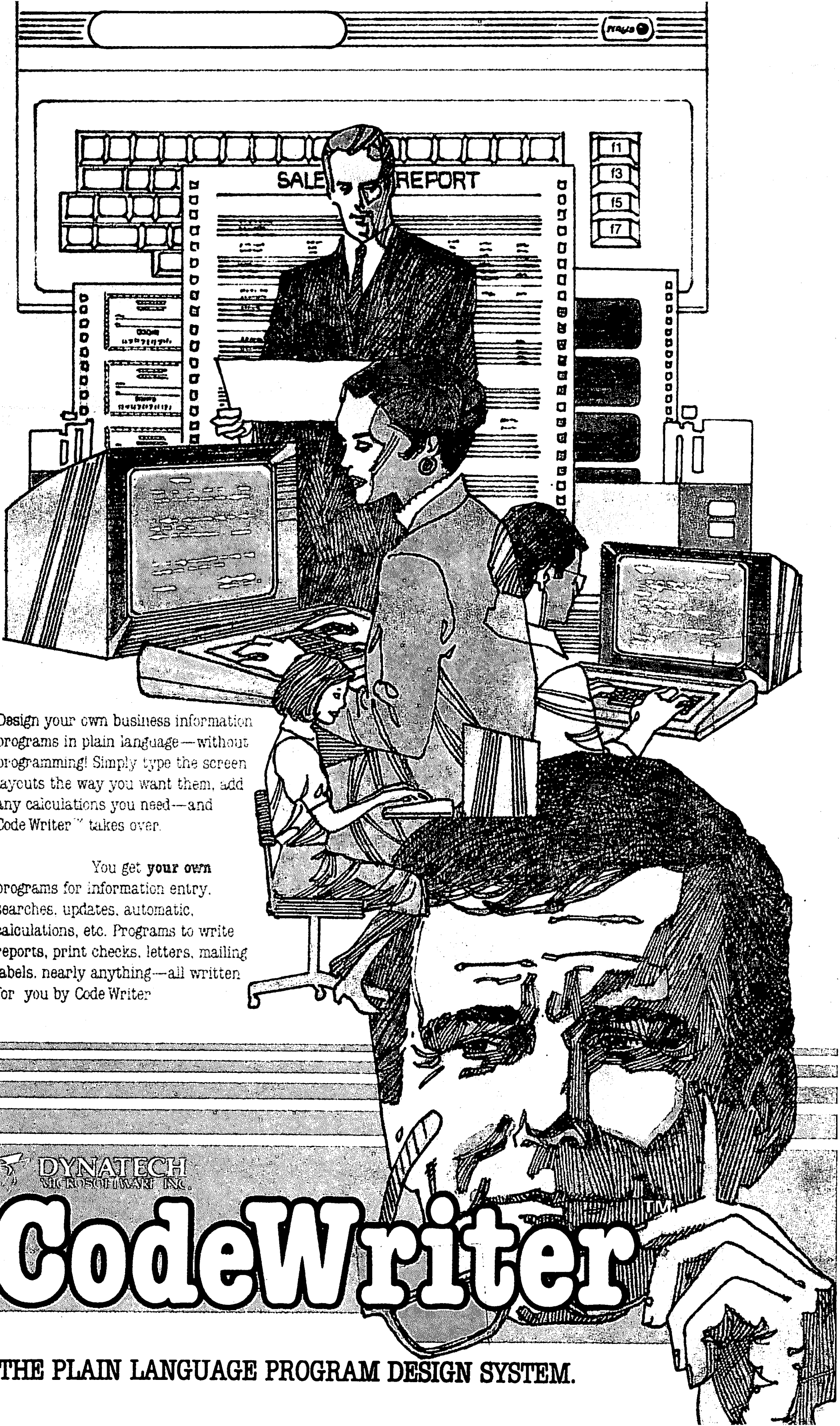

Design your own business information programs in plain language—without programming! Simply type the screen layouts the way you want them, add any calculations you need—and Code Writer™ takes over.

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CodeWriter™

THE PLAIN LANGUAGE PROGRAM DESIGN SYSTEM.

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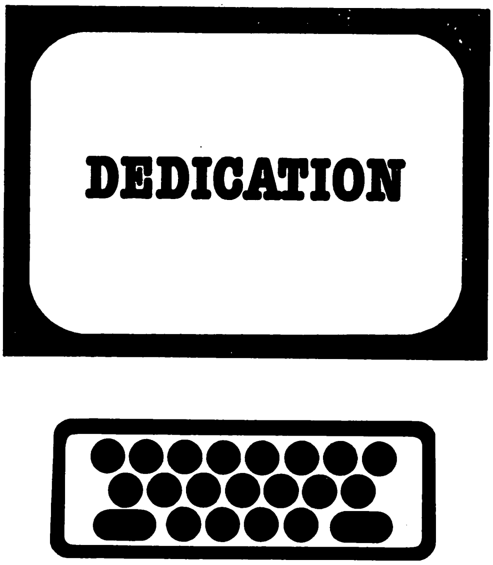


DEDICATION

The CODEWRITER Program Series, developed over the last two years, owes its existence to the following—who were never afraid to walk in the dark:

Fred Allen
Larry Coke
Dan Kritchevski
Paul Green
Warren Shore
Jay Stein
Tony Thorne, MBE

Special Commodore CBM 64 and Atari conversion work
Charles and Carol Butler

READ THIS FIRST

*

WATCH FOR THIS SYMBOL. This manual was written to be used with several microcomputer systems. There will be a number of places where the instructions in the manual won't be right for YOUR computer. Whenever there's a chance of this, you'll see a large * symbol in the margin. This means you might need to refer to your USER NOTES CARD (supplied with your CODEWRITER SYSTEM). The card should clear things up.

(By the way, your Home FileWriter is part of a family of software called CODEWRITER. All references in this manual will describe "CODEWRITER" or "your CODEWRITER SYSTEM". Your Home FileWriter is the starter system in the series.)

This manual was written to be as unique and useful as the CODEWRITER SYSTEM itself. That is a tall order. Please believe us when we say that everyone at Dynatech Microsoftware worldwide has worked to make CODEWRITER among the most valuable programs you can own.

There has been a great deal written about "Program Generation", both good and bad, pro and con. Let's begin with a simple statement about why THE CODEWRITER SYSTEM was developed over the last two years (since 1980):

There is only one reason for computers. To allow people to control the information around them. But computers deal in code while people deal in ideas. As personal computers become available to more and more people, "programming" in arcane and unforgiving code gets in the way more and more. The same people who understand the information a computer holds must be able to control that information directly. In this way, ideas can dominate rather than hardware.

THE CODEWRITER SYSTEM allows the non-programmer with an idea for ordering information to see that idea take shape on a personal computer. If the idea has elements which can be put on a screen or written on paper, CODEWRITER will structure those elements so a computer can accept them, retrieve them, re-order them and create a pattern for understanding.

Of course, none of this is magic. CODEWRITER only substitutes "programming" with "Program Design". But the difference is critical. The programmer has two problems at all times; One is the idea at hand and the second is the job of reducing that idea to a "language" vastly more primitive than human thought.

While Program Design is a great deal easier, it is hardly trivial. The simplicity of CODEWRITER Program Design comes from dealing with a problem directly in the designer's own language.

THAT'S ENOUGH THEORY

CODEWRITER will create all the computer code needed to get a program up and running on your computer. Once you're done "designing", you'll see the code written out on your computer screen as it is automatically recorded onto your disk.

For the most part, THE CODEWRITER SYSTEM is "self documented"— that is most of what you need to know to design a program is written on the screen for you and will re-appear each time you use the system.

But use this manual anyway! There is very little more "theory" inside. We have designed an example program—complete with every single keystroke needed to create that program using only human language.

Naturally, our example program is unlikely to do exactly the things you bought CODEWRITER to do. For now, that's not important. The example will show a great number (but not all) of the features of the CODEWRITER system.

More importantly, the example program will show how these features work together to solve a complex problem one step at a time.

Put the manual in front of your computer where you can read it comfortably. Turn your computer on and begin a process you'll not soon forget.

You're about to increase your dominion over the single most stimulating invention of the twentieth century. Have fun. We envy you and wish you well.

A WORD ABOUT SOFTWARE PROTECTION

At Dynatech Microsoftware we have some very definite ideas about protecting software. We feel that both the software developer and the software customer have rights which must be protected. The developer must be protected from "unauthorized use" of his work. After all, if the market place does not reward the developer for his work the work will not be produced, not be supported, and not be improved.

But workable software protection cannot exclude the customer's rights. The paying customer makes all new software possible. Thus, the customer should be able to use the software freely and with confidence. A 'back-up' copy of your Commodore 64 CODEWRITER disk is available at a small cost (See the coupon included with your system). Also, a free one year guaranty is part of your system cost. If your CODEWRITER disk fails to operate for any reason during this period, we'll replace it free. Once your purchase is registered, you'll be notified of our toll-free help line for any problems you might have with your CODEWRITER system.

In addition, whenever possible we'll add new features (or improve existing features) to the CODEWRITER system at no increase in retail price. We'll be glad to UPGRADE your existing system free if you'll simply send your disks in. Watch our ads for these changes—or simply call to make sure your version is the latest.

Please enjoy your CODEWRITER system. We developed it to be the best.

GETTING STARTED

Before you begin working with your Commodore CBM 64 CODEWRITER system, make sure you have the following:

A Commodore CBM 64 microcomputer

A 1541 Commodore disk drive

(In some cases a modified 1540 drive will do—see your dealer. A 4040 dual disk drive will also work, though this edition of CODEWRITER 64 will use only drive 0.)

A blank, formatted diskette.

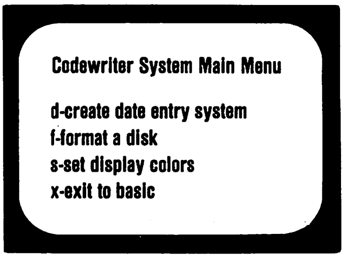
A Commodore compatible printer is optional.

(SPECIAL NOTE: Some commodore compatible options like Skyles' VicTree will interfere with CODEWRITER operations. Please remove them before you begin. If your system works erratically, check for these optional items before continuing.)

Insert your CODEWRITER disk (Disk 1 side up) in your disk drive. Press the SHIFT and Commodore symbol key) lower left on keyboard) TOGETHER. This will activate the UPPER/lower case mode in which CODEWRITER operates. Next, type the following EXACTLY:

```
load "newmenu",8
```

After the program loads, your cursor (flashing square) will return along with the 'READY' message. Type run
After a short delay, the following screen should appear:



```
Codewriter System Main Menu

d-create date entry system
f-format a disk
s-set display colors
x-exit to basic
```

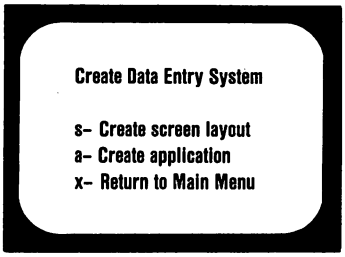
If you have not already formatted a disk, do so now.

Press 'f' and then RETURN

Pressing 'f' will display a warning that formatting ERASES all information on a disk. REMOVE the CODEWRITER disk and insert your own disk. Type 'y' and press RETURN. You'll be asked to "name" your work disk using up to 16 characters and press RETURN. Formatting usually takes between 90 seconds and 2 minutes. You'll then be asked if you need another disk 'formatted'. Answer 'n' and press RETURN. You should now see the CODEWRITER System Main Menu again.

CODEWRITER SYSTEM MAIN MENU

Once back at the main menu with a formatted disk, we're ready to create a data entry system. Press 'd' from the menu selection and then RETURN.

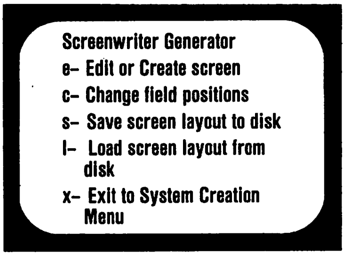


```
Create Data Entry System

s- Create screen layout
a- Create application
x- Return to Main Menu
```

Each CODEWRITER data entry program begins with a SCREEN LAYOUT. This is simply a form created on the screen which shows what kind of information (data) the program operator is to enter and how much space is allowed to do so. CODEWRITER makes this process as easy as possible.

Press 's' and then RETURN



```
Screenwriter Generator
e- Edit or Create screen
c- Change field positions
s- Save screen layout to disk
l- Load screen layout from
   disk
x- Exit to System Creation
   Menu
```

We'll look at all the options on this menu before we're done, but for now the task is to CREATE A SCREEN so:

Press 'e' and then RETURN

You should be looking at a screen full of instructions on how to accomplish writing a screen. This is for future reference in using CODEWRITER. For now the screen instructions might make the job look more complex than it really is. Let's examine the instructions to sort things out:

CODEWRITER allows you to type anywhere on the screen to create the entry form you want. The screen instructions will show which keys on your computer allow you to move the cursor around the screen.

Your CODEWRITER 64 system allows you to make printed copies of your screen designs. You must have a Commodore (or compatible) printer connected to your system to do this. You'll see a line at the bottom of your work screen which reads:

```
Press f1 to read screen   f3 hardcopy
```

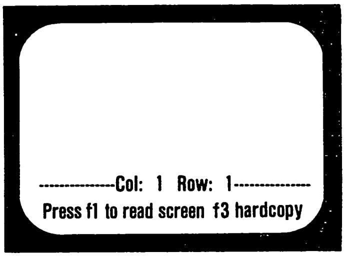
The 'hardcopy' refers to printed copy. Simply press the f3 function key on your Commodore 64 to send an image of your screen design to your printer.

ONLY ONE LIMITATION—You may NOT use column 40 of your screen as part of your screen design. The cursor position indicator (second line from the bottom) will let you know when you're in this column. Put NO screen information there.

That's really all there is to writing on the CODEWRITER screen. We will cover all of the information on the current screen as we proceed with the example program. For now, just remember the instruction screen is there to help you. Press RETURN. You'll see another instruction screen. This, too, will be covered in our example program. Again, remember the screens are there and press RETURN.

DESIGNING THE PROGRAM SCREEN

You should now be looking at an almost blank screen. the CODEWRITER screen is 40 columns across and 22 rows top to bottom. You should see the cursor at the upper left and two lines at the bottom of the screen:



```
--------------Col:  1  Row:  1--------------
Press f1 to read screen  f3 hardcopy
```

The Col/Row line will TRACK the cursor position on the screen. Try using the cursor keys we described earlier. Watch the numbers on the Col/Row line change as the cursor moves. This CODEWRITER feature helps in counting positions when designing your screen and is very valuable when you're trying to copy an existing form to the screen for use in a program.

