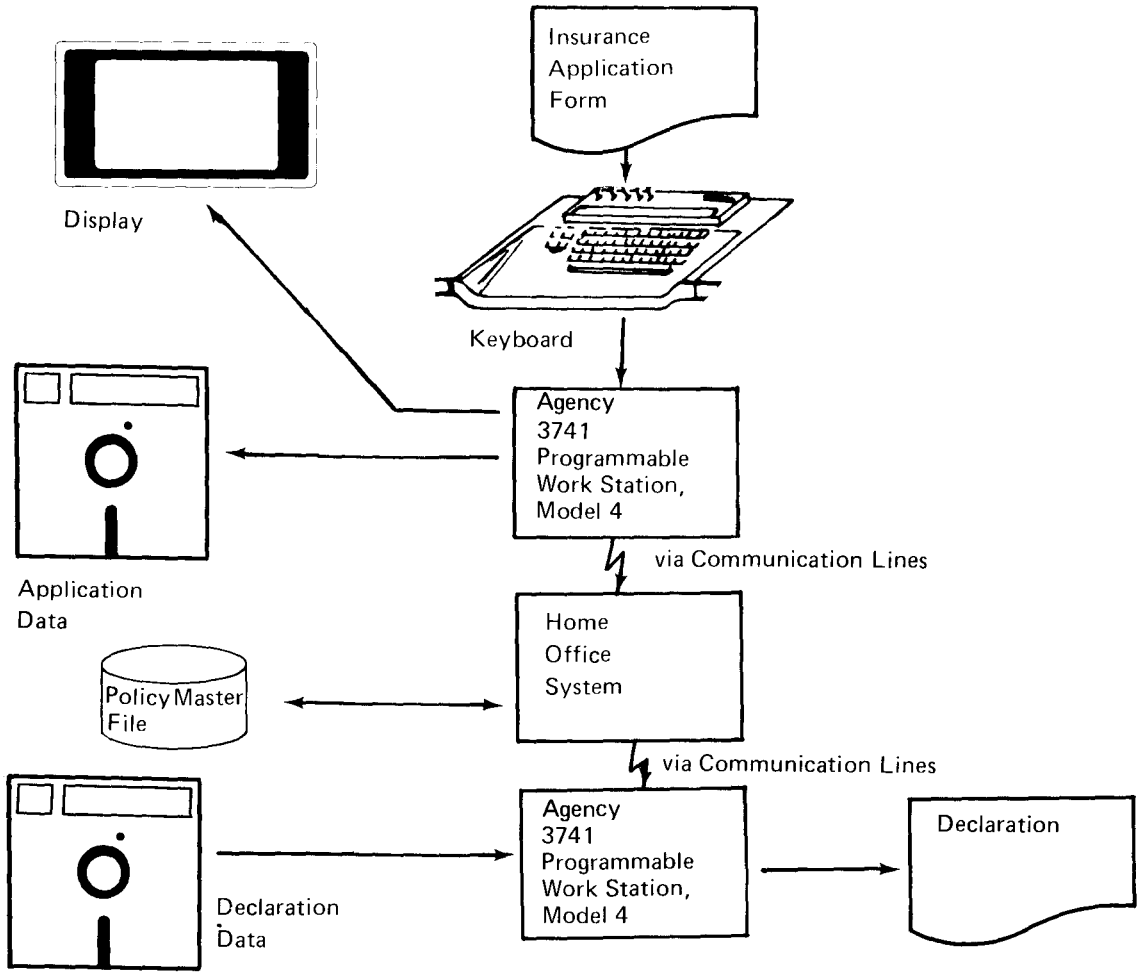
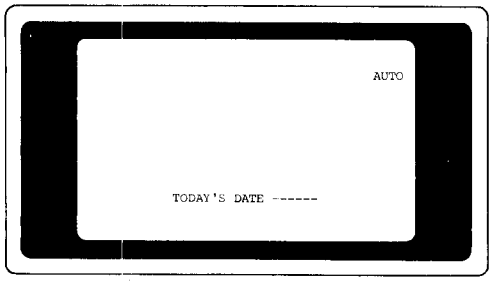
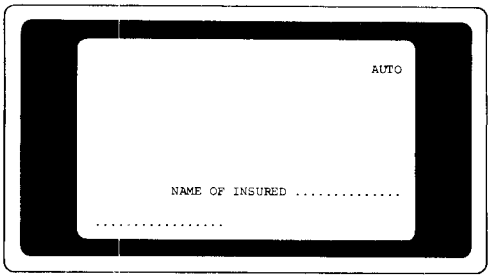


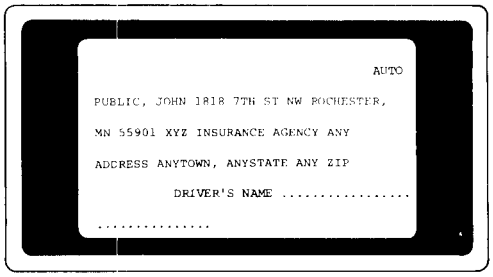
Figure 6. Automotive Insurance New Policy Data Entry



After loading the program (the program name is displayed in the upper right hand corner of the display), the operator is prompted: TODAY'S DATE ———————. Once entered, this date is stored and inserted by the program into each policy data set.

