

AS-EASY-AS

Version 5.7

For MS-DOS

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AS-EASY-AS Version 5.7 User's Manual

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1. INTRODUCTION

Congratulations on your purchase of AS-EASY-AS, an excellent spreadsheet program, packed with features that can't be found in other packages that cost many times more. Before you rest your fingers on the keyboard and start using AS-EASY-AS, its useful to have an overview of the capabilities of the program.

1.1 REGISTRATION

After opening the package, please take a minute to remove the Registration Card from the inside cover of this manual, fill it out, and mail it to us. Registration makes it easier for you to get technical support and allows us to notify you of future developments.

If you find that your program diskette is defective, return it to us within 30 days from the date of purchase and we will replace it absolutely FREE of charge. If your program diskette gets damaged after the 30 day period has expired, we will replace it for a nominal fee.

Please note that we CANNOT replace program diskettes unless the Registration card was returned within 30 days from the date of purchase.

From time to time we will notify you of updates to the program. These updates will be made available to registered users of AS-EASY-AS for a nominal fee.

1.2 WHAT IS A SPREADSHEET

A spreadsheet is a large grid of cells, each uniquely identified by a column, row coordinate i.e., A1, B13, D146, etc. In AS-EASY-AS, this grid is made up of 8,192 rows (1 through 8,192) by 256 columns (A through IV) i.e., 2,097,152 cells. Typical spreadsheets contain a mix of descriptive text and numbers with calculations dynamically linked to other cell contents.

For complex business applications, the dynamic quality of AS-EASY-AS is indispensable. You can change a number and the spreadsheet recalculates instantaneously. Entering new values or text is almost effortless. Performing calculations on a column or a row of numbers is simplified with the use of built-in functions.

A PC monitor can typically display only 25 lines of 80 characters each, (although some modes support more characters). With a spreadsheet you can only look at a small portion of this large grid of cells at one time as shown in Figure 1-1.

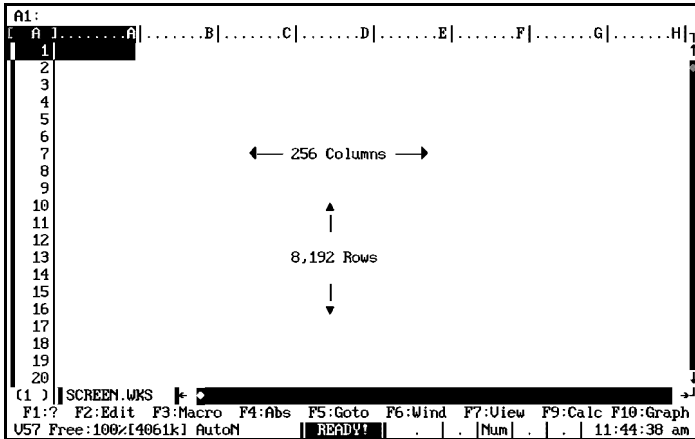


Figure 1-1 AS-EASY-AS Screen

1.3 SAMPLE APPLICATION

This section introduces a simple AS-EASY-AS application, in order to familiarize you with the program. If you are experienced with using spreadsheets, you may feel an urge to skip this section. We suggest, however, that you spend the time to at least quickly review it so that you may become familiar with the general hierarchical structure of the program and its interface.

The sample application is not designed to make you an expert in the program, but it is meant to give you a taste the overall capabilities of AS-EASY-AS. Later sections in this manual provide you with the detailed information necessary to tap into the almost unlimited potential of the program.

For the purposes of the example, you are the financial analyst of ASEASY Corporation. Your responsibilities, among others, include presenting a financial summary of the company to the Board of Directors as well as determining the profit to be distributed to the numerous shareholders.

Your presentation to the Board of Directors should include a short financial history of the company over the last 6 years, and summary figures for income, expenses, salaries, etc. The data that is available to help you with these calculations are presented below:

Year	Income	Expenses	Salaries	Investment
1986	\$564,983	\$292,903	\$189,922	\$43,900
1987	\$652,983	\$311,982	\$219,900	\$25,000
1988	\$683,900	\$334,520	\$226,500	\$18,500
1989	\$688,550	\$342,800	\$225,250	\$35,000
1990	\$695,500	\$350,500	\$228,550	\$30,250
1991	\$710,400	\$351,000	\$226,000	\$22,000

The first thing we should do, of course, is to enter all this information into an AS-EASY-AS worksheet. After we do that, we'll be able to manipulate the data and get the type of results we are interested in.

We'll assume that we have already started the program, and we are currently in the Ready mode. Let's move the cursor to cell A2 type **Year** and press [ENTER]. Then let's move the cursor to cell A3, type \- and press [ENTER]. The backslash tells the program to fill the cell with the character that immediately follows it, i.e., with dashes.

1-4 INTRODUCTION

Now, let's move the cursor to cell A4, type **1986** and press [ENTER]. Continuing this process, move the cursor down to cells A5, A6..., and enter the rest of the years.

Next, let's move cursor to cell B1, type **Gross** and press [ENTER]. Move the cursor to cell B2, type **Income** and press [ENTER]. Move the cursor to cell B3, type \- and press [ENTER]. At this point, it's time to enter the Gross income for year 1986. Move the cursor to cell B4, type **564983** and press [ENTER]. Please, note that the preceding dollar sign and the comma should NOT be entered! These characters will be added to the appropriate cells using a formatting command later on. If you enter these characters, (\$ and ,) while entering the values, they will be treated as text and you will not be able to use them for the required analysis.

Following this procedure, continue entering all the data in the worksheet, until your screen looks like Figure 1-2.

1	Gross	Total		
2	Year	Income	Expenses	Salaries Investment
3				
4	1986	564983	292903	189922 43900
5	1987	652983	311982	219900 25000
6	1988	683900	394520	226500 18500
7	1989	688550	342800	225250 35000
8	1990	695500	350500	228550 30250
9	1991	710400	351000	226000 22000
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

(1) | 1.WKS | F1: ? F2: Edit F3: Macro F4: Abs F5: Goto F6: Wind F7: View F9: Calc F10: Graph U57 Free: 100% [4060k] AutoN | READY! | . . . | Num . . . | 11:45:13 am

Figure 1-2 ASEASY Corporation's Income and Expenses

Now that the data is all entered, let's make it look a bit better by using some of the formatting capabilities of AS-EASY-AS.

Let's press the [Home] key to bring the cursor to cell A1. Now, let's right justify the text data in the first two rows of the data. Press the forward slash (/) key, to invoke the menus. You should be presented with the main menu of the program.

Press **R** to select the Range command, then press **P** to select the Prefix command. Now, press **R** to specify right justification. You will be prompted to specify the range to justify. The default range displayed should be A1..A1. Press the period (.) key, to anchor the cursor, and then move the cursor to cell E2. The block of cells from A1 to E2 should be highlighted. Press [ENTER] to confirm the range.

Now, move the cursor to cell B4 and get ready to format the cells containing the income/expenses figures. Again, press the slash (/) key to invoke the main menu. Now, press **R** to select Range and **F** to select format. You will be presented with the formats selection menu. Press **C**, for currency. You will be prompted to enter the number of decimal points. Type zero "0" and press [ENTER].

At this point, you will be prompted to select the range to format. Press the period (.) key to anchor the cursor, and then move the cursor to cell E9. The desired range should be highlighted. Press [ENTER] to complete the operation.

All values should now be preceded by a dollar sign and a comma should separate the thousands. You'll notice, however, that the numbers look somewhat crowded. That's because the column width is not wide enough to accommodate the values in the selected format comfortably.

Let's quickly expand the column width so that the worksheet will be more pleasing to the eye and easier to read. Press the slash key (/) to invoke the main menu, press **S** for Sheet C for ColWidth and **G** for Global. When prompted for the column width, type **11** (11 characters wide) and press [ENTER]. Your screen should now look like Figure 1-3.

Year	Gross Income	Total Expenses	Salaries	Investment
1986	\$564,983	\$292,903	\$189,922	\$43,900
1987	\$652,983	\$311,982	\$219,900	\$25,000
1988	\$683,900	\$334,520	\$226,500	\$18,500
1989	\$688,550	\$342,800	\$225,250	\$35,000
1990	\$695,500	\$350,500	\$228,550	\$30,250
1991	\$710,400	\$351,000	\$226,000	\$22,000

(1) | 2.WKS | F1: ? F2: Edit F3: Macro F4: Abs F5: Goto F6: Wind F7: View F9: Calc F10: Graph U57 Free: 100% [14060k] AutoN | READY! | | Num | | | 11:45:53 am

Figure 1-3 Financial Data Formatted as Currency

1-6 INTRODUCTION

At this time, we'd like to calculate the profits available for distribution at the end of each year, after all expenses have been paid and all planned investments have been made. Move the cursor to cell F4. Then, follow the steps outlined below.

Type	Press	Explanation
+		Tells the program that you will be entering a formula into the current cell.
	Left	Move cursor to E4
	Left	Move cursor to D4
	Left	Move cursor to C4
	Left	Move cursor to B4. Control panel area, top of the screen should display +B4
-		Indicate that the next term will be defined
@SUM(c4..e4)		Enter an AS-EASY-AS function to sum cells C4 to E4. The control panel should display +B4-@sum(c4..e4)
	ENTER	Tell AS-EASY-AS that you have finished defining the formula.

Cell F4 should now display the calculated result, as shown in Figure 1-4.

Year	Gross Income	Total Expenses	Salaries	Investment	
1986	\$564,983	\$232,903	\$189,922	\$43,900	38258
1987	\$652,983	\$311,982	\$219,900	\$25,000	
1988	\$683,900	\$334,520	\$226,500	\$18,500	
1989	\$688,550	\$342,800	\$225,250	\$35,000	
1990	\$695,500	\$350,500	\$228,550	\$30,250	
1991	\$710,400	\$351,000	\$226,000	\$22,000	

Figure 1-4 Cell F4 contains "+B4-@SUM(C4..E4)"

Now, we can use the powerful CopyCell command to copy the formula we entered to cells F4, to cells F5..F9. There is no need to reenter the formula for calculating the profit each year. In copying the formula, the cell addresses will be automatically adjusted to reflect the new year. For example, when the formula +B4-@SUM(C4..E4) is copied to cell F5, the contents of E5 will read +B5-@SUM(C5..E5). That's just one of the many features in AS-EASY-AS.

Type	Press	Explanation
/c		Invoke the main menu and select CopyCell. You will be prompted to enter a FROM: range.
	[ENTER]	Accept the current cell (F4) as the FROM: range. You will now be prompted for a TO: range.
	Down .	Move the cursor to cell F5 and press the period (.) key to anchor the cursor.
	Down	Move cursor to F6. F5 and F6 should be both highlighted.
	Down	Move cursor to F7
	Down	Move cursor to F8
	Down	Move cursor to F9
	[ENTER]	Signify the end of the copy TO: range.

A copy of the formula you entered in F4 should also be present in the rest of the cells, with the references appropriately translated. In other words, F5 should contain the formula $+b5-@sum(c5..e5)$, cell F6 should contain the formula $+b6-@sum(c6..e6)$ and so on...

Now, let us label the new column of numbers and format them to look similar to the rest of the entries in the table. Move the cursor to cell F2, and type "**Profits**" (the double quote is for right justification) and press [ENTER]. Move the cursor to cell F3, type \- and press [ENTER].

Press / **R F C** (for **R**ange, **F**ormat, **C**urrency), type **0** (0 decimal places) and press [ENTER]. When prompted for the range to format, type **F4..F9** and press [ENTER] again. The result should be similar to Figure 1-5.

Year	Gross Income	Total Expenses	Salaries	Investment	Profits
1986	\$564,983	\$292,903	\$189,922	\$43,900	\$38,258
1987	\$652,983	\$311,982	\$219,900	\$25,000	\$96,101
1988	\$683,900	\$334,520	\$226,500	\$18,500	\$104,380
1989	\$688,550	\$342,800	\$225,250	\$35,000	\$85,500
1990	\$695,500	\$350,500	\$228,550	\$30,250	\$86,200
1991	\$710,400	\$351,000	\$226,000	\$22,000	\$111,400

Figure 1-5 shows a spreadsheet window with the following data and status:

- Formula bar: F9 [C0]: +B9-GSUM(C9..E9)
- Cell A1: Year
- Cell B1: Gross Income
- Cell C1: Total Expenses
- Cell D1: Salaries
- Cell E1: Investment
- Cell F1: Profits
- Row 9: 1991, \$710,400, \$351,000, \$226,000, \$22,000, \$111,400
- Status bar: (1) | 4.WKS | F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph U57 Free:100%[4060k] AutoN | READY! | . | Num | . | . | 11:47:18 am

Figure 1-5 Calculated Profits of ASEASY Corporation

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Before we continue with any more calculations, let's take a quick look at how the AS-EASY-AS graphics capabilities can be used to instantly give us an indication on how the ASEASY Corporation is doing.

Continuing with the step-by-step instruction format, move the cursor to cell A4 and follow through these steps.

Type	Press	Explanation
	/G	Invoke the Graphics menu
	R	Indicate that you want to specify the data ranges to be used for the graph. Note that at least the X-range and one of the Y- ranges (A,B,C,...) have to be specified.
	X	X-Data specification; you will be prompted to specify the X-range.
A4..A9	[ENTER] A	Specify that the X-range will be the years of interest. A-Data (first dependent range) specification; you will be prompted to specify the A-range.
B4..B9	[ENTER] B	Specify that the A-range will be the total income for each year. B-Data (second range) specification; you will be prompted to specify the A-range.
F4..F9	[ENTER] Q T B	Specify that the B-range will be the profit for each year. Exit the Range Sub-menu. Select Type and when presented with the graph type selection menu, select Bar.

Now, we are ready to take a quick look at the graph we have just defined. Press V, for View the graph. Your screen should look similar to Figure 1-6.

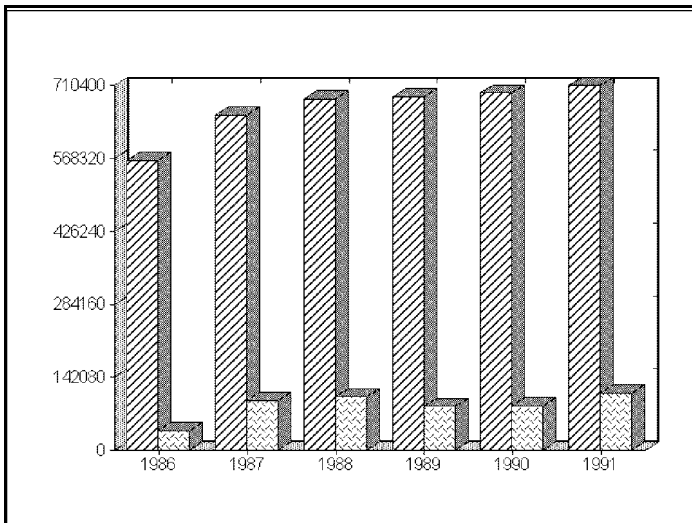


Figure 1-6 Bar Graph Showing Income and Profit

As you can see, this figure quickly tells us how sales and profits have been going for the last six years, and it also gives us a good representation of the Income/Profits relationship.

Now, let's see if we can make the graph look a bit better by using some of the graph formatting features of the program. First, press any key to leave the graphics display and return to the Graphics menu.

<u>Type</u>	<u>Press</u>	<u>Explanation</u>
	S	Select the Scale command from the menu
	Y	Specify the Y-Axis from the menu
	F	Indicate that you will be changing the format of the Y-Axis. A format selection sub-menu will appear.
	C	Select Currency. You will be prompted for the number of decimals places.
0	[ENTER]	Select zero decimals.
	Q	Exit this Y-Axis Scale sub-menu.
	X	Specify the X-Axis from the menu
	F	Indicate that you will be changing the format of the Y-Axis. A format selection sub-menu will appear.
	F	Select Fixed, and specify the number of decimals.
0	[ENTER]	Select zero decimals.
	Q	Exit this X-Axis Scale sub-menu.
	Q	Exit the Scale sub-menu, back to the main Graph menu.

Next, we'll add titles to the graph and the X- and Y-axes, and then we'll create a legend so that we can tell which bar represents the income and which represents the profit of the ASEASY Corporation.

<u>Type</u>	<u>Press</u>	<u>Explanation</u>
	O	Select the Options command from the menu
	T	Invoke the Titles sub-menu. You will be presented with a dialog window that permits you to specify graph titles.
	M	Indicate that you want to enter a main graph title. The area next to the Main: field will be highlighted.
ASEASY CORP.	[ENTER]	The main Graph Title will be "ASEASY CORP."
	X	Indicate that you want to enter an X-axis title. The area next to the XAxis: field will be highlighted.
YEAR	[ENTER]	The X-Axis title will be "YEAR"
	Y	Indicate that you want to enter an Y-axis title. The area next to the YAxis: field will be highlighted.
DOLLARS	[ENTER]	The Y-Axis title will be "DOLLARS"
	Q	Exit the Titles sub-menu
	L	Specify the Legend option. You will be presented with a dialog window that allows you to specify the legends for the graph.
	A	Indicate that you will be entering the legend for the A-data range. The area next to the A: legend prompt will be highlighted and you are ready to enter the desired text.

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Income [ENTER] The legend for data range A will be "Income"
B Indicate that you will be entering the legend for the B-data range. The area next to the B: legend prompt will be highlighted and you are ready to enter the desired text.

Profit [ENTER] The legend for data range A will be "Profit"
Q Exit the Legend sub-menu
Q Exit the Options sub-menu
V View the modified graph. It should look like Figure 1-7.

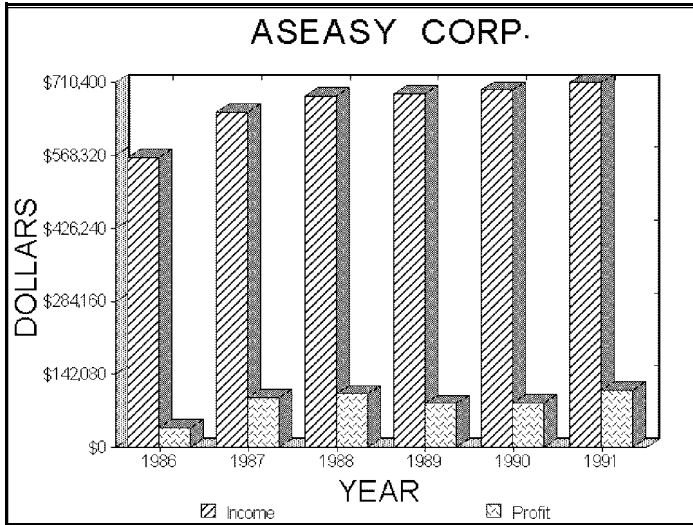


Figure 1-7 Bar Graph with Title Information Added

The next step in this simple example will be to calculate the profit distribution to the shareholders, since that's one of the parameters that need to be presented to the Board of Directors of ASEASY Corp.

In doing so, we will be setting up some more simple formulas using the calculational abilities of the program. For the purposes of this example, let's at first assume that 100,000 shares have been issued for the last six years in question. The per-share profit, then, would be the total profit divided by the number of shares.

Let's move the cursor to cell G4, type in the formula **+F4/100000** and press [ENTER]. This should calculate the per-share profit distribution of the first year in question, i.e., in 1986 the profit was 0.38258 dollars per share (for now, let's keep all the decimal places).

Now, using the powerful CopyCell command, let's copy this formula for all the other years. With the cursor still on cell G4, press /C and then press [ENTER] to confirm G4..G4 as the "Copy From:" range.

Then, move the cursor to cell G5, press the period (.) key to anchor the cursor, move the cursor to cell G9 and press [ENTER]. This should copy the formula for every year of interest. Your screen should look like Figure 1-8.

	Gross Income	Total Expenses	Salaries	Investment	Profits	Profit Per Share
4	\$564,983	\$292,903	\$189,922	\$43,900	\$38,258	0.38258
5	\$652,983	\$311,982	\$219,900	\$25,000	\$96,101	0.96101
6	\$683,900	\$334,520	\$226,500	\$18,500	\$104,300	1.04300
7	\$688,550	\$342,800	\$225,250	\$35,000	\$85,500	0.855
8	\$695,500	\$350,500	\$228,550	\$30,250	\$86,200	0.862
9	\$710,400	\$351,000	\$226,000	\$22,000	\$111,400	1.114

Figure 1-8 Calculated Profit Per Share

In order to make our screen look a bit more consistent and more readable, let's create a title for the new column and format the results to eliminate some of the decimals.

Move the cursor to G1, type "**Per**" (including the double quote, for right justification) and press [ENTER]. Move the cursor to cell G2, type "**Share**" and press [ENTER]. Move the cursor to cell G3, type \- and press [ENTER].

Now, move the cursor to G4 and press **/R F C** to invoke the main menu and select Range Format Currency. When you are requested to specify the number of decimals, type 2 and press [ENTER]. You will then be prompted to specify the range to format. Move the cursor to cell G9 (the highlighted range should expand as you move the cursor) and press [ENTER].

You have probably noticed that with the current column width settings, you are not able to view all the data at once on your screen. Since column A only contains the years, there is no need for it to be 11 spaces wide (remember, we changed the Global column width earlier). Let's change the width of column A so all our data may be displayed on the screen at once.

Move the cursor to column A (any row). Press **/S C S** to invoke the / Sheet, ColWidth, SetWidth command. Press the left arrow four times. You should see the column width dynamically change.

1-12 INTRODUCTION

At this point, press [ENTER] to confirm the current width for column A (7 spaces). Your screen should look like Figure 1-9.

	Gross	Total			
Year	Income	Expenses	Salaries	Investment	Profits
1986	\$564,983	\$292,903	\$189,922	\$43,900	\$38,258
1987	\$652,983	\$311,982	\$219,900	\$25,000	\$96,101
1988	\$683,900	\$334,520	\$226,500	\$18,500	\$104,380
1989	\$688,550	\$342,800	\$225,250	\$35,000	\$85,500
1990	\$695,500	\$350,500	\$228,550	\$30,250	\$86,200
1991	\$710,400	\$351,000	\$226,000	\$22,000	\$111,400

(1) | 4.WKS | READY! | 11:47:18 am

Figure 1-9 Formatted Profit Per Share Data

The next step is to combine text and graphics in your worksheet. We'll assume that your system is equipped with at least an EGA color monitor and a corresponding graphics adapter.

The first thing we'll do is to invoke the EGA graphics mode of the program. Note that if you have a VGA, or Hercules monitor/adaptor combination, you should invoke the corresponding graphics mode.

Press **/U I V E** to select the EGA 25 lines graphics mode. On a good quality monitor you should barely see the difference between the text mode and the EGA 25 line graphics mode. Press [ESC] three times to return to the Ready mode.

Now, we will embed the graph we created earlier, directly into the AS-EASY-AS screen, so that we can look both at the data and the graph at the same time.

Move the cursor to cell B11. Press **/G N I** to invoke the **/Graph, Name, Insert** command. A small window will appear at the top of the screen requesting the name of the graph to insert. Press [ESC] for a list of the available named graphs. Since we haven't created any named graphs, the only name on the list is the MAIN graph, i.e., the currently define graph. MAIN should be highlighted; press [ENTER] to select the MAIN graph for insertion.

You will be prompted to specify the graph insertion range, starting at the current cell location. Move the cursor right to column F and then down to row 18. The range B11 to F18 should be highlighted. Press [ENTER] to confirm.

Your screen (assuming you have an EGA system) should look like Figure 1-10, or similar to that if you have a VGA or Hercules graphics setup.

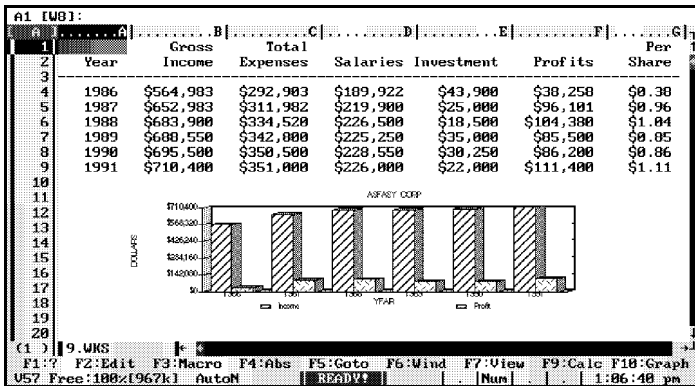


Figure 1-10 Inserted Graph Viewed in Graphic Mode

If your system is in text mode, then your screen should look like Figure 1-11.

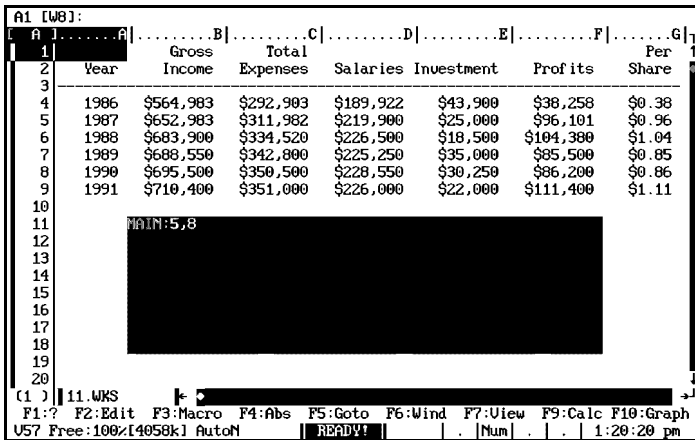


Figure 1-11 Inserted Graph Viewed in Text Mode

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Continuing with our example, let's assume that as soon as you've finished all your calculations and you are preparing to go to the Board of Directors meeting, you realize that 20,000 shares that were issued last week were not part of the 100,000 figure you used in your analyses.

Let's use the Search/Replace capabilities of AS-EASY-AS to correct this. First, let's move the cursor to A1, because unless a range is specified, Search/Replace operations start looking forward from the current cell location. Press **/S T R** to invoke the /Sheet, Text, Replace command. You are prompted to specify the "Find:" string. The string we want to search for, of course, is 100000 (without the commas since we did not, and could not have, used commas in our formulas). Type **100000** and press [ENTER].

You are then prompted to specify the "Replace with:" string. Type **120000** (the adjusted total number of shares) and press [ENTER]. You are now asked to select Pause, Upper Case, and/or Range.

We don't need to select Pause (which will pause at each occurrence of the string), because we know that we want to change ALL the "100000" entries in this small worksheet.

Upper Case has no effect in this case, since we are replacing digits which have no upper/lower case, and there is no need to specify a range (we'll perform the Search/Replace on the whole worksheet).

Simply press the backspace key twice (to eliminate the default PU) and then press [ENTER]. AS-EASY-AS will go through the worksheet, find all occurrences of 100000 and change them to 120000. It will also pop-up a small window and tell you how many occurrences of the specified string were found (in this case, 6).

Since these entries were in formulas and the recalculation is set to automatic (AUTO should be displayed on the bottom status line), the formulas are automatically re-evaluated. Your screen should look like Figure 1-12.

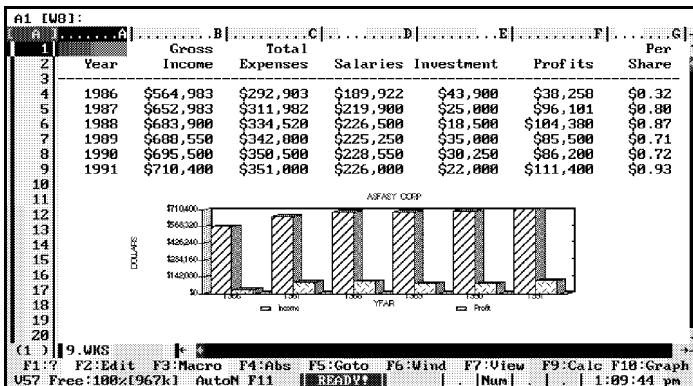


Figure 1-12 Revised Profit Per Share Data

The last thing we'll do in this example, is to print the results we have created so that a summary report can be presented to the Board of Directors. This summary report will consist of an image that looks similar to the one in Figure 1-12, i.e., the table of results with the associated graph.

Before we do that, you need to select the appropriate output device for your system. We'll assume that your printer is a LaserJet II. The steps you need to follow to select the appropriate device and create the printed report are outlined below.

<u>Type</u>	<u>Press</u>	<u>Explanation</u>
	/U I P	Invoke the User, Install Printer menu. You should be presented with a selection of printers that may be used with AS-EASY-AS. Move the cursor to the HP Laserjet line and press [ENTER] to select the printer.
	ESC ESC ESC	Press [ESC] three times to get back to the main Ready mode.
	P	Select the PrintTo menu. You are presented with a number of options.
	G	Since we want to print a range with an embedded graph, select Graphic.
	R	Select Range. You are asked to specify a print range. Type A1..G20 and press [ENTER].
	A	Select Adjust to make sure the program and the printer are synchronized regarding the top-of-page.
	G	Select GO to send the output to the Laserjet printer. A status bar, at the top of the screen, should report the progress of the printing process. After 100% of the image has been processed, the Print menu will appear on the screen.
	P	Advance the printer to the next top-of-page. This should eject the page on your laserjet. Please note that if you are printing through a network, the page will probably not be printed until you exit the program.

This concludes our simple tutorial. As mentioned earlier, it is not meant to make you an expert user of the program, but rather to let you taste its capabilities. If you want to save the final worksheet for later reference, at this point, press /F S to invoke the File, Saving sequence. A window will appear similar to Figure 1-13. Move the cursor to the File Name field and press [ENTER]. The field should be highlighted. Type **SAMPLE** (or any other valid DOS file name you wish) and press [ENTER].

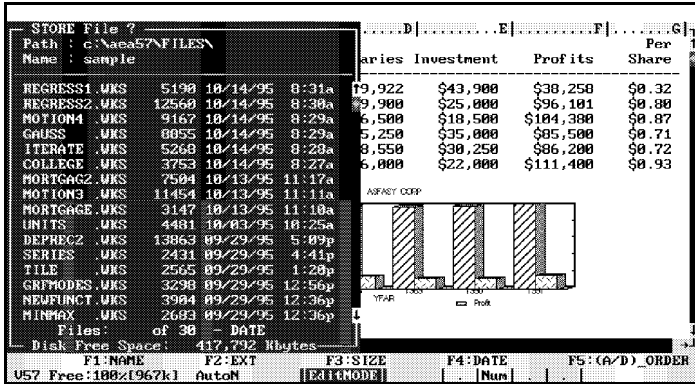


Figure 1-13 AS-EASY-AS / File Store Window

Now you may exit the program using the /E Y (/Exit, Yes) sequence.

The sections that follow provide you with detailed information on how to use all the powerful features of AS-EASY-AS.

2. GETTING STARTED

2.1 OPERATING REQUIREMENTS

AS-EASY-AS requires an 80286 or better CPU, EGA/VGA or better graphics, and at least 450 K free RAM running DOS 3.3 or later.

For program worksheet file storage, 1.5 MB of disk space are recommended.

Two MB Expanded Memory (EMS) are recommended. AS-EASY-AS will use up to 8 MB of EMS. If you don't have EMS, you can instruct AS-EASY-AS to use Virtual Memory (see /VM Command Line Switch).

AS-EASY-AS will print text and graphics to Epson and compatible 9- and 24-pin dot matrix printers, deskjet and inkjet printers, and most laserjet printers. AS-EASY-AS can print color graphics on most color-capable dot matrix and deskjet/inkjet printers.

It will also work with daisy wheel printers, but they will not be able to print graphics. For more information on printers, see Section 4, Printing.

AS-EASY-AS may optionally be used with a Microsoft or compatible mouse.

AS-EASY-AS is designed to operate with DOS 3.3 and later. It may be operated as a DOS application from within Windows 3.1x and Windows 95. However, installation of AS-EASY-AS should be performed from the DOS prompt, without Windows operating.

On some systems (particularly older 486 CPU systems), you may experience difficulties running in a windowed mode under Windows 3.1. When setting up the .PIF file, make sure the minimum conventional RAM requirement is set to at least 450K and the EXCLUSIVE operation box has been selected.

If you are still having difficulties, you might need to turn the 80387 off and use the program's 80387 emulation instead. To do that, prior to running Windows, at the DOS prompt, type "**SET 87=N**" (without the quotes) and press [ENTER].

2.2 INSTALLATION

Before installing AS-EASY-AS, you may wish to view last minute news about the program, important information that did not make it into the printed manual, and a brief description of the files on diskette. This information is contained in the VENDINFO.DIZ file on the distribution diskette.

To view the VENDINFO.DIZ file on your screen, use the DOS command TYPE:

```
TYPE A:VENDINFO.DIZ [ENTER]
```

If you prefer, you can read it using any text viewer. For example, if the LIST viewer is in your DOS path, you would use the command LIST A:VENDINFO.DIZ.

DOS OPERATING SYSTEM

Before using AS-EASY-AS, you must install the program on your hard disk or on floppy diskettes. An installation program transfers the necessary files from the distribution diskette to your working disk/directory.

If you are installing the program on diskettes, first format a blank diskette and label it AS-EASY-AS. If you want to make the disk bootable, use the DOS FORMAT/S command.

To install the program:

1. Place the AS-EASY-AS distribution disk in drive A: (or B:)
2. At the DOS prompt, type A: (or B:) and press [ENTER]
3. Type INSTALL and press [ENTER].

Follow the simple on-screen instructions to specify where to install the program. If you are installing the program to 360K diskettes, you will get a message that some file(s) will not fit on the disk. To extract the rest of the files, use an additional formatted diskette.

When the operation is complete, the DOS prompt will reappear on your screen. Place the original diskette in a safe place. If your working diskette later becomes damaged, repeat the above process to re-install the program.

WINDOWS 3.1X

You should first exit Windows to the DOS prompt by clicking on "File", "Exit". From the DOS prompt, follow the DOS installation instructions above.

For optimal operation when operating AS-EASY-AS from Windows 3.1x, you should create a PIF file. The file should specify Text Video Mode, 450 KB Ram Required, 640 KB Desired, and 1024 KB EMS Required. The EMS KB limit may be set depending upon your file size. You can start with 2048 KB and increase the value as your worksheets increase in size. XMS Desired and Limit should be set to 0 KB. Display usage should be set to Full Screen.

Refer to your Windows documentation for more information on creating a PIF file and program group.

WINDOWS 95

In order to install AS-EASY-AS in Win95, you have to run the installation program from the DOS prompt. To do that,

1. Get to the DOS prompt and execute the AS-EASY-AS installation program, INSTALL.EXE. We'll assume you installed the program on drive C:, subdirectory c:\ASEASY.
2. Start WIN95 again, and open a folder where you'd like to install the program, or create a new folder following the WIN95 instructions.
3. From the open folder, select FILE, NEW, SHORTCUT. When you are prompted for the command line, type c:\aseasy\aseasy.exe and press [ENTER].
4. When asked for a name for the shortcut, type ASEASY and press [ENTER].
5. Select an icon from the WIN95 stock icons, and double-click on it, or click on finish.
6. At this point, the icon you selected should appear in the folder. Click on the icon once and then select FILE, PROPERTIES.
7. Select the Program Tab. Make sure you select Close on Exit. Also, make sure you enter any command line switches you might want for AS-EASY-AS at the end of the entry in the command line string.
8. Click on the Screen tab, select whether you want the program to run in Full screen or Window mode, and then click on OK.

From now on, you can run AS-EASY-AS by double-clicking on the icon. Many more options can be set by selecting the FILE, PROPERTIES option. For further information, refer to your WIN95 documentation.

2.3 USING A MOUSE

AS-EASY-AS may be used with a Microsoft or compatible 2 or 3 button mouse. A mouse provides access to all menu commands and facilitates movement around the worksheet.

The AS-EASY-AS package does not include a mouse driver, a small memory-resident program included with your mouse. The mouse driver provides a standard interface which permits different programs to interact with different mice.

The mouse driver must be installed before starting AS-EASY-AS. Make sure the mouse driver was included in the CONFIG.SYS file or execute from DOS by typing the name of the mouse driver.

Some mice have three buttons while others have two. AS-EASY-AS uses only two buttons on the mouse. The left button is functionally equivalent to the [ENTER] key on the keyboard, and the middle and/or right mouse buttons both represent the [ESC] key. You can use the keyboard and mouse equivalents interchangeably.

In text modes, the mouse cursor appears on the AS-EASY-AS screen as a block one character in width and height. The cursor may be moved around the screen through corresponding movement of the mouse.

If the left mouse button is "tapped" or "clicked" while on a worksheet cell, the worksheet cell pointer will relocate to the cell occupied by the mouse cursor.

If the left button is held down while moving the mouse, and the mouse cursor reaches a border, the worksheet will start scrolling in the direction of mouse movement. This motion will continue until the outer limits of the worksheet are reached. The cell pointer will be positioned in the last cell where movement was stopped.

The sensitivity of the mouse while scrolling may cause overshoot of the desired window on some fast computers. If this happens, you can move the cell pointer one cell at a time by clicking on the scroll bar pointers in the right and bottom borders.

Throughout this manual, when a reference is made to the [ENTER] key, the left mouse button will also be implied. Similarly, when reference is made to the [ESC] key, the right mouse button should be assumed to perform the same function.

2.4 STARTING THE PROGRAM

The system configuration and certain default parameters can be specified when the program is started. Various configuration options can be invoked by a number of command line switches (each switch is preceded by a slash [/] character). Note that most of these defaults can also be changed in the AS-EASY-AS Configuration file. See USER, INSTALL in Section 10 for further information.

AS-EASY-AS will automatically check to see if a math co-processor is installed on your computer system. If one is detected, the program will use it. If your computer system has a math co-processor, but for some reason you do not want it to be used, then prior to executing AS-EASY-AS, at the DOS prompt, type **SET 87=N** and press ENTER. For problems related to the math co-processor on 486 systems, see the **/N486** Command Line Switch.

The general form to start the program is:

ASEASY /switch1/switch2/switch3...

COMMAND LINE SWITCHES

Switches are limited to a maximum of 46 characters on the command line. The following command line switch options can appear in any order.

4 Convert Zero Values in Version 4.00 Files

If you access .WKS files that were created and last saved with Version 4.00 and some early releases of Verison 5.00., it is possible that 0 values in your worksheet will appear as an exponential value with a very large negative exponent.

To display the 0 values correctly, start the program using the /4 command line switch. When the .WKS file is saved with this version, it will be automatically converted so you will not need to use the /4 command line switch when you access the file again.

ATT AT&T Monochrome System.

Set this switch if you are using an AT&T system (and some Olivetti systems) to produce graphics with a resolution of 640x400 (video mode \$48).

ATT2 AT&T Monochrome System.

Set this switch if you are using a Toshiba laptops (and some Olivetti systems) to produce graphics with a resolution of 640x400 (video mode \$40).

AUTO=Filename Autoload Worksheet.

Automatically loads a worksheet upon program startup. Be sure to specify the file's .WKS extension and path, if the file is not located in the default directory.

As an example *ASEASY /AUTO=C:\FILES\SALES.WKS* will automatically load SALES.WKS located in directory C:\FILES upon program startup.

- NOTES:**
1. File names containing a hyphen "-" can not be auto-loaded. However, the underscore character "_" is acceptable.
 2. The file name of an auto-loaded file will not appear on the status line.

BK=X Screen Blanking Time

Sets the screen blanking time. If your computer is left inactive (no key pressed) for X seconds, the screen will blank to prevent phosphor burnout. When the screen is blank, pressing any key will re-display the sheet. (We suggest using the ESCAPE key).

The default blank out time is set to 5 minutes (i.e., X=300). If a blanking time of 0 is used, screen blanking will be disabled.

NOTE: If your system is already using a screen blanking option, the AS-EASY-AS screen blanking should be disabled (i.e., X=0).

BM Bypass Mono

This switch overrides the equipment autodetection and is used in combination with /EM or /EMV.

CFG = Path/Filename Sets Alternate Configuration File

Enables users to invoke the program using a specified configuration file. This feature allows users with different workstations to use the program without modifying the configuration every time.

/CFG=Drive:\Directory\Filename will instruct AS-EASY-AS to search the specified drive and directory for an alternate configuration file, "Filename".

CTR Center Column Letters

This switch centers the column heading letters over each column.

DIR=Path Sets the Default Directory/Data Path

Specify the default drive/directory. The default data drive and subdirectory is the drive and subdirectory from which the program was started.

For example, typing *ASEASY /DIR=C:\ASEASY\DATA* sets the default data drive to C: and the data subdirectory to \ASEASY\DATA.

DO Use 2-digit years for date display

Display only the last 2 digits of the year in formatted dates, such as 05/06/97. The default is to display all 4 digits of the year, such as 05/06/1997.

DW Highlight Unprotected Cells

Highlight cells which have been formatted as unprotected (/RANGE LOCK NO), whether worksheet protection has been enabled or not. Normally unprotected cells are highlighted only if protection has been enabled.

E Enhanced Graphics Adaptor

This switch specifies an IBM Enhanced Graphics Adaptor or equivalent available for graphics. The resolution on the EGA screen is 640x350 pixels with multiple colors. Although most EGA monitors will be detected automatically by AS-EASY-AS, we suggest you use this switch when using an EGA monitor.

EM Monochrome EGA Monitor/Card (640x350)

Specifies that your computer is equipped with a monochrome EGA monitor and adapter card, capable of displaying at a 640x350 pixel resolution.

EV VGA Monitor/Card (640x480)

Specifies that your computer is equipped with a VGA monitor and adapter card, capable of displaying at a 640x480 pixel resolution. If your system is equipped with such a monitor/card combination and the /EV switch is not used, the program will attempt to detect the appropriate hardware settings. If it fails, it will most likely start up in EGA mode.

EVM Monochrome VGA Monitor/Card (640x480)

Specifies that your computer is equipped with a monochrome VGA monitor and adapter card, capable of displaying at a 640x480 pixel resolution.

H Hercules Card (720x348)

This switch specifies that you are using a Hercules Mono-Graphics board or clone. The resolution of the screen when plotting graphics is 720x348 pixels, and will use the first graphics page at \$b000.

H2 Hercules Card, Page #2 (720x348)

This switch instructs the program to use the second video page at \$b800 for graphics when using a Hercules Mono-Graphics board or clone.

MONO Monochrome (B&W)

Change all colors to a white/black color scheme. This can be used on monitors which do not display all colors visibly, such as LCD monitors found on most laptops. This switch is not required for Hercules cards as they are set to mono by the program automatically.

N486 Bypass 486 Co-Processor Error Trapping

This switch eliminates math co-processor related problems experienced on some 486 systems. Use of the switch bypasses specific instructions in the program that mask error trapping for the co-processor.

NE Don't Use Expanded Memory

Do not use expanded memory. AS-EASY-AS will automatically use all the EMS memory it detects unless this switch is used. The program overlays will also not use expanded memory, loading instead from disk as needed.

NR Force Manual Recalculation

Forces recalculation to be set to manual mode and disables Recalc Linking when a worksheet file is loaded. This results in significantly decreased time for loading complex worksheets.

NT Non-Turbo Keyboard

Cursor movement using the keyboard cursor keys defaults to a "turbo" mode. Turbo speeds up cursor movement on 286 ATs and above. It may not be compatible with some types of computers, such as the PCjr. Therefore, the turbo feature may be disabled by use of the NT switch. The /NT option also disables mode indicator blinking, permitting execution of the program on computer systems using hardware/software that intercept the timer interrupt.

NW Change Data Bin Boundary Values

This switch changes the boundary values for the Data Bin operation. Without this switch, the criterion used for assigning a sample to a bin is $LIMIT1 \leq VALUE < LIMIT2$, which results in the value being assigned to the LIMIT2 bin.

If the command line switch /NW is used, the criterion for being assigned to the LIMIT2 bin becomes $LIMIT1 > VALUE \# LIMIT2$. See Section 7.4 for an example of Data Bin with and with out the /NW switch.

P Use Alternate Menu (Ver. 4.00) File

Use alternate menu file (ASEASY.MN2) which provides command compatibility with Version 4.00 of AS-EASY-AS.

Q Quick Screen Update (CGA only)

This switch speeds up screen I/O by writing directly to video memory. This switch is only active on a CGA card/monitor system.

RA Round Absolute

By setting this switch, the absolute value of negative numbers is used when rounding. If the RA switch is NOT used $@Round(1.6,0)=2$ and $@Round(-1.6,0)=1$. If AS-EASY-AS is started with the RA switch, $@Round(1.6,0)=2$ and $@Round(-1.6,0)=-2$.

SV VESA Graphics

Specify the VESA graphics video extensions. In order to use this feature, make certain that the VESA BIOS extensions are active on your system. Some video cards have an auto VESA detection mode, while others need to be explicitly placed in that mode by the user. Consult your hardware user's manual for information on how the VESA mode is activated on your system, and what modes are available.

Start AS-EASY-AS with the /SV=\$xxx switch where xxx is the hexadecimal mode you wish to use. VESA BIOS extension modes are described below. Please, note that your system might NOT support all these modes. Consult your system documentation for further information.

100 640x400, 256 colors
 101 640x480, 256 colors (Default)
 103 800x600, 256 colors
 105 1024x768, 256 colors

Examples:

ASEASY /SV Starts the program in VESA mode 101
 (default SV setting)
 ASEASY /SV=\$103 Starts the program in VESA mode 103

UK UK Punctuation Switch

Starting the program with this switch sets the pound (£) as the default currency symbol and modifies the @DATEVAL function to accept arguments in the form: @DATEVAL(DD,MM,YY)

V1 CGA Mode

Force EGA/VGA cards operation to CGA mode. This might be necessary for some non-standard EGA/VGA monitors and video card combinations.

VM=XXX Use Virtual Memory

This switch instructs AS-EASY-AS to use a disk drive to emulate EMS RAM. XXX represents the maximum number of 4K packages to use as EMS memory. (i.e. /VM=80 is equivalent to 320K of EMS.)