Before we begin our example program, we need to understand a few terms about the way computers handle information. The terms are FILE, RECORD, and FIELD:

FILE—A FILE is a collection of information on a single subject. thus a receivable file is a collection of information on who owes money to a particular company. A stamp collection file contains all the information about a certain stamp collection, etc.

RECORD—As we get more specific, we use the term RECORD. Thus, within a stamp collection FILE, information about a certain stamp would appear in a RECORD for that stamp. Within a receivables FILE we would find RECORDS of the individual companies or people who owe money.

FIELD—The FIELD is the most specific information. Within the stamp collection FILE, the RECORDS for individual stamps would contain FIELDS of information like; the color of the stamp, the country of origin, etc.

Don't be discouraged if everything you read is not clear the first time through. We have tried to keep computer jargon to a minimum in this manual, but a little is bound to creep in. If you work through the example program, things will begin to come together.

Your CODEWRITER form screen is a remarkably flexible tool. Getting information into your program, in the order you want and the language clearest to you should be easy. Don't be afraid to experiment. You may use as many as 100 fields on a screen. Just type anywhere (except col. 40)—YOU CAN'T HURT CODEWRITER OR YOUR COMPUTER FROM THE KEYBOARD.

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A SALES/INVOICE PROGRAM

Our example program is intended to keep track of sales. We chose this program idea because it gives a good indication of what the CODEWRITER system will do. To use our new vocabulary, we wish to build and keep track of a FILE of sales over a certain period of time. Each sale will be entered to a screen RECORD known, naturally enough, as an invoice. Each invoice will contain FIELDS to put the most specific information like; customer name, item purchased, date, price paid, etc.

We should give our invoice form some kind of heading or label to show what its use will be. The example in the shaded box below uses an up arrow (↑) as a SPECIAL MARKER on either side. Your computer may use another character. Check the screen instructions.

↑ ABC COMPANY SALES INVOICE ↑

What you have typed is known as a LABEL to the CODEWRITER system. A LABEL is something written which is NOT associated with information to be entered. Things like our title (just entered), copyright information on the screen, instructions for the program operator, dotted lines and the like are all LABELS to the system because they DON'T ASK ANYONE TO REACT BY ENTERING INFORMATION.

CAN USE GRAPHICS

As you see our label example has the up arrow (↑) symbol on either side. This identifies screen information as a LABEL. The up arrow key on your Commodore 64 is the second key from the right on the second row from the top. Even if screen material is simply a line as below:

↑ ———————————————————— ↑

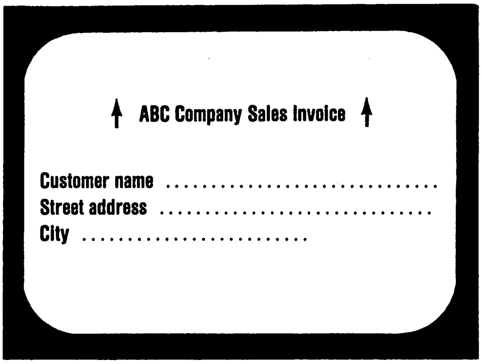
be sure to use UP ARROWS on BOTH SIDES.

By the way, don't be concerned if the invoice label you just typed is not centered exactly as you wish. We'll take care of things like that later.

THE PROMPT

Now for the part of our sales invoice screen that IS concerned with information handling. Let's add some customer information PROMPTS to our form. A PROMPT asks for INFORMATION TO BE ENTERED. A PROMPT is always followed by at least one dot (.) or a dotted line (. . . . .) to indicate HOW MUCH SPACE is available to enter the information requested by the PROMPT.

Thus we could add customer information PROMPTS to our sales invoice screen and it would look as follows: (Don't worry about typing exactly.)



↑ ABC Company Sales Invoice ↑

```
Customer name  . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
Street address  . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
City  . . . . . . . . . . . . . . . . . . . . . . . . .
```

There are several things we should notice about PROMPTS. As you can see, there are no UP ARROWS. For the CODEWRITER system to recognize your PROMPTS as the requests for information they are, never use UP ARROWS. Also while each PROMPT must have a dot (.) or dotted line (. . . . . . .) following it, the dots DON'T have to come IMMEDIATELY AFTER the letters or numbers in the PROMPT.

Look at the PROMPT 'Customer name'. After the final 'e' in 'name', there are TWO SPACES BEFORE the line of dots begins. This allows you to create screen forms which are easier to read because the PROMPT for information needn't bump right against the information itself.

In any of your screen designs, the number of DOTS which follow the PROMPT determines HOW MANY characters of information (letters, numbers, symbols or spaces) may be entered to answer that prompt.

CODEWRITER CONCEPT

THE PROMPT—A PROMPT is a request for information by the program designer. It is always followed by a dot or dots to indicate length of entry. It NEVER contains up arrows. The CODEWRITER system will search for the FIRST DOT following a PROMPT and store the information which follows as the response to the PROMPT. The total number of dots following a PROMPT should never be more than 38 when using your 40 column computer.

There is one more tip concerning PROMPTS: Never put a dot (.) into the PROMPT itself. This can happen where a PROMPT involves an abbreviation as in—

Max. amount needed? (y or n)

This is simply a PROMPT asking for a yes or no (one letter) response to the question 'Maximum amount needed?' Can you see what's wrong? The CODEWRITER system will see the dot after 'Max' and consider 'Max' alone to be the PROMPT with a one-dot response (Max.) CODEWRITER would then read further (from 'amount needed', etc.) and consider this to be a second PROMPT.

Abbreviation is O.K. Simply leave out the period as in—

Max amount needed? (y or n)

This will work fine.

DATE ENTRY

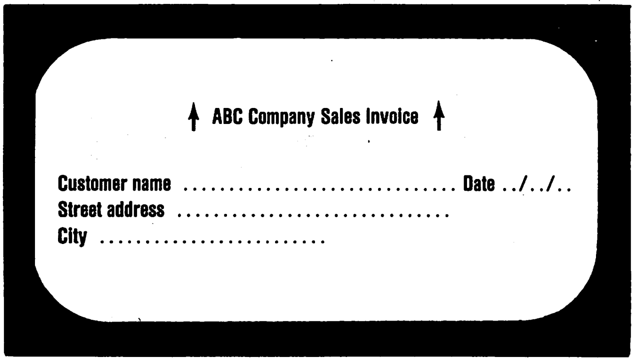
The CODEWRITER system handles dates as a special kind of response to a PROMPT. You may use either the American date format or the European and CODEWRITER will automatically write code to check for the appropriate format and a valid date entry, i.e. no July 40 or February 29 (when not a leap year), Formats are as follows: To express the 15th day of June, 1983

American	European
06/15/83	15/06/83

For now simply enter the empty date format. CODEWRITER will ask for the American/European choice later.

../../..

Added to our current screen this would be:


```
↑ ABC Company Sales Invoice ↑

Customer name .............................. Date ../../..
Street address ............................
City ........................
```

Add the date PROMPT to your screen. Whenever you wish date information to be entered into your CODEWRITER created programs, use the ../../.. format. The PROMPT may be whatever you wish as:

Order Date	../../..
Member since	../../..
Date to Close	../../.. etc.

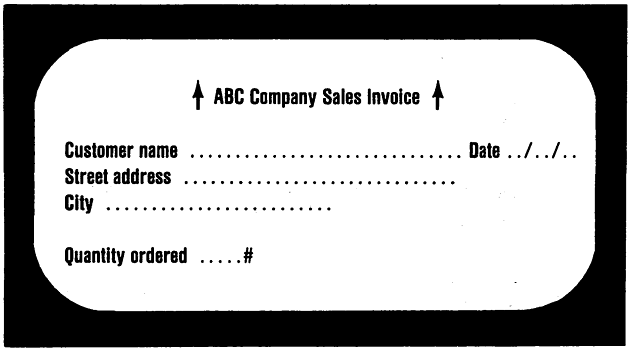
Only the actual date entry format need be the same. When the operator of your program enters a date, it will be as 02/05/81—(You may type SPACES instead of leading zeros.) Later on in program development you will be offered the choice by CODEWRITER as whether you wish American or European format date handling.

NUMBERS

Up to now the information required by the PROMPTS on our sales invoice screen has been what your computer considers ALPHANUMERICS—jargon meaning IDEAS expressed in letters and numbers. For example a name, an address, and a date are all ALPHANUMERICS because of two things; They can be expressed in letters and numbers AND they are NOT USUALLY part of any CALCULATION—you don't add, subtract, multiply or divide them even though they MAY include numbers.

NUMERICS, to your computer, are different. In the CODEWRITER system NUMERICS have two meanings of their own; They involve NUMBERS ONLY, never letters, and they can be included in CALCULATIONS. As we promised to avoid jargon, let us begin here to refer to NUMERICS as simply numbers.

As we add a new line to our sales invoice screen you'll notice a change:

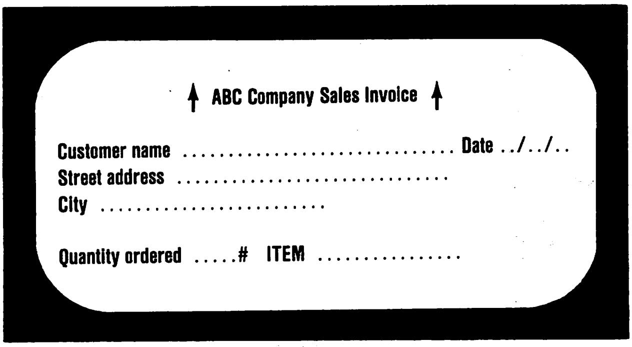


ABC Company Sales Invoice

```
Customer name ............................. Date ../../..
Street address .............................
City ........................

Quantity ordered .....#
```

See the new symbol? After the 5 dots following 'Quantity ordered', we've added the # sign. This does two things; The # sign takes the place of a dot, making the space for information total 6, and the # sign tells the CODEWRITER system that the information to be entered will be NUMBERS and ONLY NUMBERS. Thus the numbers may be part of a calculation—if the program designer wishes.

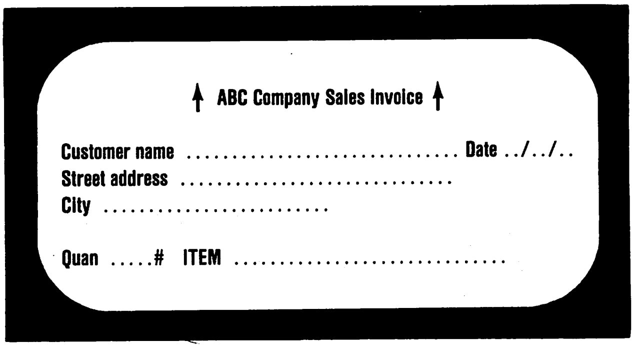
By now your program screen should look like the one above and include the new NUMBERS field for 'Quantity ordered'. Let's add another field to the screen.



```
              ABC Company Sales Invoice

Customer name ............................ Date ../../..
Street address ............................
City ........................

Quantity ordered .....#  ITEM ................
```

As you see, we've added another ALPHANUMERIC field called 'ITEM' and given it 16 spaces for operator entry. Again, we didn't need any symbol after the row of dots. Add the new field yourself.

Now it's time for a little 'housekeeping'. As we look at the latest line on our sales invoice screen, it looks as though space is running out too soon. Most invoice forms allow for 'Quantity', 'Item', 'price each', and 'total' all on a SINGLE LINE. The CODEWRITER system allows ANYTHING on your form to be retyped as often as you like until it's just as you wish. Why not take advantage?



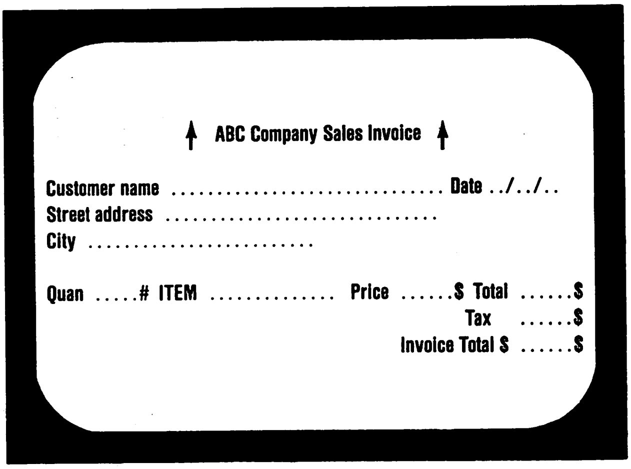
```
              ABC Company Sales Invoice

Customer name ............................ Date ../../..
Street address ............................
City ........................

Quan .....#  ITEM ..............................
```

There. We've abbreviated 'Quantity ordered' to 'Quan' (no period) and added space to the 'ITEM' PROMPT, allowing for a better description of ITEM.

MONEY

The last type of PROMPT field CODEWRITER offers is for MONEY. This field type simply stores numbers for all DECIMAL TYPE CURRENCIES for a maximum of 2 places to the right of the decimal point. The CODEWRITER program designer adds the $ sign (the meaning here being 'money' rather than the American dollar) to the end of the dotted entry line.

We can now complete our sales invoice form:



```
          ↑ ABC Company Sales Invoice ↑

Customer name ............................ Date ../../..
Street address ............................
City ........................

Quan .....# ITEM ............. Price ......$ Total ......$
                                             Tax   ......$
                                   Invoice Total $ ......$
```

Look at the four new PROMPT fields before you type them onto your screen. The PROMPTS 'Price', 'Total', and 'Tax' are simple MONEY fields. 'Price' calls for an entry of 7 characters (6 dots and the $ sign). 'Total' allows for a 7 character entry (6 dots and the $ sign), and so does 'Tax'. The PROMPT for 'Invoice Total' may be confusing. Here the PROMPT ITSELF ends in the $ sign. This is perfectly O.K. as long as you're careful.

For 'Invoice Total $' the trailing $ sign in the PROMPT simply allows the final form of the MONEY entry to read:

Invoice Total $ 125.75 instead of
Invoice Total   125.75

This is a purely cosmetic option for the program designer. As a trailing sign, of course, the $ symbol could be ANY symbol appropriate to the currency you are using. Only the $ sign at the END of the dotted line MUST be the $ sign as this is what tells CODEWRITER it's handling MONEY.

As you can imagine, you need to be especially wary of accidental dots in your PROMPTS where MONEY is involved.

