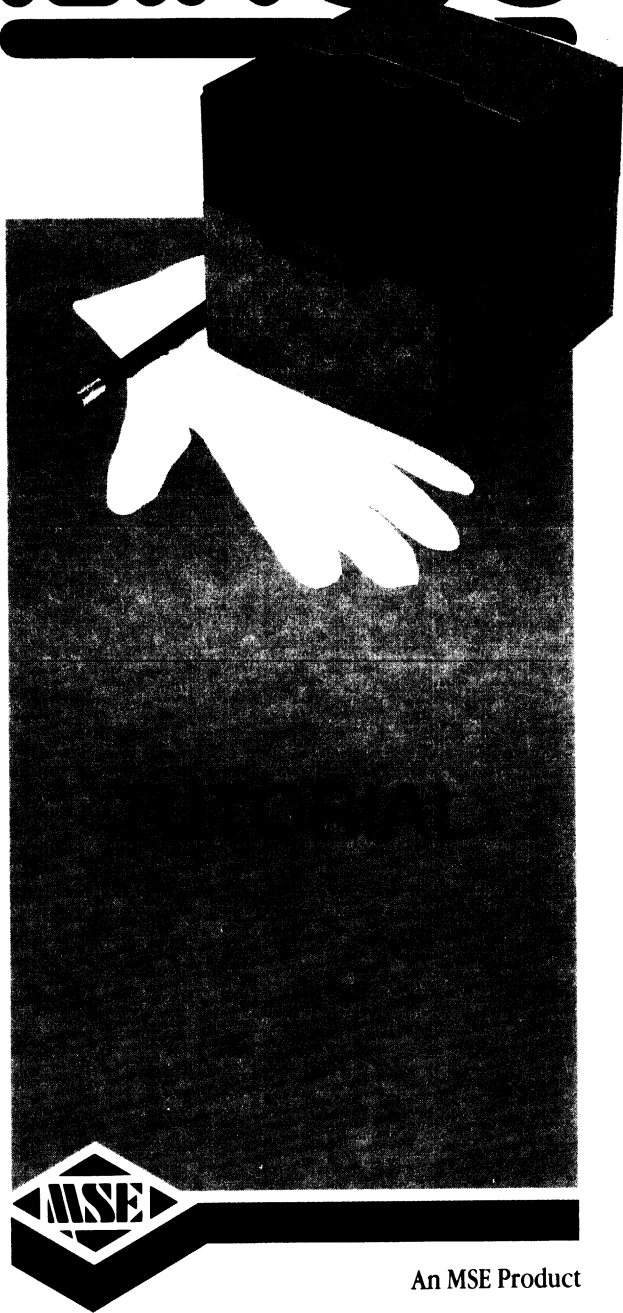
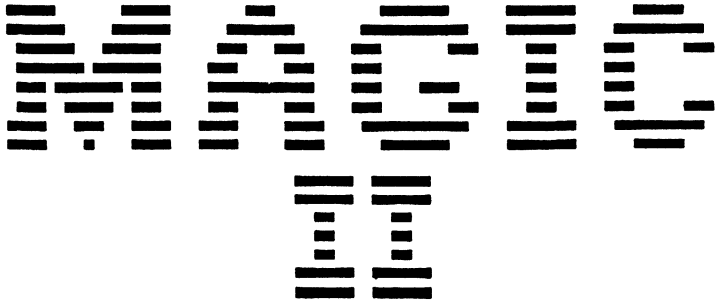


MAGIC



An MSE Product



An Application Development Tool

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Tutorial

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Part I: Tutorial

Chapter 1: Using a MAGIC Application

Chapter 2: Designing a MAGIC Application

Preface

We hope that the second edition of the MAGIC documentation will help you understand the MAGIC “way of thinking” and that with your suggestions the next edition will be even better. We would appreciate hearing any comments you may have or corrections and omissions you may find. Thank you for your cooperation. We have no doubt it will be worth your while!

Acknowledgment

Credit is due to Yoni Haskes and Yohai Shaked who developed this product and turned the “Wish List” into reality and to Beth Pfeffer and Einat Glasz who had the patience and insight to make it publishable.

David Assia

M.S.E. Ltd.
April 1987

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Introduction

MAGIC is an Application Development Tool. It will help you implement complex Database-oriented applications on your IBM PC and compatibles faster and more reliably than you ever thought possible.

And the emphasis here is on the word “complex”. While most Database Management Systems (DBMS) for microcomputers are targeted for personal use by the non-professional user, MAGIC was designed to provide the professional user a powerful tool for implementing commercial systems.

Optimum utilization of MAGIC will undoubtedly be by the community of computer professionals: system analysts, system designers and programmers, who have long sought a tool of this kind. If you belong to this group, you can now look forward to maximum power and sophistication from MAGIC’s tool box. MAGIC allows you, at long last, to enjoy a professional approach that gives you the flexibility, speed and versatility that has been so lacking until now.

Chapter 3, the first chapter of the Reference Manual, is dedicated to describing the major concepts and features of MAGIC. To familiarize yourself with the basic scope of MAGIC, it is suggested that you read this Chapter.

How to Use this Manual

The Manual contains two parts: A Tutorial and a Reference Manual. Since MAGIC introduces a new approach to developing applications, the best way to learn it is by example. This is why we urge you to go through the Tutorial step-by-step and learn how to “think MAGIC”. The Tutorial itself has two chapters. In the first, we take you through the Order Entry Demo System as an End User, showing all the features MAGIC has to offer. Then, in the second chapter, we build the same application with you while we teach the different MAGIC features, rules and techniques.

Once you are familiar with MAGIC, you can use the Reference Manual which is organized by subjects. First, we introduce some major MAGIC concepts and a general overview (Chapter 3), then all the elements of MAGIC, in the order they are used (Chapter 5).

In Chapter 8, we discuss the Multi-User Environment. MAGIC can run under a Local Area Network and support not only File Locking but Record Locking as well.

Chapter 9 discusses the Utilities available to control Data files and the Application Control File.

Getting Started in MAGIC

In this introductory section of the manual, we describe the few steps that you must follow to install the MAGIC Application Development Tool on your computer.

It is suggested that you familiarize yourself with your computer and the software supplied with it, including basic MS-DOS commands. In any event, the explanations that follow are self-contained. All you need to know before you start is how to turn on the computer and how to format and copy diskettes. Refer to your computer's Guide to Operations for an explanation of these topics.

1. Contents of the Package

When you open this package, you will find diskettes containing the following files:

- MGMAIN.EXE the Main MAGIC Program
- MGCONST.DAT constants for your specific installation (Owners Name, Language, etc.)
- BTRIEVE.EXE the File Manager
- MAGIC.BAT a Batch program to start MAGIC.

Getting Started in MAGIC

- DMCTL.DAT the Demo System Program Control File.
- DMFIL001-005.DAT the Demo System Data Files.
- USER.BAT a Batch File to simulate User Exit programs.
- BUTILEXE the BTREIVE Utility program.

In addition, you have been supplied with a Protection Module, which must be inserted into the Parallel port of the computer for MAGIC to run. The Demo System does not require this.

2. System Configuration

MAGIC runs on the IBM-PC and full compatibles with at least 512K RAM and 720K On-line disk storage, under PC-DOS 2.0 and up.

The CONFIG.SYS file in the root directory must include the following lines:

```
BUFFERS=20
FILES=40
```

3. Setting up a Working System

- A. Make Backup copies of both MAGIC diskettes and store the originals in a safe place. *DO NOT WORK ON THE ORIGINAL DISKETTES AT ANY TIME.*

- B. Turn on the computer and make sure that you are on drive C: in the Root Directory, by typing:

```
C: <Enter>  
CD\ <Enter>
```

- C. Create a Sub-Directory for MAGIC by typing

```
MD\MAGIC (Make Directory)
```

Enter the Sub-Directory by typing

```
CD\MAGIC (Change Directory)
```

- D. Now copy both diskettes into the sub-directory you have just created by typing the DOS command

```
COPY A:*.* C:
```

for each diskette.

- E. Insert the Protection Module supplied with your program into the Parallel port of your computer. The printer cable is then inserted into this module.

3. MAGIC Demo System

The MAGIC Demo System is set up exactly as above, without the Protection Module. This version of MAGIC has the following limitations:

Maximum # of Records:	100 (for each file)
Maximum # of Files:	5
Maximum # of Programs:	20
Maximum # of Systems:	2

Getting Started in MAGIC

4. Setting Up a Run-Time Only System

A Run-Time Only MAGIC application is set up as above, replacing the development versions of the MGMAIN.EXE file with the Run-Time version.



When running MAGIC for the first time, it is necessary to enter the Options menu (F1) of the Main MAGIC Screen and load the Help file. This need not be done again unless the MGHELP.DAT file is modified or the MGCONST.DAT file is replaced.

Chapter 1

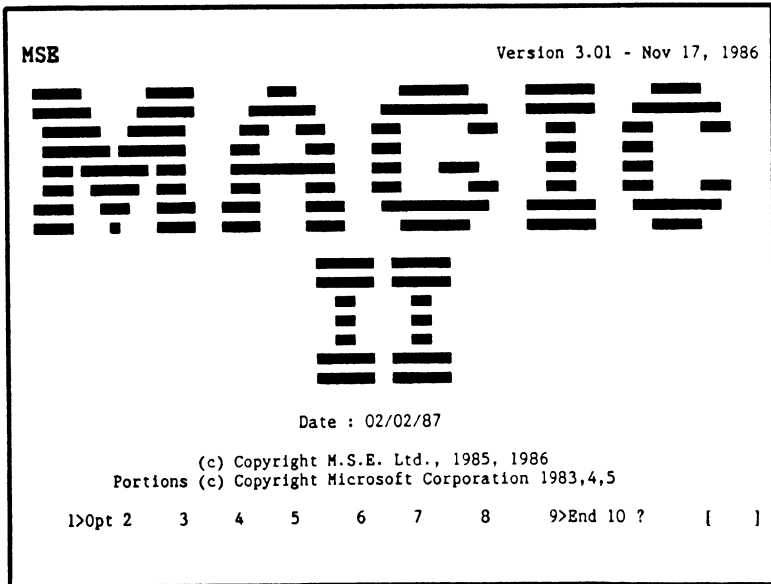
Using a MAGIC Application

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In this chapter, you will learn how to use a sample MAGIC Application – The Order Entry Demo System, which has been supplied with your MAGIC diskettes. Before you start this tutorial, make sure that you have backed up both the diskettes and installed MAGIC on your computer as described in “Getting Started”.

Lesson 1: First Steps

Start MAGIC by typing: MAGIC <Enter> at the DOS prompt level. You will see this screen, which is the Main MAGIC screen:

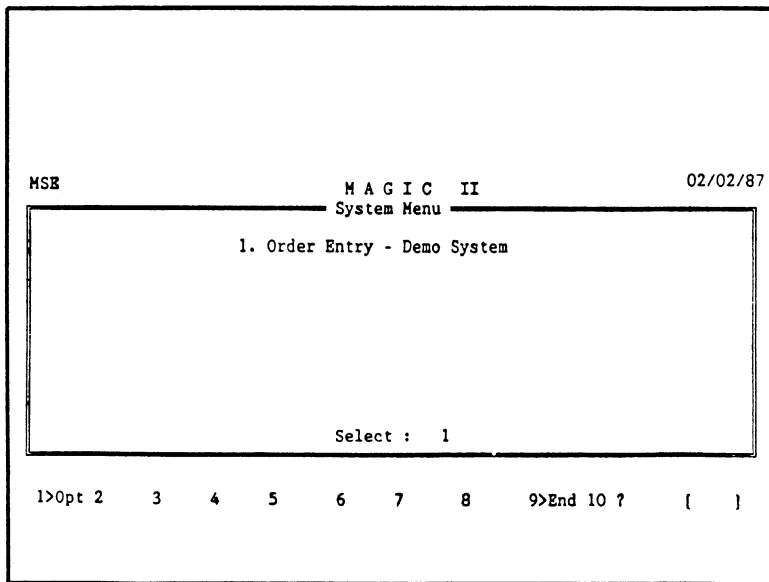


At the bottom of the screen, you see a Function Key Line. At this stage, only the Option (F1), End (F9) and Help (?) functions are active. You would use F9 to leave MAGIC.

Chapter 1: Using a MAGIC Application

The date appearing on your screen is automatically the DOS system date. If no system date is given, MAGIC will supply the date entered at the last session. You can, of course, input another date. Use the Backspace key to correct this field. Hit <Enter> to start the session.

The first MAGIC menu is the System Menu screen. Under MAGIC, you can have several systems running at the same installation. Each system is self-sufficient and can be run on different sub-directories or drives. In this example, there is only one choice on the Menu. When you design your own system (Chapter 2), you will define a second entry in the System Menu.



The first (and only) selection in the Menu is highlighted, and hitting the <Enter> key will accept that selection. The second screen in MAGIC is the Sub-System Menu.


```
MSE                               M A G I C   I I                               02/02/87
----- System Menu -----
Order Entry - Demo System
----- Sub-System Menu -----
                               1. Master File Update
                               2. Order Entry Management
                               3. Reports and Analyses
                               4. External Programs

                               Select : 1

1>Opt 2   3   4   5   6   7   8   9>End 10 ?   [   ]
```

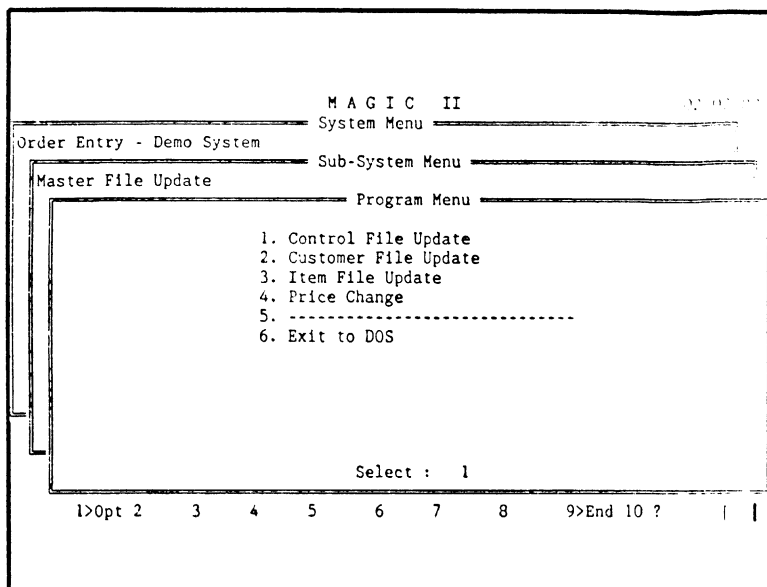
All the options provided in the application are presented in a logical form for the user in this Menu. Every one of these sub-systems has a set of programs associated with it.

Now, hit <Enter> to go into the first option (Master File Update) and we will explain the general rules for working within Menu screens.

Working Within a Menu

You should now see the Program Menu screen, which lists all the programs that update the system's Master Files as suggested by the sub-system name. Note that the hierarchy of your menu choices is highlighted by the "stepped" presentation of the menu windows.

Chapter 1: Using a MAGIC Application



As in all the previous menu screens, you are presented with a list of options from which to choose. In the previous two cases, you chose the first option by simply hitting <Enter>. There are actually two methods of working within this type of menu:

1. Use the directional keys (Up, Down, Right, Left, Home and End) to highlight your selection, then hit <Enter>. Use Home to highlight the first option, and End to highlight the last.
 2. Type the number of your selection, then hit <Enter>
- If you want to leave a menu, you would use F9 (End).

Working within a Program

Choose option 2 from the Program Menu, Customer File Update. This is the Display screen of the program.

MSE		MAGIC II			
		Customer File Update			
No.	Customer Name	Address	Discount	Terms	
1008	Green, Mitch	1000 N.E. Sunset Dr. Boston, USA	9.00	Net 30	
1234	Doe, John	123 Main Street, England	10.00	C.O.D.	
5678	Smith, Sue	456 Main Street Geneva, Switzerland	14.00	Net 45	
9012	Green, Jack	789 Birch Road, Framingham, USA	7.00	C.O.D.	

Modify 1>Opt 2>Can 3>Del 4 5 6 7 8 9>End 10 ?

Each double line on this screen is a record, comprised of fields which stretch across the screen.

Using Directional Keys

Within a program, the directional keys work as follows:

Down Arrow Moves the cursor down one record, highlighting the next current record.

Up Arrow Moves the cursor up one record, highlighting the new current record.

Chapter 1: Using a MAGIC Application

Right Arrow	Moves the cursor to the next field to the right within the current record.
Left Arrow	Moves the cursor to the next field to the left within the current record.
Home	Brings the cursor to the first record on the screen.
Home twice	Brings the cursor to the first record in the file.
End	Highlights the last record on the screen.
End twice	Highlights the last record in the file.
Ctrl/→	Moves the cursor to the last field of the Right Arrow current record.
Ctrl/←	Moves the cursor to the first field of the Left Arrow current record.

Using the above keys, you can bring your cursor to any field of any record in the file.

Updating Data in a Record

To update data in an existing record, use the directional keys to bring the cursor to that record, making it the current record. Then move to the field you want to change and type in the correction.

Hitting Ctrl-Home *before* leaving the field will *undo* all changes to the field.

Hitting <Enter> or Right Arrow will accept the field and move to the next one, while hitting Left Arrow will accept the field and move to the previous one.

Note that the record itself has not yet been updated. To do this, you have to leave the record by hitting Up or Down Arrow. For convenience, if you hit Up or Down Arrow right after a field was changed, both the field and the record will be updated and you will move to the next record.

Let's try an example of this: Suppose we want to change the name of customer no. 5678, from "Smith, Sue" to "Jones, Joan" .

Bring your cursor to the record of customer no. 5678, by hitting Down Arrow a few times until you reach it. Now move the cursor right until the cursor stands on the Name field. Enter the name "Jones, Joan" and hit Down Arrow to accept the record.

Using the Mini-Editor on a Field

To change existing data without retyping, MAGIC provides the user with a Mini-Editor which can be used to edit the contents of a field, similarly to a word-processor.

To activate the Editor function, hit the Esc key. The message "Edit" appears in the lower right corner of the screen.

The following keys are active within the Mini-Editor:

Right and Left

- | | |
|-----------|---|
| Arrow | Moves the cursor one character to the right or left within the field. |
| Backspace | Erases the character to the left of the cursor position |
| Del | Erases the character to the right of the cursor position. |

Chapter 1: Using a MAGIC Application

Insert	Activates insert mode, enabling the insertion of additional characters at the cursor position. (The letter I appears on your screen).
Up and Down Arrow	Concludes editing session and continues to next record.
<Enter>	Concludes editing session, bringing the cursor to the next field of the same record.
Ctrl-Home	Cancels all the changes you have made on the field, leaving the data as it was before the editing session.
Ctrl-End	Brings the cursor to the End of a field.

The above Mini-Editor functions are available on any field at any time.

For example, take your cursor to the address field of Customer No. 1234. We forgot to enter the name of the city in the address. However, we surely don't want to re-type the entire address.

Hit Esc to turn on the Mini-Editor. Move the cursor through the field with the Right Arrow key, until you reach the beginning of the second line of the address. Now, hit Ins (Insert) since we want to add the City name without losing the data already in the field.

Type "Mayville," and you should see the full corrected address.

Hit Esc to cancel the Mini-Editor, then Down Arrow to accept the record.

Calculating on a Field

An additional user option is the ability to make calculations on a numeric field. Bring the cursor to the relevant field. Enter a number followed immediately by an arithmetic function (+, -, *, /) and hit <Enter>. The number you have entered will be added to, subtracted from, multiplied by or divided into the original numeric entry in that field, and the cursor will remain on the same field. (For example, if the original value in the field is 4, then entering 2+ <Enter> yields 6, 2- <Enter> yields 2, 2* <Enter> yields 8, and 2/ yields 2.

Now, try to change the Discount field using this option. Suppose we want to add 2 to the existing Discount rate. Bring the cursor to the Discount field of Customer 9012. Type 2+ <Enter>. The arithmetic is done for you.

Deleting a Record

To delete a record from the database, highlight the relevant record, and hit F3 (Delete). MAGIC will always request confirmation ("Confirm Deletion (Y/N)?") before any records are actually deleted.

Now try deleting a record from our Customer List.

Controlling the Operating Mode

Since entering the Customer File Update Program, you have been in Modify Mode. You have been able to change and delete existing records. In order to create new records, you must switch to Create Mode. This is the first use of the User Option Menu which is activated by hitting the F1 (Option) key. Hit F1.

Chapter 1: Using a MAGIC Application

```

HSE                               M A G I C   I I                               02/02/87
                                Customer File Update
-----
No. Customer Name                Address                Discount  Terms
-----
1008 Green, Mitch                1000 N.E. Sunset Dr.  9.00 Net 30
                                   Boston, USA
1234 Doe, John                   123 Main Street,
                                   England
5678 Smith, Sue                  456 Main Street
                                   Geneva, Switzerland
9012 Green, Jack                 789 Birch Road,
                                   Framingham, USA
-----
Options
-----
Mode:  > 1> Modify
        > 2> Create
        > 3> Query
-----
Operation: > 4> Locate
           > 5> Range
           > 6> Key
           > 7> Sort
-----
Select : 1

```

Within this Menu, you have the following methods of making your selection:

1. Use the directional keys to highlight your selection, then <Enter> to accept it.
2. Type in the number of the option you wish to select, then <Enter>.
3. Hit the Function key with the same respective number as the option you want to select.



Once you are familiar with the option you can hit F1 and the respective F key consecutively to get quickly to the requested option. (The "Options" window will not open.)

Changing to Create Mode

The first three options on the Menu are Modes of Operation. To enter Create Mode, hit F2. The word "Create" has appeared in the lower left corner of your screen, and you are presented with an empty screen in which to enter your new data.

In Create Mode you have the following functions at your disposal:

1. Use the Right Arrow key to move from field to field within a record.
2. Use the Backspace key and the Mini-Editor to make corrections.
3. Use the Down Arrow key to continue to the next record, accepting the data you have entered on the previous one.
4. Use the F4 (Ditto) key to copy the data from the previous record to the current one. (Do not duplicate data in a Unique Key field or you will get an error message: "Duplicate Key".)
5. Use F2 to cancel.

Now try this example:

Hit F1F2 to enter Create Mode.

Chapter 1: Using a MAGIC Application

Enter this data:

Customer No.	Name	Address	Discount	Terms
2543	Mann, Mark	145 East 78th St., New York, N.Y.	6	COD
2544	Manning, Morris	15 Tree Blvd, Some Town, USA	7	COD
2545	Manning, Joanna	*	*	*

Remember to hit the Down arrow after each entry, and use the F4 (Ditto) key to copy data from the previous record.

In the address field, we have allowed you 40 characters to use as you wish. If you want to use the format we have used, with the city and country on the second line, just type spaces until your cursor reaches the second line.



Note that you can use the Up Arrow to return and modify any records which have been entered in this "Create" session. After you leave this Mode, you will be able to make changes in Modify mode only.

Changing to Query Mode

The third User Mode of Operation is the Query mode. In Query mode, you can only view existing records, and cannot change, delete or create new ones. Often the designer will limit the user to working in Query Mode when he wants to be sure that the data will not be changed.

To leave Create Mode and enter Query Mode, hit F1 and F3 in quick succession. Notice that the User Option Menu did not appear. If you know the options, you can save time by working without displaying the Menu.

In Query Mode, all the directional keys, including Home and End, are active, allowing you to scan the records in your Database, without making any changes in the data.

The rest of the Options Menu entries (the "Operations") will be discussed in the next lesson.

Leaving the System

At all levels of MAGIC, the F9 (End) key will take you out of the current Program or Menu to the previous level. To leave the Customer File Update Program and return to the Program Menu, hit F9.

Note that the last Program selection is still highlighted on your Menu screen.

To go back to DOS at this point, hit F9 three times. This will give you the DOS System prompt and you have totally left MAGIC.

Chapter 1: Using a MAGIC Application

If you have changed the data in the Customer File, you should now restore your data files to their original form by inserting diskette #2 and typing:

```
COPY A:DMFIL*.DAT C: <Enter>
```



In the next lesson, we will show how to restore Data files from within MAGIC.

Lesson 2: User Options

In this lesson, we will discuss the following options in a MAGIC program:

Zooming to a Window

Locating Specific Records

Changing the Range of Records

Changing the Key

Sorting by Different Fields

Re-enter MAGIC by typing MAGIC <Enter> from the DOS prompt level.

Go into the Order Entry System Menu and choose the Master File Update option from the Sub-System menu. Select Item File Update from the Program Menu.

Chapter 1: Using a MAGIC Application

This is the screen used for updating the Item File:

```
MSE                                M A G I C   II                      02/02-8
                                Item File Update
```

No.	Description	Type	Price	In Stock	Customer Orders	Vendor Orders
1002	Large Poodle	D	500.00	80	0	10
1003	Fox Terrier	D	212.00	120	11	0
1004	Labrador Retriever	D	150.00	40	1	0
1005	White Whale	F	1,200.00	50	1	10
1006	Chihuahua	D	8.00	20	3	10
1007	Guppy	F	0.50	160	12	0
1008	Killer Shark	F	45.00	30	0	40
1009	Boa Constrictor	S	500.00	80	1	80
1010	Hamster	R	7.00	140	13	0
1011	Guinea Pig	R	30.00	30	0	50
1013	Rattlesnake	S	18.00	40	0	0
1103	Garden Snake	S	12.50	12	0	10
1105	White Mice	R	10.50	26	26	25
1106	Great Dane	D	789.00	2	3	1

```
Modify 1>Opt 2>Can 3>Del 4      5>Zoom 6      7      8      9>End 10 ? [
```

On this screen, you see the Item No., which is the Key, the Item Description, the Type of Item, the Price and quantities in stock, on order by our customers, and on order from our own vendors. Note that all fields are open for input. As we will see soon, it is possible to “block” input to fields.

Zooming to a Window

Notice that when the cursor is on the Item No. column, the Zoom key (F5) is highlighted in the function line. Bring the cursor to Item 1003 on the second line and hit F5 (Zoom). An additional window will pop-up on your screen.

Chapter 1: Using a MAGIC Application

MSE		M A G I C II				02 1 1987	
Item File Update							
No.	Description	Type	Price	In Stock	Customer Orders	Vendor Orders	
1002	Large Poodle	D	500.00	80	0	10	
1003	Fox Terrier	D	212.00	120	11	0	
1004	Labrador Retriever	D	150.00	40	1	0	
1005	White Whale	F	1,200.00	50	1	0	
1006	Chihuahua	D	8.00	20	3	10	
1007	Guppy	F	0.50	160	12	0	
1008	Killer Shark	F	45				
1009	Boa Constrictor	S	500				
1010	Hamster	R	7				
1011	Guinea Pig	R	30				
1013	Rattlesnake	S	18				
1103	Garden Snake	S	12				
1105	White Mice	R	10				
1106	Great Dane	D	789				

Stock Status	
Item: 1003 Fox Terrier	
In Stock:	120
Customer Orders:	14
Available:	106
Vendor Orders:	0
To promise:	106

Modify 1>Opt 2>Can 3>Del 4 5 6 7 8 9>End 10 ?

In this window, you see the details of the stock status of the current record, with additional information, such as the total available and the total available to promise, taking into account the customer and vendor orders.

By using a window in this situation, you see only the most important data on your screen at all times. To get more details for a particular item, you Zoom to a window. Here is an example where you cannot make any changes to the fields from within a window. In this particular case, the window is for informational purposes only and the option to make changes has been blocked by the designer. Later, we will show you how a window can be used to update other files from within a program.

To exit from a window, hit F9 (End). You should be back in the Item No. column of the Item Update screen.

Utilizing the User Operations

Hit the F1 (Options) key. The top portion of this Option Menu was discussed in the previous chapter. We will introduce the operation capabilities now:

- F4 > Locate: Enables you to Locate and display on the screen the first record in the current range that fits certain selection criteria. This could be as simple as to Locate Item number 1007 or as complex as the ability to give an expression that will be evaluated to find a specific record.
- F5 > Range: Enables you to limit the range of records that participate in the program. If, at a given time you would like to see only the Dogs (Item Type = 'D') on the screen in front of you, the Range option will help you do this.



Range will "block" a group of records and will not allow scanning past it. Locate, on the other hand, will position the cursor on the first record that meets the criteria within the current Range, but you can then move your cursor to anywhere you want within the Range.

- F6 > Key: Enables you to change the current Key. The records will be displayed in the new Key order instantaneously.
- F7 > Sort: Enables you to display the records in any order you wish with the help of a sort procedure.

Locate

Now enter the Locate Option by hitting F4:

```

MSE                               M A G I C   I I                               02/02/87
                                Item File Update
+-----+-----+-----+-----+-----+-----+-----+
| No.   | Description | Type | Price | In Stock | Customer | Vendor |
|       |             |     |      |          | Orders  | Orders |
+-----+-----+-----+-----+-----+-----+-----+
|       |             |     |      |          |          |          |
+-----+-----+-----+-----+-----+-----+-----+
Locate 1>Opt 2>Can 3>Del 4>Nul 5      6>Expr7>From 8>To  9>End 10 ?  [  ]
    
```

This is a “masked” screen, allowing you to enter the Locating criteria. Type 1007 in the No. column, and hit F9. The requested record is shown as the first record on the screen. Move the cursor up to see the rest of the records. (Hit Home to go to the top of the file).

Now hit (F1, F4) to enter the Locate screen quickly. The No. 1007 still shows on the screen. This is a global rule – all operations stay in effect until you change them. Now type 1012 and hit F9. The message “Record not found – positioned at next” is displayed and, indeed, the first record shown is 1013.

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Hit (F1, F4) and Item 1012 still shows. Note that at the bottom the F7 (From) is highlighted. Hit F8 (To). In the No. column, enter 1015 over the previous entry. Now hit F7 again. 1012 shows on top. Hit F7 and F8 in succession to see that the From screen shows 1012 and the To screen shows 1015. Now hit F9. The record 1013 shows again, but this time without the error message. This is because this time we asked to locate the first record From: 1012 To: 1015. Record 1013 is that record.

As we saw in this example, when we enter a 'From' value, MAGIC copies it automatically to the 'To' field and if we leave (F9) without changing the 'To', we will be locating From 1012 To 1012, or, in other words, locating 1012.

Hit (F1, F4) again. Hit F3 to Delete the current From: To: line. (F4 (Nullify) will nullify only the field you are on.) The masked line should be clear at this stage. Hit F6 (Expression). This is the Expression Table. At this point, you can write any logical expression using the fields' assign letters shown on the left side of the screen. For example, type F>20 AND G>30 <Enter>:

```

MSE                                M A G I C   I I           02/02/83
                                Item File Update
                                Customer Vendor
N----- Expressions -----S
█ Item Price > 20 AND In Stock > 30 █

Field ----- File ----- Expression -----
A Item No. (parm) Virtual P>20 AND G>30
B Item Type (parm) Virtual
C Item No. Items
D Item Description Items
E Item Type Items
F Item Price Items
G In Stock Items
H Customer Orders Items
I Vendor Orders Items

Locate 1 2>Can 3>Del 4 5>Zoom 6 7 8 9>End 10 ? | |
    
```

The translation appears on the top of the screen: Locate the first record whose price is greater than 20 and which has more than 30 Items In Stock. Hit F9. You can now add more 'From: To:' criteria in this screen. It will be added to the expression as another 'AND'. For this example, just hit F9 again. The first record which meets the criteria is displayed on top.

To summarize:

1. The quickest way to Locate a record is to go to the Locate screen (F1 F4), type the needed number and hit F9.
2. A simple range for locating a record can be given with the 'From: To:' (F7 F8).