NOTE: XXX is limited to a maximum of 500 pages, which is the equivalent of 2,000K of EMS. This allows for even larger worksheets to be created.

When AS-EASY-AS is started with the /vm command line switch, it creates a file with the name ASEASY.TMP. If you shell DOS while using virtual memory you may see this file.

DO NOT DELETE ASEASY.TMP WHILE RUNNING AS-EASY-AS. DELETING THIS TEMPORARY FILE WILL DESTROY YOUR SPREADSHEET DATA.

VP=Drive\Path; Path for Virtual EMS

Specifies the drive and subdirectory to be used by AS-EASY-AS when the /VM switch is used. The default is the start-up drive\directory. You may specify another drive which has more available space to be used for the temporary files. Note the ";" at the end of the path name.

XM=NNN Limit amount of expanded memory

Allows the user to limit the amount of expanded memory used by the program. NNN is the number of 16K pages of EMS to be used. For example, using /XM=10 would instruct the program to only use 16K*10, or 160K of expanded memory. The limit is 500 pages, or 8Mb.

Any combination of valid switches (depending on your system) can be used.

As an example, *ASEASY/E/NE/DIR=C:\DATA* instructs AS-EASY-AS to start in EGA mode, not to use expanded memory, and set the default data drive and directory to C:\DATA.

By creating individual batch files, you could start AS-EASY-AS on a number of different systems, without having to remember all the switches required.

2.5 DROP-DOWN MENUS

All AS-EASY-AS commands are accessed through menus which are invoked by pressing the [/] key. This key is usually located on the lower right side of the keyboard, just above the space bar. An alternate key may be specified, refer to User, Install, Punctuate, Menukey for details.

If you use a mouse, command menus are invoked by pressing the right mouse button when the program is in the Ready! mode. The main command menu will drop down and provide access to all other menu commands. If the right button was selected in error, tapping the right button again will return you to the Ready! mode.

In order for your mouse to be operational, your mouse driver needs to be loaded prior to starting AS-EASY-AS (see Section 2.3 on using the mouse).

When the [/] key is pressed, the main window menu will appear in the top left corner of the screen as shown in Figure 2-1. As you will see later, window menus provide you with a useful trail through the different levels of menus in the program.

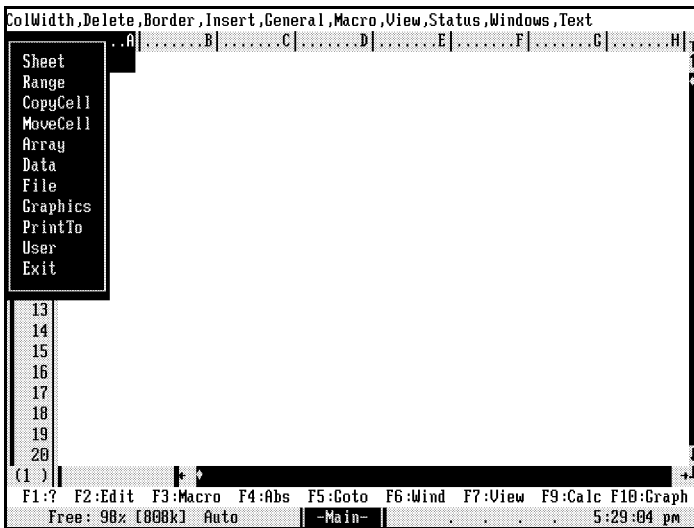


Figure 2-1 AS-EASY-AS Main Menu

The first option in the menu will be indicated by a moveable pointer. The command area line, on the top of the screen, will display additional information about the option or menu choice.

2-12 GETTING STARTED

The pointer can be moved by pressing the cursor arrow keys or by moving the mouse pointer, if your mouse is active. [HOME] will move the selection bar to the first menu option, while [END] will move it to the last one. Pressing [LEFT], [UP] or [BACKSPACE] will move the selection bar up. Pressing [RIGHT], [DOWN] or [SPACE] will move the selection bar down.

To make a selection, use the cursor keys to highlight the command you want and press the [ENTER] key. An alternative way is to press the key corresponding to the highlighted letter of the desired option. For example, when the main menu is displayed, pressing **S** gets you in the **S**heet menu, or pressing **R** gets you in the **R**ange menu, etc. Tapping the left mouse button will select the highlighted command. Continue the process until the desired command is reached. Tapping the right button once is the equivalent of hitting [ESC], and will return you to the previous menu.

Once a selection is made, a new menu window appears in the same location. This window is actually made up of two parts. The top part displays the option you selected in the previous menu. The bottom part is a menu, with the last option selected highlighted. You can select an option from this menu either by highlighting the choice and pressing [ENTER] or by pressing the key corresponding to the highlighted letter of the option.

To facilitate repetitive tasks, AS-EASY-AS remembers the last sequence of menu commands used. If the main menu is selected a second time, you will notice the command last used is highlighted. To reuse the same command, simply press [ENTER] or click the left mouse button to select the command, and continue likewise through the submenus.

The display menu window can be shifted between the left and right sides of the screen by pressing the period [.] key. Press period (.) again and it returns to its original position. Once the menu window has been placed either on the left or the right side of the screen, it will appear there every time the menu is accessed until it is moved again or until the program is exited.

Both the width and the position of the menu window can also be adjusted by macro commands (see Section 8, Macros).

When the number of selection items is too large, (such as filename in a directory) to be displayed on a single screen as may occur during /File Retrieve, only a single page at a time is presented. Viewing successive pages can be achieved by moving the cursor past the bottom row or using the [PgUp] and [PgDn] keys.

Refer to the MENU COMMAND SUMMARY section for a complete listing and information about the various commands and options available.

2.6 STATUS LINE

A line of status information is displayed at the bottom of the screen as shown in Figure 2-2.

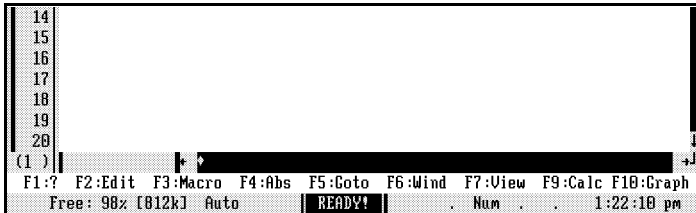


Figure 2-2 AS-EASY-AS Status Line

On the left of the status line is the amount of free memory, displayed in percent and kilobytes. As the spreadsheet fills with information, the free memory will decrease.

The system time in minutes and seconds is displayed on the far right of the status line.

The current mode of AS-EASY-AS is displayed in the middle of the status line, followed by the status of the keyboard. Each mode is represented by a short name in reverse video. The modes are:

- Cap** Capital lock, letters will appear in upper case
- Num** Numeric key pad selected, cursor key pad inactive
- Scr** Smart Cursor active
- Ovr** Indicates overstrike mode when editing cell
- End** The END key has been depressed, the next cursor keystroke initiates a range movement
- Man** Only the edited cell is recalculated. All other referring cells are not calculated and values remain unchanged until the recalculation key [F9] is pressed.
- Auto** Automatic recalculation. All referring cells are recalculated automatically as data is entered.
- AutoC** Automatic recalculation in a column-by-column, left to right sequence.
- AutoR** Automatic recalculation in a row-by-row, top to bottom sequence.

2.7 INPUT LINE

The very top line on the screen is the input line and is used to display the contents of the current cell. This line is used for entering new information, or editing information already in a cell. It is also used to display a short explanation about the currently selected menu choice when an AS-EASY-AS menu is displayed.

In addition to displaying the current cell contents, the input line also displays other pertinent information about the cell. Typically, as you move through the worksheet, the input line in Figure 2-3 shows the following:

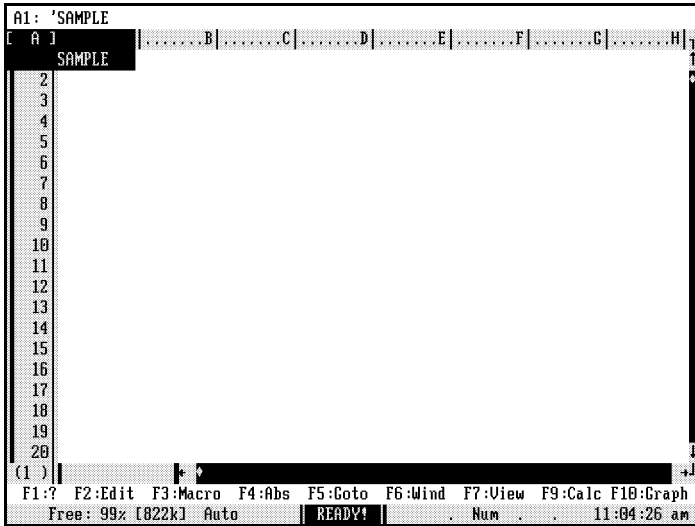


Figure 2-3 AS-EASY-AS Input Line

- A1** Current cell
- Un** Unprotected cell. "pr" would indicate protected cell. This indicator shows up only when /Sheet, General, Protection has been enabled.
- F** Fixed format. A letter indicating the cell format is displayed. If the cell has not been formatted, this field is blank.
- 'Sample** Contents of current cell.

2.8 INPUT WINDOW

Often, additional information is required to complete the selected command operation (e.g. specifying the number of digits after the decimal in a /rff command sequence). In such instances, an input window will temporarily appear on the command line, and will prompt you for the additional information as shown in Figure 2-4.

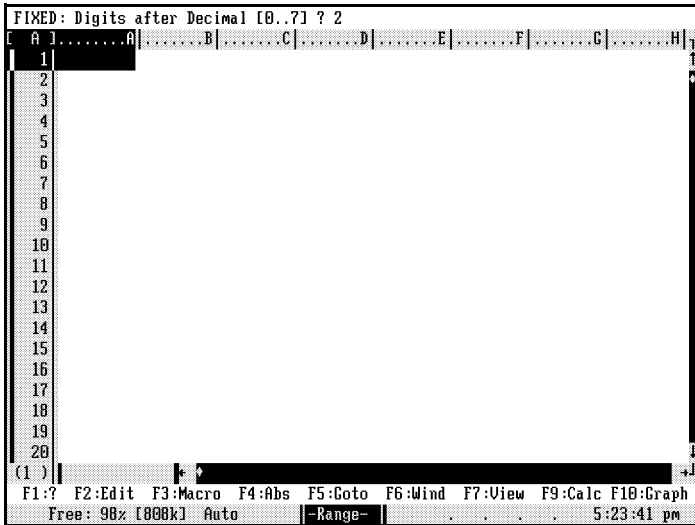


Figure 2-4 AS-EASY-AS Input Window

2.9 MULTIPLE WINDOWS

AS-EASY-AS has the ability to open up to six windows or views of the worksheet at one time. Worksheet views can be arranged and resized on the screen according to your preference. When multiple views are created, only one window can be worked on at a time. This is called the active window and is identified by a blinking cursor. The [F7] key is used to toggle between worksheet views. The cell pointer identifies which view is active as shown in Figure 2-5.

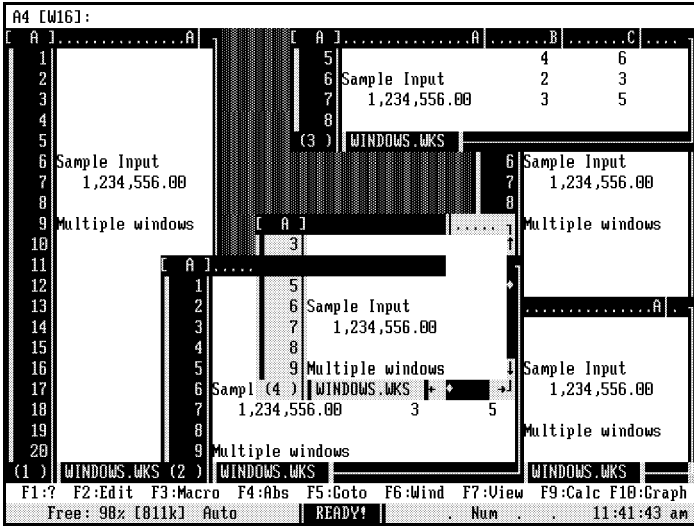


Figure 2-5 Multiple AS-EASY-AS Windows

The windows can be manipulated through the View menu command or by a mouse.

To resize the window with a mouse, position the mouse pointer on the "-" character in lower right corner of the window. Depress the left button and drag the mouse to the desired size. Dragging the "," character located in the upper right corner of the window will move the window. Positioning the mouse pointer on any portion of an inactive window and clicking the left button makes that window active.

Refer to the /Sheet View command in Section 10, for a discussion on View menu commands.

2.10 MOVEMENT KEYS

For keyboards with a combined cursor/number key pad, first make sure the NUM status indicator is NOT displayed on the status line. This means that the cursor key pad is active. Next, take a close look at the cursor key pad (usually located on the right side of your keyboard). Each key performs the following action:

- [UP]** Move the cursor up one row
- [DOWN]** Move the cursor down one row
- [PGUP]** Move the cursor up one screen page
- [PGDN]** Move the cursor down one screen page

- [LEFT]** Move the cursor left one column
- [RIGHT]** Move the cursor right one column
- [HOME]** Move the cursor to cell position A1 or the border boundary
- [END]** This key acts in combination with the next cursor key pressed. It causes the spreadsheet to scan in the indicated direction until a change of state occurs. For example, a column of numbers with a blank cell in the middle will result in the cursor stopping at the blank cell. Subsequent **[END]** **[DOWN]** will jump to the bottom of the column.

- [END][UP]** Move to far top of range
- [END][DOWN]** Move to far bottom of range
- [END][LEFT]** Move to far left of range
- [END][RIGHT]** Move to far right of range
- [END][HOME]** Move to lower right corner of sheet

- [TAB]** or **[CTRL] [RIGHT]** Move one page right

- [SHIFT][TAB]** or **[CTRL] [LEFT]** Move one page left

- [F5]** Go to specified cell

- [F6]** When the /SHEET WINDOW option has been selected, pressing **[F6]** moves the cursor between the two windows. With only one window active, pressing **[F6]** toggles between the current and the last position of the cursor.

- [F7]** The **[F7]** function key is used to toggle between worksheet views when multiple windows are created.

SMART CURSOR

Smart Cursor will automatically move the cell pointer one cell in the direction of the last cursor movement after the [ENTER] key has been pressed. Smart Cursor is toggled on/off by pressing the [SCROLL LOCK] key. "SCR" displayed in the status line indicates Smart Cursor is active.

When active, if a number is typed into a cell, followed by [ENTER] and a cursor key, Smart Cursor remembers the direction of movement. Subsequent input of data, followed by [ENTER], will place the data in the cell, and move the cursor one cell in the established direction of movement. If a cursor key is again pressed, that direction becomes the new direction of movement.

For example, when you type the number 1 in cell A1 and press [ENTER], the cursor remains in cell A1. If you move the cursor to cell A2 and type the number 2, the cursor will automatically move to cell A3 after [ENTER] has been pressed.

2.11 FUNCTION KEYS

Direct access to special features and functions is provided by simply pressing a function key. A listing of the function keys and their purpose is displayed at the bottom of the AS-EASY-AS screen as shown in Figure 2-6. Mouse users may access the function by clicking on the desired function key. There will be an audible beep confirming function key selection.

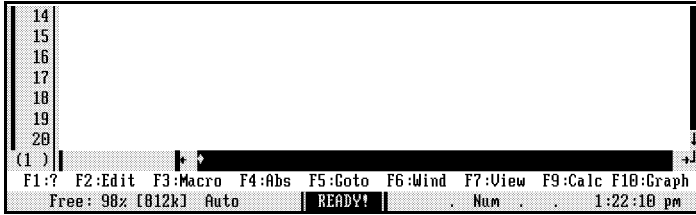


Figure 2-6 AS-EASY-AS Function Keys

F1 Help Function Key (when ready mode is active)

Help screens can be displayed by pressing the Help key [F1]. You have instant access to a help file that should answer most of your questions. After pressing [F1], a pick window will appear on the right side of the screen, containing the various Help topics.

To choose among these topics, press the up/down cursor keys to move the highlighted cursor to the one desired. To move around within the help topic list, press the [HOME] key to go to the top of the list; the [END] key to go to the bottom of the list; the [PAGE UP] key to go to the top the list that is visible on the screen; press the [PAGE DOWN] key to go to the bottom of the list that is visible on the screen. To search more quickly for a topic, press the first letter of the desired topic.

Press the [ENTER] key to select the highlighted topic. The pick list will disappear and the information for the selected topic will appear in a full screen. Use the up/down cursor keys to scroll through the file. The highlighted bottom boundary of a file disappears when the end of the file has been reached.

To exit one help topic and select another, hit [ESC], scroll up or down to the next topic, and hit [ENTER]. The first letter quick-search method may also be used. To exit the help menu altogether, press the [ESC] key.

The [F1] key has a few more capabilities which are as follows:

F1 - Help When Entering a Macro If you are typing a macro and the last key typed was the "{" key, pressing [F1] will open a pick window in the middle of your screen, displaying all the macro commands available to you. Move the cursor using the arrow keys, select the macro command you want and press [ENTER]. The macro command is inserted at the cursor position and you are ready to continue typing. Do not forget to type the right curly bracket.

F1 - Help When Entering an Equation If you have just entered a valid operator (+, -, *, or /), pressing F1 will display all named ranges defined in the spreadsheet. Select the one you want, using the cursor, press [ENTER] and the named range is inserted in your equation.

F1 - Help When Entering a Function If you have just pressed the "@" key, pressing F1 will open a selection window in the middle of your screen, and display all the @-Functions available to you, along with the number of arguments expected for each function.

When the function list appears, move the cursor using the arrow keys, pick the function you want and press [ENTER]. The function is inserted and you are ready to continue typing. Pressing the [ESC] key, when the function list appears, will cancel the operation but still leave you in the edit mode.

F1 - Help When Entering a Printer Setup Code If you are in the PrintTo Printer Options Setup submenu and are trying to remember a printer setup code, all you need to do is press [\] followed by F1. A selection window displays the setup codes that you have placed in your printer set-up file (see section on Printer Options). Move the cursor with the arrow keys, select the setup code that you want, and press [ENTER]. AS-EASY-AS will insert the selected printer setup code and you can continue with your next operation.

This is a great feature for those who have to use complicated lengthy laser printer setup strings.

The F1 Printer Setup Code option is also available when embedding setup codes directly in a print range (see section on Printer Options).

- NOTES:**
1. You can still manually enter the setup codes if you prefer.
 2. The printer setup file has the name ASEASY.PRT and must be in the default directory.

F2 Edit Function Key Pressing the F2 function key places a copy of the contents of the current cell on the second line of the command panel area, and invokes the edit mode. For more information about the edit mode options, refer to Section 3.2.

F3 Macro Function Key The F3 function key allows execution of a macro by name or by cell reference. When F3 is pressed, a prompt appears requesting the name of the macro that you want to execute. The default address is the cell reference specified the last time F3 was invoked during the current session. You can either type the name of the macro you want to execute and press [ENTER] or press [ESC].

Pressing [ESC] in response to the prompt will display a pick list of range names to choose from. Move the cursor to the desired macro name and press [ENTER].

NOTE: This is the equivalent to the {JUMP NAME} macro command.

F4 Absolute Address Function Key Pressing F4 when in the middle of entering a formula, makes the address of the current cell absolute (both row and column). Pressing F4 once more makes only the column of the current cell absolute and pressing it for the third time makes the reference relative.

NOTE: This function key is only active when entering a formula in the pointing mode. It is not active when editing a cell or when simply typing in the formula.

F5 GoTo Function Key The GOTO function key allows you to position the cursor on a cell indicated by name or by reference. When the prompt for the destination appears, pressing [ESC] will present a window of range names from which to choose. The default address is the address specified last time F5 was invoked during the current session.

F6 Window/Location Function Key The F6 function key toggles the cell cursor between the current location and the last location the cell cursor occupied. When the Sheet, Windows command has been invoked, pressing the F6 key will toggle the cursor between the two windows. When the Sheet, Border command has been invoked, pressing the F6 key will toggle the cursor into and out of the border area (only if a border was assigned to one window).

F7 View Key The F7 function key is used to toggle between worksheet views when multiple windows are created. Up to six window views can be opened but only one window can be worked on at a time. This is called the active window and is identified by a visible cell pointer. Also, take a look at the @QVIEW function in Section 6.

F9 Calculate Function Key When the ready mode is active, pressing F9 results in all cells being recalculated.

Another feature of the F9 key is that it performs the calculation of any equation, at any point in an editing AS-EASY-AS operation. When editing a formula, pressing F9 replaces the entire formula with its evaluated result.

Example: Cell A1 contains the value 1, and Cell A2 contains the value 2

Place the cursor in cell B1 and press the following keys:

/scsA1+A2 [F9] [ENTER]
|
Function Key

This will set the width of column B to 3, i.e., the value of cell A1 plus the value of cell A2.

F10 Graph Function Key Pressing F10 displays the currently defined 2-D graph. If no graph has been defined, a beep will sound and an error message will be displayed.

3. BASIC OPERATIONS

This section provides information necessary to perform basic functions, such as entering text, values, and formulas, and editing data once it has been entered. It also describes basic skills and concepts, such as copying and moving cells, inserting and deleting rows and columns, creating and using range names, and file management.

3.1 ENTERING INFORMATION

ENTERING LABELS

A label is normally any sequence of characters which is not preceded with a digit or mathematical operator. Digits may be entered as labels if they are preceded with an apostrophe ['], a caret [^], a quote ["], a backslash [\], a left or right hash mark [<] or [>], or a pipeline [|] character. These label prefix characters are special formatting characters which perform the following:

- ['] Left justifies the label within the column
- [^] Centers the label within the column. If the label is wider than the column, the result is left justified.
- ["] Right justifies the label within the column. If the label is wider than the column, the result is left justified.
- [<] Right justifies the label within the column and pads the spaces to the left with ellipses (...dots).
- [>] Left justifies the label within the column and pads the spaces to the right with ellipses (dots...).
- [\] Repeats the character which follows, the width of the column.
- [|] Sends the characters that follow to the printer as a setup string. (The "|" character is not displayed on screen).

3-2 BASIC OPERATIONS

Several examples follow:

<u>ENTER</u>	<u>RESULT</u>
'Quantity	Left justifies label in column
^1-Total	Centers label in column
"Amount	Right justifies label in column
\=	Column is filled with equal signs
\|027\069	Sends setup string to printer. Please note that all decimal control characters are preceded by backslash [\] and must be three digits in length.

The default prefix character is an apostrophe ['] which will automatically be inserted as the first character. Prefix characters are interpreted as text if they appear other than in the first position of the label.

NOTE: Digits that have been entered with a label prefix character are labels. As a label, the digits will be evaluated as having a value of **zero**. Therefore, it is not possible to left or center justify numbers and be able to use them in equations.

ENTERING VALUES

A value is any sequence of digits. AS-EASY-AS supports 11 significant digits. Large numbers are entered by using exponential notation. For example, the number 2.3×10^{15} would be entered as *2.3E15* [ENTER].

All entries must be completed by pressing the [ENTER] key or one of the direction keys. If one of these keys has not been pressed, the [BackSpace] key may be used to delete the previously entered digit.

The limiting range of numbers recognized by the program is $9.9E-307 < X < 9.9E+307$.

If a cell contains all asterisks, "*****", it indicates the width of the column is insufficient to hold all the characters required to display the number. To make the value visible, either expand the column width (see /Sheet, ColWidth, Setwidth command) or change the format of the cell (see /Range, Format command).

If a cell contains a real value greater than $9.9E+14$, and is formatted with a Fixed format option, the contents will display all exclamation points, "!!!!!!!!". This indicates the format selected is inappropriate. To display the value, reformat the cell using a Scientific format.

ENTERING FORMULAS

A formula consists of a series of numbers, cell references or functions separated with the following mathematical operators.

[-]	negation
[+]	addition
[-]	subtraction
[*]	multiplication
[/]	division
[!]	factorial
[%]	percent
[^]	exponentiation
[>]	greater than
[<]	less than
[=]	equal to
[<=]	less than or equal
[>=]	greater than or equal
[<>]	not equal to
[()]	parentheses

A formula must be preceded by one of the following characters:

- + (@ or a digit.

The following examples assume that cell A1 contains the value 4.

<u>Type</u>	<u>Result</u>	<u>Comment</u>
1.1+2*3+5^2	32.1	--
+A1*2+5.5	13.5	--
@SQRT(A1)+5	7.0	--
(2*A1+3)*3	33.0	--
-5.1+2	-3.1	--
2>3	0	Result is False
3>2	1	Result is True
5>=2	1	Result is True
5<>4	1	Result is True
6=6	1	Result is True
6=5	0	Result is False

RELATIVE VERSUS ABSOLUTE CELL ADDRESSES

Cell references can be either relative or absolute. If a formula containing a cell reference is typed in directly, such as $+a1*b1$, it is a relative cell reference. If the cell containing the formula is copied to another cell, or to a range of cells, the cells in the formula will automatically change to reflect the new location of the formula. For example, if cell C1 contains $+a1*b1$, and the formula is copied with the /CopyCell command to cell C2, the contents of the formula will automatically adjust to the new row, and will display $+a2*b2$.

This feature can be extremely helpful when copying a formula over a range. However, there can be times when you don't want a cell reference in a formula to change. In other words, you want the reference to be absolute and not change.

The "\$" character is used to fix the row, column, or both in a formula. A formula with an absolute row reference has the row preceded by the "\$" character, e.g., $A\$1$. Wherever the formula is copied, the row reference would remain 1. Likewise, if the formula was $\$A1$, the column reference would remain A as the formula was copied. If the formula had both the row and column prefaced by a \$, e.g., $\$A\1 , the formula would always refer to cell A1 no matter where it was copied.

If you use the pointing method to create a formula, pressing the [F4] Function Key toggles through the reference options for the cell specified by the cursor.

AS-EASY-AS does all the work to keep track of the cells you refer to in formulas:

- If you move the cells referenced in a formula to another place in the worksheet, AS-EASY-AS automatically adjusts the references in the formula.
- If you move a formula from one cell to another, cell references in the formula remain unchanged.
- If you insert a column or row within a specified block, any formula that references the block is automatically adjusted to include it.
- If you delete a row or column within a block, any formula that references the block is automatically adjusted to exclude it. An important exception is if you delete a row or column that contains one of the corner cells included in the range reference, an ERR is entered in the formula cell. If this occurs, you must reenter the formula with the correct range.
- If you copy a block of cells that include a formula but not the cells referenced in the formula, the formula is updated to reference new cells which have the same position in relation to the formula's cell. (Cells viewed this way are called relative cells).
- Named ranges operate just like all references and will translate when copied or moved. To make a named range absolute, you must preface the range name with a dollar sign.

ENTERING GRAPHICS CHARACTERS

AS-EASY-AS permits entry of high bit ASCII characters (sometimes referred to as graphics or box characters). To create one of these characters, hold the [ALT] key down and enter the decimal code of the character you want using the numeric pad (on the right side of your keyboard). When you let go of the [ALT] key, the specified character will appear.

For example, if you type 195 (while holding down the [Alt] key) the character / will appear on your screen. See Appendix E for a listing of ASCII characters.

Box characters are automatically entered by the program when the Box format type is used. (See /RANGE, FORMAT, BOX in Section 10).

NOTE: Some graphics characters can be printed only if they are supported by your printer.

3.2 EDITING A CELL

Changes to the contents of a cell may be made by retyping the contents and pressing [ENTER] or by invoking the Edit Mode, using the Edit Function Key [F2].

Pressing [F2] causes the contents of the current cell to be placed on line 1 of the command panel. The mode indicator is changed to EDIT. The character cursor is positioned at the end of the line. Make changes by moving the character cursor to the desired position and start typing.

If the cursor is on a protected cell, and protection is enabled, pressing [F2] will display a blank string. The cell must be unprotected or worksheet protection disabled in order to edit the cell.

When in the edit mode with insert active, text under and to right of the cursor will be shifted to the right as characters are typed. Insert can be toggled on/off by pressing the insert [INS] key. The opposite of insert mode is overwrite mode which is indicated by an increase in cursor size and the display of the OVR status indicator (text will be overwritten by new typing).

The following keys may be used to edit:

[LEFT]	Move cursor one position to the left
[RIGHT]	Move cursor one position to the right
[HOME]	Move cursor to the first character position
[END]	Move cursor to the last character position
[INS]	Toggle between overwrite and insert mode
[DEL]	Delete the character underneath the cursor
[BACKSPACE]	Delete the character left of the cursor
[TAB]	Move 8 positions to the right
[SHIFT][TAB]	Move 8 positions to the left
[CTRL][RIGHT]	Move to the beginning of the next word
[CTRL][LEFT]	Move to the beginning of the previous word
[ESC]	Cancel all editing and leave original cell contents

After all changes have been made you must press the [ENTER] key to insert the changes into the current cell in the worksheet. A typical example of an editing session follows:

1. A cell contains the label TOTOL and you want to change it to TOTAL.
2. Move the cursor to that cell,
3. Press [F2], the cursor will appear immediately to the right of the last letter, L
4. Press [LEFT] [LEFT],
5. Press [DEL] to delete the letter O,
6. Press [A], this should insert the character A immediately after the second T,
7. Press [ENTER], and the new contents of the cell is TOTAL.

3.3 FORMULAS AND FUNCTIONS

WHAT IS A FORMULA

The power of a spreadsheet stems from its ability to interrelate the contents of its cells. These relationships are set through the use of formulas that are entered directly into the cells. Once entered, the formulas may be saved with the spreadsheet, copied, edited, or moved etc. Relationships between cells are formed using algebraic, statistical or logical expressions. Once a formula is typed in and [ENTER] is pressed, it is evaluated and the result is placed in the cell. Examples are given below:

<u>CELL</u>	<u>CONTENTS</u>	<u>EXPLANATION</u>
A1	+A10+B1	Add contents of A10 to contents of B1. Result appears in cell A1.
K1	+C2/(D4-F9)	Subtract contents of F9 from contents of D4, divide contents of C2 by this total. Result appears in cell K1.
O13	@SUM(G1..G26)	Sum the contents of cells G1 through G26 (inclusive). Result appears in cell O13.
L1	@IF(A1=0,1,S20)	Compare the content of A1 to the value 0. If equal, return result of 1, if not return the value of S20. Result appears in cell L1.

Punctuation is very important in the way formulas are evaluated.

Parentheses are used to group calculations and force a specific order of evaluation. AS-EASY-AS will first evaluate the expression in parentheses, then continue in order of operator precedence. As an example, $(2+3)*6$ evaluates to 30, while $2+(3*6)$ evaluates to 20.

Quotes must be used to indicate string arguments. For example, +"Hello"&" Tom!" will display Hello Tom in a cell.

TYPES OF FORMULAS

AS-EASY-AS uses three types of formulas; arithmetic, logical, and text.

ARITHMETIC Arithmetic formulas, such as $+A3*2.5$, result in numeric values. These are probably the most commonly used formulas and accept any of the following operators:

- + * / ^ = < > <= >= <>

LOGICAL Logical formulas result in true (1) or false (0). For example $+3=3$ would result in 1 since the logical formula is true, $3=3$. The formula $@LENGTH("ABC")<2$ would evaluate to 0 (false) since the length of the string is 3, not less than 2. Logical formulas accept the following operators:

< > <> <= >= = #AND# #OR# #NOT#

TEXT Text formulas express a textual result. For example, $+B3\&"function"$ enters the text in cell B3, a space, and the word function. If 15 was entered in cell B3, then the result would be "15 function". Text formulas accept the following operators:

& < > <= >= = <>

ENTERING FORMULAS

AS-EASY-AS will accept formulas of up to 240 characters in length. Up to 60 levels of operation may be defined in a single formula.

There are two ways to enter a formula into an AS-EASY-AS cell. One is to type the whole formula and the second is to point to the referred cells.

Let's say that you want to enter the formula $@SUM(A5..A12)+A1/(C6*C8)$ in cell B6. This could be accomplished in two ways as shown below (assuming that the cursor is already in cell B6).

TYPING METHOD With the cursor positioned on cell B6, type:

$@SUM(A5..A12)+A1/(C6*C8)$

and press [ENTER]. The calculated value will appear in cell B6, and the above equation will show on the control panel.

POINTING METHOD With the cursor positioned on cell B6:

<u>TYPE</u>	<u>PRESS</u>	<u>SHOWN ON CONTROL PANEL</u>
@SUM(		@SUM(
	[LEFT]	@SUM(A6
	[UP]	@SUM(A5
	(period).	@SUM(A5..A5
	[DOWN](7 times)	@SUM(A5..A12
	)+	@SUM(A5..A12)+
	[HOME]	@SUM(A5..A12)+A1
	/	@SUM(A5..A12)+A1/(C6
	[RIGHT]	@SUM(A5..A12)+A1/(C6
	*	@SUM(A5..A12)+A1/(C6*
	[RIGHT]	@SUM(A5..A12)+A1/(C6*C6
	[DOWN]	@SUM(A5..A12)+A1/(C6*C7
	[DOWN]	@SUM(A5..A12)+A1/(C6*C8
	)	@SUM(A5..A12)+A1/(C6*C8)
	[ENTER]	@SUM(A5..A12)+A1/(C6*C8)

And the calculated value is displayed in cell B6.

WHAT IS A FUNCTION

AS-EASY-AS provides predefined functions which make complex calculations simple.

Each function begins with an at-sign (@). In order to use a function, you must supply the function name and the required number of parameter values or arguments. Each of the function arguments must be enclosed in parentheses. The general form for using a function is as follows:

@function(argument1,argument2,.....)

Details about the functions available in AS-EASY-AS and the way to invoke them are provided in Section 6, @FUNCTIONS.

3.4 RANGES

WHAT IS A RANGE

A range is defined as any rectangular group of cells in the spreadsheet. A range can be as narrow as a single row in depth or as deep as all the rows in the spreadsheet. Similarly a range can be as narrow as a single column in width or as wide as all the columns in the spreadsheet (256).

A range is described by specifying the upper left cell and lower right cell of the range. The cells must be separated by two periods "..". An example of this is A1..D5. This includes all cells in columns A, B, C and D and rows 1, 2, 3, 4 and 5. The entire group of cells looks like this:

A1	B1	C1	D1
A2	B2	C2	D2
A3	B3	C3	D3
A4	B4	C4	D4
A5	B5	C5	D5

It should be pointed out that the range specified by A1..D5 is the same as the range specified by D1..A5.

DEFINING A RANGE

Ranges can be defined by two methods, **pointing** to the cell or range of cells, or actually **typing** in the range (upper left cell followed by two periods and then the lower right cell) or range name.

POINTING METHOD Pointing to a cell simply involves moving the cursor. It is best to use this method in response to COPY or MOVE commands. When asked for a range, move the pointer. Notice that the pointer expands on the screen. In the middle of the leading edge of the pointer you will see a small blinking cursor. This indicates the corner of the range which you can expand or contract. To switch to the next corner press the period [.]. If you press the period 4 times, you will return to your starting position.

When the range has been completely highlighted, press the [ENTER] key. This fixes the range and allows any action to continue. For example, if the range was entered in response to a COPY command, the copy operation would be initiated.

POINTING METHOD WITH A MOUSE The mouse may be used when building ranges in AS-EASY-AS. The process of pointing with the mouse is similar to that pointing with the arrow keys. (Note that in order to use the mouse, your mouse driver needs to be loaded prior to starting AS-EASY-AS).

When prompted for a cell range, position the mouse pointer at one corner of the range and press the left mouse button. Keep it depressed as you move the mouse until the desired range is highlighted. Release the button to signify the end of the range and click the left mouse button again to confirm the selection (similar to pressing the [ENTER] key at the end of the range definition). To change the range a second time, hold the mouse button down and repeat the previous step.

If you wish to cancel a range or stop the process, tapping the right mouse button will back you through the command.

When using the right mouse in conjunction with AS-EASY-AS functions, such as @SUM, the function name and left parenthesis must be typed first, e.g., "@SUM(". To build the range, position the mouse cursor at the top left cell of the range, depress the left mouse button and build the range. When the range is completed, type the remainder of the function, in our example, this would be the right parenthesis)", and hit [ENTER]. Again, you can proceed back through the range building process by pressing the right mouse button.

TYPING METHOD Typing a range may be done by specifying diagonally opposite cell corners of the range. Each cell reference is separated by one or two periods [.] For example, type A1.D5 to define the range A1..D5. When the entry is complete press the [ENTER].

NAMING A RANGE

A powerful feature is the ability to refer to a range of cells by using a name assigned to that range. Such range names may be used anywhere a cell reference is expected by AS-EASY-AS. Since a range can also consist of a single cell, this naming ability can be used to create applications and formulas that are easy to understand.

For example, let us say that cell A1 contained total income for the month and cell A5 contained total expenses. If cell A10 contained a formula to calculate the monthly balance, i.e. +A1-A5, then, when you placed the cursor on cell A10, the input line would display A10: +A1-A5. If, on the other hand, you had named A1 as INCOME and A5 as EXPENSES, when on A10, the input line would display A10: +INCOME-EXPENSES, which is much more informative.

When entering the formula in A10, with the cells named as above, you could use either the named range or the actual reference. The keystroke sequences below would yield identical results (assuming the cursor is currently at A10):

+A1-A5 [ENTER] or +INCOME-EXPENSES [ENTER]

Up to 250 named ranges may be defined in a single worksheet. Each range name can be up to 11 characters long.

Ranges are assigned names using the /RANGE, NAME, CREATE command sequence. See Section 10, /RANGE commands for more information.

3.5 SETTING FORMATS

Format controls the appearance of a cell's contents as it is displayed onscreen. There may be a big difference between the way the contents of a cell is displayed and the way the value of that cell is stored internally. It helps to keep that in mind at all times.

WHY DO YOU NEED FORMATS?

Imagine that a cell contains the result of a calculation where you are trying to figure out the monthly payments on a loan. Let's say that the calculated payment was 657.17625412 per month.

Do you really want to see 8 digits after the decimal point? Most likely not, and that's where formats come in. A better way to format the payment amount would be:

657.18 (rounded to two decimals, cents)

or better yet,

\$657.18

It is important to remember, that even though the value is displayed as 657.18, the value stored in the cell and used in any calculations involving that cell is 657.17625412.

Applying a format to a single cell or to a whole range of cells may be done with the /Range, Format command. Setting the default format for the entire worksheet is done using the /Sheet, General, Format command.

Details about the types of formats available in AS-EASY-AS can be found in the command summary section.

3.6 COPY AND MOVE

The Copy and Move commands can be used to copy or move values, formulas or text that exist in a cell or in a group of cells. Both commands need the user to specify the 'From range' and the 'To range'. When copying or moving formulas, what ends up in the 'Copy or Move To' range depends on the formulas being transferred. Formulas that contain relative references are translated by the copy command. Values, text and absolute references are not translated.

COPY VALUES

Using the COPY CELL command on a value duplicates the value in the "FROM" cell into the "TO" cell. For example, to copy the value from cell B5 to cell C6, simply enter the following sequence of commands (assuming the pointer is already on cell B5):

```
/c [ENTER] [RIGHT] [DOWN] [ENTER] (Pointing Method) or
/c B5 [ENTER] C6 [ENTER] (Typing Method)
```

COPY FORMULAS

Let's take an example of three cells containing the following:

cell	B1	contains	+A1+A2
"	B2	"	+A1+\$A2
"	B3	"	+A1+\$A\$2

The value result in cells B1, B2 and B3 should be identical. Now copy the cells B1, B2 and B3 to C2, C3 and C4 respectively, and let's see what the new cells contain.

cell C2: +B2+B3 Copied from an original formula, in B1, that said: *"Add the contents of the cell one column to the left (A1) to the contents of the cell one column to the left and one row down (A2)."*

cell C3: +B2+\$A3 Copied from an original formula, in B2, that said: *"Add the contents of the cell one column to the left (A1) to the contents of the cell in absolute column A (\$A) and one row down."*

cell C4: +B2+\$A\$2 Copied from an original formula, in B3, that said: *"Add the contents of the cell one column to the left (A1) to the contents of the cell in absolute column A (\$A) and in row 2 (\$2)."*

MOVE VALUES

Moving values is a simple operation that relocates the value from a cell into another specified cell.

For example, to move the value from cell B5 to cell C6, simply enter the following sequence of commands (assuming the pointer is already in cell B5):

/m [ENTER] [RIGHT] [DOWN] [ENTER] (Pointing Method)
 or
 /m B5 [ENTER] C6 [ENTER] (Typing Method)

MOVE FORMULAS

The rules that apply to copying formulas also apply to moving formulas. Let's consider the same example of the three cells containing the following:

cell B1	contains	+A1+B4
" B2	"	+A1+\$B4
" B3	"	+A1+\$B\$4
" B4	"	5

The values displayed in cells B1, B2, B3 and B4 should be identical. Now move the cells B1, B2, B3 and B4 into C1, C2, C3 and C4 respectively. Let's see what the new cells contain.

cell C1: +A1+C4

Notice the translation of B4 to C5. This occurred because B4 was within the moved block. The reference to A1 remains unchanged because it was outside the block.

cell C2: +A1+\$C4

Absolute symbol does NOT keep column reference from changing for the move operation because the reference was inside the moved block.

cell C3: +A1+\$C\$4

Moved from original location but the formula changes the same as in cell C2.

As you can see, NO translation occurs for cell references OUTSIDE the block being moved. References to cells inside the block ARE translated during a move to reflect the new position.

3.7 INSERTING/DELETING ROWS/COLUMNS

Sometimes, after spending time on a worksheet, you find it necessary to insert or delete an extra row or column in your worksheet. No need to worry, columns and rows can be inserted or deleted anywhere in the worksheet.

INSERTING ROWS

The Insert Rows function is invoked by the commands:

`/Sheet, Insert, Row`

To insert a row, let's say between rows 3 and 4, position the cursor on any cell in row 4 and press the following keys:

`/sir [ENTER]`

This will insert a blank row 4 and all the rows between the original row 4 and the bottom of the worksheet will move one position down.

To insert 3 rows between rows 6 and 7, bring the cursor to any cell in row 7 and type the following:

`/sir . [DOWN] [DOWN] [ENTER]` (Note: Yes, that is a period)

This will insert three blank rows after row 6, and all the rows between the original row 7 and the end of the sheet will move three positions down.

NOTE: You will get a message if any cells would be lost at the bottom of the worksheet because of the insertion of the new rows.

INSERTING COLUMNS

Inserting columns works exactly the same as inserting rows. The inserted column will take on the column width of the adjacent column to the right.

NOTE: You will get a message if any cells would be lost at the right of the worksheet.

DELETING ROWS/COLUMNS

Deleting rows or columns is similar to the inserting procedure.

CAUTION: Any cell reference to a deleted cell will result in an ERR replacing the reference.

3.8 RECALCULATION MODES

Recalculation refers to the manner in which all formulas within a spreadsheet are calculated. As formula references get complex, the number of required calculations increases. If every cell within the spreadsheet were calculated each time a cell was updated, it could take a while just to make a minor change.

To select the recalculation mode, press **/sgr**, which stands for Menu, Sheet, General, Recalc, and press the letter of the recalculation mode desired.

AUTOMATIC Only those cells which are dependent on the updated cell are recalculated. Each dependent cell may have multiple dependent cells which must also be recalculated, and so on. This continues until a root cell (a cell with no dependant references to it) is reached and the calculation sequence stops. The status indicator **Auto** is displayed at the bottom of the screen.

MANUAL In some cases, a linked recalculation sequence may require too much time to recalculate after entry of new data. Therefore, the calculation sequence can be turned off while a series of changes are being made to the spreadsheet. This method is called **MANUAL** recalculation. After the changes are completed, the spreadsheet must be updated by pressing the **CALC** function key [F9]. The status indicator **Man** will appear on the bottom of the screen.

ROW-WISE Automatic recalculation of the spreadsheet occurs in a row-by-row sequence, starting at the top left of the worksheet and processes calculations on a row-by-row basis, from left to right, top to bottom. The indicator at the status line at the bottom of the screen will display **AutoR**.

COLUMN-WISE Forces automatic recalculation of the worksheet to occur in a column-by-column sequence. **AS-EASY-AS** starts at the top left of the worksheet and processes calculations on a column-by-column basis from top to bottom, left to right. The indicator at the status line at the bottom of the screen will display **AutoC**.

3.9 CIRCULAR REFERENCES

When a calculation model in a worksheet gets sophisticated, it is sometimes difficult to keep track of the referenced cells in each formula.

Occasionally, two or more cells accidentally, directly or indirectly refer to each other. Even worse, you can have a number of cells that are circularly referenced so that convergence of the calculation is impossible.

Consider the following:

Cell A10 contains: +D21+5
 Cell C11 contains: +W90+5
 Cell D21 contains: +AA10+5
 Cell W90 contains: +X500+5
 Cell X500 contains: +A10+5

Trying to trace the circular reference in this group of cells could take a significant amount of time and cause severe headaches.

If a circular reference is discovered, a message will appear on the Sheet, Status (/ss) screen.

Circular reference recalculation only allows one iteration of the referenced cells. If more iterations are desired, they can be accomplished by pressing the F9 (re-calculate) key, or by automating the process with the following short macro:

```

Back:  {Let A1,10}      <--- Name this cell 'A'
       {Calc}         <--- Name this cell 'Back:'
       {if A1>0} {Let A1,A1-1} {Jump Back;}
       {Quit}
  
```

To see how AS-EASY-AS can help track down a circular reference, see the section on the Range Audit command in Section 10.

3.10 FILE MANAGEMENT

The AS-EASY-AS FILE command provides access to your files. It can be used with worksheet files or any other files located on a hard disk or floppy disk.