PROMPT FIELD TYPES

ALPHANUMERIC (letters, numbers, symbols)—need NO special sign at the end of the dotted line. Ex. Name .... They CANNOT be a part of a calculation.

DATE—may use ANY PROMPT but MUST use the input form ../../.. as in Member since ../../.. They CANNOT be part of a calculation.

A GENERAL CAUTION—Do not use the comma (,) colon (:) or semicolon (;) as part of your screen designs. These symbols confuse the file handling operations of both your CODEWRITER system and your CBM 64. To prevent problems, these keys are DISABLED when CODEWRITER is in use.

NUMERIC (numbers only)—may use ANY PROMPT but MUST use the # sign at the end of the dotted line. Ex. Amount ....# They CAN be part of a calculation.

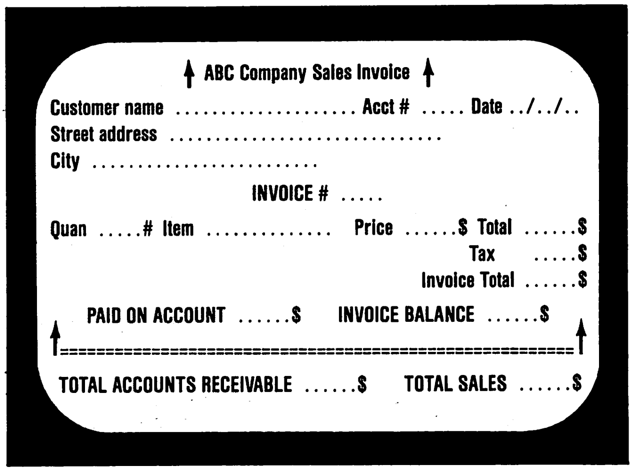
MONEY (numbers only)—may use ANY PROMPT but MUST use the $ sign at the end of the dotted line. Ex. Price ......$ They CAN be part of a calculation.

BOTH A NUMBER AND A MONEY field need at least two characters to define their length. For example, the fields CASH PAID .$ or NUMBER USED .# both have two characters (the dot and the sign) following the prompt. Use at LEAST two.

SOME REAL CODEWRITER POWER

Our sales file can be much more than an electronic invoice system. Let's get down to some real PROGRAM DESIGN. By adding six additional fields to our screen, the CODEWRITER sales program can become a very efficient CREDIT JOURNAL while giving up to date reports on both TOTAL ACCOUNTS RECEIVABLE and TOTAL SALES. (Not bad for a first effort!)

Here is our screen with the six new fields:



```
              ↑ ABC Company Sales Invoice ↑
Customer name .................... Acct # ..... Date ../../..
Street address ............................
City ........................
                    INVOICE # .....
Quan .....# Item .............   Price ......$ Total  ......$
                                               Tax    .....$
                                         Invoice Total ......$
↑  PAID ON ACCOUNT ......$    INVOICE BALANCE ......$       ↑
=============================================================
 TOTAL ACCOUNTS RECEIVABLE ......$     TOTAL SALES ......$
```

The six new fields each have a specific job. Here's a look at them one by one:

Acct # .....

This allows each ABC Company customer to have his own identity—even if names are alike. We have allowed for 5 places. Notice there is no # sign after the dotted line. There are two reasons for this; First the # sign would limit us to NUMBERS ONLY. Some account numbers use both letters and numbers (as T1450 etc.) to give greater variety using the fewest places. Secondly, using the # sign requires a bit more computer memory. Whenever CODEWRITER sees this sign (or the $), it holds extra computer memory space aside in case the information in the field would be needed for use in a CALCULATION. Since we aren't likely to use account numbers in any calculation, why not save computer memory?

Invoice # .....

This five-place field identifies a PARTICULAR SALE to our ABC Company Customer. By using BOTH the Acct # AND this Invoice #, we allow our CODEWRITER program to group together, in its memory, ALL the sales to the SAME Account number. We'll show later why this helps. Again, we left off the # sign (for the same reasons as the Acct # example above).

PAID ON ACCOUNT

This seven-place $ field will be used to record customer payments against the particular invoice which is on the screen. We used the $ sign because money is involved AND because this field WILL be used in a calculation. We'll explain the calculation function later.

INVOICE BALANCE

This field will hold the DIFFERENCE between the amount shown on screen as 'Invoice Total' and 'PAID ON ACCOUNT'. Again, the $ sign is used because this field will always involve money. Also we'll use 'INVOICE BALANCE' as part of a calculation. Our CODEWRITER program will be designed to calculate this amount automatically.

TOTAL ACCOUNTS RECEIVABLE

This $ field is intended to give a RUNNING GRAND TOTAL of all the balances carried in the field 'INVOICE BALANCE'. We have placed this field on the screen below the ===== header line to help show that the amount is a total of ALL the invoices in the file rather than the particular invoice on the screen.

TOTAL SALES

Again, this $ field is a FILE WIDE GRAND TOTAL of ALL sales. rather than relating to the invoice on the screen. We'll show later how to design CODEWRITER programs to perform the grand total function.

Our sales invoice is now complete. Of course a real sales invoice would have more lines to enter sales items and prices, but for our example this is enough. You are perfectly free to adjust the screen until your invoice form looks as close to our example as you wish to follow the manual.

Now the real magic of CODEWRITER will come clear. You may have been asking yourself "What does drawing a screen form have to do with writing a program?" The answer in the CODEWRITER system is "almost everything". CODEWRITER will "read" the screen we have just created and develop AUTOMATICALLY the entire file structure needed to make our program run. All the PROMPTS will be saved in the right places. The 'dates' will be saved as 'dates', 'money' as 'money', etc. Most of the program designer's work in creating this program is over!

SCREEN READING

Once you're satisfied with the screen on your computer, press ~~ESC~~ F1 to begin the "reading" we just spoke about. The screen will go blank for a moment and our sales invoice form will be replaced by the words "READING SCREEN". In a moment our screen will return.

Certain PROMPT fields on the screen will be HIGHLIGHTED in REVERSE and a question will appear at the bottom of the screen. CODEWRITER will skip over any LABELS, date and ALPHANUMERIC fields we've created and ask questions only about fields which contain NUMERIC and MONEY information.

The program designer is asked here whether a particular PROMPT field is to be "keyboard entered" or "program calculated". This simply means: "Do you wish to have the program operator enter the information the PROMPT requests or do you wish to have CODEWRITER itself calculate the response?"

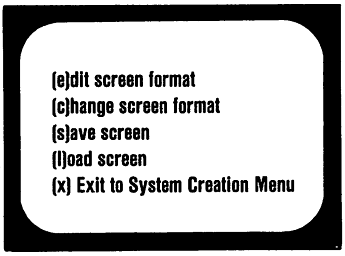
NOTE: The third choice, g for GLOBAL, allows your CODEWRITER program to accumulate TOTALS from ALL the records in the file. More about this later.

In our sales invoice example answer the following as the fields are HIGHLIGHTED in REVERSE:

Quan	enter 'k'	The operator must enter this from the (k)eyboard
Price	enter 'k'	
Total	enter 'p'	The CODEWRITER (p)rogram can calculate this amount by multiplying "Quan" times "Price". Why make extra work for the operator.
Tax	enter 'p'	As long as the sales tax rate is constant for all items, your CODEWRITER created program will recall the rate as a percentage and multiply this by the "Total"

Invoice Total $	enter 'p'	CODEWRITER will write program lines to direct the adding of "Total" to "Tax"
PAID ON ACCOUNT	enter 'k'	The program operator will enter this amount.
INVOICE BALANCE	enter 'p'	Your CODEWRITER (p)rogram will calculate this
TOTAL ACCOUNTS RECEIVABLE	enter 'g'	for this (g)rand total.
TOTAL SALES	enter 'g'	CODEWRITER will ACCUMULATE the Invoice Total amounts and show the TOTAL whenever the operator looks in the SALES FILE

Once all the appropriate fields have been designated either "k", "p", or "g" by the program designer, CODEWRITER will return to the Screen Format Generator menu where the following choices are offered:



For now, do NOTHING. Here is what the menu options mean:

EDIT SCREEN FORMAT—If the program designer wished to make ENTRY CHANGES in the screen, he would use this option. By ENTRY CHANGES we mean changes in the KIND of information to be entered, such as adding or subtracting a PROMPT, or in the SPACE allowed to respond to a PROMPT.

Once the 'e' for edit is selected, the current screen in memory will re-appear. CODEWRITER will then allow ANY changes to be made to the screen as though it had just been typed in. All 'k' or 'p' choice information needs to be RE-ENTERED before leaving the Edit Screen option.

CHANGE SCREEN FORMAT—This option is strictly for MOVING existing screen information around. No new fields may be added or existing fields or labels removed. More about "Change Screen" later.

SAVE SCREEN—This option allows the CURRENT screen in memory (the one we just created) to be saved to the disk in the drive. More about "Save Screen" later.

LOAD SCREEN—This option allows a previously saved screen to be loaded from the disk in the drive. Thus ALREADY CREATED programs made with CODEWRITER could be modified later by loading just the screen with this option and then going back to the Edit Screen Format option to continue creating a NEW program. To simply VERIFY proper screen save, Change Screen can work better. More later.

EXIT TO SYSTEM CREATION—This option starts things over from the beginning. BE CAREFUL HERE! If you choose the exit option BEFORE saving your screen, the screen will be LOST.

Even though our current sales invoice screen shouldn't need any changes, let's choose the CHANGE SCREEN option anyway—just to watch how well it works.

type 'c' here

You should see an instruction screen to explain the workings of "Change Screen". This is for future reference. Read over the screen and then press RETURN.

Once again the sales invoice form should appear. The LABEL ↑ ABC COMPANY SALES INVOICE ↑ should have the cursor at the FIRST POSITION. Let's say you weren't satisfied with the way the LABEL was centered on the screen. Press the RETURN key and the LABEL should change to REVERSE screen image.

A field SHOWN REVERSE this way is ready to be MOVED. Simply use the cursor keys and move the LABEL anywhere on the screen you wish! Should your moving label bump into another field on its journey around the screen, CODEWRITER will automatically JUMP the label to the next empty area in the direction it was being moved. Once you're satisfied with the position of the moving field, simply stop and press the RETURN key. The field will revert to the normal print mode from REVERSE. ALL screen fields can be moved in the same way.

Press ANY key (except RETURN) and you'll skip to the next field where the process can be repeated as often as you like. With each pressing of a key the cursor will move to the beginning of the next field. The cursor will move over the fields in the SAME ORDER in which the fields were FIRST ENTERED. Check your screen instructions for the correct method to BACK UP through preceeding fields.

Making "Changes" can lead to some confusion. Remember the Change Screen routine does NOT alter any of the logic of the screen CODEWRITER has already read. Thus, if you move the fields all over the screen, your CODEWRITER program will continue to prompt for the operator information in the SAME ORDER in which you FIRST typed the fields in. If you'd like the NEW screen positions to dictate the NEW order of operator entry of data, you'll need to "read the screen" AGAIN with the Edit Screen option.

To make permanent changes with Change Screen, one should:

1. Move the fields around any way you wish from Change Screen.
2. Once changes are complete, press ESC to return to Screen Format Generator.
3. Choose Edit Screen and your NEWLY ALTERED screen will appear.
4. Make any ENTRY CHANGES (see Edit Screen) you wish to further alter the screen if needed.
5. Step through the 'k', 'p', or 'g' choices again. Once complete, you'll be back to the Screen Format Generator menu.
6. Choose "Save Screen" to save your new form permanently to the CODEWRITER disk work space. NOTE: If you have already saved a screen in an OLD order and now wish to save the screen with NEW field positions, give the NEW screen a NEW file name.

*

As we don't require any permanent changes to our example program, press f1 to leave the Change Screen option. Here CODEWRITER warns us to be sure to save the screen. Once back at Screen Format Generator, we are ready to save our sales invoice screen.

Press 's' here

CODEWRITER will ask the program designer to give a NAME to the screen. A maximum of 10 characters is allowed and, as usual, simple, appropriate names are best. In this case, the name of the screen becomes the name of the PROGRAM to be created by CODEWRITER. Do NOT use a slash (/) or a dot (.) as part of a screen name. Also, a screen file name must be lower case.

enter 'invoice' and press RETURN

It would be nice to VERIFY that our screen has been saved correctly. Since we are now back to the familiar Screen Format generator menu, we can VERIFY quite simply.

press 'l' for load and RETURN

The "load" option will ask for the 'screen file name'. We chose 'invoice' so:

type 'invoice' and press RETURN

The disk in the drive should spin and stop. Next the screen format Generator menu appears. We could choose Edit screen to see our newly loaded screen, but this would force the 'k' and 'p' choices again. Instead we choose Change Screen:

press 'c' and RETURN

From Change Screen we are shown our sales invoice form again which proves it has been saved correctly. To exit Change Screen we press the f1 key.

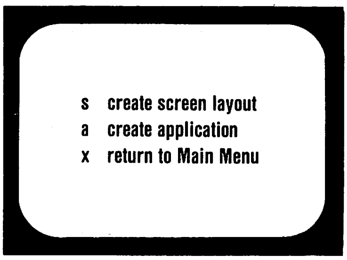
Screen creation is complete and we may now continue with CODEWRITER program design.

press 'x' and RETURN

We get one last warning to save our screen. Quite a worrier, that CODEWRITER!

CREATE DATA ENTRY SYSTEM

From the current menu we have the choices:



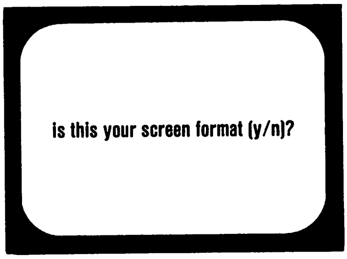
press 'a' and RETURN

CODEWRITER now announces that it will "produce the basic code for a program you design". You may now enter a name (maximum 25 characters) and press RETURN. (The name will follow the credit: PROGRAM Design by)

You are next asked for the name of the screen file. Be EXACT here so the system can find our much maneuvered screen:

enter 'invoice' and press RETURN

After a bit of whirring from the drive, the sales invoice screen should re-appear with a few changes; The arrows around the LABEL ABC COMPANY SALES INVOICE should be gone. Also, any fields we designated (p)rogram calculated should have only a single dot following the PROMPT. You'll be asked:



```
Is this your screen format (y/n)?
```

If the screen you see is correct

Press 'y' and RETURN

If you press 'n', you'll be returned to the request for "screen file name" for another try at finding the screen file.