*In an Alpha field, you can use a “wild card” search with the * character. e.g. 'AB*' will find all values that start with 'AB'*

3. If a complex formula is needed, the F6 (Expression) feature should be used to enter any possible logical expression.

The Locate criteria are active until you change them or you leave the program. To make sure all the Locate criteria are cleared, leave the program (F9) and enter it again from the menu.

Range

Hit F1 and F5 (Range). The masked screen appears again. Enter 1007 in the No. column, and hit F8 (To:). Enter 1015 in the same column. Leave with F9. A group of records is shown on the screen starting with 1007. Try to hit Up Arrow. The previous records can not be accessed. The same holds true for the bottom level. Until the Range is changed, or we leave the program, this is the current Range of records. All the techniques in the section above on the Locate option, are also applicable here. You can Range using 'From: To:' or by an expression.

Key

Hit F1 and choose F6 (Key):

MSE		MAGIC II				02/02/83	
		Item File Update					
No.	Description	Type	Price	In	Key Name		
					1	By Number	
						Item No.	
					2	By Description	
						Item Description	
					3	By Type	
						Item Type	

Key 1>Opt 2>Can 3 4 5 6 7 8 9>End 10 ? []

The Item File has three Keys: 'By Number', 'By Description', 'By Type'. The highlighted one is 'By Number'. Hit the Down Arrow to highlight 'By Description' and leave (F9). Hit Home and see the Item List sorted alphabetically by Description.



The Record 1002 was the record we were on before the Key operation was executed. Therefore, the system came back to it, helping you keep track of where you were.

Enter the Key screen again (F1F6) and choose the third Key: 'By Type'. Leave with F9. Hit Home and see the items listed by Type.

Now go to the Range screen (F1F5). The cursor parks on the Type field, not the No. field as before, because this is the current Key. Type D and F9. Only the Dogs show on

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the list now.



A Locate or Range Operation on a Key is an immediate operation. However, when the same operations are performed on a non-key field, the file is scanned sequentially. This can be a long process if the files are large. Therefore, it is recommended that you change the Key before Locating or Ranging.

Enter the Range screen and Delete (F3) the Range criteria. Leave and make sure you see the entire Item List.

Sort

Hit F1 and F7 (Sort):

MSE
MAGIC II
Item File Update
12/02 87

Customer Vendor
Sort

(A) Ascending
(D) Descending

Select Sorting Field :

	Field	File	Field	Size
A	Item No. (parm)	Virtual		
B	Item Type (parm)	Virtual		
C	Item No.	Items		
D	Item Description	Items		
E	Item Type	Items		
F	Item Price	Items		
G	In Stock	Items		
H	Customer Orders	Items		
I	Vendor Orders	Items		

Sort 1>Opt 2>Can 3 4>Cre 5 6 7 8 9>End 10 ?

Create a line (F4). Zoom (F5) and move the cursor down 6 times to the Item Price (F). Hit F9 and the Item Price field is copied to the Sort Table on the left. Hit <Enter> and type D for Descending. If we leave now (F9), the Item List will be sorted by Item Price in Descending order.

Let's add another Sort level. (Up to 10 are allowed). Reenter the Sort Table by hitting F1F7. Go to the end of the table (End) and create a new entry (F4). This time just type E (for Item Type) <Enter>. You could shorten the size, in the Size column, if this were a longer field. Since we want the inner sort in Ascending order, we can skip the last column and hit the F9 to execute the Sort.

The list is sorted by Descending Price and the two \$500 items are sorted 'D' first and 'S' second.



If you hit the Cancel (F2) while the sorting process is taking place, the process will stop and as many records as have been sorted will be displayed.

You are now in a sorted environment, which behaves just as if we had added a temporary new key to this file. As always, this holds true until the Sort is changed or we leave the program.

At this point, we strongly recommend that you practice these operations some more. Once you are familiar with them, they provide for a very powerful tool to manipulate the Data View at Run-Time.

Restoring Original Data Files

If you have changed the Demo Data during this lesson in any way, please restore the original tutorial data files from your copy of Diskette #2. You can leave MAGIC and

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use the COPY A:DMFIL*. * command as we did in the previous lesson.

A much quicker and more convenient way is to use the Backup/Restore program we have included in the system. Go to the External Program selection in the Sub-System Menu. The first program is Backup/Restore. Run the program and you will see the instructions on the screen.

```
MSE                                     M A G I C   I I
                                     Backup / Restore

Enter 'Y' to Backup or Restore:
-----
Backup | Restore
-----
      N |

IMPORTANT NOTE:

Backup will copy to Diskette (A:) all
----- data files (DMFIL*.DAT)

Restore will copy from the Diskette all
----- data files, replacing existing
      files !!!
```

It is important to emphasize again that Backup will write *to* the Diskette, while restore will read *from* the diskette and will overwrite existing files. Please use the latter and restore your Demo files.

Lesson 3: On-Line Features

In this lesson, we will show you the Order Entry Programs to demonstrate the following:

Selecting from a "Zoom Window"

The Concept of One-to-Many – The Order Entry Form

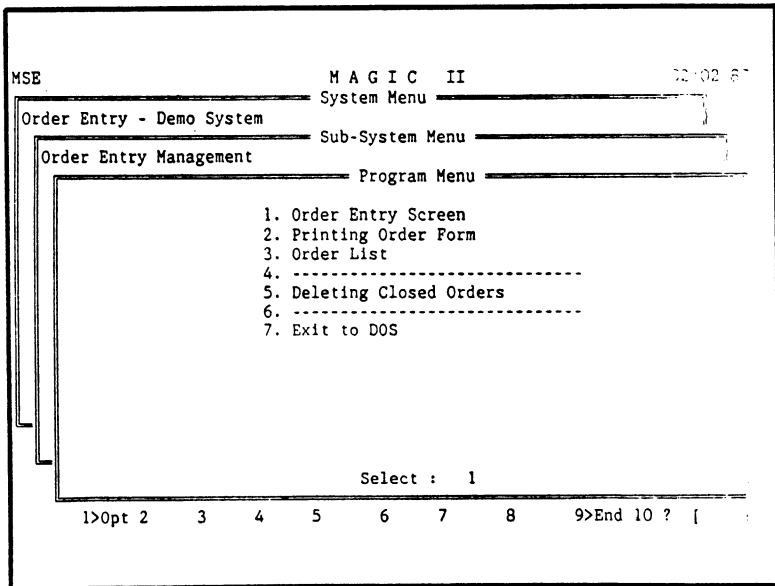
Changing an Existing Order

Canceling Lines and Orders

User Options

User Exit to DOS

If you have left MAGIC, re-enter by typing MAGIC <Enter>, and choose Order Entry Management from the Sub-System Menu.



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Go into the Order Entry Program. This is the Order Entry screen:

```
MSE                                M A G I C   I I                    02/02/87
                                Order Entry
-----
Order No: 120                    Customer No:
Order Date: 02/02/87

Line  Item  Type  Description          Quantity  Unit Price  Total Price
-----
                                         Order Sum:
Terms:                               % Discount :
                                         Sub-Total:
5.00% Sales Tax:
Print Order (Y/N)?                 Order Total:

Create 1>Opt 2>Can 3>Del 4>Dto 5      6      7      8      9>End 10 ?
```

Notice that you are in Create Mode, enabling you to enter a new order whose number has been automatically supplied (#120). The system anticipates that you wish to enter a new order when you start this program. The system date is suggested with an override capability. Hit <Enter> to accept the suggested date.

Selecting from a Zoom Window

When the cursor stands on the Customer No. Field, the Zoom function (F5) has become active. Now hit F5 to Zoom to the Customer List.

```

MSE                               M A G I C   I I           02/02/87
----- Order Entry -----
Order No: 115                      Customer No: 0
Order Date: 02/02/87

Line Item Type Description          Quantity  Unit Price  Total Price
-----
Terms:

Customer List
-----
No. Customer Name
-----
1008 Green, Mitch
1234 Doe, John
5678 Smith, Sue
9012 Green, Jack

Modify 1>Opt 2>Can 3>Del 4>Dto 5      6      7      8      9>End 10 ?  { |
    
```

Use the directional keys to scan through the Customer List until the customer you need is highlighted.

When your choice is highlighted, hit F9 to accept the selection. All relevant data pertaining to the specific customer appears on the Order Entry Form, including the customer's discount rate.

The Concept of One-to-Many

So far the Order Entry Form has been composed of one Order record. Within the Order, each item line is a record in itself. Obviously, the many lines of the Order are related to the single main record of each Order. There is, therefore, a One-to-Many relationship between the one Order Header and the many Order Lines. The display of records in a One-to-Many relationship is im-

Windows and Scrolling

While entering the second line of the order, we can examine more features of MAGIC. You should now be in the Item field of the second line. Hit Zoom (F5).

Before selecting your item, note that what you see in this window is actually *the same information you saw in the Item List screen*, restricted to a smaller window. Since the window is smaller than the task window, you need to scroll the inside the Item List on your screen. Hit <Enter> twice. The cursor is on Type. Hit <Enter> again and the column will scroll. Hit it more to see the data move forward the screen.

Another way to scroll data, without positioning the cursor is by using the Scroll Lock key. Hit it now. The letter S in the lower right corner of your screen will remind you that you are in Scroll Mode. The directional arrows are now active to scroll the data on your screen. Note that the Ctrl-Arrow keys will scroll the data at high speed. Hitting Scroll Lock again will cancel the Scroll Mode toggle.



You must leave Scroll Mode to resume working.

After you have finished scrolling, in the above two methods, use the directional keys to highlight Item No. 1006. Make sure you are on the No. field so that you can zoom again to see the Stock Status of this Item.

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MSE		MAGIC II		02/02/87			
Order Entry							
Order No: 115		Customer No: 1234		Doe, John			
Order Date: 02/02/87				123 Main Street, England			
Line Item Type Description				Item List		Price	
1 1003 D Fox Terrier				No. Description Type		120.00	
2 0				1002		Stock Status	
				1003		Item: 1006 Chihuahua	
				1004		In Stock: 20	
				1005		Customer Orders: 3	
				1006		Available: 17	
				1007		Vendor Orders: 10	
				1008		To promise: 27	
				1009			
				1010			
				1011			
				1012			
Terms: C.O.D.							

Note the "To Promise" quantity. Now leave the Stock Status Window (F9) and the Item List window (F9) to view the item 1006 selected in your order.

Enter a quantity greater than is available "To Promise". The message "No stock to promise!!" has appeared at the bottom of the screen. This is a designer supplied error message for the user.

If you Zoom now to the window (from the Quantity column), you will see only items of the same type as the record you are currently entering. This was done to help the user select other items of the same type in case of shortage. Choose another Item and leave.

Complete the line and hit <Enter> to pass the Total Price field. The total price is computed and the cursor cycles back to the first field on the record. You can now make any necessary changes in the item line. For example,

change the quantity and see the Total Price automatically recomputed!

Once you are done, hit Down Arrow. This will do the following:

1. Confirm the line, writing it to the file.
2. Update the Order Header totals and display it on the screen below.
3. Increment the “Customer Orders” field in the Item file, thus reducing the quantity “To Promise” for the next request.

You should now have two lines in your order on the screen. Please do the following to practise using MAGIC:

- Fill in more than 6 lines to see the lines scroll automatically when the 7th is entered.
- While you are doing that, choose the same Item twice and check to see the changes to the “Customer Orders” Quantity, through the Item Window.
- Delete a line (F3). Watch the totals being updated, and look into the Stock Status window to see the “Customer Orders” in the Item File decrease automatically by the deleted amount.
- Note that although still in “Create Mode” you can go up and down on the lines and fix them at will! The rule is simple: All the records which were entered in the current “Create session”, i.e. from the time you last entered Create Mode, are available to you for change! (Up to 100 records in one Create session.) Once you leave a Create session, use the Modify mode to update previous records.

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When you are done entering lines in this order, hit F9 to the Order Footer. If you have a printer attached, answer "Y" to "Print Order?" and the Order Form will be printed for you. (If your printer does not support graphics, the lines will be printed as letters.)

Note that this form was designed to be printed on blank paper. If you use a company's pre-printed form, the graphics could be eliminated and the data could be fit into the form. Hit <Enter> and continue.

Note that the system already displays the next empty order form with a new Order No. for you.

Hit Up Arrow and the order you have just entered will be displayed again! The mode is still "Create". The rule that applied for the lines, applies here as well, we are still in Create Mode and the Order Header is available for corrections.

Now hit F1 and change the Mode to Modify by hitting F1 again, thus leaving the Create session. Hit Up Arrow to see the previous orders. Hit Home to see the very first Order in the file (#112). Hit End to see the last order.

Enter the order, (by hitting <Enter> twice) to see the lines you entered earlier. Now you can change, delete (F3) or create more lines (F1 F2). You can use all the options available in the Options Window. (Try the Key (F6) Option to see the lines by Item No. instead of Line number. This is useful at times.)

Note the following rules for canceling.

Canceling Lines and Orders

As long as your cursor is situated within a line of the order, before you have confirmed it by hitting Down or Up Arrow, you can cancel any changes you have made in the line by hitting F2 (Cancel). If you are in Create Mode, F2 will delete the entire line. If you are in Modify when you hit the F2, the changes are canceled and the previous data values are displayed. Therefore, F2 (Cancel) brings you back to the same state you were in before entering the record.



If you make any changes in the Order Lines, and return to the Order Header Record with F9, hitting F2 to cancel the changes to the Order will not be accepted by the system. This is because the Header Total field has been updated by the lines and canceling the Header will leave the system in an inconsistent state.

Leave the Order Form to the Program Menu.

User Exit to DOS

After leaving the Order Entry program, we suggest you exit to DOS to restore the original data files. Select Exit to DOS. You immediately see the DOS prompt. You have momentarily left MAGIC to the DOS level. Now copy the Data files from the diskette: COPY A:DMFIL*.*

After the files have been successfully copied, return to MAGIC by typing EXIT. You are back in MAGIC at exactly the point from which you left.

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Lesson 4: Report Features

In this lesson we will discuss Batch programs including printed reports and user customization of these reports. Make sure your printer is connected and switched on.

Printing a Report

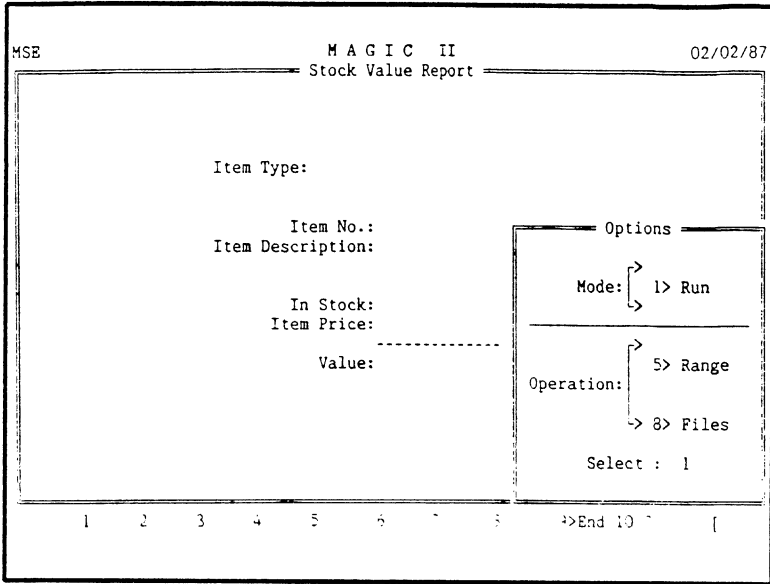
If you are still in MAGIC, go back to the Sub-System menu. If you left MAGIC, re-enter and choose the Reports and Analyses Sub-System. You should then see the Program Menu.

```
MSE                               M A G I C   I I                               02/02/87
-----                               -----
Order Entry - Demo System          System Menu -----
-----                               -----
Reports and Analyses              Sub-System Menu -----
-----                               -----
                                  Program Menu -----
                                  -----
                                  1. Customer List
                                  2. -----
                                  3. Stock Value   (by Item Type)
                                  4. Sales Analysis (by Item Type)
                                  5. -----
                                  6. Sales Orders   (by Customer)
                                  7. Sales Analysis (by Customer)
                                  8. -----
                                  9. Exit to DOS
                                  -----
                                  Select : 1
-----
1>Opt 2   3   4   5   6   7   8   9>End 10 ?  | 1
```

Select the “Stock Value by Type Report” from the Menu.

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This is the screen you see:



The Options Menu has opened automatically. As in the On-Line screen, operations are available to customize the report (see the Customer List, next). For now, simply hit <Enter> to choose the Run Option (F1). Notice that as the report is printing, some of the data is displayed on the screen for your information.

This is the report you should see:

MSE		Date: 02/02/87		
		Page: 1		
STOCK VALUE BY TYPE				

Item Type: D				
Item	Description	In Stock	Price	Value

1006	Chihuahua	20	8.00	160.00
1004	Labrador Retriever	40	150.00	6,000.00
1003	Fox Terrier	120	212.00	25,440.00
1002	Large Poodle	80	500.00	40,000.00
1106	Great Dane	2	789.00	1,578.00

Total for Type D:				73,178.00
Item Type: R				
Item	Description	In Stock	Price	Value

1011	Guinea Pig	30	30.00	900.00
1010	Hamster	140	7.00	980.00
1105	White Mice	26	10.50	273.00

Total for Type R:				2,153.00

Terminating a Report

To stop the printing of a report in the middle, hit the F2 (Cancel) key. Since most reports are comprised of multi-level tasks, you must hit the F2 key to cancel each of the tasks. Therefore, it is best to simply hit the F2 key 3 or 4 times to stop printing any report.

Customizing a Report – Customer List

Now go back to the Program Menu by hitting F9 and enter the Customer List Report. Hit <Enter> twice to run the report as is.

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You should see this report:

MSE		Date: 02/02/87	
		Page: 1	
CUSTOMER LIST			

No.	Name	Address	Discount Terms
1234	Doe, John	123 Main Street, England	10.00 C.O.D.
9012	Green, Jack	789 Birch Road, Framingham, USA	5.00 C.O.D.
1008	Green, Mitch	1000 N.E. Sunset Dr. Boston, USA	9.00 Net 30
5678	Smith, Sue	456 Main Street Geneva, Switzerland	14.00 Net 45

The other User Options of Range, Key and Sort are available to you exactly as in an On-Line Task. Of course, there is no Locate Option in a Batch task, since a Locate operation is On-Line by nature.

To see the same report sorted by Customer No., change the Key. Hit F6, then select the first Key from the Key Table. Exit from the Key window with F9 and Run (F1). The report will immediately print out sorted by the new Key. As in On-Line tasks, the Key remains valid until it is changed or the task is terminated.

To print this report for a specific Range of customers only, use the Range Option in one of these two methods:

1. Limit the records participating From: a value To: a value.
2. Limit the records to those records which match an expression entered into the Expression table.

To Sort the Item List by fields which are not Key fields, you can use the Sort Option, entering the Sort criteria in the Sort Table.

Redefining the File Destination

An additional option which is available only in Batch tasking is the File Option (F8). In this option, you can redefine the file destination. Hit F8 and you see this screen:

```

MSE                                M A G I C  II                          02/02/87
----- Customer List -----
                                     Files
    +-----+-----+-----+-----+
    | File | I/O | Name | Lines |
    |-----|-----|-----|-----|
    | Report Destination | 0 | PRN: | 0 |
    +-----+-----+-----+-----+
Files 1 2>Can 3 4 5 6 7 8 9>End 10 ?
    
```

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The default destination for an Output file is PRN: or the Printer. To see the report displayed on the screen rather than on the printer, enter CON: or the word "console" (without the quotes). Then hit F9 to execute the change and run the program (F1).

You also have the capability of giving a file name of your own choosing in this table. The report will be written to that file on your disk rather than to any other device.

Another parameter you can change is the number of lines per page. The default is 66.

As always, the output file definition you make will remain in effect until it is changed back or you have left this task.

Hit F9 to go back to the Program Menu.

Sales Analysis by Item Type Report

Two of the other reports in the Demo Order Entry System are the Sales Analysis by Item Type and Sales Analysis by Customer. Run the Sales Analysis by Item Type.

MSE	MAGIC II	02/02.87
Sales Analysis By Item Type		
Enter Range of Types and Dates:		
	FROM:	TO:
Item Type:		z
Order Date:	00/00/00	31/12/99
Computing Total Sold:		0.00

This report will help you analyze your total sales by each type, for a period of time and will also give you the percentage each type comprises out of the *total of the selected range*.

Hit <Enter> four times to select the entire range and then hit F5 to start the process. The first stage is displayed at the bottom of the screen: calculating the total for the *selected range*. Then the system automatically sorts the records by type and only on-change of a type does it display the total for the type and its percentage of the total.

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```
MSE                               M A G I C   II                               02/02/87
Sales Analysis By Item Type
MSE                               Date: 02/02/87
                               Page:      1

SALES ANALYSIS BY TYPE
-----
Type      Sold      % of Total
-----
D         6,451.00    75.1
F         1,206.00    14.0
R          364.00     4.3
S          565.00     6.6
-----
                8,586.00    100.0
```

Note that, since this report is short by nature, it was directed to the console to serve as an on-line query.

Hit any character to leave. Now run the report again. This time select only from D to R. (Use Capital letters since this is form in which the Data is stored in the file.) Run the program to see just the requested range and the percent of the total adjusted to reflect this. Hit F9 twice to return to the Program Menu.

The Customer Reports

Run the *Sales Orders by Customer Report*. This report gives all the orders for a specific customer, totaling the amount billed for the customer and the Grand Total of all customers in the specified range.

MSE		Date: 05/03/87			
SALES ORDERS BY CUSTOMERS					

Green, Mitch		(Cust No. 1008)			
Order No. : 114					
Order Date: 23/02/87					
Item	Type	Description	Quantity	Unit Price	Total Cost

1005	F	White Whale	2	1,200.00	2,400.00
1007	F	Guppy	20	0.50	10.00
1008	F	Killer Shark	1	45.00	45.00

					2,455.00
Order No. : 116					
Order Date: 23/02/87					
Item	Type	Description	Quantity	Unit Price	Total Cost

1010	R	Hamster	5	7.00	35.00
1011	R	Guinea Pig	8	30.00	240.00
1202	R	Gerbils	4	12.00	48.00

					323.00

					2,778.00
SALES ORDERS BY CUSTOMERS				Page: 5	

Total billing for all customers:				65,645.35	

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Run the *Sales Analysis by Customer Report*. It gives you important information about the business you do with your customers. Make the range selection as in the previous example.

```
MSE                               M A G I C   I I                       02/02/87
----- Sales Analysis By Customer -----
MSE                               Date: 02/02/87
                                       Page:      2

                               SALES SUMMARY
                               -----
Total # of Orders:                8
Total Billing :                   62,006.48
Average Billing :                  7,750.81
-----

Highest Billing:    48,248.25   Order No.: 119
                               Cust : Doe, John
-----
Lowest Billing:     295.79     Order No.: 118
                               Cust : Doe, John
-----
```

Hit F9 twice when you are done with this report, to return to the Sub-System Menu.

Lesson 5: Batch Updates

The Automatic Price Change program is a batch program which reads all the Item records and changes the price by the percentage you input. Enter the Master File Update Sub-System and go to the Price Change program.

You will see this screen:

The screenshot shows a terminal window with a menu. At the top left is 'MSE', at the top center is 'MAGIC II' with 'Price Change' below it, and at the top right is '02/02/87'. The main area contains the text 'Select option by hitting F5:' followed by a horizontal line. Below the line are two options: 'Manual Price Change:' and 'Automatic Price Change:'.

This is an example of a Menu screen within a program, which we call a Simulated Menu. Use the <Enter> Key to move the cursor between the two options of Manual or Automatic Price Change.

Chapter 1: Using a MAGIC Application

Bring the cursor to Manual Price Change, and hit F5 to Zoom into this selection. This window will open:

MSE MAGIC II 02/02/87
Price Change

Select option by hitting F5:

Manual Price Change: Automatic Price Change:

Manual Price Change

No.	Description	Type	Price
1002	Large Poodle	D	500.00
1003	Fox Terrier	D	212.00
1004	Labrador Retriever	D	150.00
1005	White Whale	F	1,200.00
1006	Chihuahua	D	8.00
1007	Guppy	F	0.50

Now you can modify only the price of any of the Items and can do nothing else. This sub-task is On-Line and all User Options (F1) are active at this stage.

To run the Batch task of Automatic Price Change, leave the Manual Option with F9, and select Automatic Price Change by Zooming (F5) on that field. You see this window:

```
MSE                                M A G I C   I I                    02/02/87
                                Price Change

                                Select option by hitting F5:

Manual Price Change:             Automatic Price Change:

                                Automatic Price Change
                                Enter Percent Change: 0.00%
```

Suppose we want to raise the price of all items of type 'D' (Dogs) by 10%, while all other prices remain the same. Enter the percentage for the change: 10 <Enter>.

The Options window pops up automatically. Hit F5 for Range and 'D' in the Type field. Hit F9 and F1 to execute the task with the new Range parameter.

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Lesson 6: External Programs

Enter the External Program sub-system. This sub-system includes all the programs that deal with the external environment. We are already familiar with the Backup/Restore Program. You can view it again at this point. It gives you a most convenient way to backup or restore your data files from within MAGIC.

Read/Write ASCII Files

As soon as you enter this program, you have a choice of running the program (F1) or setting pre-defined conditions before running it.

Run the program. The entire Item file is dumped to a file called DMITEM.DAT, while it is displayed on the screen.

Leave the Program. Exit to DOS (the last entry on the menu), and enter the following DOS command: TYPE DMITEM.DAT <Enter>. You should see the familiar Items on the screen.

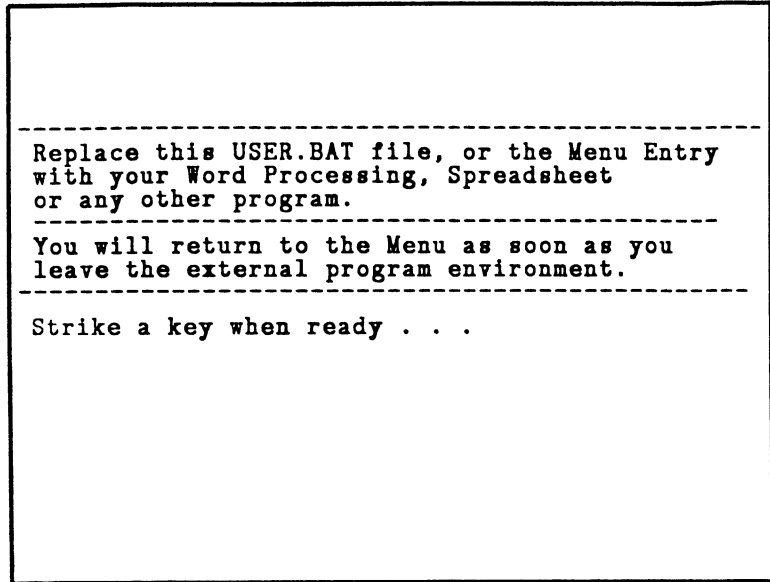
Now we can read them back in and create a MAGIC file from an ASCII file. To do that we must first delete the existing MAGIC file. Type: DEL DMFIL003.DAT <Enter> and EXIT <Enter> to return to MAGIC.

Enter the Read Item File from ASCII file program and Run it (F1). The DMITEM.DAT file is read into the MAGIC DMFIL003.DAT.

Chapter 1: Using a MAGIC Application

User Exits

Run the Word Processor or Spreadsheet program to see this screen:



In order to install your own program, first make sure your own word processing program is installed on your computer. Then go to the External Programs Menu. Hit F1 F1 to enter the Maintenance screen of the Program Menu. Move the cursor down to the USER.BAT entry. Replace this entry with the DOS command which calls your Word Processor. Leave with F9. Now run the word processing option from the Program Menu.

When you are finished, exit from the Word Processor and you will be back in the MAGIC program menu.



1. *Any legal DOS command can be entered in the Menu to replace the USER.BAT entry including program names, DOS commands, Batch files, etc.*
2. *MAGIC allows you to perform User Exits not only from the menu level, but from within a running program. For example, you can prepare data in an ASCII file, exit to a Graphics program that uses this data, and display the resulting graph on the screen. Since control will automatically return to the MAGIC program, the entire procedure is completely transparent to the user!*

From the point of view of human engineering, this is of utmost importance in system design. An example of running an external procedure from within MAGIC is the Backup/Restore program that executes the copy commands according to your request.

Summary of Chapter 1

In these lessons, you learned how to use a sample MAGIC Application – the Order Entry Demo System. You learned how to work within MAGIC, using the Directional Keys and the Function Keys. You also learned how to use the Menus and Windows that are an integral part of a MAGIC Application.

We showed you how to enter data into the database, making changes and deletions where needed. You also learned how to print reports in MAGIC and how to customize them for your own needs.

In the following Review, we will summarize the basic User Options available in a MAGIC application.

At this point, we suggest you review the Demo System until you feel quite “at home” with the functions available to you, then restore the original files as supplied to you on diskette #2, by running the Restore program in External Programs.

Review: Run-Time Topics

User Menus

There are three User Menu levels in MAGIC: the System Menu, Sub-System Menu and Program Menus. These Menus are nested. To choose from a Menu, you can either select your option number and hit the Return key, or highlight your selection with the arrow keys, then hit Return. The Up and Down arrow keys are active at all times, while the Right and Left arrows become active in a two-column menu only. To leave a Menu and go back to the previous level, hit F9 (End). Note that the selection you originally made will remain highlighted when you return to the menu.

For more information on Menu Maintenance, refer to Chapter 5: Menus.

Special Keys for the User

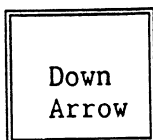
The IBM PC keyboard layout is almost standard for all models, with slight changes in the typewriter key positions. On the right side of the keyboard is a Numeric Keypad. On the left, there is a set of 10 Function keys. Both of these sets of keys have different uses within MAGIC, depending on their context. In the following pages, we will describe the different use of the special keys. Please note that the usage is consistent throughout MAGIC, in both the Designer and the User ends.

The Numeric Keypad has two modes. If you hit the Num Lock key, the keys are used to enter numbers only. You will then see the letter N in the Mode window at the bottom right of your screen.

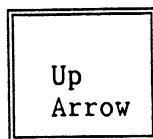
Chapter 1: Using a MAGIC Application

When Num Lock is Off, the Arrow keys, Home, PgUp and Down Keys are active. In this mode, the Numeric Keypad becomes a “Directional Keypad” and is used in two situations: on the Menu Level, or within the Program level. These keys work differently in these different contexts, although the principle is the same.

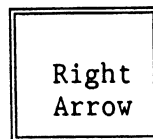
The Menu stage is defined as those times when you have a menu window open, either a System Menu, Sub-System Menu, Program Menu, or User Option Menu. At this stage, the “Directional Keypad” works as follows:



The Down Arrow key is used to move down the menu between the options.



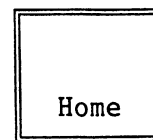
The Up Arrow key is used to move up within the menu.



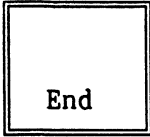
The Right Arrow key moves to the right column in a two-column menu.



The Left Arrow key moves to the left column in a two-column menu.



The Home key brings the cursor back to the first option in the Menu.



The End key brings the cursor to the last Option in the Menu.

In all cases, the current Menu entry is highlighted and hitting a Return will activate this entry.

The Program stage refers to those times when you are within the Program, itself and not in a Menu. That is, the different entries are records, and not choices in a menu. When the screen is in "Line Mode" i.e. many records are displayed at once, giving the appearance of a table, then the usage of the Directional Keys is intuitively correct: Up Arrow to move up to the previous record and Down Arrow to move down to the next, etc. For consistency, the same interpretation was given to the Directional Keys in "Screen Mode" as well. This mode implies that each record is presented on a screen, as opposed to a single line within a screen in "Line Mode". To maintain the same convention, the Up Arrow will be interpreted as "Previous record" resulting in displaying the *screen* of the previous record. The same applies to the Down Arrow resulting in displaying the screen of the next record.

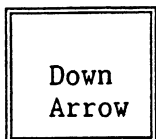


1. *In Line Mode, when the cursor moves between the lines of the "Table" it stays on the same field. In screen mode, as well, when moving between records (screens), the cursor remains on the same field.*
2. *The same holds true for Data Entry (Create Mode). When working in Table form (Line Mode), it is natural to go down to the next entry by using the Down Arrow. Therefore, in*

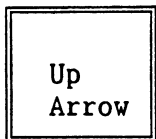
Chapter 1: Using a MAGIC Application

Screen Mode as well, hitting the Down Arrow will confirm and accept the input record, and display the next empty screen for further input.

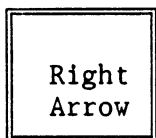
To summarize:



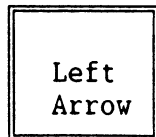
This key moves the cursor *Down* through the records. By pressing this key, the changes to the current record are confirmed and the user continues to the next record.



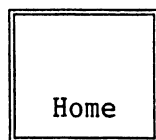
This key moves the cursor *Up* through the records. Pressing this key will confirm the changes to the current record.



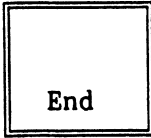
This key moves the cursor to the *Right* through the fields of the current record.



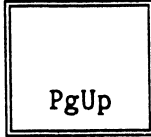
This key moves the cursor to the *Left* through the fields of the current record.



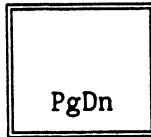
This key moves the cursor to the *First* record in the file, or the Data View if a Range was defined. In Line Mode, hitting Home the first time will bring the cursor to the first record displayed on the screen and only the second Home strike will rearrange the screen to show the first record in the file or Data View at the top of the screen.



This key moves the cursor to the *Last* record in the file or Data View. In Line Mode, it works as above bringing the cursor first to the end of the screen then to the end of the file.



In Line Mode, PgUp will enable scrolling *Upwards* between the different records, a whole page at a time.



In Line Mode, PgDn will enable scrolling *Downwards* between the different records, a whole page at a time.

Function Keys

The Function Keys (F1–F10) are on the left side of the keyboard. In MAGIC, the function keys are context sensitive. Their usage is dynamic and changes in different situations. The keys which are active at each point and their current function will appear highlighted on the bottom line of your screen.

These are the basic Function Keys and their meanings, in an On-Line situation:

F1

This key will take you out of the On-Line mode into the Option window or Menu.

F2

This key will cancel the last change made, or will return to the previous level without making any selection or change.

F3

Deletes a single entry or line.

F4

Creates a new line in a table, or the first line if the table is empty.

F5

Zooms to the next level or window.

F9

To go back one level, either from window to window or level to level, executing the operations if relevant.

User Options Window

When an On-Line Task first starts, the default mode set by the designer is operative and is displayed in the left hand corner of the screen. In most cases, the user is allowed to change this Mode of Operation. This is done by hitting F1 (Options).

The User Option menu is split into two parts: the first three selections are the available modes of operation. The remainder are special requests which can be made to manipulate the Data View. The Modes of Operation are:

Modify (F1):

In this mode, the user can change data in existing records.

Create (F2):

In this mode, the user can create new records as in data entry. As mentioned above, a Down Arrow will confirm the record and present a new screen or line for input. The Up Arrow, on the other hand, will go to previously entered records and allow you to change your data. Note, however, that the range of records available for modification while in Create mode is limited to those records created since you last entered this mode. In this way, you can refer to the "family" of records entered while in the same Create session. Up to 100 records can be entered in one Create session.

Query (F3):

The only operation allowed in this mode is scanning through the records and fields using the Directional Keys. An attempt to change a data field will result in a beep.

To choose one of these options either type the number and an <Enter>, use the arrows to highlight your selection and hit <Enter>, or press the Function Key with the same respective number. Use the F9 key to exit from the Option screen.

Locate (F4)

When choosing the Locate option, the Task screen will appear with "Masks" covering all fields.

The cursor rests on the current Key Field making it easy to ask for the most common search request – by key. Enter your requested key and hit F9 to execute the search. If found, the requested record will show immediately. If not, the next record will be shown and the appropriate message will be displayed.

Note that if the field(s) participating in the search request are key fields, the result will be almost immediate. If not, the file will be scanned sequentially. Also note that the key search will be made on the current key. To change the current key, use the Key (F6) option before executing the search.

While the simplest type of Locate operation would be to search for a record by its key, it is also possible to search From: To: . In this case, you would first

type in the data relating to where you want to start the search, then hit F8 to switch over to the To: prompt. The masking will appear again, and you can then type in the data pertaining to the point where you want to stop the search over the previous entry. The first record within that set which matches your criteria, will be displayed. If no such record is found, the cursor will be positioned on the next record by key. The F7 and F8 keys will work as a toggles, alternately displaying your first (From:) and second (To:) entries. As usual, F9 will execute the search.

The third method of using the Locate option is with an expression. Hit F6 (Expr) and enter the Expression table. You can enter any logical expression, and the system will search for the first record which fits that expression.

Within a search screen, the Delete key (F3) will delete all selection criteria, while the Nullify key (F4) will only delete a single entry.

Range (F5)

The User can set the Range of records which participate in the task, overriding the range predetermined by the Designer. This Range stays active as long as the User remains in the Task or until the entries are deleted or changed.

The Range Option has the same levels as the Locate option. You can give a Range From a field To a field, using F7 and F8 (From: To:), or by expression. The Range operation, however, will display not one record, but a group of records which fit the Range criteria.

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As usual, you exit from the definition screen with F9, thereby accepting the current Range definition, and starting the Range operation.

Key (F6)

Using this option the user can change the Main Key of the task and display the records according to the new key. To do that you must Zoom into the Key Table and define the new key.

The new key will remain active until changed or the user leaves the task. As mentioned above, before initiating a search, you can redefine the key of the Data View.



You can choose Key 0 (no key at all), by going to the top of the Key name Table (above the first key), and leaving with F9. This will display the records in the physical order they appear in the data file. This is useful mainly when you need to locate a non-key record in a large file, since scanning the file without a key is a faster operation.

Sort (F7)

The Sort Option allows a User to perform an On-Line sort by up to ten Ascending or Descending Keys.

A Sort Operation will override the active key. The new sort remains active until the User has either left the task, or canceled the sort definition.

Files (F8)

This option refers to Input/Output Files. In the program, the designer gives a name to the I/O files. This is especially useful in Batch type tasks printing reports. If no name is given, the file is sent to the Printer with the default name PRN: The User can, at this point, change the name of the Output file, sending the Output to disk file or to the console.



Any option which has been blocked by the designer will not appear on the Option Menu.

Chapter 2

Designing a MAGIC Application

Lesson 1:	User Menus	2-3
Lesson 2:	Data Dictionary	2-11
Lesson 3:	On-Line Programs (I)	2-27
Lesson 4:	Report Programs (I)	2-67
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Lesson 10:	User Exits, Passwords, User Help Screens	2-175

In this chapter you will learn to design the MAGIC application which we showed you in the previous chapter.

Designing an application with MAGIC is a totally new experience, even if you are a seasoned Programmer or Systems Analyst. The only way to really learn how to use this tool is through hands-on experience. This tutorial has been written for this purpose. You must follow the steps of the tutorial carefully to learn to utilize the power of MAGIC.

After you have learned the basics of programming in MAGIC as presented in this chapter, use the Reference Manual to look up specific topics.

Note that at any point you can hit the F10 (Help) key to see a Help screen which is context sensitive. Hit F10 again to get Help on the Help Option itself.

Chapter 2: Designing a MAGIC Application

Lesson 1: User Menus

In this lesson you will learn to:

- Design the System Menu
- Design the Sub-System Menu

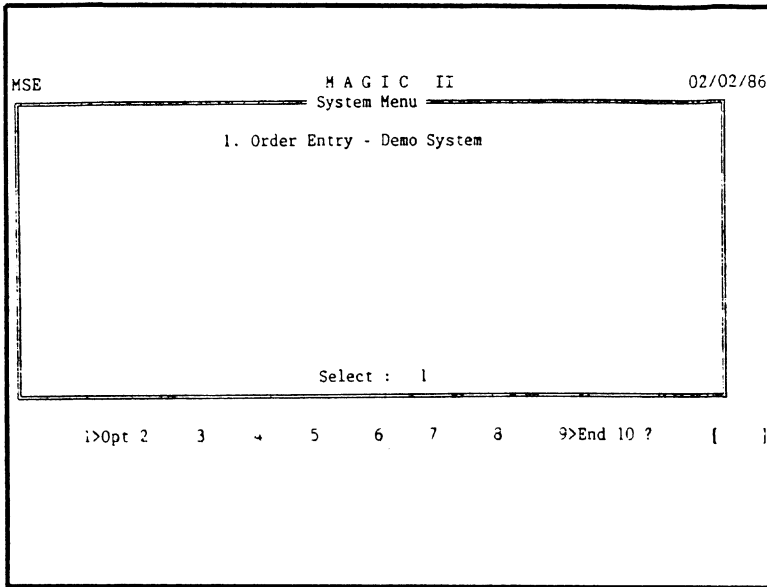
Starting MAGIC

Start MAGIC by typing MAGIC <Enter>. This is the Main Screen of MAGIC. You will observe that both the User and designer ends of MAGIC have the same Main Screen, as the two levels are totally integrated.

Now hit <Enter> on the Date field, unless you want to change it.

Chapter 2: Designing a MAGIC Application

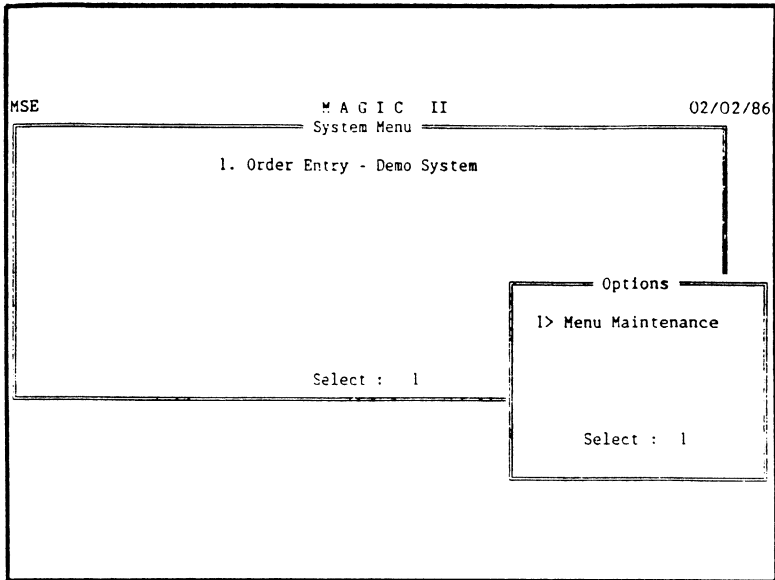
You should see the System Menu:



Defining the System Menu

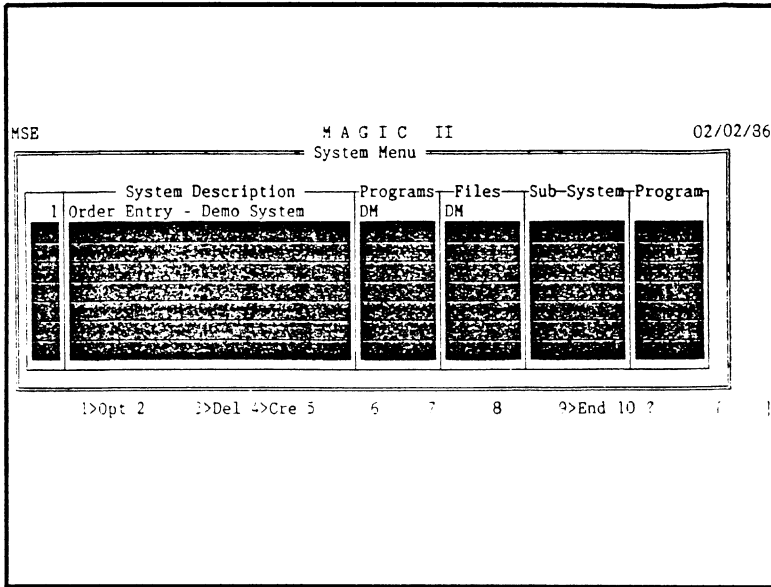
At this time, MAGIC only has one application: the Order Entry – Demo System from Chapter 1. Our first step is to create a new, separate application system for the Order Entry Tutorial.

Hit F1(Options) to open the Designer Option window.



This menu is context sensitive and at every stage of the development process gives only relevant options. At this level, the only option available to you is Menu Maintenance for the System Menu. Hit F1 again to choose this option.

Chapter 2: Designing a MAGIC Application



You now see the System Menu Maintenance screen which is comprised of a single line defining the Demo System and its file identifier – DM.

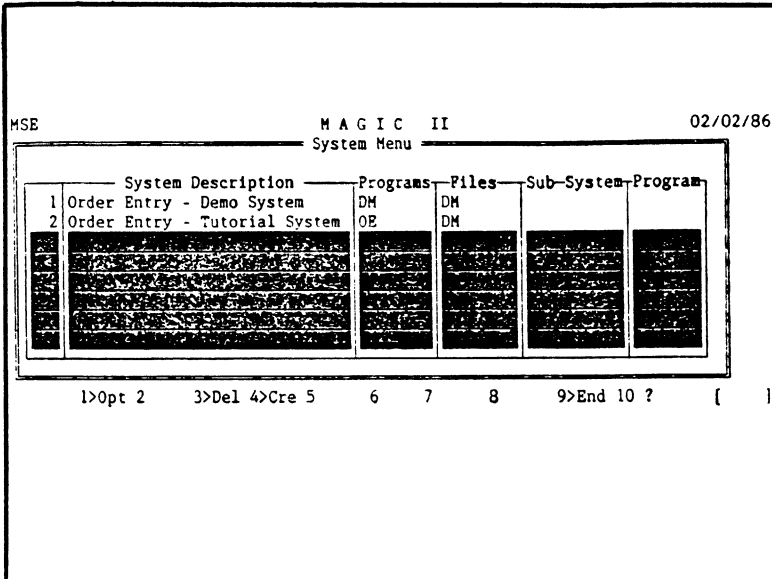


This table behaves in the same manner as all other tables in MAGIC. A new line is created with F4. You move the cursor from field to field on the line with the Right and Left Arrow keys, and use the Down and Up Arrow to continue to the next line.

We want to define a new system, so open an entry in the table by hitting F4 (Create). Now type in the System Description: Order Entry – Tutorial System

Hit Right Arrow or <Enter> to continue to the next field of the Table, and enter the System Identifier OE for the Programs. Normally, you would enter the same identifier for the Data Files. However, in this case, to save you

time entering data into your tutorial system, simply enter DM as the file identifier and your own system will use the Data files we have supplied. Your screen should look like this:



	System Description	Programs	Files	Sub-System	Program
1	Order Entry - Demo System	DM	DM		
2	Order Entry - Tutorial System	OE	DM		

1>Opt 2 3>Del 4>Cre 5 6 7 8 9>End 10 ? []



If you type in the identifiers in lower case letters, the system will automatically change them to upper case for you.

Hit F9 to accept the new Table and return to the Menu.

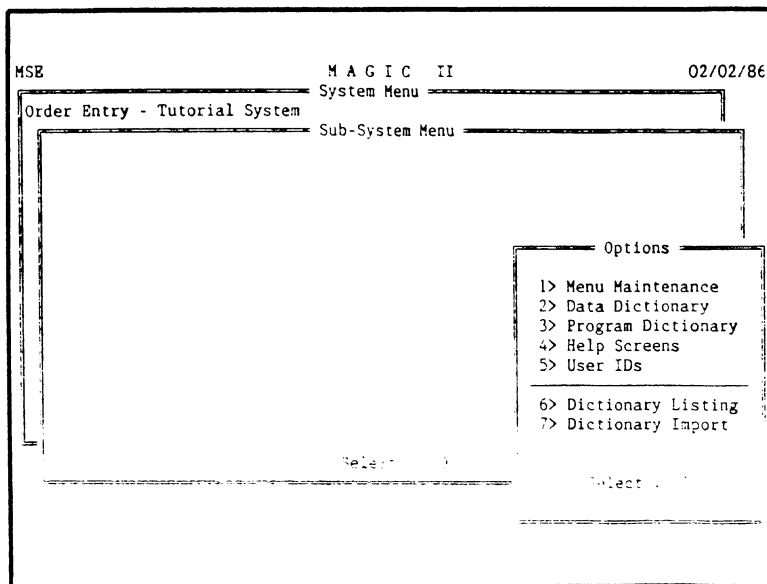
Defining the Sub-System Menu

Now that the Order Entry Tutorial system has been defined, and the OE Program Control file (OECTLDAT) is open, you can start defining the contents of this system.

Chapter 2: Designing a MAGIC Application

The next step is to design the Sub-System Menu. The breakdown into Sub-Systems is a logical split of the different parts of the system for the user's convenience. All Sub-Systems of a particular System use the same Control File, (OECTL.DAT in our case) containing the Data and Program Dictionaries.

Move the cursor with the Down Arrow to selection 2 on the System Menu and hit <Enter>. You should see an empty Sub-System Menu screen. Now hit the F1 (Options) key for the full Designer Options Menu:

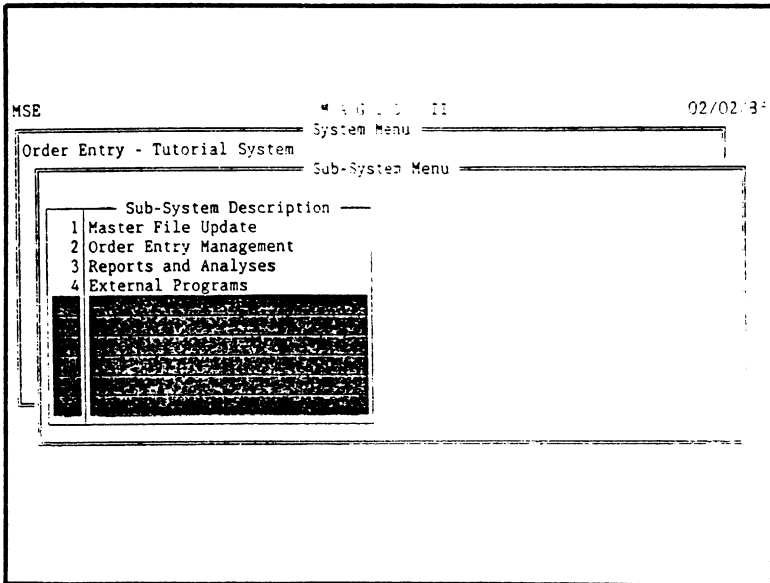


All the Designer Options are active at this level. Note that once you are in a particular system, you have access through the F1 key to all Menus, Data, and Programs in that system.

At this point, you should choose F1 for Menu Maintenance of the Sub-System Menu. Again you see an empty table. Open 4 new lines in the menu by hitting F4 (Create) 4 times.

Use the Up Arrow to go back to the first entry in the table and fill in the first Sub-System description: Master File Update.

Hit the Down Arrow to accept your entry in the table and continue to the next line. Fill in the entire table as follows:

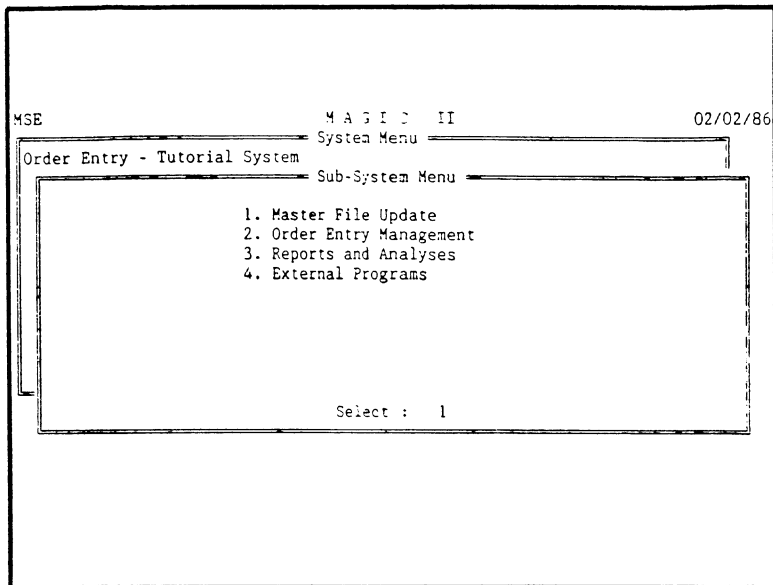


All directional keys and Mini-Editor functions are active within the designer tables. These functions operate in exactly the same manner as in the user end of a MAGIC application and are totally consistent throughout MAGIC.

Chapter 2: Designing a MAGIC Application

Hit F9 to leave the Menu Maintenance Table.

You should see this final result:



You have now finished designing the System and Sub-System Menus. The detailed Program Menus will be defined only after the Programs themselves have been written. We will come back to this at the end of Lesson 3, after you write your first MAGIC program.

Lesson 2: Data Dictionary

At this stage, you define the Data Dictionary for your application. The Data Dictionary is part of the System Control File and is made up of all File, Field and Key Definitions for the application. The files in MAGIC are automatically named and numbered. Files are made up of identical records, divided into fields. Any field or combination of fields in a file can be defined as a key.

Hit F1 (Options) for the Designer Option Menu, and choose the Data Dictionary Option either by one of the following alternatives:

1. Highlighting Option 2 with the Down Arrow key then hitting <Enter>.
2. Pressing the number 2 on your keyboard and hitting <Enter>.
3. Hitting 2.

We recommend that you use the third option, once you remember the different functions, simply by entering F1 F2 in succession.

You should see an empty Data Dictionary Table. This is the table you use to define the entire Data Dictionary for your Tutorial System.

Open a new line by hitting F4 (Create) and fill in the File Name – Control.

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Fields

Hit <Enter> to continue to the Field column. The Zoom function is now active in the Function Line. Hit F5 to Zoom into the empty Field Definition Table, where you define all the fields of the Control File and their respective attributes. Create an empty line by hitting F4. Enter the Field Name: Control Key

Field Attributes

After you name the field, you must define its attributes. Use Right Arrow key or <Enter> to bring the cursor to the Attribute column, labeled I/L/R/E/D/T/A for the Control Key field. A field can be of one of these types:

- A - Alphanumeric where the size of the field is specified in bytes, up to the maximum record size. (2K)
- I - Integer a signed (+/-) Numeric field of up to 4 digits, where the number of digits is specified and stored in two bytes.
- L - Long Integer a signed (+/-) Numeric field up to 9 digits, where the number of digits is specified and stored in 4 bytes.
- R - Real a signed (+/-) Numeric field with a decimal point, in a combination of 6 digits, stored in 4 bytes, from - 0.00001 to 999999.

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- E - Extended** a signed (+/-) Numeric field with a decimal point, in a combination of 14 digits, stored in 8 bytes.
- D - Date** stored in 4 bytes. A Date is stored internally as an integer.
- T - Time** Stored as a long integer giving the duration in seconds. Can reach 99:59:59 hours.

The Control Key Field is an Integer field made up of two digits. Therefore, type 1 for Field Type followed by an <Enter>. Then type a 2 in the Whole Number column. Notice that the size of the field is calculated for you and that you cannot enter any decimal places in a integer field.

Open a new line in the Field Table (F4) and enter the Sales Tax Field. The Sales Tax Field is a Real number made up of 3 whole digits and 2 places after the decimal point. Bring the cursor to the Attributes column of this field and enter the following:

```
R <Enter>
3 <Enter>
2
```

Hit F4 (Create) to continue to the next field definition. The Last Order No. Field is a 3-digit Integer. Define this field and move to the next. The Customer Message Field is an alphanumeric field of 20 characters. Enter these field definitions now.

Designing a MAGIC Application

When you have finished filling in the Field Table for the Control File, it should look like this:

```
MSE                                M A G I C  ii                          02/02/87
                                Data Dictionary

                                Fields

Control
  Field  I/L/R/E/D/T/A-Whole-Decimal-Size
1 Control Key      I      2      2
2 Sales Tax       R      3      2  4
3 Last Order No.  I      3
4 Customer Message A                               20
```

Hit F9 to return to the File Definition Table. You now have 4 fields defined on this table with a total record size of 28 bytes.

Keys

Hit <Enter> to continue to the Key column and Zoom (F5) to the Key table:

MSE M A G I C II 02/02/87
Data Dictionary

Keys

Control

Key	U/N

Select Key Field :

Field	Type	Size	Field	Size	A/D
1 Control Key	I	2			
2 Sales Tax	R	4			
3 Last Order No.	I	2			
4 Customer Message	A	20			

In the upper portion of this screen, you see an empty table of keys. Open a new line in the table with F4 (Create). The Control File has only one Key – the Control Access Key, which is Unique. Type in the name of the Key in line 1 of the table: Control Access Key. The default of U for Unique has been supplied by the system.

Hit F5 to zoom to the lower part of the table and define the segments of the key. Hit F4 (Create) to open a single line in the lower table since this key is comprised of one segment only – the Control Key. Zoom again (F5), bringing your cursor to the Field List on the left and

Designing a MAGIC Application

highlighting the first item: Control Key with the Down Arrow. Since this is the required field for the key, hit F9 and it will appear now in the segment table.



Zooming on the Field List is, of course, optional. In our case, it would have been simpler to type 1 in the segment table instead of Zooming. When the field list is longer than the display area, you can zoom, move your cursor to scroll the lines, position the cursor on the correct field and leave with F9 to copy the number of the field to the table. In the future, we will refer to this process as “selecting from a Zoom table”.

The cursor does not stop in the Size column for this key because you can only change the length of a key if it is an A type (Alphanumeric). The Ascending/Descending column is blocked as well, because Integer, Long and Date fields can be defined as Ascending only.

Hit F9 to return to the upper table. Since there is only one key in this file, hit F9 again to return to the File Definition Table. The number 1 appears in the “Keys” column to indicate this fact.

At this stage, it is recommended that you check the File Definition you have just completed. MAGIC gives you a powerful tool which will check your Data Dictionary for possible errors.

Hit F8 (Check) and wait. If no errors are found, you will return to the Data Dictionary Table. If any error is found, MAGIC will position the cursor at the error location, displaying the error message. Correct the error, return to the File Table (F9), and check again (F8) until no errors are found.

Defining the Customer File

Hit F4 (Create) to create a new line for the Customer file. Type in the File Name (Customers), then hit <Enter> to accept the field information. Hit F5 to Zoom to the Field Table.

Use F4 to create empty lines, fill the attributes of the fields in this Table, using the directional keys and the Mini-Editor if necessary.

MSE MAGIC II 02/02/87
Data Dictionary

Fields

Customers

	Field	I/L/R/E/D/T/A	Whole	Decimal	Size
1	Cust. No.	L	5		4
2	Customer Name	A			20
3	Customer Address	A			40
4	Customer Discount	R	3	2	4
5	Customer Terms	A			20

Once you have entered this information, hit F9 to return to the Data Dictionary Table.

Continue to the Key column and Zoom to the empty key table.

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This file has two keys – 'By number' which is a Unique key, and 'By name' which is a non-unique key. Open two lines in the upper table hitting F4 twice, go up to the first line and enter the description: "By Number". This is a Unique key, so leave the default as is. Hit F5 to Zoom to the definition table of this key. Open a single line in the lower right table for the single segment of the key. Choose field number 1 from the field list and hit <Enter>. This is an Ascending key by default because the field segment is defined as a Long field (L). Return to the upper table with the F9 key.

Go down to the second key entry with the Down Arrow and type in the description – By Name. This is a Non-Unique key, so type an N in the U/N column.

Zoom (F5) to the lower table. Open a new line with F4 and enter the field #2 Customer Name as the key. Hit <Enter> and the cursor stops on the field size. Since this is an alphanumeric field, you have the option of defining a key segment smaller than the actual field size. In our case, we will use only the first 10 characters of the Name as the key segment, so enter 10 in this column.

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The Key is Ascending (A). When the table is finished, it should look like this:

MSE MAGIC II 02/02/87
Data Dictionary

Customers Keys

	Key	U/N
1	By Number	U
2	By Name	N

→ Select Key Field : v

Field	Type	Size	Field	Size	A/D		
1	Cust. No.	L	4	2	Customer Name	10	A
2	Customer Name	A	20				
3	Customer Address	A	40				
4	Customer Discount	R	4				
5	Customer Terms	A	20				

Exit with F9 to the upper table and F9 again to the Data Dictionary Table. Check the File definition (F8) and correct any errors.

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The next file is the Items file, comprised of the following 7 fields:

MSE	MAGIC II				02/02/87
Data Dictionary					
Fields					
Items	Field	I/L/R/E/D/T/A	Whole	Decimal	Size
1	Item No.	L	5		4
2	Item Description	A			20
3	Item Type	A			1
4	Item Price	E	6	2	8
5	In Stock	L	6		4
6	Customer Orders	L	6		4
7	Vendor Orders	L	6		4

Fill in this table as above. Then exit with F9.

Now fill in the Key Definition Table. The file has three keys. So you must open three lines in the upper table which will scroll between the two lines displayed on the screen.

The three keys are:

- By Number Unique
- By Description Non-Unique
- By Type Non-Unique

Enter these key descriptions, then Zoom to the lower table to enter the segment definitions for each key.

The first key – By Number – is defined by the Item No. in Ascending order. The second – By Description – is defined by the first 10 characters of the alphanumeric field Item Description in Ascending order. The third key is By Item Type which is a single alphanumeric character, again in Ascending order.

When all three keys are defined, return to the Data Dictionary Table, check the file definitions (F8) and continue to the following files.

Defining the Order Header File

The fields of the Order Header File are as follows:

MSE	MAGIC II	02/02/87		
Data Dictionary				
Fields				
Order Header				
Field	I/L/R/E/D/T/A	Whole	Decimal	Size
1 Cust. No.	L	5		4
2 Order No.	I	3		2
3 Last Line No.	I	3		2
4 Order Date	D			4
5 Order Sum	E	6	2	8
6 Order Discount	E	6	2	8
7 Order Tax	E	6	2	8
8 Order Total	E	6	2	8

Notice that the Order Date Field is a Date (D) field and the size is automatically computed to four bytes.

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After defining the fields, define the Keys of the file.

The two keys in the file are 'By Order No.', a Unique key and 'By Customer', a Non-Unique key, which uses the Customer No. field as its single segment.

Don't forget to check (F8) the file definition before you continue.

Order Lines File

The fifth and last file in our Order Entry System is the Order Lines file which is comprised of six fields.

Define these fields as follows:

MSE		MAGIC II		02/02/87	
		Data Dictionary			
		Fields			
Order Lines					
Field	I/L/R/E/D/T/A	Whole	Decimal	Size	
1 Order No.	I	3		2	
2 Line No.	I	3		2	
3 Item No.	L	5		4	
4 Item Type	A			1	
5 Quantity	I	4		2	
6 Unit Price	E	6	2	8	
7 Total Cost	E	6	2	8	

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The Order Lines file has two keys: 'By Order' (Unique); 'By Item' (Non-Unique).

The first key is comprised of two segments, the Order No. and Line No. Define the key in the lower table as follows:

MSE
MAGIC II
02/02/87

Data Dictionary

Keys

	Key	U/N
1	By Order	U
2	By Item	N

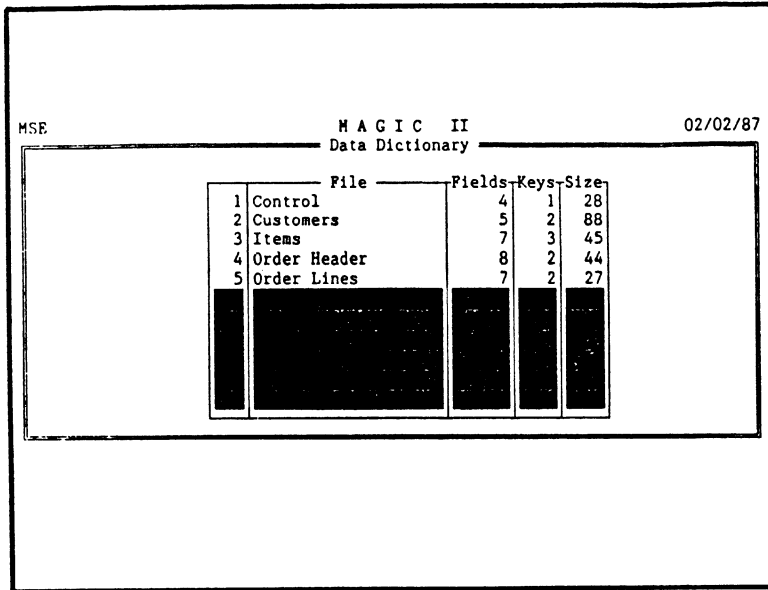
Select Key Field : ▼

	Field	Type	Size		Field	Size	A/D
1	Order No.	I	2		1 Order No.	2	A
2	Line No.	I	2		2 Line No.	2	A
3	Item No.	L	4				
4	Item Type	A	1				
5	Quantity	I	2				
6	Unit Price	E	8				
7	Total Cost	E	8				

The second key is as single segment key made up of the Item No. only.

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Return to the Data Dictionary Table with F9. The completed table should look like this:



MSE

MAGIC II

02/02/87

Data Dictionary

	File	Fields	Keys	Size
1	Control	4	1	28
2	Customers	5	2	88
3	Items	7	3	45
4	Order Header	8	2	44
5	Order Lines	7	2	27

Position the cursor on each of the files in the table and hit F8 (Check) to double check the file definitions before continuing.

You have now finished defining the entire Data Dictionary. All these Files, Fields and Keys are at your disposal at all times during the next stage of writing the programs themselves.

Making Changes in the Data Dictionary

One of the most powerful capabilities of MAGIC is the ability to add or delete fields or keys anywhere in this table. This holds true even after programs exist! MAGIC will automatically "tell" all the programs of the changes

in the Data Dictionary. Once data files are created, it is also necessary that you run the Conversion Program (F7) before leaving the Data Dictionary screen. Please refer to Chapter 9: Utilities for more information on this subject.

Backup the System

At this point we suggest that you backup your System Control File (OECTL.DAT). Leave MAGIC to DOS by hitting F9 a few times.

Type: COPY OECTL.DAT *.SAV



*If, at any time, you want to return to this stage,
type: COPY OECTL.SAV *.DAT*

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Lesson 3: On-Line Programs (I)

The next stage in developing an application with MAGIC is writing the programs themselves.

If you have left MAGIC, re-enter through the Main Screen, and continue directly to the Sub-System Menu. Hit F1 to see the Option Menu and choose F3 (Program Dictionary). You will see the empty Program Description screen.

The first Program we will be writing in this application is the Control File Update Program. Now open up a new line with F4 (Create) and enter - 'Control File Update' into the table.

Defining the Task Header

Hit F5 to Zoom into the next level of the Task Definition - the Task Header.