The FILE command allows you to store, retrieve, and merge your worksheet files, export portions of your worksheet to another worksheet file or to a dBASE III compatible file, and import ASCII text and dBASE III files. The FILE command also lets you list or erase files on your disk, and change the default data path to your files.

FILE MANAGEMENT INTERFACE

For FILE commands which involve selection of a file name, AS-EASY-AS presents the requested information in a selection list window as shown in Figure 3-1.

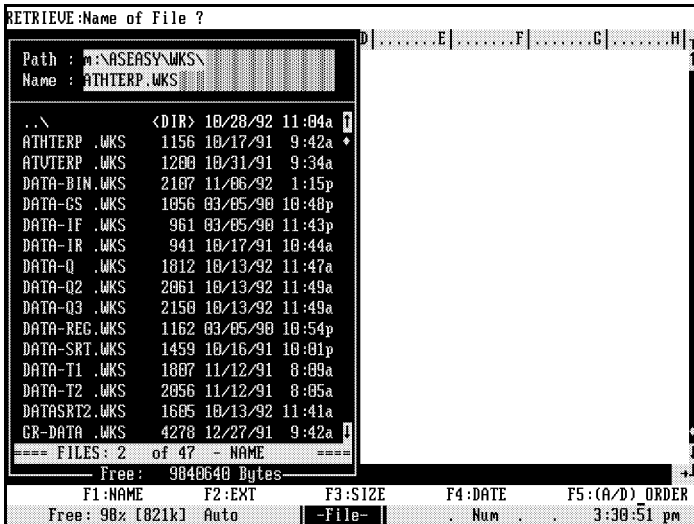


Figure 3-1 File Management Interface

The top portion of the window displays the current path, mask, and includes a location for a file name to be manually entered. The lower portion of the window displays the files meeting the mask criteria.

PATH displays the current drive and directory (path) for the files. To change the path, position the cursor over the current path (in the upper window) and type in the new path. The format is the same as in DOS, i.e., Drive:\Directory1\Directory2. If it is easier to edit the current path, press [ENTER]; you may now edit the existing path and press [ENTER] again when the changes are complete.

NOTE: Any changes made to the path will become the new default for future File operations.

The **NAME** field permits a file name to be entered manually. If you know the name of the file you wish to retrieve, place the cursor next to the "Name:" prompt and type the file name. Typing a [RIGHT] cursor key permits the current name to be edited. If the file extension is not specified, AS-EASY-AS will supply the following extensions:

Worksheet file	-	.WKS
Text file	-	.PRN
dBASEIII	-	.DBF

AS-EASY-AS allows you to use a mask in lieu of a file name. A mask operates as a filter and restricts the files displayed to only those that meet the mask criteria. A question mark (?) can take the place of any single character and an asterisk (*) can replace any group of characters, even the entire file name or extension. The default masks for File operations are:

Retrieve	*.WK?
Store	*.WKS
Merge	*.WKS
Export (WKS)	*.WKS
Export (DBIII)	*.DBF
Import (Values)	*.P??
Import (Text)	*.P??
Import (DBIII)	*.DBF
Erase (W??)	*.W??
Erase (P??)	*.P??
Erase (Other)	*.*
List (W??)	*.W??
List (P??)	*.P??
List (Other)	*.*

Based on the above, the default mask for Retrieve is *.WK?. This will display any file name having an extension which starts with .WK. To display .WK1 files only, change the NAME to *.WK1. If you wish to display both .WKS and .WK1 files, you can change the NAME to *.WK?. If you wish to list all your .WKS files that start with SA, simply set the NAME to SA*.WKS.

The lower portion of the window lists all files meeting the search criteria. The display includes file name and extension, file size in bytes, creation date, and creation time. The default sort order is alphabetically by file name. The sort order can be changed by use of the following function keys:

[F1]	-	Alphabetically by file name (default)
[F2]	-	Alphabetically by file extension
[F3]	-	Numerically by file size in bytes
[F4]	-	Chronologically by creation date
[F5]	-	Toggles list between ascending and descending order

Up to 15 file names and directories are displayed at a time. The cursor keys, [PGUP], [PGDN], [HOME], and [END] keys may be used to scroll through the file listing. If a mouse is used, the mouse pointer may be positioned on the up or down arrows on the position scroll bar at the right of the file window. Clicking the left button will scroll the file list in the desired direction.

Once the desired file is highlighted, pressing [ENTER] or clicking the left mouse button will select the file. (Note that you do not have to transfer the file name into the Name input field).

To retrieve a file with an extension other than the above, you must specify the extension and mask in place of the file name.

When the cursor is moved to the lower portion of the file window which lists file names, the message "FILES: N of T" appears in the bottom line of the window. The number T is the total number of files meeting the mask criteria. T also includes the parent directory and any subdirectories. N is the file number associated with the file highlighted by the cursor.

If you choose to make a backup, the file on disk will be renamed with the extension .WKB and the new file will be saved with an extension .WKS.

NOTE: This method provides only a single level of backup protection. If you desire additional backups, it is recommended that you save your files using a number appended to the end of the file name, i.e., WORK1, WORK2, WORK3, etc.

FILE PASSWORD PROTECTION

File Password Protection permits the user to password-protect a worksheet file and prevent it from being loaded into AS-EASY-AS without providing the proper password.

The feature is activated when you save the worksheet file to disk. Select / FILE STORE. When prompted to specify a file name, type the desired name followed by a space and the letter "p".

At that point, the user is asked to specify a password of up to 20 characters and numbers. A "#" will be displayed for each character entered. You will be asked to confirm the password by reentering the password. Once confirmed, the FILE, STORE operation is completed and the worksheet file is saved with that password.

NOTE: Once a worksheet file has been saved with a password, the password is required to retrieve the file again. If you lose the password, you will not be able to retrieve the file. TRIUS Technical Support can not help you if you lose your password.

Once a file has been password protected, protection remains in effect whenever the file is later retrieved or saved. Backup worksheet files and any worksheet files extracted from a password protected file will be password protected with the same password.

When retrieving a password protected file, AS-EASY-AS will request a valid password prior to loading the worksheet. If the proper password is not entered, an error message will be displayed, and the user will be returned to the Ready Mode.

The password must be typed in EXACTLY the same as when the file was saved. Upper and lower case characters are NOT the same. For example, the password "Test" is NOT the same as "TEST".

A password may be changed by storing the worksheet by entering the filename followed by a space and the letter "p". At the prompt, enter the new password.

To remove password protection, store the file by entering the filename followed by a space and the letter "p". When prompted for a password, press [ENTER] without typing any characters.

EXPORTING PART OF THE WORKSHEET

Sometimes it may be appropriate to save only a small portion of the spreadsheet. This may be achieved by using the /File Xport command.

Once the Xport command has been selected, AS-EASY-AS will ask if you want to export to a WKS or a dBASE III file, and then it will prompt for the name of the file. Type the name and press [ENTER]. Do NOT add an extension when you type the name as this is performed automatically by AS-EASY-AS.

After you have specified the name of the file, the program asks for the range to be exported. The range can be specified by either pointing or typing, or a range name can be used.

The specified range will then be exported to either a .WKS or .DBF type file.

WHEN AN ERROR OCCURS

If your diskette has no room for the new file, a warning BEEP will be heard and a message will appear on the status line. You must press [ESC] to continue. Replace the disk in the default drive with a formatted disk with sufficient free space and repeat the above process.

See Appendix A for additional information on error codes.

RETRIEVING THE WORKSHEET

To retrieve a worksheet select the /File, Retrieve command.

A window will open in the middle of the screen displaying worksheet files present in the default directory. Only one page of names is displayed at a time. To view subsequent pages press the [PGDN] or [PGUP] keys.

Select your file by moving the pointer to highlight the file, or type the file name at the name prompt and then press [ENTER]. To change the path, you may type in the new path in the "PATH:" field, or include the path as part of the file name. This new path will become the default path.

COMBINING WORKSHEETS

The /FILE MERGE command will combine any designated worksheet file with the current file starting at the position occupied by the spreadsheet pointer. The information merged from the new file will overwrite any information present in the cells.

WARNING: Information in cells overwritten cannot be recovered.

When /File Merge is selected, choose either to merge the whole file or a named range from a specified file. Once this choice has been made, you are asked to specify whether to merge the formulas in the named range or file or just the calculated values in the range.

NOTE: When the Merge-Range-Formulas is selected, the cell relationships are retained in the new worksheet.

If a cell of the file being merged (from disk), contains a formula, and you selected /File, Merge, [All/Range], Value, then the last values contained in the cells when the worksheet was saved will be used in the merge operation.

If you selected /File, Merge, [All/Range], Formula, then for cells in the file on disk that contained values, those values will be used in the merge operation. For cells that contained formulas, however, the contents of the current cells will be replaced with the formulas from the file on disk.

3-26 BASIC OPERATIONS

You will now be provided with three options for the merged information; SUM, DIFF, and REPLACE.

SUM will cause the cell contents of the file being merged to be added to the contents of the current file cells.

DIFF will cause the cell contents of the file being merged to be subtracted from the contents of the current file cells.

REPLACE will cause the cell contents of the file being merged to replace the contents of the current file cells.

For example, the contents of a worksheet on disk, MERGE.WKS, is shown in Figure 3-2.

	A	B	C	D	E	F	G	H
1	1.0			14.0				
2		12.0	AAA					
3				14.0				
4				14.0				
5				14.0				
6				14.0				
7				14.0				
8				14.0				

Figure 3-2 Contents of Worksheet on Disk, MERGE.WKS

The contents of the worksheet currently loaded is shown in Figure 3-3.

	A	B	C	D	E	F	G	H
1	121.0			9.0				
2		10.0						
3		2.0						
4			33.3					
5			51.0					
6								
7								
8								

Figure 3-3 Contents of Current Worksheet

If the /fmavsMERGE [ENTER] command is executed, the new worksheet will appear as shown in Figure 3-4.

	A	B	C	D	E	F	G	H
1	121.0			23.0				
2	10.0	AAA						
3	14.0							
4			33.3					
5			51.0					
6								
7								
8								

Figure 3-4 New Worksheet After File Merge Value

If, instead, the /mfafsMERGE [ENTER] command was executed, the resulting worksheet would look as shown in Figure 3-5.

	A	B	C	D	E	F	G	H
1	122.0			250.0				
2	10.0	AAA						
3	14.0							
4			33.3					
5			51.0	Formula: +A3*2*A1				
6								
7								
8								

Figure 3-5 New Worksheet After File Merge Formula

3.11 PRINTING

You can print any portion of the spreadsheet to either a printer or a print file (on your disk) by selecting the "PrintTo" option from the main menu.

For example to get into the print menu, press **/pp** which stands for /PrintTo Printer. All print output is now directed to the printer attached to the parallel port (LPT1).

NOTE: To send output to LPT3, COM1 or COM2, use PrintTo File and enter LPT3, COM1 or COM2 as the file name.

PRINTING TO A PRINTER

AS-EASY-AS provides access to printer control codes which allow special features of your particular printer to be used. No special printer drivers are required because all text is sent to the printer as straight ASCII data. You may preview your print out before you send it to the printer.

PRINTING TO A FILE

To create an ASCII file (which contains the print range) for transfer to other programs (like databases or word processors), type **/pf** which stands for /PrintTo File.

At this point the program will ask for the name of the print file. Type the name of the print file, in this case Test, and press [ENTER]. An extension of '.prn' will be automatically attached to the file name.

If you have already sent output to the print file during the current AS-EASY-AS session, the name of the print file will appear at the prompt line and you can select it by just pressing [ENTER].

For more information on controlling the printer and creating ASCII files, see Section 4 which discusses the PRINTTO menu commands.

PRINTING COMBINED TEXT AND GRAPHICS

AS-EASY-AS gives you the power to print text and graphs in a single printout. No more cutting and pasting! Selecting /PrintTo Graphic allows you to combine spreadsheet data and named graphs which have been inserted into the spreadsheet. You control the placement and size of the graph (see /Graphics Name Insert in Section 10.9). Select **/pg**, and follow the instructions in Section 4.1 for printing to a printer.

3.12 LEAVING THE WORKSHEET

You have just completed your masterpiece spreadsheet and are now ready to call it quits for the day. FIRST, MAKE SURE THAT YOU SAVED YOUR LATEST VERSION OF THE WORKSHEET (see previous section on saving your worksheet).

Access the command menu by pressing the [/] key. Select the EXIT command. You will be given a second chance to change your mind when AS-EASY-AS asks if you want to quit, YES or NO. Highlight the word YES or type the letter "y". AS-EASY-AS will prompt you one last time, asking if you have saved your worksheet. If you wish to return to the worksheet, press [ESC], otherwise press [ENTER]. The program will now return to DOS.

If you performed the above keystrokes by accident and did not intend to leave the spreadsheet, you are out of luck because all spreadsheet information in the computer memory has been lost.

Remember, save your data frequently as you work, and make back-up copies of your files!

3.13 EXTERNAL FUNCTIONS

Version 5.7 introduced a very powerful feature, External User Defined Functions. Earlier versions of the program had incorporated user defined functions which were defined within the worksheet and are still available in this version.

External User Defined Functions are significantly more versatile than the internal user defined functions. They are worksheet independent, can accommodate more complicated functions, and economical in memory usage.

FILE STRUCTURE AND RULES

The External User Defined Functions are defined in a plain ASCII data file, ASEASY.USR, which must reside in the same directory as the AS-EASY-AS program files. The structure of the file is simple and must comply with the following rules.

1. *Each function definition is made up of TWO lines.*

1st Line: Function_Name, Number_Of_Variables

2nd Line: Algebraic_Expression

The expression can use any of the AS-EASY-AS built-in functions. The dynamic arguments of the external function are referred to, in the definition, as @A(n), where n is an integer 1 to 10.

For example, 1st line: ADD2NUM,2
 2nd line: +@A(1)+@A(2)

This function simply adds the two variables passed to it. So, if in cell B10 of a spreadsheet, the user entered @ADD2NUM(2,4), the result would be 6.

2. *The maximum number of external functions that can be defined is 255.*
3. *The maximum number of dynamic variables that may be used in a function definition is 10 i.e., a(1), a(2),...a(10).*
4. *Cell references CAN NOT be used in the function definition.*
5. *Any string to the right of a semicolon ";" is ignored.*

This permits the user to embed comments and documentation information directly in the function definition file.

6. *Once an External Function is used in a worksheet, its tokenized definition is saved with the worksheet.*

Once a worksheet which uses External Functions has been saved, the ASEASY.USR file is no longer needed. Those functions may be used again in the same worksheet, even if the ASEASY.USR file no longer exists.

7. *If a worksheet file uses an External Function, even if that function has been redefined in the current ASEASY.USR file, the definition of the function stored with the worksheet takes precedence.*

USING EXTERNAL FUNCTIONS

External User Defined Functions operate similarly to internal AS-EASY-AS functions. Type the "at" character ("@") followed by the function name and required arguments in parentheses. The arguments must be values, cell references, or range names. If the arguments are entered incorrectly, i.e., too many or too few arguments, or the function name doesn't exist or was entered incorrectly, AS-EASY-AS will beep signifying an error condition and enter the edit mode. You must determine the problem and correct the error.

To create a listing of External User Defined Functions used in a worksheet, use the /RANGE USER TABLE command. The command will create a two column listing of external function names and definitions as they existed at the time the spreadsheet was created. This feature allows you to document the functions used in the worksheet in the event the ASEASY.USR file is deleted or an external function is modified.

To remove External User Functions from a worksheet, use the /RANGE USER RESET command. This command will convert the content of ALL cells which contain External User Functions from values to strings. Those cells will then display their formulas as labels. If the cells were referenced by other cells in formulas, their value will be 0.0.

To restore External User Functions which have been converted to strings, edit the cell and remove the label prefix character. If the function name exists in the ASEASY.USR file, the cell will display the evaluation of the function. If the function definition has changed from the definition that existed when the file was created, the restored user function will use the new definition. If the function name no longer exists, or the ASEASY.USR file is not present, AS-EASY-AS will beep and place you in the edit mode. You must correct the problem in order to continue.

If you make an error or need to change a definition once it has been used in a worksheet, you must use /RANGE USER RESET to clear the External User Functions from the worksheet. After making the changes to the ASEASY.USR file, restore the functions in the worksheet as described above.

EXAMPLE FUNCTION DEFINITIONS

The following are samples of the lines of text that would appear in ASEASY.USR, and the function they would perform.

- a. 1st line: ADD1,3
2nd line: $+@a(1)*10+@a(2)*10+@a(3)*10$

Function ADD1 multiplies each of the 3 argument passed by the user by 10 and sums up the three products. No internal AS-EASY-AS functions are used.

For example, $@ADD1(1,2,3) = 60$ ($1*10 + 2*10 + 3*10$)

- b. 1st line: TRIAREA,2
2nd line: $(@a(1)/2)*@a(2)$

Function TRIAREA calculates the area of a triangle based on the base and height values supplied by the user. No internal AS-EASY-AS functions are used.

For example, $@TRIAREA(4,3) = 6$ ($4/2 * 3$)

- c. 1st line: SUMSQRT,2
2nd line: $@SQRT(@a(1))+@SQRT(@a(2))$

Function SUMSQRT calculates the sum of the square roots of two values input by the user. The internal AS-EASY-AS function @SQRT is used.

For example, $@SUMSQRT(4,9) = 5$ ($@SQRT(4) + @SQRT(9) = (2 + 3)$)

EXAMPLE ASEASY.USR FILE

AS-EASY-AS is distributed with the file ASEASY.USR which contains a number of useful functions. The file is installed in with the program files in your AS-EASY-AS directory. The functions are self-documented in the ASEASY.USR ASCII file.

4. PRINTING

You can print any portion of spreadsheet text to either a printer or a file, or print combined text and graphics by selecting the "PrintTo" option from the main menu.

If you are printing to your printer for the first time, you must specify your printer type and output port. This is done by the /User Install Printer and /User Install Device commands. Once the selections are made, make sure to save your configuration file (see User Install for more information).

4.1 PRINTING TO A PRINTER

To get into the printer menu, press the following sequence of keys.

/pp

Which stands for /PrintTo Printer.

You are now in the print menu where all the print variations are defined. You will see the following selections on the command line:

Range Border LineFeed PageAdv Adjust Options Go View Quit

- | | |
|----------|--|
| Range | Stands for the rectangular area of the spreadsheet which is to be printed. This must be defined prior to printing. |
| Border | Prints specified row(s) and/or column(s) on every page of the output, if desired. |
| LineFeed | Advance the paper in the printer a single line. |
| PageAdv | Advance the paper in the printer to the top of the next page. |
| Adjust | Synchronize the program's top-of-page with the printer top-of-page. The page and line counters are reset to 1. |
| | Note: If this synchronization is <u>not</u> done, you may get several blank lines in the middle of the printed page. This is the gap allotted to skip over sheet perforation. |
| Options | Allows access to Sub-menu of printer options; margins, page length, header, footer, format type and printer setup string. (See 4.3 Printer Options for further details). |

4-2 PRINTING

- Go Starts the printer printing.
- View Preview the selected range before printing

All print output is directed to the parallel port specified by the /User Install Device command. To direct information to be printed to alternate ports, you may use the PrintTo, File command. As an example, to send output to serial port #1 (COM1), type:

```
/PrintTo File COM1 [ENTER]
```

and execute the Adjust Go commands.

NOTE: You must preset the Baud Rate using the DOS MODE command.

4.2 PRINTER BORDERS

The PrintTo Printer Border command allows you to select row(s) and/or column(s) from your worksheet that you wish to have printed on every page. This is especially useful for large multi-page spreadsheets where you need to have column headings or row descriptors printed on your output. The Printer Border command operates similar to Sheet Border.

The print range need not be adjacent to the borders you've selected. This allows you to print part of a ledger complete with row and column headings.

When Printer Border is used, you must be careful when specifying the ranges. The rows and columns specified as your print border **SHOULD NOT** be included as part of your print range: you may end up with duplicate rows or columns in your output.

To clear Printer Border, select None under the Border menu.

4.3 PRINTER OPTIONS

MARGINS & PAGE LENGTH

The default margin settings are 0 for the left margin and 80 for the right margin. Both margins are measured in characters from the left edge of the page. Using the default settings, you are able to print a range of up to 80 characters wide. Setting the left margin to 10 allows you to print a range 70 (80 minus 10) characters wide.

If your spreadsheet will not fit across a page, AS-EASY-AS prints the left part (on a page) then prints the next section on a new page, and so on until the entire spreadsheet is printed. You can combine these printed pages to create one wide spreadsheet.

If you are using wide paper, or other than 10-pitch print, and want to print more than 80 characters wide, you will need to increase the right margin.

If you've selected condensed print and your output continues to print additional pages while leaving a large right margin, chances are your right margin needs to be increased to accommodate the width of your print range.

The print margins that can be set in AS-EASY-AS are described below:

Page Length (0-1024) determines the number of lines printed on each page. The default, 66, is the correct setting for a printer that prints six lines per inch (the standard setting) on 11-inch paper. If a lasjet or deskjet printer has been selected, the page length is set to 60. If your printer is set to a different lines-per-inch value, or if your paper is a different length, change this setting accordingly. To calculate the page length, multiply the lines-per-inch value by the number of inches on a page. This setting is unaffected by headers, footers, or top or bottom margins.

Left (0-240) determines the amount of space to leave between the left edge of the paper and the printed character. The default sets a left margin of 0.

Top (0-30) determines the number of blank lines to leave at the top of each page. The default, 2, leaves a margin of approximately one-half inch. If you include a header in your printout, it is printed underneath this margin with one blank line between it and the spreadsheet data.

Right (0-240) determines the amount of space to leave for a right margin. This value is the number of spaces between the left edge of the paper and the beginning of the right margin - like the margin settings on a typewriter. The default, 80, begins the right margin at the 80th character space, leaving no right margin.

Bottom (0-32) determines the number of blank lines to leave at the bottom of each page. The default, 2, leaves approximately one-half inch. If you include a footer in your printout, it is printed above this margin with one blank line between it and the spreadsheet data.

4-4 PRINTING

In setting the correct page length for your printer, please note the following pointers:

- The default page length is set to 66 lines for dot matrix printers and 60 lines for laserjet and deskjet printers. Most printers default to 6 lines per inch, so no changes are required if you are printing on 11 inch long paper. If you wish to change the lines per inch spacing to 8, you must also change the lines per page to 88 (8 lpi X 11 inches) for headers, footers, and page breaks to print properly.
- If you have set your top and bottom margins equal to 0 and your page length equal to 66 lines, you are able to print a range of 60 rows on a page before the program will skip to a new page. One line at the top and bottom of the page is reserved for the perf-skip feature. Two lines each are reserved for headers and footers; one for the line of text and the second line serves as a spacer between the header or footer and the body of the text.

To figure out the correct number of lines that will be printed on a single page, do the following:

- Get the lines per page setting of your printer (for the current pitch and line spacing). This setting must match the page length setting of AS-EASY-AS .
- Subtract the AS-EASY-AS settings for top and bottom margin
- Subtract 4 lines (header, footer and lines between the header, the footer and the text body).
- Subtract 2 lines (top and bottom skip perforation).

In other words, the number of text lines that will be printed on a single page is given by:
Page Length - Top Margin - Bottom Margin - 4.

INSERTING PAGE BREAKS

AS-EASY-AS automatically inserts page breaks where needed (as specified by the Pagelength command setting). You may also specify "hard page breaks", i.e., force a page break, manually, using one of two methods.

- By using the /Sheet Insert Page command while in the left most cell of the print range. This command sequence automatically inserts a blank row and the "|:." character sequence for you.
- By typing a hard page break into the first cell of a blank row. The hard page break is the vertical piping character, followed by two colons (|:). If there is any other data in that row it will be ignored.

NOTE: The hard page break character sequence must be placed in the left-most column of the print range in order to be recognized by AS-EASY-AS.

EMBEDDED PRINTER CODES

You can place text enhancement printer control codes directly into a print range. This can be achieved by placing `\xxx\yyy` in the first column of the print range, where xxx and yyy are your printer's control codes.

For example, if your print range was A1 to H20, by putting `\027\069` in the FIRST column (A1) of the print range, the result is emphasized text on an Epson printer. Note that the prefix character `[]` will not be displayed.

NOTE: Any remaining data on line containing the printer control codes will not be printed. An entire line may be hidden during printing if a single `"|"` is placed in the first column.

If you try to enter text-enhancing control codes inside a label, you'll find that when you enter Alt 027, you exit the edit mode. That's because control characters (ASCII less than 32), are translated by the program into special editing keys such as Arrow keys, [ESC] key, etc.

To enter control characters, you need to use the Edit Bypass Function key, [F3]. The sequence is: `F3 Alt nnn`. F3 is only active for one control character and must be pressed every time additional control characters are to be embedded.

For example, if you want to print "This is a CONTROL code sample" on an EPSON printer with only the word "CONTROL" in condensed mode, the following keystrokes should be used:

This is a F3 [Alt] 015 CONTROL F3 [Alt] 018 code sample.

The 015 code turns the condensed print mode on and the 018 code turns the condensed print mode off.

OUTPUT TYPE

The output can be printed (to printer or file) in one of the following formats.

AS SEEN Prints the output in row and column format (as displayed on screen) with headers, footers, and page breaks.

CONTENTS Prints a columnar listing of all non-blank cells and their contents. Useful for printing cell formulas and documentation of calculation templates.

NOFORM Prints the output without header and footer information and suppresses page breaks.

EJECT Issues a page eject command after the range has been printed.

4.4 CONTROLLING THE PRINTER

Most printers can be controlled by sending a sequence of ASCII control codes to your printer.

Commonly used codes for the EPSON series of printers are:

\027\069	Turn on Emphasized text (or \027E)
\027\070	Turn off Emphasized text (or \027F)
\015	Turn on Condensed text
\018	Turn off Condensed text

Commonly used codes for the HP LaserJet/DeskJet series of printers are:

\027\038\108\054\068	6-LPI
\027\038\108\056\068	8-LPI
\027\038\108\048\079	Portrait orientation
\027\038\108\049\079	Landscape orientation
\027\038\107\048\083	10 cpi
\027\038\107\052\083	12 cpi
\027\038\107\050\083	16.66 cpi
\027\069	Reset

For details and additional control codes, refer to your printer's user's manual.

The three digit number 027 stands for the [escape] code. Printer codes may be entered by selecting PrintTo Printer Options Setup. The spreadsheet accepts codes only if they are separated by the back-slash character [\].

To select the emphasized text mode on an Epson printer, or to select Reset on an HP laserjet, type **\027\069 [ENTER]**.

To change the string, re-select the SETUP option.

NOTE: AS-EASY-AS provides a PITCH command (/ PrintTo Printer Options Pitch) which allows the user to select PICA (10 cpi), ELITE (12 cpi), or CONDENSED (16.66) print. The PITCH command should be used only for Epson and compatible dot matrix and inkjet printers.

To control the pitch for HP LaserJet, HP DeskJet, and compatible printers, select NONE from the PITCH command, and enter the HP LaserJet/DeskJet codes for the desired pitch as described above.

4.5 ASEASY.PRT FILE

To make life easier so you don't have to manually enter printer setup codes or look up an infrequently used setup code, simply type the [\] character when entering a printer setup code and press the [F1] Function Key.

A listing of predefined setup codes from ASEASY.PRT will pop-up in a pick window on your screen. By highlighting the desired function and pressing [ENTER], the appropriate printer code will be entered into the setup string.

Any control codes supported by your printer can be incorporated in the file ASEASY.PRT, an ASCII text file, which has the following structure:

- Each control code consists of two lines.
- The first line contains a description of the print enhancement (eg. Emphasized, Underline, ...). Description names should not be separated by spaces, e.g. 'Dbl_Strike' NOT 'Dbl Strike'. Note that this description name must not exceed 11 characters.
- The second line contains the decimal setup code for the described print enhancement, e.g., 027\015 - condensed for EPSON printers.

NOTE: There is no leading backslash in the setup codes in the ASEASY.PRT file (i.e. 027\015, not \027\015)

You can create or edit ASEASY.PRT with any word processor/text editor that generates ASCII files.

Let's say you want to incorporate the following codes supported by your EPSON compatible printer in an ASEASY.PRT file:

Decimal Control Codes <u>From Printer User's Manual</u>	Print <u>Enhancement</u>	ASEASY.PRT <u>Code</u>
27, 77	Elite Pitch	027\077
27, 72	Double Strike	027\072
27, 69	Emphasized	027\069

The ASEASY.PRT file for these codes should look like the one below:

```
Elite          <----- First line of the file
027\077       .
Dbl_strike    .
027\072       .
Emphasized    .
027\069       <----- Last line of the file - up to 240 lines
```


4.6 PRINTING TO A FILE

To create an ASCII file (which contains the print range information) for transfer to other programs (like databases or word processors) use the following procedure.

Type: */pfTEST [ENTER]*

Which stands for /PrintTo File, when the program asks for the name of the print file, type *TEST* and press ENTER. If no extension is specified, an extension of ".PRN" will automatically be attached to the file name. If you have already sent output to the print file during the current AS-EASY-AS session, the name of the print file will appear at the prompt line. You can select it by just pressing ENTER.

If you wish to append an existing ASCII print file, select /PrintTo Append. This command will append the selected range to the end of the specified print file.

4.7 PRINTING TEXT AND GRAPHICS

AS-EASY-AS has the ability to print combined spreadsheet data and graphs on dot matrix and laserjet printers. In order to print a graph from spreadsheet data, you must first have created the graph and formatted a range to display the graph (see Section 5.4, Combining Text and Graphics).

To print the combined data graph, first select /PrintTo Graphics. Select Range and highlight the area you would like to print. Make sure the entire graph is contained within the print range. Proceed as in Section 4.1 Printing to a Printer, above.

4.8 PRINT PREVIEW

It is possible to preview the layout and organization of data, page breaks and margin settings in the spreadsheet through the use of the view command. AS-EASY-AS will display either a full page of text (by pressing [F2]) or a 200% zoom of a half page (by pressing [F1]).

To advance through the print range use the [PGUP] or [PGDN] keys. Any graphs inserted will be displayed in their correct position on the page.

5. GRAPHS

AS-EASY-AS provides you with the capability to create high-quality 2- and 3-dimensional graphs from your spreadsheet data. Hardcopy output can be generated on 9- or 24-pin dot matrix, inkjet, and laserjet printers. Output may also be saved to a file for use with word processing and graphics programs.

Fourteen types of 2-dimensional graphs can be created. Samples of each graph type are shown in Figures 5-1 through 5-16.

- | | | | | |
|-------|-------------|------------|---------|-------|
| X-Y | Bar | Delta | Area | Radar |
| Line | Stacked Bar | Cumulative | HLoc | Pie |
| Polar | Strip | Wall | Contour | |

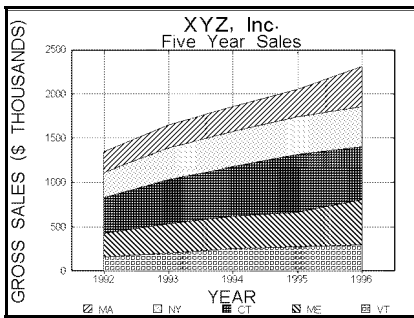


Figure 5-1 Area Graph

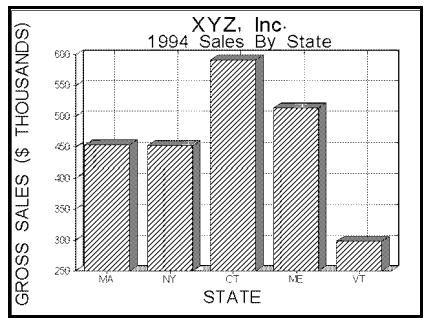


Figure 5-2 Bar Graph

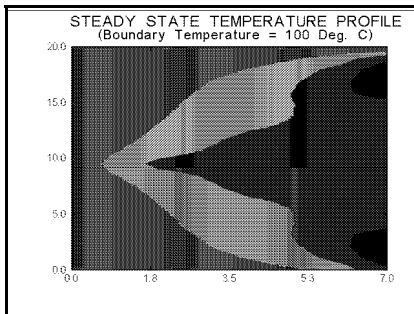


Figure 5-3 Contour, Z-scale step=4

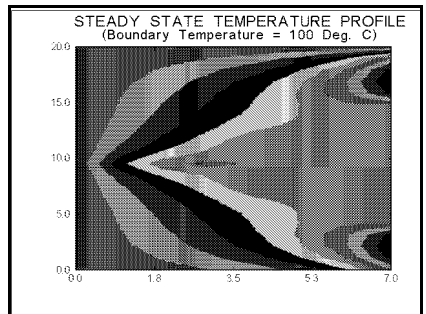


Figure 5-4 Contour, Z-scale step=10

5-2 GRAPHS

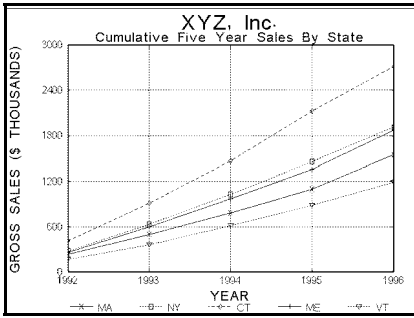


Figure 5-5 Cumulative Graph

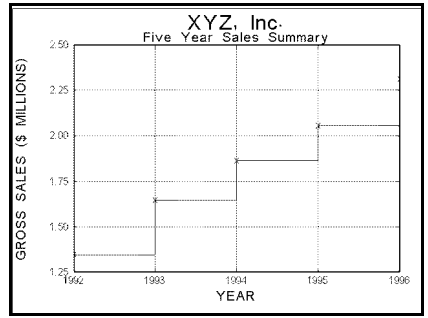


Figure 5-6 Delta Graph

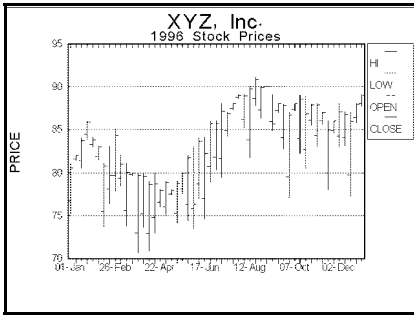


Figure 5-7 HLOC Graph

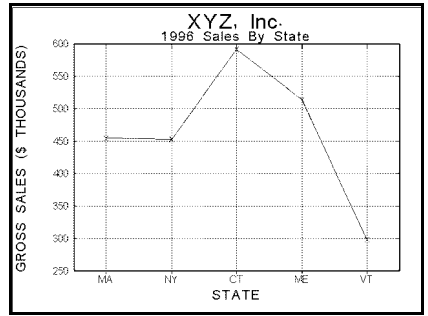


Figure 5-8 Line Graph

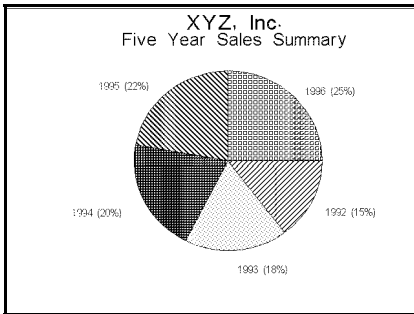


Figure 5-9 Pie Graph

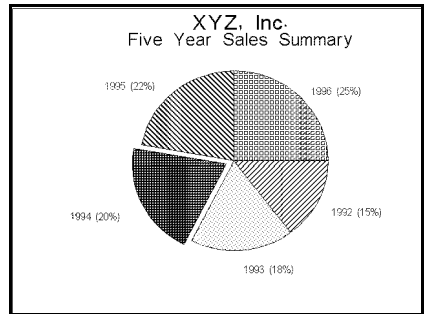


Figure 5-10 "Exploding" Pie

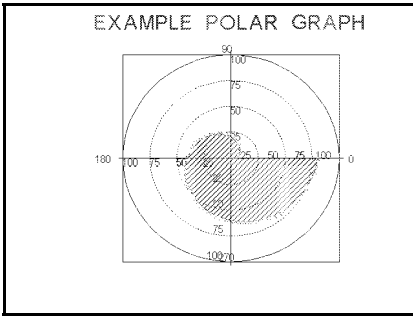


Figure 5-11 Polar Graph

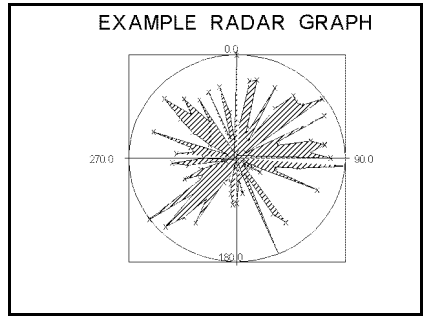


Figure 5-12 Radar Graph

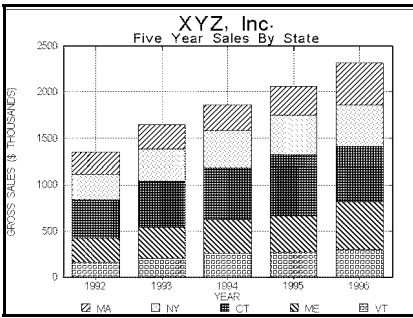


Figure 5-13 Stacked Bar Graph

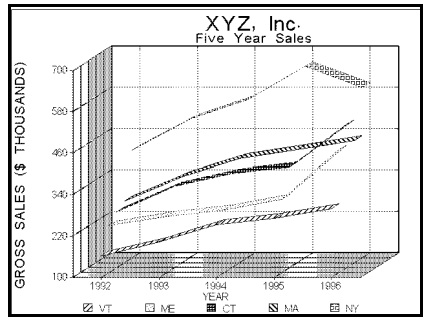


Figure 5-14 Strip Graph

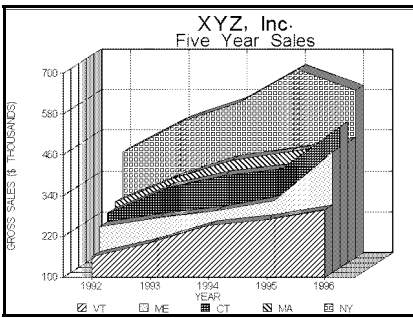


Figure 5-15 Wall Graph

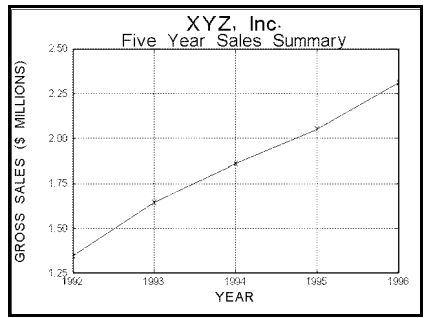


Figure 5-16 X-Y Graph

5-4 GRAPHS

Six types of 3-dimensional graphs can be created as shown in Figures 5-17 through 5-22.

Bars Surface Poles Pyramid X-Y-Z Contour

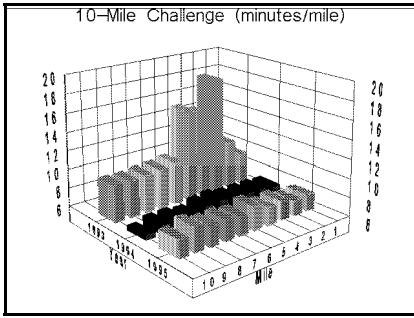


Figure 5-17 3-D Bar Graph

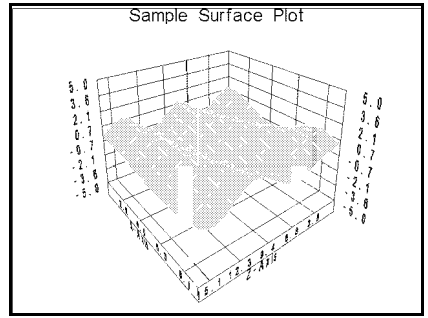


Figure 5-18 3-D Surface Graph

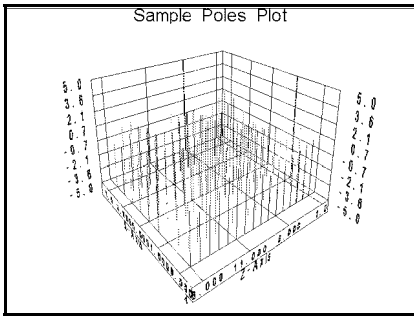


Figure 5-19 3-D Poles Graph

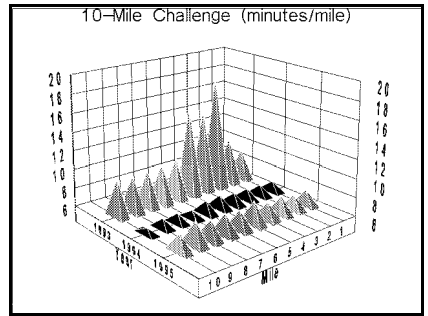


Figure 5-20 3-D Pyramid Graph

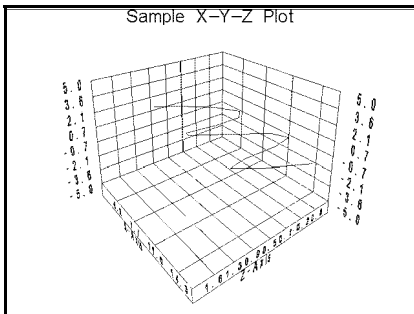


Figure 5-21 3-D X-Y-Z Graph

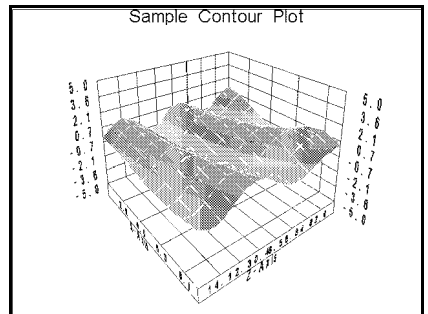


Figure 5-22 3-D Contour Graph

5.1 CREATING A GRAPH

Many options are available to customize graphs for business graphics as well as for engineering and scientific analyses, etc. Titles and legends can be added with user-specified type size. The user can also specify fill patterns, colors, line styles, and tick mark styles.

Graphs can be scaled on both the X (horizontal) axis and the Y (vertical) axis so that the entire graphed range (or a portion of the range) may be displayed. A logarithmic adjustment to either or both of the X and Y scales may be performed to produce semi-log or log-log graphs.

All data points are specified by ranges in the spreadsheet. Up to six curves may be displayed on a single graph, with an additional six if two graphs are merged.

The following provides examples on how to create a several graph types. For a detailed description of the Graphics commands, refer to Section 10.9.

A simple graph can be created by performing the following steps:

1. Select Graphics Range from the main menu
2. Specify the X range.
3. Select the range of at least one of the Y ranges (A thru F)
4. Select the type of graph desired
5. Select VIEW to display the graphics on the screen.

The user can view the current graph by either pressing the [F10] function key from the ready mode, or by selecting the /Graphics, View command.

By selecting the OPTIONS command, titles, grids, scales, legends, labels, and formats for your graph may be specified, allowing you to customize your graph.

CREATING A BAR GRAPH

Consider the data below which relate the sales of a company (XYZ) for 5 years.

[A]	A*	B*	C*	D*	E*
1*		SALES			
2*		YEAR (MILLIONS)			
3*					
4*		1992	23		
5*		1993	19.5		
6*		1994	45		
7*		1995	79	20	
8*		1996	101		

5-6 GRAPHS

A Bar Graph displaying the data contained in the sheet presented above can be generated using the following steps.

1. /g Invoke the Graphics Submenu
2. rxB4..B8 [ENTER] Specify Series X-range. These are the data that will be used to construct the X (horizontal) axis.
3. aC4..C8 [ENTER]q Specify the First data range. These data will be used to generate the curve. Each value in the range corresponds to a value in the X range.
4. tb Specify the type of graph you want (in this case a Bar Graph).
5. v View the graph. It should look like the graph shown in Figure 5-23.

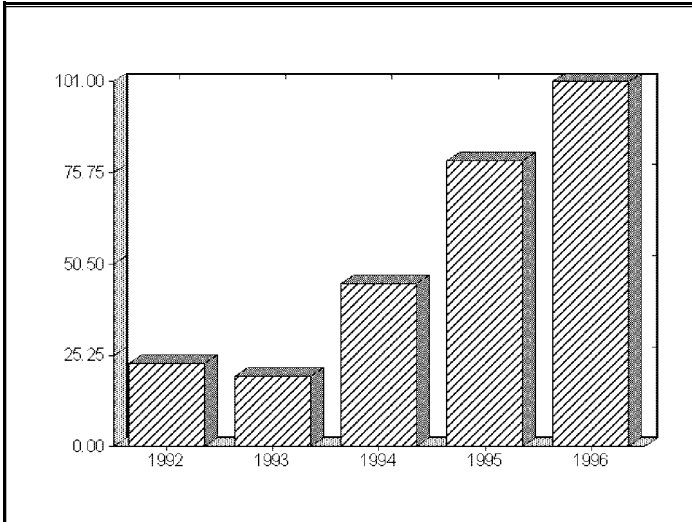


Figure 5-23 Simple Bar Graph for XYZ Company Sales

Now lets see if we can make the same graph look somewhat more attractive. As you probably noticed, AS-EASY-AS automatically scaled the Y-axis to reflect the limits of the data being plotted.

This feature can be bypassed by specifying the /Graphics, Scale, Y, Manual option.
NOTE: If the manual option is selected, you MUST specify the upper and lower limits of the axis.

We will modify the graph shown above by specifying graph titles and X- and Y-axis titles. (The steps described below assume that you are in the /Graph menu). Just type the steps as they appear, i.e., otm are the first letters for the commands Options, Titles, Main.