WHICH DRIVE FOR DATA

On your system, the prompt "Which drive for data DOES NOT appear. You'll be hearing soon how to upgrade your system to use more than one drive—for considerably more file space and power. We have the reference in the manual for the future. You may continue here if you like or SKIP to page 22.

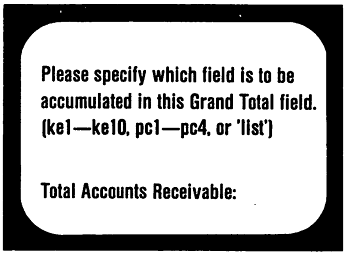
The choice is important. Remember, you are now creating a data entry program to control information. The information itself (the data) need NOT be on the same disk as the program which controls it. Keeping the control program on one disk and the data on another MAXIMIZES the amount of data you can control. On the other hand, where disk capacity is enough and the convenience of both program and data on a single disk is important, a one-disk system works fine.

Remember, the question means "which drive for data" when your PROGRAM IS COMPLETE AND RUNNING. (Users with two-drive CODEWRITER systems will NOW have their program disk in the second drive, but it will RUN in the first drive when it's finished. The "data" can be on either the first or second drive.)

For our example program, enter the appropriate number for the FIRST DRIVE.

THE GRAND TOTAL FIELDS

The next CODEWRITER request will be to define what kind of GRAND TOTALS we want in the program being designed. In our example, the prompt screen will say:



```
Please specify which field is to be
accumulated in this Grand Total field.
(ke1—ke10, pc1—pc4, or 'list')

Total Accounts Receivable:
```

What does all that mean? When we first designed the screen for our sales invoice, we included a total of 14 different FIELDS. We then specified which of the information inputs would be (k)eyboard entered, which would be calculated by the (p)rogram, and which would be a (g)rand total of some other field.

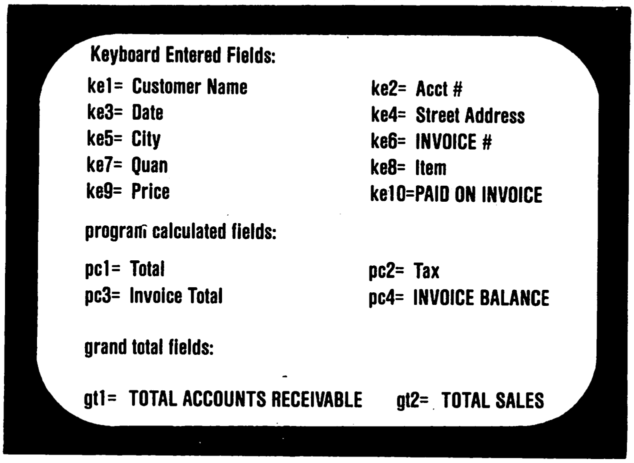
The CODEWRITER system is now ready to learn how the program designer wishes to CALCULATE the information on the screen. To make things easier, CODEWRITER has ABBREVIATED the names of the screen fields. Thus the FIRST field on the screen to be designated (k)eyboard (e)ntered becomes ke1, the second becomes ke2, and so on. Naturally enough, the first field we chose to designate (p)rogram (c)alculated becomes pc1 to CODEWRITER.

Now, back to Grand Totals. CODEWRITER is asking which screen field is to be accumulated and displayed as a Grand Total after the prompt "Total Accounts Receivable". Inside the parentheses are the choices: ke1 to ke10, pc1 to pc4. or 'list'.

Since it's difficult to remember WHICH field we designated as the FIRST program calculated (pc1), etc. CODEWRITER offers the 'list' option to display all our choices.

Type 'list' and RETURN

You should now see the following on the screen:



```
Keyboard Entered Fields:
ke1= Customer Name              ke2= Acct #
ke3= Date                       ke4= Street Address
ke5= City                       ke6= INVOICE #
ke7= Quan                       ke8= Item
ke9= Price                      ke10=PAID ON INVOICE

program calculated fields:

pc1= Total                      pc2= Tax
pc3= Invoice Total              pc4= INVOICE BALANCE

grand total fields:

gt1= TOTAL ACCOUNTS RECEIVABLE     gt2= TOTAL SALES
```

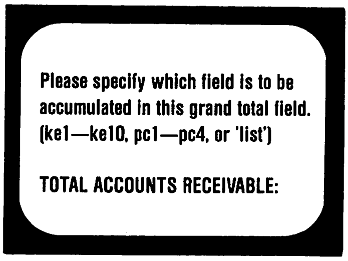
Again, back to the CODEWRITER prompt we're trying to answer. We want our program to make it easier to get useful information. Which of the screen prompts we designed will ADD UP TO a GRAND TOTAL we can call "TOTAL ACCOUNTS RECEIVABLE"? Study the list. "Invoice Total"? Maybe, but what if we receive a payment from a customer? The "Invoice Total" would, of course, remain the same after a payment, but the amount the company is owed (its receivables) would go down.

The correct answer is INVOICE BALANCE. Obviously, if we had a Grand Total of the INVOICE BALANCE amounts from ALL invoices we could call this figure our TOTAL ACCOUNTS RECEIVABLE.

The 'list' should still be on your screen. We can see that INVOICE BALANCE is abbreviated by CODEWRITER to pc4.

press RETURN

Again we see prompt:



```
Please specify which field is to be
accumulated in this grand total field.
(ke1—ke10, pc1—pc4, or 'list')

TOTAL ACCOUNTS RECEIVABLE:
```

type 'pc4' and press RETURN

This tells our CODEWRITER program to accumulate ALL the INVOICE BALANCE amounts from the entire file of invoices and show the total in TOTAL ACCOUNTS RECEIVABLE on the screen. Whenever the operator of our program looks at ANY invoice in the ABC Sales file, he or she will always see this grand total on display.

The next CODEWRITER prompt asks for the field to accumulate as;

TOTAL SALES

This should now be easy. Type 'list' again. This time, of course, 'Invoice Total' is correct as the amount to be accumulated as TOTAL SALES. Press RETURN to go back to the prompt.

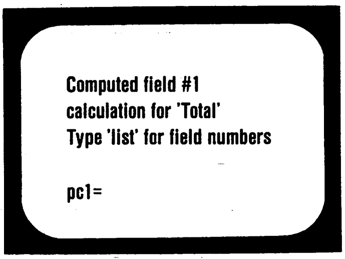
type 'pc3' and press RETURN

COMPUTED FIELDS

The CODEWRITER screen now requests the computations for 4 computed fields. You'll be given an entire second screen of information as to what this means and an entire screen as to what is meant by 'self referencing' fields.

As before, these screens are reminders for later. We'll explain the procedures here in detail. Read the two screens and press RETURN.

The screen now shows:



```
Computed field #1
calculation for 'Total'
Type 'list' for field numbers

pc1=
```

This is where you learn to be a Program Designer. Designing the screen was the most creative aspect of the job. Now comes the real power.

Type 'list' to see your choices. As you look at the list of prompt fields and their CODEWRITER abbreviations, think. What is the DEFINITION of 'Total'? In our invoice design, 'Total' (pc1) means 'Quan' (ke7) multiplied by 'Price' (ke9).

We "design" this definition with CODEWRITER by saying:

```
pc1=ke7*ke9
```

============ **CODEWRITER CONCEPT** ============

As with most computers, the four basic arithmetic functions are:

+	means add
-	means subtract
*	means multiply
/	means divide

CODEWRITER also allows the use of (   ) to isolate formula components.

Parentheses are used to ISOLATE the calculations inside them for SEPARATE COMPUTATION within a formula. An easy example would be: pc1*pc2+(ke3-ke5) which means—First multiply pc1 by pc2 and then add to this result the difference between ke3 and ke5.

While CODEWRITER will detect SOME mathematical errors (such as forgetting a closed parentheses after using an open parentheses), it CANNOT prevent all instances of incorrect math from getting into a program. You'll be offered a chance to VERIFY a formula after you type it in. Once verified, however, CODEWRITER will try to audit what it can and then ACCEPT what you wrote. Please be careful.

======================================

Here are the remaining program calculations for our Sales Invoice design and an explanation of each. Follow the screen commands to enter these:

program calculation	meaning
pc2=pc1*.06	Tax (pc2) is 6% of the Total (pc1) to the invoice. Thus, we multiply pc1 by .06 to find Tax.
pc3=pc1+pc2	Invoice Total (pc3) is simply Total (pc1) PLUS Tax (pc2)
pc4=pc3-ke10	Invoice Balance (pc4) is the result of Invoice Total (pc3) MINUS PAID ON INVOICE (ke10).

As usual there are a few rules to keep in mind. We'll try to be concise:

1. Calculation definitions must deal in KNOWN IDEAS. Thus, you cannot enter pc2=pc6-ke3. Can you see why? Calculations are defined in the SAME ORDER in which they appear on the screen (top to bottom, left to right). Thus, if you are defining pc2 you CANNOT have defined already pc6—making pc6 an UNKNOWN IDEA. This quandry is easier to avoid than you may think. Simply design your screen so that your input prompts PROGRESS in logical order (price before total, payment before balance, etc.). CODEWRITER will handle things from there.

2. Program calculations are the HEART of a good design. Use them well. They may contain ANY combination of pc fields, ke fields and even gt fields (subject to rule 1). They should be limited to 25 characters in overall length.

SELF REFERENCING FIELDS

There is a bit more power in CODEWRITER calculations. The Self Referencing field may seem abstract and confusing at first, but it's JUST PERFECT for some jobs. Where the program designer wishes to HOLD a PREVIOUS value while calculating a new one, he needs a Self Referencing field.

An example is in order. In an inventory program, a field named BALANCE ON HAND will usually be designed to depend on two others like QUANTITY IN and QUANTITY OUT.

Lets assume that QUANTITY IN is ke1 and QUANTITY OUT is ke2, while BALANCE ON HAND is pc1.

If we used a formula like pc1=ke1-ke2 (which might seem logical), our inventory would be a disaster. Can you see why? The field of BALANCE ON HAND would always contain ONLY the LATEST results of the CURRENT difference between QUANTITY IN and QUANTITY OUT.

What's needed for a field like BALANCE ON HAND is a way to REMEMBER the current value, hold it, and then COMBINE it with a new value. Though many methods for doing an inventory exist, one approach might be:

```
pc1=pc1+(ke1-ke2)
```

CODEWRITER sees this as Self Referencing since the pc1 appears on BOTH sides of the = sign.

Another use for self referencing is in a pure "counting" field. Since all 'pc' fields are automatically calculated EACH TIME a record is looked up by the operator, a field named "Record Access Times" (as pc5 for instance) could be designed to count the number of times a records was looked up by defining it as:

```
pc5=pc5+1
```

CODEWRITER will automatically create a special file for self referencing fields whenever it sees a calculation with the SAME pc on BOTH sides of the = sign. The program designer needn't do anything but write the formula.

Because the self referencing file will take extra space on the program disk, CODEWRITER will ask the designer to "confirm" that this unique field is what the designer truly wishes. Simply type 'c' to confirm as directed.

REMEMBER—The self-referencing field is for Program Calculated (pc) fields only. The CODEWRITER system contains special features for AUTOMATIC UPDATING of Keyboard Entered (ke) fields. These features are explained later, under "UPDATE DATA", in the instructions for using ANY CODEWRITER designed data entry program. Don't worry if "self-referencing" is not quite clear yet. Just keep in mind the following:

1. "self-referencing" means holding an existing value while combining it with a new one.

2. A self referencing field is ALWAYS program calculated

3. A keyboard entered field can do ALMOST the same thing another way.

One last thing. Once defined, a self referencing field MUST have some opening value (even zero) to function. This needn't be done by the designer, but must be done the FIRST time the program operator encounters the field on the screen. CODEWRITER anticipates this. Should a program operator pass a self referencing field the first time WITHOUT entering a value, the prompt "You must enter something" will appear at the bottom of the screen. Again, a zero entry is fine.

THE NUMBER OF RECORDS NEEDED

Once field calculations are completed, CODEWRITER will ask:

"What is the maximum number of records you want in the data file (50 to ----)?"

This calculation is made automatically by CODEWRITER and depends on the amount of information in a screen design.

CODEWRITER calculates the maximum for you and asks how many you're likely to need in your file. CODEWRITER will then reserve the correct amount of space on your program disk. Remember that specifying the maximum here will FILL the program disk. Where you would like MORE than one program on the same disk, ask for the FEWEST records practicable for your use.

For our Sales Invoice example, a small record file will do.

enter '50' and press RETURN

Next, we are directed to "Type in the program title" and are allowed 30 characters to do so. The program 'title' is NOT THE SAME as the 'Screen file name' we chose earlier. This 'title' is cosmetic only and will merely be printed above the menu CODEWRITER will automatically create for your programs. The 'title' should simply describe what your program DOES.

Enter something like

'ABC SALES RECORDS'

and press RETURN

THE KEY FIELD

You should now see on the screen the following questions:

"Which field is the key field (type 1 to -- or 'list' to list fields)"

The "key field" is more computer jargon for a not too difficult idea. The program which CODEWRITER is creating from our design will store records in a file and then get them back as we need them. To find a particular record (screen), the program conducts an electronic 'search'. The program can simply look at every record in file until it finds what we need, or it can go MUCH MORE DIRECTLY to the record in question.

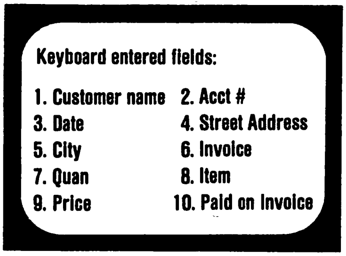
The difference is having a "key" field to search for. Where one field on our screen record is designated the "key", the CODEWRITER created program can go to a SPECIAL INDEX of "keys" it had previously set up. In a flash the needed screen appears.

There is no need for special computer knowledge to choose the "key" field. The "key" is simply the one piece of information (field) MOST LIKELY TO BE LOOKED UP when searching a file.

As an example, in a sales invoice file it is very likely that records will be searched by 'Customer name' most often. Perhaps, in another case, the screen form for the invoice contained a 'customer number' or 'account number'. Certainly either of these would make a good "key" field as well.