```
MSE                                M A G I C   I I                02/02/86
                                Task Definition
-----
1.Control File Update

                                Task No. : 1.
                                _____

Task Description : Control File Update

Main File : 0

Key: > No. : 1
     > Exp : 0

Mode: >Type : M Modify
     > Exp : 0

Task Type (O/B) : 0 Online

More Information :
```

1 2>Can 3 4 5>Zoom 6>Expr7>Draw 8>Task 9>End 10 ? []

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Notice that the program name and number appear in the upper left corner of your screen. At all times, MAGIC reminds you of your position within the program hierarchy. This is Task No. 1. The Task Description appears automatically from the Program Description table.

This screen works exactly like a single record in screen mode. Therefore, you use the Right Arrow key or <Enter> to move from field to field.

Move your cursor to the field labeled Main File. Hit F5 to Zoom to the File list.

You don't have to remember the names or numbers of your files in the Data Dictionary. All this information is at your fingertips whenever you need it. Move the cursor with the Down Arrow key to highlight the Control File (1). Now hit F9 to confirm your selection and enter it into the Task Header screen.

Continue to the next field with the <Enter> key. MAGIC has automatically displayed the first key of the file you chose above. Usually this is the key you will want to use for the task. However, you can hit F5 to Zoom into the Key table for the Main File, and choose one of the other keys. In our example, there is only one key, so we will accept the suggestion made by the system.



The system automatically skips the expression field in this case because we have defined a key explicitly. The Key and Mode can be selected dynamically using the Expression. Refer to the Reference Manual for more information on this subject.

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The next parameter of the Task Header is the default Mode of Operation. When the user enters this task, we want the Mode of Operation to automatically be "Modify". Therefore, leave the M for Modify in this parameter as suggested. Of course, the user can change this mode using his User Option Menu during Run-time.



To see a list of all the valid replies to this parameter, hit ? <Enter> in this field instead of the M. The correct codes will appear in the messages line. Hit 'M' again to delete the Message Line and continue.

The last parameter we are going to enter in the Header of this task is whether the task is on On-line or Batch. This is an On-line task, so leave the O parameter as suggested.

Your completed Task Header screen should look like this:

```
MSE                                M A G I C  II                      02/02/86
                                Task Definition
-----
1.Control File Update

      Task No. : 1.
      -----
Task Description : Control File Update
Main File      : 1 Control
Key: > No.    : 1 Control Access Key
      > Exp   : 0
Mode:>Type    : M Modify
      > Exp   : 0
Task Type (O/B) : 0 Online
More Information :

1      2>Can 3      4      5>Zoom 6>Exp 7>Draw 8>Task 9>End 10 ?  {  }
```

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The More Info parameter is used to enter information needed for more complicated tasks. Since we do not need any of these complex parameters for this program, simply skip this field by hitting <Enter>. We will come back to it later.

Your cursor should be back on the Task Description parameter. Hit F5 to Zoom into the next level of the program.

The Execution Definition Level

The Execution Definition screen is where you actually write the program including the data view definition and the flow of execution.

As you can see, the screen shows two tables. The upper one gives you the ability to control the different “levels” of the program, and the lower one will list the operations which pertain to each level. At this point, we are at the Main section of the Record Level, which you see highlighted on the screen in front of you. This is where most of the “action” takes place and therefore was chosen as the default level.

Since our program is a simple one, the *only* level we need is the Record Main Level, therefore we will skip the explanation of the different levels and concentrate on the Operations.

Hit F5 to Zoom into the lower table and start entering operations for the Record Main Level which, as you see, remains highlighted in the upper table.

Hit F4 to create a new line. The cursor stands on the Operation column. Hit F5 to see the list of possible Operations.

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```

MSE                               M A G I C   I I                       02/02/86
                                Task Definition
-----
1. Control File Update
-----
                                Execution Definition
-----
                                Operations
                                0 Remark
                                1 Sel. Field
                                2 Stop !!!
                                3 Beg. Link
                                4 End Link
                                5 Beg. Block
                                6 End Block
                                7 Exec. Task
                                8 Exec. Prog
                                9 Upd. Field
                                10 Write File
                                11 Read File
                                12 Scan File
                                13 User Exit
-----
Change  Description  Prefix  Main  Suffix
-----
1  --  Record      --  0  1  0
2  --  Task       0  --  0  0
-----

Op  Operation  Type  No.  Description  Assign  Exp  F  Inp
-----
1  0
-----

```

At this point, we will not go into the details of each of the Operations, simply choose 1 (Select Field) from the side window and hit F9 to confirm your selection. The Operation name appears on the line. Hit <Enter> to move to the next column – Type. The suggested type of field is R for Real. (The other option would be a virtual field which we will discuss at a later time). In our case, leave the R and continue to the No. column with the <Enter> key.

Zoom on this column to see the list of fields in the Main File defined in the Header – the Control File.

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MSE MAGIC II 02/02/86
Task Definition

1. Control File Update

Fields

Control

	Field	A/H/I/L/R/E/D/T	Whole	Decimal	Size
1	Control Key	I	2		2
2	Sales Tax	R	3	2	4
3	Last Order No.	I	3		2
4	Customer Message	A			20

Move the cursor down to highlight the first field you wish to select – the Control Key. Hit F9 to accept your selection in the operation. The field description appears automatically.

The rest of the columns allow for many more options in controlling the Data View and program flow. Simple programs do not need these parameters and we will skip them for now.

Hit F4 to open a new line. Type 1, <Enter> to choose a Select Field Operation. Then hit <Enter> to leave the (R)real parameter, and Zoom to see the Field List again. Move the cursor down to the second field, and leave with F9. The second line is ready.

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This is the Display Description Table. This table enables you to open other types of display windows. In our case, we will leave the suggested parameters and continue to draw the input screen itself. Notice that the screen size is 21 Rows by 78 columns, by default.

Zoom on the Display Description to get an empty screen. This is where you draw the screen for the Control File Update Task. At this point, MAGIC offers you a full screen editor, including many functions to make the design of the screen easy and flexible. (See the Reference Manual for more details.) We will introduce some of these functions as we go along.

For this example, follow the steps described below:

1. Use the arrow keys to bring your cursor to row 4 column 23. The row and column coordinates appear in the lower right of your screen.
2. Hit the Zoom (F5) to enter the Field table and choose the field you want to insert on the screen at this position (1). Type <Enter> in the selection box. The field type (I) and the Field description appear in the table.
3. At this point, there are a few parameters you can set for the picture or display of the field. Use the Right Arrow or <Enter> Key to reach these parameters. We want No commas, so leave the N. We also want No negative sign. Change the Y to an N in the Negative parameter field.
4. We will leave all the other parameters at their default values.

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5. Notice that there are two new function keys when we are in this table. F7 for Screen Mode and F8 For Line Mode. Hit F7 and the selected field and its description are placed on the screen at the cursor position. (F8 will position the field value under the description and is used when we are defining the display screen for a task which works in Line Mode)
6. The cursor has moved to the row below the field we just entered and is ready to accept the next field.
7. Go to (7,31) with the directional keys.
8. Hit Zoom (F5), choose the Sales tax field and change the negative parameter to N.
9. Leave the field selection table with the F7 Screen mode key.
10. Now finish the screen placing the Last Order No. at (8,31), and the Customer Message at (13,31)

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Your finished screen should look like this:

```
MSE                                M A G I C  II                       02/02/86
Control File Update

Control Key: 99

Sales Tax: 999.99
Last Order No.: 999

Customer Message: AAAAAAAAAAAAAAAAAAAAA

(14, 31)
```

At this point you have virtually finished writing your first MAGIC program.

Checking the Program

Hit F9 five times to go back through the levels to the Sub-System Menu. As you pass back through the hierarchy of MAGIC, try to review the steps we just followed in "reverse playback".

MAGIC gives you a powerful tool which allows you to check your program for possible errors before you run it. Hit F8 (Check) and wait. If the program is okay, you will come back to the Program Table. If, however, an error is found, MAGIC will put the cursor at the error location displaying the error message. You should then correct it,

leave the program (F9), and check it again (F8) until no errors are found.

Adding the Program to the Program Menu

At this point, all that remains is to add this program to the Program Menu.

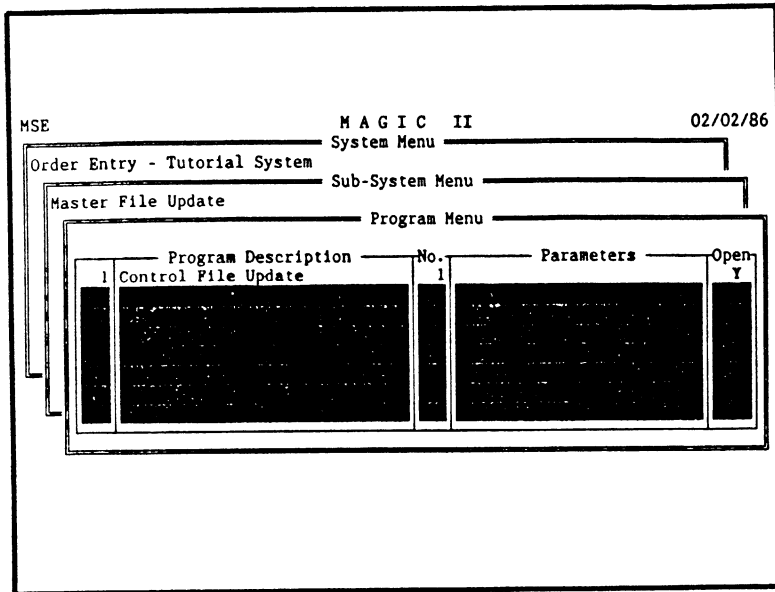
Go to the Master File Update sub-system. You now see the empty Program Menu, which we left blank when we defined all the other application menus. It's time we filled it in.

Hit F1 (Options) to see the Designer Option menu, and choose Menu Maintenance (F1). You then see the empty Program Menu Maintenance screen.

Create a new line with F4. Don't type in the Program description but move your cursor to the Program No. column. Zoom (F5) on this column and select the Control File Update program from the program list. In this case, it is the only program we have written so far. F9 will insert this name and number in the table.

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We need no parameters in this case, so your Table should look like this:



Hit F9 to exit.

You now have a single program in the program menu, and it's time to run the program and see how you did. Hit <Enter> to make the selection from the menu, and run the Control File Update program. You should see the Display Screen which you just designed.



The program has started to run in Create Mode and not Modify as we specified, because the data file is empty and there is no data to modify. The next time we enter the program, we will be in Modify Mode.

Enter the following data:

The Control Key is 1 <Enter>

Sales Tax 10 <Enter>

Last Order No. 1 <Enter>

Customer Message: Congratulations! <Enter>

Hit F9 to Exit.

Now re-enter the program, and you will enter in Modify mode, where all the data you previously entered is displayed.

You have just finished writing and running your first MAGIC program.

Leave MAGIC entirely with F9 to the DOS prompt. Backup the System Control File (OECTL.DAT) with the following command:

```
COPY OE*.DAT *.SAV
```



*If you want to restore these files at a later time, simply type COPY OECTLSAV *.DAT*

Writing the Customer File Update Program

The next program we are going to write is the Customer File Update. The main difference between this program and the previous one is that this program will run in Line Mode rather than Screen Mode.

If you have left MAGIC, re-enter by typing MAGIC <Enter> at the DOS prompt. Enter the Date and go to the Sub-System Menu of the Tutorial system.

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Now hit F1 to enter the Designer Option Menu. Choose F3 to re-enter the Program Dictionary. You should see the Program Description screen.

Hit F4 to add a new entry in the Program Description Table and type the Program name – Customer File Update.

Zoom (F5) on this description to reach the Task Header Screen.

Defining the Task Header

This is automatically Task No. 2. The Main File for the Task is the Customer File. Use the <Enter> key to reach this parameter and Zoom to the File Table. Select the correct file from the table and return with F9. The key is correct as suggested. The remainder of the Header is correct as well. There is no need to make any further changes, so go back with Left Arrow to the Task Description and Zoom to the Execution Definition screen.

Defining the Execution Definition Level

We want to Select Fields in the Main File as we did in the previous program. So, Zoom on the Main section of the Record Level to the lower table.

Open 5 lines with the F4 (Create) key, defining the operations exactly according to this screen:

M A G I C II
Task Definition

02/02/86

2.Customer File Update

Execution Definition

Change	Description	Prefix	Main	Suffix	Abort
1	-- Record	--	5	0	Y
2	-- Task	0	--	0	Y

Op	Operation	Type	No.	Description	Assign	Inp	Exp For		*	Cond
							Min	Max		
1	1 Sel. Field>	R	1	Cust. No.	E	0	0	0	Y	0
2	1 Sel. Field>	R	2	Customer Name	0	0	0	0	Y	0
3	1 Sel. Field>	R	3	Customer Address	0	0	0	0	Y	0
4	1 Sel. Field>	R	4	Customer Discount	0	0	0	0	Y	0
5	1 Sel. Field>	R	5	Customer Terms	0	0	0	0	Y	0

Skip the following columns and position the cursor on the * column of the first operation. You should see a "Y" in this column. Leave this default.



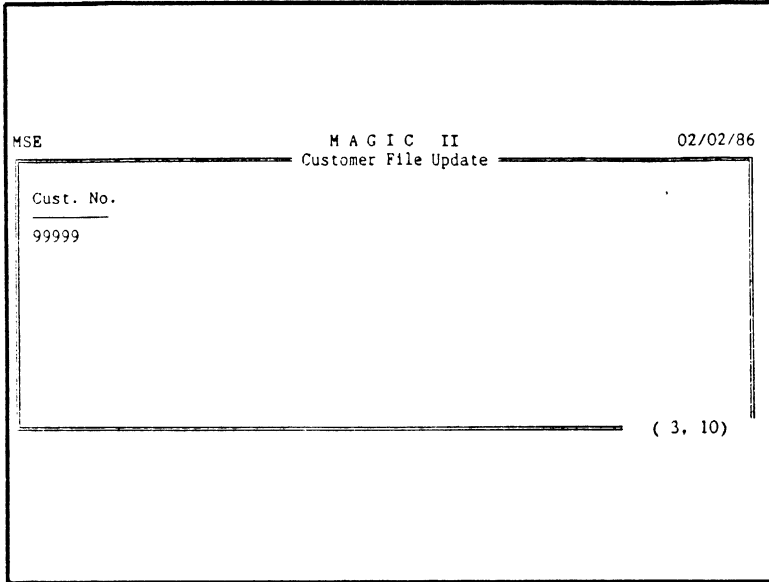
An "N" in a Select Field Operation means that the user is not allowed to change the Range for this field at Run-time.

After you have defined the Execution Definition Table, hit F7 (Draw) to enter the Display Table.

Leave the default Row and Column parameters (21x78) and Zoom to the empty Task Input screen. We want to display this Task in Line Mode.

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Take the cursor to position (3,1) and Zoom to the Field Table. Choose Field No. 1 (Customer No.) and change the negative parameter to N. Then leave the table with F8 (Line) for Line Mode. You should see this:



```
MSE                                M A G I C  II                       02/02/86
Customer File Update
Cust. No.
99999
( 3, 10)
```

Your cursor should automatically be positioned on location (3,10). However, the title for Customer No. is a bit wide. 'No.' would be enough. Take the cursor up a few lines, and DELEte the word "Cust." Then use the DEL key to move the title "No." over to the left a few places and Delete the underline to be flush right.

Take the cursor to position (3,7), Zoom, choose Field No. 2 (Customer Name) and return to the Display Screen with F8.

We want to split the address, which takes up 40 characters, into two lines. Zoom to the Field Table. Select Field No. 3. Then hit <Enter> until you reach the Size parameter which should be (1,40) out of [40]. This means a display of one line of 40 characters. Change this parameter to (2,20) giving two lines of 20 characters each. Exit with F8.

Now place fields 4 and 5 (Discount and Terms) successively in the following positions, changing the negative parameter to N when relevant.

Your screen should finally look like this:

```
MSE                                M A G I C   I I                    02/02/86
                                Customer File Update
-----
No. Customer Name      Customer Address      Customer
Discount Customer Terms
-----
9999 AAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAA 999.99 AAAAAAAAAAAAAAAAAA
      AAAAAAAAAAAAAAAAAA
                                           ( 3, 77)
```

Defining the Task Area

For this Task, we want the records to appear in Line Mode, one beneath the other, each record taking up two lines on the screen. We must, therefore, define a double line as the Task Area.

To mark the Task Area, first make sure the cursor is on the first data line. Hit Alt-L to mark the lines.



Normally an Alt-L will mark the current line. But since this line contains a data field spanning two lines, they cannot be separated. Therefore, both of them are marked.

The marked area is highlighted. Now hit Alt-T. You have defined this double line as the Task Area. If you hit Alt-T again, the area you defined is displayed for you to check.

Marking the Task Area means that the system will fit as many of these marked blocks in the screen as possible. When the user tries to fit more of these blocks in the screen, the system will automatically scroll. Note that the default Alt-T definition is the full screen, as we had in the previous example for a Screen Mode Task, where each screen contains a single record.

To summarize the rules for the use of the Alt-T function:

1. On a new screen, the Alt-T area is defined as the entire screen, by default.
2. If you hit Alt-T when an area is marked on the screen, that area becomes the new Task Area.
3. Hitting Alt-T when no area is marked, shows the existing Task Area.

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In addition to the above, another function of the Task Area in Line Mode is to highlight the current line at Run-time.

Hit Alt-T to highlight the Task Area again. If you don't change the color of this area, the highlighting at Run-time will be as what you see now. To obtain a solid highlighted area, use the Paint option of MAGIC. Hit Alt-P and the color Table appears:

MSB			MAGIC II		02/02/86			
Customer File Update			Customer Discount C		Color		FG-BG	
No.	Customer Name	Customer Address						
99999	AAAAAAAAAAAAAAAAAAAA	AAAAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAAAA	999.99	A	1	Sample	7	0
					2	Sample	15	0
					3	Sample	15	0
					4	Sample	0	15
					5	Sample	0	7
					6	Sample	0	15

(3, 77)

The first 10 entries of this table have been provided for you. The remaining 40 are at your disposal. (Refer to the Reference Manual for their functions). For now, move the cursor down once to color 2 and leave with F9. The entire Task Area is "Painted solid" (Highlighted).

Concluding the Program Definition

Now that the Display Screen is defined for this task, you could hit F9 four times to get back to the Program Description Table. A quicker method of returning to this table is to hit CTRL F9 to leave the program definition level and go directly back to the Program Description Table.

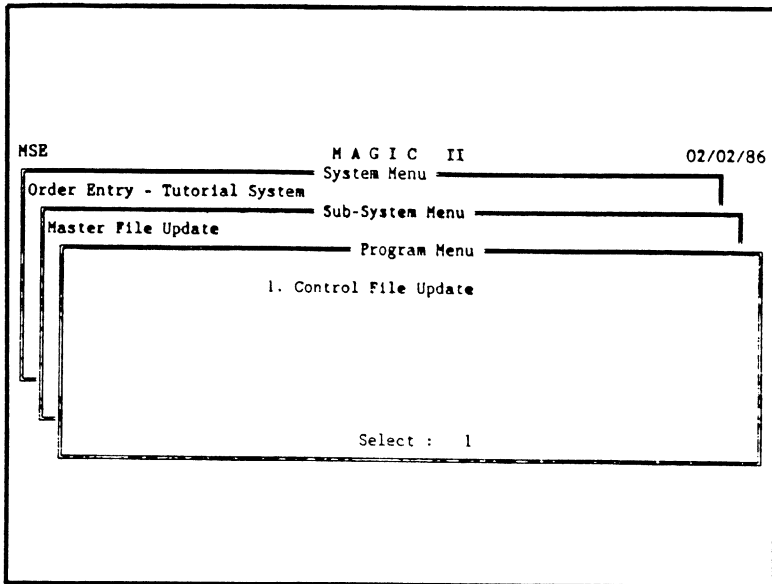


This is the moment that the Task is actually written to the disk in the OECTL.DAT file. If you wish to abort or cancel work that has been done on the program, hit F2 for a local cancel or CTRL F2 to pop back through all levels without incorporating the changes. For security purposes, the F2 function is accompanied by a confirmation request.

Check your program using F8 (Check). Correct any errors found until the program is error free.

Adding the Program to the Program Menu

The last step in this process is to add the program we just wrote to the Program Menu. Go back to the Sub-System Menu, and enter the Master File Update Sub-System. When you see this Program Menu:



Hit F1 twice to reach the Program Menu Maintenance Screen. Add the Customer File Update Program to the Table by hitting F4 to create a new line. Skip the Description field, Zoom on the No. field and select program #2. Hit F9. The program name should appear in the Description column.

Exit with F9 and run the program. Note the size of the Task Window and the attributes of a Line Mode Task. Enter a few customers into your data file (e.g. #1001, 1234, etc.)



The program will start in Create Mode since there are no existing customers in the file.

Backup your System Control File before continuing to the next program. (COPY OE*.DAT *.SAV)

Writing the Item File Update Program

The third program we are going to write for this application is the Item File Update Program. This program is different from the previous two because it utilizes a window to show the Stock Status of the current item. This is how the program display screen looks when the user requests a Zoom to the Stock Status window:

MSE		MAGIC II				02/02/86	
Item File Update							
No.	Description	Type	Price	In Stock	Customer Orders	Vendor Orders	
1000	A Black Shoe	B	22.00	100	34	20	
1001	Pair of Black Shoes	B	36.30	50	50	30	
1002	A White shoe	W	16.50	30	90	10	
1003	Pair of White Shoes	W	13.20	120	70	0	
1004	A Red shoe	R	55.00	40	40	0	
1005	3 Red shoes	R	22.00	50	20	30	
1006	1 Red shoe + 1 Black	M	8				
1007	1 White + 3 Reds	M	85				
1008	2 Pairs of Blacks	B	54				
1009	All White in Store	W	85				
1010	2.5 Red + .5 White	M	7				
1011	Red, White and Black	M	33				
1013	Any 3 Color Shoes	M	19				

Stock Status	
Item: 1000 A Black Shoe	
In Stock:	100
Customer Orders:	34
Available:	66
Vendor Orders:	20
To promise:	86

Modify 1>Opt 2>Can 3>Del 4>Dto 5 6 7 8 9>End 10 ? { }

Please refer to Chapter 1 of this manual to see how this program actually runs. Notice that when the cursor is on the Item No. field, the user can Zoom (F5) to see the

Stock Status of that item only, without the capability of changing the data.

If you have left MAGIC, re-enter through the Main Screen, enter the date and go to the Program Menu Screen of the Master File Update Sub-System in the Tutorial System. Hit F1 and F3 to reach the Program Dictionary.

You should see the Program Description screen containing the previous two programs.

Go down to the bottom of the table by hitting the End key, and create a new line by hitting F4 (Create). Type in the Description – Item File Update. Zoom (F5) to the Task Header of the program.

Defining the Task Header

The Main File of this Task is the Items File (#3) and the Key is the first Key – By Number. The default Mode of Operation is “Modify” and the task is On-Line. Fill in these parameters in the Task Header screen.

When you have finished entering the parameters on the Task Header, Zoom on the Description field to the empty Execution Definition Screen.

Defining the Execution Definition

Zoom (F5) to the lower table from the Main Section of the Record Level. Open 7 lines with F4 (Create) and select the 7 fields of the Items File.

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MAGIC II (0) 27/02/89

MGE Task Definition

3. Item File Update Execution Definition

Change	Description	Prefix	Main	Suffix	Abort
1 --	Record	--	7	0	Y
2 --	Task	0	--	1	Y

Op	Operation	Type	No.	Description	Exp For			Cond.
					Assign	Inp	Range	
1	1 Sel. Field	R	1	Item No.	0	0	0	Y 3
2	1 Sel. Field	R	2	Item Description	0	0	0	Y 3
3	1 Sel. Field	R	3	Item Type	0	0	0	Y 3
4	1 Sel. Field	R	4	Item Price	0	0	0	Y 3
5	1 Sel. Field	R	5	In Stock	0	0	0	Y 3
6	1 Sel. Field	R	6	Customer Orders	0	0	0	Y 3
7	1 Sel. Field	R	7	Vendor Orders	0	0	0	Y 3

1 Flip 2 Can 3 Del 4 Cre 5 Zoom 6 Expr 7 Draw 8 Task 9 End 10 ? ()

Defining a Call for a Sub-Task

Now we want to add a Sub-Task to this Task, which will allow the user to Zoom on the Item No. and see some information on that Item. When he leaves the window, he wants the cursor to come back to rest on the Item No. field.

The Operation which defines a Window Block is: 7-Execute Task.

Go to the top of the Execution Table (above the first line) and hit F4 to create a new line. Enter the operation code 7-Execute Task. Open an additional empty line (Code 0) as a separator.

Now we can go back to the first line and fill in the parameters.

The only parameter you change is in the asterisk column (*). Put a B (Before) in this column. This parameter signifies the following:

1. This Exec. Task appears in the Execution Definition *Before* the field with which it is associated, the Zoom field. In our case, the Item No. field is the Zoom field associated with this Exec. Task.
2. At Run-time, when the cursor parks on the Zoom field, the F5 function is highlighted in the function line, giving the user the option to execute the contents of the task by hitting F5. When the execution of the task is terminated, the cursor remains on the Zoom field allowing user override.



An alternative reply for the asterisk column is A (After). Where the Task definition is placed after the associated "Zoom Field" selection in the Execution Definition. In this case, the Zoom function will be activated when the cursor lands on the "Zoom Field", but when exiting from the window, the cursor will move automatically to the next field, disallowing override. Please refer to the example in the Order Entry Program which follows.

The third alternative reply to this parameter is an N. This signifies that this task is not a Zoom task but a conditional task. The task will be executed if the specified condition in the Condition column is True.

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This is where we write the nested sub-task which we want to run as a window. Take the cursor to the No. Column and Zoom to this empty Task Table:

MSE M A G I C II (0) 27/02/89

3. Item File Update Execution Def Task Name

Change		Description		1	Task Name
1	--	Record			Stock Status
2	--	Task			

Op	Operation	Type	No.	Descrip
1	7	Exec. Task	1	Stock Statu
2	0			
3	1	Sel. Field	A	1 Item No.
4	1	Sel. Field	A	2 Item Descri
5	1	Sel. Field	A	3 Item Type
6	1	Sel. Field	A	4 Item Price
7	1	Sel. Field	A	5 In Stock
8	1	Sel. Field	A	6 Customer Or
9	1	Sel. Field	A	7 Vendor Orde

1 2 Cen 3 Del 4 Cre 5 Zoom 6 7 8 9 End 10 ? []

This is where all the sub-tasks of this program appear. Hit F4 to open an empty line, and type in the Task Name – Stock Status. Hit F9 to leave this table.

We will define the Sub-Task as soon as we have finished the Father task.

This concludes the description of the line added to the Task to allow for the optional Stock Status Window. Before we “go in” to build this Sub-Task, we must finish our Task, by designing the Input Screen.

Drawing the Father Task's Input Screen

Hit F7 (Draw) to enter the Display Table. The description is Item File Update and the default screen size is 21 rows by 78 columns, which is correct for this program.

Now Zoom (F5) to the Input Screen itself. Draw it in Line Mode to match the example below. (Go down to 5,0, Zoom to the Field List (F5) and choose your fields one by one, returning with F8.)

MSE		MAGIC II				02/02/86	
		Item File Update					
No.	Item Description	Item type	Item Price	In Stock	Customer Orders	Vendor Orders	
99999	AAAAAAAAAAAAAAAAAAAAA	A	99,999,999	-999,999	-999,999	-999,999	

(4, 71)

Mark the record line with Alt-L. Hit Alt-P to open the color table, go down to entry 2, and leave with F9. Then set this marked line as the Task Area with Alt-T. Check that you have done this correctly by hitting Alt-T again, then once again to toggle out.

Exit with F9, and go back to the Execution Definition screen of the Father Task.

Defining the Sub-Task

Now, we will go down into the Stock Status Sub-Task. In order to get there, we can either go to the Execute Task line and Zoom from the No. field, or hit F8 from anywhere in this Task to get to the Task Table. Now, hit F8 and the cursor will sit on the only entry in this Table – Stock Status.

Zoom on the Name to the Task Header of this Sub-Task. Note that there is no difference in the method of writing a task or sub-task. All the parameters and screens are exactly the same.

In the upper-left corner, the hierarchy of the program is displayed. The sub-task is numbered 3.1, as it is the first sub-task of program #3.