- | | | |
|-----|----------------------|---|
| 1. | otm | Select the Options, Titles menu. Ready to enter the main for the graph (two line titles are available). |
| 2. | XYZ Company [ENTER] | This is the first graph title. (AS-EASY-AS remains in the <u>T</u> itle sub-menu). |
| 3. | s | Ready to enter the second title for the graph. |
| 4. | SALES (Mill) [ENTER] | This is the second graph title. |
| 5. | x | Ready to enter the X-axis title. |
| 6. | YEAR [ENTER] | X-axis title. |
| 7. | y | Ready to enter the Y-axis title. |
| 8. | SALES (\$M) [ENTER] | Y-axis title. |
| 9. | q | Exit the <u>T</u> itles menu. |
| 10. | q | Exit the <u>O</u> ptions menu. You should now be in the main GRAPHICS menu. |

At this point, press v to see the now modified graph. It should look like the one shown in Figure 5-24.

LINE GRAPH

The same data can be represented by any of the graph types and can be changed from one type to the other at any time. For example, using the data defined for the Bar Graph in the previous example, if *Type Line* was selected, the graph in Figure 5-25 would be displayed.

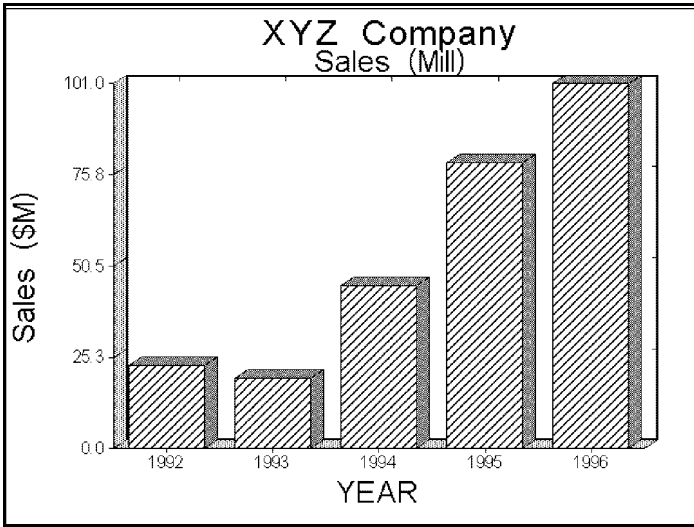


Figure 5-24 Bar Graph for XYZ Company Sales With Titles

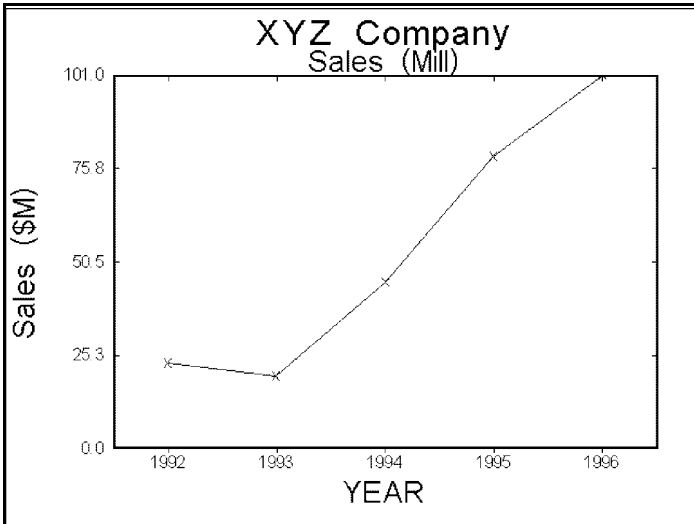


Figure 5-25 Line Graph for XYZ Company Sales

PIE GRAPH

To create a pie chart, simply select Pie from the Type menu. Figure 5-26 shows the same data for XYZ Company in a pie chart.

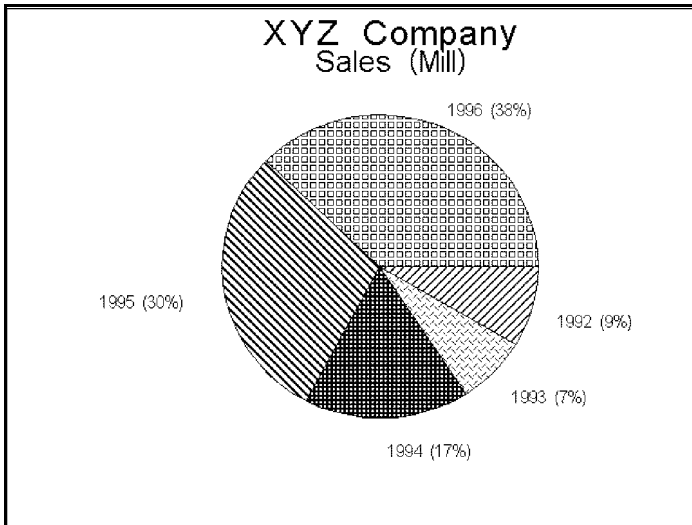


Figure 5-26 Pie Graph for XYZ Company Sales

To create an "exploding" pie chart, additional information must be provided to designate which slice(s) is to be "exploded" and how far the slice is to be removed from the pie.

Using the information from Page 5-5, let's say we want the sales for the year 1995 to be enhanced. The data ranges for X and A remain the same. In the range D4..D8, the offset value, in pixels, for each slice of the pie is entered.

Since we only want 1995 sales to be exploded, enter the value 20 (pixels) in D7. The other cells in the range will remain blank, therefore having an offset value of 0. After selecting /Graph, Range, select the B data range and enter D4..D8.

If *Type Pie* is again selected, the result when viewed will be an exploding pie as shown in Figure 5-27.

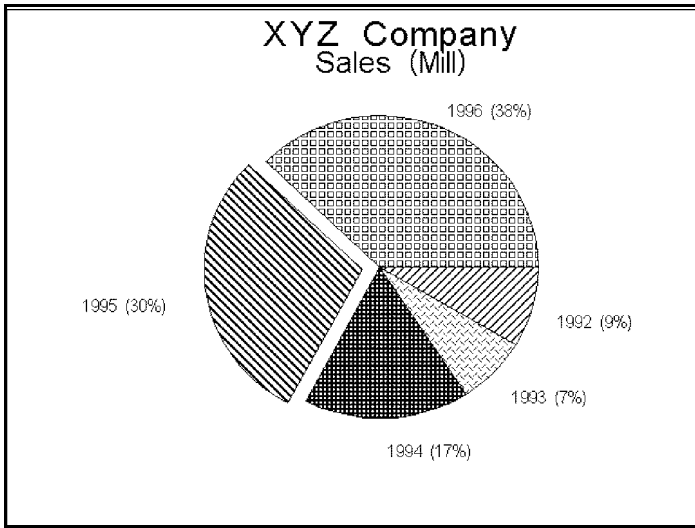


Figure 5-27 Exploding Pie Chart for XYZ Company Sales

MERGING TWO GRAPHS

AS-EASY-AS allows you to merge two graphs, a named graph and the currently defined graph. The named graph will be scaled on the right side of the graph with its own set of scaling factors, limits, formats, etc.

Assume that the table presented below is part of a worksheet that you want to use in merging two graphs.

	A/.....B/.....C/.....D/.....E/.....			
	BAR GRAPH		LINE GRAPH	
	X-Axis-1	Y-Axis-1	X-Axis-2	Y-Axis-2
1	2	5	2	40
2	4	7	4	250
3	6	20	6	420
4	8	22	8	153
5	10	21	10	47

- Invoke the Graph menu and specify the ranges for the first graph.

```

/grxA4..A8[ENTER] (Specify the X-Range)
/aB4..B8 [ENTER]  (Specify the A-Range)
q                  (Quit back to main Graphics menu)
tb                 (set graph type to bar)
    
```

- Save the Graph Settings under the name GRAPH-1

```
ncGRAPH-1 [ENTER]
```

c. Specify the ranges for the second graph.

```

rxD4..D8 [ENTER]  (Specify the X-Range)
aE4..E8 [ENTER]  (Specify the A-Range)
q           (Quit back to main Graphics menu)
tl         (Set graph type to Line)
    
```

d. Select the GRAPH-1 settings to be merged with the current graph settings.

```
nm           (Name, Merge)
```

At this point, we can type in the name of our graph, GRAPH-1 and hit [ENTER] or, by hitting [ESC], a pick list appears in the top of the screen with the graph setting names. Move the cursor to the name GRAPH-1 and press [ENTER].

e. Now just press v to view the two merged graphs.

NOTE: To disable the merge feature, select: /Graphics, Name, Reset

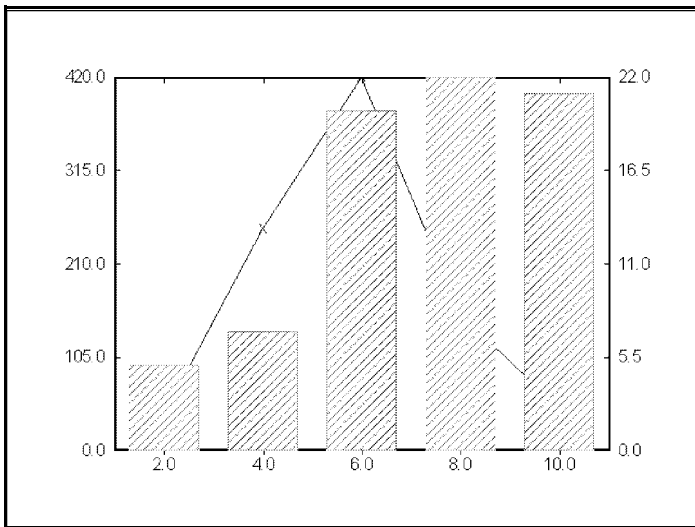


Figure 5-28 Merged Graphs

5.2 PLOTTING A GRAPH

Once you're satisfied with the graph settings, you can print a hardcopy plot or create a graphics file. Plots are sent to the hardware and output device specified in /User Install Printers and /User Install Device. Graphics file type includes .PIC (Lotus 1-2-3 Graphics format).

Plots may be printed in portrait or landscape modes and in low or high resolution.

1. Select the Graphics Plot menu
2. Set the graph size, print density, and desired orientation (landscape or portrait)
3. Select the output type (default is LPT1)
4. Select the output device (default is EPSON - 9 pin)
5. Press GO
6. Press EJECT when printing has completed and examine your masterpiece.

5.3 COMBINING TEXT AND GRAPHICS

AS-EASY-AS can include graphs within your spreadsheet for printing combined data and graphics. Create a graph as discussed previously. Select /Graphics Name Insert, and highlight the area in which the graph is to be placed.

The formatted range will appear in a highlighted color. The upper left cell of the range contains the graph name and the size of the display in columns and rows. For example, "MAIN:2,7" will display the main (or current) graph in a range 2 columns wide and 7 rows deep. The cell may be edited to change the name and size of the graph if desired. To remove an inserted graph, erase the upper left cell of the inserted range.

The graph may be viewed on-screen by placing AS-EASY-AS in one of its graphics display modes (User Install Video). The graph will appear on the screen only if it can be completely displayed without clipping. To update the graph after changing graphed data, you must manually recalc the spreadsheet by pressing the [F9] function key.

The graph will also appear when previewing the page containing the graph (PrintTo, Printer, View) prior to printing. To print combined worksheet text and graphics see Section 4.7, Printing Text and Graphics.

5.4 PLOTTING A FUNCTION

One of the unique features of AS-EASY-AS is its ability to plot functions, not just discrete data. This is done using an expression based on an internal variable, @X, as one or more of the intended Y-Ranges. Up to six functions may be viewed at once.

In setting up your worksheet, it is important to note the following:

1. The Y-Range(s) should be defined as a SINGLE cell containing a formula using the @X variable.
2. The Y-Range scale should be manually set unless one or more of the Y-Data Ranges is made up of discrete data. The upper value should be equal to or greater than the maximum calculated value of the function. Likewise, the lower value should be equal to or less than the minimum calculated value of the function.

As an example, consider the spreadsheet data shown below.

[A ]	.....A*	.....B*	.....C*.....
' 1*	1	0	
' 2*	2		
' 3*	3		
' 4*	4		
' 5*	5		
' 6*	6		The function entered
' 7*	7		in Cell B1 is
' 8*	8		+2*@X^2, which is
' 9*	9		interpreted as
' 10*	10		Y=2*X ²

To have AS-EASY-AS automatically calculate the value of Y for each value of X, perform the following steps:

1. Set X-Range to A1..A10 (Use the /GRX command sequence)
2. Set A-Data Range to B1 (Use the /GRA command sequence)
NOTE: Single cell B1 is used as the A-Data range!
3. Set the Y-Scale to manual (Use the /GSYM command sequence)
4. Set the Upper Y-Scale to 200 (Use the /GSYU command sequence)
5. View the graph (use the /GV command sequence).

AS-EASY-AS will automatically calculate the function and display the plot as shown in Figure 5-29.

NOTE: Cell B1 will initially display 0 when the function is entered. After the function has been plotted, and the screen updated, B1 will display the last Y value calculated, $2*10^2$, or 200.

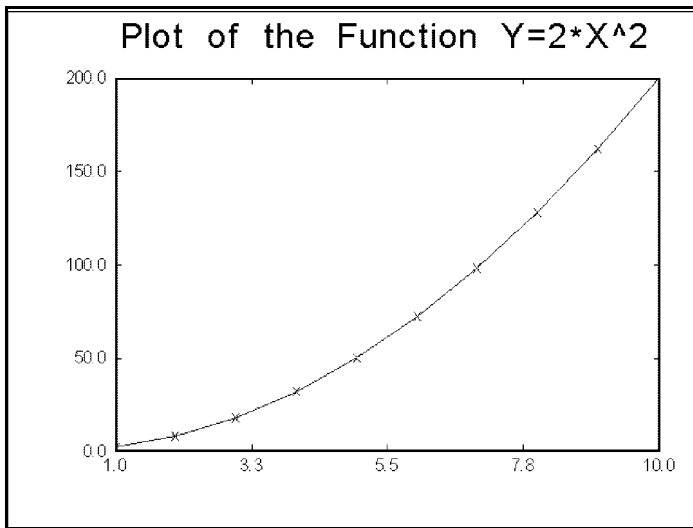


Figure 5-29 Plot of the Function $Y=2*X^2$

To display a second function at the same time, type the function in cell C1, e.g., "+3*@X^3", set the B-Data Range to cell C1, and adjust the upper Y-Scale value accordingly (to 3000). Viewing the graph will now display a plot of both functions.

5.5 SAVING AND NAMING GRAPHS

When a spreadsheet is saved, the current graph settings and named graph settings are saved with it. When the file is retrieved, those graph settings are retrieved as well. The user can then view the current graph by either pressing the [F10] function key from the ready mode, or by selecting the /Graphics, View command.

Sometimes more than one graph might need to be created from the data in a worksheet. That's no problem. Instead of having to re-specify the settings every time you want to look at a previous graph, you can use the /Graphics, Name, Create and Use commands.

When the /Graphics, Name, Create command is invoked, the program saves the current graph settings under the user specified name. To select and view a named graph, select the /Graphics, Name, Use command and select or type the desired graph name. The selected graph becomes the current or MAIN graph.

5.6 3-D GRAPHICS

The 3-D graphics option allows the user to visualize 3-D response surfaces, lines, bars etc. Options allow you to annotate, scale, and rotate the graph until the desired view is displayed. You can create a hard copy print of your 3-D graph or an output file formatted for a particular printer. Or, direct output to one of four supported graphics formats; PIC, PCX, PSP (Encapsulated PostScript Printer), or PLT (HP-GL Plotter file), for use in other programs.

To demonstrate the power of 3-D Graphics, let's walk through a simple example. While it is not necessary to enter the data exactly as shown in this example, if you wish to follow along, create a simple spreadsheet with similar data.

The data below represent the three years of mile split times for each mile marker of the 10-Mile Challenge, a local 10-mile road race over a challenging (hilly) course.

[A ]	.....A*	.....B*	.....C*	.....D* ..
1*	Mile	1993	1994	1995
2*	1	9.27	7.13	7.72
3*	2	11.01	7.22	7.59
4*	3	18.32	7.22	7.98
5*	4	15.00	7.18	7.84
6*	5	15.58	7.49	8.48
7*	6	10.40	7.32	7.95
8*	7	10.12	6.80	8.22
9*	8	10.00	7.02	8.06
10*	9	9.87	6.99	8.52
11*	10	9.89	6.53	7.86
12*				

Using AS-EASY-AS to display the data in a 2-D bar graph results in the graph shown in Figure 5-30.

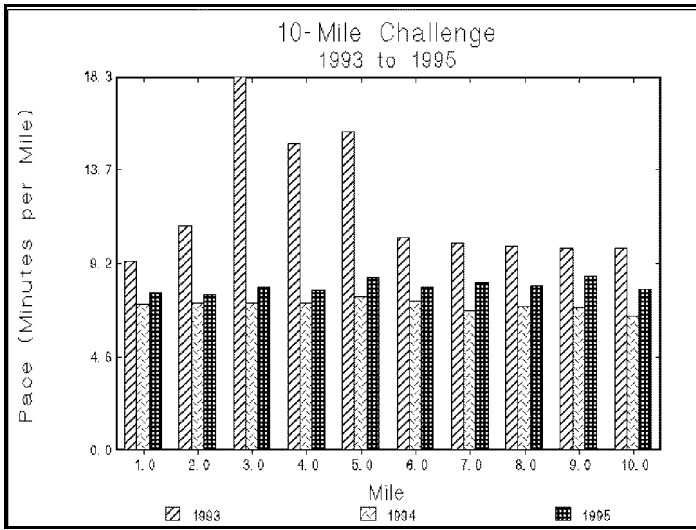


Figure 5-30 2-D Bar Graph

It is apparent that the split times for the second two years were much better than those for the first year (due to better training and a fall at the end of mile 2 the first year). However, at first glance, it is difficult to see overall, how the second and third years compared. While the peaks are easy to see in a bar-type graph, the "valleys" can get easily lost. AS-EASY-AS now offers another way to view the data, 3-dimensional graphics.

To create a 3-D graph of our data, first select /GRAPHICS, 3-D GRAPH from the main menu. Next, specify the data range for the graph. Unlike 2-D graphs, where the X and Y ranges are specified separately, the range for a 3-D graph is specified as a single block, including heading information. Because of this, you need to be sure you set up your data properly ahead of time. In our data, the information in row 1 is the X-Range, the information in Column A is the Z-Range, and the minute data represent the Y-Range. Select RANGE from the menu, type A1..D11, and press [ENTER].

Now we need to select the type of graph to display. AS-EASY-AS provides Bars, Surface, Poles, Pyramid, and X-Y-Z graphs. The type of display will depend on the type of data you are wish to display. Since we viewed the data as a 2-D bar graph, lets see how the data looks as a 3-D bar graph. Select TYPE, BARS from the menu.

At this point, let's view the graph to see what we have. Select VIEW from the menu. You should see a graph similar to the one shown in Figure 5-31.

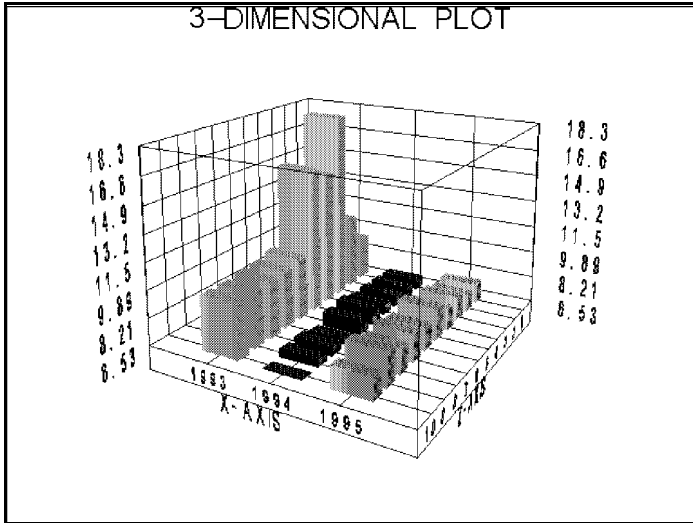


Figure 5-31 3-D Bar Graph

We can now see each year's results individually, as well as compare data points between years. It is much easier to see that the second year was better than the third. Lets choose a different graph type and embellish it a bit with titles and format changes. These features operate the same as 2-D graphs

Select the Pyramid-type 3-D graph. Choose TYPE, PYRAMID. Select SCALE (which affects the display of the Y-Axis data) MANUAL, and set the UPPER limit to 20 and the LOWER limit to 6. Select FORMAT and specify FIXED with 0 decimal places, and set DIV (the number of Y-Axis divisions) to 7, and select QUIT.

5-18 GRAPHS

Select **OPTIONS**, **TITLES** and enter the **MAIN** graph title (10-Mile Challenge (min/mile)), the **X-AXIS** title (Year), and the **Z-AXIS** title (Mile), and select **QUIT**. Select **GRID** and deselect **FACE** (if **ON**) by pressing **F**, and select **QUIT**, **QUIT**.

Let's alter the size and rotate the graph. Select **ADJUST**, and a cube will display on the screen with a listing of keys and their functions displayed on the bottom line. Experiment with the options until you get a pleasing orientation. If things get out of hand, press **I** to restore the display to the initial default settings.

Let's look at the result of our changes. Select **VIEW** once again. You might end up with a display similar to that shown in Figure 5-32.

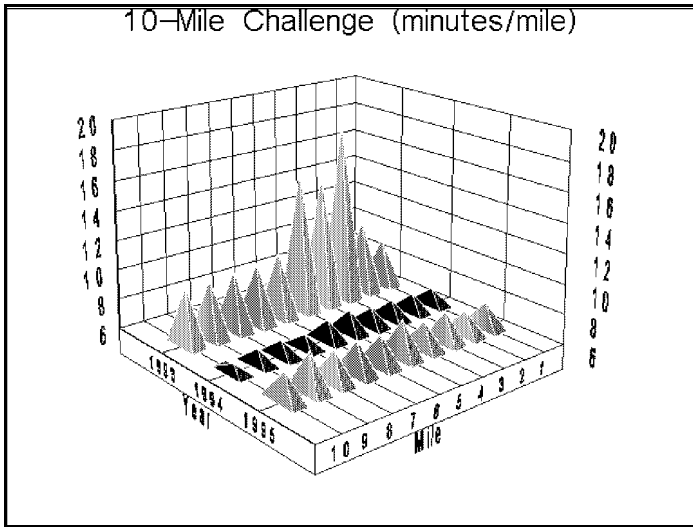


Figure 5-32 3-D Pyramid Graph

To create a hard copy print of the graph, select **PLOT**. Check **OUTPUT** and make sure **PRINT** is selected. This will send the information to the printer you selected from the **/USER**, **INSTALL**, **PRINTER** menu. As can be seen, output can also be directed to **PIC**, **PCX**, **PSP**, and **PLT** format files. Type **1** to specify **PRINT**. Check the **IMAGE** settings, and make any desired changes. If everything is ready, **QUIT** back to the **PLOT** menu and select **GO**. Experiment with the different graph types and options to see what works best for you.

6. @FUNCTIONS

A function is denoted by an @ (at) character preceding a function keyword. The following functions act upon the argument (represented by "x") contained within the parentheses. The argument may be a value, formula, or reference to other cells in the spreadsheet. Strings arguments must be enclosed in quotes, such as "string".

6.1 STRING FUNCTIONS

+Cell (Where Cell contains a String) Direct cell reference.

Syntax: +Cell (where Cell is any valid cell address)

The current cell will have the same contents as Cell, whether Cell contains a string or a value.

& - Concatenation Combines string expressions.

Syntax: "string1"&"string2"

The ampersand (&) is used to add two string expressions together. Note that using the plus sign (+) when adding strings would give erroneous results.

Example: "Abc"&"D2N" will produce AbcD2N

@@ Indirect cell reference

Syntax: @@(Cell) (where Cell is any valid cell address)

The @@ function is used to indirectly address the location described by the string in Cell (another spreadsheet cell).

Examples: Assume the following cell contents:

Cell A1 contains the string "Sample"

Cell A5 contains the string "A1" (Note that it must be uppercase)

@@(A5): the contents of the cell described in A5 = Sample

NOTE: If the indirectly referenced cell changes, you must refresh the value with the [F9] key or the {CALC} macro.

@CELL Returns information about the referenced cell.

Syntax: @CELL("Type",Cell)

Similar to @CELLPT, @CELL returns information about the referenced Cell. See @CELLPT for "Type" descriptions.

@CELLPT Returns information about the current cell.

Syntax: @CELLPT("Type")

Type: One of the predefined words described below. Type MUST be enclosed in double quotes (only the first three characters of the type are required).

Returns information about the current cell (i.e., the cell where the cursor is currently located). The information returned depends on the function argument, as described below. The function will return a value or a string, depending on specific Type.

NOTE: A cell containing an @CELLPT command will only be updated when the sheet is re-calculated either with [F9] or a {CALC} macro.

Type = "FORM" (String) Returns the format of the current cell (see Range Format for format descriptions). The string returned is of the following:

- blank = Unformatted cell
- Sn = Scientific with n decimals
- Fn = Fixed with n decimals
- ,n = Comma format with n decimals
- Cn = Currency format with n decimals
- Dn = Date format, type n (see date formats)
- %n = Percent with n decimals
- + = +/- format
- T = Text format
- H = Hidden format
- G = General format
- bn = Engineering format with n decimals
- L = Label format
- X = Box or line character format

Type = "ADDRESS" (String) Returns the address of the current cell, in the form of a string "ColumnRow" (e.g., A1, C12, AF321).

Type = "CONTENTS" (String) Returns the physical contents of the current cell as a string. e.g., if the cell contains +A1+1, the string "+A1+1" is returned.

Type = "ROW" (Value) Returns the row address of the current cell.

Type = "COLUMN" (Value) Returns the column address of the current cell as a value, (e.g., A=1, B=2, C=3, etc.)

Type = "WIDTH" (Value) Returns the column width of the current cell.

Type = "TYPE" (Value) Returns one of the following values depending on the contents of the current cell:

- 0 - String Formula
- 1 - Value Formula
- 2 - Real/Value
- 3 - Integer/Value
- 4 - String/Label
- 5 - Blank Cell
- 6 - Virgin Blank cell
- 8 - String formula error
- 9 - Value formula error

Type = "PREFIX" (Label) Returns the first character of the current cell's contents ('', '^', '+', '-', 'i', '@', 'P'). If the cell contains a value, the left-most digit will be returned. e.g., 456 will return the label 4.

@CHR Return ASCII character

Syntax: @CHR(Num)

Num: a value, or calculated variable, between 0 and 255

Returns the ASCII character corresponding to Num (fractional values are ignored). Refer to Appendix E for a table of ASCII character codes.

Examples: @CHR(34) = "
 @CHR(36) = \$
 @CHR(55) = 7

@CLEAN Remove high bit ASCII characters.

Syntax: @CLEAN(String)

String: Any text string

Removes all high bit ASCII characters (>127) and control code characters (<32) from String.

Example: @CLEAN("SAM*PLE%") = SAMPLE

@EXACT Compare strings to see if an exact match exists.

Syntax: @EXACT(String1,String2)

Compares String1 to String2 to see they are an exact match. If the strings are equal, the function returns the value 1 (true), otherwise it returns the value 0 (false). Please note that this function is case sensitive so characters in the two strings have to match exactly (e.g., A=A, A<>a).

Examples: @EXACT("This is an Example","This Is An Example") = 0
(not equivalent strings as "an" is different from "An")

@EXACT("This is "&"an Example","This is an Example") = 1
(equivalent strings)

@FIND Find the position of a string.

Syntax: @FIND(String1,String2,Start)

Start: start position to begin search in String2

Returns the position of String1 in String2; Search starts at position Start in String2. The first character of String2 is assigned an position of 1.

Examples: @FIND("hello","Dave says hello",1) returns the value 11
@FIND("e","Dave says hello",1) returns the value 4
@FIND("e","Dave says hello",5) returns the value 12

@LEFT Return substring starting with the left character of String.

Syntax: @LEFT(String,Num)

String: Any string,

Num: Numeric value or value formula

Returns a substring starting with the left (first) character of String, Num characters in length.

Examples: @LEFT("This is an example",6) = This i
@LEFT("This is an example",10) = This is an

@LENGTH Returns the number of characters in a string.

Syntax: @LENGTH(String)
String: Any string or cell reference

Returns the number of characters in String. A string argument must be enclosed in quotes, otherwise, the argument must be a valid cell reference. Please note that spaces are also characters. References to labels ignore the prefix character.

Examples: @LENGTH("abcdefG") = 7
@LENGTH("ABc"&"123") = 6
@LENGTH("a b c d") = 7
@LENGTH(A1) = 14 where A1 contains 'This is a test

@LOWER Convert characters to lower case.

Syntax: @LOWER(String)
String: Any string

Converts all characters in String to lower case.

Examples: @LOWER("This is an Example") = this is an example
@LOWER(@LEFT("This is an example",4)) = this

@MID Returns a substring from a string.

Syntax: @MID(String,Start,Num)
String: Any string
Start, Num: Numeric values or value formulas

Returns a substring from String Num characters long, starting at position Start (from the left).

Examples: @MID("This is an example",2,3) = his
@MID("This is an example",7,3) = s a
@MID("This is an example",1,7) = This is

@N Returns the value of a cell.

Syntax: @N(Cell)

Similar to @S. This function inspects Cell, and returns the value contained in it. If the cell is blank, or contains a string, then the function returns zero.

Examples: @N(C9) = 0 if C9 contains the string "Test"
@N(B9) = 28 if B9 contains the value 28

@ORD Return ASCII code of first character of string.

Syntax: @ORD(String)
String: Any string

Returns the decimal ASCII code of first character of String. All other characters in String are ignored.

Examples: @ORD("2") = 50
@ORD("215") = 50
@ORD("2") = 193

@PROPER Convert first letter of each word to upper case.

Syntax: @PROPER(String)
String: Any string (with quotes) or cell reference (without quotes)

Converts the first letter of each word in String to upper case, such as in a proper name. Characters already in upper case are left unchanged.

Examples: @PROPER("This example") = This Example
@PROPER("john doe") = John Doe

@REPEAT Repeat string.

Syntax: @REPEAT(String,Num)
String: Any string,
Num: Any number or value formula

Repeats the string argument Num times.

Examples: @REPEAT("Sample",3) = SampleSampleSample
@REPEAT("This"&" Sample",2) = This SampleThis Sample

@RIGHT Return substring starting from the right of a string.

Syntax: @RIGHT(String,Num)
String: Any string
Num: Numeric value or value formula

Returns a substring, Num characters long, starting from the right of String.

Examples: @RIGHT("This Example",6) = xample
@RIGHT(@MID("Example",2,3),2) = am

@S Returns the string contained in a cell.

Syntax: @S(Cell)

This function inspects Cell, and returns the string contained in it. If the cell is blank, or contains a numeric value, a null string is returned.

@S acts as a filter and will only return a string reference. It may be used in cases where a referenced cell may contain either a value or a string, without generating an error condition.

Examples: @S(C9) = "Test" if C9 contains the string "Test"
@S(B9) = Null string if B9 contains the value 28

@STR Convert value to string.

Syntax: @STR(Value,Num)
Value: Any value or calculated variable
Num: Number of decimal digits to retain

Returns a string made up of Value with Num digits after the decimal.

Example: @STR(1234.12345,3) = "1234.123"

@TRIM Trim multiple blank spaces from string.

Syntax: @TRIM(String)
String: Any string

Trims multiple blank spaces from String and replaces each occurrence with a single space character.

Example: @TRIM(" This is an example ") = This is an example

@UPPER Convert characters to upper case.

Syntax: @UPPER(String)
String: Any string

Converts all characters of String to upper case. Numbers and special characters remain unchanged.

Examples: @UPPER("Example") = EXAMPLE
@UPPER(@LEFT("+example\$",9)) = +EXAMPLE\$
@UPPER("THIS example") = THIS EXAMPLE

@VAL Convert string to numeric value.

Syntax: @VAL(String)
String: Any string

Converts String into a numeric value. String may also be a string function, but you cannot embed value formulas in the String. If a value formula is embedded, then the value of zero is returned.

Note that this function will accept the decimal separator specified with the User, Install, Punctuation command. The examples below assume that "." is the decimal separator.

Examples: @VAL("123") = 123
@VAL("1.23") = 1.23
@VAL("11.23") = 11.23
@VAL("4/2") = 0
@VAL("2..34") = 0

6.2 MATH FUNCTIONS

- NOTES:**
1. Arguments for trigonometric functions must be in radians.
 2. Arguments for hyperbolic functions must be in hyperbolic radians.
 3. An out of range argument will result in ERR being displayed.

@ABS Returns the absolute value of the argument.

Syntax: @ABS(x)
x: any value

Examples: @ABS(-10) = 10
@ABS(10) = 10
@ABS(20/-4) = 5

@ACOS Returns arc cosine of value in radians.

Syntax: @ACOS(x)
x: any value where $-1 \leq x \leq 1$

Example: @ACOS(0.5) = 1.0471975512

@ACOSH Returns Arc hyperbolic cosine of value x in radians.

Syntax: @ACOSH(x)
x: any value where $x \geq 1$

Example: @ACOSH(1)=0

@ASIN Returns arc sine of value x in radians.

Syntax: @ASIN(x)
x: any value where $-1 \leq x \leq 1$

Example: @ASIN(0.8415) = 1.0

@ASINH Returns arc hyperbolic sine of value x in radians.

Syntax: @ASINH(x)
x: any value

Example: @ASINH(1)=0.881374

@ATAN Returns arc tangent of value in radians.

Syntax: @ATAN(x)
x: any value

Example: @ATAN(1.7320508076) = 1.0471975512

@ATANH Return Arc hyperbolic tangent of value x in radians.

Syntax: @ATANH(x)
x: any value where $-1 \neq x \neq 1$

Example: @ATANH(-0.999) = -3.800201

@BESSELI Evaluates Hyperbolic Bessel Function I_n for a value x.

Syntax: @BESSELI(x,n)
n: Integer indicating the order of the function (0,1,2,...)
x: Any value

Examples: @BESSELI(1,0) = 1.266065
@BESSELI(1.5,0) = 1.646723
@BESSELI(0.5,1) = 0.257894

@BESSELJ Evaluates the Bessel Function J_n for a value x.

Syntax: @BESSELJ(x,n)
n: Integer indicating the order of the function (0,1,2,...)
x: Any value

Examples: @BESSELJ(3.5,0) = -0.38012
@BESSELJ(2,0) = 0.223890
@BESSELJ(2,1) = 0.576724

@BESSELK Evaluates the Bessel Function K_n for a value x.

Syntax: @BESSELK(x,n)
n: Integer indicating the order of the function (0,1,2,...)
x: Any value

Examples: @BESSELK(2,0) = 0.113893
@BESSELK(1.5,0) = 0.213805
@BESSELK(2.5,1) = 0.073890

@BESSELY Evaluates the Bessel Function Y_n , also known as Weber's function, for a value x .

Syntax: @BESSELY(x,n)
n: Integer indicating the order of the function (0,1,2,...)
x: Any value

Examples: @BESSELY(1,0) = 0.08825
@BESSELY(4,0) = -0.01694
@BESSELY(1.5,1) = -0.41230

@BETA Calculates the complete Beta function for w,x . Note that @BETA(w,x) = @BETA(x,w).

Syntax: @BETA(w,x)
w: Any real value
x: Any real value

Examples: @BETA(1,4) = 0.25
@BETA(2,3) = 0.083333333
@BETA(4,1) = 0.25

@BETAI Calculates the z -th incomplete Beta function for w,x .

Syntax: @BETAI(z,w,x)
z: Integer indicating the order of the function (0,1,2,...)
w: Any real value
x: Any real value where $0 \leq x \leq 1$

Examples: @BETAI(4,1,0.3) = 0.151110791
@BETAI(2,2,0.9) = 0.573086786

@CEIL Rounds value x to n decimal places away from zero. Note that if n is negative, then the function rounds to the next integer value based on 10^n .

Syntax: @CEIL(x,n)
x: Any value
n: Any integer

Examples: @CEIL(12.0123,2) = 12.02
@CEIL(-12.0123,2) = -12.02
@CEIL(12.0123,-1) = 20
@CEIL(-12.0123,-1) = -20
@CEIL(12.0123,-2) = 100
@CEIL(-12.0123,-2) = -100

6-12 @FUNCTIONS

@COS Returns Cosine of angle x in radians.

Syntax: @COS(x)
x: any value in radians

Example: @COS(1.0471975512) = 5

@COSH Returns hyperbolic cosine of angle x in radians

Syntax: @COSH(x)
x: any value in radians where $-88 \leq x \leq 88$

Example: @COSH(0.5) = 1.127625

@CSC Returns cosecant of angle x in radians.

Syntax: @CSC(x)
x: any value in radians where $x \neq 0, \pi$

Example: @CSC(5) = -1.042835

@CTN Returns cotangent of value

Syntax: @CTN(x)
x: any non-zero value where $x \neq 0, \pi$

Example: @CTN(@PI/4) = 1.0

@EXP Returns exponential of x (raise "e" to the "x" power).

Syntax: @EXP(x)
x: any value where $-88 \leq x \leq +88$

Example: @EXP(5) = 148.4131591

@FLOOR Rounds value x to n decimal places towards zero. Note that if n is negative, then the function rounds to the next smallest integer value based on 10^n .

Syntax: @FLOOR(x,n)

x: Any value
n: Any integer

Examples: @FLOOR(12.0123,2) = 12.01
@FLOOR(-12.0123,2) = -12.01

@FLOOR(12.0123,-1) = 10
@FLOOR(-12.0123,-1) = -10

@FLOOR(12.0123,-2) = 0 (nothing in 100's position)
@FLOOR(-12.0123,-2) = 0

@FLOOR(112.0123,-1) = 110
@FLOOR(-112.0123,-1) = -110

@FLOOR(112.0123,-2) = 100
@FLOOR(-112.0123,-2) = -100

@GAMMALN Returns natural logarithm of the Gamma function for value.

Syntax: @GAMMALN(x)

x: any positive value

The Gammaln function is the floating point equivalent of the factorial function, and is related by $(N-1)! = @EXP(@GAMMALN(N))$.

Example: @GAMMALN(6.5) = 5.662562

@GAMMAP Calculates the x-th incomplete Gamma function for x.

Syntax: @GAMMAP(a,x)

a: Any positive real number
x: Any positive real number

Examples: @GAMMAP(1,2.5) = 0.917915
@GAMMAP(3,1.2) = 0.120512

@GAMMAQ Returns the ath complementary incomplete Gamma function for x.

Syntax: @GAMMAQ(a,x)

a, x: Any positive real number

Example: @GAMMAQ(1,2.5) = 0.082084

@INT Returns integer value of argument.

Syntax= @INT(x)

x: any value

The fractional part of the number is truncated and the integer remainder is returned.
(See also command line switch /RA)

Examples: @INT(10.60) = 10
@INT(11.32) = 11
@INT(0.156) = 0

@LOG Returns the logarithm to base "10" of the argument.

Syntax: @LOG(x)

x: any value where $x > 0$

Examples: @LOG(10) = 1
@LOG(100) = 2

@LOGB Calculates the logarithm of x in base n.

Syntax: @LOGB(x,n)

x: Any value where $x > 0$

n: Any integer where $n > 0$

Examples: @LOGB(100,10) = 2
@LOGB(10,2) = 3.321928
@logb(5,3) = 1.464973

@LN Returns the natural Logarithm (base "e") of the argument.

Syntax: @LN(x)

x: any value where $x > 0$

Example: @LN(6) = 1.7917594692

@MOD Modulo division, returns the remainder of x divided by y.

Syntax: @MOD(x,y)
x: any value
y: any non-zero value

Examples: @MOD(10,3) = 1
@MOD(8,2) = 0

@PI Constant which has a value of 3.1415926536

@RAND Returns a new random number with each recalculation.

@ROUND Rounds a value to x digits.

Syntax: @ROUND(x,y)
x: any value
y: any integer value where -11 # y # 11

Rounds the value of x to y digits right of the decimal. Negative numbers round to left of decimal.

Examples: @ROUND(10.1234,1) = 10.1
@ROUND(123.123,-2) = 100

@SEC Returns Secant of angle x in radians.

Syntax: @SEC(x)
x: any angle in radians where $x \in]-\pi/2, \pi/2[$

Example: @SEC(5) = 3.525320

@SIN Returns Sine of angle x in radians.

Syntax: @SIN(x)
x: any value in radians

Example: @SIN(1.0471975512) = 0.86602540379

@SINH Returns Hyperbolic sine of angle x in radians

Syntax: @SINH(x)

x: any value in radians where $-88 \leq x \leq +88$

Example: @SINH(0.20) = 0.201336

@SQRT(x) Returns the square root.

Syntax: @SQRT(x)

x: any value where $x \geq 0$

A negative argument will result in an error.

Example: @SQRT(2) = 1.4142135624

@SQRT(36) = 6

@TAN Returns tangent of angle x in radians

Syntax: @TAN(x)

x: any value in radians where $x \in (-\pi/2, \pi/2)$

Example: @TAN(1.0471975512) = 1.7320508076

@TANH Returns hyperbolic tangent of angle x in radians

Syntax: @TANH(x)

x: any value in radians where $-88 \leq x \leq +88$

Example: @TANH(.075) = 0.074859

6.3 FINANCIAL FUNCTIONS

- NOTES:**
1. For financial functions, all interest rates must be expressed in decimal fractions, or followed by the % operator. For example, 0.08 = 8%.
 2. The interest rate must be in the same units as the payment period. If a monthly payment is desired, the interest rate must be expressed as a monthly rate (equal to the annual rate divided by 12).

@ACI Returns the accumulated interest on a loan after the specified payment has been made.

Syntax: @ACI(Principal,Interest Rate,Period,PmtNumber)
Principal: Principal amount
Interest Rate: Periodic interest rate
Period: Number of periods
PmtNumber: Payment number

Example: @ACI(10000,0.01,48,36) = 2444.07

@BAL Returns unpaid balance on a loan after the specified payment has been made.

Syntax: @BAL(Principal,Interest Rate,Period,PmtNumber)
Principal: Principal amount
Interest Rate: Periodic interest rate
Period: Number of periods
PmtNumber: Payment number

Example: @BAL(10000,0.01,48,47) = 260.73

@CTERM Returns the number of compounding periods required for a present value (PVal), invested at an interest rate (Int) per compounding period to reach a future value (FVal).

Syntax: @CTERM(Int,FVal,PVal)
FVal: Future Value
Pval: Present Value
Int: Interest Rate per compounding period

Examples: @CTERM(0.1,100000,10000) = 24.2
@CTERM(0.08,400000,60000) = 24.7

@DDB Returns the amount of depreciation allowed during the specified period, using the Double-Declining-Balance depreciation method.

Syntax: @DDB(Cost,Salvage,Life,Period)

Cost: Cost of a purchase

Salvage: Value at the end of the depreciation

Life: Number of periods for full depreciation

Period: Current Period

Example: 5-Year Depreciation Schedule

@DDB(5000,1000,5,1) = 2000.0

@DDB(5000,1000,5,2) = 1200.0

@DDB(5000,1000,5,3) = 720.0

@DDB(5000,1000,5,4) = 80.0

@DDB(5000,1000,5,5) = 0.0

To Date Total 4000.0

@FV Returns the future value corresponding to an annuity occurring over the specified period.

Syntax: @FV(Annuity,Interest Rate,Period)

Annuity: Periodic payment amount

Interest: Periodic interest rate

Period: Number of periods

Example: @FV(700,0.0925,30) = 99979.77

@IRR Returns the Rate of Return per period associated with a cash flow.

Syntax: @IRR(Guesstimate Interest Rate,Range)

Guesstimate Interest Rate: Best guess at internal rate of return
periodic interest rate

Range: Cell range which contains the cash flow return values

The solution is iterative and may result in more than one correct answer, so a good guess is important.

Example:

A1	B1	C1	D1
-1000	300	400	500

@IRR(0.1,A1..D1) = 0.088963, or 8.9%

@NPV Returns the net present value of a cash flow over interest period.

Syntax: @NPV(Interest Rate,Range)

Interest Rate: Periodic interest rate

Range: Cell range which in which the series of cash flows is stored

Example: @NPV(0.0925,A1..A5)

@PMT Returns the amount of an annuity equal to the principal amortized over the period.

Syntax: @PMT(Principal,Interest Rate,Period)

Principal: Principal amount

Interest Rate: Periodic interest rate

Period: Number of periods

Example: @PMT(75000,0.0925,30) = 7462.606

@PMTP Returns the amount that, for a given loan payment, is used to reduce the principal, i.e, does not include the interest portion.

Syntax: @PMTP(Principal,Interest Rate,Period,PmtNumber)

Principal: Principal amount

Interest Rate: Periodic interest rate

Period: Number of periods

PmtNumber: Payment number

Example: @PMTP(10000,0.01,48,5) = 169.97

@PV Returns the present value corresponding to an annuity occurring over the specified period.

Syntax: @PV(Annuity,Interest Rate,Period)

Annuity: Periodic payment amount

Interest: Periodic interest rate

Period: Number of periods

Example: @PV(700,0.0925,30) = 7035.075

@RATE Returns the interest rate required for a present value PVal, invested for Nterm number of compounding periods to reach a future value FVal.

Syntax: @RATE(Fval,PVal,Nterm)
 FVal: Future value
 PVal: Present value
 NTerm: Number of compounding terms

Examples: @RATE(90000,20000,20) = 0.078
 @RATE(190000,50000,20) = 0.069

@SLN Returns the amount of depreciation per period, using the straight line depreciation method.