For the moment, type 'Li' and press RETURN

You should see a screen like this:



```
Keyboard entered fields:

1. Customer name   2. Acct #
3. Date            4. Street Address
5. City            6. Invoice
7. Quan            8. Item
9. Price          10. Paid on Invoice
```

Our choice is limited to the 10 fields designated 'keyboard entered'. A 'program calculated' field can NEVER be a "key". The CODEWRITER system has numbered our fields from 1 to 10 and has kept track of the numbers. Thus we can choose the "key" by entering the number only. Let's make 'Invoice #' the key.

enter '6' and press RETURN

MORE ABOUT KEY FIELDS

You may search by ANY field on a record screen. The key field is simply the fastest and most direct way to search. To design the BEST POSSIBLE key field, keep one rule in mind; The best key in a record is the most unique key.

For instance, in our invoice example the 'Acct #' key may be REPEATED in many records (where the same customer buys many different times, for instance). Since the 'Acct #' entered is the SAME for many records, each time a 'search' on the key field is done many records will 'qualify' in the search. This will work, but is not the MOST EFFICIENT way.

Try to devise a key which will be unique to a SINGLE record. In our example, the Invoice# is best. This number wil be DIFFERENT for each record entered.

Again, any keyboard entered field may be the 'key' and a key which can refer to multiple records is O.K., but unique is best.

Since many CODEWRITER applications will involve money, we can use a bit more advice on the subject. Here are a few tips:

1. CODEWRITER will allow an operator to enter simply 23. and this will print as 23.00

2. An amount with NO numbers to the left of the decimal place as in .10 will be printed later as 0.10
3. Where the program designer wishes to make sure that money amounts line up top to bottom with the decimal points EVEN, care should be taken to see that the DOTTED LINES for money justify TO THE LEFT. For example:

```
          left
             ......$         (7 places)
             ........$       (9 places)
             ...$            (4 places)
```

   will result in a column of money amounts with the decimals in line TOP TO BOTTOM even though the $ signs vary. The fact that the dotted entry lines are justified LEFT will accomplish this.

KEEPING OUT GARBAGE

We are almost finished with program design. This last section is really optional, but it can be quite important.

Any collection of information can be made most valuable to the extent it can be kept PURE. That is a file on stamps should not contain an occasional recipe and a PROMPT field for price should not allow letters to be typed in, etc.

Without some attempt at keeping out 'garbage' entry, a file can become an awful mess and lose a lot of its value.

You should now be looking at the first of two screens which show how the CODEWRITER system allows the program designer TRAP OUT ERRORS in operator entry.

Like the other instruction screens on the CODEWRITER disk, these are for future reference. Let's go through them now for more detailed understanding.
Once past the two screens, CODEWRITER will bring our sales invoice screen back into view and begin to HIGHLIGHT each of the KEYBOARD ENTERED fields. At the bottom of the screen there is a prompt line saying: Reject if: at the same time as ONE FIELD is HIGHLIGHTED above.

The program designer is being asked, "What will not be accepted?"

CODEWRITER offers a complete arsenal of weapons to keep out nonsense and a very good system for letting a program operator know when something is wrong.

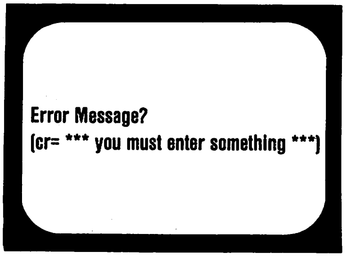
In order to best use your Reject if: weapons, we'll go through the entry process together. Remember, you can always type 'help' to see all the types of data traps again on the 2 screens. You SHOULD study the screens as we go.

You'll see HIGHLIGHTED on the screen 'Customer name .... etc.' and 'Reject if:' below.

enter 'no entry' and RETURN

This means that we have DEMANDED SOME ENTRY by the operator of our program. Since 'Customer name' is quite important, the operator musn't leave it blank or the sales record could be confusing.

Once 'no entry' is typed and RETURN pressed, you'll see:



```
Error Message?
(cr= *** you must enter something ***)
```

CODEWRITER is asking the program designer to write a message to the program operator EXPLAINING that the mistake 'no entry' was made. The "cr= *** you must enter something ***" means that if the program designer wishes, the message "you must enter something" will be entered AUTOMATICALLY by CODEWRITER as a response to the 'no entry' error. (the cr means (c)arriage (r)eturn or just RETURN)

Let's write our own error message:

enter 'You must enter customer's name.' and RETURN

As you'll see the SAME field will remain HIGHLIGHTED and the Reject if: message will appear again. Why? Because MORE than one error could be made in the same field entry.

Let's say we want to prevent an entry which is TOO LONG. The 'name' field is 30 spaces. We can use the edit feature of CODEWRITER to automatically reject an entry longer than 29 (in this case). The rule is; Where you wish to restrict length, allow the space involved to be at least ONE SPACE MORE than the entry you wish to reject.

enter 'length>29' and RETURN

Your CODEWRITER program will then reject all entries MORE THAN 29 spaces in length. (The symbol after 'length' above means 'greater than'.) This prevents an operator from typing more information than your screen form can accept. Regardless of any edits you provide, your CODEWRITER program will automatically sound a BELL when an operator tries to type PAST THE BOUNDS of your screen format size for a given field (i.e. more than 10 spaces in a 10 space field).

enter 'customer name cannot be over 29 spaces' and RETURN

CREATIVITY IN PROGRAM DESIGN

The choosing of edits and operator messages to trap out errors is where the personality of the program designer really comes through. The "attitude" of the created program toward its user, and the general need for accuracy, is built at this point.

Rather than go through all of the fields in our example program, we'll offer, instead, some suggested "edits" and messages. Once you feel comfortable with the process of edit control, by all means devise your own.

Field Name	Reject if: (syntax)	Meaning	Message
Acct #	contains 'ab'	Invoice #CANNOT contain ab'	"ab accounts only in file 5."
Acct #	length<5	Acct #'s MUST have 5 digits	"The Acct # entered is too short"
INVOICE #	no entry	As KEY FIELD, it MUST be entered	"Please include the invoice #."
Quan	not numeric	A quantity MUST be entered as a number	"Please express quantity as a number"
Price	> 10000	No number OVER 10,000 will be accepted	"Items costing over $10,000 use form 3"

(Note: Though the following aren't in our example program, they help to illustrate the edit process.)

Last Name	> 'D'	No name beginning with D or later will be accepted	"This form for A to C names only"
Part #	=300	Don't accept 300	"Item 300 has been dropped-see note 10"
SEX	<> 'male'	MUST be male	"Use male only for this survey"

WARNING: While edits can be COMBINED to test the SAME field for different kinds of operator errors, some combinations are LEATHAL—as they allow no entry at all (or eliminate a range of entries by mistake). For instance, >"a" rules out EVERY lower case letter entry. (Can you see why?) And >100, when combined with <50, allows ONLY 50 to 100 to be entered.

By studying these examples as well as the two edit screens, you should be getting a good idea of the editing process. Remember, CODEWRITER will process as many or as few information edits as you wish. Don't leave edits out entirely, though, as they can be the "soul" of a good information file.

PLEASE NOTE: If the "reject if:" syntax is still not clear, see Appendix A at the end of the data entry section in this manual.

Once the edit section is complete, CODEWRITER asks if you would like a special "end of data entry" message to be used in your program. This message allows the program operator to either get a new blank screen form to fill in or return to the program menu.

The Program Designer is free to choose his own language here, but ONE bit of program LOGIC is automatic: If the operator presses the RETURN key at the end of filling in a screen, a NEW SCREEN will appear. And if "y" or 'yes' is entered, the program STOPS DATA ENTRY and returns to the menu. Examples of "legal" messages are:

"Are you ready to stop data entry y or n (RETURN = n)"

or

"To return to the Main Menu press "y", to continue press RETURN"

If you'd rather not bother to compose any special message, simply press the RETURN key and CODEWRITER will write its own message as shown on the screen.

This final CODEWRITER design choice is for date format.

Enter an 'a' for American or 'e' for European date format in your program.

Any field you designated 'date' (by entering ../../.. to the screen) will automatically be evaluated by CODEWRITER for legal date entries.

THAT'S IT!

Once the correct date format is selected, your system is ready to create a separate program disk to contain your new appliction. The procedures to do this will vary depending on which computer you're using.

Check your USER NOTES CARD and be sure to follow the SCREEN MESSAGES that are offered by your CodeWriter system.

To run your program immediately simply type: run and press RETURN. Later, you run the program like any other piece of software—there is no further need for CODEWRITER until your next program design. Simply place your disk in the drive (after proper power up). The 'program name' is the name of your SCREEN FILE plus a /t. For example, if your screen file is named joe your program name will be joe/t . Both the screen file name and the t MUST be lower case.

The correct sequence for running your new software (once you have turned your computer off) is the following (We'll assume the screen file in named joe):

```
load"joe/t",8
run
```

NOTE: Where you have already created a program with CodeWriter you can load it into your computer's memory easily. First, find what's on the disk (load "$", 8 then 'list'). You'll see a series of files with the same screen file name (but different suffixes). The '/T' file is the one to load. For example, our 'invoice' program would be loaded:

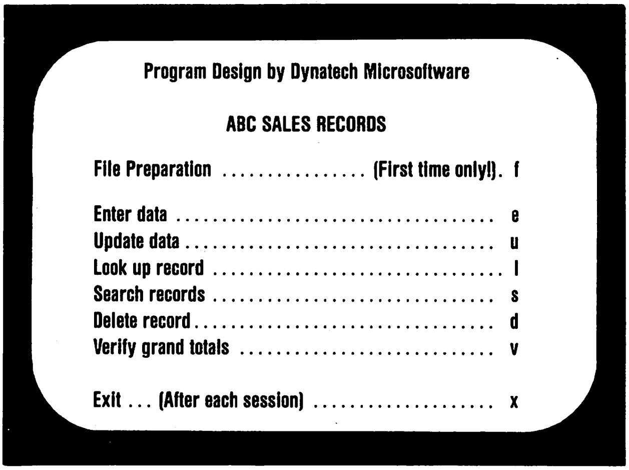
type load "invoice/t",8

(Naturally, if you used a different "screen file name", substitute that name in front of the '/t' in the directory file name.)

Once the flashing cursor returns to the screen:

type 'run' and press RETURN

After a bit of disk activity, the Main Menu of your first CODEWRITER program should appear. Except for your name being used instead of ours, it should look like this:



```
Program Design by Dynatech Microsoftware

ABC SALES RECORDS

File Preparation ................ (First time only!). f

Enter data ................................... e
Update data .................................. u
Look up record ............................... l
Search records ............................... s
Delete record ................................ d
Verify grand totals .......................... v

Exit ... (After each session) ................ x
```

Let's go through the menu options one at a time.

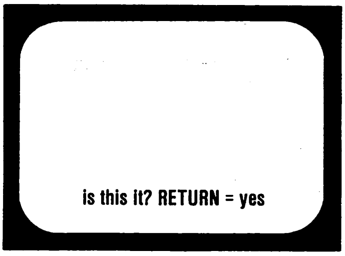
File Preparation—This is the CODEWRITER utility which prepares the disk designated to hold the data for the program. The File Preparation utility will create enough disk space on the data disk to hold the file the designer had requested. REMEMBER! This utility is used ONLY the FIRST TIME a program is run. Once there is data on a disk, the File Preparation utility will ERASE it to 'Prepare' a new file. Beware!

Enter data—This gives the program operator a new and empty screen form to fill in. At this point ONLY the KEYBOARD ENTERED fields are displayed (not program calculated, grand total or labels). To stop the 'Enter data' sequence mid-screen, press the f1 key. Once a screen is complete, the operator will see a line showing how many records have been entered into the file and how many are left. Next the operator is asked whether the data entry session is complete. If not a new screen is shown. If so, the program returns to the MENU.

Update data—This program routine gives the operator a chance to change any information already entered into a screen record. The operator is asked to give the "key" information-that is the data entered in the field designated "key" by the program designer. Here's an example:

In our ABC SALES program, the "key" field is 'Acct #'. Thus, on Update the operator first sees a prompt asking for the 'Acct #' of the record to be 'Updated'. Once the Acct # of the record (invoice) is entered and RETURN is pressed, the program searches the disk for the record and displays it on the screen.

At the bottom of the screen, the prompt line displays:



is this it? RETURN = yes

If the record displayed is correct, press RETURN. You'll notice that now ALL FIELDS and LABELS are displayed. The results of program calculations appear and grand totals are listed where they were designed. (NOTE: If the record displayed is not correct, type 'n' and the program will continue to search.)

A new prompt now appears at the bottom of the screen. Using our Invoice Program as an example, the prompt reads:

Which field to update (1-10, 'list', f1 to cancel, RETURN to save)

The prompt choices, inside the parentheses separated by commas, mean the following:

1-10—This is a choice of field numbers to UPDATE from field #1 to field #10. All are KEYBOARD ENTERED fields (the ONLY ones intended by the program designer for the program operator to be involved with).

list—Naturally, this gives the operator a list of the KEYBOARD ENTERED fields showing which FIELD LABELS belong with each of the 10 numbers. Once the operator sees which field # needs to be UPDATED, RETURN is pressed, the record screen returns, and the update is ready for a choice.

F1—At any time during UPDATE, the operator may press f1 and cancel the update process. This returns the main menu.

RETURN—To COMPLETE and SAVE the update to disk file, press RETURN.

This sequence illustrates the update process on our example program:

1. The operator notices that an incorrect price was used in a customer invoice already on file.

2. The UPDATE routine is called with "u" and RETURN.

3. The Acct #, 1005, is entered as called for.

4. The first record displayed is the right Acct # but the WRONG invoice, so 'n' and RETURN get a second invoice—which is correct.

5. 'List' is called to get the field # for 'Price', which is 9. The 9 is entered and the cursor appears at the 'Price' field—now erased and waiting for a new entry.

6. As soon as the new price is entered and RETURN is pressed, the screen action begins! Not only is 'Price' updated, but ALL the program calculated fields and grand total fields which in some way depend on the price amount are also updated and can be saved by pressing RETURN again once the revised screen appears.

Before we leave the UPDATE routine, there is one more valuable feature called "(m)ore and (l)ess". Here's an example from our ABC SALES program:

1. A customer wishes to make a payment on one of his open invoices. The operator goes through the update routine and finds that the field (#10) PAID ON INVOICE already contains a payment amount. The customer is making a second payment on the same open invoice.

2. Since in this case we don't want the amount NOW in PAID ON INVOICE to be ERASED and replaced with the current payment, the normal update won't do. (Let's say the amount currently in PAID ON INVOICE is $15.00)

3. The operator chooses field #10 which places the cursor at PAID ON INVOICE and OVERWRITES the $15.00 amount. Since the new payment is $10.00 and we wish to ADD this amount to PAID ON INVOICE, the payment is entered as 10.00m for more. The 'm' ADDS the 10.00 to the previous 15.00 so when RETURN is pressed, the new PAID ON INVOICE amount reads 25.00 and once again all fields which relate to this change automatically.