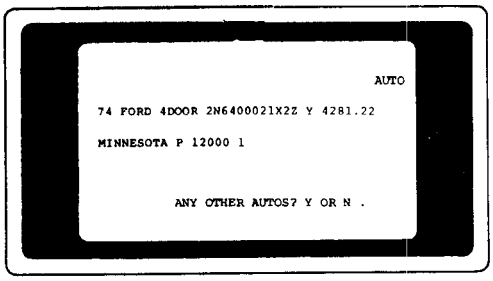


Then a series of prompts directs the operator to enter; NAME, STREET, CITY, STATE, POLICY PERIOD, and other pertinent policy information. The policy period can be checked by the program for being a valid entry. For example, if the valid policy period can be 3, 6, or 12 months, the program checks for one of these entries. If the entry keyed by the operator is not valid, an error message would be displayed and the operator would be prompted to rekey the policy period number. Agency information is automatically inserted into the record by the program.

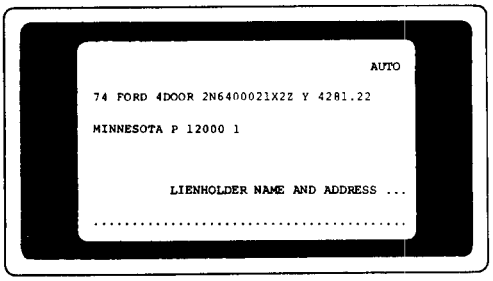


Another series of prompts instructs the operator to enter appropriate driver information, such as: DRIVER'S NAME, DATE OF BIRTH, SEX M OR F (operator keys M for male, F for female), MARITAL STATUS S, M, W, OR D (operator keys S for single, M for married, W for widowed, or D for divorced). MONTHS LICENSED, and other pertinent driver information. The program checks for a valid response to SEX and MARITAL STATUS. If the response is not M or F for SEX, an error message would be displayed and the operator would be prompted to enter a valid entry. Similarly, if the response to MARITAL STATUS is not S, M, W, or D, an error message would be displayed and the operator would be prompted to enter a valid entry.

Figure 7. Automotive Insurance New Policy Data Entry Example



Another series of prompts are for describing each auto. Typical prompts are: MODEL YEAR, TRADE NAME, BODY TYPE, SERIAL NO. and other pertinent auto information. When the entries for a particular auto are complete, the operator is prompted with ANY OTHER AUTOS? Y OR N. If the operator keys Y (yes), the series of prompts for the auto description is repeated.



After the operator keys N (no) to the prompt ANY OTHER AUTOS?, lienholder information (if any), policy coverage, and endorsements are entered by the operator as each field is requested by program prompting. At the end of each insurance application form, the operator has the option of terminating the batch or continuing with another application form.

CONSTRUCTION JOB SITE REPORTING

Application Description

Computers are being used by both large and small construction companies for accounting and management reporting systems. The success of these systems depends on accurate, timely source information. The 3741 Programmable Work Station provides for recording of source data at the job site.

The examples used here deal with two major applications of the construction industry: payroll and accounts payable. The same work station, however, can be used for obtaining edited data for the other construction applications: accounts receivable, equipment cost control, material cost control and overall job cost reporting.

The basic tasks to be performed by the work station are to record payroll transactions from time cards and to record accounts payable transactions from invoices received at the job site. During the data entry operation, job numbers, cost codes, employee numbers, general ledger numbers, and vendor numbers keyed are checked for validity against an edit file maintained on a diskette. This edit file is created and maintained by, and transmitted periodically from the home office.

At the end of each day, your operator inserts the diskette containing accounts payable and payroll information into the work station. During the low telephone rate hours, the home office calls each location and receives that location's daily activity. The data is accumulated and later processed against the master files.

In the case of payroll, when the week is over, the home office runs the payroll programs that perform the payroll calculations and records the results separately for each location. This data is then transmitted back to those locations, where checks are printed and distributed.

On a periodic basis, the home office transmits a job site activity report to each site, enabling the superintendent to track job progress against bids and estimates.

Figures 8 and 10 show the general data flow for accounts payable and payroll, respectively. Figures 9 and 11 illustrate the procedure steps taken on the work station during these data entry operations.