Syntax: @SLN(Cost,Salvage,Life)
 Cost: Cost of a purchase
 Salvage: Value at the end of the depreciation
 Life: Number of periods for full depreciation

Examples: @SLN(5000,1000,5) = 800.0
 @SLN(11000,1600,10) = 940.0

@SYD Returns the amount of depreciation allowed during the specified period, using the Sum-of-Years depreciation method.

Syntax: @SYD(Cost,Salvage,Life,Period)
 Cost: Cost of a purchase
 Salvage: Value at the end of the depreciation
 Life: Number of periods for full depreciation
 Period: Current Period

Example: 5-Year Depreciation Schedule

@SYD(5000,1000,5,1)	=	1333.3
@SYD(5000,1000,5,2)	=	1066.7
@SYD(5000,1000,5,3)	=	800.0
@SYD(5000,1000,5,4)	=	533.3
@SYD(5000,1000,5,5)	=	<u>266.7</u>
To Date Total		4000.0

@TERM Returns the number of compounding periods required for some periodic payment (Pmt), invested at an interest rate (Int) per compounding period to reach a future value (FVal).

Syntax: @TERM(Pmt,Int,FVal)

FVal: Future value

Pmt: Periodic payment

Int: Interest rate per compounding period

Examples: @TERM(100,0.15,1000) = 6.6 periods
@TERM(850,0.07,100000) = 32.9 periods

6.4 LOGICAL FUNCTIONS

Logical operators may be used within a formula, such as $+(a1>2)*3+(a1\leq 2)*4$. This formula will yield a result of 3 if the value stored in cell A1 is greater than 2 and will yield a result of 4 if the value is less than 2.

#OR# & #AND# Operators

The #OR# & #AND# logical operators are used to combine simple logical criteria into complex logical expressions. These two operators are evaluated according to the following logical table:

Test1	Test2	#OR#	#AND#
True	True	True	True
True	False	True	False
False	True	True	False
False	False	False	False

Examples:

<u>Expression</u>	<u>Result</u>
+(0=0)#AND#(0=1)	0 (False)
+(0=0)#OR#(0=1)	1 (True)

@IF(@MOD(5,2)=1#AND#@MOD(6,2)=0,1,0) returns 1 (true)

NOTES:

1. Spaces between the values and logical operators are not allowed.
2. Use of parentheses is recommended for clarity.

@ERR Returns the value ERR in the current cell and in any other cells that reference it directly or indirectly.

Syntax: @ERR

The ERR value returned by this function is the same ERR value produced by AS-EASY-AS when it encounters an error.

@FALSE Constant which has a value of 0.

Syntax: @FALSE

@IF Returns one of two expressions based on the evaluation of a condition.

Syntax: @IF(Test argument,arg1,arg2)
Test argument: Expression to be evaluated
Arg1: Expression returned if test is true
Arg2: Expression returned if test is false

The test argument is evaluated as a logical expression. If the test is true, Arg1 is returned, otherwise Arg2 is returned.

TEST can utilize logical operators ">,<=,<>" etc., or refer to the result of a cell with a logical result in it.

Examples: @IF(10>2,3*2,4+5) = 6
@IF(10<2,3*2,4+5) = 9

NOTE: Up to 10 nested @IF statements are allowed providing internal limit of 240 bytes per formula is not exceeded.

@ISERR This function is used to trap ERR displays and prevent their propagation through the recalculation sequence.

Syntax: @ISERR(Expression)
Expression: cell reference or any other valid AS-EASY-AS expression.

A value of 1 (true) is returned if the cell contains ERR or the expression evaluates to an error condition. A value of 0 (false) is returned otherwise.

Examples: @ISERR(10/5)=0 (Not an error)
@ISERR(10/0)=1 (Error in Expression)

@ISNA Tests for the special value of NA in cell.

Syntax: @ISNA(Cell)

If the cell contains NA it returns 1 (true); otherwise, it returns 0 (false). Please note that if a cell contains the label "NA" (not produced by the @NA function), it is not recognized by the @ISNA function.

@ISNUM Tests for a value or formula in a cell.

Syntax: @ISNUM(Cell)

If the cell contains a number or a formula, it will return 1 for TRUE, otherwise, it will return 0 for FALSE.

@ISSTR Tests for a label in a cell.

Syntax: @ISSTR(Cell)

If the specified cell contains a label, it returns 1 for TRUE, otherwise, it will return 0 for FALSE.

NOTE: A blank cell is neither a string nor a number.

@NA Constant which has a value of -1.

@NOT Logical negation

Syntax: @NOT(Cell)

Returns the value 0 if cell contains the value 1 and the value 1 if cell contains 0 or any other value. If cell contains a string, the string is returned unchanged.

@TRUE Constant which has a value of 1.

6.5 STATISTICAL FUNCTIONS

These functions operate on a range of values. A range specifies a rectangular block of data in the spreadsheet, i.e. Range = A1..B10 defines the block of data from:

$$\begin{array}{c}
 a1 \dots b1 \\
 \cdot \qquad \cdot \\
 \cdot \qquad \cdot \\
 a10 \dots b10
 \end{array}$$

Presented below are the statistical functions. To illustrate the use of each function, simple examples are provided.

All examples will operate on the numbers contained in the portion of the spreadsheet duplicated below, A1..C3

	.....A/	.....B/	.....C/
1	1.1	5.6	8.2
2	2.3	7.5	10
3	3.5	4.4	2

@AVG Calculates the average value of the range.

Syntax: @AVG(Range)

Range: Cell range to be averaged

Example: @AVG(A1..C3) = 4.955555

@AVEDEV Calculates the average deviation of the sample in range.

Syntax: @AVEDEV(range)

Range: Cell range to be evaluated

Example: @AVEDEV(A1..C3) = 2.550617

@COMB Number of combinations of N distinct items taken R at a time.

Syntax: @COMB(N,R)

N,R: any integer value such that N \$ R

Example: @COMB(6,2) = 15

@COUNT Returns the number of elements in the range, (blank cells and cells containing text are ignored).

Syntax: @COUNT(Range)
Range: Cell range to be counted

Example: @COUNT(A1..C3) = 9

@COV Calculates the covariance of the range.

Syntax: @COV(Range)
Range: Data range to be analyzed

Example: @COV(A1..C3) = 0.621733

@FACT Returns the factorial of X. (See also @GAMMALN for floating point related function and "!" operator).

Syntax: @FACT(X)
X: Numeric value where (0 < X < 33)

Example: @FACT(6) = 720

@GAUSS Returns the value of the Gaussian (or Normal) distribution function, at point x.

Syntax: @GAUSS(x,u,d)
x: Value at which to evaluate
u: Mean of distribution
d: Standard deviation

Example: Annual rainfall in a town follows a Normal, or Gaussian, distribution N(60 in, 15 in), i.e., the mean is 60 inches per year and standard deviation is 15 inches. What is the probability of a 30 inch rainfall next year?

In this case, we have x = 30 in, u = 60 in, d = 15 in, or
@GAUSS(30,60,15)
= 0.003599

@KURT Calculates the coefficient of kurtosis for a set of data in a range, using the second and fourth moments about the mean of the sample.

Syntax: @KURT(range)

range: Cell range to be evaluated

Examples:	Cell A1:	1.00	Cell A1:	1.00000
	Cell A2:	2.00	Cell A2:	0.25000
	Cell A3:	3.00	Cell A3:	0.11111
	Cell A4:	4.00	Cell A4:	0.06250
	Cell A5:	5.00	Cell A5:	0.04000
	Cell A6:	6.00	Cell A6:	0.02778
	Cell A7:	7.00	Cell A7:	0.02041
	Cell A8:	8.00	Cell A8:	0.01563

@KURT(A1..A8) = 1.363157 @KURT(A1..A8) = -0.14900

@MAX Returns the maximum value in the range.

Syntax: @MAX(Range)

Range: Cell range to be analyzed

Examples: @MAX(A1..C3) = 10
@MAX(A1..A3,15,C1..C3) = 15

@MEDIAN Calculates the median in a range of values.

Syntax: @MEDIAN(range)

range: Cell range to be evaluated

The median of a set of observations arranged in order of magnitude is the middle value or the arithmetic mean of the two middle values.

Examples: If the cell range A1..A5 contains the values 3,5,1,7,9, then,
@MEDIAN(A1..A5) = 5

If the cell range A1..A6 contains the values 6,2,2,4,5,3, then,
@MEDIAN(A1..A6) = 3.5

@MIN Returns the minimum value in the range.

Syntax: @MIN(Range)

Range: Cell range to be analyzed

Examples: @MIN(A1..C3) = 1.1
@MIN(A1..A3,1,C1..C3) = 1

@PERM Number of permutations of N distinct items taken R at a time.

Syntax: @PERM(N,R)

N,R: any integer value such that $N \geq R$

Example: @PERM(6,2) = 30

@POISSON Returns the value of the Poisson distribution function, at point x.

Syntax: @POISSON(x,v,t)

x: Value at which to evaluate

v: Mean of distribution

t: Evaluation interval

Example: Records show an average of 4 storms per year for the last 20 years. Assuming a Poisson distribution, what is the probability of:

- NO storms next year? In this case we have: $x=0, v=4, t=1$
@POISSON(0,4,1) = 0.018315639
- TWO storms next year? In this case we have: $x=2, v=4, t=1$
@POISSON(2,4,1) = 0.146525111
- THREE storms in the next 2 years? In this case: $x=3, v=4, t=2$
@POISSON(3,4,2) = 0.028626144

@SKEW Calculates the coefficient of skewness for a set of data in a range, using the second and third moments about the mean of the sample.

Syntax: @SKEW(range)

range: Cell range to be evaluated

Examples:	Cell A1: 1.00	Cell A1: 1.00000
	Cell A2: 2.00	Cell A2: 0.25000
	Cell A3: 3.00	Cell A3: 0.11111
	Cell A4: 4.00	Cell A4: 0.06250
	Cell A5: 5.00	Cell A5: 0.04000
	Cell A6: 6.00	Cell A6: 0.02778
	Cell A7: 7.00	Cell A7: 0.02041
	Cell A8: 8.00	Cell A8: 0.01563

@SKEW(A1..A8) = 0.000 @SKEW(A1..A8) = 1.67789

@PSUM Calculates the sum of the products of two ranges.

Syntax: @PSUM(Range1,Range2)

Range1: First cell range to be evaluated

Range2: Second cell range to be evaluated

Returns the sum of the product of Range1 and Range2. Each element in Range1 is multiplied by the equivalent element in Range2, and the products summed.

Range1 and Range2 must be the same length or an ERR condition will be returned by the function.

Example:

1	.....A/	.....B/	.....C/
2	1	2	
3	2	4	
	3	6	

$$@PSUM(A1..A3,B1..B3) = A1*B1 + A2*B2 + A3*B3 = 2 + 8 + 18 = 28$$

@STD Returns the population standard deviation of the cells in the Range.

Syntax: @STD(Range)

Range: Cell range to be evaluated

Returns the standard deviation of the elements in the range, assuming the whole sample population is known, i.e., N-weighting.

Example: @STD(A1..C3) = 2.904827

@STDU Returns the sample standard deviation of the cell in the Range.

Syntax: @STDU(Range)

Range: Cell range to be evaluated

Returns the standard deviation of the elements in the range, based on the sample size, i.e., N-1 weighting.

Example: @STDU(A1..C3) = 3.081035

@SUM Returns the summation of the range.

Syntax: @SUM(Range)

Range: Cell range to be evaluated

Examples: @SUM(A1..C3) = 44.6

@SUM(A1..C3,R3,D9,X3..Y9) = 255.5

@VAR Returns the population variance of the elements in the range.

Syntax: @VAR(Range)

Range: Cell range to be analyzed

Returns the population variance of the elements in the range, assuming the whole sample population is known, i.e., N-weighting.

Example: @VAR(A1..C3) = 8.438024

@VARU Returns the sample variance of the elements in the range,

Syntax: @VARU(Range)

Range: Cell range to be analyzed

Returns the sample variance of the elements in the range based on the sample size, i.e., N-1 weighting.

Example: @VARU(A1..C3) = 9.492777

6.6 @Q... STATISTICAL FUNCTIONS

The following @Q... Statistical Functions take the form:

@QCOUNT("@X=Criterion",Range,Offset)

Criterion: Value of formula to be used for match. @Q... functions require the criterion be a string argument enclosed in quotes. References to string arguments are permitted. @X represents reference to cell in range upon which criterion is applied (required).

Range: Search Cell range

Offset: Number of columns to the right (positive), or to the left (negative), from the criterion column, on which the statistical function should operate. It is important to note that if a range of more than a single column is specified as the offset, then the @Q... function applies the criterion on a column at a time and processes the appropriate offset column until all columns in the range are processed.

The @Q... examples which follow refer to Figure 6-1.

Age (yrs)	Weight (lbs)	Height (in)	@Q... Function	Text Corresponding to @Q... Function to the left.
18	165	67	11 <-	@QCOUNT("@X>30",A4..A19,0)
19	176	69	174.5 <-	@QAVG("@X>30",A4..A19,1)
25	202	70	68.6 <-	@QAVG("@X>30",A4..A19,2)
32	156	71		
49	176	70.5	6 <-	@QCOUNT("@X>30#AND#X<40",A4..A19,0)
39	165	69	163.8 <-	@QAVG("@X>30#AND#X<40",A4..A19,1)
34	155	67.5	69.5 <-	@QAVG("@X>30#AND#X<40",A4..A19,2)
52	197	68.5		
33	166	70	202 <-	@QMAX("@X<40",A4..A19,1)
47	175	71	154 <-	@QMIN("@X<40",A4..A19,1)
39	154	70.5	197 <-	@QSUM("@X>50",A4..A19,1)
44	187	66	18 <-	@QMIN("@X<69",C4..C19,-2)
43	201	62	10.1 <-	@QSTD("@X>45",A4..A19,1)
29	199	67	1.2 <-	@QVAR("@X>45",A4..A19,2)
35	187	69		
27	165	74.5		

Figure 6-1 Examples of @Q... Functions

@QCOUNT Returns the number of cells which match the criterion.

Syntax: @QCOUNT("@X=Criterion",Range,Offset)

Searches Range for all cells that match the criterion and returns the number of those cells in Offset columns to the right (or left for negative offsets) that correspond to cells in Range matching the Criterion.

For example, cell D4 = @QCOUNT("@X>30",A4..A19,0) = 11. AS-EASY-AS searched the Range (A4..A19) and found all cells that meet the criteria of Age being greater than 30 years, i.e., A7, A8, A9, A10, A11, A12, A13, A14, A15, A16 and A18. Then, it moved Offset (0) rows to the right, counted all cells corresponding to those found in the criterion range, i.e., same cells again, and returned the number of cells.

@QMAX Returns the maximum value in the range which matches the criterion.

Syntax: @QMAX("@X=Criterion",Range,Offset)

Searches Range for all cells that match the Criterion and returns the maximum value of those cells in Offset columns to the right (or left for negative offsets) that correspond to cells in Range matching Criterion.

For example, cell D12 = @QMAX("@X<40",A4..A19,1) = 202. AS-EASY-AS searched the specified range (A4.. A19) and found all cells that meet the criteria of Age being less than 40 years, i.e., A4, A5, A6, A7, A9, A10, A12, A14, A17, A18, and A19. Then, it moved Offset (1) row to the right, compared all cells corresponding to those found in the criterion range, i.e., B4, B5, B6, B7, B9, B10, B12, B14, B17, B18, and B19, and returned the maximum value in those cells.

@QMIN Returns the minimum value in the range which matches the criterion.

Syntax: @QMIN("@X=Criterion",Range,Offset)

Searches Range for all cells that match the specified criterion and returns the minimum value of those cells in Offset columns to the right (or left for negative offsets) that correspond to the cells in the Range matching the criterion.

For example, cell D13 = @QMIN("@X<40",A4..A19,1) = 154. AS-EASY-AS searched the specified Range (A4..A19) and found all cells that meet the criteria of Age being less than 40 years, i.e., A4, A5, A6, A7, A9, A10, A12, A14, A17, A18, and A19. Then, it moved Offset (1) row to the right, compared all cells corresponding to those found in the criterion range, i.e., B4, B5, B6, B7, B9, B10, B12, B14, B17, B18 and B19, and returned the minimum value in those cells.

@QSTD Returns the standard deviation of those cells in the range which match the Criterion.

Syntax: @QSTD("@X=Criterion",Range,Offset)

Searches the Range for all cells that match the specified criterion and returns the Standard Deviation value of those cells in the offset columns to the right (or left for negative offsets) that correspond to the cells in the Range matching the Criterion.

For example, cell D16 = @QSTD("@X>45",A4..A19,1) = 10.1. AS-EASY-AS searched the specified Range (A4..A19) and found all cells that meet the criteria of Age being greater than 45 years, i.e., A8, A11 and A13. Then, it moved Offset (1) row to the right, compared all cells corresponding to those found in the criterion range, i.e., B8, B11 and B13, and returned the standard deviation of the values in those cells.

@QSUM Returns the sum of the cells in Range which match the criterion.

Syntax: @QSUM("@X=Criterion",Range,Offset)

Searches Range for all cells that match the specified criterion and returns the sum of the values of those in Offset columns to the right (or left for negative offsets) that correspond to the cells in the Range matching the Criterion.

For example, Cell D14 = @QSUM("@X>50",A4..A19,1) = 197. AS-EASY-AS searched the specified Range (A4..A19) and found all cells that meet the criteria of Age being greater than 50 years, i.e., A11. Then, it moved Offset (1) row to the right, compared all cells corresponding to those found in the criterion range, i.e., B11 and returned the sum of the values in those cells.

@QVAR Returns the variance of the cells in Range which match the criterion.

Syntax: @QVAR("@X=Criterion",Range,Offset)

Searches Range for all cells that match the specified criterion and returns the variance of the values of those in Offset columns to the right (or left for negative offsets) that correspond to the cells in the Range matching the Criterion.

For example, cell D17 = @QVAR("@X>45",A4..A19,2) = 1.2. AS-EASY-AS searched the specified Range (A4..A19) and found all cells that meet the criteria of Age being greater than 45 years, i.e., A8, A11, and A13. Then, it moved offset (1) row to the right, compared all cells corresponding to those found in the criterion range, i.e., B8, B11 and B13, and returned the variance of the values in those cells.

6.7 SPECIAL FUNCTIONS

@AUTO Checks the status of the recalculation mode. Returns (1) if the recalculation mode is set to automatic, or (0) if the recalculation is set to manual.

Syntax: @AUTO (no arguments)

@CASE Returns the Numth argument from the argument list.

Syntax: @CASE(Num,Arg2,...Argn)

Num: Any number or calculated value where Num > 0

Arg1...ArgN: Any number, string, character

Examples: @CASE(2,"A",17,"ABC",4) = 17

@CASE(3,"Abc"&"d",129/4,@LEFT("Example",5),123) = Examp
 .)))O)))-.))O-.)))))O)))O)))O)))O-
 * * * *
 * * * *
 First * Third *
 Argument * Argument *
 Second * Fourth *
 Argument * Argument

@COUNTA Returns the number of non-blank cells in range.

Syntax: @COUNTA(range)

range: Cell range which is to be evaluated

Returns the number of cells in range that contain a value, a string, or a formula, i.e., that are not blank. This is different from the @COUNT function which ignores cells containing text.

Example: If cell range A1..A5 contains "3", "4", "Test", "+A1+A2", "Sample"
 @COUNT(a1..a5) = 3
 @COUNTA(a1..a5) = 5

@COLS Returns the number of columns in the specified range.

Syntax: @COLS(Range)

Range: Any cell Range

Examples: @COLS(A1..E121) = 5
 @COLS(AA11..BB32) = 28
 @COLS(TEST) = 6, where TEST = named range of (C5..H21)

@DEC Returns the decimal value of a hexadecimal string.

Syntax: @DEC(String)

String = Any text string up to 8 characters long

The string is limited to the hexadecimal values 0000-FFFF. If String is longer than 4 characters, then the four rightmost characters are used for the conversion. If String is longer than 8 characters, ERR is returned).

Examples: @DEC("12") = 18
 @DEC("0012") = 18
 @DEC("23AB001A") = 5.98E+08
 @DEC("AB1232GA1202") = ERR

@DET Returns the determinant value of the square matrix contained in range.

Syntax: @DET(range)

range: Cell range containing the square (number of rows = number of columns) matrix to be evaluated

Example: If the range A1 to C3 contains the values shown below:

5	3	4
4	6	1
7	2	9

then, @DET(A1..C3) = 37

@DMS Returns a string in terms of Degrees:Minutes:Seconds of x.

Syntax: @DMS(x)

x: Value to be evaluated

Example: @DMS(1.1) = 1:06:00
 @DMS(2.033333) = 2:01:59

@DOSVER Returns a value representing the DOS version running on your system.

Syntax: @DOSVER (no arguments)

@ERF Calculates the value of the Error Function for x.

Syntax: @ERF(x)

x: Cell value to be evaluated where $0 \leq X \leq 1$

Examples: @ERF(0.01) = 0.011283416
 @ERF(0.3) = 0.328626759
 @ERF(0.9) = 0.796908208

@FILEINFO Returns information about a file.

Syntax: @FILEINFO(String,Mode)

String = File name specifications

Mode = Type of Information Required

Returns information about the specified file. String can be any valid DOS file specification (it can include Drive/ directory information, etc.) Mode, is an integer 1-3, as shown below:

Mode = 1 - File Size (bytes)

Mode = 2 - File existence. Returns one of the following values:

0 - File does not exist

1 - File exists

Mode = 3 - File Attribute. Returns one of the following values:

1 - Read Only (\$01)

2 - Hidden (\$02)

4 - System File (\$04)

8 - Disk Label (\$08)

16 - Directory (\$10)

32 - Archive (\$20)

@HEX Returns the hexadecimal equivalent of a value as a string.

Syntax: @HEX(Value)

Value = Any numeric value x where $-65,535 \leq x \leq 65,535$

Returns the hexadecimal representation of Value as a string. Note that value is rounded and only integer hex numbers are returned. Negative values are returned as hex compliments of 2. Hex values returned are preceded by the dollar sign.

Examples: @HEX(12) = \$000C
 @HEX(1125) = \$0465
 @HEX(-2) = \$FFFE

@HTABLE Perform a lookup in a horizontal table and return value or string.

Syntax: @HTABLE(Criterion,Range,Offset)

- Criterion: Value or string to be used for match in top row of range
- Range: Cell range which contains criterion range as top row and includes data value table
- Offset: Number of rows down in data value table from which to return a value or string

Returns the value or string at a vertical offset in the column that matches the criterion.

The search starts at the upper left cell and proceeds until a value or string is found which is greater than the criterion. The position of the previous value or string which did not exceed the criterion is then used as a starting offset into the table.

The offset is added to the top row and the value or string at the offset position is returned by the function.

Several examples of @HTABLE are shown in Figure 6-2.

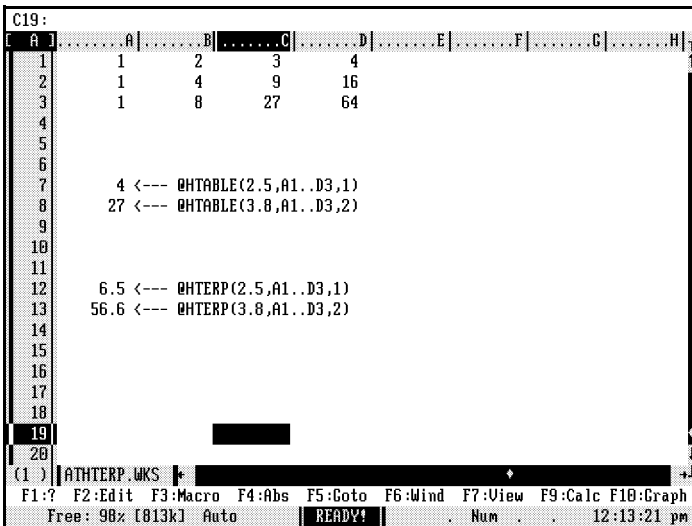


Figure 6-2 Examples of @HTABLE and @HTERP Functions

@HTERP Perform a lookup in a horizontal table and return an interpolated result.

Syntax: @HTERP(Cell,Range,Offset)

Perform a straight-line interpolation based on table specified by Range. It operates similar to @HTABLE function, but returns a result based on the following:

$$Y_v = \frac{(X_v - X_i)}{(X_{i+1} - X_i)} \times (Y_{i+1} - Y_i) + Y_i$$

Where X is the first row and Y is the offset row in the table.

An example of @HTERP is also shown in Figure 6-2.

@INDEX Return the value or string from a table specified by an index.

Syntax: @INDEX(Range,Col,Row)

Range: Any cell Range

Col: Numeric value or value formula where $0 < \text{Col} \# 255$

Row: Numeric value or value formula where $0 < \text{Row} \# 8,192$

Searches the specified range and returns the element located Col columns to the right and Row rows down from the top left corner of the range. Element may be a string or a value.

Example:

1	.....	A/	.....	B/	.....	C/
2		22		RR		HH
3		A		1		2
4		21		23		9
		b		F		3

@INDEX(A1..C4,2,2) = 1

@INDEX(A1..C4,3,1) = HH

@INDEX(A1..C4,1,3) = 21

@INTG Evaluates the integral of the function defined in terms of @x evaluated with limits X0 and X1. Uses an accelerated Romberg integration technique.

Syntax: @INTG("@x...",X0,X1)
@x...: Function to be evaluated
X0: Start value of @x
X1: End value of @x

The function to be evaluated can not contain any user-defined functions. If the argument @x is not enclosed in quotes, it is assumed the function is a constant.

Examples: @INTG("@x",0,1) = 0.5
@INTG("@EXP(@x)",-1,1) = 2.3504024
@INTG("@SIN(@x^2)",0,@PI/4) = 0.1571547

@IORESULT Returns a value indicating the status of the last file I/O operation.

Syntax: @IORESULT (no arguments)

If 0 is returned, then the last file I/O operation worked as expected. If any other value is returned, then an error occurred during the last file I/O operation. Please, note that this boolean function is reset to 0 when it is used. Some of the error codes that may be returned are:

- | | |
|--------------------|-------------------------|
| 2 - File Not Found | 4 - Too many files open |
| 3 - Path not found | 5 - File Access denied |

@LINK Links cells in worksheets on disk to the current worksheet.

Syntax: @LINK("Drive:\Path\Filename>Cell")

NOTES: 1. Double quotes and the ">" character are necessary.

As the name indicates, it links cells in worksheets on disk to cells in the current worksheet. Once this function is entered, a link is created but it is not updated. As a result, as soon as this function is entered, the cell frequently displays "N/A". Do not panic, a newly created link is not updated until the /File, Uplink command is executed. At that time, any value or string variable in the referenced cell of the indicated worksheet on disk is retrieved and placed in the calling cell.

Updating occurs automatically when the spreadsheet is first retrieved.

If a path is not specified with the file name, AS-EASY-AS will search the default path, i.e. the path specified by the /DIR= command line switch (or the File, Dir command).

Example:

Worksheets on disk are LINK1.WKS and LINK2.WKS as shown in Figures 6-3 and 6-4. The current worksheet is shown in Figure 6-5.

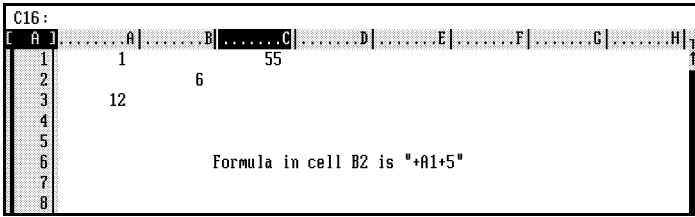


Figure 6-3 Worksheet on Disk, LINK1.WKS

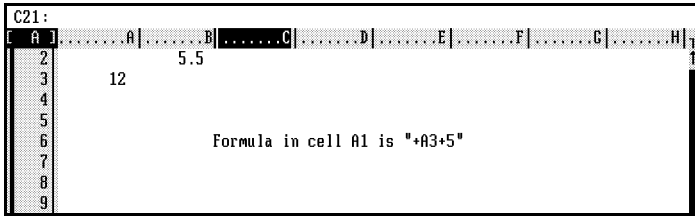


Figure 6-4 Worksheet on Disk, LINK2.WKS

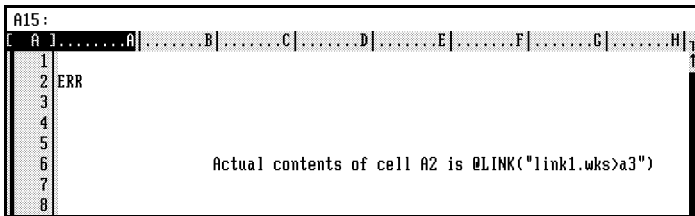


Figure 6-5 Current Worksheet

If the /fu[ENTER] command is executed, the resulting worksheet will look as shown in Figure 6-6.

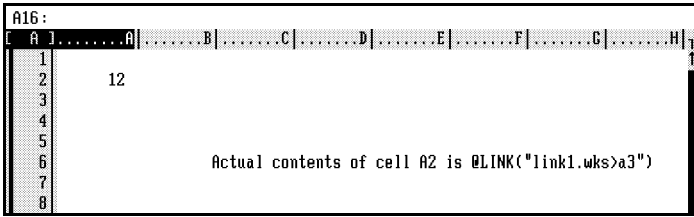


Figure 6-6 New Worksheet After /File Uplink

In a second example, the current worksheet is shown in Figure 6-7.

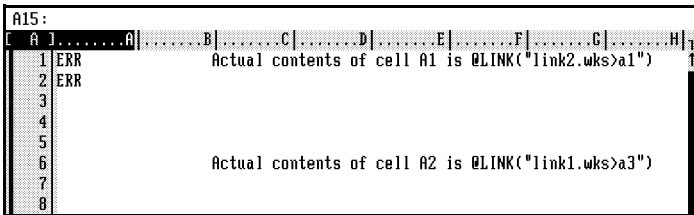


Figure 6-7 Current Worksheet

If the /fu[ENTER] command is executed, the new worksheet will now look as shown in Figure 6-8.

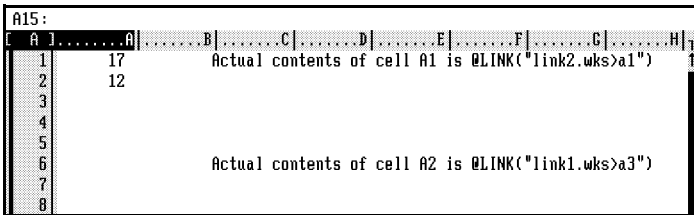


Figure 6-8 New Worksheet After /File Uplink

NOTE: The last value saved in the referenced cell from the file on disk will be used, i.e., **no recalculation will take place prior to extracting the value from the referenced cell.**

@MEMAVAIL Returns the amount of memory available.

Syntax: @MEMAVAIL(X)

X: Value representing type of memory to report, 0, 1 or 2.

0 - Total Memory

1 - Conventional Memory

2 - EMS/VMS Memory

Returns the amount of total, conventional, and EMS/VMS memory, in bytes, available at the time of call.

Examples: @MEMAVAIL(0) = 864315

@MEMAVAIL(1) = 205088

@MEMAVAIL(2) = 659227

@PATH Returns the current data path.

Syntax: @PATH (no arguments)

Returns the current data path, i.e., the current drive and directory where AS-EASY-AS expects worksheet files to be located, or will save worksheet files.

Example: @PATH = C:\ASEASY57\FILES\

@PROTECT Returns the status of global protection.

Syntax: @PROTECT (no arguments)

Checks the status of Global cell protection. Returns 1 if Global protection is ON, 0 if it is OFF.

@QVIEW Returns the status of worksheet views.

Syntax: @QVIEW(N)

N: Integer indicating type of view to report

0 = Number of open views

1 = Number of active view

Returns a numeric value (1-6) that indicates either the total number of views open (if N=0), or the number of the current active view (if N=1).

Example: @QVIEW(0) = 1 (when you first start AS-EASY-AS)

@RANK Returns the rank of a matrix.

Syntax: @RANK(Range)

Range: Cell range which contains matrix to be evaluated

If a matrix AA can be formed by selection of r rows and columns of A such that $AA^*x > 0$ or $AA^t * x > 0$ for every $x > 0$, and if the addition of an $(r+1)$ th row and column produces a singular matrix, then r is called the rank of matrix A .

For example, consider matrix $[A]$ below:

$$[A] = \begin{array}{ccc} 2 & 4 & 5 \\ 1 & 3 & 7 \\ 3 & 7 & 12 \end{array}$$

In this example, the coefficients in row 3 are not independent, the coefficients of row 1 plus the coefficients of row 2 equal the coefficients of the third row. That is, $2 + 1 = 3$, $4 + 3 = 7$, and $5 + 7 = 12$. Therefore, the rank r of matrix $[A]$ is 2. If the coefficients of the third row had been dependant, the rank r of $[A]$ would have been 2.

@RECUR Evaluates the recursive function.

Syntax: @RECUR("@X...",Seed,Diff)

"@x...": Recursive function to be evaluated

Seed: First guess value of @x

Diff: Difference value at which to stop

Evaluates the recursive function represented in terms of @X using Seed as the first guess and recursing until the difference between two successive recursions is equal to or less than Diff.

For example, let's consider modeling the Newton-Raphson method for calculating the square root of a number, by successively calculating better estimates of such using the equation:

$$X_{n+1} = X_n + \frac{X_n^2 - V}{2X_n}$$

where $X[n]$ = n -th estimate of the square root and V is the number whose square root we are trying to calculate.

If the number is stored in cell A6, and A6/2 is a good first guess as to the square root, and a difference of 0.001 between two successive recursions is acceptable, then the function:

@RECUR("@x-(@x*(@x-A6)/(2*@x)",A6/2,0.001) will return the square root of the number in cell A6.

Applying the same model to calculate the cube root of a function, we have the equation:

$$X_{n+1} = X_n + \frac{X_n^3 - V}{3X_n^2}$$

Again, if the number is stored in cell A6, and a difference of 0.001 between two successive recursions is acceptable, then the function:

`@RECUR("@x-(@x*@x*@x-A6)/(3*@x*@x)",A6/2,0.001)` will return the cubic root of the number in cell A6.

NOTE: The Newton-Raphson method requires the user to provide a reasonably close estimate of a solution and may, in some situations, diverge and not produce a solution.

@ROWS Returns the number of rows in the specified range.

Syntax: `@ROWS(Range)`

Range: Any cell Range.

Examples: `@ROWS(A1..E121) = 121`

`@ROWS(AA11..BB132) = 122`

`@ROWS(TEST) = 17` where TEST = named range of (C5..H21)

@TRACE Returns the trace of a matrix.

Syntax: `@TRACE(Range)`

Range: Cell range which contains matrix to be evaluated

Returns the trace of the matrix contained in range. The trace of a matrix is the sum of all elements along the main diagonal.

For example, if cells A1..C3 contain the values shown below:

5	2	12
4	1	4
6	8	9

Then, `@TRACE(A1..C3) = 15`, i.e., $5 + 1 + 9 = 15$

@USER Define a personalized function.

Syntax: @USER(Arg1,Arg2,Arg3)

USER: User provided name of function (any unique name)

Arg1,Arg2,Arg3: User provided arguments

This is a special function, defined by the user, which can have up to three alphanumeric arguments. The user specifies the formula which relates the arguments and creates a unique range name which includes the cells containing the formula and the arguments. The function may then be used in the worksheet just as any other internal @ function.

To set up the function, perform the following steps:

1. Place up to three alphanumeric arguments, Arg1, Arg2, Arg3, in a single row in adjacent columns.
2. Place the formula which relates the arguments in the cell immediately below Arg1, the leftmost argument.
3. Give a unique range name to the block which includes the arguments and the formula. This range name will become the function name.
4. Use the newly defined function.

Two examples of user-defined functions are shown in Figure 6-9.

Row	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H
1		1	3	4.5				
2		1.5				201		NJ
3						202		WASH DC
4		A2 contains the formula (A1/B1)*C1				203		CT
5		Range name MINE is A1..C2				204		MANITOBA
6						205		AL
7		1.5				206		WA
8						207		ME
9		Cell A7 contains @MINE(1,3,4.5)				208		ID
10						209		CA
11						212		NY
12		204				213		CA
13		MANITOBA				214		TX
14						215		PA
15		Cell A13 contains @UTABLE(A12,F2..C131,1)				216		OH
16		Range name AREA is A12..A13				217		IL
17						218		MN
18		MANITOBA <-- Cell A18 Contains @AREA(204)				219		IN
19						301		MD
20						302		MD

Figure 6-9 Example of @USER Function

@VERSION Returns the version of AS-EASY-AS running on your system.

Syntax: @VERSION (no arguments)

@VTABLE Perform a lookup in a vertical table and return value or string.

Syntax: @VTABLE(Criterion,Range,Offset)

Criterion: Value or string used for match in left column of range
 Range: Cell range which contains criterion range as left column and includes data value table

Offset: Number of columns to the right in data value table from which to return a value. The first criterion column in the range has an offset value of zero.

Returns value or string at horizontal offset in the row that matches the criterion.

In a VTABLE operation, the search starts at the upper left cell of the data table and proceeds downwards row by row until a value or string is found which is greater than the criterion. The position of the previous value which did not exceed the criterion is then considered a match. The offset is added to the left column and the value or string at the offset position is returned by the function.

NOTE: Table values outside the search region cause an error result.

An example of @VTABLE is shown in Figure 6-10.

A	B	C	D	E	F	G	H
1	1	2	3	4			
2	2	4	9	16			
3	3	9	27	64			
4	4	16	64	256			
5							
6							
7			4 <---	@VTABLE(2.5,A1..D4,1)			
8			27 <---	@VTABLE(3.8,A1..D4,2)			
9							
10							
11							
12			6.5 <---	@VTERP(2.5,A1..D4,1)			
13			56.6 <---	@VTERP(3.8,A1..D3,2)			
14							
15							
16							
17							
18							
19							
20							

(1) | @VTERP.WKS |
 F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F18:Graph
 Free: 98% [812k] Auto | READY! | Num . . . 2:09:11 pm

Figure 6-10 Examples of @VTABLE and @VTERP Functions

@VTERP Perform a lookup in a vertical table and return an interpolated result.

Syntax: @VTERP(Cell,Range,Offset)

Similar to @HTERP, but scans vertically (row by row). See @HTERP of an explanation of the function.

An example of @VTERP is shown in Figure 6-10.

@XYTERP Performs a double interpolation in Range and returns the function value at x,y.

Syntax: @XYTERP(x,y,Range)
x: Function to be evaluated
y: Start value of @x
range: Search cell range

For example, given the data range presented below:

[A ]	.....	A*	.....	B*	.....	C*	.....	D*	.....	E*	.....
'	1*			1		2		3		4	
'	2*	2		2.00		5.00		26.00		677.00	
'	3*	4		1.50		3.25		11.56		134.69	
'	4*	6		1.67		3.78		15.27		234.22	
'	5*	8		1.60		3.56		13.67		187.97	

@XYTERP(7,3.5,A1..E5) = 112.7825
 @XYTERP(5,2.6,A1..E5) = 9.455

6.8 DATE AND TIME FUNCTIONS

Date functions are based on the number of days elapsed since January 1, 1900. As such, they return a value. Positive values represent days after 1900, negative values represent days before 1900. In order to display the value in a typical date form, such as 12/31/1997 or 31-Dec-1997, the cell(s) containing the date value must be formatted with one of the date formats (see Section 10.2, Range Format Date).

In all date functions, if the year is given as 2 digits, e.g., 97, the year is taken to be during the 1900s, i.e., the prefix 19 is assumed. In this case, the year would be treated as though it had been entered as 1997. For all other centuries, the 4 digit year must be specified. To prevent ambiguity, it is recommended that 4 digit years be used as common practice.

NOTE: Dates are normally entered using the @DATE or @DATEVAL functions. However, AS-EASY-AS provides a shortcut. If a cell is preformatted as Date 4, i.e., /Range Format Date 4 MM/DD/YY, you may enter the date directly into the cell, and AS-EASY-AS will convert the date to its value. For example, if you type 12/1/1996 into a formatted (Date 4) cell, the cell will display 12/01/1996. If the cell is edited, the value 35400 will be displayed.

Time functions are based on fractions of a day. For example, if 1:30 (1 hour and 30 minutes) is to be entered in a time function, the value 1.5/24 (24 hours/day) or .0625 must be used. Likewise, time functions return values representing fractions of a day. In order for a cell containing a time value to be displayed as time (in hours:minutes:seconds), the cell must be formatted with one of the time formats (see Section 10.2, Range Format Date H:M:S or H:M).

Time values are calculated using the following formula:

$$\text{Hour} + \text{Min}/60 + \text{Second}/3600$$

))))))))))))))))))
24

@DATE Returns date value (integer) corresponding to date.

Syntax: @DATE(Year,Month,Day)

Year: Value corresponding to year, 2 or 4 digits.

Month: Value corresponding to month of year, 1-12

Day: Value corresponding to day of month, 1-31

Returns a unique integer for each day since January 1, 1900. Negative values indicate dates prior to January 1, 1900.

Example: @DATE(96,12,1) returns an integer of 35400. If the cell is formatted as Date MM/DD/YY, then the date 12/01/1996 is displayed.

@DATEVAL Returns date value corresponding to date string.

Syntax: @DATEVAL("MM/DD/YY")
MM: Value corresponding to month of year, 1-12
DD: Value corresponding to day of month, 1-31
YY: Value corresponding to year, 2 or 4 digits.

Convert the string argument to a date number representing the month(MM):day(DD):year(YY). Spaces, colons, semicolons, and other non-numeric characters are acceptable delimiters.

Examples: @DATEVAL("12/1/96") = 35400 (Unformatted cell)
@DATEVAL("12/1/96") = 12/01/96 (Formatted cell)
@DATEVAL("12/1/2006") = 39052 (Unformatted cell)
@DATEVAL("1"&"/6"&"/97") = 01/06/97 (Formatted cell)
@DATEVAL(A6) = 01/06/1997 (Formatted cell where cell A6 contains the string "1/6/97")

@DAY Returns the day of the month corresponding to a date value.

Syntax: @DAY(x)
x: number of days since Jan. 1, 1900.

Based on a unique day assigned to "x", computes the day in the month of that date.

Example: @DAY(35400) returns the number 1
(The date number is equivalent to December 1, 1996)

@HOUR Returns hours corresponding to a time value.

Syntax: @HOUR(Value)
Value: value in fractional days

Returns the hours corresponding to the fractional portion of Value. The integer portion of Value (representing days) is ignored.

Examples: @HOUR(0.5) = 12
@HOUR(3/4) = 18
@HOUR(0.25) = 6
@HOUR(9.25) = 6

@MINUTE Returns minutes corresponding to a time value.

Syntax: @MINUTE(Value)
Value: value in fractional days

Returns the minutes corresponding to the fractional portion of Value. The integer portion of Value (representing days) is ignored.

Examples: @MINUTE(0.51) = 14
@MINUTE(0.33) = 55
@MINUTE(3.33) = 55

@MONTH Returns month corresponding to a date value.

Syntax: @MONTH(x)
x: number of days between January 1, 1900 and date of interest.

Based on a unique day assigned to "x", computes the month in which that day occurs.

Example: @MONTH(35735) returns the number 11.
(The date number is equivalent to November 1, 1997)

@SECOND Returns seconds corresponding to a time value.

Syntax: @SECOND(Value)
Value: value in fractional days

Returns the seconds corresponding to the fractional portion of Value. The integer portion of Value (representing days) is ignored.

Examples: @SECOND(0.511) = 50
@SECOND(0.541) = 2
@SECOND(9.541) = 2

@TIME Returns time value (fraction of a day) corresponding to a time.

Syntax: @TIME(Hr,Min,Sec)
Hr: value in hours
Min: value in minutes
Sec: value in seconds

Returns a fractional time serial number represented by Hr:Min:Sec.

Examples: @time(6,4,30) = 0.253125 (unformatted)
@time(6,4,30) = 6:04:30am (formatted as Hr:Min:Sec)
@time(0,0,540) = 0:09:00am (formatted as Hr:Min:Sec)

@TIMEVAL Returns time value corresponding to a time string.

Syntax: @TIMEVAL("HH:MM:SS")

HH: Value representing hours

MM: Value representing minutes

SS: Value representing seconds

@TIMEVAL converts the string argument to a real number representing the hour(s):minute(s):second(s) as a fraction of a day.

Examples: @TIMEVAL("1:2:3") = 0.04309027 (Unformatted cell)

@TIMEVAL("1:2:3") = 1:02 (Cell formatted for time)

@TIMEVAL("1:2:120") = 1:04 (Cell formatted for time)

@TIMEVAL("1:70:120") = 2:12 (Cell formatted for time)

@TIMEVAL("6:4:30") = 6:04:30am (cell formatted as Hr:Min:Sec)

@TIMEVAL("25:2:120") = 1:04 (Cell formatted for time)

@TODAY Returns value corresponding to system date and time.

Syntax: @TODAY (no argument)

Returns the unique number corresponding to today's date and time referenced to January 1, 1900.

@TODAY returns the number 35400 if today is December 1, 1996. If the cell were formatted as Date D-M-Y, then the date 1-Dec-1996 is displayed. If the cell were formatted as Date 6 (H:M:S), then the time associated with the fractional part of the date is displayed.

If @TODAY does not return the correct date and time when the [F9] function key is pressed, it is likely that your system's date and time are not correctly set.

NOTE: @TODAY is NOT automatically updated when a spreadsheet is retrieved, even if the recalculation mode is set for automatic. You must recalc the spreadsheet by manually pressing the [F9] function key or by macro command in order for the function to update.

@YEAR Returns year corresponding to a date value.

Syntax: @YEAR(x)

x: value representing number of days between January 1, 1900 and date of interest.

Based on a day assigned to "x", computes the year in which that day occurs.