Obviously, entering 'l' (for less) as in 35.00l would SUBTRACT 35.00 from the amount already entered.

One last point; The m and l feature at first seems the same as a self referencing program calculated field, which holds an old value while calculating a new one. The two are different. The m and l feature works ONLY on KEYBOARD ENTERED fields while self referencing is ONLY for PROGRAM CALCULATED fields.

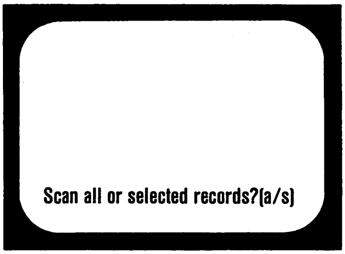
Keep "(m)ore and (l)ess' in mind for your future CODEWRITER applications. The feature is invaluable for inventory type programs especially.

Look up record—When the 'l' is used from the main menu, the user first sees the key field alone on his screen. The ENTIRE key field entry should be typed and then RETURN is pressed. Once a full screen appears, the user is offered a choice; If the screen record is correct, simply view as long as needed and then type x and RETURN. This will return to the main menu. If the first screen seen is NOT correct (there may be several with the same key), press RETURN and the program will search for another screen record with the same key.

Search records—This feature has two main purposes. One is to find screen records where the "key" field information is unknown. The second is to give the program operator a chance to view an entire SERIES of screen records which are LINKED by search boundaries the operator has chosen. Here's another example from our ABC SALES program:

1. The operator wishes to find the invoice to "Abbott Jewelers" but does not know the Acct # to find "Abbott Jewelers" with the Look up command. The Search command is chosen instead.

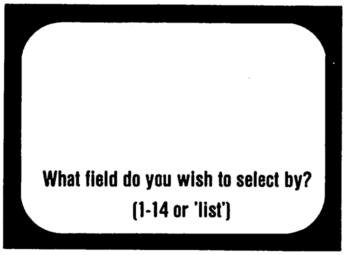
2. After 's' and RETURN are pressed, the operator sees the prompt:



```
Scan all or selected records?(a/s)
```

Since the operator doesn't want to see "all" of the invoices to find "Abbott", the 's' is pressed for 'selected' records.

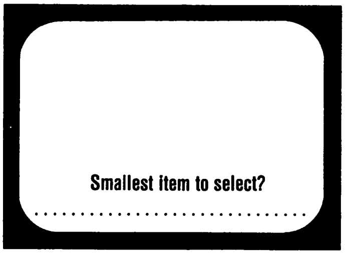
3. Next the operator sees the prompt:



What field do you wish to select by?
(1-14 or 'list')

Here the operator types 'list' and sees a list of all 14 fields (except grand totals). The operator wants to search alphabetically so field #1, Customer Name, is selected for the search.

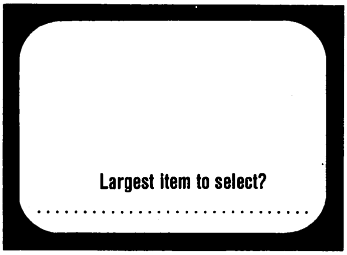
4. The next prompt reads:



```
Smallest item to select?
..............................
```

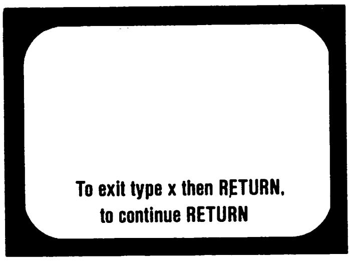
Here 'Smallest' means lowest in the alphabet. Notice that the prompt offers 30 dots to fill in? That's because your CODEWRITER program "remembered" that field #1 was designed to have 30 characters maximum. The operator types 'Ab' which means that records with 'Customer Name' beginning lower in the alphabet range than "Abbott" (say Aaron, for instance) would be omitted from the search. Remember a lower case letter is 'lower' than its UPPERCASE counterpart (i.e. 'a' is lower than 'A').

5. The next prompt:



```
Largest item to select?
..............................
```

is answered; 'Abbott' so that nothing above 'Abbott' will be searched. The records within the range will be displayed one at a time along with the prompt:



To exit type x then RETURN,
to continue RETURN

and so the operator simply presses RETURN until the desired record is displayed and then types x to halt the search.

A few more items concerning 'Search':

1. **On an alphabetic search of, say, A to D remember that a lower limit of A is fine but D alone as the upper limit will leave out everything beyond D by itself. To search a file A through D, enter Aa or A and DZ as the two limits.**

2. Remember that to a computer A is different from a. If you used capital letters in your fields, use capitals in your search limits.

3. Where a search field is a date, you'll be offered ../../.. instead of dotted entries. You may search through a range of dates.

Delete record—This menu option removes records from the file disk. It works by asking the operator for the entry to the "key" field and then displays the screen record in question. by answering the "is this it" prompt with RETURN, the record is deleted.

Verify grand totals—Because of occasional instances of computer "rounding off" certain sums, the 'Verify' option is included. Simply enter 'v' and RETURN. No other entry is needed. All of the 'grand total' fields on the screen will be checked for accurate mathematic sums. The Verify option appears ONLY when a file contains grand totals.

Exit—This is simple, but can be easy to forget. After EACH session of data entry is complete, exit the program with THIS 'x' RETURN option. Do NOT simply turn the computer off. The 'Exit' routine in your program performs a number of very important "computer housekeeping" tasks which keep the data file ready for reliable use.

A FINAL WORD

We have tried in this manual to show the major features of CODEWRITER and how these features work interactively to allow the Program designer to control information. We've shown some things in detail and only hinted at others—all by design. CODEWRITER is a tool, to be discovered rather than explained.

This CODEWRITER product is the first of a series aimed at making PROGRAM DESIGN more powerful and capable a function. We hope never to lose sight of the fact that your growth is our growth.

Appendix A — The "Reject if:" rules

We thought it would be helpful to have the two "reject if:" help screens for your CODEWRITER program reproduced here for easier reference.

screen one

GENERAL TESTS

Test name	example	meaning to operator
'no entry'	–	some entry required
'not numeric'	–	use only numbers here
'numeric'	–	don't use numbers here

DATA SIZE TESTS

Test name	example	meaning to operator
'length >'	length > 4	no more than 4 keystrokes allowed
'length <'	length < 7	no less than 7 keystrokes allowed
'length='	length=2	must NOT be 2 keystrokes
'length < > '	length < > 3	must be 3 keystrokes

screen two

NUMBER TESTS

Test name	example	meaning to operator
'>'	>100	must NOT be greater than 100
'<'	<20	must be 20 or higher
'='	=631	must NOT equal 631
'<>'	<>17	must equal 17

CHARACTER TESTS (note single quotes)

Test name	example	meaning to operator
'>'	> 'd'	must NOT be after "d" in the dictionary
'<'	< 'jo'	must NOT precede "jo" in the dictionary
'='	= 'bill'	must NOT be "bill"
'<> '	<> 'male'	must be "male"
'contains'	contains 'abc'	must NOT contain 3-letter group "abc"

The various symbols used in "reject if:" syntax may not be familiar. Here's a detailed explanation. We'll take the tests in order.

Very often the most confusing aspect of the "reject if:" design is the backward or opposite nature of the prompt: the designer is asked to state what he does NOT want rather than what he does. Help is on the way.

NO ENTRY—Since the purpose of "reject if:" tests is to let the program operator know what is NOT accepted entry, "no entry" as a test is vital. When the program designer answers a "reject if:" with "no entry" the meaning is: "Don't skip over this field—it will be rejected if there is no entry."

Use the 'no entry' test when the field in question is the KEY FIELD. Without the 'no entry' test, the operator could leave the key field blank. With nothing in the key field, the ENTIRE SCREEN RECORD would be lost to the CODEWRITER system.

Anytime you wish to DEMAND SOME ENTRY to a field, use this test.

NOT NUMERIC—Again we must think in opposites. Where a field is designed for number type information only (i.e. quantity, number of days, part number, etc.) the designer should "reject" a "not numeric" entry by the operator.

This is critically important where a number will be part of a calculation. Obviously, if an operator answers a quantity question with "two" instead of "2", the calculation function will not work.

NUMBERIC—Where a designer wishes ONLY TEXT to be entered to a field, the syntax is; reject if:numeric - The CODEWRITER program will not accept keystrokes 0 through 9 under this test.

LENGTH > —The meaning here is "length greater than". The " > " sign the computer symbol for "greater than". Literally, what is to the LEFT or LARGE side of the " > " is greater or larger.

In the case of "length", the "reject if:" meaning is the number of keystrokes (both spaces and characters) allowed for entry. Thus, where NO MORE THAN a 5 digit number is acceptable entry, use "length > 5" meaning "length greater than 5" as the correct test.

LENGTH < —No surprise here. The " < " symbol means "less than". Thus, where a particular part number MUST HAVE at LEAST 6 digits, for example, the test "length < 6" will prevent an operator from entering a number whose length is too short.

LENGTH=—Again, this is fairly clear. The meaning is "length equals". The test will screen out a SINGLE PARTICULAR LENGTH as "reject if: length=3". This test is not used very often, but COMBINED with some other test, may be useful.

LENGTH < > —The " < > " symbol is computerese for "does not equal". Where a designer wishes ONLY A SPECIFIC LENGTH of entry and nothing more OR less, this test is used. An entry of 6 keystrokes and NOTHING ELSE would be tested with, "reject if: length < > 6"

QUANTITY and TEXT

Where the four symbols," > ", " < ", "=", and " < > " are used WITHOUT "length" and WITH numbers, they evaluate the QUANTITY INVOLVED rather than the number of keystrokes.

> —This still means "greater than". Where you wish to prevent an entry of ANY HIGHER QUANTITY than 100, for example, the test is "reject if: >100".

< —As you'd expect, the "less than" symbol works to prevent ANY LOWER QUANTITY than the designer wishes from being entered. To reject any lower entry than 50, for instance, the test is "reject if: < 50".

=—As before "equals" seeks out a SINGLE QUANTITY ONLY to reject. Where, as an example, the ONLY wrong amount is 200, the designer tests for this with "reject if: =200".

< > —The symbol means "does not equal" as before. Used without "length", the test is to SEEK OUT A SINGLE CORRECT QUANTITY. Where the designer wants, say, only part 400 as a field entry, the test is "reject if: < > 400".

Be careful with "does not equal" as a test. Since it accepts ONLY ONE quantity as correct, it cannot be combined with other quantity tests.

LETTER TESTS

When used with quotation marks and letters, the " > ", " < ", "=", and ' <> ' test for POSITION IN THE ALPHABET OR DICTIONARY.

> "   "—In the example > 'p' , the meaning is "greater than p" or "past p" in the alphabet. Using a SINGLE LETTER as we did limits the test to the FIRST LETTER in an entry. Thus the test 'reject if: > "p"' would TRAP OUT all words beginning with r or any other FIRST letter LATER THAN p in the alphabet.

Where MORE than one letter is used, dictionary position determines the "greater than" or "later than" test. The test 'reject if: > 'mac' ' would eliminate ALL WORDS later in the dictionary than a word beginning with 'mac' .

< '   ' —Here the meaning becomes "lower than" a FIRST letter or group of FIRST letters in the alphabet or dictionary. To trap out ALL "d" words or lower in the alphabet, the test is 'reject if: < "e"'. Thus, only "e" words or higher could be entered.

= '   ' —As before "equals" looks for ONE THING only. Where, for some reason, the designer does not wish "frog" as an answer, the correct test would be "reject if: = 'frog' . Several of these tests can be combined on a single field to trap out a LIST of words or letters not wanted.

‹ › '   '—As before, the "does not equal" symbol is used to trap out ONE SINGLE ITEM. Therefore if "tractor" is the only response the designer wishes to allow, it is demanded with "reject if: ‹ › 'tractor'. Also as before the "does not equal" test CANNOT be combined with others on the same field. It is seeking a single acceptable response.

CONTAINS '   '—The "contains" test is used ONLY with words and letters within the CODEWRITER system. If, for instance, a particular letter or group of letters is to be tested for, "contains" will do the job.

Let's assume that a part number entry in some inventory analysis is "B1200" and the designer wishes to allow NOTHING from the "C" series (C1200, etc.) to get into the data by mistake. The correct test for the 'Part Number' field would be 'reject if: contains"c" All numbers and other letters would be ignored, but any entry containing "C" would be refused.

The "contains" test can also trap a CONTINUOUS GROUP of letters ANYWHERE in a word or sentence. Thus the test 'reject if: contains 'me' ' would trap out 'me' as well as 'men' BUT ALSO "some" and "stammer" (because they contain the 2-letter group 'me'). 'Contains' is a powerful test. Be careful.

Keep in mind that with all the letter and word tests, an UPPER CASE letter is not the same as its lower case counterpart. You may have to test for BOTH kinds of entry to really be sure you keep out what you want out.

We hope this appendix makes the "reject if:" idea more clear. Remember, while your program designs will be made more powerful by using these tests, they are optional. Use them as you are comfortable with them.

THE REPORT SYSTEM

The creating of "reports" from data entry programs is the real payoff in program design. This is where machine controlled information is "humanized". What was merely entered as it happened, is now looked over, compared, sorted, and rigorously manipulated until the program designer can answer the most useful questions: What does this mean? Are there patterns to what's happened? Of all the information we've collected, what's significant?

In creating the instructions for The Report system for CODEWRITER, we've changed the rules a bit from the CODEWRITER data entry system. These new instructions will be shorter and will assume the following:

1. That you are familiar with the workings of CODEWRITER-Disk 1. For the most part the answering of screen prompts and the syntax for entering calculations is the same.

2. That you will generally understand the screen prompts and will be able to proceed. We will not include detailed examples with the screen prompt explanations, but will instead use the PROMPT SCREEN NUMBERS (usually in the upper right corner) to refer you ahead in the instructions for more "in depth" treatment—with examples.

Why the change? The CODEWRITER Disk 1 data entry design system includes many functions for creating in fact "on screen" reports. By using the ability to calculate between fields and

display grand totals as you go, CODEWRITER gives the program designer a lot of what's needed for many kinds of reports.
Thus, the Report System is intended to be an invitation to experiment with CODEWRITER to find report formats not possible with CODEWRITER alone.
Don't worry. We wouldn't leave you alone. At the end of the screen prompt explanations, you'll find the DESIGNER'S REFERENCE section of the Report System manual.