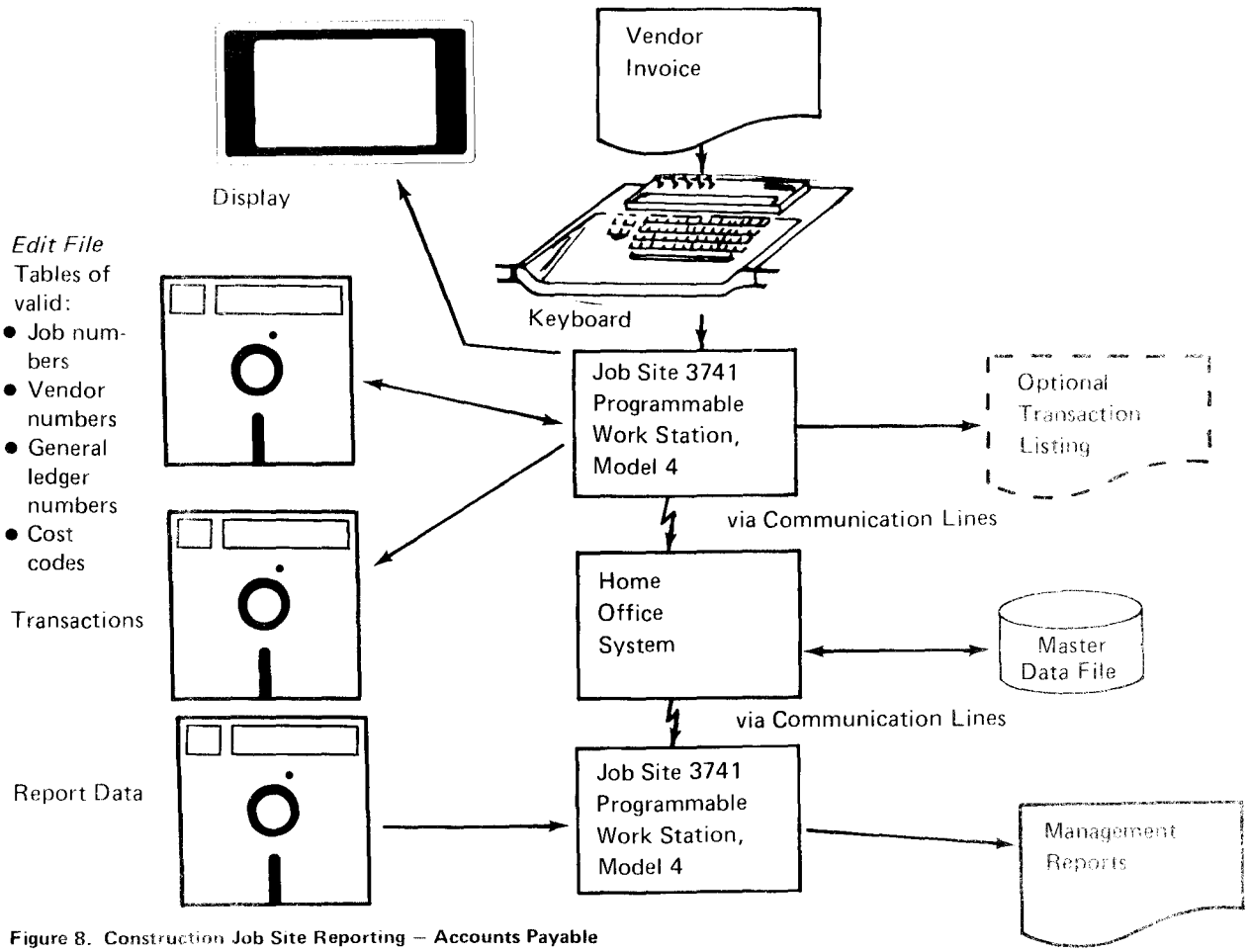
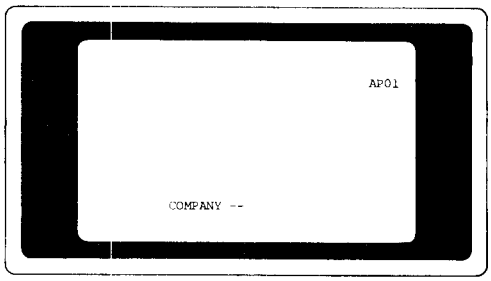
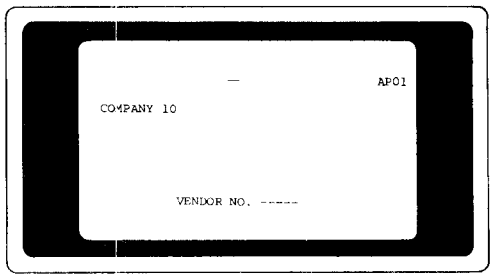


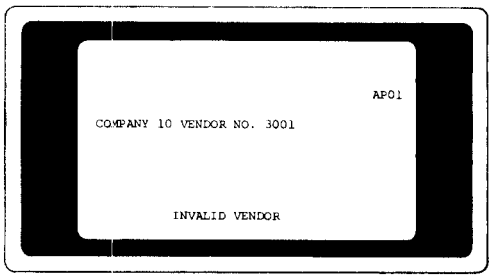
Figure 8. Construction Job Site Reporting – Accounts Payable



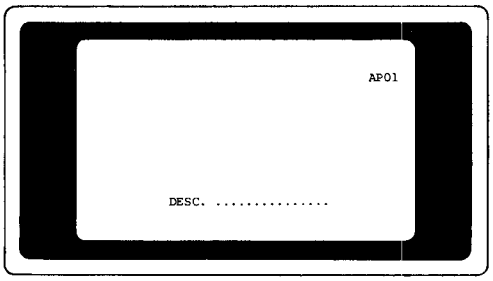
As soon as the program has been loaded by the operator, a prompting message is displayed requesting company number. This number identifies the company and job site and is stored for insertion into each record of this batch. Notice that the program name is displayed in the upper right hand corner of the display.