The Main File of the Task is the Items File, as in the Father Task and the Key is the first key, By Number. After entering these parameters in the Header, Zoom on the Description field to the Execution Definition table.

In this task, we want to select fields for display only, then do some computations on the data.

Zoom to the lower table and open up an empty line in the Main section of the Record Level. In this line, Select Field No. 1 – the Item No.

This is a good example of the use of some of the “Exp For” (Expression For) columns:

Input

Move the cursor to the Inp. Column. Zoom to this table:

Field		File	Expression
A	Item No.	Items	
B	Item Description	Items	
C	Item type	Items	
D	Item Price	Items	
E	In Stock	Items	
F	Customer Orders	Items	
G	Vendor Orders	Items	
H	Item No.	Items	

This is the first time you are presented with the Expression Table. As you will see in the future, it is one of the most powerful tools in MAGIC, and is used in many different situations. You will learn to use this table as we go along.

Open a new line in the table on the right and enter the following expression: 'FALSE'L. This expression always evaluates to a logical False. (The L indicates a Logical value rather than the string 'FALSE') Now hit F9 and the number 1 shows in the Inp. Column, referring to expression 1.

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The rule for the Input Condition is that the cursor will “park” on the field, but the user will be allowed to change the contents of the field, only if the input expression evaluates to True. In our case, we want to park the cursor on the Item No. field but never allow the user to change it. Therefore, we set the Input Expression to Logical False, which, of course, will never evaluate to True.



In other cases, you might want to allow or disallow changing the field content, depending on some condition. This condition will replace the simple 'FALSE' condition we used in this case.

Min – Max

The Minimum and Maximum columns contain a pair of expressions which are responsible for limiting the range of the records which participate in the current data view.

In our case, we want to limit the view to one specific record, the Zoom record. Therefore, we choose to limit the data view in this window by the Item No. from the Father Task, allowing the user to display no other Items.

Zoom on the Min column to the Expression Table and add a new entry at the end of the list with F4 (Create). On the left, you see the list of selected fields. The Item No. in the Items File appears twice (A and H). The first appearance refers to the selection made in the Father Task, while the second refers to this selection in the Son Task. For our purposes, we want to limit the view to the Item No. selected in the Father Task, so type “A” as an expression and hit <Enter>. You can see the field name written at the top of the screen.

translate the expression to a readable form for you.

Now, exit with F9 to the Min column of the Execution Definition. The number 2 will show in this column indicating Expression # 2.

The Maximum of the range definition uses the same expression as the Minimum since we want to limit the view to that single record. Therefore, type 2 in this column and now Zoom. The second expression will be highlighted. Leave with F9.



This last Zoom operation was done only as an exercise to verify the expression, but it is not mandatory. Typing the Expression number is sufficient.

Open a new line and Select Field No. 2 – Item Description.

Condition

For this field, we don't want the cursor to park on the field at all, let alone allow the user to make any changes.

The rule is that the cursor parks on a selected field only if the expression in the Condition (Cond) column evaluates to True. Therefore, if the expression is False the field will appear as display only, and the cursor will skip over this field to the next one.

Bring the cursor to the Cond column of the Item Description Select Operation, and Zoom to the Expression column. Expression #1 is a Logical False. Highlight this expression and return with F9 to the Operation Table.

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This is a good point to summarize the designer's control over field update options. MAGIC first checks the Cond. column. If it evaluates to False, it does not park on the field and continues to the next line in the program. If it is True, it parks on the field and checks the Inp. condition. If this, in turn, is False, input is disallowed. If it is true, input is allowed.

Repeat the procedure described above for the "In Stock" (5) and "Customer Orders" (6) fields including the 'FALSE' in the Cond column.

You should see this final result:

MSE		MAGIC II				02/02/86			
Task Definition									
3. Item File Update 1. Stock Status									
Execution Definition									
Change	Description	Prefix	Main	Suffix	Abort				
1	-- Record	--	4	0	Y				
2	-- Task	0	--	0	Y				

Op	Operation	Type	No.	Description	Assign	Inp	Exp For		Min	Max	*Cond
							Range	Range			
1	1 Sel. Field>	R	1	Item No.	0	1	2	2	Y	0	
2	1 Sel. Field>	R	2	Item Description	0	0	0	0	Y	1	
3	1 Sel. Field>	R	5	In Stock	0	0	0	0	Y	1	
4	1 Sel. Field>	R	6	Customer Orders	0	0	0	0	Y	1	

Virtual Fields

The next field we want to display in the window is a field which will show the total quantity of this item which is currently available. That is the 'quantity in stock' less the 'customer orders'. This will be a virtual field, which is defined as a field which is recognized only for the life of the task.

Make sure that the cursor is on the last line (Sel. Field Customer Order) and open line 5, enter a Select Field Operation (1) and type a V (Virtual) in the Type column. Now continue to the No. column and Zoom (F5) to the empty Virtual Field Table.

This Table behaves exactly like another Field List in the Data Dictionary. Note that all virtual fields belong to a "Virtual" file displayed in the Upper Left corner.

Open a new line in the Table (F4), and enter this data:

Field:	Available
A/I/L/R/E/D/T	L
Whole	6

Then return to the Execution Definition Table with F9, bringing the virtual field name with you.

Assign

Move to the Assign column. We want to assign a computed value to this field. Zoom to the Expression Table, use the End key to go to the end of the list, and open a new line (F4).

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Now you are looking for the fields "In Stock" and "Customer Orders" to subtract the second from the first. Since they do not show in the list on the left, you can Zoom to that side of the screen and start searching for the fields you need using the Directional Keys. The corresponding letters for these fields are J and K. So go back to the Expression table (F9) and type J - K. The translation "In Stock - Customer Orders" will show at the top of the screen.

Leave this table with F9, and a 3 will show in the Assign Column.

This field will be displayed with the value of the subtraction of the previous two fields. However, we want to ensure that this is a display only field, so enter the condition 'FALSE'L in the condition column as above.

Now open a new line and select the Real field #7 - Vendor Orders, making its Condition 'FALSE'L.

The Last Select Field Operation ("To Promise") refers again to a virtual field, which is assigned the value of the fields "In Stock - Customer Orders + Vendor Orders" (J-K+M). This field, as all the others, is a display field only.

Repeat the same procedure you followed for the Available field. Add a new virtual field called "To Promise" as Long 6. Go to the Assign column, Zoom, go to the end of the Expression list, open a line, Zoom to scan the field list, return with F9, type J-K+M, hit <Enter> to see the translation of the formulae. Then hit F9 to see the 4 appear in the Assign column. Enter 1 in the Cond. column.

The final result of this Record Level Main should look like this:

MSE		MAGIC II				02/02/86				
		Task Definition								
3.Item File Update		1.Stock Status								
Execution Definition										
		Change	Description	Prefix	Main	Suffix	Abort			
1	--	Record		--	7	0	Y			
2	--	Task		0	--	0	Y			
				Exp For						
				Range						
Op	Operation	Type	No.	Description	Assign	Inp	Min	Max	Y	Cond
1	1 Sel. Field>	R	1	Item No.	0	1	2	2	Y	0
2	1 Sel. Field>	R	2	Item Description	0	0	0	0	Y	1
3	1 Sel. Field>	R	5	In Stock	0	0	0	0	Y	1
4	1 Sel. Field>	R	6	Customer Orders	0	0	0	0	Y	1
5	1 Sel. Field>	V	1	Available	3	0	0	0	Y	1
6	1 Sel. Field>	R	7	Vendor Orders	0	0	0	0	Y	1
7	1 Sel. Field>	V	2	To Promise	4	0	0	0	Y	1



In every task the cursor must have at least one field in the task upon which it can park. In this task, the first field was defined with a conditional input limit, which allows the cursor to park but disallows user input. The remaining fields were defined with no cursor parking at all.

Drawing the Stock Status Window

Hit F7 (Draw) to enter the Display Table for the window. Notice that the display block for the Father Task appears in the Table on the first line and the second line has been automatically created for the window of this task. (Each MAGIC task has a window – at some time you

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may choose not to use it and write on the Father task's window, as we will see later.)

The top task is always assigned a window of maximum size (21x78). The second task's window size is up to you. As you can see, the default is 0x78. Change the Rows to 10 and the Col to 33.

Now, we would like to change the color of the entire task window. Move to the Color column and Zoom to the Color Table. Go down to choose the fifth entry and leave (F9). This will "reverse" the background of the Stock Status window and highlight it as you will see below.

Now go back to the Display Description column and Zoom to the Display screen itself.

Your Stock Status window appears with only a title and no depth. Now hit the Scroll key and you see the Content Position of the window. The Frame is 2x35 and the Content is 10X33. We must, therefore, both reposition and expand the frame so we will be able to see something inside it.

Hit F1 to see the Windowing Options Menu.

Frame Location and Size

The first step is to locate the window Frame on the screen. Hit F2 and use the Right Arrow Key to bring the window all the way to the right side to this position:

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MSE MAGIC II 02/02/86
Item File Update

No.	Item Description	Item type	Item Price	In Stock	Customer Orders	Vendor Orders
99999	AAAAAAAAAAAAAAAAAAAAA	A	99,999,999	-999,999	-999,999	-999,999

Stock Status

Frame Pos. : Frame 2x35, Content 10x 33 (0, 0)

Now hit F1 and choose F3 to enter the Frame Size option. Now use the Down Arrow key to expand the Frame of the window, until it is 12x35. (Keep hitting the Down Arrow, MAGIC will stop at the maximum size.) The frame should be two characters larger than its contents, if you do not want scrolling within the window.

Hit F1 and F2 again to position the window at the Bottom Left corner. Do that by hitting PgDn. The window is now ready to enter the data into it.

Hit Scroll to toggle out of the Framing option.

Place the fields in the Stock Status Window, using F5 to Zoom to the Field Table and F7 to return in Screen Mode. Use the following selected fields from the Sub-Task: #8,9,10,11,12,13,14. Make sure you display the sub-task fields and not the selected fields from the father task.

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MSE		MAGIC II			02/02/86	
Item File Update						
No.	Item Description	Item type	Item Price	In Stock	Customer Orders	Vendor Orders
99999	AAAAAAAAAAAAAAAAAAAAA	A	99,999,999	-999,999	-999,999	-999,999

Stock Status	
Item: 99999	AAAAAAAAAAAAAAAAAAAAA
In Stock:	-999,999
Customer Orders:	-999,999
Available:	-999,999
Vendor Orders:	-999,999
To Promise:	-999,999
(2, 6)	

The program comprised of its two tasks is ready. Exit with Ctrl F9 all the way through the programs back to the Program Description screen, check the program (F8) and correct errors. Hit a final F9 to go back to the Menu.

Adding the Program to the Program Menu

Hit F1 twice to reach the Program Menu Maintenance Screen and add this third program (Item File Update) to the Menu.

Dumping the Program in Document Mode

At this point, try dumping the program you have just written in Document form. Choose this option from the Option Menu, giving the program number. You will see that the document mode program dump is a highly readable form of the programs.

Run the program, according to the explanation found in Chapter 1: Using a MAGIC Application.

Before you continue to the next lesson, leave MAGIC and backup all your files. (COPY OE*.DAT *.SAV).

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Lesson 4: Report Programs (I)

In this section, you will learn how to write a simple report with MAGIC – the Customer List. In the second half of the lesson, we will show you how to design a more complex report – the Stock Value by Item Type – which includes Totals and Sub-Totals.

Design the Customer List Report on Paper

Before you start writing the program, you must design the report on paper. This is the report we want:

ABC LTD.				Date: 99/99/99
				Page : 999
CUSTOMER LIST				

No.	Name	Address	Discount	Terms

9999	AAAAAAAAAAAAA	AAAAAAAAAAAAA AAAAAAAAAAAAA	99.99	AAAAAAAAA

This report is divided into two logical parts – the Report Header and the Customer Lines. These parts are called Display Blocks. The 'Header' should show at the top of each page and the 'Customer Lines' are printed

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for each customer record. MAGIC allows you to design this report on the screen exactly as you drew it on paper.

Task Header Screen for the Report

If you have left MAGIC, re-enter and go to the Program Dictionary of the Tutorial System. Add a new program to the Program Table – Customer List.

Now Zoom on the Program Description to reach the Task Header Screen. The Main File of this Task is the Customer File. The system suggests the first File Key–“By Number” as the Main Key of the Task. For our purposes, the key “By Name” is more useful, so the list will be automatically alphabetized. Change the key to 2. Leave the Mode of Operation default as “Modify”.

The Task Type is, of course, Batch for a Report Task. Change the parameter to B.

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Your cursor should now be on the More Information parameter. Zoom into this field and you should see these defaults:

```
MSE                                M A G I C   I I                    02/02/86
                                Task Definition
4. Customer List

Task No. : 4.

Task Description : Customer List

Main File : 2 Customers

More Information
Open Files : Modifiable (Y/N) : Expression for : Conditions (Y/N) :
DB : 1      Options : Y          Locate : 0      Open Window : Y
I/O : 1     Modify : N          Range : 0      Close Window : Y
           Create : N          End : 0       Record Cycle : Y
           Delete : N         Delete : 0     Repaint Screen : N
           Locate : N         Form Lines : 0 Resident Task : N
           Range : Y          Task Help : 0
           Key : Y
           Sort : Y
           I/O Files : Y
```

Most of these parameters are used in more sophisticated programs. You can, for example, give expressions here to limit the Range for the entire task, or give End conditions. At this point, we want to leave all the defaults as they are and bring the cursor to the I/O (Input/Output) parameter to define our Output File.

Zoom on the I/O field. You should now see an empty I/O File Table. Open up a new line and type in a name for our Destination File – “Report Output”.

This is an Output File, so leave the O in the I/O/S (Input/Output/Sequential) column. The Expression column is used to enter an expression or file name and

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change the destination of the report from the printer, which is the default, to the console ('CON:' or 'console') or to a disk file (e.g. 'Customer List'). For our report, enter no expression.

The Lines column is used to change the 66 lines per page default. Skip this parameter as well.

The next two columns allow (Y) or disallow (N) the user to change the file destination (Name) and the lines per page. Leave them as Y.

As you can see none of the default values have changed, and the only entry you made was the file description.

MSE MAGIC II 02/02/86
Task Definition

4. Customer List

	File	I/O/S	Exp	Lines	Mod. Name	Mod. Lines
1	Report Output	0	0	0	Y	Y

Expr
Ran
E
Dele

Y/N) :
ow : Y
ow : Y
le : Y
en : N

Leave the window with F9.

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When you return to the More Info window, you should see that the parameter has been updated to reflect the single file you entered in the table. Leave with F9, and hit <Enter> to reach the Task Description.

Choose the Data View in the Main Section of the Record Level

Now Zoom to the empty Execution Definition screen. The first step is to Select the Fields participating in the Task in the Main Section of the Record Level, exactly as we did in an On-Line Task.

Zoom to the lower table and select the fields as follows:

MSE MAGIC II 02/02/86

Task Definition

4.Customer List

Execution Definition

Change	Description	Prefix	Main	Suffix	Abort
1	-- Record	--	5	0	Y
2	-- Task	0	--	0	Y

	Op	Operation	Type	No.	Description	Exp For				*Cond	
						Assign	Inp	Min	Max		
1	1	Sel. Field>	R	1	Customer No.	0	0	0	0	Y	0
2	1	Sel. Field>	R	2	Customer Name	0	0	0	0	Y	0
3	1	Sel. Field>	R	3	Customer Address	0	0	0	0	Y	0
4	1	Sel. Field>	R	4	Customer Discount	0	0	0	0	Y	0
5	1	Sel. Field>	R	5	Customer Terms	0	0	0	0	Y	0

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Design the Selection Screen

At this point, hit F7 to reach the Display Table, where we will design the Input Screen which the user will see when running the report. Make no changes in this table and Zoom to the Screen itself.

Now draw the Screen as follows, Zooming to the field screen, using F7 to leave, inserting the fields and their respective names in Screen Mode:

```
MSE                M A G I C  II                02/02/86
----- Customer List -----
Cust. No.: 99999
Name: AAAAAAAAAAAAAAAAAAAAAA
Address: AAAAAAAAAAAAAAAAAAAAAA
Discount: -999.99%
Terms: AAAAAAAAAAAAAAAAAAAAAA
( 0, 0)
```

To split the Address field into two lines, define the Size of the field as (2,20) out of [40], as we did in the Customer File Update screen.

At this point, you can use the directional keys, as well as the Insert and Delete keys to improve the aesthetics of the Screen. Since the title of the entire screen is Customer List, it is unnecessary to write the word Customer all over the screen. Delete the word Customer wherever you think it is not needed. Add the % sign after the Discount field.

To center the block of fields on the screen, do the following:

1. Go to the 'C' of 'Cust. No.' and hit Alt-B.
2. Go to the rightmost 'A' of the Terms field and hit Alt-B again.
3. The Block is now marked.
4. Hit Alt-C to see the Block centered on the screen.
5. Alt-U will unmark the Block.

When you have finished designing the Display Screen, hit F9 to go back to the Display Table. Now we can design the Report Layout.

Display Blocks for the Report

As we mentioned above, this report is divided into two logical parts called Display Blocks – the Report Header and the Customer Lines. Add two new lines to the Table for these two Display Blocks by hitting F4 twice.

Name the two Display Blocks – Report Header and Customer Lines.

Notice that the two new Blocks are defined as Class 1 by default. Class 0 is reserved for the Task Window itself, which is always the first Display Block. The following

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Blocks are, in our case, grouped together in the same Class. If we have more than one report per task, different class numbers will group the Display Blocks for each report.

The following column (H/F) is the Header/Footer parameter. The default is Header. Footers will be used for Total and Sub-Totals on more complex reports, such as the Stock Value Report in the next lesson.

In the Rows parameter, you must enter the number of rows in the Display Block. In this Report, enter 8 rows for the Header and 2 rows for the Customer Lines Block.

The width of the report can be changed. For now, we will leave the default of 132 columns.

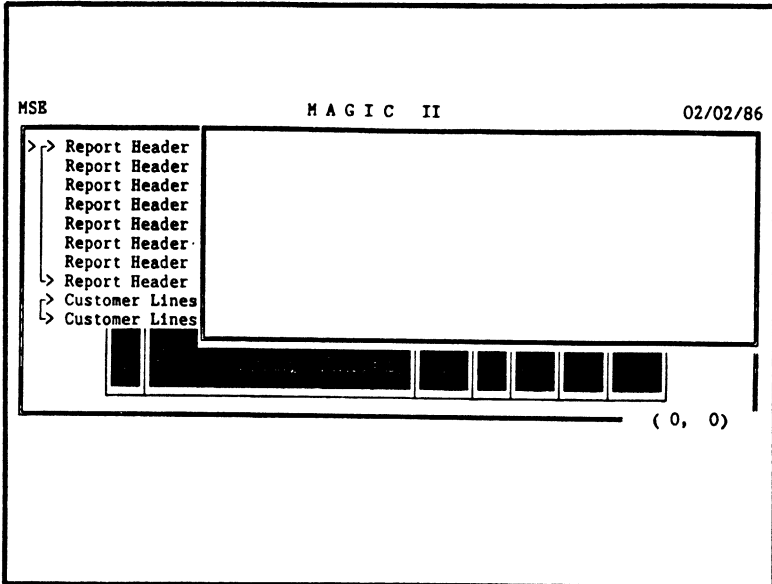
The Color parameter is not used for printing.

Now your Display Table should look like this:

```
MSE                M A G I C   I I                02/02/86
----- Task Definition -----
10.Customer List
  Display Description      Class/H/F/Rows/Cols/Color
 1 Customer List          0  H   21   78   1
 2 Report Header          1  H    8  132   1
 3 Customer Line          1  H    2  132   1
```

Drawing the Report Layout

Make sure you are in the 'Report Header' column and Zoom (F5) to the Layout Screen. You should see a screen, where the upper window is exactly 10 lines long, which is the length defined previously in the Display Blocks. Now hit ALT-X and you should see this:



On the left, you see the breakdown into Display Block Areas. As you move the cursor through the lines of the Blocks, note that the Position (x,y) shown in parentheses in the lower right of your screen is your relative position in each block, and not in the entire screen.

Hit Alt-X again and the marking will disappear. Hit Alt-S and only the boundaries will show. This is done for those who would like only a small area of their screen taken up by the markings. Hit Alt-X again to resume the

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extended marking.

Now you just need to draw your report. We recommend that you enter the Customer Lines fields first, so you know how to align the Header properly above them.

Take the cursor down 8 lines to line (0,0) of the Customer Lines Block and Zoom to the Field Table. Choose Field No. 1 from the Customer File, and return with F8.

Select each of the five fields, and place them on the screen. Remember to define the size of the Address field as (2,20) out of [40] characters, so it will be split to two rows on the printed report.

Fix the titles and turn off the Alt-X. You should end up with this result:

No.	Name	Address	Discount	Terms
99999	AAAAAAAAAAAAAAAAAAAA	AAAAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAAAA	999.99	AAAAAAAAAAAAAAAAAAAA

(6, 0)

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Go to the top line of the Header Block. Now we want to enter the Company Name, Date and Page No. Place the cursor at position (0,0) (Home) and Zoom (F5) to the Field Table. Do not enter a Field No. but continue right to the Expression parameter. Zoom (F5) on this field. You now see the empty Expression Table. Open a new line and type in the function - OWNER(). This function returns the Owner Name as defined in MAGIC. Hit F9. As you can see, MAGIC has given default values to this "field" as A(30). Hit F9 again to see the Owner field on the Display Block.

Now hit End to get to the right margin of the Report, where we want to print the Date and Page No. Note that the Report is really too wide and we do not need the full 132 columns. Actually we need only about 76 columns. Go back to the Display Table (F9) and change the Columns parameter to 78 for both Display Blocks. This will allow the User the additional option of sending the Report to the console at Run-time, because 78 columns will fit across his screen.

Hit F5 to Zoom back into the Layout Screen, hit End on the first line of the Header Block, then move the cursor to column 63. Enter the Field Table, skip the Field No. parameter, move right and Zoom to the Expression Table. Under the Owner function, enter this Expression for the Date : DATE(). This function returns the System Date. Go back to the Layout Screen with F9 twice.

Bring the cursor down one row, Zoom to the Field Table and to the Expression Table. The function which returns the current page number must specify which Output File and which Task is being referred to. The function is defined as follows : PAGE(0,1) where the first parameter (0) refers to the Current Task (1 -Previous task, 2 - One before the Previous task) etc. and the

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second parameter refers to the Output File which is being used. In this case, we defined only one Output File (in the More Info section of the Header), thus the parameter supplied is 1. PAGE(0,1) means the Page No. for this Task, in the first Output File.

Leave with F9 twice, and add the 'Date:' and 'Page:' headings.

Type in the Title of the Report in row 3, column 0, and the underline characters in Row 4 column 0. Mark the Title (Name and Underline) with Alt-B's in the upper left and lower right corners, and hit Alt-C to center the Title on the Report page. Hit Alt-U to unmark the block.

Turn off the Extended labels on the left of the Display Screen with Alt-X if active, and you should see the entire Report Screen Layout.

MSE M A G I C II 02/02/86

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA Date: 99/99/99
Page: 9999

CUSTOMER LIST

No.	Name	Address	Discount Terms
99999	AAAAAAAAAAAAAAAAAAAAAAAAAAAA	AAAAAAAAAAAAAAAAAAAAAAAAAAAA	999.99 AAAAAAAAAAAAAAAAAAAAAA

(3, 32)

Leave with F9 twice to the Execution Definition.

Writing the Display Blocks in the Execution Definition

The last step in this Report program is to specify in the Execution Definition when each Display Block is printed. This is the first time we discuss the function of the upper table of the Execution Definition. Bring your cursor back to the Record Main Box in the upper table. Now hit Down Arrow. The task Prefix box is highlighted and the bottom table is empty. Zoom to the lower table. All the Operations that are entered here will be executed only once, at the beginning of the Task (Task prefix), before the Record level is executed.



The exact parallel to this is the Task Suffix, which will be executed once, at the end of the Task, just before termination.

In our report, we want to write the Report Header before anything else, and only once. The system will take care of printing it again at the top of a new page.

Therefore, open a new line and choose Operation 10 – Write to a File. Hit <Enter> and Zoom into the Display> parameter, choose the Display Block which this Task is supposed to Write – 2. Report Header and return with F9.

In the File parameter on the right, you have a default of 1. Zoom to the File Table, where you see the Output File you previously defined in the More Info section and leave this default with F9.

Continue to the * column of the Operation Definition. The options in the * column for the Write File Operations are S–Skip, A–Automatic and T–Top. The Default is A for Automatic, which we will explain in the next section. In this operation, change the parameter to T, which ensures that this Display Block is always printed

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at the Top of a Page.

The screenshot shows the 'MAGIC II' interface with the following details:

- MSB: MSE
- Task Definition: 4. Customer List
- Date: 02/02/86
- Execution Definition Table:

Change	Description	Prefix	Main	Suffix	Abort
1 --	Record	--	5	0	Y
2 --	Task	1 --		0	Y
- Operation Definition Table:

Op	Operation	Type	No.	Description	Assign	Inp	Range	Min	Max	*	Cond
1	10 Write File>	Disp>	2	Report Header	File>	1				T	0

This is the only operation needed at the Task Prefix level. Leave with F9.

The next Display Block, Customer Lines, is printed after each record is read. This Block, therefore, is printed in the Record Suffix. Bring the cursor to the Record Suffix Box, Zoom and open a new line and type in the Operation code 10. Write File. Hit <Enter>.

The Disp> parameter is Display Block 3 - Customer Lines and the File parameter is File 1, the only File defined for this Task.

In this case, we will leave the default of A - Automatic in the * column. The purpose of this parameter is to tell the system what to do if this Display Block encounters an End of Page. If the parameter is Automatic, and an End of Page is encountered before the Block is written,

the system will skip to the next page, then automatically display all the previous Header Display Blocks in the same class at the top of the page, before printing this Block. In this way, you are assured that the titles always appear on each page. In our case, when the system is about to write the Customer Lines and sees that there is not enough room on the page for *both* lines, it will continue to the next page, and print the Report Header before printing the Customer Lines.

Here again, this is the only operation needed in the Record Suffix.

Leave with Ctrl F9 and check your program (F8).

Adding the Customer List to the Menu

We have now finished writing the Customer List Report. Now you need only add this Report to the Program Menu. Go into Menu Maintenance in the Reports and Analyses Sub-System and add the Customer List at the top of the Menu.

Run the Program. Notice that you can change the range of records participating in the Report, as well as the Sort Order and Key.

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If you want to see the Report on the console rather than on the Printer, which is the default, choose the Files Option from the Side Menu (8). You should see this window:

The screenshot shows a terminal window titled "MAGIC II" with the date "02/02/86" in the top right corner. Below the title bar, the text "Customer List" is displayed. A sub-window titled "Files" is open, containing a table with the following columns: "File", "I/O", "Name", and "Lines". The table has one row of data: "Report Output", "0", "console", and "0". The "Name" column contains a redacted area.

File	I/O	Name	Lines
Report Output	0	console	0

Type in the code CON: or simply the word "Console" in the name column. Exit with F9 and Run (F1) the program again. At the end of every page, hit any character to display the next page.

Designing the Stock Value Report by Item Type

The next report we are going to write is the Stock Value Report by Item Type. This report is slightly more complex than the previous one. It includes Totals and Sub-totals on different break levels. However, the basic principles are identical to those presented in the previous section.

Design the Report on Paper

The first stage of writing any report is to draw the report on paper. This is the outline of the report we want to print:

	Company name		Date: 99/99/99	
REPORT HEADER			Page: 999	
	STOCK VALUE BY TYPE			

TYPE HEADER	Item Type: A			
	Item	Description	In Stock	Price Value
->ITEM LINE	9999	AAAAAAAAAAAAAAAAAAAAAAAAA	9999	999.99 9999.99
	"	"	"	"
	"	"	"	"
TYPE FOOTER				Total for Type A: 9999.99
	Item Type: B			
	Item	Description	In Stock	Price Value
	9999	AAAAAAAAAAAAAAAAAAAAAAAAA	9999	999.99 9999.99
	"	"	"	"
	"	"	"	"
REPORT FOOTER				Total for Type B: 9999.99
				----- GRAND TOTAL: 9999.99

Notice that we want a Header for the entire Report, in addition to separate Headers for each of the Item Types. We also want to compute the value of the stock for each item, with sub-totals for each type and a grand total for the entire Report. We have, therefore, different levels of Headers and Footers.

Defining the Task Header

Now go into the Program Dictionary and add a new program to the Program Table – Stock Value by Type. Then Zoom to the Task Header.

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The Main File of the Task is File 3 (Items) and the Key is "By Type". Leave the Mode parameter 'M' (Modify) and change the Task Type to B (Batch).

Zoom to the More Information window. We want to ensure that the user does not change the Key or the Sort sequence of the Task at any time, because the entire structure of the Report is based on sub-totals by a certain Item Type. Therefore, change the Modifiable parameters for Key and Sort to 'N'. Leave the Range open to user choice. He can then print the Report for a particular Range of records, without being allowed to change their sequence.

Open a File in the I/O Table named "Report Output", and don't change any of the other parameters.

MSE	MAGIC II	02/02/86	
Task Definition			
5. Stock Value by Type			
Task No. : 5.			
Task Description : Stock Value by Type			
Main File : 3 Items			
More Information			
Open Files :	Modifiable (Y/N) :	Expression for :	Conditions (Y/N) :
DB : 1	Options : Y	Locate : 0	Open Window : Y
I/O : 1	Modify : N	Range : 0	Close Window : Y
	Create : N	End : 0	Record Cycle : Y
	Delete : N	Delete : 0	Repaint Screen : N
	Locate : N		Resident Task : N
	Range : Y	Form Lines : 0	
	Key : Y	Task Help : 0	
	Sort : Y		
	I/O Files : Y		

Defining the Record Main Section

Now enter the Execution Definition of the Task on the Record Main Level. First select your Data View, including a virtual field 'Value', E(8,2) with an Assign expression of (In Stock * Item Price) (D*E). Add two extra lines at the end of this Table and define 2 more Virtual Fields – “Total for Type” and “Grand Total”. These will be our 'total buckets' for the length of the program.

The Record Main Operations should look like this:

MSE MAGIC II 02/02/86
 Task Definition

5. Stock Value by Type Execution Definition

Change	Description	Prefix	Main	Suffix	Abort
1	-- Record	--	8	0	Y
2	-- Task	0	--	0	Y

Op	Operation	Type	No.	Description	Assign	Exp For			*	Cond
						Inp	Min	Max		
1	Sel. Field>	R	3	Item type	0	0	0	0	Y	0
2	Sel. Field>	R	1	Item No.	0	0	0	0	Y	0
3	Sel. Field>	R	2	Item Description	0	0	0	0	Y	0
4	Sel. Field>	R	5	In Stock	0	0	0	0	Y	0
5	Sel. Field>	R	4	Item Price	0	0	0	0	Y	0
6	Sel. Field>	V	1	Value	1	0	0	0	Y	0
7	Sel. Field>	V	2	Total for Type	0	0	0	0	Y	0
8	Sel. Field>	V	3	Grand Total	0	0	0	0	Y	0

Define the Display Blocks

Once you have defined the Data View of the Task, hit F7 to go into the Display Definition. Then define the Display Blocks for the different levels.