Examples: @YEAR(35490) returns the number 97 (35490 = March 1, 1997).

@YEAR(39142) returns the number 2007 (39142 = March 1, 2007).

7. DATA MANAGEMENT

In addition to the typical spreadsheet format, AS-EASY-AS includes powerful DATA commands which enhance your ability to create sophisticated data management applications, what-if tables, etc.

7.1 DATA FILL

The Data-Fill command allows you to fill a range with an arithmetic sequence of equally spaced values. For example, assume that you want to fill a range of cells with real values that range from 3 to 43 in increments of two.

Move the cursor to the beginning of the range. Invoke the Data-Fill command (/df), enter range to fill, the starting value (in this case 3), and the increment value (2). Voila!

7.2 DATA TABLE

DATA TABLE - 1 INPUT

The Data Table-1 Input command permits you to do "what-if" analysis by generating a table based on substituted values in an input cell.

This command takes the input value from the first column, places the value in the model, calculates a result, extracts that value and places it in the table to the right of the input value. The process is continued until the bottom of the table range is reached.

For example, suppose that you want to borrow \$1 million to start a new business. Since you could borrow money from a number of different institutions with different interest rates, you want to compare your monthly payments for different interest rates. The payback period is 10 years.

To generate the comparison table, follow these steps:

- Enter the amount you want to borrow in cell B1
- Enter the starting interest rate in cell B2
- Enter the term of the loan (years) in cell B3

7-2 DATA MANAGEMENT

Create the following range names (using the /Range, Name, Create command, see Section 10) to help you identify the various inputs:

Cell B1 - PRINCIPAL
Cell B2 - INTEREST
Cell B3 - TERM

Enter the following payment equation in cell B4:

`@PMT(PRINCIPAL,INTEREST/12,TERM*12)`

NOTE: INTEREST/12 and TERM*12 are used to obtain payments on a monthly basis.

Create a column of interest rates in this example ranging from 9% to 10.1% in cells A8 to A19 (perhaps using the /Data Fill command!).

Tell the program which value to extract and place in the table by entering a reference to the payment formula (cell B4) in cell B7 (+B4).

Now you are ready to generate the desired table using the following commands:

/dt1 - Data, Table, 1-input
A7..B19 - The table range (it includes the input values that you want to vary and the locations that you want the calculated result to be placed in).
[ENTER]
B2 - The input cell. This is the value that will change with each new interest rate, and is the value that we want to extract.

The output should now look like the one in Figure 7-1.

NOTE: Multiple extractions are allowed providing each output column has a cell reference at the top.

A7 [W14]:			
A	B	C	D
1	Loan Amt.	\$1,000,000.00	PRINCIPAL B1
2	Interest	0.10	INTEREST B2
3	Loan Term	10	TERM B3
4	Payment	\$13,215.07	<---- @PMT(PRINCIPAL, INTEREST/12, TERM*12)
5			
6	Interest	Payment	
7		\$13,215.07	<---- This cell refers to the result of the calculation that we want to extract and place in the table. Its contents is +B4
8	9.00%	\$12,667.50	
9	9.10%	\$12,721.76	
10	9.20%	\$12,776.07	
11	9.30%	\$12,830.51	
12	9.40%	\$12,885.07	
13	9.50%	\$12,939.76	
14	9.60%	\$12,994.57	
15	9.70%	\$13,049.51	
16	9.80%	\$13,104.57	
17	9.90%	\$13,159.76	
18	10.00%	\$13,215.07	
19	10.10%	\$13,270.51	
20			

(1) | DATA-T1.WKS | F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph
U55 | Free 90% [806k] Auto | READY! | 6:12:40 pm

Figure 7-1 Interest Rate Table Generated by Data Table Command

DATA TABLE - 2 INPUTS

Now, let's say that you want to generate a comparison table varying both the interest and the term of the loan.

Leave the column containing the interest rates (A8..A19) unchanged. Place the different terms (number of years) that you desire in row 7 (one entry in each column). Place 10 in cell B7, 20 in cell C7 and 30 in cell D7. Enter the formula +B4 in cell A7 (this tells the program what cell you want to extract values from).

Now enter the following keystrokes:

- /dt2 - Data, Table, 2-inputs
- A7..D19 [ENTER] - Table range
- B2 [ENTER] - First input (Interest rate will vary)
- B3 [ENTER] - Second input (Term will vary)

The resulting screen should look like Figure 7-2.

E7 [F8]:

	A	B	C	D	E
1	Loan Amt.	\$1,000,000.00	PRINCIPAL	B1	
2	Interest	8.10	INTEREST	B2	
3	Loan Term	10	TERM	B3	
4	Payment	\$13,215.07	← @PMT(PRINCIPAL, INTEREST/12, TERM*12)		
5					
6	Interest	Payment			
7	\$13,215.07	10	20	30	
8	9.00%	\$12,667.50	\$8,997.26	\$8,046.23	
9	9.10%	\$12,721.76	\$9,061.67	\$8,118.28	
10	9.20%	\$12,776.07	\$9,126.29	\$8,190.55	
11	9.30%	\$12,830.51	\$9,191.10	\$8,263.01	
12	9.40%	\$12,885.07	\$9,256.11	\$8,335.68	
13	9.50%	\$12,939.76	\$9,321.31	\$8,408.54	
14	9.60%	\$12,994.57	\$9,386.71	\$8,481.60	
15	9.70%	\$13,049.51	\$9,452.30	\$8,554.85	
16	9.80%	\$13,104.57	\$9,518.00	\$8,628.29	
17	9.90%	\$13,159.76	\$9,584.06	\$8,701.91	
18	10.00%	\$13,215.07	\$9,650.22	\$8,775.72	
19	10.10%	\$13,270.51	\$9,716.56	\$8,849.70	
20					

(1) DATA-T2.WKS

F1: ? F2: Edit F3: Macro F4: Abs F5: Goto F6: Wind F7: View F9: Calc F10: Graph

U55 Free 98k [806k] Auto READY! 6:14:29 pm

Figure 7-2 Comparison Table Generated by Data Table 2-Input Command

7.3 DATA SORT

The Data Sort command is used to rearrange the information in a worksheet in alphabetical or numerical order. The sorting process operates on rows. Let's look at the following example.

	A	B	C	D	E	F
1						
2		Last Name	First Name	Grade		
3						
4		Jones	James	87		
5		Martin	John	79		
6		Williams	Daniel	91		
7		Byron	David	93		
8		Cryan	Robert	78		
9		Elliot	Paul	69		
10		Jackson	Michael	92		
11		Harrison	Bryan	96		
12		Cassidy	Edward	77		
13		Baily	Richard	83		
14		Mason	Joseph	88		
15		Willy	William	68		
16						
17						
18						
19						
20						

Figure 7-3 Unsorted Student Data

Figure 7-3 shows the name and grade of students in a school class. It would be nice to sort this information by the students' last name or by grade.

The following steps will sort the information by the students' last names (only). Two sorting criteria can be specified (i.e. two different columns). This would be very useful in cases where, two students had the same last name or two students had the same grade, i.e. a tie-breaker.

1. /ds - Invoke the Data, Sort menu
2. d - Select the Data-range command
3. B4..D15 [ENTER] - Specify the range to be sorted
4. p - Select the Primary sort key command
5. B4 [ENTER] - Specify the Primary sort key. Any cell in column B would select Last Name as the primary sort key.
6. a [ENTER] - Accept the default, ascending order. Typing d [ENTER] would select descending order.

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7. s - Select the Secondary sort key (column) command
8. D4 [ENTER] - Select Secondary sort key. Any cell in column D would select Grade as the secondary sort key.
9. a [ENTER] - Accept the default, ascending order. Typing d [ENTER] would select descending order.
10. g - Select Go to perform the sort.

The information will be sorted and your screen should look like Figure 7-4.

	A	B	C	D	E	F
1						
2		Last Name	First Name	Grade		
3		-----	-----	-----		
4		Baily	Richard	83		
5		Byron	David	93		
6		Cassidy	Edward	77		
7		Cryan	Robert	78		
8		Elliot	Paul	69		
9		Harrison	Bryan	96		
10		Jackson	Michael	92		
11		Jones	James	87		
12		Martin	John	79		
13		Mason	Joseph	88		
14		Williams	Daniel	91		
15		Willy	William	68		
16						
17						
18						
19						
20						

(1) | DATASRT2.MKS |
F1: ? F2: Edit F3: Macro F4: Abs F5: Goto F6: Wind F7: View F9: Calc F10: Graph
U55 | Free 98% [886k] Auto | READY! | . Num | . . 8:58:57 am

Figure 7-4 Data Sorted By Last Name

To sort on any other field (column), simply type in a new primary/ secondary column.

Third and Fourth Sorting Keys allow the user to specify third and fourth columns that may be used as additional, tie-breaker sort keys. During prolonged sort operations, a rotating status indicator appears in the upper left hand corner of the display.

7.4 DATA BIN

The Data Bin command creates a frequency distribution table displaying the count of values in a range that falls within given ranges, bins, as well as the frequency of values within that range. The bins are a block of values, in ascending order, placed anywhere in the worksheet.

The requirements for setting up the bins are:

1. The bin values are contained in a single column block, and
2. There are two blank columns directly to the right of the bin range. (This is the area that will be filled by the /db command).

Once this command is invoked, the user is prompted to supply the "Analysis" range and the "Bin" range.

ANALYSIS range, as the name indicates, is the range containing the values that the user needs to perform the frequency distribution on. The range may contain any positive or negative value or formula.

BIN range is the column containing the bin (group) values, with two blank columns to the right.

The first value in the ANALYSIS range is compared with the first value in the BIN range. ANALYSIS values which are less than the first BIN value are assigned to the first bin. ANALYSIS values which are equal to or greater than the first BIN value but less than the second BIN value are placed in the second BIN, and so on. ANALYSIS values which are greater than the last BIN value are assigned to a separate BIN. This is graphically displayed in Figure 7-5.

The command line switch, /NW, may be used to change the boundary values. When /NW is used, ANALYSIS values less than **or equal to** the first BIN value are assigned to the first bin. ANALYSIS values greater than the first BIN value but less than **or equal to** the second BIN value are placed in the second BIN, and so on. ANALYSIS values greater than **or equal to** the last BIN value are assigned to a separate BIN.

D15 [W10]:

Analysis Range	Bin Range	Output Number	Output Fraction
47.93	1	0	0.00 <- Value < 1
86.30	5	2	0.17 <- 1 <= Value < 5
11.30	8	0	0.00 <- 5 <= Value < 8
1.00	20	1	0.00 <- 8 <= Value < 20
74.62	22	0	0.00 <- 20 <= Value < 22
22.00	50	6	0.50 <- 22 <= Value < 50
40.00		3	0.25 <- 50 <= Value
34.23			
58.75			
2.35			
48.92			
24.83			

(1) | DATA-BIN.WKS |

F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph
 U55 | Free 98k [006k] Auto | READY! | 6:18:22 pm

Figure 7-5 Example of Data Bin

The effect of the /NW command line switch on the bin boundary values can be seen in Figure 7-6 as compared to Figure 7-5.

D17 [W10]:

Analysis Range	Bin Range	Output Number	Output Fraction
47.93	1	1	0.00 <- Value <= 1
86.30	5	1	0.00 <- 1 < Value <= 5
11.30	8	0	0.00 <- 5 < Value <= 8
1.00	20	1	0.00 <- 8 < Value <= 20
74.62	22	1	0.00 <- 20 < Value <= 22
22.00	50	5	0.42 <- 22 < Value <= 50
40.00		3	0.25 <- 50 < Value
34.23			
58.75			
2.35			
48.92			
24.83			

Bin Results When AS-EASY-AS is
 Started with /NW Command Line Switch

(1) | DATABNW.WKS |

F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph
 U55 | Free 98k [006k] Auto | READY! | Num | 10:18:58 am

Figure 7-6 Data Bin with /NW Switch

7.5 DATA GOAL SEEK

The Data Goalseek command allows you to search for the input that would result in a desired output from a model. Specify the INPUT cell, the OUTPUT cell and the DESIRED goal and AS-EASY-AS modifies the input cell by using a NEWTON-RAPHSON convergence technique until the specified output is reached.

If the desired result has not been reached by 25 iterations, the process stops, and the value plus @ERR is placed in the input cell. If this happens try choosing an input closer to the desired input.

When prompted for the desired goal, AS-EASY-AS requires you specify the tolerance limit. You should be aware that the more restrictive (smaller) the tolerance is, the longer it will take the program to converge to the correct answer.

For example try the following situation:

You want to borrow \$100,000 for 30 years, and you don't want your monthly payments to exceed \$1,028.61. You want to determine the loan interest rate which would meet the above restrictions.

The steps required to solve this problem are presented below:

- a. Enter the Loan amount in cell A1 --> 100000
- b. Enter a reference interest rate in cell A2 (i.e. if you start with an annual interest of 18%, enter 0.18)
- c. Enter the term of the loan ($30 * 12 = 360$ months) in cell A3.
- d. Enter the Payment equation in cell A4 - @PMT(A1,A2/12,A3)
- e. Invoke the DATA, GOALSEEK command
- f. Specify cell A2 as the INPUT cell
- g. Specify cell A4 as the OUTPUT cell
- h. Specify 1028.61 as the DESIRE
- i. Specify a tolerance of 0.001

Figure 7-7 displays the results generated by the Goalseek command.

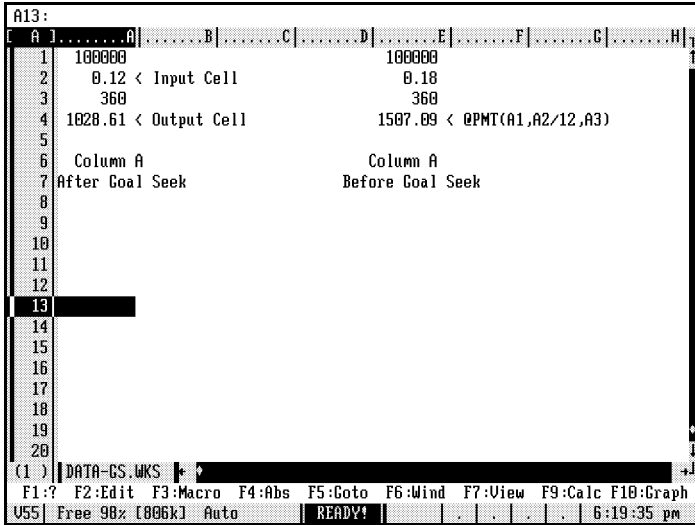


Figure 7-7 Example of Data Goal Seek

Cell A4 will display the amount you specified as the desired monthly payment (if solution convergence occurred), and cell A2 will display the interest rate required for the loan to meet your restrictions, 0.12 (or 12%).

7.6 DATA REGRESSION

AS-EASY-AS includes a powerful Least Squares Fit Data Regression module. In its most basic implementation, data regression permits the user to find an analytical function that describes the behavior of a set of experimental data. Furthermore, it allows the user to predict values other than those observed in the experiment. The term experiment is used to describe any process that results in measurable observations.

AS-EASY-AS permits single variable and multivariate (up to three variables) regression analyses where each variable can have up to 9 coefficients.

For example, the user-specified regression function can range from the simple:

$$f(x) = a + bX$$

where a and b are coefficients calculated by the data regression process, to the much more complex:

$$f(x,y,z) = a + b1*x + c1*x^2 + d1*x^3 + e1*x^4 + m1*x^5 + n1*\text{SQRT}(x) + p1*\text{LN}(x) + r1*\text{EXP}(x) + b2*y + c2*y^2 + d2*y^3 + e2*y^4 + m2*y^5 + n2*\text{SQRT}(y) + p2*\text{LN}(y) + r2*\text{EXP}(y) + b3*z + c3*z^2 + d3*z^3 + e3*z^4 + m3*z^5 + n3*\text{SQRT}(z) + p3*\text{LN}(z) + r3*\text{EXP}(z)$$

where $a, b1, c1, \dots, n3, p3, r3$ are coefficients calculated by the data regression process. It should be noted that $x, y,$ and z have been used as the variables for clarity. In general, they are referred to as $X1, X2,$ and $X3$.

The available coefficients are:

Constant	X0	Fifth Order	X5
Linear	X1	Square Root	$\text{SQRT}(X)$
Square	X2	Logarithmic	$\text{LN}(X)$
Cubic	X3	Exponential	e^X
Fourth Order	X4		

The user may select which forms of (X) are desired using the /Data, Regression Coefficient command. For example, if the desired function is:

$$Y = a + bX + cX^2$$

then the user would select the Constant (1), the Linear (2), and the Square (3) coefficients from the menu. If, on the other hand, the function is:

$$Y = aX + bX^3 + c\text{SQRT}(X)$$

select Linear (2), Cubic (4), and Square Root (7) coefficients from the menu.

7-12 DATA MANAGEMENT

When invoking the Data, Regression menu for single variable regression you need to specify one column for the X-Data and a corresponding column for the Y-Data. For multivariate analysis, the X-Data should be two (or three) columns, and the Y-Data should be one column.

When the Coefficients submenu is selected, the number of independent variables you can select is based on the number of columns which have been selected for the X-Data. You can enable/disable any of the three independent variables. For single variable regression, only variable 1 can be enabled.

The number of statistical variables calculated by the program varies depending on the selected coefficients. For example, if the default linear regression is selected, additional regression variables such as the intercept, slope, R^2 , Sum x^2 , Sum y^2 , count, σx^2 , σy^2 , regression error, slope error, as well as the formula are calculated by the program.

If the user specifies a data set with constant Y values (a horizontal line), AS-EASY-AS will return a constant as the function definition. If the user specifies a data set with constant X values (a vertical line), AS-EASY-AS will return @ERR as this data would not correspond to a valid $y=f(x)$ functional relationship.

AS-EASY-AS also permits the user to quickly graph the measured results (used for the regression) and the curve corresponding to the calculated function. After you specify the X and Y data ranges, and select the coefficients, simply select View from the /Data, Regression menu.

NOTE: You will be prompted for an output range, even if you've just done the regression. The program needs to re-calculate the coefficients prior to graphing the data.

Consider the simple example shown in Figure 7-8. Enter the data as shown in columns A and B, and follow the sequence of keystrokes presented below:

/dr	Invoke the Data Regress command.
xA4..A9~	The program will prompt for the X (or independent) range. Type A4..A9 and press [ENTER]
yB4..B9~	The program will prompt for the Y (or dependent) range. Type B4..B9 and press [ENTER]
c [1 2]q	The program will prompt for the coefficients. Type 1 or 2, if necessary, to toggle both (1) Constant and (2) Linear ON. Type Q to quit the menu.
oD4~	The program will prompt for the output range. Type D4, then [ENTER].

The Y-Intercept and slope of a straight line going through the data points will then be entered in cells D4 and D5. Additionally, values for R squared, the sum of the X squared values, the sum of the Y squared values, formula, and other parameters are reported as shown in Figure 7-8.

D18:			
A	B	C	D
1			
2	X	Y	
3	----	----	
4	1	12	Intercept -1.8
5	2	34	Slope 16.65714
6	3	42	R^2 0.959691
7	4	76	Sum X^2 91
8	5	82	Sum Y^2 24213
9	6	93	Sum X*Y 1478
10			Count 6
11			σ_x^2 2.916666
12			σ_y^2 843.25
13			RegErr 7.140428
14			SlopeErr 1.706888
15			
16			
17			
18			
19			
20			
(1) DATA-REG.WKS			
F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph			
U55 Free 98% [806k] Auto READY! 6:20:56 pm			

Figure 7-8 Example of Data Regression

It should also be noted that due to the complexity of the calculated formula, AS-EASY-AS will not construct a formula as part of the calculated output if the built formula string is to exceed the maximum number of characters that may be accommodated in a single cell. Instead, a message that the formula is too large will be displayed.

7.7 DATA INPUT

DATA INPUT RANGE

This powerful command is mainly for those who develop applications to be used by other individuals. Once this option is invoked and a range is highlighted, cursor movement is restricted to the cells that were intentionally unprotected by the user using the /Range, Lock, No command.

For example, in the sample worksheet as shown in Figure 7-9, the command sequence:

```
/rlnC2..C4 [ENTER] [Unlock Cells C2, C3, and C4]
/sgpe [Turn On Protection]
/dirA1..D8 [ENTER] [Input Restricted Cells]
```

would turn the global protection on and would only allow the user to move the cursor to cells C2, C3, and C4 (those specifically unprotected by the user).

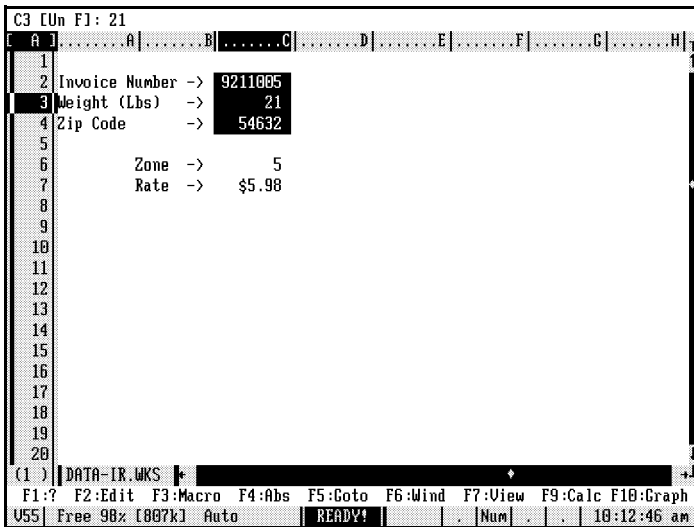


Figure 7-9 Example of Data Input Range

DATA INPUT FORM

This powerful command allows a user to define a form that can be used for entering, editing, or browsing records. Based on formatting information and field characteristics, AS-EASY-AS creates a data input form and locates the database pointer at the first record of the database. The user then has the option of entering a new record, editing existing data, or browsing through the database. AS-EASY-AS automatically formats new data as it is input into a field. You may optionally control the position and color of the fields, the valid range of data, and the case (upper, lower, or proper) of the data.

The following rules apply in creating a data input form:

1. The field names must appear in a single row, and must begin with a letter. Field names which begin with a number will be skipped.
2. The column width is used to set the data input field size.
3. All field names are left justified. If the field names are to appear right justified, they must be padded with spaces.
4. Up to 50 input fields (in Graphics mode) may be displayed.
5. Columns which do not contain a field name will be skipped, as will field names which are protected (when protection is enabled).
6. The format of the field heading cell sets the format for the input field.
7. Cursor movement from one field to the next will be in the same order the fields appear in the field name row.

Field characteristics may optionally be used to position and control the input data. They are to be entered in the cell immediately above each field name and must start and end with a semi-colon (;). Two or more field characteristics may be combined, but they must be separated by a semi-colon. The following options are available:

?c,r	Locate the field at column(c) and row (r)
Cx	Set the field color to x (see Appendix C for color assignments)
P	Make the entry proper case (capitalize first letter)
U	Make the entry all upper case
L	Make the entry all lower case
Rx,y	Accept only values that are in the range x to y inclusive

Some examples which combine the above options:

;?5,15;C1;P;	Locate the field at column 5, row 15, set the color to 1 (blue), and make the entry proper case.
;?10,22;C4;R-1,1000;	Locate the field at column 10, row 22, set the color to 4 (red), and limit numeric entries to the range -1 to 1000.

7-16 DATA MANAGEMENT

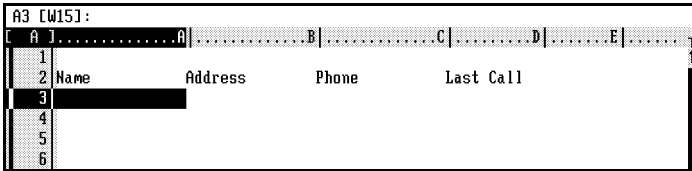
To create an input form, perform the following steps:

1. Define a number of cells (in the same row) that contain the field headings for your database.
2. Format the field headings for the type of data each cell will contain. Since Name and Address will contain text, format these field names as "Label" (/Range Format Label). This ensures that when a street number is entered, followed by the street name, the contents will be a label, rather than a value.

Format Last Call as date (/rfd) and select one of the date options. When entering the date, simply type "8/29/91". AS-EASY-AS will convert the string to its date equivalent.

3. Enter desired field characteristic options in the cell immediately above the field heading (be sure to include starting and ending semi-colons).
4. Select Data, Input Form, and highlight the range of field headings. **DO NOT** include the row containing the field characteristic options.

As an example, cells A2 through D2 in Figure 7-10 contain the desired field names of a simple contact database.



The screenshot shows a spreadsheet window titled 'A3 [W15]:'. The spreadsheet has columns labeled A through E and rows numbered 1 through 6. Row 1 is empty. Row 2 contains the field names: 'Name' in cell A2, 'Address' in cell B2, 'Phone' in cell C2, and 'Last Call' in cell D2. Row 3 is highlighted in black. Rows 4, 5, and 6 are empty.

	A	B	C	D	E
1					
2	Name	Address	Phone	Last Call	
3					
4					
5					
6					

Figure 7-10 Simple Contact Database Field Names

The keystrokes `/difA2..D2[ENTER]` will produce the AS-EASY-AS screen shown in Figure 7-11:

RECORD #1 ADD ?

Name : ██████████

Address : ██████████

Phone : ██████████

Last Call : ██████████

PgUp:Last PgDn:Next ^PgUp:Top ^PgDn | . | . | 4:01:53 pm

Figure 7-11 Simple Contact Database Input Form

Note that if cell D2 had not been formatted with a date format, and the date was entered as "08/29/91" (no apostrophes), cell D3 would display 0.0030315, i.e., the indicated division would have been performed; an action which was not intended.

A description of the movement keys available in this mode is displayed at the bottom line of the screen:

- PgUp - Go to the previous record
- PgDn - Go to the next record
- Ctrl-PgUp - Go to the beginning of the database (record #1)
- Ctrl-PgDn - Go to the end of the database

The user can freely move up and down the fields of the displayed record using the arrow cursor keys. The {ESC} key is used to exit the input form and return to the worksheet.

7-18 DATA MANAGEMENT

By adding field characteristics to the row above the field heading name row, as shown in Figure 7-12, a highly customized data input form can be developed, as shown in Figure 7-13.

A5 [W12]:				
A	B	C	D	
1	;?7,5;p;	;?35,5;p;	;?12,7;p;	;?18,3;
2	First Name	Last Name	Title	Company
3	John	Smith	Contracting Officer	ABC Company, Inc.
4	Mary	Moore	Executive Officer	XYZ Company, Inc.
5				
6				
7	Column	Row 1 Contents	Row 2 Field Names	Cell Width and Format
8	A	;?7,5;p;	First Name	12 Label
9	B	;?38,5;p;	Last Name	15 Label
10	C	;?12,7;p;	Title	23 Label
11	D	;?18,3;	Company	23 Label
12	E	;?18,9;p;	Address	25 Label
13	F	;?13,11;p;	City	18 Label
14	G	;?37,11;u;	State	2 Label
15	H	;?47,11;p;	Zip	9 Label
16	I	;?12,13;	Phone	14 Label
17	J	;?39,13;	Fax	14 Label
18	K	;?38,16;	Last Call	9 Date 4
19	L	;?18,16;	Contract Date	9 Date 4
20	M	;?18,28;	Memo	55 Label

(1) DATA-CIF.MKS

F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F18:Graph
 USS Free: 98z [136k] Auto READY! Num . . 4:43:54 pm

Figure 7-12 Field Names and Field Characteristics

RECORD #1 of 4

Company: ABC Company, Inc.

First Name: John Last Name: Smith

Title: Contracting Officer

Address: 55 Wilson St.

City: No. Andover State: MA Zip: 01845

Phone: (508) 555-7414 Fax: (508) 555-6312

Contract Date: 08/01/92 Last Call: 08/22/92

Memo: Contact 3 weeks prior to anniversary date of contract

PgUp:Last PgDn:Next ^PgUp:Top ^PgDn . Num/Cap . 11:58:01 am

Figure 7-13 Customized Data Input Form

7.8 DATABASE OPERATIONS

A database is information stored in a range of one or more rows and columns. The information that can be stored in a database is almost anything that one normally keeps track of.

Let's see how you might use database commands to keep track of a list of your customers, their addresses and telephone numbers (a function that is normally performed by a stack of index cards or a Rolodex).

	F. NAME	L. NAME	STREET	CITY	STATE	ZIP	PHONE
1	John	Marks	12 Fall Dr.	Boston	MA	11234	123-4567
2	George	Davis	134 Wells St.	Denver	CO	12345	321-4567
3	James E.	Eaton	6 Memory Ave	San Jose	CA	23456	654-4567
4	John	Murray	99 Way Ct.	Lynn	MA	11234	125-4567
5	Chris	Davis	87 Irene St.	Boston	MA	12234	123-8976
6	Mary E.	Dow	5 West 3rd St.	Denver	CO	12356	333-4567
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

(1) | DATA-Q, WKS | F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph
 U55 | Free 98% [886k] Auto E5 | READY! | Num | B:45:21 am

Figure 7-14 Sample Customer Database

The spreadsheet in Figure 7-14 holds a small database of customers. The database of customers is stored in the range A1..G7. For each customer, you intend to keep track of the first and last name, street address, city, state and telephone number. Each row (all the information for one customer) is called a record of the database.

Each column has a heading identifying the information stored in the cells beneath it. Each heading is called a "field" of the record.

Once the information is stored in this database format, you can look at it many different ways and gain valuable information from it using the AS-EASY-AS database commands.

There are three ranges in the Database Menu which must be defined. The INPUT range, the CRITERION range and the OUTPUT range.

The operations that can be performed, based on the above ranges, are:

- FIND - Highlight records that match the criterion range.
- EXTRACT - Copy records that meet the criterion range into the output range.

INPUT RANGE

The input range is the entire area where the database information is stored. When the input range is specified, you must include the headings as the top row of the range.

In the preceding example the input range would be A1..G7. Notice that the range also contains the headings F. NAME, L. NAME, etc.

CRITERION RANGE

The criterion range contains the criteria that will be used to perform the FIND or EXTRACT operations on the Input range of the database. The minimum number of rows that can be used to define the criterion range is two.

The top row ALWAYS contains the field headings exactly as they appear in the database. It is good practice to copy these headings from the database itself to assure that they are exactly the same. Subsequent rows contain the actual criteria. Criteria fall into two categories, character comparisons and numeric comparisons.

Character comparisons can be performed by looking for an exact match or by using wildcard characters.

- ? Substitutes for any single character in the comparison string.
- * Will match all characters to the right of the asterisk position.
- ... Ellipsis (3 dots) preceding a string will search each record for the occurrence of that string anywhere within the string.

Numeric comparisons can be performed by using all of the logical operators defined in the Logical Operators section.

Criteria placed in adjacent columns are treated as logical ANDs, while criteria placed in adjacent rows are treated as logical ORs.

AS-EASY-AS provides you with the option to facilitate the inputting of criteria. The command / Data Input Criteria operates similar to / Data Input Form described earlier.

After the criteria range is selected, a criteria input form will appear in the middle of the screen. The user can then enter the criteria for each field heading. If multiple matches for the same heading are desired, AS-EASY-AS will generate a second form once the first form has been completed. An example of Data Input Criteria is shown in the database example.

Although this might sound complicated, an example later on will demonstrate how all these rules work.

OUTPUT RANGE

The EXTRACT command causes records that match the criteria to be placed in the output range. The output range should contain the headings of the fields from which information is to be extracted.

RESET

The RESET command resets the data input, output and criteria ranges.

7.9 DATABASE EXAMPLE

At this point, let's go through some examples to see how all these rules are combined while managing an AS-EASY-AS database.

In Figure 7-15, the input range (where all our information is stored) is A1..G7. We want to extract the Last Name, First Name and State of all customers with a first name of John.

A12 [W10]:						
A	B	C	D	E	F	G
1	F. NAME	L. NAME	STREET	CITY	STATE	ZIP PHONE
2	John	Marks	12 Fall Dr.	Boston	MA	11234 123-4567
3	George	Davis	134 Wells St.	Denver	CO	12345 321-4567
4	James E.	Eaton	6 Memory Ave	San Jose	CA	23456 654-4567
5	John	Murray	99 Way Ct.	Lynn	MA	11234 125-4567
6	Chris	Davis	87 Irene St.	Boston	MA	12234 123-8976
7	Mary E.	Dow	5 West 3rd St.	Denver	CO	12356 333-4567
8						
9						
10						
11	F. NAME	L. NAME	STREET	CITY	STATE	ZIP PHONE
12						
13						
14						
15						
16						
17						
18						
19						
20						

(1) DATA-Q1.WKS

F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph

U55 Free 98x [806k] Auto READY! Num 8:46:42 am

Figure 7-15 Criterion and Output For Data Question Extract Command

The Criterion range is defined as A11..C12. If the / Data Input Criteria command is used, the input screen in Figure 7-16 is displayed. Enter John as the F. NAME match and asterisks for the L. NAME and STATE matches. After exiting, our worksheet will resemble that in Figure 7-17. For this example, however, it might have been just as easy to type in the match criteria in A11..C12.

PGUP:Last, PGDN:Next, CPgUP:Top CPgDN:Bot ESC:Quit

CRITERIA #1 ADD ?

F. NAME: John

L. NAME: _____

STREET: _____

U55 Free 98z [806k] Auto EditMODE Num 10:15:28 am

Figure 7-16 Sample Data Input Criteria Form

A13 [W10]:

	A	B	C	D	E	F	G
1	F. NAME	L. NAME	STREET	CITY	STATE	ZIP	PHONE
2	John	Marks	12 Fall Dr.	Boston	MA	11234	123-4567
3	George	Davis	134 Wells St.	Denver	CO	12345	321-4567
4	James E.	Eaton	6 Memory Ave	San Jose	CA	23456	654-4567
5	John	Murray	99 Way Ct.	Lynn	MA	11234	125-4567
6	Chris	Davis	87 Irene St.	Boston	MA	12234	123-8976
7	Mary E.	Dow	5 West 3rd St.	Denver	CO	12356	333-4567
8							
9							
10							
11	F. NAME	L. NAME	STATE	F. NAME	L. NAME	STATE	
12	John	*	*				
13							
14							
15	Input Range	A1..G7					
16	Criterion Range	A11..C12					
17	Output Range	D11..F11					
18							
19							
20							

(1) DATA-Q3.WKS

F1:? F2:Edit F3:Macro F4:Abs F5:Coto F6:Wind F7:View F9:Calc F10:Graph

U55 Free 98z [806k] Auto READY! Num 10:16:52 am

Figure 7-17 Criterion for Data Question Extract Command

Let's examine the second row of the Criterion range.

Cell A12, directly under the field heading F.NAME, contains the name John. This indicates that we want the database operation to be performed only on the customer records whose first name is John.

The cells under the headings L. NAME and STATE contain an asterisk. It means match any TEXT (not numbers), i.e. Any Last Name, Any State. The only criterion here is F. NAME = John.

The Output range is defined as D11..F11 (only the headings need to be specified). Note that the headings can be in any order and can even be duplicated. When the /dqe (Data, Question, Extract) command is executed the screen should look like Figure 7-18.

D15 [W18]:						
A	B	C	D	E	F	G
1	F. NAME	L. NAME	STREET	CITY	STATE	ZIP PHONE
2	John	Marks	12 Fall Dr.	Boston	MA	11234 123-4567
3	George	Davis	134 Wells St.	Denver	CO	12345 321-4567
4	James E.	Eaton	6 Memory Ave	San Jose	CA	23456 654-4567
5	John	Murray	99 Way Ct.	Lynn	MA	11234 125-4567
6	Chris	Davis	87 Irene St.	Boston	MA	12234 123-8976
7	Mary E.	Dow	5 West 3rd St.	Denver	CO	12356 333-4567
8						
9						
10						
11	F. NAME	L. NAME	STATE	F. NAME	L. NAME	STATE
12	John	*	*	John	Marks	MA
13				John	Murray	MA
14						
15	Input Range	A1..G7				
16	Criterion Range	A11..C12				
17	Output Range	D11..F11				
18						
19						
20						
(1) | DATA-Q3.WKS |						
F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph						
U55 Free 98k [006k] Auto | READY! | 6:45:53 pm						

Figure 7-18 Output Resulting From Data Question Extract Command

As you see, the First Name, Last Name and State of all customers whose first name is John were placed in the output range.

8. ARRAY/MATRIX OPERATIONS

Matrix is a notation that is commonly used in the field of mathematics to describe a table of numbers. When dealing with matrices you should be familiar with basic terminology and rules for matrix manipulation.

A matrix is an array of values with a number of rows (i) and a number of columns (j). Mathematically, a matrix is denoted by an uppercase letter enclosed in brackets.

[A] - Matrix A

The elements of the matrix are denoted by the equivalent lowercase letter and two subscripts referring to the position of the element (row, column).

$a_{1,2}$ - the element of matrix [A] located in the first row and the second column

The transposition of a matrix [A] with size i,j (i -rows, j -columns) is a new matrix $[A]^T$ with size j,i (j -rows, i -columns). After the transposition, the first row of [A] becomes the first column of $[A]^T$, the second row of [A] becomes the second column of $[A]^T$, etc.

Example:

ORIGINAL MATRIX

1	6	8
5	7	3
9	1	4

TRANSPPOSED MATRIX

1	5	9
6	7	1
8	3	4

8-2 ARRAY/MATRIX OPERATIONS

In operations involving two matrices, $[A]$ (i,j) and $[B]$ (k,n), the following rules must be observed:

1. The matrices can be added or subtracted only if: $i=k$ and $j=n$
2. The matrices can be multiplied only if: $i=n$ and $j=k$

The inverse of a matrix $[A]$ is a second matrix $[A]^{-1}$, such that:

$$[A] \times [A]^{-1} = \text{Identity matrix}$$

The identity matrix is a special matrix whose elements are:

$$\begin{aligned} a_{i,j} &= 1.0 && \text{for any } i=j \\ a_{i,j} &= 0.0 && \text{for any } i \neq j \end{aligned}$$

That is, 1s appear along the diagonal of the matrix and all other values are zero.

A matrix can be inverted only if the number of columns and rows are equal. This is called a square matrix.

Having gone through the basics about matrices, we can now see some of the matrix manipulation tools AS-EASY-AS brings to you.

8.1 MATRIX ADDITION

To add two matrices [A] and [B], and get a third matrix [C], follow the steps given below. The two matrices and the results are shown in Figure 8-1.

1. /aa - Invoke the Menu, Array, Add command
2. B3..D5 [ENTER] - Specify the first matrix
3. B9..D11 [ENTER] - Specify the second matrix
4. B15 [ENTER] - Specify the beginning of the output range

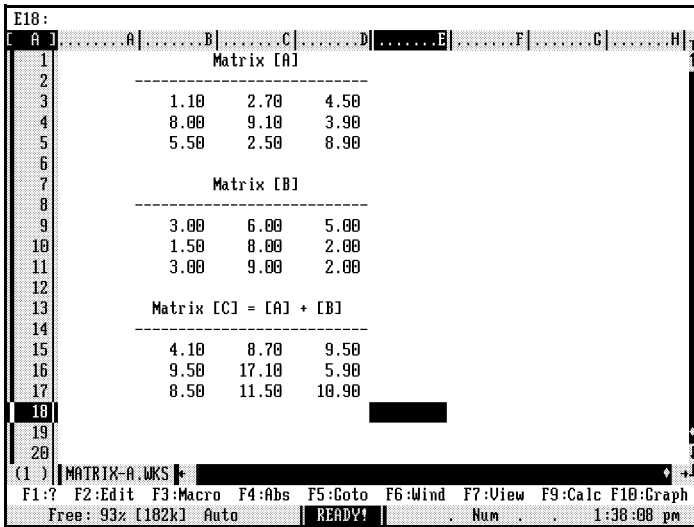


Figure 8-1 Matrix Addition

8.2 MATRIX SUBTRACTION

To subtract the two matrices [A] and [B], and get a third matrix [C], follow the steps given below. The two matrices and the results are shown in Figure 8-2.

1. /as - Invoke the Menu, Array, Sub command.
2. B3..D5 [ENTER] - Specify the first matrix
3. B9..D11 [ENTER] - Specify the second matrix
4. B15 [ENTER] - Specify the beginning of the output range

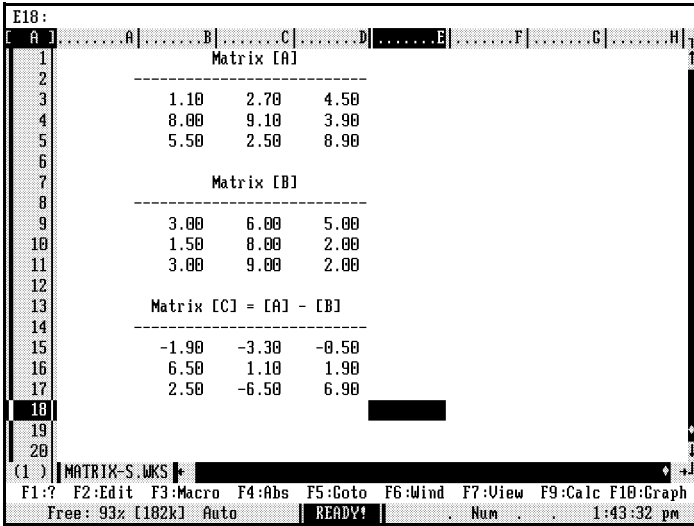


Figure 8-2 Matrix Subtraction

8.3 MATRIX MULTIPLICATION

To multiply the two matrices [A] and [B], and get a third matrix [C], follow the steps given below. The two matrices and the results are shown in Figure 8-3.

1. /am - Invoke the Menu, Array, Mult command.
2. B3..D5 [ENTER] - Specify the first matrix
3. B9..D11 [ENTER] - Specify the second matrix
4. B15 [ENTER] - Specify the beginning of the output range

E18:			
A	B	C	D
Matrix [A]			
	1.10	2.70	4.50
	8.00	9.10	3.90
	5.50	2.50	8.90
Matrix [B]			
	3.00	6.00	5.00
	1.50	8.00	2.00
	3.00	9.00	2.00
Matrix [C] = [A] x [B]			
	20.85	68.70	19.90
	49.35	155.90	66.00
	46.95	133.10	50.30

(1) | MATRIX-M.WKS |

F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph
Free: 93% [182k] Auto | READY! | Num . . . 2:13:42 pm

Figure 8-3 Matrix Multiplication

8.4 MATRIX INVERSION

To invert a matrix $[A]$ and get a second matrix $[A]^{-1}$, follow the steps given below. The results are shown in Figure 8-4.

1. /ai - Invoke the Menu, Array, Inv command
2. B3..D5 [ENTER] - Specify the matrix to be inverted
3. B15 [ENTER] - Specify the beginning of the output range

D13:		A	B	C	D	E	F	G	H
1									
2									
3		1.10	2.70	4.50					
4		8.00	9.10	3.90					
5		5.50	2.50	8.90					
6									
7									
8									
9		-0.37	0.07	0.16					
10		0.26	0.08	-0.17					
11		0.16	-0.06	0.06					
12									
13									
14									
15									
16									
17									
18									
19									
20									

(1) MATRIX-I.WKS

F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph

Free: 93% [182k] Auto READY! Num 2:21:25 pm

Figure 8-4 Matrix Inversion

The maximum size of a matrix that can be inverted is 30 rows by 30 columns.

8.5 MATRIX TRANSPOSE

To transpose a matrix $[A]$ and get a second matrix $[A]^T$, follow the steps given below. The results are shown in Figure 8-5.

1. /at - Invoke the Menu, Array, Trans command
2. B3..D5 [ENTER] - Specify the matrix to be transposed
3. B15 [ENTER] - Specify the beginning of the output range

D13:			
A	B	C	D
Matrix [A]			
1	1.10	2.70	4.50
2	8.00	9.10	3.90
3	5.50	2.50	8.90
Matrix [A] - Transpose			
4	1.10	8.00	5.50
5	2.70	9.10	2.50
6	4.50	3.90	8.90

(1) | MATRIX-T.WKS |

F1:? F2:Edit F3:Macro F4:Abs F5:Goto F6:Wind F7:View F9:Calc F10:Graph
Free: 93% [182k] Auto | READY! | Num . . 2:25:05 pm

Figure 8-5 Matrix Transposition

8.6 MATRIX EQUATION

The matrix equation command can be used to solve a set of simultaneous equations with an equal number of unknowns.

Suppose you have the following set of simultaneous equations in matrix form, written as $[A] \times [X] = [C]$:

$$\begin{aligned} 3x_1 + 5x_2 + 2x_3 &= 11 \\ 4x_1 + 1x_2 + 8x_3 &= 5 \\ 1x_1 + 9x_2 + 3x_3 &= 10 \end{aligned}$$

where:

[A] - The coefficient matrix, [3x3], which contains the coefficients of x_1 , x_2 , x_3 .

$$[A] = \begin{vmatrix} 3 & 5 & 2 \\ 4 & 1 & 8 \\ 1 & 9 & 3 \end{vmatrix}$$

[X] - The unknown Matrix, also called a vector, [3x1], which contains the unknowns.

$$[X] = \begin{vmatrix} x_1 \\ x_2 \\ x_3 \end{vmatrix}$$

[C] - The constant matrix, [3x1], which contains the constants to the right of the equal sign in the above equations.

In order to solve this set of equations follow these steps:

1. Place the values of [C] in the column immediately to the right of the coefficient matrix.
2. Invoke the /Menu, Array, Matrix, Equation command.
3. Specify the equation range, INCLUDING the column that contains the constant matrix [C].
4. Indicate the beginning of the output range.

Continuing with the sample equations given above and based on the information shown in the figure below the solution of the equations would be as follows:

1. /ae - Invoke the Array, E-Solve command.
2. B5..E7 [ENTER] - Select the input range.
3. G5 [ENTER] - Select the output range.