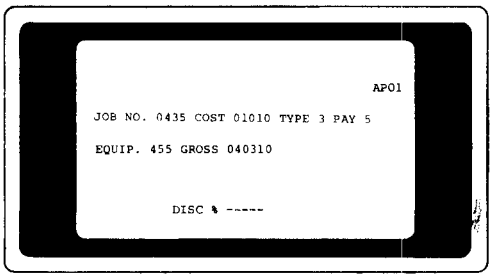
A prompting message from the program requests that the operator enter a vendor number from an invoice. When it is entered, the program searches an index file for the location of the table of valid vendor numbers. The table is read into storage from the diskette and a match between the keyed number and a table number is sought. If the match succeeds, the number is valid and the program proceeds.



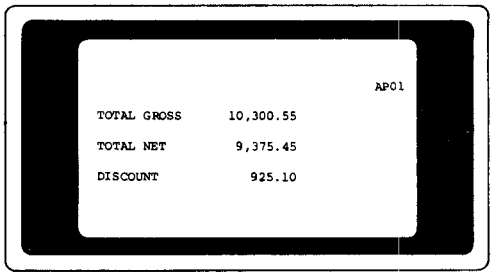
If no match is found, the operator is informed by a prompt message that this vendor number is not in the file. The operator has the option of rekeying the vendor number or requesting the program to accept the vendor number as keyed. A similar check is made on the general ledger credit number when it is entered. Other invoice data is entered including invoice number, date, due date, and check number (each of these fields is requested by a prompt message on the display).



The prompt message now requests the operator to enter information for each line item on the invoice. This information is item description, general ledger debit account number, job number, cost code number, cost type number, pay item number, equipment number, and gross amount. Cost codes and general ledger numbers are checked with an edit file for validity.



Notice that after the data has been entered, the prompting message and the data are moved up to lines 2, 3, and 4 for visual verification. As each invoice line item is entered, the operator is prompted to indicate whether or not the item qualifies for discount. If it does, the operator is prompted to enter a discount percentage. After the discount percentage has been entered, the gross amount is multiplied by the discount and the discount amount is displayed.



After all invoices have been entered, the operator presses the appropriate key and control totals are displayed.

Figure 9. Construction Job Site Reporting — Accounts Payable Example

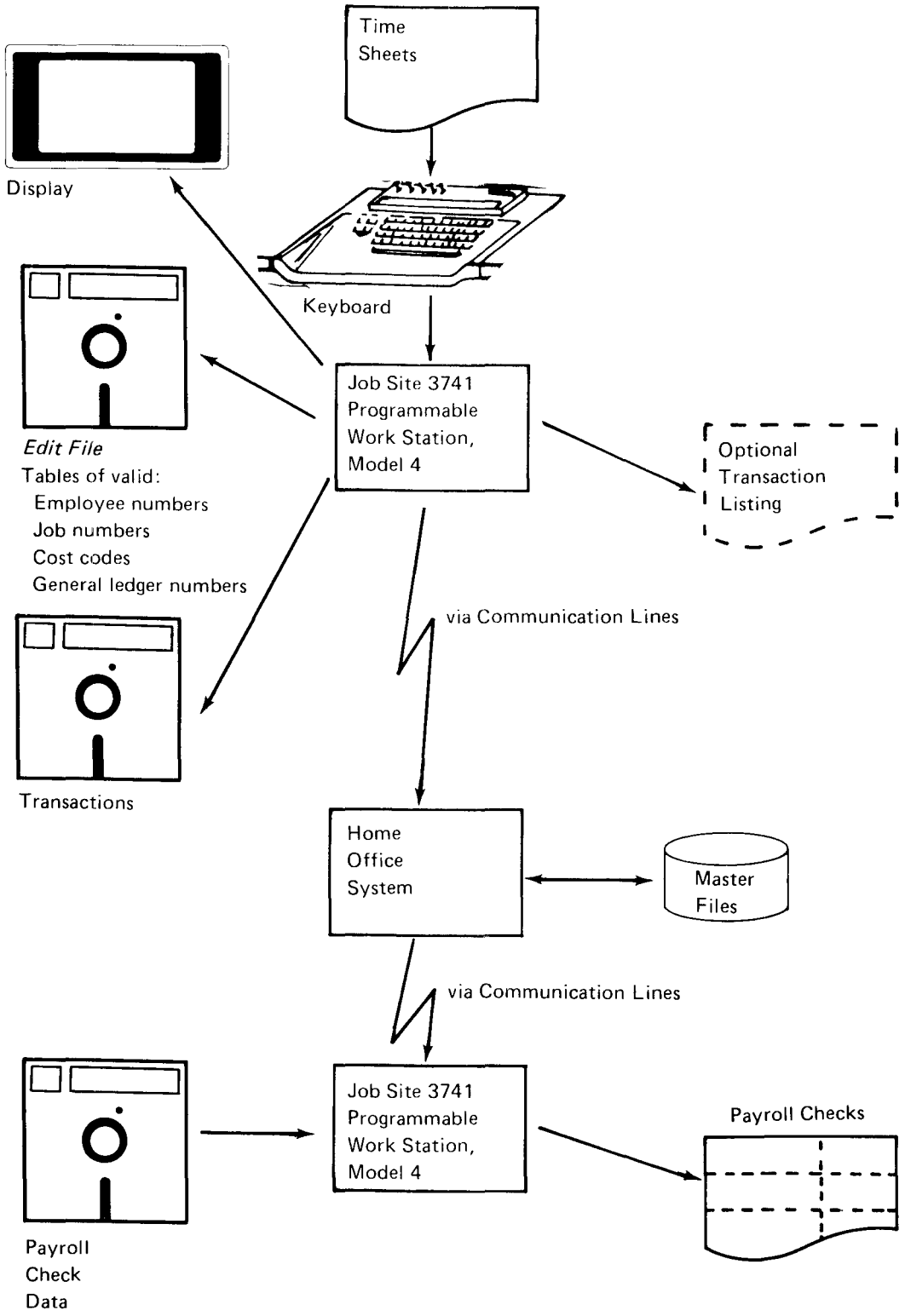
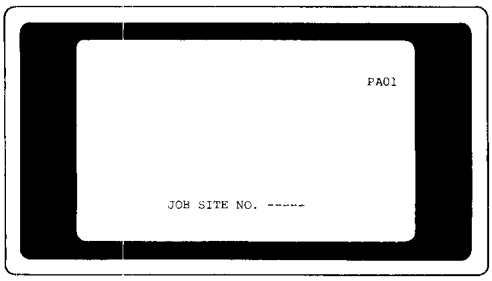
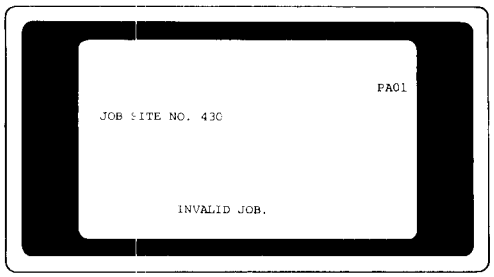