The first Block is the 0 Display Block, the default class for the Task Window. Leave the defaults for this Block. Use F5 F7 to choose your fields and design the screen to look like this:

```
MSE                               M A G I C   I I                       02/02/86
----- Stock Value Report -----
Item Type: A

Item No.: 99999
Item Description: AAAAAAAAAAAAAAAAAAAAAA

In Stock:   -999,999
Item Price: -999,999.99
-----
Value: -99,999,999.99

( 0, 0)
```

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Come back to the Display Table with F9 and create 5 lines for the five Display Blocks. Fill in the lines to look *exactly* like this:

MSE		MAGIC II				02/02/86	
		Task Definition					
5. Stock Value By Type							
		Display Description	Class	H/F	Rows	Cols	Color
		1 Stock Value Report	0	H	21	78	1
		2 Report Header	1	H	5	78	1
		3 Grand Total	1	F	3	78	1
		4 Type Header	1	H	6	78	1
		5 Type Total	1	F	2	78	1
		6 Item Line	1	H	1	78	1
Op-							Cond
7	0						0
8	1						0
9	1						0

Note that the Display Blocks are paired-off. Each Header with its Footer. The rule is: Enter the Top Header block, then its Footer; enter the next Header Block and *its* Footer, etc. The Item Line has no Footer.

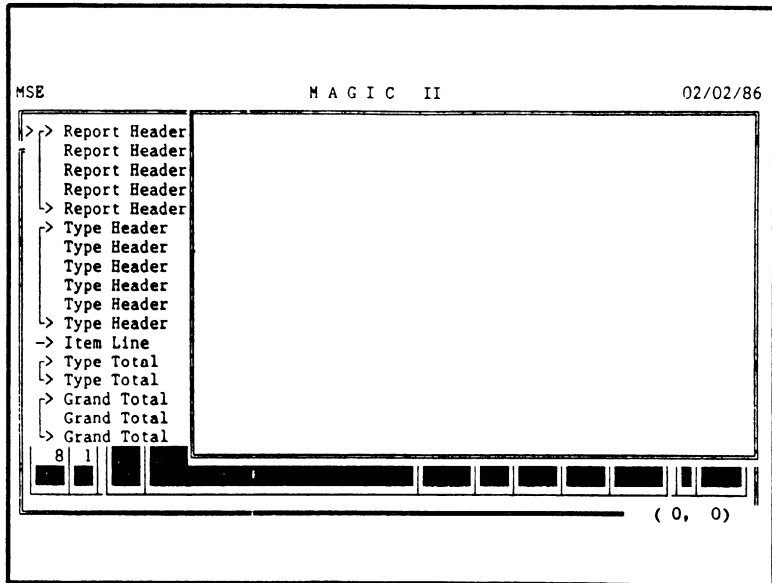
Although the 'Natural' way to enter the Blocks might seem to be to enter all Headers and then all Footers, the advantage of entering them in this way is the fact that the system will know which Headers to print for each Footer at the Top of the Page - only those above it on the list. For example, if the End of Page (EOP) occurs on the Grand Total Block, only the Report Header (the only Header above it) will show at the top of the next page. If the EOP occurs at the Type Total Block, we will get both the Report Header and the Type Header. The

same holds true for EOP on Item Line.

It is very important to pair the blocks correctly, not only because of the above EOP problem but also because of the manner in which the blocks are displayed on your Layout Screen, as you will see in the next stage.

Drawing the Display Blocks

Zoom to the Report Block from any field on the class 1 Display Block List, and hit ALT X:



If you placed the Header/Footer pairs correctly on your Display Table, they will appear here in the correct order as well. That is, the three headers first, and then the Footers in reverse order. The last Footer in the Display Table (Type Total) shows first here, followed by the Grand Total. This way we can design the Report normally, and also gain the EOP hierarchy explained above.

Record Level

The Record Suffix is used to :

1. Increment the counters
2. Write the Item Line Block

Bring the cursor to the Record Suffix box, Zoom to the Record Suffix Operation Table, open the first line and enter an Update Field (Operation 9).

Zoom on Field> to choose the field to be updated which is #7 "Total for Type". Select the field and return with F9.

Advance to the EXP> parameter and Zoom to enter the Expression for the update and enter G+F in the table, meaning the previous "Total for Type" + this record's 'value'. Return with F9.

Leave the Mod parameter 'N', and the * column 'N' as well.

Now open a new line and repeat the same operation (9) for field #8 (Grand Total) with the expression H+F (Grand Total + Value).

After updating the counters, the Record Suffix must write the Display Block which is associated with it – the Item Line. Add a Write File (10) Operation which writes the Item Line Block.

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The Record Suffix should look like this:

MSE M A G I C II 02/02/86
Task Definition

5. Stock Value By Type Execution Definition

Change	Description	Prefix	Main	Suffix	Abort
1 --	Record	--	8	4	Y
2 --	Task	0	--	0	Y

Op	Operation	Type	No.	Description	Assign	Range		*Cond			
						Inp	Min		Max		
1 9	Upd. Field>	Field>	7	Total Value (Type)	Exp>	5	Mod	N	N	0	
2	9	Upd. Field>	Field>	8	Grand Total	Exp>	6	Mod	N	N	0
3	0									0	
4 10	Write File>	Disp>	6	Item Line	File>	1			A	0	

Leave the Record Suffix operations (F9) and return to the upper table.

Defining the On-Change Block

The additional level which has been added here is the On-Change level. The change criterion defines a block of records which are similar in at least this aspect. Once established, the On-Change criterion entry allows the definition of Operations which will serve as a Prefix and a Suffix to the Block of records. There is no Main Section on this level, since we are directing the Task what to do at the beginning and end of a series of records.

It is important to note that the moment a change is recognized, the system performs the operations specified in the suffix of the previous block of records before con-

tinuing. You can enter as many On-Change Levels as needed and the system will automatically assume a break in a lower level when a break takes place in a higher level. Please refer to Chapter 4: MAGIC Elements for more information on this subject.

To define the On-Change, make sure your cursor is on the Record line of the Execution Definition and open a new line with F4 between the Record and Task Levels.

Now you need to enter the Change criterion. This criterion defines a block of records which have the same Type. This block of records ends and a new block begins every time the Item Type changes. Zoom on the Change column to see this table:

MSE MAGIC II 02/02/86
Task Definition

5. Stock Value By Type

		Change	Descr	Ex	Field	File
1	--	Record		1	Item Type	Items
2	--	Task		2	Item No.	Items
				3	Item Description	Items
				4	In Stock	Items
				5	Item Price	Items
				6	Value	Virtual
				7	Total Value (Type)	Virtual
				8	Grand Total	Virtual

Op	Operation	Type	No.
1	9 Upd. Field>	Field>	7
2	0		
3	10 Write File>	Disp>	4

Choose Item Type as the Change Criterion.

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Now we will define the Operations which take place at the beginning of a block of similar records and at the end of such a block of records.

As we mentioned above, each program level maintains its counters and writes its associated Display Blocks. In this case, at the beginning of each set of records of a certain Type, we want to zero the "Total for Type" counter and print the Type Header. At the end of each Type, we want to print the Type Footer, which includes the Type Total, before going on to the next series of records.

Therefore, move your cursor to the Item Type Prefix Box and Zoom to the Lower Table, preparing it as follows, where the value in the Update Field Expression for the counter is 0 and the Write File Operation prints the Type Header Display Block (4).

MSE		MAGIC II				02/02/86	
Task Definition							
5. Stock Value By Type							
Execution Definition							
Change	Description	Prefix	Main	Suffix	Abort		
1	--	Record	--	8	4	Y	
2	1	Item Type	3	--	1	Y	

Op	Operation	Type	No.	Description	Assign	Inp	Exp For		Min	Max	**	Cond
							Range	Mod				
1	9	Upd. Field>	Field>	7	Total Value (Type)	Exp>	7	Mod	N	N		0
2	0											0
3	10	Write File>	Disp>	4	Type Header	File>	1				A	0

In the Item Type Change Level Suffix, before the program continues to records of the next Item Type, we want to print the Type Footer which includes the Type Sub-total. Enter this single operation in the Change Level Suffix. (Write file, operation 10, with Display Block 5.)

MSE MAGIC II 02/02/86
Task Definition

5. Stock Value By Type Execution Definition

Change	Description	Prefix	Main	Suffix	Abort
1	-- Record	--	8	4	Y
2	1 Item Type	3	--	1	Y

Op	Operation	Type	No.	Description	Assign	Inp	Range		*	Cond
							Min	Max		
1	10 Write File>	Disp>	5	Type Total	File>	1			A	0

Exp For

Leave with F9 to go back to the Upper Table.

Defining the Task Level Operations

Hit the Down Arrow to reach the Task Prefix. Before reading the first record, we want to zero the Grand Total counter and print the Report Header Block. In the Task Suffix, at the end of the Report, we want to write the Grand Total Footing block, which concludes the report.

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Therefore, the Task Level Prefix Operations are as follows:

MSE		MAGIC II				02/02/86					
Task Definition											
5. Stock Value By Type											
Execution Definition											
Change		Description		Prefix		Main		Suffix		Abort	
2	1	Item Type		3	--	1	Y				
3	--	Task		3	--	1	Y				
Exp For											
Op	Operation	Type	No.	Description	Assign	Exp	Range	Min	Max	Cond	
1	9	Field>	8	Grand Total	Exp>	7	Mod	N	N	0	
2	0									0	
3	10	Disp>	2	Report Header	File>	1				T	
										0	

where the Expression in the Update Field Operation is 0 and the Write File Operation for the Report Header has a parameter of T to start printing at the Top of the Page.

The Task Level Suffix is comprised of a single Write File Operation where only the Grand Total Footer is written to the Report File.

```

MSE                                M A G I C   I I                                02/02/86
----- Task Definition -----
5. Stock Value By Type
----- Execution Definition -----

```

Change	Description	Prefix	Main	Suffix	Abort
2	1 Item Type	3	--	1	Y
3	-- Task	3	--	1	Y

Op	Operation	Type	No.	Description	Assign	Exp For			*Cond	
						Inp	Min	Max		
1	10 Write File>	Disp>	3	Grand Total	File>	1			A	0

You have concluded the preparation of this report. Before leaving it, take a moment to scan the different levels to ensure that all the different operations are in the right places. Also, it is important to take a break from the detailed work, and view the program in a global way. It is comprised of these elements:

1. Task Header: Global information about the Task
2. Record Level:
 - Prefix - Data View (and program flow in an on-line task).
 - Suffix - Activity for each record.
3. Item Level:
 - Prefix - Activity to perform at the start of a new Item Type.

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Suffix - Activity performed at end of a Type.

4. Task Level:

Prefix - Activity for the beginning of the Task

Suffix - Activity for the end of the Task.

In addition to the above, we have:

1. The Display Block Table that describes the screen for the Task and the Display Blocks for the Report Layouts.
2. An Expression Table for a list of Expressions for different purposes.

The above two tables serve as "Banks" of information to be called upon at different points in the Execution Definition.

Another major Bank that exists is the Task Bank which is empty in this report, but which we saw in the On-Line Task.



Each of these three banks can be accessed either from the place they are used specifically or by using a global Function Key:

F6 - Expression Table

F7 - Display Blocks

F8 - Tasks

You must pay attention to the difference between the two methods of reaching these banks. When you access them from the specific location where they are being used, you are automatically positioned on the specific entry in the Table. If you move around to scan the table for information, and then leave with F9, the entry you happened to be on will be copied to the place you are on even

though you didn't mean to do this. This is a common mistake!

If you want to scan one of the Bank entries, remember to either leave with F2 and not F9 or better yet, Zoom to the Table using the Function Key (F6, F7 or F8). Leaving with F9, in this case, will not harm anything!!

Once you familiarize yourself with the above functions, you will find it easy to work with MAGIC for Reports, finding it very logical and consistent.

Leave the program (Ctrl F9) and check it (F8).

Adding the Report to the Program Menu

Now that you have finished writing this Report, go back with F9 and add it to the Program Menu in the Reports and Analyses Sub-System.

Run the Report (F1). Notice that you no longer have the option of changing the Key or Sort sequence. Remember that you can print this Report on your console by entering the name "console" in the Files (8) option.

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You should see this report:

MSE	M A G I C II	02/02/86
	Stock Value Report	
MSE		Date: 02/02/86
		Page: 2
STOCK VALUE BY TYPE		

Item Type: D		
Item	Description	In Stock Price Value

1006	Chihuahua	20 8.00 160.00
1004	Labrador Retriever	160 78.00 12,480.00
1003	Fox Terrier	140 7.00 980.00
002	Large Poodle	30 30.00 900.00
1106	Great Dane	40 18.00 720.00
Total for Type D:		15,240.00

Backup the System

Backup the OE*.DAT files before continuing to the next lesson.

Lesson 5: On-Line Programs (II)

Now that you have learned the basic steps in programming with MAGIC, we are going to show you the real power of this tool in developing a sophisticated Order Entry System.



Many MAGIC options, techniques and general “ways of thinking” will be introduced here. We believe that the best way to teach them is by example. Please follow the instructions carefully and note the features as you progress.

In this tutorial, we will write the programs for the same Order Entry application which was described in the Demo system. We suggest that you go back to this system as described in Chapter 1 to review the programs shown there.

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This is the Order Entry screen which we are going to design:

MSE	MAGIC II	12/02/86				
Order Entry						
Order No: 112	Customer No: 5678	Smith, Sue				
Order Date: 26/01/86		456 Main Street				
		Geneva, Switzerland				
Line	Item	Type	Description	Quantity	Unit Price	Total Price
1	1006	D	Chihuahua	3	8.00	24.00
2	1106	D	Great Dane	1	789.00	789.00
3	1003	D	Fox Terrier	11	212.00	2,332.00
4	1009	S	Boa Constrictor	1	565.00	565.00
5	1010	R	Hamster	13	7.00	91.00
					Order Sum:	3,801.00
					14.00% Discount :	532.14
					Sub-Total:	3,268.86
					5.00% Sales Tax:	163.44
					Order Total:	3,432.30
Terms: Net 45						

The Order Entry program should do the following:

1. Start in Create Mode, assuming that we want to enter a new order when we enter the program.
2. Display the next Order No. automatically and disallow modification of this number.
3. Suggest Today's Date, with an override capability.
4. Choose a customer from the Customer File and display his Name, Address, Discount Rate and Terms.

5. Enter the Items on the order, line by line. Choose the Item, displaying the Type, Description and Price from the Item File. Enter the Quantity, and compute the Total Price.
6. Show the Total Order Sum, after every line is entered. This includes the computed Discount and the Sales Tax.

With the above in mind, we can now define a program that is comprised of two nested tasks. The first task is the Order Header, and the second the is Order Lines, each of them referring to its own respective file.

Re-enter MAGIC and go to the Program Menu of the Tutorial System. Add the Order Entry Program to the end of the Program List. Now Zoom (F5) on the description and you will be at the Task Header screen for the Father Task. The Main File is #4 Order Header and the Key is #1 'By Number'. Change the starting Mode to Create. Leave the More Info window without any changes for now.

Drawing the Input Screen

In complex programs like this, it is preferable to design the Input Screen first, coming back later to fill in the elements.

Now, hit F7 to Draw the screen. Leave the Display Table as is, and Zoom to the screen itself.

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Fill in the text on the screen to match this example:

	1	2	3	4	5	6	7
	1234567890123456789012345678901234567890123456789012345678901234567						
0	Order Entry						
1	Order No:						Customer No:
2	Order Date:						
3							
4							
5	-----						
6	Line	Item	Type	Description	Quantity	Unit Price	Total Price
7	-----						
8							
9							
10							
11							
12							
13							
14	-----						
15						Order Sum:	
16						% Discount :	
17	Terms:					Sub-Total:	
18						% Sales Tax:	
19						_____	
20						Order Total:	

Note the cursor position which is displayed at the bottom right corner. The line numbers are supplied here to help you position your cursor correctly.

To draw the lines across the screen, bring your cursor to line 5 and mark it with Alt L. Then hit Alt F (Fill) and enter the Fill character "-" (Alt 196), and <Enter>. This will draw a solid line across your screen.

Since we want to draw several lines across the screen, it would be easiest to simply copy this line a few times. To copy this line, bring your cursor to the destination line (#7) and hit Alt R (Repeat). Do this again for the last line (#12).

When you have finished drawing the screen, leave with F9.

Linking to Another File

Now go to the Record Main Section of the Execution Definition. The first step is to retrieve some necessary information from the Control File – the Last Order No. and the Sales Tax. To do this, we will introduce the Linking Operation. Since our Main File is the Order Header, we can link to the Control File and retrieve the necessary data.

Take the cursor to the lower table of the Record Main, open a new line and choose Operation 3 – Begin Link. Zoom on the File> parameter and choose the Control File as the Linked file.

Now Zoom on the Key> parameter and you will see the Key Table for the Linked file. Linking is always done by a key in the Linked file. You can choose which key you want to use. In this case, only a single key has been defined in the file – the Control Key, so select it and enter it in the Operation line.

The next prompt is for a Return code. We will not be using this option here.

Go to the * column. Leave the default N for Normal Link and Zoom to the Link Table (F5). This table shows you all the segments of the Link Key. In our case, there is only one segment. What we need to do here is define an expression which will evaluate to the key value in the linked file. To do this, Zoom to the Expression Table, open a line and enter '1' in the table. Hit F9 returning to the Link Table. This is a simple expression which tells the system to link to the Control File with a key value of 1, since we already know that this is the only record in the Control File, and that it contains the information we need. Hit F9 again and the Link has been defined.

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This was a special kind of a Link operation, because we linked to a file with only one record in it, having a key value of 1. Later, when we link to the Customer File, we will show you a more typical Link operation. (For more information on Link Options, refer to the Reference Manual.)

Now hit F4 to open a new line in the operation table, and enter a Select Field operation – 1. Zoom to the field list of the linked Control File. This is the list of fields available to us for selection because we are inside a link operation. All references to fields after the introduction of a Begin Link operation will be to fields in the linked file, until we enter an End Link operation to close the link.



All selected fields are available to you for the duration of the task.

Select field #2 Sales Tax. Zoom on the Condition column to enter the expression 'FALSE'L, causing the field to be displayed but disallowing user overwrite.

Select Field #3 – Last Order No. and enter an End Link Operation – 4, thereby closing the Link.

Assigning the Next Order No. Automatically

The next stage in this program is to ensure that the Next Order No. is assigned automatically when creating a new order.

Enter an empty line in the Operations Table to visually separate the different stages.

Select the Order No. field (#2) with the Condition 'FALSE'L, so the cursor will not stop on the field. (Note that since we close the Link, the field selection is done now from the Main File – Order Header).

In this case, we want to assign a value to the Order No. to the field automatically. This will make use of the Update Field operation. Open a line and choose operation 9. Zoom to choose the selected Field No. 3 – Order No. and Zoom to the Expression Table. Open a line at the end and enter the Expression 'B+1' <Enter>. As displayed at the top of the screen, this expression evaluates to the Last Order No. taken from the Control File incremented by 1. Hit F9.

Skip the Mode parameter but hit ? on the * column to see the alternatives. "A" means Abortable, while "N" means Non-abortable. In our case, we want to change the parameter to "A".



Abortable in this operation will allow the User to use the cancel (F2) key at Run-Time. Non-abortable will not allow a user cancel, making the Update Field operation a binding one. This is typically done only when the updated field is in the Father task. See the next Note below.

Go to the Condition column and Zoom to the Expression table. We want to ensure that the update of the Last Order No. will take place only when a new line is created, and not in Modify or Query mode. Enter this expression at the end of the Table – STAT(0,'C'). (Make sure you type a capital C) This function evaluates to True, if the Current Task (Task 0) is presently in Create ('C') Mode. Otherwise it is False.

To conclude the process of incrementing by Order No. by 1, we must make sure that the Last Order No. in the Control File is incremented as well. This will be done after all user interaction with the program is concluded, i.e. in the Record Suffix.

Leave the Record Main Section and go to the Record Suffix. Zoom to the operations table and open a new line. Enter an Update Field operation (9), choosing field #2 (Last Order No. in the Control File). Choose the expression B+1 as the expression with which we are updating the field. Again, skip the Mode column, but this time leave the * column as N for Non-abortable. The condition for this update is, again, STAT(0,'C'), ensuring that it will be carried out only when the Task is running in Create Mode.



Use the Non-Abortable Option of the Update field Operation when the Operation is changing data in a Father Task. This will disallow User cancellation of the Father record after the Son records have already been accepted. Keep in mind that it is enough to have one Non-abortable Update Field either in the record main of a task or in any of the task updating this record to prevent the user from aborting (F2 - Cancel). To summarize, typically an Update Field operation in a Record Main will be abortable, while in the Record Suffix it will be Non-abortable. This is because the activity in the suffix takes place after the user has concluded his interaction with the program, and the Cancel option would have no meaning anyway.

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This concludes the process of incrementing a counter by one. Return with F9 to the Execution Definition of the Main Section, which should look like this:

MSE MAGIC II 02/02/86

Task Definition

4. Order Entry Program

Execution Definition

Change	Description	Prefix	Main	Suffix	Abort
1 --	Record	--	7	0	Y
2 --	Task	0	--	0	Y

Op	Operation	Type	No.	Description	Assign	Inp	Range		*	Cond
							Min	Max		
1 3	Beg. Link >	File >	1	Control	Key >	1	Ret	0	N	0
2 1	Sel. Field >	R	2	Sales Tax	0	0	0	0	Y	2
3 1	Sel. Field >	R	3	Last Order No.	0	0	0	0	Y	0
4 4	End Link >									0
5 0										0
6 1	Sel. Field >	R	2	Order No.	0	0	0	0	Y	2
7 9	Upd. Field >	Field >	3	Order No.	Exp >	3	Mod	N	A	4

Selecting the Customer for the Order

Open a new line and enter a Select Field Operation. Zoom to the field list to select field #1 – Cust. No. Now we must ensure that the Customer No. entered by the user actually exists in the Customer File. If the Customer does indeed exist, we want to bring the data pertaining to this customer and display it on the screen.

Open a line and enter a Begin Link Operation 3 to link to the Customers File (#2). Choose Key #1, 'By Number'. Skip the Return Code parameter and leave the N in the * column.

Zoom on the * column to the Link Table and Zoom again on the Expression column. Enter the code for the Customer No. from the Order Header File – E. The value of this expression, i.e. the Customer No. as entered by the user into the Order Header screen, will be the key value by which the pertinent record is retrieved from the linked Customer File. At this point, all the data stored in this record is available to the task, exactly as if it were an extension of the current record in the Main File.

Hit F9 twice to return.

Now we can select the fields we need from the Customer Record. Select fields #2,3,4, and 5. (Name, Address, Discount Rate and Terms). Put the Condition 'FALSE'L on each of these fields, to disallow user override.

Conclude the link with a End Link operation (4) which has no parameters.

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Your Operation Table should now look like this:

MSE MAGIC II 02/02/86
Task Definition

4. Order Entry Program Execution Definition

Change	Description	Prefix	Main	Suffix	Abort
1 --	Record	--	15	0	Y
2 --	Task	0	--	0	Y

Op	Operation	Type	No.	Description	Exp For				Cond	
					Assign	Inp	Min	Max		
6	1 Sel. Field>	R	2	Order No.	0	0	0	0	Y	2
7	9 Upd. Field>	Field>	3	Order No.	Exp>	3	Mod	N	A	4
8	1 Sel. Field>	R	4	Order Date	5	0	0	0	Y	0
9	1 Sel. Field>	R	1	Customer No.	0	0	0	0	Y	0
10	3 Beg. Link >	File>	2	Customers	Key>	1	Ret	0	N	0
11	1 Sel. Field>	R	2	Customer Name	0	0	0	0	Y	2
12	1 Sel. Field>	R	3	Customer Address	0	0	0	0	Y	2
13	1 Sel. Field>	R	4	Customer Discount	0	0	0	0	Y	2
14	1 Sel. Field>	R	5	Customer Terms	0	0	0	0	Y	2
15	4 End Link >									0

Review the above steps and check that you have concluded this stage correctly before continuing.

Computing the Totals

Before we leave this Task to write the line operations which belong to the sub-task, we must prepare the section of the Header Task which deals with totals. This is because the Lines sub-task will be updating these totals continually as it runs.

First we will define the Order Sum field, which will give the total of all the lines. Select field #5 - Order Sum.

Now we want to define the Total Discount Field. Select Field #6 - Discount, and Zoom on the Assign column. Go to the end of the table and enter this Expression: $J * H / 100$ <Enter>. This expression means that the Total Discount equals the Total Order Sum multiplied by the Customers Discount Rate divided by 100. Exit with F9.

To define the Sub-Total for the Order which is computed as the Order Sum minus the Total Discount, we must define a virtual field. Open a new line, enter a Select Field operation, change the Type to (V)irtual and Zoom to the Virtual Field Table. Define a Virtual Field named Sub-Total as E(6,2). Leave the Table with F9 and continue to the Assign column. Zoom, hit End, open a new line and enter this expression: $J - K$ (Order Sum - Order Discount). Leave with F9.

Now select the Order Tax field #7 and assign the expression $L * A / 100$ (Sub-Total * Sales Tax /100). Leave with F9.

Select the Order Total Field #8 and assign to it the expression $L + M$ (Sub-Total + Total Tax).

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Your Expression Table should now look like this:

MSE		MAGIC II		02/02/86
4. Order Entry Program		Task Definition		
Sub-Total + Order Tax		Expression		
Field	File	Expression		
A Sales Tax	Control	2	'FALSE'L	
B Last Order No.	Control	3	B+1	
C Order No.	Order Header	4	STAT (0,'C')	
D Order Date	Order Header	5	DATE ()	
E Customer No.	Order Header	6	E	
F Customer Name	Customers	7	J*H/100	
G Customer Address	Customers	8	J-K	
H Customer Discount	Customers	9	L*A/100	
I Customer Terms	Customers	10	L+M	

Leave with F9.

Remember that we want to disallow user input on all these fields, because they will be automatically computed by the system. Therefore, enter 'FALSE'L conditions in all of them.

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Your Execution Definition screen should look like this before we continue:

MSE	MAGIC II	02/02/86							
Task Definition									
4.Order Entry Program									
Execution Definition									
Change									
1	--	Record	--	20	0	0	Y		
2	--	Task	0	--	0	0	Y		
Exp For			Range						
Op	Operation	Type	No.	Description	Assign	Inp	Min	Max	*Cond
11	1 Sel. Field>	R	2	Customer Name	0	0	0	0	Y 2
12	1 Sel. Field>	R	3	Customer Address	0	0	0	0	Y 2
13	1 Sel. Field>	R	4	Customer Discount	0	0	0	0	Y 2
14	1 Sel. Field>	R	5	Customer Terms	0	0	0	0	Y 2
15	4 End Link >								0
16	1 Sel. Field>	R	5	Order Sum	0	0	0	0	Y 2
17	1 Sel. Field>	R	6	Order Discount	7	0	0	0	Y 2
18	1 Sel. Field>	V	1	Sub-Total	8	0	0	0	Y 2
19	1 Sel. Field>	R	7	Order Tax	9	0	0	0	Y 2
20	1 Sel. Field>	R	8	Order Total	10	0	0	0	Y 2

Now select the Last Line No. field (#3), so you will be able to automatically increase the line no. in the Order Line Sub-Task.

Since the Last Line No. will not show at any time on any input screen, it will get a zero value automatically when the Order Header record is created. The Order Line task will therefore start incrementing this field from zero for each order.



Default values are always assigned as Blank for alphanumeric fields and Zero for numeric fields which are not directly updated by the user or the program.

Calling the Order Line Sub-Task

Make sure you are at the end of the Operations Table in the Record Main and enter an Execute Task Operation – 7. Take the cursor to the No. parameter and Zoom to the Task Table. Enter the Sub-task Description – Order Lines. Now go back to the Execution Definition of the Father Task (F9). We will define the sub-task as soon as we finish designing the screen of the Order Header.

Inserting the Selected Fields in the Input Screen

Hit F7 (Draw) and Zoom on the Display Table. Insert the fields as follows in the designed screen. Bring your cursor to the specified position, hit F5, enter the Field No., fix the parameters if needed and leave with F9.

Position	Field No.	Description	Parameters
(1,14)	3	Order No.	N N N
(2,14)	4	Order Date	-
(1,45)	5	Cust. No.	N N N
(1,56)	6	Cust. Name	
(2,56)	7	Address Size:	(2,20)
(17,8)	9	Terms	
(16,45)	8	Discount	N N N
(18,45)	1	Sales Tax	N N N
(15,65)	10	Sum	Y Y N
(16,65)	11	Order Discount	Y Y N
(17,65)	12	Sub-Total	Y Y N

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(18,65) 13 Order tax Y Y N
(20,65) 14 Order total Y Y N

Your finished screen should look like this:

MSE	MAGIC II	02/02/86				
Order Entry						
Order No: 999	Customer No: 99999	AAAAAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAAAAA				
Order Date: 99/99/99						
Line	Item	Type	Description	Quantity	Unit Price	Total Price
Terms: AAAAAAAAAAAAAAAAAAAAA				999.99%	Order Sum: -999,999.99	
				999.99%	Discount : -999,999.99	
					Sub-Total: -999,999.99	
				999.99%	Sales Tax: -999,999.99	
					Order Total: -999,999.99	
						(0, 0)

Hit F9 twice to return to the Execution Definition Table.

Defining the Sub-Task

Now we can define the Sub-task which we called in the Order Header Father Task.

Hit F8 to open the Task Table, and Zoom on the Order Lines Sub-Task. The Main File of the Sub-Task is File #5 - Order Lines. Leave the Key, and leave the Mode as Modify. If no lines exist, i.e. this is a new order, the task will open in Create Mode creating a new line. If displaying an existing order, the task will display the lines, allowing modification.

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Now go up to the Task Description and Zoom to the Record Main section.

Select Field No. 1 – Order No. This field will not show on the screen but will be used to ensure that the lines are limited to those associated with this order. This is done as follows:

1. Zoom in the Assign column and enter the value C (Order No. from the Order Header Task) as Expression 1. This ensures that when a line is created, the Father's Order No. will automatically be assigned to the Son's record.
2. Define both the Min-Max parameters as having the same expression 1 (C) in the Expression table, ensuring that in Modify or Query Mode, the Range is limited to this single Order No.

Incrementing the Line Number Automatically

To increment the line number automatically, we will use a technique similar to the one we used to increment the Last Order No. in the Control File.

Select Field #2 Line No., giving it the Condition 'FALSE'L.

Enter an Update Field operation (9), updating field #17 (Line No.) assigning it the Expression O+1 (Last Line No. + 1) and entering an A in the * column making the update Abortable. This will allow the user to cancel a line. This Update will take place only on Condition that the Task is presently in Create Mode. Choose the Expression STAT(0,'C') for the Condition column. (Make sure you type a zero and not the letter O.)

Leave the Main Section with F9.

Go to the Record Suffix and enter another Update Field Operation (9), updating field # 15 (Last Line No. in the Order Header File), with the value of the same expression (O+1). (Make sure you type the letter O and not the number zero.) We have left the * column Non-abortable (N) as it takes place after user interaction is terminated. Enter the STAT(0,'C') to ensure execution only in Create Mode.

Now we have finished the incrementing process for the automatic line number. Go back to the Record Main section.

Selecting the Item No.

We want to select the Item No., linking to the Item File to ensure that the Item No. we have entered actually exists and to retrieve the information pertaining to that Item (Type, Description and Price). We also want to update the customer order quantity in the linked Item File from the quantity we enter in the order.

Enter a Select Field Operation (1) choosing field #3 – Item No. Now open a new line and enter a Begin Link operation (3). Link to File #3 (Items) by Key #1 (By Number).

Zoom on the * column to see the Link Table. Zoom to the Expression Table and enter R – Item No. in expression 5, meaning that the Item No. as entered in the Order Line File equals the Key value for the link. This is then the current record.

Leave with F9 twice.

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Select the following fields in the linked current record:

- 2 Description Condition 'FALSE'L disallowing
override
- 3 Type Condition 'FALSE'L
- 4 Price
- 5 In Stock
- 6 Customer Orders
- 7 Vendor Orders

Now enter an End Link (4) operation to close the link to the Item File.

Select Field #4 (Item Type) in the Order Lines file, and assign to it the Expression T (Item Type) from the linked Items File.