DESIGNER'S REFERENCE is for the examples and fuller explanations needed to get the most out of your system. Where a screen explanation is expanded upon in DESIGNER'S REFERENCE, you'll be alerted.

JUST WHAT IS A REPORT?

The answer is not as obvious as you might think. The broader your definition of "report", the better reports you'll design. Here are a few ideas:

1. Reports give the "status" of a file of information. How many items are below a certain number, how many above, etc.
2. Reports seek out a pattern. If the designer imposes certain conditions, how many of the entries in a file will qualify?
3. Reports pull together information to change its purpose. All the headings from an invoice file can be pulled together to form a mailing list.

LET'S BEGIN

Before your first CodeWriter report, you'll need to transfer two programs from your CodeWriter Report System disk (the disk with the data entry program you created).
We'll assume you are starting fresh with your Commodore CBM 64 showing the message below and your disk drive is on.

```
          ****COMMODORE 64 BASIC V2****
64K RAM SYSTEM          38911 BASIC BYTES FREE
READY
```

Do the following EXACTLY:

1. Press the SHIFT and Commodore symbol keys at the same time to switch to UPPER/lower case mode.
2. Place your CodeWriter Disk 2 (label facing up) into the drive.
3. Type— load "sc5",8 and press RETURN.
4. Once loading is complete, remove the CodeWriter disk and insert your application disk in the drive.
5. Type— save"@0:sc5",8 and press RETURN.
6. Once saving is complete, remove your application disk and place your CodeWriter Disk 2 back in the drive.
7. Type— load "sort",8 and press RETURN.
8. Once loading is complete, again switch disks, removing the CodeWrtier Disk 2 and replacing in the drive your application disk.
9. Type— save "@0:sort",8 and press RETURN.

The two needed programs (sc5 and sort) should now be on your application disk. You can verify this by checking the contents of your disk:

1. Type— load "$",8 and press RETURN.

2. After the 'ready' re-appears, type— list and press RETURN.

You should see a list (or directory) of the program files on your disk. The list should contain the "sc5" and "sort" programs as well as a series of programs whose names begin with the screeen file name of your data entry program.

Repeat the process, checking carefully, if all is not as expected. Watch the red 'activity' light on your disk drive. If this light flickers on and off during the load or save process, something may be wrong with either the disk or drive.

To load the Codewriter Report System, place the Codewriter disk (disk facing up) in the drive and type— load "report",8 and press RETURN. RUN

You'll see a brief copyright notice and the a reverse video WARNING SCREEN. The screen asks for confirmation that the two needed programs are in place on your application disk. Since they should be at this point, press the f1 key to continue.

SCREEN
R1

You'll need to SWAP DISKS again at this point. Remove the CodeWriter disk from the drive and replace it with your application disk. This disk contains the '/s' program and the '/pcf' program the Report System needs.

CodeWriter Concept: There are two points we should consider before going further; One is the idea of a "record" as it's used in the Report System. The second is using an 80 column screen on your 40 column Commodore CBM 64.

1. A "report" is simply output from the data file of your choice, It may be a standard sheet of figures arranged in column form under headings you choose. It may also be a form letter using data from the file to fill in "holes" you designed or even a check or mailing label — they're all reports of a sort.

   Thus, when you're asked (later) 'How many records across the page' you'll need, the meaning is; How wide is the screen segment needed to contain the information you want from ONE data entry record. We'll explain more later.

2. Your CodeWriter Report System allows you to create 80 column wide reports to either the screen or to your printer. How is this possible on a 40 column screen? When designing your report, certain sections of the Report System allow you to FLIP back and forth between TWO 40 column "screens". You'll normally see the left "half" of your report design. To see the right "half", press the > key (a shifted dot on your keyboard). To return to the left segment, press the < key (a shifted comma).

SCREEN
R2a

   Enter the name of the screen file EXACTLY as you entered it when designing your data entry system.

SCREEN R4

Enter 'a' or 'e' remembering that your date format must be the SAME as you used in data entry.

SCREEN R5

You may use up to 28 characters for design credit.

SCREEN R6

Your report program title may use up to 30 characters.

SCREEN R7

This is the way the title page for your report will look. If you answer 'n' for no here, the title page will be ERASED and you'll be returned to SCREEN R5.

2 DISK SWAPS HERE

Your computer screen should now instruct you to make the FIRST of two disk swaps. In each case there will be a pause after you press the key in question. Simply follow the instructions on the two SWAP screens, After the second swap, you'll be ready to work n screen R8.

SCREEN R8

The Report System will display all the PROGRAM CALCULATED fields defined in the original data entry program. You'll see the "name" of the field along with its 'pc#' and the calculation used (one 'pc' at a time). For each 'pc' you see displayed, enter the MAXIMUM LENGTH (4 to 9) that the field will need for this report.

SCREEN R9

Here you are to declare NEW program calculated fields for use in this report. The next available 'pc' # will be displayed. You enter the calculations just as in the CODEWRITER data entry program. However, you may not use the same 'pc' # on BOTH sides of the = sign.

(For more on NEW 'pc' fields, see DESIGN NOTES—R9)

SCREEN R9a

Once the "definition" or calculation formula for each 'pc' is entered, you'll be asked if the entry is valid. The report system does some mathematical and syntax error checking of its own, but not enough to eliminate ALL kinds of mistakes. Caution here will pay off!

The 'brief description' asked for here is to update the "list" of fields so you'll be reminded that your NEW 'pc' is available in your report—and for future 'pc' calculations.

The (d)ollar or (n)umber choice is for automatic formating. A 'd' choice makes your NEW 'pc' display with two decimal places to the right. A choice of 'n' is for normal numeric handling of the quantity.

As with the ORIGINAL 'pc' fields, the Report System will next ask about maximum length for these NEW 'pc' fields.

We're getting close to the REAL POWER of the report System! As with any good report mechanism, the CODEWRITER Report System looks at ONE RECORD at a time. Keep in mind, however, three important choices you have:

1. Not ALL records need to be included in a report. Some will be IRRELEVANT to your report goals.

2. Not ALL PARTS (fields) of a record need to be included for evaluation.

3. Only those records, or parts of records, you wish need to be DISPLAYED or PRINTED at all. Your Report System design can LOOK at a record and EVALUATE its content without going to either screen or paper. Sometimes, just a summary is enough.

This Screen asks you to begin to VISUALIZE which parts of the data entry file are important in the report you're designing now. While your ORIGINAL data entry design may have used ALL of an 40 column screen, this report may only concern a FEW of those fields. How large a SEGMENT of the screen or page will you need?

Our ABC Sales Invoice example (from CODEWRITER 1) used most of the screen. But a CUSTOMER LIST could be extracted from those screens by using ONLY the 'name', 'address', and 'city' fields and RE-ARRANGING them to fit 3-across on a screen segment OR directly on to mailing labels.

The question: "How many records do you wish displayed across the page?" asks you to CONSIDER the following:

1. Your screen workspace is 80 columns (with the left/right control) and your printed page space is naturally 80 columns. If the SIGNIFICANT INFORMATION from one record can be re-arranged to fit a space 30 columns wide, you'll get TWO ACROSS on a screen (with space left over). You are, of course, free to use the ENTIRE screen width (simply answer '1').

2. Remember, you'll be allowed to MOVE AROUND the contents of your CODEWRITER data entry screen any way you wish—including adding NEW TEXT and NEW 'pc' fields.

The question: "How many lines long, etc" offers ALMOST the same choices. A full report page is 80 columns wide and 56 lines top to bottom. Since most screens displays only 23 lines at a time, you MAY want to consider that when declaring your record segment size. You may, of course, display as much of an 80 by 56 page as you wish to your screen. Your computer will SCROLL UP at your command, after displaying 23 lines, and show the rest.

You'll always have the choice as to whether your report will be printed to paper or displayed on the screen.

DON'T WORRY! The idea of report design may seem remote at first, but will be much more clear after your first time through. Just press on. Remember, mistakes are the way you know you're learning!

The last question asked on this screen is to verify your previous answers. A 'y' or 'yes' sends you onward in the Report System. An 'n' or 'no' ERASES both your entries and returns to "How many records across . . .", etc. There will be a short delay (5 - 8 seconds) while a new program loads.

SCREEN R11

This is where you design your report. As you see, a screen segment has been drawn by the Report System according to the dimensions you gave in SCREEN R10. The vertical dashes mark the RIGHT HAND boundary of your report segment. The solid line is the top-to-bottom boundary.

At the bottom of the screen is the familiar column and row position indicator from CODEWRITER 1. Here, however, your cursor movements are limited to the boundaries of the screen segment.

The prompt line contains the following options:

(E)nter— Allows a field to be positioned within the screen segment. Press 'e' (without RETURN) and you'll be asked whether your entry is (k)eyboard entered, (p)rogram calculated, or (t)ext. You'll be asked if you want 'numeric formatting' on any 'ke' fields marked with the # sign. Enter number of positions you need to the RIGHT of the decimal point. 'Text' allows any keyboard character to be typed as usual. The 'list' option works as always. Press the f1 key to stop entering. After an (E)ntry, the cursor returns to its LAST position. Move it to the NEXT place you wish to enter.

(D)elete—Reverses the entry process. Any field, ke, pc, or text can be erased by moving the cursor over the FIRST character and pressing 'd'. You'll be asked if you're sure.

(M)ove— Allows any field already entered to be moved with the normal cursor keys. In this mode, the f3 key acts as tab to the far right.

(H)elp— A full review of all screen entry procedures.

e(X)it— Press 'x' to stop the screen segment formatting process.

(For additional information on this procedure. see DESIGNER'S REFERENCE R11)

SCREEN R12

Simply press RETURN after reading the screen.

SCREEN R13

This is a look at the way your report record will appear when repeated across the screen as you designed. You'll be asked if you would like to repeat the format display. This is in case your format was longer than 23 lines and scrolled off the screen. Next Report System asks if you'd like to change anything about the screen you designed. Press 'y' and the original screen segment will re-appear as you left it.

SCREEN R14

Do you want report headings and page numbering? In many kinds of reports you will. But for projects like mailing lists, the report headings and page numbers would simply waste labels.

The rule to keep in mind is: Where you want CONTINUOUS print with NO BREAKS at all, answer that you don't want headings or page numbers. Caution: some printers do not support paging and with these CodeWriter will not give page numbers. The rest of the report page will be as usual. Consult your printer manual.

SCREEN R15

You'll see a sample of the LEFT HALF of your report form (as in Screen R13). To view the RIGHT HALF, press>(shifted dot). There are a total of three lines for headings. The top line or lines are normally used for a report heading, leaving a line for column headings if you wish. To SKIP the second line, enter a space and then press RETURN. Remember you may be working on HALF a page at a time, so you'll need to be careful about centering.

MAYBE AUTOMATIC

SCREEN R16

Here the report system introduces the subject of report sections. A section is simply a part of a report. Each part, or section, may be ENTIRELY SEPARATE from the others in design make-up, logic, etc.

Where you enter a choice of MORE than ONE section, the Report System will automatically repeat the design process the appropriate number of times.

There will be short delay (5 - 8 seconds) while a new program loads.

SCREEN
R16a

This is where program design pays off. The Report System asks the designer to decide which data records to EVALUATE for the report. Some reports MUST look at all records to give the status check the designer wants. In other cases, only CERTAIN records should be included based on the information found in a PARTICULAR field within the record. Still other reports accept records for review only if some COMBINATION of conditions exist in several fields. Again, each section of a report can have entirely separate 'Accept if:' criteria from all the others. Only ONE 'Accept if:' evaluation is allowed per SECTION of your report.

The design syntax for the 'Accept if:' statement is as in following example:

Accept if: ke3 > 15

which means; Accept the record in question for inclusion in the report IF the quantity held in field (k)eyboard (e)ntered 3 (ke3) is greater than 15.

Study the example to be sure you can relate the syntax shown to the definition offered above.

Should We Use All the records?

Where you wish ALL the records to be part of your report, as in a complete summary, simply avoid all evaluations by entering 'all' as in:

Accept if: all

AND OR and NOT

The words 'and;, 'or', and 'not' can help make the 'Accept if:' statement a very sophisticated design tool. Here's an example of the use of 'and':

SINGLE QUOTES

Accept if: ke3="male" and ke4 > 25

Where ke3 is a field asking about sex and ke4 is a field for age to be entered, this 'Accept if:' statement means:

"In this report I am interested ONLY in those records in the file where the sex is male AND the age is over 25."

Again, look at the meaning and try to see how the 'Accept if:' statement means the same thing.

You might be intimidated by the 'Accept if:' idea at first. Don't worry. It's simply a bit new. Use one or two in your early report designs and you'll soon be thinking up more and more uses.

(For more about the 'Accept if:' features of your Report System, DESIGNER'S REFERENCE R16a)

SCREEN R17

You will see the prompt "Do you want an overall summary?" only where you have asked for MORE than one section in your report. The meaning is: "Would you like a summary of ALL your summaries?".

In the next screen, you'll be asked about the kind of summary information your report design will include.

There will be a short delay (5 - 8 seconds) while a new program loads.

SCREEN R18

The Report System summary options are; Total, Average, Minimum (or minima), and Maximum (maxima). You'll be offered the chance to SUM UP any DOLLAR and/or NUMBER fields which get INCLUDED in your report.

The Summary Work Screen will show the fields you have created to date (with the usual 'list' option). Below the field numbers you'll see the 4 kinds of summary options ONE AT A TIME. Simply enter the field number (i.e. ke5, pc3, etc.), and this field will be added to the KIND of summary shown.

For example, where ke6 is the quantity of some part, and you want your summary section to show the TOTAL of all those parts, enter "ke6" when the word 'Total' is displayed for summary. Each field number you designate for 'Total'ing will be displayed across the 'Total' line.

When you're finished with fields to 'Total', press f1 and the Summary Work Screen will continue on to 'Average' in the same way. Again, where you want an average for a field entry, type in the field number and the designated field will be added to the line for inclusion in the summary section.

The 'Minimum' option will display in your summary the SMALLEST of a particular quantity (i.e. What was the least amount of widgets ordered this month?). As you'd expect, 'Maximum' does the same thing; finding the greatest number among those evaluated by your report.

SCREEN R19

Here you get a chance to design your summary section again. When you answer "y" to this option, your OLD summary is ERASED and you RETURN to R18 to try again.

SCREEN R20

The CODEWRITER Report System will assign a 3 digit number of your choice to each report you design. This makes identifying a report easier where several are used or report titles are long.

YOU'RE DONE!