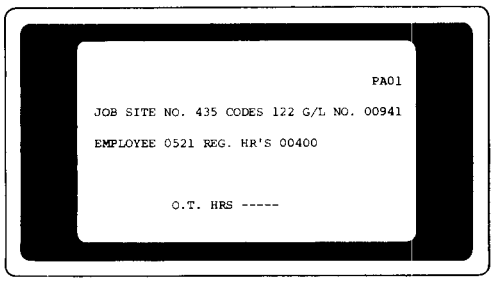
Figure 10. Construction Job Site Reporting — Payroll



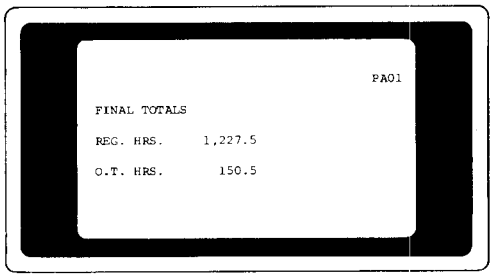
Upon receipt of the payroll time sheets, the operator loads the Payroll Entry Program. The first prompting message is for a job number. After keying the job number, the program initiates the search of the edit file. If there is a match, processing continues.



If no match is found, a prompting message advises the operator that the job number was not found in the edit file. The program allows the operator to use the number as entered or rekey the job number.



Once a valid job number is entered, a series of prompts directs the operator to enter; date, city and state codes, general ledger number to be charged, employee number, regular hours, overtime hours, cost code, union code, equipment code, and special adjustments or deductions. Many of these fields are checked for validity in the same way that the job code is checked.



After all payroll entries have been entered, the operator presses the appropriate key and control totals are displayed. The operator records this information at the site for control purposes and also as an audit trail.

Figure 11. Construction Job Site Reporting – Payroll Example

Advantages

Advantages of construction job site reporting with the 3741 Programmable Work Station are:

- The work station provides data editing where it counts, at the source. Errors detected at the source can be easily and economically corrected before the data enters into the main data processing system.
- Fast and easy data entry is possible using existing clerical personnel to operate the work station. Central office designed programs provide prompting and guidance to lead the operator through the data entry procedure.
- Faster turnaround time from event to reporting is made possible by recording and transmitting daily transactions from the job site.
- Job site management reports, transmitted from the host system and printed on the on-site printer, are a useful tool for local managers. Early detection of cost trends may help prevent costly overruns.

DEBIT INSURANCE ROUTE CONTROL

Application Description

Debit insurance is life insurance for which premium collections are made periodically (usually weekly) by a company agent. The agent is responsible for collecting each of his weekly routes, selling new and additional life insurance, reporting all route changes, and turning in the correct amount of cash to the cashier. Figure 12 is an example of a route listing used by the agent.