Relational Database design dictates that it is not necessary to copy data from a linked file, because it is available to you exactly as if it is a part of your current record. However, in this case, since the Item Type is only a single character and we are planning to print a report sorted by the Item Type (Sales Analysis Report) it is worthwhile to store this character in the Order Lines File itself, to save the linking overhead which would otherwise be necessary in the Report Task.

Select the following fields:

- 5 Quantity
- 6 Unit Price Assign U Price from the Item File
- 7 Total Cost Assign Z*BA (Quantity*Unit
Price)



When the single letter codes for the selected fields are exhausted, the codes continue to be constructed from double-letters, starting BA, BB, BC etc.

Block the Total Cost field for input by entering a 'FALSE'L Condition. This should be the final result:

MSE MAGIC II 02/02/86

Task Definition

4.Order Entry 1.Order Lines

Execution Definition

Change	Description	Prefix	Main	Suffix	Abort
1 --	Record	--	16	1	Y
2 --	Task	0	--	0	Y

Op	Operation	Type	No.	Description	Assign	Exp For Range			*	Cond
						Inp	Min	Max		
7	1 Sel. Field>	R	3	Item type	0	0	0	0	Y	2
8	1 Sel. Field>	R	4	Item Price	0	0	0	0	Y	0
9	1 Sel. Field>	R	5	In Stock	0	0	0	0	Y	0
10	1 Sel. Field>	R	6	Customer Orders	0	0	0	0	Y	0
11	1 Sel. Field>	R	7	Vendor Orders	0	0	0	0	Y	0
12	4 End Link >									0
13	1 Sel. Field>	R	4	Item Type	6	0	0	0	Y	0
14	1 Sel. Field>	R	5	Quantity	0	0	0	0	Y	0
15	1 Sel. Field>	R	6	Unit Price	7	0	0	0	Y	0
16	1 Sel. Field>	R	7	Total Cost	8	0	0	0	Y	2

Updating the Order Sum of the Order Header

Once User interaction with the program is concluded, we want to carry out the following updates in the Record Suffix, in addition to the one we already entered: update the Order Sum in the Header and the Customer Orders in the linked Item File.

Go to the Record Suffix Operations table and enter an Update Field operation (9), choose the Order Sum field (10), assigning the expression BB (Total Cost) to it. Return with F9 and continue to the Mode column. Hit ? <Enter> to see the two alternative replies (Incremental/None) Hit I to choose Incremental mode of updating.

Incremental Update

The Non-incremental mode we have used so far in updating fields simply assigns the expression into the field. In Incremental mode, the field is incremented algebraically by the evaluated expression. In addition, using the Incremental Mode ensures the following:

1. When a line is deleted the system automatically decrements the same value from the field.
2. If the expression is re-evaluated resulting in a different value, the field is automatically decreased by the previous value and incremented the new value.
3. In case of a link, if the field that is being updated is in a linked file, and the linked record is changed, the system will automatically decrement the value from the original record and will increment the new record.



The Incremental Mode of the update field saves the designer the involved procedures to preserve data integrity in all cases mentioned above. However, it should be used with discretion, as it is a very powerful mechanism. The general rule of thumb is to use the Incremental Mode for accumulating totals in Father Tasks, while the Non-

Incremental Mode is used to assign values to fields.

Incremental Mode should never be used in Batch programs, because it will always yield a zero value. Refer to the Sales Analysis Report in Lesson 6 for an example and to the Operation Directory in the Reference Manual.

Update the Customer Quantity in the Linked File

The next update field in the suffix will be an incremental update of a field in a linked file as explained in note 3 above.

Enter an Update field operation (9) and choose field #23 (Customer Orders in the Items File). Assign the value of the Quantity field (Z), in Incremental Mode. In this case, the quantity in the field of the linked file is incremented by the value of the expression (which is the Quantity in this line of the order). In the event that the value is changed, the customer orders field is decreased by the original quantity and the modified quantity is then incremented to it.

Moreover, if the Item itself is changed, this mode will ensure that the Customer Order value for the original item will be decreased, and the new Item will be incremented by the same quantity.

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This is how your Record Suffix Execution Definition screen should look:

MSE MAGIC II 02/02/86
Task Definition

4.Order Entry 1.Order Lines

Execution Definition

Change	Description	Prefix	Main	Suffix	Abort
1	-- Record	--	16	3	Y
2	-- Task	0	--	0	Y

Op	Operation	Type	No.	Description	Assign	Inp	Range		**	Cond
							Min	Max		
1	9 Upd. Field>	Field>	15	Last Line No.	Exp>	3	Mod	N	N	4
2	9 Upd. Field>	Field>	10	Order Sum	Exp>	9	Mod	I	N	0
3	9 Upd. Field>	Field>	23	Customer Orders	Exp>	10	Mod	I	N	0

and this is your Expression Table:

MSE		MAGIC II		02/02/86	
4.Order Entry 1.Order Lines		Task Definition		Exp	
Quantity		File		Expression	
A	Sales Tax	Control	2	'FALSE'L	
B	Last Order No.	Control	3	STAT (0,'C')	
C	Order No.	Order Header	4	O+1	
D	Order Date	Order Header	5	R	
E	Customer No.	Order Header	6	T	
F	Customer Name	Customers	7	U	
G	Customer Address	Customers	8	Z*BA	
H	Customer Discount	Customers	9	BB	
I	Customer Terms	Customers	10	Z	

Designing a Sub-Window

The final step, for now, in writing this program is to design the input screen for the sub-task. This is a good example of a case where we do not want to open a new window for the task, but rather use a portion of the Father's window.

To achieve this, go back to the More Info screen of the Order Lines sub-task, and take the cursor to the Open Window parameter on the right. Change this parameter from Y to N, signifying that this Task does not open its own window.

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Leave the More Info screen with F9, and hit F7 to enter the Display Description. Zoom (F5) on the Order Line Display Block and you will find yourself in the Father Task window itself.



It is mandatory that the Open Window parameter be changed to N prior to designing the window. An attempt to design a window and then change the parameter will not work. In this case, you would have to clear the Display Block entirely, change the parameter, assign the same row and columns as the Father Block in the Table, and start again.

Now we will define the sub-window on the Father Task's window. We must limit a sub-window of the entire screen for the Order Lines. Take the cursor to (8,0) and hit Alt-L. Move to (13,0) and hit Alt-L again, marking the center area of the window.

To define this marked area as the window area for this task, hit Alt-W. The marked area will disappear. Hit Alt-W again to check the sub-window area and Alt-U (or Alt-W) to unmark. This area is the sub-window area of the sub-task.

Now position the fields within this area as follows:

(8,2)	#17	Line No.	N N N
(8,7)	18	Item No.	N N N
(8,15)	25	Type	
(8,19)	19	Description	
(8,43)	26	Quantity	Y Y N
(8,52)	27	Price	Y Y N
(8,65)	28	Total Cost	Y Y N

Once we have positioned the fields in the window, we must mark the Task area. Hit Alt-L to mark the current line, then hit Alt-P to paint the line in color #2 if you wish. Hit Alt-T to define the Task area as a single line of the order within the sub-window you have defined by the Alt-W above. Hit Alt-T again to check the definition you just made. These task lines will automatically scroll when the sub-window is filled.

This concludes the design of the Order Entry screen for now. Hit Ctrl F9 to exit to the Program Table. Check your program (F8), fix it if necessary and add it to the Order Entry Management Program Menu. Backup your control file at this point.

Running the Program

Now we are going to run the program, so we can check what we have done so far. As we go through the program, we will point out what features we would like to add to the program to make it easier to use.

Run the program. Notice that the Order No. and Sales Tax fields appear automatically. The program is in Create Mode by default. Today's Date appears but can be changed. Hit <Enter>, continuing to the Customer No. field.

The system is waiting for you to enter a customer No. This would be a good spot to Zoom to a window which would show us the Customer List. We will add this window in the next stage. For now, enter a Customer No.-1234 <Enter> or any other customer number you added to your tutorial file. The Name, address, terms and Discount rate are displayed on the screen.

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The first line of the order is created automatically, and the system awaits your input of the Item No. It would, again, be convenient to have a Zoom window at this point for Item selection.

Now, enter a non-existent Item No. 9999 <Enter>. You should see the message "Record Not Found". Hit 1106 or any other Item No. you added to your files, and the Type and Description are displayed on the Order Line.

Enter a quantity and the Unit Price is displayed for you to change if you wish. Hit <Enter> and the Total Price is computed.

Hit Down Arrow to accept the record line, and enter a few more lines in the order.



There is no limit on the quantity at this point. We will add a limit based on the Stock Quantity and the outstanding orders in the next stage of programming.

Leave the Order Lines window with F9. Note that we are still viewing the same Order Header. To continue to a new order, hit Down Arrow. It would be convenient to continue directly from the termination of the Order Lines to the next order. We will add this enhancement as well.

To summarize the changes we want to make in this program:

1. Automatically continue to the next order entry, when the previous one is finished.
2. Verify that the quantity entered is less than what is available to promise and display an appropriate error message when relevant.

3. Design a window to help select a Customer from the Customer File.
4. Design a window to help select the Items from the Item List.
5. Make some changes which will increase the efficiency of the program.

Re-enter the programming level of the Order Entry Program and make the following changes to improve our program.

Continuing Automatically to the Next Order Header

Go to the More Info screen of the Order Header Task. Take your cursor to the Record Cycle parameter and change it to N.

A Y parameter in this field signifies that when you enter the last field of the record, the system cycles back to the first field, awaiting the Down Arrow to accept it and continue to the next record. Since we want to continue automatically from the last field to the first field of the next record, enter an N, simulating a Down Arrow. When you have finished entering the lines of an Order, the system will continue automatically to the first field of the next Order Header.

Increasing Processing Speed

At this point, we can make a simple change in the Order Header Task which will be a great time-saver.

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Go to the DB parameter of the More Info screen. Zoom to view the three Data Files which are handled by this Task – Order Header, Control File, and Customer File. These files were inserted in the Table automatically by the system, as they are the Main Task File and the two linked files. As the program stands now, it is the responsibility of the sub-task to open the Order Lines File and Item File. When the sub-task terminates, it closes those files again. Since we assume that we will write many orders, we can ensure that all five files will be opened at the Order Header level, saving the overhead of opening and closing the sub-task files each time.

To do this, add two entries to the end of the table – Items File and Order Lines File. Leave the Mode and Expression columns without any change. Leave with F9.

Note that removing the above two files from the DB table of the sub-task is not allowed, because the Checking program will look for them to ensure integrity. At Run-time, however, the system will know that they were opened by the Father.

Limiting the Quantity and Inserting an Error Message

Now we want to limit the Quantity that can be entered in an Order Line to what is available to promise, displaying an error message if the maximum quantity is exceeded.

Hit F8 and F5 to Zoom until you reach the sub-task – Order Lines. Take your cursor to line 15 of the Record Main, which should be the Select Field operation for the Quantity. Hit F4 to open a new line and enter operation 2 – Stop!! At this point, you enter the message you want

to display in the Show> field. To widen this field, hit F6 so you can enter a long message. Type in “Not enough stock to promise!!” <Enter>, which will appear in the message line on condition that the Quantity entered is greater than In Stock - Customer Orders + Vendor Orders. Enter this expression in the Condition column for the User message: $Z > V - W + X$

We have finished defining the limitation on the Quantity value and the accompanying user message. Leave with F9 three times.

Further Efficiency Enhancements

Go to the More Info screen of the Sub-Task. Take the cursor to the parameter labeled “Resident Task”. The default in this parameter is N, meaning that whenever this task is called, it is read into memory from the disk.

A Y parameter in this field, means that the task is read into memory when its Father Task is read in, and will remain there until the termination of the Father or calling Task.

In our case, this will further speed up the movement between the Order Header and the Lines. The “price” to be paid is in the memory requirements for the entire Task. The memory needed by each task is displayed for your convenience in the Task Header window. Change this parameter to Y in the Order Lines Sub-Task, and hit F9 to see the Task Size on the Task Header screen. (e.g. Task Size: 1122 bytes)

Design a Window to help Select a Customer

The next feature we are adding to the Order Entry Program is the ability to view the Customer List and choose a Customer for our order. This could be achieved in one of two ways:

1. Write a sub-task that would display relevant information from the Customer File, allowing user selection.
2. Use the existing Program that already performs the above – the Customer Update Program.

The difference between the above two methods lies in the fact that when you write a sub-task all Father Task variables are known to it. When you call a program, you must pass the variables to the program as parameters. In addition, you must define these parameters in the existing program.

To add this Zoom window to our sample Order Entry program, go back to the Father Task (Order Header). Position your cursor on the Select Field operation which selects the Cust. No. (Line 9) in the Record Main Section. Open a new line, entering an Execute Program Operation (8). Change the * column to A, signifying an After Window, as we discussed earlier in Lesson 3.

Zoom on the No. field to select Program No. 2 – Customer File Update from the Program List.

Continue to the Parameters (Parms>) column. Zoom and choose the Cust. No. (5) as the parameter for this Execute Program Operation.

This parameter will be passed to the Customer File Update Program. We will alter that program to accept the parameter and assign to it the Cust. No. that has been chosen, bringing back that information when control returns to the Order Header Task. Leave with F9.

In the Scr> column, we enter the screen which the called program will be displayed on. If we do not specify the screen here, the called program will open its own screen, which would mean overwriting the entire Order Entry screen.

Zoom on this column, and open a line at the end of the Display Table - Customer List. Change the Class to 0, since this is an on-line screen and not a Report Block as assumed by the system. Fill in the table by defining the Task Area as 11 rows by 78 columns.

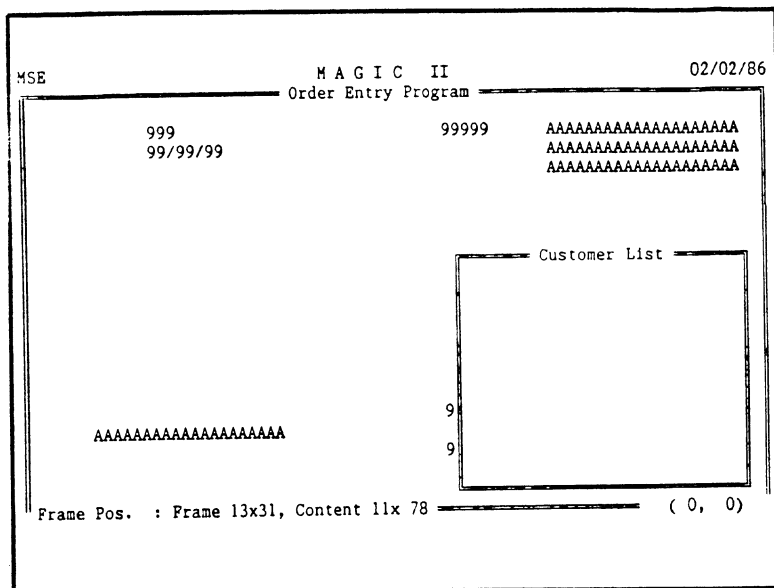


Note that the total width of the Display Block must be equal to the width of the called program (78), while we will be designing the actual window Frame as only 31 columns, allowing scrolling within the window.

Zoom to the Input screen itself from the Display description column and we will design the window frame. Hit Scroll and F1 to see the Windowing Options. Hit F3 to change the size of the frame. Use the Left Arrow to shrink the frame to 2x31. Notice the frame size on the left side of the screen. Then hit the Down Arrow to expand it downward to reach 13x31.

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Hit (F1 F2) to Locate the window on the screen. Hit Right Arrow until the screen looks like this:



You do not have to fill in the actual fields in the screen you have just designed. The called program will use the definitions made in its own task window, positioning them automatically within this frame, allowing for scrolling where necessary.

Remember, the sole purpose of this screen definition has been to instruct the Customer Update Program to reside within this Frame rather than its own.

Hit F9 three times to return to the Execution Definition of the Task.


```

MGE                                M A G I C   I I          ( 0 )          27/02/89
----- Task Definition -----
13. Order Entry Screen
----- Execution Definition -----

Change  Description  Prefix  Main  Suffix  Abort
1  --  Record  --  55  10  Y
2  --  Task  0  --  0  0  Y

Op-  Operation  Type  No.  Description  Assign  Inp  Min  Max  *  Cond
9  1  Sel. Field  R    3  Last Order No.  0  0  0  0  --  0
10 4  End Link
11 0
12 1  Sel. Field  R    2  Order No.      0  0  0  0  Y  2
13 9  Upd. Field  Field 4  Order No.      Exp  3  Mod  N  0  Y  4
14 1  Sel. Field  R    4  Order Date     5  0  0  0  0  Y  0
15 1  Sel. Field  R    1  Customer No.   0  0  0  0  0  Y  0
16 0
17 8  Exec. Prog  No.   2  Customer File Update  Parm  1  Scr  2  A  0  0
18 0
19 0

```

1 Flip2 Can 3 Del 4 Cre 5 Zoom 6 Expr7 Draw 8 Task 9 End 10 ? ()

Now we have to alter the Customer File Update Program to accept the parameter and assign data to it.

Leave this program with Ctrl F9, returning to the Program List.

Go to the Customer File Update Program and Zoom to the Execution Definition. Hit Up Arrow to bring the cursor above the first line and add a new line *at the top*, entering a Select Field operation. Select a Virtual field, Zoom to the virtual field Table and enter a field called "Cust. No. (parm)" defined as L 5. Leave with F9.

The rule is that the matching of parameters is done against the list of Virtual fields in the Virtual File, and *not* in the order they are selected in the Execution Definition. In other words, the first parameter in the calling program will be matched with the first virtual field in

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The rule is that the matching of parameters is done against the list of Virtual fields in the Virtual File, and *not* in the order they are selected in the Execution Definition. In other words, the first parameter in the calling program will be matched with the first virtual field in the virtual file list, the second with the second, etc.

It is the designer's responsibility to ensure that the parameters in the calling program and the corresponding virtual fields are in the right order and have the same type.

The next step required is to make sure the parameter is assigned a value. Since we would like to assign the last Cust. No. displayed just before we leave the program by hitting F9, we will put the Update Field instruction in the *Task Suffix*.

Go to the Task Suffix level, and enter an Update Field Operation (9). Zoom to the Field List, selecting field #1, (Customer No. (parm)). Zoom again on the Expression parameter, entering B for Customer No., leaving the Mode N (Non-Incremental Mode). Change the * column to A (Abortable), making this assignment a "Soft" assignment, which will allow the calling program to cancel the current record.

Leave the programming level with Ctrl F9. Check (F8) both your programs (the Order Entry and the Customer Update).

Running the Changed Program

Now let's run the program to check how the features we have added work.

Go to the Program menu and run the Order Entry program. Try to Zoom to the Customer List, then check that you can scroll from right to left, using the Down and Up Arrows to select a Customer. Leave with F9 and the Customer you selected should appear in the Customer No. Field. The Program then continues to link to the Customer File and display the pertinent data as before.

Now continue to the Lines section, and check that the User message in the Quantity field is active when you enter a very large quantity.

If either of these options does not work properly, go back over the steps outlined above, checking each operation and screen.

Designing the Window to Choose an Item No.

The next step in this program is designing the window to choose the Item No., using the Item File Update Program. As you remember, we can Zoom to the Item File from two places in the Order Entry screen -. The first Zoom window is on the Item No. column, where we display all items. The second window is available on the Quantity column where we would like to display only items of the same type to make it easier for the user to choose an alternative item of the same type. To achieve this, we will call the Item File Update Program with two parameters.

Go back to the programming level of the Order Entry Program, and continue to the Execution Definition screen of the Order Lines sub-task.

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This program design is very similar to the previous window definition, so we will lead you quickly through the steps.

Position the cursor on the Select field operation where the Item No. is selected.

Hit F4 to open a line, and enter an Execute Program operation (8). Zoom to choose the Item File Update Program. Zoom to the parameter table, selecting field #18 (Item No. in the Order Lines file). Define this as an "After" window (A).

On the Scr> parameter, Zoom again to the Display Table. Open a new line at the end of the Table, calling it "Item List". Change the Class to 0 for an On-line screen. Define the dimensions as 15 x 78.

Zoom again on the Display Table to view the Input screen. Hit the Scroll Key, and F1(Opt). Use the F3 (Size), F2 (Locate) and the Arrow keys to create and bring the window frame to 17x36 in this position:

```

MGE                                     M A G I C   I I       ( 0 )       27/02/89
                                     Order Entry
Order No: 999                          Customer No: 99999      AAAAAAAAAAAAAAAAAAAAAA
Order Date: 99/99/99                    AAAAAAAAAAAAAAAAAAAAAA
                                     AAAAAAAAAAAAAAAAAAAAAA
-----
line  Item Type Description                Quantity Unit Price Total Price
-----
                                     Customer List
Terms: AAAAAAAAAAAAAAAAAAAAAA          9
Print Order? (Y/N): A                   9
-----
1      2 Can 3 Del 4 Cre 5 Zoom 6        7      8 Help 9 End 10 ?      ( 0 , 0 )
                                     (

```

Now go back to the Execution Definition.

We have finished defining a Zoom window to the Item Update Program, for selecting an Item from the Item File.

Designing the Zoom Window on the Quantity Column

The Zoom window on the Quantity column is almost exactly the same as the one above. In this case, however, we need to limit the records participating in the called program to those which are of the same Item Type.

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Continue to the Quantity Select Field Operation. Take your cursor one line up, and open a new line above the field selection. Enter a new line, entering an Execute Program operation (8). Select program #3 – Item File Update. Zoom to the Parameters Table and again choose field #18 (Item Type) as the parameter. Change the parameter N to B. This will, therefore, be a “Before” window, meaning that the user will return to the Quantity field when he leaves the window.

Now open an additional line in the Parameter Table and define a *second* parameter – field #20 (Item Type). Exit with F9.

Continue to the Screen field and Zoom to the Display Table, where you choose the same screen we just designed for the previous Zoom window –#4 (Item List). Exit with F9.

This should be the final result:

MSE		MAGIC II				(0)		27/02/89		
13.Order Entry Screen		1.Order Lines		Task Definition						
Execution Definition										
Change	Description	Prefix	Main	Suffix	Abort					
1	-- Record		0	23	3	Y				
2	-- Task		0	--	0	Y				
Op	Operation	Type	No.	Description	Assign	Inp	Range	Min	Max	*Cond
13	1 Sel. Field	R	4	Item Price	0	0	0	0	0	N 0
14	1 Sel. Field	R	5	In Stock	0	0	0	0	0	N 0
15	1 Sel. Field	R	6	Customer Orders	0	0	0	0	0	N 0
16	1 Sel. Field	R	7	Vendor Orders	0	0	0	0	0	N 0
17	4 End Link									
18	1 Sel. Field	R	4	Item Type	6	0	0	0	0	N 2
19	6 Exec. Prog	No.	3	Item File Update	Parms	2	Scr	4	8	N 0
20	1 Sel. Field	R	5	Quantity	0	0	0	0	0	N 0
21	2 Stop III	Show		Not Enough Stock to						E 1
22	1 Sel. Field	R	6	Unit Price	7	0	0	0	0	N 0

1 Flip2 Can 3 Del 4 Cre 5 Zoom 6 Expr7 Draw 8 Task 9 End 10 ? ()

Leave the program entirely with Ctrl F9.

Altering the Item File Update Program

The final step in designing a Zoom window is, as above, altering the Zoom window to accept the parameters, assigning the current value to the Item No. field.

Go back to the Item File Update Program, and enter the Execution Definition level.

Open two lines *at the top* and Select two Virtual fields: Item No. (parm) defined as L 5 and Item Type (parm) defined as A 1.

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Go to the Task Suffix to assign the current value to the Item No. field when leaving the Zoom window. Enter an Update Field operation (9), using Field #1 (Item No.), and the Assign Expression - C. Make this operation Abortable (A). There is no Condition.

To limit this particular window to the Item Update Program so that it includes only records of the same Item Type, go to the More Info screen of the Task Header. Bring your cursor to the Range parameter, Zooming to the Expression Table.

Enter this Expression at the end of the table: IF (B<>'E=B,'TRUE'L) meaning that if the Item Type parameter was passed (= / Blank) to this program, then the Range of records is defined as all those where the Item Type equals the Item Type in the parameter (E=B), else display all records.

This concludes the second Zoom window to the Item File Update Program.

Leave the programming level with Ctrl F9, and run the program to check how it works. Remember that you can Zoom again from the Item List window to the Stock Status Window within it.

Lesson 6: Report Programs (II)

At this point in the process of getting to know MAGIC, you have been exposed to almost all the elements of the system. From this point on, therefore, we will use a different method of teaching you the additional features. We will scan the programs in the Demo System, highlighting the important new points in each program. Please follow carefully and study the notes as they are critical to learning to utilize the power of MAGIC.

Go back to the Demo System, entering the Reports and Analyses sub-system, and run the Sales Analysis by Item Type Report. Answer the “From To” ranges by hitting <Enter> four times and then hit F5 to start the report. You should see the total being computed on your screen, then the Sort window followed by the requested report display on the console.

Let’s examine the report: For each Item Type, we see the Total Sold and the percent of the Grand Total which this Total represents.

In order to prepare this report, the system must go through three main stages:

1. Display the screen to accept the ranges the user is interested in viewing.
2. Compute the Grand Total for the *requested range*.
3. Go through the Order Line file, in Type order (this is the Sort sequence seen on the screen), and accumulate the Total Cost for each Type. When the Type changes, we display a line for that type, showing the amount sold and the percent of the Grand Total we computed before. At the end, we display the Totals.

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Now we can see how to write a MAGIC program to achieve these requirements.

Hit any character to leave and continue the display of this report. Since there are no more pages, it goes back to the prompt screen. Hit F9 to leave.

Examining the Main Task

Now hit F1 F3 to enter the Program Dictionary, and locate the Sales Analysis by Item Type Program in the Program Description Table. Hit F5 to enter the Program itself.

1. The purpose of this top task is to display the prompt screen, accept the User prompts and then call the other two tasks: 1. Compute Total Sold and 2. Display Analysis Data.

Hit F8 to see the Sub-task Table which lists the above two tasks, and hit F9 to exit again.

2. As this task has no Main File of its own, it is legitimate to choose File 0, a scratch file.

Zoom to the Execution Definition level, where you see this screen:

MSE		MAGIC II				02/02/86				
		Task Definition								
11.Sales Analysis By Item Type										
Execution Definition										
		Change	Description	Prefix	Main	Suffix	Abort			
1	--	Record		--	17	0	Y			
2	--	Task		0	--	0	Y			
				Exp For						
					Range					
Op	Operation	Type	No.	Description	Assign	Inp	Min	Max	**	Cond
1	1 Sel. Field>	V	1	Item Type - From	2	0	0	0	Y	0
2	1 Sel. Field>	V	2	Item Type - To	3	0	0	0	Y	0
3	2 Stop !!! >	Show>		Wrong order: (To < F						4
4	0									0
5	1 Sel. Field>	V	3	Order Date - From	5	0	0	0	Y	0
6	1 Sel. Field>	V	4	Order Date - To	6	0	0	0	Y	0
7	2 Stop !!! >	Show>		Wrong order: (To < F						7
8	0									0
9	1 Sel. Field>	V	5	Total Sold	0	0	0	0	Y	1
10	9 Upd. Field>	Field>	5	Total Sold	Exp>	8	Mod	N	Y	0

Please note the following:

1. We have selected 4 Virtual Fields to help accept the 4 ranges.
2. We also assign default values to these fields to make it easy for the user to select the entire range.
3. After each pair, we check (Stop!!) that the range is legitimate.
4. Then, we select the Total Sold virtual field. This field will be assigned by the "Compute Total Sold" sub-task. Note that we update this field with zero, to ensure a zero field every time we ask for a different range.

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5. Now we display the Confirm virtual field, which serves as an "Zoom" field for the following "After" Block. This is why we will be displaying the message "Hit F5 (Zoom) to start the report" on the screen. The cursor stands on the Confirm field. If the user hits the F5, the Block is executed and the two tasks are performed one after the other.

Hit F7 F5 to view the input screen:

```
MSE                               M A G I C   I I                               02/02/86
Sales Analysis By Item Type

Enter Range of Types and Dates:
-----
      FROM: | TO:
Item Type:  | A  | A
Order Date: 99/99/99 | 99/99/99

Hit F5 to start Report Processing: A

Computing Total Sold: -99,999,999.99

( 0, 0)
```

6. Note that the message at the bottom of the screen was highlighted using the Block (Alt B) and the Painting (Alt P) options. The Total field was displayed on this screen and when the sub-task updates it, we will see the numbers change.

Leave with F9 twice.

Examining the Two Inner Tasks

Now we can examine the two inner tasks: Compute Total Sold and Display Analysis Data.

Hit F8 and F5 on the Compute Total Sold entry. This is a Batch task, running over the lines in the Order Lines file by Order number. Open the More info window and note the following:

1. All the modifiables have been changed to N, permitting no User interaction with the program.
2. The Open Window parameter is N. Therefore, the accumulating totals will show on the Father Task screen.

Leave the More Info window and Zoom to the Execution Definition, noting the following:

1. First, we choose the Order No.
2. Then, we link to the Order Header to get the Date. This is done to allow Min Max parameters on the date as entered on the prompt screen.
3. Then we choose the Item Type and limit it with Min Max as supplied by the user prompts.
4. The final step is to select the Order line Total Cost field which we intend to sum up.

Go to the Record Suffix. The single operation contained in this level of the task is a Non-incremental Update of the virtual field Total Sold, using the Expression "Total Sold + Total Cost".



Since this is a Batch Task, the Expression “Total Cost” should not be used with an Incremental (I) Update Field operation. It will always yield a Zero in the Total Sold field. Incremental Mode is used only in On-Line tasks, when appropriate.

Zoom to the Task window (F7 F5) to see the Father’s window, because we selected “No” in the Open Window parameter of this sub-task. This is the conclusion of the computing task. Leave with F9 three times to the Task Name Table.

Zoom to the Analyse Data Task.

This task will scan the Order Line file by Type and display a line for each Type.

Go to the More Info screen and note the following:

1. All modifiable flags are N.
2. Go to the Sort flag and Zoom to the Sort Table. You see the Item Type on the Sort List, ensuring the necessary sort procedure.
3. Go to the I/O parameter and Zoom. This is the Output File and the Expression shows ‘CONSOLE’, sending this report to the console, rather than the default printer. Also note that the two flags (Mod Name and Line) are both N, to eliminate the appearance of the User Option Menu.

Leave the More Info screen, Zooming to the Execution Definition. Hit Down Arrow and note that there are three levels in the upper table: Record, Item Type, and Task.

Go back to the Main Section of the Record Level. Zoom to the Select Field for “Sold per type” in line 10, which is very similar to the previous task: selecting the necessary field and assigning Min Max values to it. “Sold per Type” and “% of Total” are the virtual fields, which will be used for each type.

Now go to the Record Suffix to see that the only operation contained here is a Non-incremental update of the “Sold per Type” field, using the Expression: Sold per Type + Total Cost.

Note that *no Display Blocks are printed* at the record level! We only accumulate the “Sold per Type”. When the Type changes, we will first execute the suffix operations for the previous type.

Now go to the Suffix of the Item Type On-Change Block. This includes calculating the “% of Total” (Sold per Type / Total Sold * 100) and then displaying display Block #5, a line for the Type, on the console.

We then execute the Prefix for the new type.

Go to the Prefix of the Item Type level. This includes operations to Zero out the two fields (“Sold per Type” and “% of Total”) in preparation for the accumulations pertaining to the group of records of the next Item Type.

The Task Level is simple. The Task Prefix prints the Report Header and the Task Suffix prints the Totals.

Zoom to examine the Display Block (F7, Down Arrow, F5). Hit Alt-X. Notice that there is nothing new here which was not discussed in previous lessons.