The results should be as in Figure 8-6.

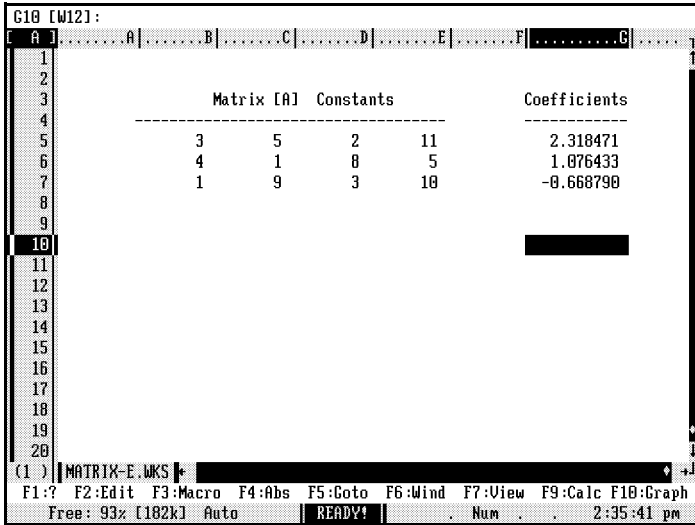


Figure 8-6 Matrix Equation Results

As the results in Figure 8-6 illustrate, the solution to the set of simultaneous equations is:

$$\begin{aligned}
 x_1 &= 2.318471 \\
 x_2 &= 1.076433 \\
 x_3 &= -0.668790
 \end{aligned}$$

The maximum size matrix that can be solved using the Array, E-Solve command is 30 rows by 30 columns.

8.7 MATRIX DETERMINATE

A determinate $|A|$ is a scalar function of a square matrix defined in such a way that:

$$\begin{matrix} T a_{11} & a_{12} & a_{13} \\ * a_{21} & a_{22} & a_{23} \\ R a_{31} & a_{32} & a_{33} \end{matrix} \begin{matrix} T \\ * \\ R \end{matrix} = \begin{matrix} a_{11}a_{22}a_{33} + a_{12}a_{23}a_{31} + a_{13}a_{21}a_{32} \\ - a_{13}a_{22}a_{31} - a_{11}a_{23}a_{32} - a_{12}a_{21}a_{33} \end{matrix}$$

To calculate the determinate $|A|$ of matrix [A], follow the steps given below. The results are shown in Figure 8-7.

1. /ad - Invoke the Menu, Array, Determinate command
2. B3..D5 [ENTER] - Specify the matrix to be transposed
3. C9 [ENTER] - Specify the output cell

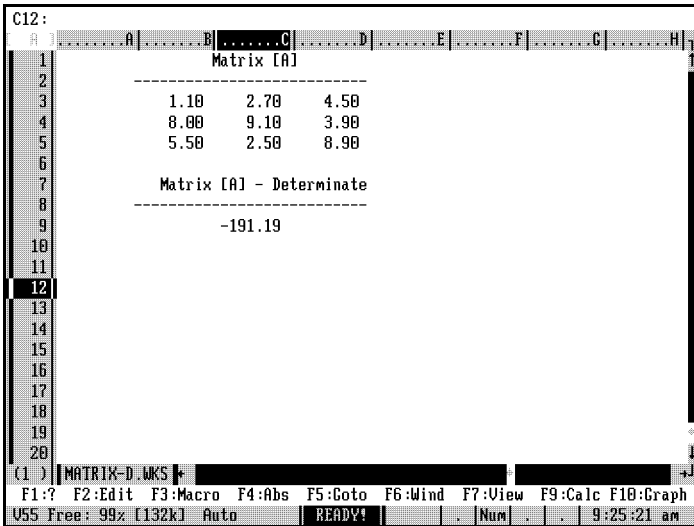


Figure 8-7 Matrix Determinant

8.8 LINEAR PROGRAMMING

Linear Programming uses the Simplex Big M method of solution. A detailed explanation of the Linear Programming concept is well beyond the scope of this user manual. If interested, the reader is encouraged to seek additional information from text books that specialize in Linear Programming.

The Linear programming capabilities of AS-EASY-AS are invoked using the /ARRAY, LINEAR command. The program expects the user to specify an array (rectangular range of cells), containing the following information:

Coeff #1	Coeff #2	...	Coeff #n	LE/GE	Constraint #1
Coeff #1	Coeff #2	...	Coeff #n	LE/GE	Constraint #2
...
...
Coeff #1	Coeff #2	...	Coeff #n	LE/GE	Constraint #m
FCoeff #1	FCoeff #2	...	FCoeff #n	EQ	Min/Max Criterion

Where:

- Coeff #1,2,..** The coefficients for the variables in each of the constraint equations
- LE** Less than or equal to the constraint
- GE** Greater than or equal to the constraint
- Constraint #1,#2** The constants of the constraint relationships.
- FCoeff #1,2,..** The coefficients for each variable in the function being optimized.
- EQ** The last row of the range containing the description of the function being optimized **MUST** be set to EQ (equal)
- Min/Max** Either MIN or MAX indicating whether you are trying to minimize or maximize the function.

Then, AS-EASY-AS produces an optimized solution of the form:

- Min/Max** Optimized Value
- X1** Value of 1st variable for optimized solution
- X2** Value of 2nd variable for optimized solution
- X3** Value of 3rd variable for optimized solution

The use of the Linear Programming capabilities of AS-EASY-AS is best illustrated with a few examples.

8-12 ARRAY/MATRIX OPERATIONS

EXAMPLE #1 Maximize the function: $P = 10x + 5y$

Subject to the constraints: $6x + 2y \leq 36$
 $2x + 4y \leq 32$

The solution matrix is set up in cells A1..D3 as shown below. The first row contains the first constraint, the second row represents the second constraint, and the third row contains the function we are trying to maximize.

Cells A6..B8 contain the solution which was obtained by the series of keystrokes:

/ALA1..D3[ENTER]A6[ENTER]

Note that [ENTER] is used to denote pressing the ENTER key.

[A ]	.....A*	.....B*	.....C*	.....D*	.....E*
1*	6	2	le	36	
2*	2	4	le	32	
3*	10	5	eq	max	
4*					
5*					
6*max		70			
7*X1		4			
8*X2		6			

The solution indicates that the maximum value of the function is $P = 70$, and it occurs at the x and y values of $x=4$ and $y=6$.

EXAMPLE #2 Maximize the function: $P = 3x + 6y$

Subject to the constraints: $-2x + 3y \leq 9$
 $-1x + 3y \leq 12$

The solution matrix is set-up in AS-EASY-AS is shown below, again in cells A1..D3. The first row contains the first constraint, the second row represents the second constraint, and the third row contains the function we are trying to maximize.

Cells A6..B8 contain the solution which was obtained by the series of keystrokes:

/ALA1..D3[ENTER]A6[ENTER]

[A ]	.....A*	.....B*	.....C*	.....D*	.....E*
1*	-2	3	le	9	
2*	-1	3	le	12	
3*	3	6	eq	max	
4*					
5*					
6*max		39			
7*X1		3			
8*X2		5			

The solution indicates that the maximum value of the function is $P = 39$, and it occurs at the x and y values of $x=3$ and $y=5$.

EXAMPLE #3 A farmer owns 100 acres of farm land and wants to plant up to three crops X, Y and Z. The seed for these crops costs \$40, \$20 and \$30 per acre, respectively, and the farmer cannot spend more than \$3,200 total on seed. In addition to that, crops X, Y and Z require 1, 2 and 1 workdays per acre, and there are a total of 160 workdays available.

If the farmer can sell the crops and make a profit of \$100 per acre on crop X, \$300 per acre on crop Y and \$200 per acre on crop Z, how many acres of each crop should be planted to maximize profit?

Based on the information provided above, the problem is formulated as follows.

Maximize the function: $P = 100x + 300y + 200z$

Subject to the constraints: $1x + 1y + 1z \leq 100$
 $40x + 20y + 30z \leq 3200$
 $1x + 2y + 1z \leq 160$

The solution matrix is set-up in cells A1..E4 as shown below. The first row contains the first constraint, the second row represents the second constraint, the third row contains the third constraint and the fourth row contains the function we are trying to maximize.

Cells A7..B10 contain the solution which was obtained by the series of keystrokes:
 /ALA1..E4[ENTER]A7[ENTER]

[	A	]	.....	A*	.....	B*	.....	C*	.....	D*	.....	E*	.....
'	1*			1		1		1	le			100	
'	2*			40		20		30	le			3200	
'	3*			1		2		1	le			160	
'	4*			100		300		200	eq		max		
'	5*												
'	6*												
'	7*max					26000							
'	8*X1					0							
'	9*X2					60							
'	10*X3					40							

The solution provided by AS-EASY-AS indicates that in order for the farmer to maximize his profit, he should not plant any of crop X, 60 acres of crop Y, and 40 acres of crop Z. His total profit would be \$26,000.

8-14 ARRAY/MATRIX OPERATIONS

EXAMPLE #4 Minimize the function: $P = 20x + 12y + 40z$

Subject to the constraints: $1x + 1y + 5z \leq 20$
 $2x + 1y + 1z \leq 30$

The solution matrix is set-up in cells A1..E3 as shown below. The first row contains the first constraint, the second row represents the second constraint, and the third row contains the function we are trying to minimize.

Cells A6..B9 contain the solution which was obtained by the series of keystrokes:
 /AL A1..E3[ENTER]A6[ENTER]

[	A	]	.....	A*	.....	B*	.....	C*	.....	D*	.....	E*	.....
'	1*			1		1		5	ge			20	
'	2*			2		1		1	ge			30	
'	3*			20		12		40	eq	min			
'	4*												
'	5*												
'	6*min					320.00							
'	7*X1					10							
'	8*X2					10							
'	9*X3					0							

EXAMPLE #5 Acme Micros assembles and sells computers with single and/or double sided disk drives. The disk drives are purchased from two other electronic manufacturers, Advanced Electronics and Drives Associates. Advanced Electronics charges \$250 for a single sided drive and \$350 for a double sided drive. Drives Associates charges \$290 for a single sided drive and \$320 for a double sided drive.

Advanced Electronics can only supply 1,000 drives a month (any combination), while Drives Associates can supply a maximum of 2,000 a month (any combination). Acme Micros needs at least 1,200 single sided drives a month and at least 1,600 double sided drives a month.

How many drives of each type should Acme Micros order from each supplier in order to meet its demand and minimize its cost?

Based on the information provided above, and using,

- X1 - Single sided drives from Advanced Electronics
- X2 - Double sided drives from Advanced Electronics
- X3 - Single sided drives from Drives Associates
- X4 - Double sided drives from Drives Associates

The problem is formulated as:

Minimize the function: $P = 250 * X1 + 350 * X2 + 290 * X3 + 320 * X4$

Subject to the constraints:

$X1 + X2$	#	1000
$X3 + X4$	#	2000
$X1 + X3$	\$	1200
$X2 + X4$	\$	1600

The solution matrix is set-up in cells A1..F5 as shown below. The first row contains the first constraint, the second row represents the second constraint, the third row contains the third constraint, the fourth row contains the fourth constraint, and the fifth row contains the function we are trying to minimize.

Cells A7..B11 contain the solution which was obtained by the series of keystrokes:
/AL A1..F5[ENTER]A7[ENTER].

[A ]	.....A*	.....B*	.....C*	.....D*	.....E*	.....F*
1*	1	1	0	0	le	1000
2*	0	0	1	1	le	2000
3*	1	0	1	0	ge	1200
4*	0	1	0	1	ge	1600
5*	250	350	290	320	eq	min
6*						
7*min		820000				
8*X1		1000				
9*X2		0				
10*X3		200				
11*X4		1600				

8-16 ARRAY/MATRIX OPERATIONS

The solution indicates that in order for Acme Micro to meet its demand and minimize its cost, it should order 1,000 single sided drives from Advanced Electronics, and 200 single sided drives and 1,600 double sided drives from Drives Associates.

The minimized cost for such an order would be \$820,000.

EXAMPLE #6 A department store has a \$2000 budget to spend on television advertising to promote an up-coming sale. A daytime ad can be purchased for \$100 and can be seen by 1,400 potential viewers. A prime-time ad can be purchased for \$200 and can be seen by 2,400 potential viewers. A late-night ad can be purchased for \$150 and can be seen by 1,800 potential viewers. The television station will not accept more than 15 ads total in all three time frames.

To maximize the number of potential customers who will view the ads, how many ads should be placed in each time frame? How many potential customers will view the ads?

Based on the information provided above, the problem is formulated as:

Maximize the function: $P = 1400x + 2400y + 1800z$

Subject to the constraints: $1x + 1y + 1z \leq 15$
 $100x + 200y + 150z \leq 2000$

The solution matrix is set-up as shown below, in cells A1..E3. The first row contains the first constraint, the second row represents the second constraint and the third row contains the function we are trying to maximize.

Cells A6..B9 contain the solution which was obtained by the series of keystrokes: /AL A1..E3[ENTER]A6[ENTER].

[A ]	.....A*	.....B*	.....C*	.....D*	.....E*...
1*	1	1	1	le	15
2*	100	200	150	le	2000
3*	1400	2400	1800	eq	max
4*					
5*					
6*max		26000			
7*X1		10			
8*X2		5			
9*X3		0			
10*					

The solution provided by AS-EASY-AS indicates that in order for the department store to maximize the number of potential customers who will view the ads, 10 daytime ads, 5 prime-time ads and 0 night-time ads should be purchased. The ads would reach 26,000 potential customers for the up-coming sale.

EXAMPLE #7 A dietitian is presented with a task to prepare a diet using three foods X, Y and Z. One ounce of each food contains the following units:

<u>Food</u>	<u>Calcium</u>	<u>Iron</u>	<u>Vitamin A</u>	<u>Cholesterol</u>
X	20	10	10	20
Y	10	10	20	24
Z	10	10	10	18

The minimum daily requirements are 300 units of calcium, 200 units of iron, and 240 units of vitamin A.

How many ounces of each food is required to meet the minimum daily requirements, and at the same time minimizing cholesterol intake? What is the minimum cholesterol intake?

Based on the information provided above, the problem is formulated as:

Minimize the function: $P = 20x + 24y + 18z$

Subject to the constraints: $20x + 10y + 10z \leq 300$
 $10x + 10y + 10z \leq 200$
 $10x + 20y + 10z \leq 240$

The solution matrix is shown below in cells A1..E4. The first row contains the first constraint, the second row represents the second constraint, the third row contains the third constraint and the fourth row contains the function we are trying to minimize.

Cells A7..B10 contain the solution which was obtained by the series of keystrokes: /ALA1..E4[ENTER]A7[ENTER].

[	A	]	.....	A*	.....	B*	.....	C*	.....	D*	.....	E*	.....
'	1*			10		10		10	ge			300	
'	2*			10		10		10	ge			200	
'	3*			10		20		10	ge			240	
'	4*			20		24		18	eq		min		
'	5*												
'	6*												
'	7*min			403.9999									
'	8*X1					10							
'	9*X2					4							
'	10*X3					6							

The solution indicates that 10 ounces of food X, 4 ounces of food Y, and 6 ounces of food Z should be consumed in order to meet the daily minimum requirements, while minimizing cholesterol intake to 404 units.

9. MACROS

A macro is a sequence of keystrokes which may be activated by pressing the combination of the Alt key and a letter key or by using the [F3] key -macro execute. An example macro would be the following:

```
{RT} {RT} {DN}
```

The words/letters in braces represent an action keystroke. The above macro will move the pointer two cells to the right and one cell down. A macro may be placed in any cell.

To activate a macro with the [ALT] key, it must have a special type of range name assigned to its location. The special range name is the backslash [\] followed immediately by any letter from "A" thru "Z". For example:

```
\A
```

This specific macro may be activated by pressing the [ALT] key and the letter "A" simultaneously. Therefore, even though the backslash is used to define the range name it actually represents the [alt] key.

If you desire a macro to automatically execute upon retrieval of a spreadsheet, name your macro "\0" (Zero). When AS-EASY-AS retrieves your spreadsheet, it searches for a macro named "\0". If one exists, it is automatically executed. You can have only one auto-executing macro in a spreadsheet.

NOTE: To edit an auto-executing macro, it may be necessary to use the /File Merge command to keep the macro from auto-executing as it would if /File Retrieve were used.

9.1 DEFINING A MACRO

The powerful macros that are supported by AS-EASY-AS provide a complete programming environment for most applications. Macros can be chained together to provide self running applications that do virtually anything that can be done manually through the command mode.

Macro commands can be typed in directly from the keyboard. This requires that you know the exact sequence of macro commands to perform the desired action ahead of time.

For short macros, this method is acceptable. However, if you have a long macro to create, or if you are unfamiliar with the sequence of commands needed, AS-EASY-AS provides an alternative method for creating macros.

AS-EASY-AS has the ability to learn by example, it records your keystrokes as you perform the desired task, and writes them out to the sheet as macro commands. To access this macro recording ability, select /Sheet, Macro, Compose.

When you first select Compose, AS-EASY-AS starts recording all your keystrokes. The macro compose buffer is capable of storing 2048 characters. When you have completed your macro, reselect /Sheet, Macro, Compose a second time.

AS-EASY-AS will prompt you for the cell location in which to place the macro commands. Simply point to a vacant cell or type in the cell location and hit [ENTER]. The macro commands will be entered, continuing to the next rows below as necessary, writing over any information currently in the cells.

9.2 EXECUTING A MACRO

There are several ways to execute your macro. The first step is to name your macro. To define a range name, type the following: `/rnc` which stands for `/RANGE, NAME, CREATE`.

After you press the letter "c" (for Create) the spreadsheet will prompt YOU for the name of the range. Now type the range name and then press the [ENTER] key. (Be careful, don't include any spaces in the range name).

The next step involves typing (or pointing) the cell which the macro occupies. If the macro was in cell A1, then type A1 [ENTER]. The simplest method of executing macros is to name your macro using the special range name character \ followed by a single letter as discussed previously.

Pressing the [ALT] key and the letter name of your macro simultaneously will execute your macro. Naming your macro \0 (zero) will create a macro that will auto execute each time the spreadsheet is retrieved.

A second execution method is to press the [F3] Macro Execute function key. Type in the name of your macro and hit [ENTER], and AS-EASY-AS will execute your macro.

If you can't remember your macro name, press [F3] then [F1]. A pick window of all the range names will appear in the middle of your screen. Highlight the name of your macro and hit [ENTER] to execute the macro.

A third method to execute your macro is by selecting /Sheet, Macro, Execute. You are allowed to specify a cell address, a named range, etc. Again, pressing [F1] after this option has been selected will display all named ranges in a pick window on the screen.

Because of its execution speed, it may be difficult to follow your macro commands to determine if your macro is performing as planned. To assist you in your debugging efforts, AS-EASY-AS provides the ability to execute your macro one command at a time.

/Sheet, Macro, Step toggles the macro step execution on and off. If the option Yes is selected, you are asked to specify the number of msec of delay between macros ($0 < D < 5000$ msec). If a delay of zero, ($D=0$), is specified, the program will pause after each macro command, until you press any key to continue. The currently executing macro command will also be displayed at the bottom of the screen.

9.3 MACRO MENU ESCAPE SEQUENCE

This feature allows the user to develop multi-level menu driven applications.

Pressing [ESC] while a macro menu is displayed, instead of stopping the macro execution, can return the user to the previous menu or to any other execution point or action.

The menu structure is such that the cell to the right of the last menu option is blank, but the cell two rows below it can contain a macro command to be executed if the [ESC] key is pressed while the menu is being displayed. An example of macro menu Escape sequence is shown in Figure 9-1.



Figure 9-1 Macro Menu Escape Sequence

The macro menu displayed with this macro appears in the upper left corner of the screen. If you press the [ESC] key, execution would be transferred to the macro menu called "START" (this example assumes that you have defined another macro menu called START).

9.4 MACRO KEYWORDS

All menu commands can be invoked from within a macro with the key-letter (the highlighted letter in the command). In addition, the following cursor movements have macro keywords:

<u>MACRO</u>	<u>MEANING</u>
<u>COMMAMD</u>	
{LT X}	Move cursor X cells to the Left
{RT X}	Move cursor X cells to the Right
{DN X}	Move cursor X cells Downward
{UP X}	Move cursor X cells Upward
{PGUP X}	Move cursor X pages Up
{PGDN X}	Move cursor X pages Down
{PGRT X}	Move the cursor X pages to the Right
{PGLT X}	Move the cursor X pages to the Left
{DEL X}	Delete X characters to the right of cursor
{BS X}	Backspace X characters to the Left of the cursor
{INS}	Same cursor as the [INS] key. Toggles between Insert and Overtyping modes
{INSON}	Toggles the Insert mode on
{INSOFF}	Toggles the Insert mode off
{HOME}	Move cursor to cell A1
{END}	Same as the [END] key
{HELP}	Corresponds to pressing Help [F1] key
{EDIT}	Places the current cell in the Edit mode [F2]
{NAME}	Name, show matrix of names same as [F3]
{ABS}	Make cell reference absolute [F4]. Toggles between absolute reference modes.
{GOTO cell}	GoTo a specified cell, [F5]
{WINDOW}	If window active toggles the cursor between windows otherwise toggle the cursor between the current and previous cursor locations, [F6]
{VIEW}	Toggle the current view between the opened windows, same as [F7]
{CALC}	Recalculate all cells, [F9]
{GRAPH}	View the specified graph, [F10]
{ESC X}	Represents the [ESC] (Escape) key (X is optional).
~	Tilde (~), same as the [ENTER] key

- NOTES:**
1. The keystroke [ENTER] in a macro is represented by the tilde (~).
 2. All macro commands **MUST** be enclosed in curly braces {}.
 3. The X in the above listing is optional, i.e., {RT 5} moves the cursor to the right 5 cells, whereas {RT} moves the cursor to the right just one cell.
 4. The maximum value of X is 240.

9-6 MACROS

Macros are executed from left to right in a given cell and proceed downwards row by row until either a blank cell is reached, the [ESC] key is pressed, or the {QUIT} macro keyword is executed.

For example, assume that cells A5 and A6 contain the following macro: (when typing a macro, remember to start each line with a single quote to avoid executing the commands as you are typing).

<u>CELL</u>	<u>CONTENTS</u>
A5	'{HOME}/c~.{RT}{RT}~
A6	'{GOTO A1}~/m.{RT}~B10~{GOTO B12}~/re~

Assign a range name, \T, to cell A5 by pressing:

```
/mc\T [ENTER]
```

When you press ALT-T the macro is interpreted as follows:

<u>MACRO COMMAND</u>	<u>ACTION TAKEN</u>
{HOME}	Cursor moves to cell A1
/c	Copy command is invoked.
~	Copy From is A1, Copy To is shown.
.	Cursor is anchored at cell A1.
{RT}{RT}	Cursor expands two cells onto cells B1 & C1
~	Copying takes place, contents of cell A1 are copied to cells B1 and C1. Execution is transferred to A6.
{GOTO A1}~	This is the same as pressing F5, typing A1 and pressing [ENTER] in command mode. Cursor moves to A1.
/m	Move command is invoked.
.	Pointer is anchored. Move From A1..A1 is shown.
{RT}	Cursor moves to B1. Move From A1..B1 shown.
~	Move From complete. Move To A1 is shown.
B10~	Cursor moves to B10, contents of cells A1 and B1 are moved to cells B10 and B11.
{GOTO B12}~	Cursor moves to B12.
/r	Range submenu is selected.
e	Erase command invoked
~	Contents of cell B12 are erased.

Execution of the macro stops, provided cell A7 is blank.

9.5 ADVANCED MACROS

The advanced macro capabilities of AS-EASY-AS complete a powerful programming environment. Using these macros, you can set up your own custom menus, set up programming loops, branching and execute sub-routines.

NOTE: All commands below may **ONLY** be used in an executing macro.

{?} Pauses macro execution and awaits keyboard input. Useful for interrupting macro to allow movement around sheet or entry of data. Macro execution continues only after [ENTER] or [ESC] is pressed.

NOTE: [ENTER] and [ESC] characters will not appear in the macro stream. You must provide them where required to terminate input in response to a prompt.

{APPEND F#, "FileName"} Open FileName in Append mode. See {OPEN} command. Subsequent WRITES to the file will cause text to be appended to the end of the file.

F# - File Number (1, 2, 3, 4, or 5)

Filename - Name of File, may include drive and path information

NOTE: Any file which is opened with {APPEND}, must be closed with the {CLOSE} macro command before exiting from AS-EASY-AS. Failure to do so will result in the file information becoming corrupted and unusable.

{BEEP X} Produces a beep sound. This macro could be useful at the end of unattended macro(s) to signal the user that some task is completed, or to get the user's attention when a prompt for information is introduced. Also see {TONE X,Y}.

{BLANK Range} Erases the cells in the range defined by "Range". The effect is the same as when executing the /re command. This method is sometimes more desirable than /re since it will not display the menus as does /re when it is used in a macro.

{BORDEROFF} Turn the column and row borders off. Its function is the same as the /sbs menu command. Once this macro is invoked, the borders of the sheet, i.e., the portion containing the row numbers, become invisible until a {BORDERON} command is invoked.

{BORDERON} This macro command cancels the {BORDEROFF} macro. You might note that the screen needs to be updated, using the {UPDATE} macro after {BORDERON} is invoked.

{CALL Location} or {RangeName} Call the subroutine identified by "location". This is different than the {JUMP} command. {JUMP} transfers execution of the macro to a given location but "forgets" its current position. {CALL}, on the other hand, transfers execution to another location.

When a {RET} command is encountered, it returns execution to the next command following the calling cell and continues with the macro. Subroutines may be nested (they can call more subroutines) up to 20 levels deep.

Any macro command sequence can be called as a subroutine. Macro commands can call themselves as subroutines (i.e., they can be recursive). Improperly designed recursive macros can result in serious problems and will cause the macro stack overflow error.

{CHDIR "Path"} Change the current DOS directory to the one specified by Path. This macro command operates the same as the DOS chdir command.

{CLOSE F#} Close disk file F#. See {OPEN}, {READ}, {WRITE}, and {APPEND} macro commands.

F# - File Number (1, 2, 3,...)

As an example, {CLOSE 1} will close disk file #1.

{CLRSCR} Clears the screen, so that a messages can be written for presentations, etc. The screen remains in this mode until an {UPDATE} macro command is executed or the macro terminates.

CURSOR This variable may only be used in edit or macro modes and refers to the cell occupied by the current position of the cursor.

Example: Assume that cells A1 through A100 contain the values 1., 3., 4.5, and 8. randomly distributed. Let's say that you want to replace all occurrences of the value 8. with 1.25.

The following macro would do the trick for you:

<u>Cell Contents</u>	<u>Explanation</u>
B1 0	Set a counter cell
B2 {LET B1,0}{GOTO A1}	Go to beginning of range
B3 {If CURSOR=8}{LET CURSOR,1.25}	Set the criterion
B4 {LET B1,B1+1}	Increase counter by 1.
B5 {IF B1=100}{JUMP OUT}	Check if all 100 cells have been processed (if the counter cell reached 100). If yes, jump out of the loop.
B6 {DN}	Move the cursor down one cell.
B7 {JUMP BEGIN}	Repeat the loop
B8 {QUIT}	Stop executing macro.

** Don't forget to define the following range names:

<u>Range Name</u>	<u>Cell</u>
BEGIN	B3
OUT	B8
\A	B2 <-Press Alt-A to start macro

{DELAY X} This macro command will halt program execution for the specified (X) number of thousands of a second within a macro, **ONLY** while displaying a graph or the Sheet Status screen. A delay of X equal to 0 resets the pause mechanism to wait until a key has been pressed. This could be useful in displaying a graph for a given amount of time, before continuing execution of the macro.

{ESCON} and {ESCOFF} Disables/enables the escape key which would normally permit a macro to be aborted.

CAUTION: {ESCOFF} should be used only if other provisions for exiting a macro have been made. If no such provisions exist, you are liable to end up in an infinite loop, with the only way out being to reboot your computer.

{EXIT} Cancels one/top level of subroutine calls and allows macro programming to continue. This macro command was built into AS-EASY-AS to allow the user flexibility when a forced exit out of subroutines and loops is desired.

{FOR COUNTER, START, STOP, STEP} Executes the macro commands which follow until {NEXT} is encountered. The counter is increased by the value of step. If the new counter value does not exceed the step value, the macro loop is repeated again. This continues until the counter exceeds the stop value at which time execution transfers to the macro command cell below {NEXT}.

Counter	Cell location which keeps track of the number of macro iterations
Start	The beginning value for the counter
Stop	The end value for the counter
Step	The incremental value to be added to counter after each iteration

- NOTES:**
1. If Stop is initially less than the Start value, the macro loop will be skipped and execution transferred to the cell below.
 2. If Step is set equal to 0 (zero), an infinite loop will be created as the counter will never exceed the Stop value.
 3. A maximum of 4 nested {FOR} {NEXT} loops may be created.

{GET CELL} This command accepts the next character from the keyboard and places it in CELL. (This occurs as soon as you depress a keyboard key you do not need to press [ENTER]). For example, {GET A13} stops and waits until a key is pressed. If the Key "A" is pressed, then "A" is placed in cell A13.

{GOTOXY A1,A2} Places the character cursor at the column and row screen coordinate specified by A1 and A2. A1 is the column and A2 is the row of that coordinate. The coordinate 0,0 is located at the top left corner of the screen. Subsequent use of the {WRITE} macro will place text at the current cursor position.

Example: {Gotoxy 20,12}
 {Write "This text is in the middle of the screen"}

{HELP} Provides access to the AS-EASY-AS help screens during macro execution. Provides the same function as pressing the [F1] function key while in the Ready mode.

{IF Condition}Action... If the "condition" is met, then proceed with the identified "action" in the same cell, otherwise continue with the macro in the cell below this command. This macro command is very similar to the if-then-else structure found in many programming languages.

It is important to remember, however, that the "then" action must follow in the same cell as the IF test.

Example: {goto A1}~Macro Example~
 {IF Test>2}{JUMP A50}
 {calc}

Explanation: Position cursor on cell A1. Place the string "Macro Example" in that cell. If the value of the cell named "Test" is greater than 2, go to cell A50 and start executing the macro in that cell. If the value of "Test" is less than 2, then recalculate the spreadsheet.

{INDXY m,n} Sets the location of the mode indicator, to line (m) and column (n). (This is the area displaying the messages "Ready, Macro, Wait, etc."). The value for "m" must be 1-24 and that for "n" must be 1-80.

{INKEY CELL} Pauses execution of the macro and stores a single typed character in CELL. Macro execution continues after the key has been pressed.

{INLABEL "Prompt", Location}

{INVALUE "Prompt", Location} Display the text "Prompt" on the control panel and pause for input. The user can type a label (text string), or a value, and when [ENTER] is pressed, the label, or the value, is placed in the cell identified by "Location".

Example: {INLABEL "Enter Your Name",A5}

Explanation: Display the prompt "Enter Your Name" in the control panel and pause. When a user types his name and presses [ENTER], the name is placed in cell A5.

{INRANGE "Prompt",Cell} This macro command prompts the user for a cell range. The range can be defined using the pointing method (or the typing method) and the result is placed in cell.

Example: The Macro {InRange "What is the Erase Range",D2} would place the prompt "What is the Erase Range" in the panel area and wait for input. If the user presses:

```
[HOME]
. <----- (Period)
[DOWN]
[DOWN]
[RIGHT]
[ENTER]
```

The text A1..B3, representing the highlighted range, would be placed in cell D2.

{IOINIT "COMn:Baud,PA,DB,SB,LEN,DL"} This macro command is used to initialize one of the computer's serial ports for subsequent use of the {IOVALUE} and {IOLABEL} macro commands.

Initialize the serial port COMn where n=1,2,3,4.

Baud	Baud Rate (300, 1200, 2400,
PA	Parity (E, O, N, ...)
DB	Data Bits (Normally 7 or 8)
SB	Stop Bits (Normally 1 or 2)
LEN	Maximum length of string that will be transmitted or accepted as input (Default is 80)
DL	Delay in units of System Cycles.

Example: {IOINIT "COM2:2400,N,8,1,80,2000"}

Initialize serial port 2 for 2400 baud, No parity, 8 data bits, 1 stop bit, a maximum string length of 80, and a delay of 2000 system cycles.

{IOLABEL "String",Range} Transmit String to the initialized communications port and store the received information, as a label, in Range. You may leave String blank ("") if you just want to get information from the port without sending anything. Conversely, use the range name NUL if you are just sending information to the port.

Example: {IOLABEL "ATDT1234567"&@CHR(13),NUL}

Send the dial up sequence ATDT1234567, followed by CR to the initialized serial port. No information expected to come back to AS-EASY-AS, Range = NUL.

{IOVALUE "String",Range} Transmit String to the initialized communications port and store the received information, as a label, in Range. You may leave String blank (""), if you just want to get information from the port without sending anything. Conversely, use the range name NUL if you are just sending information to the port.

Example: {IOVALUE "",A2}
Receive information from the serial port (in this case from the other computer), and place it in Cell A2.

{IF @FIND(":",A2,1)>0} {IOVALUE +F1,NUL}
Check to see if the string that was received from the serial port, and placed in cell A2, contains the substring ":". If it does, then transmit the value in cell F1 to the serial port.

{JUMP Location} This macro instructs the program to continue executing at a new "location". The "location" can either be a cell location (A1, B345, AG5) or a range name that was created with the /Range, Name, Create command.

Be careful, this command is different than the {GOTO} macro command. {JUMP} simply tells the program which macro to execute next, whereas, {GOTO} transfers the cell pointer to the specified cell.

Example: {goto A1}~Macro Example~
{JUMP A50}

Explanation: Go to cell A1, place the string "Macro Example" in that cell and then jump to cell A50 and execute the macro in that cell, while the cell pointer is still at A1.

{LET A1,EXPRESSION} Evaluates the formula "EXPRESSION", and places the value in A1. Use of this command does not require that you physically move the cursor to A1 before entering data, therefore, it can reduce moving back and forth between various portions of the worksheet. EXPRESSION can be any valid mathematical or logical expression.

Example: {Let A3,A3+1} increments the value in cell A3 by one.

NOTE: There is no space between the "," and "Expression".

{MENCALL Location} Transfers execution to macro menu at "Location". Allows the user to make a menu selection, and then CALLS the macro identified by that menu selection. When {RET} is encountered, macro execution continues with the command following the {MENCALL}.

See {MENUJUMP} for instructions on defining your own menu.

{MENUJUMP Location} Transfers execution to the macro menu at "Location". Allows the user to make a menu selection, and then executes the macro identified below that menu selection.

The macro menu has to follow the guidelines given below:

- Two rows are used for the creation of the menu. Each menu option can be up to 30 characters long.
- The cell to the right of the last item of the menu must be empty to indicate the end of the menu.
- Each selection is placed in an individual cell in the first row.
- Each cell in the second row contains the explanation of the command in the cell above it. Whenever the user moves the cursor highlighting one of the menu options, the control panel displays the explanation for that selection.

A macro menu performs identically to AS-EASY-AS command menus.

- HINTS:**
1. Avoid menu entries that start with the same character so that an option can be selected by typing the unique first letter.
 2. AS-EASY-AS will assign the next unique letter in the command if a duplicate occurs.
 3. Upper case and lower case letters are considered equal.

When a user selects one of the items in the menu, AS-EASY-AS starts execution of the macro on the third row in the column of the selected menu choice.

An example of a Macro Menu is shown in Figure 9-2.

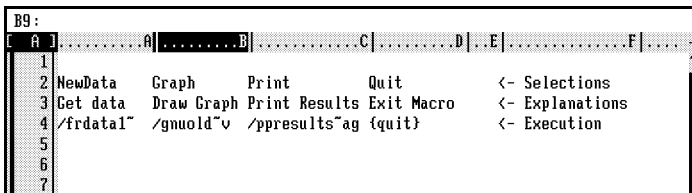


Figure 9-2 Example Macro Menu

{MENUOFF} Disables the screen update of the panel and pop-up window menus. Invoking this command will speed the operation of macros that frequently update the screen.

{MENUON} Restores screen update of the panel and pop-up window menus. This command should be invoked at the end of a macro that used {MENUOFF}.

{MENUWIDTH x} Specify a width of x (up to 28 characters) for the menu window. Once a menu width is specified, it stays in affect until a new {MENUWIDTH x} macro command is issued.

{MENUXY x,y} Specify the x,y coordinate of the upper left corner of menu window.

If the period key [.] is pressed while a menu is displayed at x,y, the menu position will toggle between the left and the right side of the screen, i.e., the x coordinate above will be overridden, but the vertical position of the menu will not change until a new {MENUXY x,y} command is used.

{MKDIR "Path"} Create the DOS directory specified by Path. The operation is similar to the DOS mkdir command and has the same limitations. For example, if you want to create the subdirectory C:\MINE\DATA, then the subdirectory C:\MINE should already exist.

{ONERROR} Transfers macro execution if an error condition exists. If an error condition exists at the time {ONERROR} is executed, execution of the macro will transfer to the macro command specified by "location". If an error condition does not exist, execution continues with the next macro command in sequence.

Syntax: {ONERROR location}

location: Cell address or range name which contains the next macro command to execute if an error condition exists.

Examples: {ONERROR L10} Execution will transfer to the macro command in cell L10 if an error condition exists.

{ONERROR ALARM} Execution will transfer to the macro command in the cell named ALARM if an error condition exists.

{OPEN F#,M#,"Filename"} Open a disk file which is to be read, written to, or appended. See {READ}, {WRITE}, {APPEND}, and {CLOSE} macro commands.

F# - File Number (1, 2, 3, 4, or 5)

M# - Mode (1, 2 or 3)

1 - Read - Allows the file to be read.

2 - Write - Opens a new file. If the file exists, current information will be erased.

3 - Append - Opens an existing file and places the file pointer at end of file.

Filename - Name of File, may include drive and path information

As an example, {OPEN 1,3,"C:\DATA\TRIDATA.DTA"}{WRITE...} will open TRIDATA.DTA located in C:\DATA, which is to be appended. If the file does not currently exist, it will be created.

NOTE: Any file which is opened with {OPEN}, must be closed with the {CLOSE} macro command before exiting from AS-EASY-AS. Failure to do so will result in the file information becoming corrupted and unusable.

{PAGESET} Sets document page length and margin settings.

Syntax: {PAGESET p,t,b,l,r}

p: Page length (lines per page)

t: Top margin (lines)

b: Bottom margin (lines)

l: Left margin (characters)

r: Right margin (characters measured from left side of the page)

Similar to manually selecting the /PrintTo, Printer, Options, Margins command, {PAGESET} can adjust the settings in one macro command. All settings must be included and separated by a comma.

Examples: {PAGESET 60,0,0,10,75} Set page length to 60, top and bottom margins to 0, left and right margins to 10 and 75.

{PAGESET 88,2,2,12,126} Set page length to 88, top and bottom margins to 2, left and right margins to 12 and 126.

{PICK Range,Outcell} PICK will create a pick window comprised of an alphabetical listing of the labels contained in the specified RANGE. Using the cursor keys, the user can move through the list and highlight the desired label. Pressing the first letter of a valid selection will move the cursor down the list to the first label beginning with that letter. When [ENTER] is selected, the highlighted choice is placed in OUTCELL.

- Range Cell range which contains listing of labels to appear in pick list.
Range is limited to a single column.
- Outcell Cell which will contain picked selection of up to 20 characters in length.

PICK is useful for situations where the user is to be prompted for data input, and there is a limited selection of valid or desired responses. An example of PICK is shown in Figure 9-3.

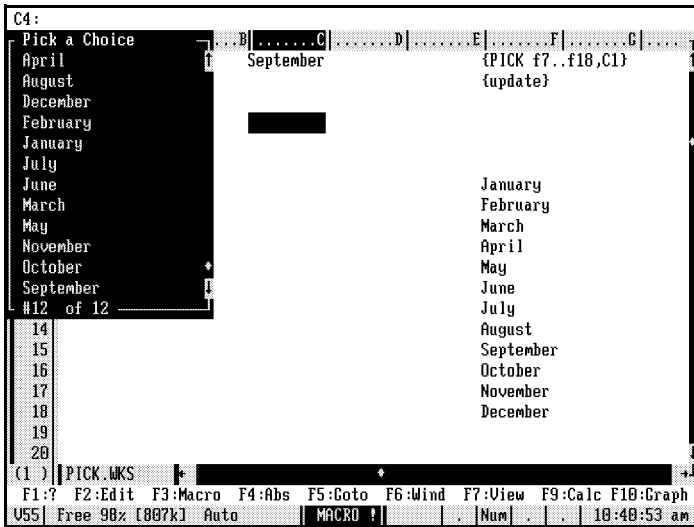


Figure 9-3 Example {PICK} Macro List

When the executing macro encounters {PICK f7..f18,C1}, a pick window will appear in the top left of the screen which is comprised of the labels in the range F1..F18. The user will select a label by pressing [ENTER] and the result be placed in cell C1.

{QUIT} Stops execution of the macro and returns to the "Ready" mode.

{READ F#, CellAddress} Read one line from disk file #, from the current pointer location up to the carriage return, and place it in CellAddress. Subsequent {READ}s will continue to read in one line at a time, until the end of file is encountered. At that point, execution will continue with the macro in the current cell, or if unsuccessful, the macro command in the next row. See {OPEN}, {CLOSE}, {WRITE}, and {APPEND} macro commands.

F# - File Number (1, 2, 3, 4, or 5)

CellAddress - Worksheet cell location (column & row) where read information is to be placed.

As an example, {READ 1, D10} will read a line of information from file #1 and place it in cell D10 of the worksheet.

{RECALC Range} Calculates only the specified range.

{RESTART} This command clears all levels of the subroutine stack and continues execution of the macro commands. If {RESTART} is encountered, AS-EASY-AS continues with the instructions that follow. Upon completion of the subroutine, it will terminate and WILL NOT return to the calling routine.

{RET} When this command is encountered, execution is returned to the cell just below the last {CALL} command, i.e., to the macro that called the subroutine terminated with {RET}. If no {CALL} command exists, and a {RET} command is encountered, a macro error occurs.

{RMDIR "Path"} Remove the DOS directory specified by Path. The operation is similar to the DOS rmdir command. If the specified directory contains any files, it will not be removed.

{SCRNOFF} Disables the update of the screen. Invoking this macro command will speed the operation of most of your macros since screen I/O is time consuming. Remember to restore screen update after your macro is completed.

NOTE: When this macro is used, it will seem that your computer is not doing anything, i.e., the screen will not be updated until {SCRNON} and {UPDATE} macros are executed.

{SCRNON} Enables the update of the screen. This command should be invoked at the end of a macro that used {SCRNOFF}.

{TONE A1,A2} Generates a sound of frequency A1 (Hz) and duration A2 (milli-seconds). A1 and A2 can be values, results of a calculation or cell references. This macro can also be used to cause a delay in macro execution without generating an audible tone, if desired.

i.e. {TONE 0,5000} will create a silent delay of 5 seconds.

{UPDATE} Refreshes the screen. Useful after a {SCRNON} command.

{VALIDATE} Prompts the user for a value, showing the range of valid values, and places the validated result in a destination cell.

Syntax: {Validate "Prompt",Lower_Limit,Upper_Limit,Destination}

Prompt:	Text prompt to be displayed
Lower_Limit:	Lower value of valid input range
Upper_Limit:	Upper value of valid input range
Destination:	Cell location where validated value is to be placed

Suspends execution of the macro sequence and displays the prompt and the Minimum and Maximum values. After the user enters a value and presses [ENTER], the program compares the entered value to the Lower_Limit and Upper_limit Values.

- If the entered value is within the specified range, then it is placed in the Destination cell.
- If the entered value is less than the Lower_limit, then the Lower_limit value is placed in the Destination cell.
- If the entered value is greater than the Upper_limit, then the Upper_limit value is placed in the Destination cell.

Examples: {Validate "Age:",5,55,A5}

If the user enters 12, the value 12 will be placed in cell A5.

If the user enters 3, the value 5 will be placed in cell A5.

If the user enters 67, the value 55 will be placed in cell A5.

{WHILE Test,Action} Perform a subroutine call to the "Action" while the "Test" is true. The subroutine must have a corresponding {RET} statement. Once the result of "Test" is false, continue execution of the macro command in the cell below.

{WRITE "String"} Print the content of "String" at the current character cursor screen coordinates, and leave the cursor at the end of the printed string. It should be noted that this is only a temporary screen write. If this was the last macro command in a sequence, it would disappear as soon as it was printed since the screen would be updated at the end of the macro sequence.

{WRITE F#, "String"} Writes "String" information to open disk file F#, starting from the current pointer location. Subsequent {WRITE}s will continue to be appended to the file. If the {WRITE} fails, execution will continue with the macro command in the next row. See {OPEN}, {CLOSE}, {READ}, and {APPEND} macro commands.

F# - File Number (1, 2, 3,...)

"String" - Information to be written to the file.

As an example, {WRITE 1, "Test Data"} will write the string "Test Data" to file #1.

{WRITELN "String"} Same as the {WRITE} macro, above, but places the cursor at the beginning of the next character row.

{WRITELN F#, "String"} Same as the {WRITE F#, "String"} macro above, but writes String information to the file, starting from the current pointer location, as a single line, followed by carriage return and line feed characters.

10. MENU COMMAND SUMMARY

Commands are the tools for performing AS-EASY-AS tasks and menus are the toolboxes. Access to the command menus is provided by pressing the forward slash key [/] or by pressing the right mouse button. The [/] slash key is usually located on the right side of your keyboard, just above the space bar. Once this key is pressed, a window will appear on the top left corner of the screen, containing the main menu commands. If you select the wrong command, you can press [ESC] at any time to return to the preceding menu.