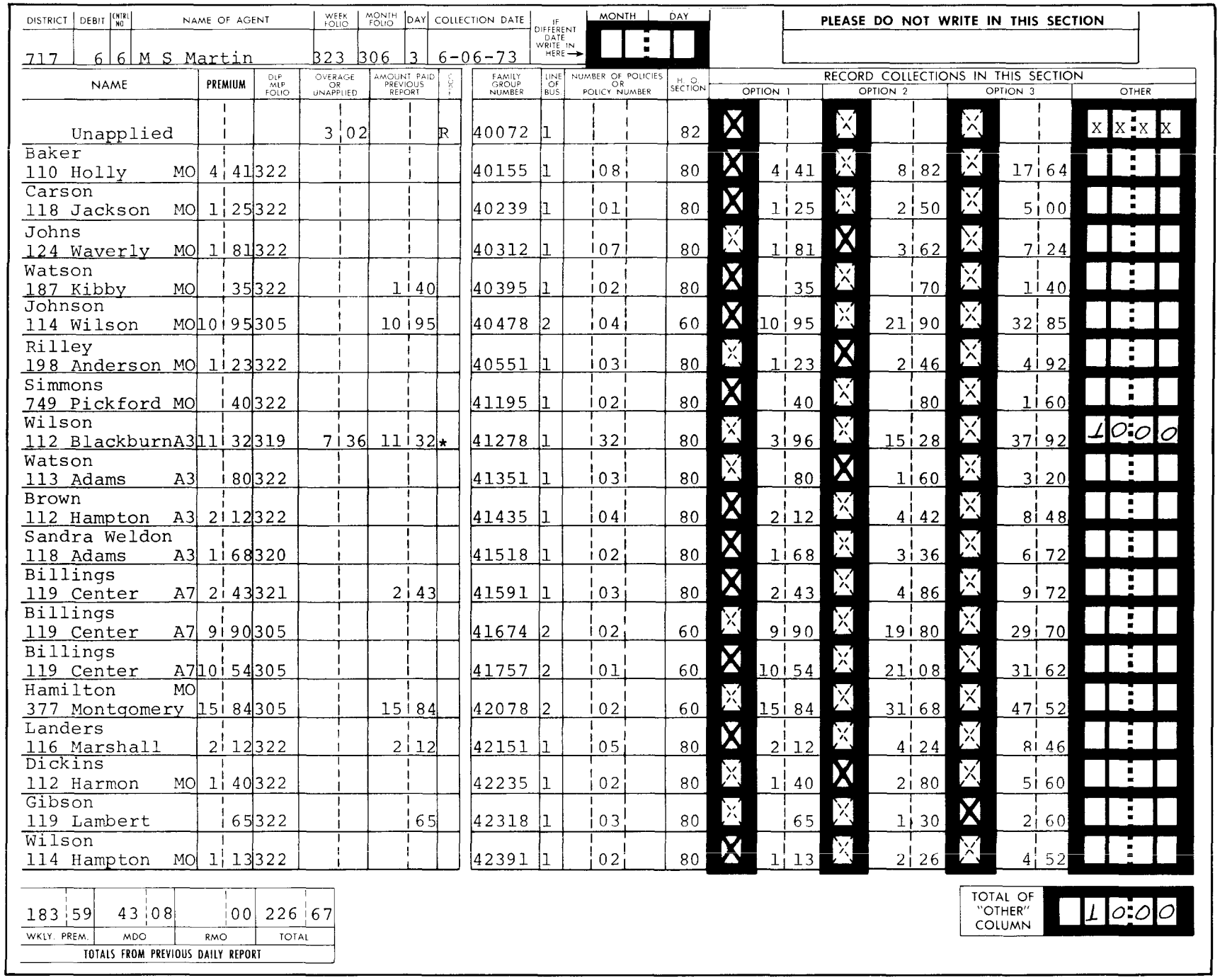
In order to maintain up-to-date policy information, most insurance companies in the debit insurance business like to keep all policy information in their home office computer data files, furnishing the route personnel enough information to service their routes. To accomplish this goal, it is necessary to send weekly route data to the agent; who, in turn, services the route on the specified day of the week and turns in the money and route list to the cashier. The cashier updates the route data on the same diskette on which the data was received and then transmits it to the home office. The home office updates its files and sends the next week's route information to the district office; the cycle is complete.

Figure 13 shows the general data flow for the application and Figure 14 illustrates the procedure steps on the 3741 Programmable Work Station during the data entry operation.

Advantages

The advantages of using the 3741 Programmable Work Station for debit insurance route control are:

- Information transmitted from the home office is retained on removable diskette storage for backup until the route is complete.
- Keying of route information is simplified for the operator requiring only a single key stroke for most family group numbers.
- Programmed reconciliation routines aid the cashier in resolving differences in cash collection amounts.
- Operator display guidance assists the operator in entering information and in the reconciliation of cash.
- Unattended transmit and receive capabilities of the work station, when not under ACL program control, allow transmission of data to and from the district office at times of low line costs.