Leave the Program, using Ctrl F2, to cancel any changes you may have made in the original by mistake. Leave the Program Description Table with F9.

Sales Orders by Customer

This program introduces one major new feature: both Father and Son Tasks are printing here. The Father prints the Customer and Order information, including an On-Change break on the Order Number. The Son prints the line for each Order Line.

Please examine this program in the same way we reviewed the the Sales Analysis by Item Type. Please take special note of the Record Suffix definition in the Father Task.

Sales Analysis by Customer

The menu for this program is an example of prompting for more specific information from the user. In this case, the possibility of printing a complete report or summary only, or sending the report to the printer or console. There is no need to open the option window. The program itself summarizes the information by customer and also keeps a record of the highest and lowest billing to be printed at the summary level. Examine this report carefully to learn these techniques.

Lesson 7: Batch Programs

The previous lesson dealt with a specific kind of batch program – reports. This lesson will demonstrate how to use the Batch concept to process data.

We will examine the programs which do the following:

1. Automatically increase prices by a certain percent.
2. Automatically delete a range of orders (Headers and Lines) from the system.

It should not be surprising to you at this point that almost all of the features required for these tasks have been discussed in previous lessons. This is due to the fact that in MAGIC there is no difference between “Report Generating” and “Batch Procedures”. Both processes use the rules pertinent for Batch Tasks which we explained in previous chapters. This consistency gives the designer using MAGIC the great benefit of being able to use the same global techniques throughout the program. Once you are familiar with the concepts, you can program almost anything!

Price Change Program

Enter the Demo Order Entry System, select the Master File Update Sub-system and the Price Change Program. Run the program again to make sure you understand what it does. In short, it gives you a choice of either updating the prices manually or Zooming to a sub-task which prompts you for a percent change, then updates all the Item Prices by that percentage.

Now go into the design level of this Program.

The first task is the Main Task. It has no Main File and it displays two Virtual fields (Manual Price Change and Auto. Price Change) as “Zoom” fields for two “Before” Blocks containing the corresponding procedures. Once the user hits F5, the appropriate Block is executed.



This is only one way to simulate a menu in MAGIC. Another could be by accepting a value (Y/N for example) and executing a task or program on that condition.

Please take note of the following point: in the block that calls the Item File Update, we set a flag (Manual Price Flag) as 999999. This is passed as a parameter to the Item File Update program. Later, take a look at the Item File Update program to see that if the parameter is 999999, it prohibits input on all but the price field, and also skips the Task Suffix assignment which is used in the Order Entry Program.

Go to the Task Window of the program. You will see that it is very simple and is actually a simulated menu.

The Automatic Price Change Sub-Task

Zoom to the sub-task with F8 F5. You will see that this task is also a simple task, which prompts for the percent change, and then calls the Price Change Loop.

Hit F8 F5 again to see the actual processing task. This is a Batch task, running on the Item File, assigning (in the Record Suffix) the existing price to a virtual Old Price field and assigning the new increased or decreased price to the Item price.

Go to the More Info screen and notice that the Open Windows parameter is set to Y. Leave and display the window with F7 F5. The task window exists but it has no frame! Hit scroll, F1, F4 (Frame Type) and you will notice that there is an N in the Frame window. Change this to S (Single) or D (Double) and leave with F9. The previously unframed window now shows with a frame and a title.

Note that in this case, we should have chosen Open Window = N in the More Info screen and displayed the variable on the Father Task's window. The only reason this was not done here was to allow you to see how the Frame feature works and to give us another opportunity to warn you that any attempt to change the Open Window to N at this point will cause an error in your programs. This is because the system will attempt to display the variable in the wrong place!

This concludes the discussion of the Price Change Program. Please leave the program with Ctrl F2, so you don't make any inadvertant changes to the original program. Now briefly view the Item Update file to see the effect of the 999999 parameter. You will find this in the Condition column and the Update field operation in the Task Suffix. Exit to the Program Menu.

Deleting Closed Orders

Run this program in the Demo Order Entry System. It has the familiar Range screen and then the Orders chosen are displayed and deleted. We can examine the program now.

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The top task is almost identical to the Sales Analysis Report. Hit F8 to see the sub-task – Delete Order Header.

Zoom again to the More Info screen of the sub-task. Notice that the Delete has an Expression defined for it. Zoom to the expression table to see that it shows 'TRUE'L. This means that *every selected record* will be deleted. The selection will be carried out in the Min Max fields of the Order Number and Order Date. To see this, leave the More Info screen and Zoom to the Execution Definition.

Indeed, these are the only two fields in the Record Main section, and their Min Max expressions are the parameters from the Prompt task.



The Delete expression itself could also have been used to define the selection by using $F \geq A$ AND $F \leq B$ AND $G \geq C$ and $G \leq D$ instead of the 'TRUE'L expression. In this case, no Min Max would be used.

This, however, would have been a bad choice, mainly because it would force the system to scan all records in the file, evaluating the expression for each of them, deleting only those which evaluate to 'TRUE'L. Using the Min Max method with the 'TRUE'L expression in the Delete parameter, will be much faster, since the Order No. is a Key, and the Min Max will cause a quick Key access only to the requested range and not to the entire file!

View the small window of this task (F6 F5) and go to the Record Suffix to see that the only operation it contains is a call to the Deleting Order Lines Task.

Zoom to this sub-task. Notice the similarity to its Father:

1. The Delete Expression in More Info is 'TRUE'L.
2. Min Max is defined on the Order No.
3. A small window is used to display the deleted lines. Note that when you Zoom to this window, you see the Father and Grandfather task windows!

One final note: if you would like to keep an ASCII file containing the deleted records, you can easily add display blocks in the different tasks, dumping them to an Output File before the records are deleted.

This concludes our examination of some of the features available in writing Batch programs with MAGIC.

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Lesson 8: Forms Design

This lesson will explain the basics of form design in MAGIC. In addition, it will also introduce some important notes about the rules of operation of MAGIC. It is recommended that you read this lesson very carefully to understand these fundamental rules.

MAGIC supports Form Design for printing on existing pre-printed forms or generating its own graphics and printing on blank paper. This latter technique is used in the Print Order Form program.

Run this program. The first screen prompts you for the range of orders to be printed and then the orders are printed. Print at least one order:

M.S.E. Ltd.		MAGIC II		13/02/86		
		Order Entry				
		Order No: 112				
Name: Smith, Sue		Order Date: 26/01/86				
Addr: 456 Main Street		Cust. No. : 5678				
Geneva, Switzerland						
Line	Item	Type	Description	Quantity	Unit Price	Total Price
1	1006	D	Chihuahua	3	8.00	24.00
2	1106	D	Great Dane	3	789.00	2,367.00
3	1003	D	Fox Terrier	11	212.00	2,332.00
4	1009	S	Boa Constrictor	1	565.00	565.00
5	1010	R	Hamster	13	7.00	91.00
Terms: Net 45				14.00%	Order Sum:	5,379.00
					Discount :	753.06
					Sub-Total:	4,625.94
				5.00%	Sales Tax:	231.30
Thank You !!!					Order Total:	4,857.24

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As you can see, this form looks like a pre-printed form allowing for maximum of 10 Order Lines. The Order No. is highlighted and the customer message from the Control File is printed.

Actually, we already printed this form from the Order Entry screen. Indeed, the Print Order Form Program is actually made up of two programs: the Range screen and the printing program itself. The printing program is also called from the Order Entry screen with parameters limiting it to the current order which we just entered. In this way, the user can print one order at a time when it is needed, or a group of orders when they can be batched.

Now, go to the Program Dictionary. Find the Print Order Form program and Zoom in. We have seen the Task several times. The only difference is that after the Confirm field (at the end of the Main Record section), we execute a program (Operation 8), not a task (Operation 7).

Go to the Params column and Zoom. You will see the four parameters that the printing program needs to select the range.



Since this task is common to many programs with only small modifications, it is advisable to design it once and use it where necessary. The next lesson will teach you how to copy existing programs and alter them.

Leave this program (Ctrl F2) and Zoom on the Print Order Program. It is a Batch program. In the More Info screen, we can see the 5 DB files and the Output File to the printer (in Exp).

Zoom to the Execution Definition. The first four fields are the Parameters in the same sequence as in the calling program. (Note again that it is the sequence in the Virtual File table and not in the Execution Definition list, which is important, even though they will be the same in most cases). The parameters are used in the Min Max of the Order No. and Order Date, to ensure the requested range limitations.

The remainder of this program is very similar to the Order Entry screen program.



Since this is a Batch program, the Main section is executed only once to define the data view and assignments. The record suffix is executed once for each record. Therefore all operations in a Batch program should be placed in the Record Suffix. This is done to save execution time. Since there is no user interaction in a Batch program, the Record main is not used for that. Therefore, by moving all the executional instructions to the suffix, we can eliminate the need to run through the Main more than once.

Go to the Record Suffix. For each selected record, we display the header, and execute a task which, in turn, will display all the lines. When it is done, it will come back to this Record Suffix and print the footer.

Zoom to the sub-task (F8). Zoom to the More Info screen. The important information here is contained in the Form Lines parameter (Form Lines =10). This will ensure the following: Under all circumstances, this task will print 10 lines. If there are less than 10 lines in the order, then blank lines (with the constants) will be printed to complete 10 lines. If the order has more than

10 lines, an EOP (End of Page) condition is set and the designer can do what he wants based on it. This will ensure that when this task is finished, the next line will always be printed at the same location, exactly as required by a pre-printed form.

Zoom to the Main Record section. The Order No. is limited by Min Max. The rest is similar to programs we discussed before. The Record Suffix is used to display the Order Line.

Zoom to the Order Form (F7, Down Arrow, F5). This form was designed using the graphic characters with the assistance of Alt-B (Marking), and Alt-R (Relocate and Copy). Note the top three Alt-14 characters which are used in most printers to double print. (Check your printer and change these characters if necessary). The string in the lower left box is the Customer Message from the Control File.

Now leave with no changes (Ctrl F2).

Calling the Printing Program from the Order Entry Screen

As we mentioned earlier, we would like to have the option of printing the Order Form at the time it is typed in. There are two ways of doing that:

1. Design a task which will print the Form. This method has the advantage that all the variables are still known to the program, even though they were not yet written to disk. however, it has the major disadvantage of designing the task all over again.

2. Use the program we just saw and call it to print the order. The only problem is that the programs, unlike the task in the previous option, will go to *disk* to look for the Order header Record and will not find it! To overcome this, we can first write the order to disk, by leaving the Order Header, and print the form before starting the new order. All we have to do is remember the previous Order No. and Date, and execute the printing program only if the user entered 'Y' in reply to the "Print Order?" question. Let's see how this is done.

Zoom to the Order Entry screen program. As you can see, the first operation in the Main Record section is to Execute the Print Order program. This is done only on condition that the "Confirm Print" field is 'Y'. When the program is first started, the Task Prefix is executed and then an 'N' is assigned to this field, ensuring that the program will not be run immediately when the Main program starts. (See the Task Prefix.)

Go to the end of the Main Record to see the Print Order No. and Print Order Date Virtual field defined. They will be assigned values in the Record Suffix. Then comes an Update Field on the "Confirm Print" as 'N' to make 'No' the default. Only then comes the Select Field of the 'Confirm Print' field to await user override of the default.



You may be wondering why we didn't save the Update Field operation by using the Assign in the Select field of the 'Confirm Print' as we did previously when default values were needed. The reason is a simple one. We need to keep the entered information on the 'Confirm Print' field for the next

record. Since the rule is that all 'assign' expressions of virtual fields are immediately executed upon entering a new record, (e.g. to ensure current calculations of fields) – the value of the 'Confirm Print' will always be 'N' if we were to use the Assign in its selected field operation. Since we want it to stay as it was entered, we cannot use 'Assign' but rather an Update Field operation.

The major rules to remember are the following:

- *Update Field is only executed when the program encounters the operation.*
- *Assignment to a Virtual field takes place as soon as we enter a new record or when any of the components of the expression in the Assign change! We call this automatic recomputing. In most cases, it is very convenient and saves worry. For example, if we change the price, the total is automatically recomputed. There are, however, some cases where we don't want the system to recompute for us. In these cases, we use the 'Local' option of Update Field. Expression in Update Field operations are not recomputed automatically.*

Learning how to use these two tools correctly will give you the utmost power: Automatic calculation when needed (Assign), and Local calculation in other cases (Update Field).

Now go to the Record Suffix. The Block that is defined here is executed only when the user enters 'Y'. In this case, we save the Order No. and Date. Return to the Main section. The printing program will be executed

with the needed 4 parameters (i.e. the same Order No. and Date as From: and To:) only when the 'Y' was entered by the user beforehand.

This concludes our explanation of the Order Form options in MAGIC.

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Lesson 9: Reading/Writing ASCII Files

Communication between MAGIC and external systems is carried out with the help of ASCII files. MAGIC is capable of reading in data presented in ASCII form and creating MAGIC files. It is also capable of dumping MAGIC file data to an ASCII file format.

The Reading process can be carried out in one of three different modes:

1. **Column Mode** Where the exact layout of the input record is known.
2. **Single Delimiter Mode** Where each data field is separated from the next by a single known delimiter, (e.g. a comma, slash or dash)
3. **Double Delimiter Mode** Where each data field is surrounded by a delimiter on each side, (e.g. 'ABC"123.5"HIJ')

The most commonly used mode is the Column oriented mode and we will use this mode in our example which follows.

In this example, we will do the following:

1. Write a program which will dump the Item File (OEFIL003.DAT) to an ASCII file called OEITEM.DAT.
2. Delete the MAGIC Item File (OEFIL003.DAT).
3. Write a program to read the ASCII file back into MAGIC.

4. Read the ASCII File and re-create the MAGIC File.

Writing a Dump Program

If you left MAGIC, re-enter and go to External Programs in the Tutorial System.

Hit F1F3 to reach the Program Description list. Hit End and F4 to create a new entry – Dump Item File to ASCII File.

Now Zoom to the Task Header screen. The Main File is the Items File, while the Key is By Number. Leave the Mode 'M', and change the task to Batch.

Zoom to the More Info window. Go to the I/O parameter and Zoom to the I/O window, filling it in as follows:

File Description:	Output File
I/O/S:	S (Sequential)

A Sequential Output file does not write a Top of Page mark in the file.

Now Zoom to the Expression Table from the Exp column. Enter the ASCII file name in the Expression Table: 'OEITEM.DAT' including the quotes.

Hit F9 to return. Leave the More Info window (F9) and Zoom to the Execution Definition from the Task Description.

In the Record Main section, select all 7 fields from the Main File, changing all the * parameters to Y.

Now Draw (F7) the Task Window:

```
MSE                               M A G I C   II                               02/02/86
----- Dump Item File to  ASCII File -----
                                         Item No.: 99999
                                         Item Description: AAAAAAAAAAAAAAAAAAAAAA
                                         Item Type: A
                                         Item Price: -999,999.99
                                         In Stock: -999,999
                                         Customer Orders: -999,999
                                         Vendor Orders: -999,999
                                         ( 0, 0)
```

positioning all the fields on the screen. Exit with F9 and open a new line in the Display Table in which we will define the layout of the records in the output file (Record Layout). Enter 1 Row and 78 Columns.

Zoom on Record Layout entry, and you will see a single line across the top of your screen. This is the Display Block for the Output record.

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Select and position all the fields across the line like this:

The screenshot shows a terminal window with the following content:

```
MSE                                M A G I C   I I                                02/02/86
```

```
-99999 AAAAAAAAAAAAAAAAAAAAAA A -999,999.99 -999,999 -999,999 -999,999
```

1	Dump Item File to ASCII File	0	H	21	78	1
2	Record Layout	1	H	1	78	1

(0, 0)



This is a normal Display Block. All rules and options are applicable.

Exit with F9 twice and take your cursor to the Record Suffix, where you will write the display block to the ASCII file, using operation 10 – Write File, with Display Block #2 and the default File – #1.

This is the entire program. Now go to Menu Maintenance of the Program Menu, in the External Programs Sub-System.

After you check your program (F8), add it to the Menu.

Adding the Exit to DOS Option to the Program Menu

At this stage it is a good idea to add the option of a temporary User Exit from MAGIC to DOS. Simply add this line to the Program Menu, being sure to enter the word DOS in the parameter column:

The screenshot shows a multi-level menu system for 'MAGIC II'. The top level is 'System Menu' (dated 02/02/86), which contains 'Order Entry - Tutorial System' and 'Sub-System Menu'. 'Sub-System Menu' contains 'External Programs' and 'Program Menu'. 'Program Menu' is the active screen, displaying a table of program options:

	Program Description	No.	Parameters	Open
1	Dump Item File to ASCII File	6		0
2	Read Item File from ASCII File	7		0
3	-----	0		0
4	Exit to DOS	0	DOS	0

Run the Program

Leave the Menu Maintenance screen and run the Dumping to an ASCII file program. The MAGIC file OEFIL003.DAT will be dumped into OEITEM.DAT, an ASCII file.

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Exit to DOS

Now exit to DOS, by selecting the new entry in the Program menu you just added. As you can see you are at the familiar DOS environment and all DOS commands are available to you.

Type the ASCII file on your screen by entering the DOS command: TYPE OEITEM.DAT <Enter>

You will see this:

```
TYPE DMITEM.DAT

1002 Large Poodle      D      500.00      80      0      10
1003 Fox Terrier      D      212.00      120     11      0
1004 Labrador Retriever D      150.00      40      1      0
1005 White Whale      F     1,200.00      50      3      30
1008 Chihuahua        D       8.00      20      3      10
1007 Guppy            F       0.50     180     12      0
1008 Killer Shark     F      45.00      30      0      40
1009 Boa Constrictor S      500.00      80      1      80
1010 Hamster          R       7.00     140     13      0
1011 Guinea Pig       R      30.00      30      0      50
1013 Rattlesnake      S      18.00      40      0      0
1103 Garden Snake     S      12.50      12      0      10
1105 White Mice       R      10.50      28     28      25
1108 Great Dane       D     789.00       2      3      5

Now delete the MAGIC Item File by entering DEL OEFILE003.DAT <Enter>
```

Now delete the MAGIC Item File by entering DEL OEFILE003.DAT <Enter>

Return to MAGIC by typing EXIT <Enter>.

Writing the Program to Read an ASCII File

The Reading program is so similar to the Dumping program as to be almost a mirror image of it. MAGIC allow you to make a copy of an existing program, then modify it. That is what we will do in this case.

Duplicating MAGIC Programs

Take your cursor to the Program Menu, then hit F1 to see the Option Menu. Option F6 gives you the Dictionary Listing. You will see this screen:

```

MAGIE                               M A G I C   I I           ( 0 )           27/02/85
----- Dictionary Listing -----

      Listing Type (M/F/P/H/U) : F
                From No. : 0
                To No. : 8

      Document/Internal printing (D/I) : D
                Export File : PRN:           (Hit F5 to start)

                Dumping No. :
                Line No. :
                Code :

1 Opt 2 Can 3 4 5 6 7 8 9 End 10 ? [ ]

```

For the Listing Type, select P=Program. Zoom on the "From No." and select the dumping program. This is the program we want to copy. Hit F9. Enter the same

number in the “To No.” field. Since we want to dump only one program, change the D in the Document/Internal Printing (D/I) to I.

Hit <Enter> and an Export file name is suggested by the system. Hit F5 and MAGIC will write the original program into a file named OEPnnn in an internal code representation. (Remember this Name.)

When this is done, hit F1 again to choose F7 Dictionary Import. The Import File name is the name of the Export File in the previous step – OEPnnn. Enter it and hit F5 to continue.

Note that no program name was requested for the imported file. When importing a program, MAGIC gives the program the next available number automatically and adds it to the end of the Program List.

Notice that the copied Dumping Program appears at the end of the list.



For more information on the Dumping and Importing Utilities, please refer to Chapter 6: Utilities.

Modifying the Copied Program

Now we need to change the program to suit our needs in reading rather than writing an ASCII file. Follow these steps:

1. Change the name of the Program to “Read Item File from ASCII File” in the Program Description.
2. Zoom to the Task Header and Change the Mode of Operation to ‘C’ for Create Mode.

3. Zoom to the More Info window and Zoom again on the End Condition. In this field we enter a condition which will end the process of creating new records. In this case, this condition will be the end of the Input file. Enter the expression: EOF(0,1) which translates to End of File – this task, the first file. Exit to the More Info window with F9.
4. Now Zoom on the I/O parameter. Change the name of the File to Input File and the Type (I/O/S) to Input (I). Leave the Expression which contains the name of the file, because the OEITEM.DAT will be our input file now.
5. Leave the More Info and the Task Header and Zoom to the Execution Definition of the Task. Leave the Select Field Operations in the Main Section exactly as they were in the previous program.
6. Hit F7 to see the Display Table, and change the Title of the window to “Reading from” instead of “Writing to”. Leave the Record Layout with no change.
7. Go to the Record Suffix and change Operation 10 – Write File to 11 – Read File. The Display Block to be Read is Block #2, and the File is #1. Skip the CHR> column and go to the * column. Hit ? to view the options. You can here enter the mode of reading as explained earlier, Column/Single Delimiter/Double Delimiter. If we choose S or D we would have to enter the delimiter character in the previous column.

Hit C to leave the default of Column Mode.
8. Leave the program (Ctrl F9) and add the modified program to the Program Maintenance screen.

Running the Read ASCII File Program

Now run the Read program. Remember that you previously deleted the MAGIC Item File. After the program terminates, you can go into Item File Update and see that all of your data has been read back into MAGIC format from the ASCII file.



When an Input File is prepared by an editor or another external program, the record layout should be duplicated exactly in the MAGIC program. This includes spaces, decimal points etc.

Lesson 10: User Exits, Passwords, and User Help Screens

User Exits

MAGIC can execute External Programs (User Exits) from two levels. You can call the program from the menu, or from within a MAGIC program. We have examples of both of these cases in the External Programs Sub-system of the Demo System.

Now, go to that Sub-System. The Dump and Read Programs were already discussed in Lesson 9.

User Exit from Menu

Choose the Word Processing or Spreadsheet programs to see a screen simulating your own programs. Hit any character to resume. Now “open” the menu (F1 F1). The parameter column of this menu maintenance table can be changed to any executable DOS command. The parameter line is passed to the DOS COMMAND.COM for execution.

The open column should be used to clear the screen before exiting.



You can pass parameters to your external program. For example, if WD is your program name for Word Processing, you could enter WD ABC.TXT in the parameter column to enter the word processor on a specific file.

Now, “close” the menu (F9).

User Exit from within a MAGIC Program

The Backup/Restore program is a good example of the capabilities of MAGIC to interact with the outside world, without leaving MAGIC at all.

Run this program. As you can see, it will backup your data files to diskette or restore from diskettes to your disk.

Enter the program in the Program Dictionary (F1 F3). The Main Record Section has two prompt virtual fields (Backup and Restore), assigning 'N' as the default value. Then we check for allowable Y,y,N or n.



The INSTR function returns the positioning of field A in the string 'YyNn'. For example, if A='y', it will return 2. If it returns 0, it means the A was not found in the string. Instead of the INSTR function, you could have entered the longer expression: A 'Y' and A 'y' and A 'N' and A 'n'.

The User Exit operation has an EXPression that should evaluate to a string. Zoom to it. In our case, we have the DOS command: COPY DMFIL*.DAT A: This is passed to the COMMAND.COM program for execution. The Clr column is used to clear the screen before exiting. The condition is, as always, a condition for executing the operation. In our case, only if the User entered Y or N.

The Restore side of this program is identical to the Backup, except for the change in the Expression which is COPY A:DMFIL*.DAT.

You can enter any program you wish in the User Exit Expression – Word Processing, Graphic Program Spreadsheets, Statistics. If needed, you can prepare an

output file before the User Exit to pass information to the external program and vice versa.

Passwords

The Password system is used to authorized access to the Data and Program Dictionaries of each system. It is also used to allow or deny execution of a program by specific users. Each user is given a password and group level number in the Users Table. The lower the group number the greater access given to that user. Group 0 defines the System Manager and has total access to all Generator and Run-Time options.

To begin setting up an Authorization System in your own Tutorial System, enter MAGIC from the DOS level. Hit F1 (Options) and F1 (Environment) to reach the Environment Screen.

Change the Input Password parameter to Y. This will activate the password system. Leave this screen with F9.

Hit <Enter> on the system date. You should now see the Logon Screen. Since we have not yet entered any users or passwords, simply hit <Enter> twice to reach the System Menu.

User Authorization is defined for each system separately. Therefore, you must now enter your Tutorial System and reach the Sub-System Menu. Hit F1 (Options) then F5 (User IDs). This is the User's Table for this System.

This is the table where you enter a list of users and their respective passwords.

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Hit F4 (Create) to create the first entry in the table. Note that the first user has the default group level 0. This is the System Manager level and a member of this group has full access to all programs and definitions. Members of successive groups (1,2,3 etc.) will be given progressively less access.

Enter the User's Name: "JOHN" and his Password: "DOE". The name will appear as typed on all screens. The password will be hidden from view when entered by the user.



Be careful not to forget your System Manager's password, because you could find yourself locked out of your own system.

Now hit F4 and enter a second user. Name: "JACK" Password: "GREEN". This time make the User Group 1.

Enter a third user - "JILL" "BROWN" as a Group 2 member.

You may define as many users as you wish in each group level. A member of group 0 will have access to this entire table. However, members of "weaker" groups will only be shown the information pertaining to their own password and those of users in weaker groups. A member of group level 1 who enters this screen cannot create a new user at levels 0 or 1.

Leave this screen with F9 returning to the Sub-System Menu.

Defining Access to the Data Dictionary

Now that we have make a User List, we must decide which level user has access to the Data Dictionary and the type of access given.

Hit F1 (Options) and F2 (Data Dictionary).

First, we want to ensure that only users on the System Manager level (Group 0) can create new files. Hit Up Arrow to bring the cursor above the first entry in the table. Now hit F6 (Authorization). You should see the Authorization screen for the Create Option. Verify that the only group given Create access is group 0.

Leave this screen with F9 .

Now we will give access to the different data file definitions.

Hit Down Arrow twice to highlight the Customers File. We want to give Group 1 members full access to the file, including the right to modify or delete the file. Group 2 members will have limited access to view the file (Query only) and no option of modification or deletion.

Hit F6 (Auth). Enter “2” for the Query Group, thereby giving access to member of groups 2, 1, and 0. Enter “1” for Modify Group and Delete Group, denying these options to any group above 1. Leave the Create Group Authorization 0, since we have decided to give this option only to the System Manager level.



This parameter overrides the previous definition if different.

Leave the Authorization screen with F9 F9 .

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At this point, we have defined access to groups 1 and 2 in the Customer's File only. By default, all the other file definitions will be accessible only to group 0 members.

Access to the Program Dictionary

The Authorization process for the Program Dictionary is very similar to the Data Dictionary.

Hit F1 (Options) and F3 (Program Dictionary). Hit Up Arrow to go up above the Program Table and verify that only Group 0 is authorized to create new Programs. Leave with F9.

Highlight program #2 (Customer File Update) and hit F6 (Auth). Define the Query Group level "2", Modify and Delete "1", and leave the Create Group level "0".

The last parameter on the screen is the Execute Group level, which defines which groups are authorized to execute the program in Run-Time. Any user who is denied access to a specific program, will see the message "User not authorized for this operation."

For our purposes, define Group 1 as the highest group number which can execute this program.

Hit F9 twice to reach the Sub-System Menu. Then hit CTRL F9 to leave MAGIC.

Testing the Authorization System

Now let's check the results of what we have just done.

Enter MAGIC. Hit <Enter> on the System Date. Now, log on as "JILL" "BROWN", who is a member of group 2.

Note that when you enter the System Menu, the User's name (JILL) and Group No. appears on the screen. Now enter your Tutorial System. The Password is checked at this point in relation to the User List for your system. If the user is not recognized, the message "Illegal Password" appears.

Hit F1 F5 to view the Users Table. Note that you can see only your own password. Try to open a new user and it is automatically defined as group 3. Leave with F9 .

Hit F1F2 to enter the Data Dictionary. Enter the Customers File with F5 on the Field column. Remember, group 2 members only have Query access in this file. If you try to change anything in the file definition, it will not be accepted. Leave with F9 .

Now try to Zoom into the Field definition of the Items File, to which we gave no access for groups other than the System Manager (Group 0). You will see that access is denied.

You can now try to view and change the program definitions in accordance with the authorization levels defined earlier.

Return to the Sub-System Menu and try to run the Customer File Update in the Master File Update Sub-System. The message "User not authorized for this operation" will appear on your screen.

Leave MAGIC with CTRL F9 and re-enter as the System Manager: "JOHN" "DOE". You can define your own User List and your own passwords. Be sure not to forget the System Manager's password, because no other group member can view this entry in the table. You can define

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other users to be at the '0' level (System Manager) providing you are logged on as such.

User Help Screens

There are two levels of User Help Screens which you can define. User Help can be either Task sensitive or field sensitive. In either case you define the different screens themselves in the Help Screen Table.

Hit F1 F4 from the Sub-system Menu. You now should see the Help Screens Table. Make a list of all the general screens which you will want to call from either the task or field level.

If, for example, we want to write a help screen which explains the Order Entry screen, we would enter the name of the Help Screen – Order Entry and leave the default size (21x50). Of course, you can change the Help Screen dimensions like any other screen.

Now, Zoom from the Description column, and type in the text of the Help Screen.



If a word processor was defined in the Environment section, you can hit F8 (Edit) to enter your own Word Processor at this point. This will make the arduous task of entering Help Screens a bit easier.

Hit F9 when you have finished writing the Help Screen Text. Screen #1 is defined.

Now, if we want to define a second Help Screen which will appear under different circumstances, enter a second name. For example, Help for the Customer Number. Zoom to this screen and enter a text which explains how the customer number is to be entered. Leave

with F9 .

Linking the Help Screens to the Task

Now we will link these two Help screens to the Task itself. There are two methods of linking User Helps to the Programs – through the More Info screen and on the Display Screen itself.

Hit F1F3 to enter the Program Table. Zoom to the Task Header of the Order Entry Program. Now Zoom to the More Info screen. Go to the Help Screen Parameter, Zoom and choose screen #1 – Order Entry. Leave with F9. This Help Screen will now appear every time the user requests Help while running the Order Entry Program.

Alternatively, you could hit F7 (Draw) to Zoom to the Display Screen, position the cursor anywhere on the screen, but not on a field definition, and hit F8 (Help). Choose the relevant screen, then return with F9 . This will have the identical effect as defining the screen in the Task Header.

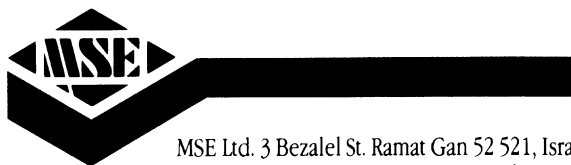
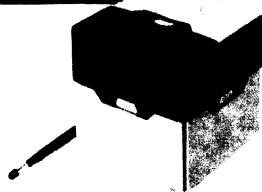
Linking the Help Screens to a Field

To make a Help Screen field-sensitive, Zoom to the Display Screen, and position the cursor on the relevant field. In our case, position the cursor on the definition for the Customer Name. Hit F8 (Help), and choose the pertinent Help Screen (#2). Leave with F9 or zoom to select a display field. Go to the Help parameter, zoom and choose screen (#2).

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Now you can check the Help Screen definitions you have just set up. Run the Order Entry Program and request Help at different times, moving your cursor around the screen. Note that the same Help screen will appear in all cases, except where a different screen was defined to be sensitive to the field – Customer Name. There are 4 levels of Help Screens. If you hit F10 while you are positioned on Customer Name you will get Help Screen #2, another F10 will give you screen #1, another F10 will give you User Option Help screen and another F10 will give you the Help screen for Help. Leave this stage by hitting F9 four times.

MAGIC



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