Once you've chosen the report number, you'll make one final DISK SWAP to remove the CodeWriter Report System disk and replace it with your application disk. Your report program will be saved to this disk.

The time needed to create and save your report will be much less than was used to create the data entry system. Report programs will average between 10 and 20 minutes creation time. Again, you'll see the program lines scroll to the screen. The process is automatic, so you may leave the computer, but be sure the computer is not accidentally shut off while you're away.

THE SORT PROGRAM

The CodeWriter "sort" program was placed on the application disk when we first began report design (see pages 45-46). As the name implies, this program sorts the information in a data file so a report can be created most efficiently. For instance, where you want an alphabetic listing of names, the sort program could re-arrange the "name" fields in your data file automatically. Where you wish to print out certain golf scores, for example, from low score to high — sorting first by the "score" field makes it easy.

CAUTION: Whether or not your report requires a sorting operation, you MUST RUN THE SORT PROGRAM each time you run a report. "Sort" updates certain iternal values in your data entry program which keeps things tidy, so please don't forget.
The procedure to run a report is the following:

1. type— load "sort",8 and press RETURN.

2. type— run and press RETURN.

The sort program will ask for the number of report you wish to run and will then run the appropriate report automatically. You'll be asked for the field number by which you want to sort. Of course, you needn't sort at all.

Not everything will be clear the first time you read it. Try a few report ideas just to see what happens. Don't worry about mistakes. The next few pages will explain certain report writing concepts more fully. Enjoy controlling information.

SCREEN R9—The creation of NEW program calculated fields may be a bit unclear. Why are new calculations needed? Let's look at an example; In the ABC Sales data entry program, the calculations used were to make the DATA ENTRY process easier for the operator—calculating price extensions, tax, totals, etc. The calculations were appropriate to the program.

In a report program, the same information should be looked at in a different way. Now that we have the information IN the file, does it have a PATTERN? Does the data suggest a TREND?

We'll use the following data entry field examples to create NEW program calculations for a report;

ke9 = paid with order	pc2 = invoice total	gt1 = total receivables
gt2 = total sales	pc3 = invoice balance	

Where the program designer would like an analysis of how much each customer pays with his order in RELATION to the total order, a NEW 'pc' called pc5 could be created for the report program:

pc5 = (ke9/pc2)*100

When asked for a "brief description" of the new pc (for the 'list'), the program designer could call pc5— "% paid with order". In this case the answer to "maximum length" would be 3 as a percentage wouldn't get above 100 (3 characters).

Since it's wise to be aware of how much customers OWE in relation to how much has been SOLD, a new pc6 for the report could be:

pc6 = (pc3/gt1)*100

and label the result "inv. bal. as % of rec."—meaning 'invoice balance as a percentage of receivables'.

At this point a short but useful report could be written. Print out only:

```
    Customer name ..................  invoice # ....
percent paid with order ...%  Balance as % of receivables ...%
```

Obviously, these examples are quite specific, but you should see that the new calculations possible in the Report System expand your design possibilities a great deal.

SCREEN R11—What is a screen segment? The creation of a screen segment allows the program designer to FOCUS the original data entry screen—so that the report can deal with SPECIFIC parts of collected information.

The most important consideration in using the Report System is that it gives the designer ALL of the INFORMATION of the data entry system, while allowing the FORM of the information to change completely.

Remember, when the Report System 'reads' your data entry program, it will retain ONLY the field names and spaces you designed. It does NOT retain their positions on the data entry screen. There is no need for this. The Report System offers you the chance to pick and choose among the fields needed. Their NEW positions within your report is entirely up to you.

A "record", within the Report System, is ANY field or group of fields from the data entry screen record RE-ARRANGED any way you wish. The screen segment created in work screen R11 is ONE of these new 'sub-records' which you may REPEAT either across an 80 column screen or down a 56 line page.

Let's begin with a fairly direct example; You would like to create a mailing list 'report' from the information in your invoicing program. You wish to 'strip off' from the invoice form ONLY—Customer name, address, city, state (or district), and zip code (or other mail routing #).

You begin the design on work screen R10. The first question is 'How many records across the page?' As we are designing a mailing list, our screen segment (or record segment) is a single MAILING LABEL.

The work screen is 80 characters wide. If the 'name' entry space in your data entry program is 25 characters or less, you could get 3 mailing label 'records' across (with tight margins). In our ABC Sales example, we used 30 characters of space for 'Customer name'. This means that we can format 2 labels. Across the report screen. Thus, we answer '2' to the quesiton 'How many records across the screen?'

The next question on work screen R10 is 'How many lines long (1 to 56)?' A standard design choice here would be "6". Most mailing labels allow one blank line on top, 4 address lines, and one blank line below.

Remember that on the data entry screen the SPACE to enter a customer name was always PRECEEDED by the words 'Customer name'. In the Report System the 'field label' 'Customer name' is NOT connected to the space (the 30 dot line). This is to provide the designer complete freedom to RE-LABEL the fields.

Since we asked for a segment space of 40 spaces (80 divided by our "2" choice) wide and 6 lines down, work screen R11 begins by DRAWING that area on the screen. To begin label design, press 'e' to Enter a field, and 'k' to designate that the field is 'Keyboard entered'. You'll be prompted by Report System to help you stay within the 40 by 6 area. Press 'm' to Move your field around the area with the cursor control keys. Use the normal 'list' option to remind you of the numbers of the fields which contain the data you want on your label.

Only the 'field type and #' are connected to the field space by Report System. Thus, the mailing label record segment would look like this on the report work screen:

```
ke1...........................
ke2...........................
ke3.......... ke4...
```

This will work well as a mailing label. There is no need for anything but the address data itself, so the lack of field labels is a help.

Let's add a little advertising for ABC Sales on each label. Press 'e' to Enter screen information and the 't' to designate the information as 'text'. Move the screen cursor to just below the 'ke3' entry and type; "ABC MEANS QUALITY". The label becomes:

```
ke1...........................
ke2...........................
ke3.......... ke4...
        ABC MEANS QUALITY
```

Though it didn't matter here, when you enter a number field on to R11 work screen, you'll be asked if you want 'numeric formatting'. If you answer "y", you'll be asked 'How many digits to the right of the decimal point?'. This allows you to specify the display format of all numbers in the report. Where you want a number handled as an integer (whole number only), answer '0' for the digits to the right of the decimal point.

JUST THE BEGINNING

The mailing label format is merely a simple way to introduce a few of the possibilities of Report System. You needn't work in "screen segments" at all. By answering "1" in screen R10 (for 1 record across) and 56 for the lines down, you have the space of more than two full Commodore screens to design your report layout.

The more traditional 'columnar' type reports can be built by using data entry fields and new program calculated 'report' fields ACROSS the 80 column page:

```
ke5.......... Ke6...... pc7..... pc8...... ke11........
```

Later, on work screen R15, you can add a report title and column headings:

```
                  The 1982 Grape Harvest

Grove location manager    cost p/vine  vat cost    grape variety
--------------------------------------------------------------
ke5........ Ke6......     pc7.....     pc8......   ke11.......
```

When run, the column format will simply fill-in down the screen until the page size you chose (in lines) is full. Then a new page with the same headings will begin. If your report goes to the computer SCREEN instead of paper, the output display will stop when the 25 line screen is full and continue when RETURN is pressed.

TEXT IS A DESIGN ELEMENT

The text feature we used for the mailing label advertising line can add lots of eye appeal and excitement to a report. Keep in mind that the CODEWRITER Report System lets you MIX text and data freely. Use the freedom. There's no reason a report on operations can't look like a breezy memo:

The Wonder Wheel Company—Year 1982

"Our greatest hopes for Wonder Wheel have come true. While the rest of the wheel industry was down pc5%, Wonder showed an encouraging pc8% increase—with a pc9% boost in market share.

To: ke3...................... in department ke6......

We could not have come this far without your help. Your department's pc3.......$ contribution to sales represents pc12% of the total."

A 'report' can be a form letter, a check, a purchase order or nearly anything which can be put to paper or screen. The report is simply a way of organizing input information to do a job. Use the design screens to create!

SCREEN R16A—CREATING THE 'ACCEPT IF' STATEMENT The best report programs look at the fewest data record screens while doing their work. This makes for fast, efficient reports which are easiest to design and easiest to use.

The CODEWRITER Report system allows the designer to "describe" just the file information needed by using the 'Accept if:' statement. In this reference section, we'll deal with 'Accept if:' as the descriptive language it is. With a very few components, the 'Accept if:' statement can be used to give amazingly complex instructions to your report programs.

Here's a list of the components and how they can help:

The string constant—"string" is computer jargon for a "connected group of letters or characters". The letters or characters may form a word or words, but the real distinction between strings and numbers is that numbers are grouped together to describe a quantity—and strings aren't. The computer can't calculate two strings. In an 'Accept if:' statement, the String Constant is for DESCRIBING SPECIFIC LETTERS OR CHARACTERS to search for. Here's an example:

You wish to get some information on the people in the data file named "Smith". The 'last name' field is 'ke1'. Since you don't want your report program to look at any screen records not associated with "Smith", you write;

Accept if: ke1= "Smith" — SINGLE QUOTES

Only the "Smith" records will be inspected. Putting the word Smith in quotes makes it a string. It's called a String constant because that particular 'Accept if' statement will check ONLY for "Smith". We'll look later at ways to make string checking variable.

The Date Constant—To check for a specific date on the same 'constant' basis as the strings above, simply put the date within '@' signs—as in @12/10/82@. Thus, if your report design was to look only at file information for records dated 6/12/82, and your date field is ke6, it is expressed as:

Accept if: ke6= @6/12/82@

The idea to seek information only AFTER 6/12/82 looks like this:

Accept if: ke6 > @6/12/82@   ('>' means 'greater than')

As with strings, dates need not always be constant in an expression. We'll show how this is done later.

A NUMBER can easily be used as a constant in an 'Accept if:' statement with no special syntax needed. Where a report design is to focus on quantities less than 50, for example, simply write:

Accept if: ke5   50   (ke5 being a 'quantity' here)

As before, a number can be variable as well as constant.

SINCE LIFE IS VARIABLE, SO ARE REPORTS

All the constants we've described can be very useful in report design. Very often, however, the IDEA of a report will remain the same, but the information needed must CHANGE each time the report is run.

For instance, when we wrote the 'Accept if:' line to find all the people named "Smith". in a file, the String Constant was fine. But such a report would seek out ONLY "Smith" ALL THE TIME. It's more helpful if we could write a report program which could isolate one name, as before, but allow the user to CHANGE the name being sought each time the report is run.

For this, the symbol 'va' is used—meaning 'Variable Alphanumeric' or String Variable. Using the 'va' is simple. It's a two-step process; First, assign some MEANING to a 'va' (adding a number to remember which 'va' is which) and, secondly, writing a QUESTION for the user of the report—asking for a response which fits the meaning. Here's how:

Our simple one-name search, using a 'va' would read:

Accept if: ke1=va1

The '1' in va1 simply means it's the FIRST 'va' we've used (any number could have been assigned). When the CODEWRITER Report System reads the 'Accept if:' statement, the 'va' will be detected.

The Report System will 'see' that the designer wants records studied ONLY when the contents of 'ke1' (a name field) are the same as 'va1'. It also detects that there is currently NO MEANING attached to 'va1'. What is 'ke1' supposed to be equal to?

Whenever a VARIABLE (like 'va') is detected in an 'Accept if:', the CODEWRITER Report System will ask the designer to 'write a user prompt'—that is write a question or request asking for the MEANING of the variable to be inserted when the report is run.

The user prompt for our one name search could be:

"For what name should this report search?"

The user would then enter a name (by typing it in), and report would carry out its search duties.

Where the variable is a NUMBER, the procedures are the same except that the designation 'vn' (variable number) is used instead.

Using DATES as report variables is also the same—with one exception. The designation is 'vd' (variable date), but 'vd1' is ALWAYS THE SAME. The CODEWRITER Report System will ask at the beginning of every report "What is today's date?"—that is the date the report is being run. This date is labeled 'vd1' by CODEWRITER and reserved. When designing 'Accept if:' statements involving variable dates, begin with 'vd2' or greater.

Naturally, you may use the 'vd1' in YOUR statements whenever you'd like the date the report is run to be part of a condition—as in:

Accept if: ke4 < vd1

This comes in handy in a bill payment report, for instance. Where 'ke4' is the due date for a bill on file, the 'Accept if:' shown above means: Let' look at ONLY the bills where the due date is EARLIER than (less than) TODAY'S date. (i.e. which bills are overdue?)

AND, OR, & NOT (AS IF WE DIDN'T HAVE ENOUGH POWER)

You have now seen all the components of the 'Accept if:' statement. From now on the increases in capability come from COMBINING, EQUATING, or NEGATING them to form new ideas. The words 'and', 'or' and 'not' are used here as in normal thought. Let's go right to some examples:

Study the following until you see the sentence on the LEFT means the SAME as the 'Accept if:' on the RIGHT.

IDEA	Accept if:
Find all the male participants whose names are after 'S' in the alphabet.	Accept if: ke3="male" and ke5>"S"
Which voters, who approve the new school tax, also voted for me in last election?	Accept if: ke9="yes" and ke11="yes"
Let's find the items which cause the most returns or complaints.	Accept if: pc3>10 or pc7>10
Which locations in New York State have the best ratio of sales to payroll?	Accept if: ke6="NY" and pc5/pc8>.50
Of all our customers from out of this city, who spent over a certain sum?	Accept if: ke5 not "London" and pc3>vn1
Show which shares, traded on the New York Exchange, for Panama-based companies, have price/earnings ratio less than 8.	Accept if: ke3="NYSE" and ke5="Panama" and pc6<8
We need the names of all female coronary patients admitted since Feb. 4, 1981 who have been given at least 5 doses of nitroglycerin.	Accept if: ke2="F" and ke3="CO" and ke7>@02/04/81@ and pc2>4 and ke12="nitroglycerin"

NOTE TO EXPERIENCED PROGRAMMERS: What follows 'Accept if:' on a line is actually an OPEN WINDOW to all legal BASIC statements. The examples used above are to show the uses of 'Accept if:' within the syntax covered in this manual. It is certainly not our purpose here to include a primer on BASIC. By all means, use the 'Accept if:' to its fullest extent by including any BASIC statement that will fit on a single line. Work carefully, however, CODEWRITER can trap some but not all syntax errors.

We have tried to include featues in the Report System which will allow the greatest power and freedom to the designer and still provide true alternative to programming in computer code. With our best wishes, go forth and control information!

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