DISTRICT	DEBIT	CNTRL NO	NAME OF AGENT	WEEK FOLIO	MONTH FOLIO	DAY	COLLECTION DATE	IF DIFFERENT DATE WRITE IN HERE →	MONTH	DAY
717	6	6	M S Martin	323	306	3	6-06-73			

PLEASE DO NOT WRITE IN THIS SECTION

NAME	PREMIUM	DLP MLP FOLIO	OVERAGE OR UNAPPLIED	AMOUNT PAID PREVIOUS REPORT	CODE	FAMILY GROUP NUMBER	LINE OF BUS	NUMBER OF POLICIES OR POLICY NUMBER	H. O. SECTION	RECORD COLLECTIONS IN THIS SECTION: OPTION 1	OPTION 2	OPTION 3	OTHER
Unapplied			3 02		R	40072	1		82	X	X	X	X X X X
Baker 110 Holly MO	4 41	322				40155	1	08	80	X 4 41	X 8 82	X 17 64	
Carson 118 Jackson MO	1 25	322				40239	1	01	80	X 1 25	X 2 50	X 5 00	
Johns 124 Waverly MO	1 81	322				40312	1	07	80	X 1 81	X 3 62	X 7 24	
Watson 187 Kibby MO	35	322		1 40		40395	1	02	80	X 35	X 70	X 1 40	
Johnson 114 Wilson MO	10 95	305		10 95		40478	2	04	60	X 10 95	X 21 90	X 32 85	
Rilley 198 Anderson MO	1 23	322				40551	1	03	80	X 1 23	X 2 46	X 4 92	
Simmons 749 Pickford MO	40	322				41195	1	02	80	X 40	X 80	X 1 60	
Wilson 112 Blackburn A3	11 32	319	7 36	11 32	*	41278	1	32	80	X 3 96	X 15 28	X 37 92	10 00
Watson 113 Adams A3	80	322				41351	1	03	80	X 80	X 1 60	X 3 20	
Brown 112 Hampton A3	2 12	322				41435	1	04	80	X 2 12	X 4 42	X 8 48	
Sandra Weldon 118 Adams A3	1 68	320				41518	1	02	80	X 1 68	X 3 36	X 6 72	
Billings 119 Center A7	2 43	321		2 43		41591	1	03	80	X 2 43	X 4 86	X 9 72	
Billings 119 Center A7	9 90	305				41674	2	02	60	X 9 90	X 19 80	X 29 70	
Billings 119 Center A7	10 54	305				41757	2	01	60	X 10 54	X 21 08	X 31 62	
Hamilton MO 377 Montgomery	15 84	305		15 84		42078	2	02	60	X 15 84	X 31 68	X 47 52	
Landers 116 Marshall	2 12	322		2 12		42151	1	05	80	X 2 12	X 4 24	X 8 46	
Dickins 112 Harmon MO	1 40	322				42235	1	02	80	X 1 40	X 2 80	X 5 60	
Gibson 119 Lambert	65	322		65		42318	1	03	80	X 65	X 1 30	X 2 60	
Wilson 114 Hampton MO	1 13	322				42391	1	02	80	X 1 13	X 2 26	X 4 52	

WKLY. PREM.	MDO	RMO	TOTAL
183 59	43 08	00	226 67

TOTALS FROM PREVIOUS DAILY REPORT

TOTAL OF "OTHER" COLUMN: 10 00

Figure 12. Route Listing

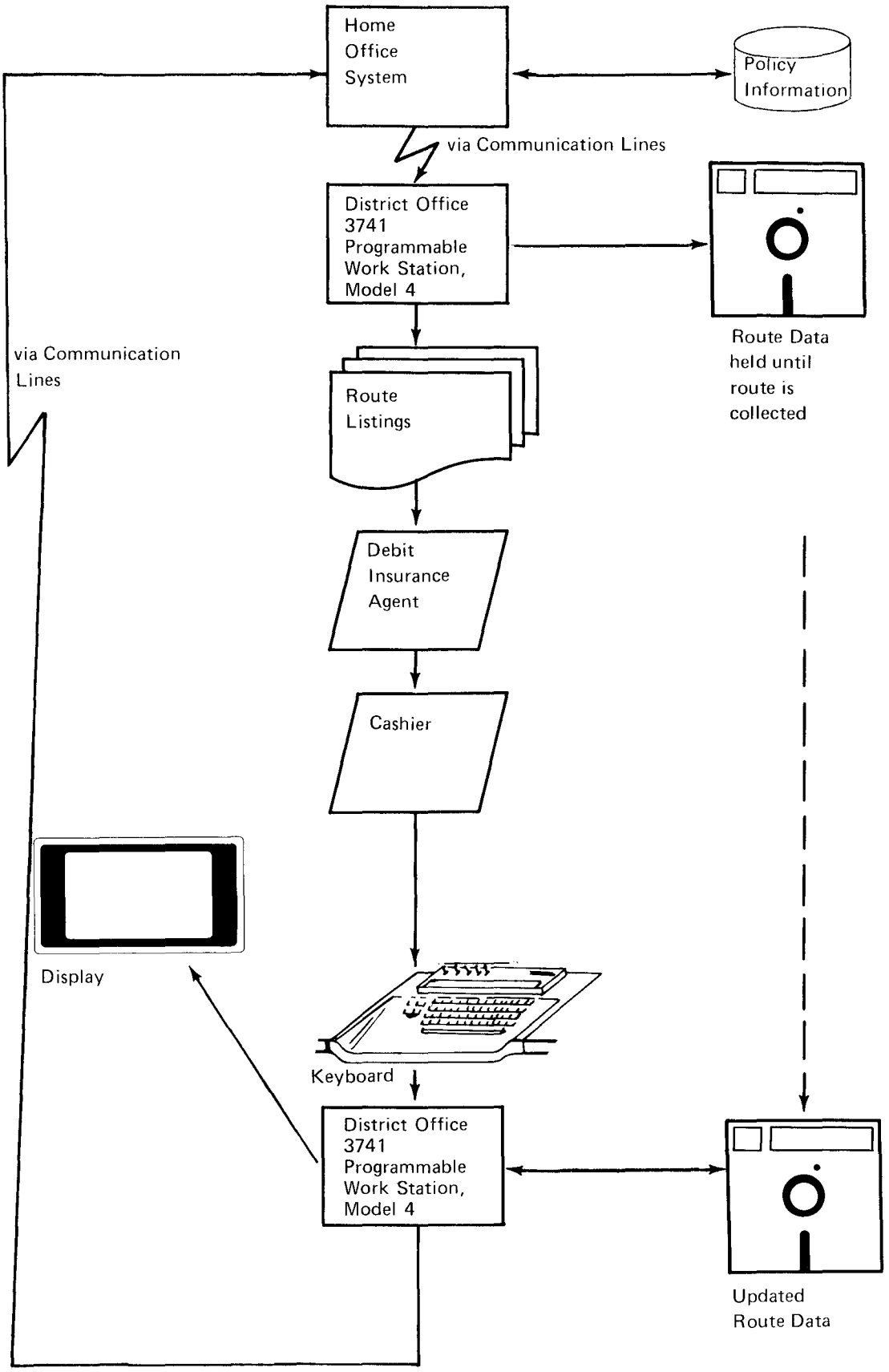
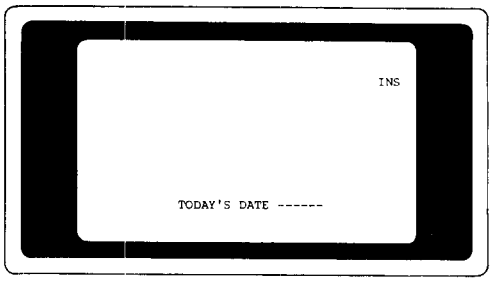
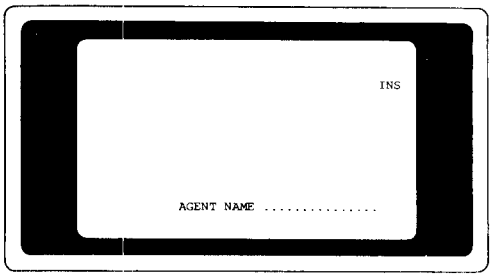


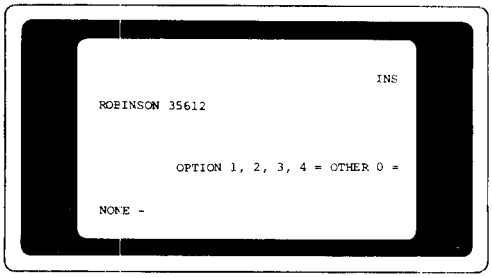
Figure 13. Debit Insurance Data Flow



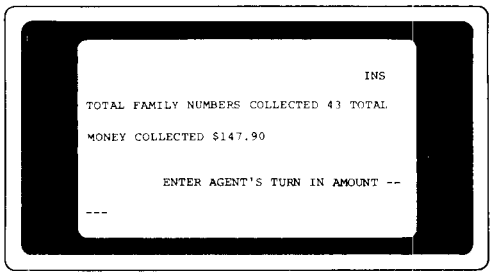
As soon as the program has been loaded, a prompting message appears on the display requesting today's date. The date entered by the operator is checked for validity by the program; for example, the date, 06/31/73, is invalid because June has only 30 days.



The agent's name is requested by a prompting message from the program. As soon as it has been entered by the operator, a search is made for the record with a matching name and date.



When the data set has been found, the program presents each family name and policy number on the display in the same sequence as the route listing from which the operator is reading the cash collections. Figure 12 is a route listing with the collection information. Note that the collection of a 1, 2, or 4-week multiple requires no writing by the agent. Likewise, the operator entering the collection amounts needs only key the digit 1, 2, or 4 to cause the entry of the corresponding amount for the record. Any other collection amount must be noted by the agent and entered by the operator.



As soon as the last policy on the list is entered by the operator, the display has the messages shown above. The operator then keys in the exact amount of money turned in by the agent. If the amounts agree, this route accounting is complete. If the amounts do not agree, the program initiates a reconciliation routine. Each policy number and the associated amount collected is displayed for the operator. By comparing each policy collection amount with the route collection list, the operator can find the error(s) in keying. As each correction is entered, the program compares the two totals. If they agree, the reconciliation is complete. When the daily routes have been keyed and reconciled, the operator inserts the diskette with the daily collections and changes into the 3741 Programmable Work Station for transmission to the home office system.

Figure 14. Debit Insurance Example

READER'S COMMENT FORM

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