Hint: Pressing the period (.) key while a menu is displayed will toggle the position of the window between the left and right sides of the screen.

The commands that appear in the pull down menu box can be selected by one of the following methods.

1. Move the cursor with the [UP] and [DOWN] cursor keys to highlight the command of your choice. Once there, the command may be activated by pressing the [ENTER] key.
2. Type the highlighted letter of the desired command. For example to select the FILE menu, press the letter "F"; to select the PrintTo menu, press the letter "P", etc.
3. Move the mouse pointer to the desired option and press the left mouse button to select it. To back out of the menu, press the middle or right button. (Note your mouse driver needs to be loaded prior to starting AS-EASY-AS).

As you point to different commands by moving the menu pointer, either an explanation of the command or a listing of subcommands appears in the control panel area.

The following section provide a complete list of AS-EASY-AS commands. Details about the operation of the major commands given here can be found in other parts of the manual.

10.1 SHEET (/s) SHEET commands control the way spreadsheet information is displayed on the screen. Access to default settings which affect the spreadsheet as a whole are also provided.

BORDER (/sb) Rows and columns may be set such that they do not scroll with the rest of the screen as you move about a worksheet. They can be thought of as fixed headings which are continually displayed as you move through a worksheet.

Both (/sbb) Row(s) above the current cursor row and column(s) to the left of the current cursor column will remain displayed as you move through the worksheet.

Clear (/sbc) Clears border row and column settings from memory.

Horizontal (/sbh) Row(s) above the current cursor row will remain fixed as you move through the worksheet.

Suppress (/sbs) Toggles the display of column headings and row numbers on and off.

Vertical (/sbv) Column(s) to left of cursor column are set to a vertical border that will remain fixed as you move throughout the worksheet.

COLWIDTH (/sc) Sets column widths.

Global (/scg) Set the default column width.

Hide (/sch) Set the column width to 0. Information in the column will still be used for spreadsheet calculations. Resetting the column width to a non-zero value will re-display the column.

Hint: To "hide" a row from printing, place a "|" character in the left-most cell of the print range in the row you wish to hide.

Range (/sca) Set the column width for a range of columns. This command may also be used to format alternating columns by setting SKIP to a non-zero value. A SKIP value of 1 will set the column width for every other column. A SKIP value of 2 will set the column width for every third column, etc.

Reset (/scr) Reset the width of the column occupied by the cursor to the General Column width.

Setwidth (/scs) Adjust the width of the column occupied by the cursor. This can be accomplished three ways. You can type the new column width when the current column width appears in the command area, you can dynamically adjust the column width using the left and right cursor keys, or adjust the column width using a mouse. When you have achieved the desired column width, press [ENTER] to return to the ready mode.

A variable or formula reference may be used to supply the requested value.

Consider the following example that sets the width for column B:

Assume cell A1 contains the value 5, the cursor is located in B1 and the following sequence of keys is pressed:

/scsA1[ENTER]

This will result in the width of column B being set to 5 (the value in cell A1).

NOTE: If you have a mouse you can bypass this menu while in the ready mode. Just position the mouse on the column heading. Depress the mouse button and drag the column to the desired width.

DELETE (/sd) Delete column(s) or row(s).

Column (/sdc) Delete column(s) at cursor position. The columns to the right of those deleted are shifted left. The pointer can be expanded to delete more than one column by pressing the "." to anchor the cell and expanding the pointer. Note that formulas that reference cells in the deleted column(s) will now display "ERR".

Row (/sdr) Delete row(s) at cursor position. The rows below the ones deleted are shifted up. The pointer can be expanded to delete more than one column by pressing the "." to anchor the cell and expanding the pointer. Formulas that referenced cells in the deleted row(s) will be adjusted and will now display "ERR".

GENERAL (/sg) Sets default parameters for the whole worksheet. Once these parameters are set they stay in effect until they are changed, a new worksheet is loaded, or the program is exited.

Format (/sgf) Sets the default format of all unformatted cells in the spreadsheet (see /Range Format for formatting options).

Example: /sgfF2 [ENTER] sets the default format to "fixed" with two places to the right of the decimal point.

Label (/sgl) Sets the default formatting prefix for labels (text). The default label prefix is left justified but you can also specify "center" or "right" justified, or "padded" with ellipses (...).

The default prefix can be overridden by preceding text by one of the following characters.

- ' Left Justified (e.g., 'Test)
- " Right Justified (e.g., "Test)
- ^ Centered (e.g., ^Test)
- « Right Justified, pad with ellipses (e.g., «Test)
- » Left Justified, pad with ellipses (e.g., »Test)

Negative (/sgn) This toggle switch is used to help the user quickly identify cells containing negative numbers in a worksheet (see Section on /Sheet,General,Install,Options for color selections).

YES (/sgny) Cells containing negative values are displayed in a unique color.

NO (/sgnn) Cells containing negative numbers do not look any different than other positive cells.

Protect (/sgp) Toggle worksheet protection on/off.

Disable (/sgpd) This command disables protection and allows all cells to be modified. A diamond to the right of Disable indicates that cell protection has been turned OFF.

Enable (/sgpe) Turn protection ON. This command does not have any effect on cells that have been unprotected using the /RANGE, LOCK, NO command. Protected cells cannot be edited once this command has been invoked. When this sub-menu is accessed, a indication to the right of Enable indicates that cell protection has been turned ON.

Password (/sgpp) Provides password protection for making changes to a worksheet. The password may consist of upper/lower case characters and numbers and can be up to 20 characters long.

This command provides added security to the user's worksheet. The effect is similar to the SHEET, GENERAL, PROTECTION, ENABLE command with a very important difference. Once the password is specified, protection is turned ON and the RANGE, LOCK menu command is disabled.

Once Password Protection is enabled, the user MUST know the password to disable it. If you forget your password, you will NOT be able to turn protection off.

To cancel Password Protection, select SHEET, GENERAL, PROTECTION, DISABLE and type in the EXACT password when prompted to do so. Note that upper and lower case characters are different. For example, the password "Test" is NOT the same as "TEST".

Recalc (/sgr) Set the worksheet calculation mode.

Auto (/sgra) Select automatic recalculation. The status indicator **Auto** is displayed at the bottom of the screen. If the automatic recalculation mode is selected, when a cell entry is modified, all cells containing references to the modified cell are updated.

NOTE: For worksheets that are calculation intensive, the manual recalculation option may be more desirable since cell changes will not result in all calculations being performed each time data is entered.

Manual (/sgrm) Select manual recalculation. A status indicator **man** is displayed at the bottom of the screen. Once this option is set, you have to press F9 each time you want formulas to be re-evaluated.

Row-wise (/sgrrr) Forces automatic recalculation of the spreadsheet to occur in a row-by-row sequence. The indicator at the status line at the bottom of the screen will display **AutoR**. AS-EASY-AS starts at the top left of the worksheet and processes calculations on a row-by-row basis, from left to right, top to bottom.

Col-wise (/sgrc) Forces automatic recalculation of the worksheet to occur in a column-by-column sequence. The indicator at the status line at the bottom of the screen will display **AutoC**. AS-EASY-AS starts at the top left of the worksheet and processes calculations on a column-by-column basis, top to bottom, from left to right.

10-6 SHEET COMMAND SUMMARY

Zeros (/sgz) Selects whether the user wants to display cells with zero values or not. Note that although invisible, the zeros contained in the cells can be used in calculations.

No Don't show cells with zero value.

Yes Show cells with zero value.

INSERT (/si) Insert column(s), row(s), or page break characters.

Column (/sic) Insert column(s) at cursor position. More than one column may be inserted by expanding the pointer. Press the "." (period) to anchor the cell and expand the pointer. Then press [ENTER]. Only the number of columns in the expanded pointer will be inserted.

If the rightmost column of the sheet contains non-blank cells, no insertion will occur and an error message will be displayed.

Page (/sip) Insert a single row and page break characters, |:: . This will result in a page break in your text when printing, i.e., when |:: is encountered, a page eject occurs.

Row (/sir) Insert row(s) at cursor position. More than one row may be inserted by expanding the pointer. Press the "." (period) to anchor the cell and expand the pointer. Then press [ENTER]. Only the number of rows in the expanded pointer will be inserted.

If the bottom row of the worksheet contains non-blank cells, no insertion will occur and an error message will be displayed.

NOTE: If 3D mode is selected, only rows to the bottom of the current page will be shifted by an insert command.

MACRO (/sm)

Compose (/smc) Record your own macros, keystroke by keystroke.

The first time this command is invoked, the macro composition ability of the program is turned on. The only difference in the operation and appearance of the worksheet is the mode indicator at the bottom of the screen which displays "COMPOSE".

Perform your desired action as you would in normal operation. All keystrokes are placed into a storage buffer which can hold up to 2,048 keystrokes.

When you finish composing your macro, invoke the /SHEET, MACRO, COMPOSE command a second time.

You will be prompted to specify the destination cell for the defined macros. The macro command sequence will be divided into 40 character blocks. Each block is placed in a cell starting with the specified output cell and continuing downward until the whole buffer has been dumped.

The 40 character limit is reduced in cases where it would result in dividing a valid macro command into two invalid ones (eg. "{BORDERON}" would NOT be divided into "{BORD" in one cell and "ERON}" in the cell below).

Execute (/sme) Execute macros that have been assigned a range name. For example, to execute a macro given the name SAMPLE, you would follow the steps below:

1. Invoke the /Sheet, Macro, Execute command.
2. When a message appears in the panel area, asking you for the name of the macro, either:
 - a. Type the name SAMPLE and press [ENTER], or
 - b. Press [F1] and select the macro name from the window.

Once specified, the macro will begin executing. (See also Function Key [F3])

Step (/sms) Toggles Macro Step execution On/Off.

Yes (/smsy) Execute a macro step by step. You specify the number of msec to delay between macros ($0 < D < 5000$ msec). If a delay of zero ($D=0$) is specified, the program will pause after each macro command, until you press any key to continue.

No (/smsn) Toggle macro step execution off.

STATUS (/ss) Displays the general settings of the spreadsheet. This information includes the version, the boundaries of the working area, the amount of conventional and EMS memory reported by DOS, and the available free memory, the default prefix, columnwidth, format, the number of windows and panels, the type of video detected, the user's hardware, command line switches used, etc.

TEXT (/st)

Find (/stf) Searches for a specified string throughout the spreadsheet. Starts the search at the current position of the cursor and scanning from left to right and then downward row by row. The pointer stops in the cell where the string is found and waits for a keystroke. Pressing [ENTER] searches for the next occurrence of the string while pressing [esc] terminates the search at the current cell. (see Text Replace for search options)

Justify (/stj) Takes the highlighted block and rearranges the text within the specified width. This can also be used to snake text column by column.

When justifying text to a narrower width, make sure that the specified range includes enough rows to accommodate the narrower (but longer) text column.

When the text justify command is selected, the user is given the option of Padding the text with spaces (right justification) or justify with a ragged right edge.

If the number of rows included in the range are not enough for the new size columns, a message will be displayed and no adjustment will take place. This is to make sure that the justified text does not over-write other information by mistake.

Replace (/str) Searches for a specified sequence of characters in the spreadsheet. Three options are available for either find or replace:

P Pause at each occurrence of the specified string, and wait until one of the following keys is pressed:

[ENTER] Continue until next occurrence

[ESC] Stop Searching

[SPACE] Skip this replacement, find next occurrence of the string

U Upper Case search only. Ignore any occurrences of the string if they are lower case.

R Search specified range only. A prompt for the Search Range will occur.

NOTE: Protected cells will not be altered if Protection is enabled.

Word (/stw) Select the word processing mode, which is useful for writing memos or short letters of up to on screen in length.

When the TEXT WORD command is selected, the user is given the option of padding the text with spaces (right justification) or justify with a ragged right edge.

VIEW (/sv) Enters the menu for opening and manipulating multiple windows or views of the worksheet in RAM.

Close (/svc) Close the last window opened. This command can be repeated until all views are closed. Closing a middle view will result in the windows being renumbered accordingly.

Layer (/svl) Reorganize the view from a full-screen view to a layered view of the active window. [F7] is used to toggle between the window views and is used to select the active window.

Move (/svm) Reposition the active window. To move the worksheet view, the size of the window must first be reduced to less than full-size. The cursor keys may then be used to move the active window.

Open (/svo) Creates a new view based on the active window. If this process is continued, up to 6 views of the worksheet will be created. Worksheets will overlap each other (layer) when opened.

Reset (/svr) Close all window views.

Size (/svs) Change the width and/or height of the window. The smallest size is 22 character columns by 4 character rows. The number of columns and rows is dependant on the type of graphics text selected. The [up], [down], [left], [right], [home], arrow keys can be used to reduce and enlarge the view.

Zoom (/svz) Change the current view from a layered view to a full-screen view of the active window.

WINDOWS (/sw) Splits the screen into either horizontal or vertical windows. You can then work in one window or the other and jump between windows with the [F6] key.

Clear (/swc) Restore the screen to its original condition, i.e., one window.

Horizon (/swh) Splits the screen into two horizontal windows at the location of the cursor.

Sync (/sws) Synchronizes the two windows on the screen so they both scroll together.

Unsync (/swu) Un-synchronize the two windows on the screen so they scroll independently of each other.

Vertical (/swv) Split the screen into two vertical windows at the location of the cursor.

10.2 RANGE (/r) Allows you to perform a number of operations on a range of specified cells, (see Section 3.4 on ranges).

AUDIT (/ra)

Crossref (/rac) Print a Cross Reference report of a selected range on your printer. It looks similar to the sample below:

<u>Cell</u>	<u>Type</u>	<u>Count</u>	<u>References</u>
A2	REAL	1	D5
A3	FORM	2	C30 F55
A4	LABEL	2	Y3 X6

Where:

Count	The number of cells using the specified cell in a formula
References	The cells that use the specified cell in a formula
Type	Specifies the content-type as follows: STR - string formula INTEGER - integer REALVALUE - real value FORMULA - formula LABEL - label ERROR - a previous calculation resulted in an error.

Overview (/rao) Allows a global range view of the data in the spreadsheet, including statistics such as the number and percent of total cells of a particular type, (i.e., errors, formulas, real value, integer, labels, string)

The overview is displayed with column and row headings. The resolution of the displayed information depends on the size of the worksheet in use, i.e., the distance to the rightmost and leftmost occupied (non-blank) cells in the worksheet currently loaded in memory.

Depending on the contents within each displayed block of information, the first letter of the cell type is placed at the intersection of each row/column heading.

If the worksheet is large, and the displayed resolution is less than one cell, then the character identifier is based on the last cell of each block of cells represented in the overview matrix.

Trace (/rat) Highlights the cells in the worksheet that are linked to the selected cell. Position the cursor over the desired cell and press [ENTER]. Cells which reference the selected cell will appear highlighted. This is a very useful command when you are trying to trace a complex linkage of cell references.

COPY (/rc)

Formula (/rcf) Copies the formula contents of a cell unaltered to a new location, i.e., without performing the formula translation done by the Copycell command.

Invert (/rci) Copies a range of values and places them in the output range after dividing them into 1. For example, if cells A1 and A2 contain the values 3 and 5 respectively, and are invert copied to B1 and B2, they would contain the values 0.3333 and 0.2 respectively.

Scale (/rcs) Copies a range of values and places them in the output range after applying a scale factor.

For example, if cells A1 and A2 contain the values 3 and 5 respectively, and they are scale copied to cells B1 and B2 with a scale factor of 2, cells B1 and B2 would contain the values of 6 and 10 respectively.

Transpose (/rct) Copies a range of values and equations into another range of the worksheet, transposing the column/row locations of the original range.

The sequence of commands /rctA1..D2 [ENTER] A4 [ENTER], would result in copying the range as follows.

The first row of the original range becomes the first column of the new range; the second column of the original range becomes the second row of the new range, etc. Note that when a range is copy-transposed, NO EQUATIONS are being copied, just like the Range, Copy, Value command.

Value (/rcv) The Range, Copy, Value command only copies the values from the selected range, NOT THE EQUATIONS.

Example: Cell A1 contains the value 3.0
 Cell B1 contains the value 5.0
 Cell C1 contains the equation +A1+B1 and the value 8.0

If cell C1 is copied to cell G3, using the CopyCell command, the content of G3 is the equation +E3+F3.

If cell C1 is copied to cell G3 using the Range, Copy, Value command, there is NO EQUATION in G3, just the value 8.0.

COLOR (/ro) Set the foreground and background colors for a range of cells. A matrix of colors appears with the current color settings highlighted by the cursor. As the cursor is moved around, the color value for the combination selected is displayed in the command panel area. When the desired combination is displayed, press [ENTER] to select the desired color. Alternatively, you can enter the color number directly in the command panel area (e.g., 23 = blue background and white foreground).

Once the color selection is made, and the range to be colored is entered, the appropriate color changes will take effect.

ERASE (/re) Erases the cells within the specified range.

FORMAT (/rf) Specify the way cells display their information. For cells with numeric entries, the way the cell looks does not always reflect the accuracy of the number as it is stored internally. A variable or formula reference may be used to supply the requested value.

The following example sets the format for cell B1. Assume cell A1 contains the value 5, the cursor is located in B1 and the following sequence of keys is pressed: /rffA1[ENTER][ENTER]. This would result in cell B1 being formatted to fixed values with 5 decimals (the value in cell A1).

Background (/rfb) A character is used to fill the spaces of a cell not occupied by the value/string entered in that cell. See /USER, INSTALL, COLOR, FBKGD to change the color.

Box (/rfo) A box or table is created in the range specified. A box can only be created to occupy a blank cells. For example, if you would like a box created between cells, rows and/or columns must be inserted around the cell.

The box format senses any neighboring cells and chooses the appropriate box character. To erase the box you have created, select Range, Format, Reset (/rfr).

Comma (/rf,) Use commas to separate thousands. Useful for accounting applications. Negative numbers are enclosed in parentheses.

Example: If cell A1 contains the value -1000.2 and it is formatted using /rf,2[ENTER], the cell will display (1,000.20).

Currency (/rfc) Displays number preceded by a dollar sign. Negative numbers are surrounded by parentheses. (See /User Install Punctuate for alternate currency symbols).

Example: If cell A1 contains the value -1000.2 and it is formatted using /rfc2[ENTER], the cell will display (\$1,000.20).

Date (/rfd) Sets the format to one of the date or time formats. To display the year with only the last 2 digits, rather than all 4 digits, see the /DO command line switch in Section 2.4.

D-M-Y (/rfd1) Shows the date in the form **day-month-year**, i.e., 29-Nov-1996

D-M (/rfd2) Shows the date in the form **day-month**, i.e., 29-Nov

M-Y (/rfd3) Shows the date in the form **month-year**, i.e., Nov-1996

MM/DD/YY (/rfd4) Shows the date as **month/day/year**, i.e., 11/29/1996

DD/MM/YY (/rfd5) Shows the date as **day/month/year**, i.e., 29/11/1996

H:M:S (/rfd6) Shows the time as **Hours:Minutes:Seconds**. The program assumes that the value in the cell represents a fraction of a day.

Examples:	<u>Cell Contents</u>	<u>Display</u>	
	0.5	0.5	< Unformatted
	0.5	12:00:00pm	< Formatted as HH:MM:SS
	0.55	01:12:00pm	< Formatted as HH:MM:SS

H:M (/rfd7) Shows the cell as **Hours:Minutes**. The program assumes that the value in the cell represents a fraction of a day.

Examples:	<u>Cell Contents</u>	<u>Display</u>	
	0.5	0.5	< Unformatted
	0.5	12:00	< Formatted as HH:MM
	0.55	13:12	< Formatted as HH:MM

Eng (/rfe) Displays the number with the following engineering suffix for values \$ 1E-18 and # 1E+12.

a	=	1E-18	atto	m	=	1E-3	milli
f	=	1E-15	femto	k	=	1E+3	kilo
p	=	1E-12	pico	M	=	1E+6	Mega
n	=	1E-9	nano	G	=	1E+9	Giga
u	=	1E-6	micro	T	=	1E+12	Tera

For example, 1,450 formatted in E2 (2 decimal places) would display as 1.45k.

Fixed (/rff) Sets the number of digits displayed after the decimal point (up to 7 max). If a cell containing a real value greater than 9.9E+14 is formatted using the fixed format option, then the cell displays !!!!!!! as an indication to the user that the selected format is inappropriate. The display may be reset by either formatting the cell using the scientific format, or by resetting the cell format (RFR command).

Example: If cell A1 contains the value 1000.2 and it is formatted using /rff2[ENTER], the cell will display 1000.20.

frAc (/rfa) Displays entry as a fraction. Sets the base denominator of 2 to the n power. For example, if the denominator power was set to 2, (i.e., the denominator is 2² or 4), an entry of 0.5 would be displayed as 1/2, and an entry of 2/8 would be displayed as 1/4.

An entry of 0.33333 (i.e., 1/3) would be displayed as 1/4, 3/8, 5/16, 11/32, 21/64, and 43/128 for cells formatted with the base denominator power set to 2, 3, 4, 5, 6, and 7 respectively.

General (/rfg) Trailing zero digits after the decimal are not displayed.

Hide (/rfh) Makes the contents of cells invisible. The contents of the cells can still be used in calculations. To make the contents of the cells visible again, use /Range, Format, Reset.

Label (/rfl) Forces all inputs into these cells to become labels. This is useful for telephone numbers, social security numbers, and zipcodes which would otherwise be displayed as their evaluated result.

Map (/rfm) Sets the color of the contents of each cell based on the value contained in that cell. The color of a cell may be calculated as follows:

$$\begin{aligned} \text{Foreground} &= @\text{MOD}(x,16) \\ \text{Background} &= @\text{MOD}(@\text{INT}(x/16),16) \end{aligned}$$

Color combinations have a valid range of 0..255. The color values are combined as: Color = Foreground + (Background*16). See the AS-EASY-AS User's Manual, Appendix C, for a listing of color values.

For example, the color of a cell containing the value 233 would have the color:

$$\begin{aligned} \text{Foreground} &= @\text{MOD}(233,16) &&= 9 \text{ (Royal Blue)} \\ \text{Background} &= @\text{MOD}(@\text{INT}(233/16),16) &&= 14 \text{ (Yellow)} \end{aligned}$$

or a Royal Blue foreground on a Yellow background.

Percent (/rfp) Displays number by multiplying by 100 and attaches a % sign, i.e., 29 percent (0.29) is displayed as 29%.

+/- (/RF+) Displays positive numbers as an integer number of (+) signs, negative numbers as (-) signs. A value of zero is represented as (.)

For example, the number 5 would be displayed as +++++ (five plus signs), and the number -3 would be displayed as --- (three minus signs). This is useful for graphically representing the behavior of a range of values.

Reset (/rfr) Restores format to default format (See Sheet, General, Format to set the default format).

Science (/rfs) Display the number in scientific notation.

Example: If cell A1 contains the value 1000.2 and it is formatted using /rfs4[ENTER], the cell will display 1.0002E+03.

Text (/rft) Displays all formulas as text. For example, a cell with the formula @sin(5) would normally display the value -1. If the cell is formatted as text, the cell would display the formula @sin(5).

You can return to the calculated value of the formula by invoking /Range, Format, Reset.

User (/rfu) Displays values (not labels) using a template specified by the user under /USER, INSTALL, FORMAT. See USER, INSTALL, FORMAT, CREATE for details in setting up such templates.

LOCK (/rl)

Yes (/rly) Protect cells in a specified range. Once the range is protected, and the /Sheet General, Protect, Enable command is active, the contents of the range cannot be altered. The panel area will display *Protected* when the cursor is placed on a protected cell and /Sheet General Protection is Enabled.

No (/rln) This command reverses the effect of the previous command. If Range, Lock, No has been executed on a range of cells, the cells can be edited even after the /Sheet, General, Protect, Enable.

See User Install Colors Unprotect to set the color of unprotected cells.

NAME (/rn)

Build (/rnb) Automatically creates range names based on information provided in columns of the worksheet. The two columns, which need to be adjacent, contain the desired range name (left column) and the actual cell range (right column), as in the example shown below:

<u>Column-1</u>	<u>Column-2</u>
Range_Name1	A1..A10
Range_Name2	A2..A15
Range_Name3	B10..C35

By selecting /rnb and highlighting the information in the two columns, AS-EASY-AS will automatically build the range names.

Create (/rnc) Assigns a name to a range of the spreadsheet. Thereafter, the name may be used in place of the cell reference. To make a named range absolute, a \$ must preface the range name, e.g. \$TOTAL.

A maximum of 11 characters may be used to define a range name. Note that a maximum of 250 range names can be defined in a single WKS file.

To redefine a name, after you invoke the /rnc command, press the [ESC] key once. A pick list of all range names will be displayed on the screen. Move the pointer to highlight the selected range name and press [ENTER]. The range currently occupied by the NAME will be displayed. This range can be canceled by retyping the new range.

Example: Try the following keystroke sequence:

```
/rncTOTAL [ENTER] A1 [ENTER];
```

Move the cursor to cell A2 and type: +TOTAL [ENTER]. The value of cell A1 should appear in cell A2. (If no value is present in cell A1, a value of zero will appear in cell A2).

Delete (/rnd) Removes a name from the list of range names. Once you remove it from the list, you cannot refer to the corresponding range of cells by that name.

Reset (/rnr) Erases all the Range Names from the spreadsheet.

Table (/rnt) Places a table of the ranges and range names, converted to labels, in the spreadsheet. This can be very useful in documenting the spreadsheet.

PREFIX (/rp) Changes the formatting prefix character of a range of labels. Three choices are available as shown in the sub-menus below.

Center (/rpc) Centers labels within the specified range.

DotL (/rpd) Permits padding left justified labels with ellipses (dots...). This prefix [»] may also be entered in a cell by holding the Alt key down and entering (using the numeric keypad) 175, for left justified.

DotR (/rpo) Permits padding right justified labels with ellipses (dots...). This prefix [«] may also be entered in a cell by holding the Alt key down and entering (using the numeric keypad) 174, for right justified.

Left (/rpl) Left justifies labels within the specified range.

Right (/rpr) Right justifies labels within the specified range.

USER (/ru) Creates a listing of referenced External User Defined Functions or clears the function definitions from a worksheet.

Table (/rut) Creates a two column listing of external function names and definitions which are contained in the worksheet. This feature allows you to document the external functions used in the worksheet.

Reset (/rur) Converts the content of all cells which contain references to External User Functions from values to strings. Those cells will then display their formulas as labels. The worksheet is then cleared of all external function definitions.

10.3 COPYCELL (/c) Copies a cell or a block of cells to cursor position.

1. Highlight cell or range you want to copy or type in cell range. When range is finalized, press [ENTER].
2. Move pointer to position where block is to be copied to. Press [ENTER].

The block will be copied to the position of the cursor in step 2 and to cells to the right and below if more than one cell was indicated. All relative cell references are maintained while absolute cell references will remain unchanged.

10.4 MOVECELL (/m) Moves a cell or a block of cells to cursor position.

1. Highlight cell or range you want to move from or type in cell range. When range is finalized, press [ENTER].
2. Move pointer to position where upper left hand corner of block is to be placed and press [ENTER].

The cell or block will be moved to the pointer position. All cell formula references are updated to reflect the new position and maintain the integrity of the reference. Moving cells on top of referenced existing cells will cause those references to be adjusted to +ERR.

10.5 ARRAY (/a) Enter the Array/Matrix Menu. See Section 8 for a detailed discussion on Array/Matrix operations.

Add (/aa) Adds two matrices. You must specify the first array, the second array, and the output location.

ESolve (/ae) Finds the solution to a set of N simultaneous equations with N unknowns.

Invert (/ai) Calculates the inverse of a NxN matrix. The smallest N*N dimension is assumed and all other elements are ignored.

Multiply (/am) Multiplies two matrices. You must specify the first array, the second array and the output location.

Subtract (/as) Subtracts two matrices. You must specify the first array (subtract from), the second array and the output location.

Transpose (/at) Calculates the Transpose of matrix.

Determinant (/ad) Calculates the Determinant of a matrix.

Linear (/al) Determines the Maximization and Minimization of functions using the Simplex Big M method.

Quit (/aq) Exits the Array sub-menu and returns to the Ready mode.

10.6 DATA (/d) Enters the Data and DataBase Menu. See Section 7 for a detailed discussion on Data Management.

BIN (/db) Creates a frequency distribution table displaying the count of values in a range that fall within given ranges, bins, as well as the frequency of values within that range. The bins are a block of values, in ascending order, placed anywhere in the worksheet.

FILL (/df) Fills a range with a series of values. Specify the output range, the starting value, and the increment.

GOALSEEK (/dg) The DATA GOALSEEK command allows you to search for the input that would result in a desired output from a model. Specify the INPUT cell, the OUTPUT cell and the DESIRED goal and AS-EASY-AS modifies the input cell by using a NEWTON-RAPHSON convergence technique until the specified output is reached. If the desired result has not been reached by 25 iterations, the process stops, and the value plus @ERR is placed in the input cell.

Desire (/dgd) Specify the value that you are seeking. When this value is specified, the program next asks for the solution tolerance. The more restrictive (smaller) the tolerance is, the longer the solution takes.

Input (/dgi) Specify the input cell to the calculation model.

Output (/dgo) Specify the cell that contains the output value of the calculation model.

INPUT (/di)

Criteria (/dic) The criterion range contains the criteria that will be used to perform the FIND or EXTRACT operations on the input range of the database. Two is the minimum number of rows used to define the criterion range. Criteria fall into two categories: character comparisons and numeric comparisons.

Form (/dif) Define a form that can be used for entering, editing, or browsing records. Based on formatting information and field characteristics, AS-EASY-AS creates a data input form and locates the database pointer at the first record of the database. The user then has the option of entering a new record, editing existing data, or browsing through the database. For detailed instructions on setting up a Data Input Form, see Section 7.7.

AS-EASY-AS automatically formats new data as it is input into a field. You may optionally control the position and color of the fields, the valid range of data, and the case (upper, lower, or proper) of the data. Up to 50 fields may be displayed on one screen in Graphics Mode.

To create an input form, perform the following steps:

1. Define a number of cells (in the same row) that contain the field headings for your database.
2. Format the field headings for the type of data each cell will contain.
3. Enter desired field characteristic options in the cell immediately above the field heading.
4. Select Data, Input Form, and highlight the range of field headings.

Range (/dir) This powerful command is mainly for those who develop applications to be used by other individuals.

Once this option is invoked and a range is highlighted, cursor movement is restricted to the cells that were intentionally unprotected by the user using the /Range, Lock, No command.

PARSE (/dp) This function allows you to take numbers embedded within a label, and convert them to values in individual cells.

For example, if cell A1 contains the string "12 13 15", the keystrokes /dpA1 [ENTER] would result in the numbers 12, 13, and 15 being placed in cells A1, B1, and C1 respectively.

QUESTION (/dq) Enters the menu for performing operations on a database.

Criteria (/dqc) Specifies the range where your criteria are located. This range should include the column headings. (see the Data Management section for details on setting up your criteria)

Extract (/dqe) Extract copies of all the records that meet the criteria, and place them in the output range. Erases any data in the output range prior to extracting the new data.

FindRec (/dqf) Find the first record that meets the criteria. The cursor is repositioned at that location. Subsequent records that meet the criteria can be found by pressing the SPACE bar.

InpRange (/dqi) Specifies the Input range, i.e. the database that you want the subsequent commands to operate on. The input range must include the row that contains the field (column) headings.

OutRange (/dqo) Specifies the location that you want the Extracted database records to be placed. The output range must include the field (column) headings.

Quit (/dqq) Leave Data Question menu and return to the worksheet.

REGRESS (/dr) Determines the coefficients which correspond to a least squares fit of a function to a set of X and Y data.

Coefficients (/drc) Specify the coefficients which correspond to the function (Constant, Linear, Square, Cubic, Fourth Order, Fifth Order, Square Root, Logarithmic, or Exponential).

Output (/dro) Specify the location you want the calculated regression coefficients to be placed.

View (/drv) View a graph of the measured results and the curve corresponding to the calculated function.

Xdata (/drx) Specify the X-data (independent data) range.

Ydata (/dry) Specify the Y-data (dependent data) range.

SORT (/ds) Enters the sorting sub-menu.

D-Range (/dsd) Specifies the range of data to be sorted. Remember that the data is sorted in place. If you want to preserve the data in its original order for some other operation, you should save a temporary duplicate worksheet file and perform the sorting on the temporary file.

NOTE: Range references to sorted data may become altered.

Go (/dsg) Performs the sort according to the specified conditions.

P(1)-key (/dsp) Specifies the first (primary) column to sort. In sorting mixed string and value data, the values always precede the strings (if you selected ASCENDING order).

S(2)-key (/dss) Specifies the second, tie-breaker, column that you want to sort. It is not necessary to define a second sort column if it is not desired.

T(3)-key (/dst) Specifies the third, tie-breaker, column that you want to sort. It is not necessary to define a third sort column if it is not desired.

F(4)-key (/dsf) Specifies the fourth, tie-breaker, column that you want to sort. It is not necessary to define a fourth sort column if it is not desired.

Quit (/dsq) Exits the Data, Sort menu.

Reset (/dsr) Resets the sort range and the first and second sort keys.

TABLE (/dt) Creates a table of values based on some defined equation, and varying one or two of the input parameters. Refer to the DATA command in the Data Management section.

1) Column (/dt1) Generate a data table (column) based on a single variable.

2) Table (/dt2) Generate a data table based on two variables

10.7 FILE (/f) Enters the file menu.

DIR (/fd) Change the drive and directory that is used for all file operations.

ERASE (/fe) Erase a selected worksheet or print file from the disk.

IMPORT (/fi) Load an file into spreadsheet at the current cursor position.

Dbase (/fid) Import database files created with dBASE program (DBF). The DBF operations that are supported in AS-EASY-AS are described below:

ALL Import ALL the data contained in the database file into the current worksheet, starting at the current cursor location. Once this command is invoked, a file selection menu appears, similar to the File, Retrieve command. After the file is selected, a status window appears that reports the status of the file import operation. The data is imported in AS-EASY-AS database format. The field names become column headings and the data in each record is placed below the corresponding heading, one record per row.

RANGE Import a range (portion) of the database by specifying the first and last record number of the desired range.

BROWSE This command allows you to browse (look at) all the records in a dBASE data file. Once the command is invoked, a file selection menu appears, similar to the File, Retrieve command. After the desired file is selected, the program enters the dBASE browse mode. The field names are displayed as column headings and the data in each record is placed below the corresponding heading, one record per row.

While in this mode, the following keys are active (they are also briefly described in the bottom status line).

[F2] Find Find the first record that contains the specified search string. Note that the search is performed only on the field that the cursor is currently located in. If you want to search for the occurrence of a string in a different field, then move the cursor to that field (column) prior to pressing [F2].

When [F2] is pressed you are asked to specify the desired search string. After pressing [ENTER] to confirm the search string, you are prompted to confirm that the search operation will be case insensitive (U). If you want the search to be case sensitive, make sure you delete the U when the confirmation window opens.

AS-EASY-AS will search the records in the database sequentially until a record is found that contains the specified search string in the current field. The cursor will then be placed on the record and the search will stop.

[F3] Find Next Find the next record that contains the specified string in the current field. Locate the record and place the cursor on it.

[F4] Mark Mark a block of records to be imported. Move the cursor to the first record to be imported, press [F4] to mark the record. The marked record will appear highlighted. Move the cursor down to mark (highlight) the records to be imported. When completed, press [ESC]. The marked records will be imported with the first record placed at the cursor location.

[F5] GOTO Move the cursor directly to a specified record number specified by the user.

[HOME] Move the cursor to the first record in the database.

[END] Move the cursor to the last record in the database.

[Left, Right, Up, Down] Move the cursor one field to the left, right, up, or down, respectively.

[PgUp, Pgdn] Move the cursor 20 records up, or down.

CRITERION This command allows you to selectively import those records in a dBASE data file which match a specified criteria. Once the command is invoked, a file selection menu appears, similar to the File, Retrieve command.

After the desired file is selected, the program displays a window of the dBASE field names. Use the cursor keys to select the desired field name for which the criteria is to be applied. Pressing the first letter of a field name will move the cursor down the listing to field names which start with that letter. Press [ENTER] to confirm the field name selection.

A selection window will appear with the following match options:

- 1) **Less.Equal** Import files where field data is less than or equal to the match criteria.
- 2) **Less.than** Import files where field data is less than the match criteria.
- 3) **Equal** Import files where field data is equal to the match criteria.
- 4) **Greater.than** Import files where field data is greater than the match criteria.
- 5) **Greater.Equal** Import files where field data is greater than or equal to the match criteria.
- 6) **Not.Equal** Import files where field data is not equal to the match criteria.

Highlight or select the appropriate match option and press [ENTER]. You will then be prompted to enter the match criteria.

For string matches, you will be given the option of an exact, appear anywhere, or case insensitive match. For numerical matches, enter the appropriate number or valid formula. For date matches, enter the date using the @DATE(YY,MM,DD) function.

Press [ENTER] to complete the selection. Records which meet the criteria will be imported with the first record placed at the current cursor location.

Fixed (/fif) Imports ASCII (text) files into AS-EASY-AS, according to a user-defined format string. When the command is invoked, the user is prompted to specify the name of the ASCII file to be imported and the cell containing the format string.

NOTE: The data is imported at the location of the cursor just prior to invoking the Import command.

The import format string, contained in a single cell, consists of the import format options separated by commas, in the form:

Xn,Xm,Xj,....

where X is one of the import format options and n,m,j,.. are the number of characters the format option is to be applied to.

The format options are:

- L - Left justified label
- R - Right justified label
- C - Center justified label

N - Numeric value - Blank characters are ignored and the number or formula is evaluated. If a numeric field is specified, but the imported string portion is NOT a valid number, then the field defaults to a left justified label.

S - Skip the number of characters indicated. The column pointer remains at its current position.

B - Blank - The characters are ignored, but the column pointer is shifted 1 column to the right.

For example, a text file on disk contains the 1-line string:

```
Price =      23.50          #      124      Tot. =      2914.00
123456789*123456789*123456789*123456789*123456789*12
```

(The above ruler line is provided for reference only)

In the screen below, rows 3, 7, 11, and 15 display the contents of using the File, Import, Fixed command and four different format lines, rows 2, 6, 10, and 14 respectively.

```
[ A ].....A*.....B*.....C*.....D*.....E*.....F*
1*
2*L7,S4,N5,S8,N1,S3,N3,S5,L6,S3,N7
3*Price =          23.5 #                      124 Tot. =          2914
4*
5*
6*R7,S4,N5,S8,R1,S3,N3,S5,R6,S3,N7
7* Price =          23.5 #                      124      Tot. =          2914
8*
9*
10*B11,N5,S12,N3,S14,N7
11*          23.5          124          2914
12*
13*
14*S11,N5,S12,N3,S14,N7
15*          23.5          124          2914
```

The content of each cell is more easily seen in the listing below:

```
A3: 'Price =
B3: 23.5
C3: '#
D3: 124
E3: 'Tot. =
F3: 2914
```

```
A7: "Price =
B7: 23.5
C7: "#
D7: 124
E7: "Tot. =
F7: 2914
```

```
B11: 23.5
C11: 124
D11: 2914
```

```
A15: 23.5
B15: 124
C15: 2914
```

Note that the format string contained in cell A2 specified the format N1 for the # character. However, in cell C3, '#' was actually imported. This is because # is not a valid number, and the field defaulted to a left-justified label.

List (/fil) Loads all files matching the search specification and present in the current directory. The information includes filename, extension, size and date of creation, and is similar to the listing provided by the DOS DIR command.

Text (/fit) Load a text file into the worksheet as text. All digits and characters will be entered as labels (text).

If no file extension is specified, the program assumes that the file that you want to import has the extension PRN, therefore, if you specify the name of the file without the extension, and the extension is other than PRN, it will not be found.

Example: The line 1,2,3,4,5 imported from a file as text would be stored in the corresponding cell as the string '1,2,3,4,5'.

Values (/fiv) Load a text file into the worksheet and parse each line as values or as text. Valid delimiters are spaces and commas. To keep a text string intact, enclose it in double quotes before importing it into the worksheet. For example,

<u>Lines Imported</u>	<u>Stored in Worksheet as:</u>
1 2 3 4 5	Values 1 through 5 in 5 consecutive cells.
1,2,3,4,5	Values 1 through 5 in 5 consecutive cells.
1/2/3/4/5	Value 0.008333, i.e., the expression was evaluated.
1,A,2,B,3	Values 1, 2, 3 and strings A, B, in consecutive cells.

LIST (/fl) Display a list of files matching the search mask present which are in the current directory. Also, display available memory in bytes and as a percentage of free space available on the disk.

.W?? or .PRN or Other (/flw /flp /flo) List all files with selected file extension.

.W?? Lists all worksheet files having extensions of .WKS, WRK, WK1, etc.

.PRN Lists all text files having the extension .PRN

.* Will list all files in subdirectory

MERGE (/fm) Load part or all of an existing worksheet into the current worksheet starting at the current position of the cursor. Several options are provided as described below.

All [Formulas or Values] (/maf or /mav) Once the command is selected, the user is prompted to specify whether only the values, from the file being merged, should be retrieved or the formulas should be retrieved as well.

Range [Formulas or Values] (/mrf or /mrv) Once the command is selected, the user is prompted to specify whether only the values, or the formulas should be extracted and placed in the sheet.

[All/Range], [Value/Formula], Sum (/fm[a/r][v/f]s) Add each cell contents of the file being merged to the current cell contents at the same location. This command applies to cells that contain values and formulas.

If a cell in the file being merged (from disk), contains a formula, and the user selected /File, Merge, [All/Range], Value, then the value contained in the external cells will be added to the value of the current cell.

If, on the other hand, the user selected /File, Merge, [All/Range], Formula, then for cells that contained values in the file on disk, those values will be added to the current cell values. For cells that contained formulas, however, the contents of the current cells will be replaced with the formulas from the file on disk.

[All/Range], [Value/Formula], Diff (/fm[a/r][v/f]d) Subtract the cell contents of the file being merged from the contents of the current file cells. The command applies to cells that contain values and formulas, but it operates differently depending on whether the user selected Merge, Values or Merge, Formulas.

If a cell of the file being merged (from disk), contains a formula, and the user selected /File, Merge, [All/Range], Value, then the last value contained in the cells (obtained by evaluating the formula BEFORE the worksheet was saved), will be subtracted from the value of the current cell.

If, on the other hand, the user selected /File, Merge, [All/Range], Formula, then for cells that contained values, in the file on disk, those values will be subtracted from the current cell values. For cells that contained formulas, however, the contents of the current cells will be replaced with the formulas from the file on disk.

[All/Range], [Value/Formula], Replace (/fm[a/r][v/f]r) Replace cells in the current worksheet with values or formulas from a range or the entire merging worksheet (ALL).

This command applies to cells that contain values, and formulas but it behaves differently depending on whether the user selected Merge, Values or Merge, Formulas.

If a cell of the file being merged (from disk), contains a formula, and the user selected /File, Merge, [All/Range], Value, then the last value contained in the cells (obtained by evaluating the formula BEFORE the worksheet was saved), will replace the value of the current cell.

If, on the other hand, the user selected /File, Merge, [All/Range], Formula, then for cells that contained values, in the file on disk, those values will replace the current cell values. For cells that contained formulas, however, the contents of the current cells will be replaced with the formulas from the file on disk.

NEW (/fn) Erase the entire contents of the spreadsheet from RAM.

WARNING: You can not recover the spreadsheet UNLESS you have saved it on disk. Note that this operation is NOT required prior to retrieving a file from the disk.

Once you select this option, the program will give you one more chance to change your mind and return to the ready mode, leaving the worksheet intact.

OPTION (/fo) Toggles option on and off to filter out blank cells during retrieve and store.

RETRIEVE (/fr) Read .WKS or .WK1 worksheet file into the current spreadsheet. Any information in the current sheet is erased and written over by the new information. When this command is executed, you are presented with a list of all available .WK? files in the currently specified directory.

When retrieving a password protected file, AS-EASY-AS will prompt for the password prior to loading the worksheet. If the proper password is not entered, an error message will be displayed, and the user will be returned to the Ready Mode.

The password must be entered EXACTLY as when the file was saved. Upper and lower case characters are NOT the same. For example, the password "Test" is NOT the same as "TEST".

Because of new features and functions introduced in the latest version of AS-EASY-AS, the file structure is necessarily different from earlier versions. Therefore, earlier versions of AS-EASY-AS may not be able to successfully load or use WKS files created by the latest version.

NOTE: Even though AS-EASY-AS will generate files with the extension "WKS", it will read files with extensions of "WKS", generated by LOTUS 1-2-3 Ver. 1A, "WK1", generated by LOTUS 1-2-3 Rel. 2.0, or "WRK", generated by SYMPHONY.

STORE (/fs) Store entire spreadsheet as a .WKS file. If the file was retrieved from the disk, then the original name of the file appears and can be selected by just pressing [ENTER]. If you want to store the contents of your worksheet under a different name, just type the desired name (without the .WKS extension) and press [ENTER].

You will notice when you STORE a worksheet with the SAME name as a file already present on disk, a menu prompt will be displayed which asks the following:

CANCEL Terminate the store option and return the spreadsheet to the READY mode. (Neither the current worksheet nor the disk file are altered).

REPLACE Replace the contents of the specified disk file with the current contents of the sheet in memory (the old information on the disk is lost).

BACKUP Change the extension of the original file (on disk) to .WKB, leaving its contents unaltered and then STORE the current worksheet under the specified file name (with the normal .WKS extension).

Worksheet files may be stored with password protection. To do so, type the desired file name followed by a space and the letter "p". You will be prompted to specify and confirm a password of up to 20 characters and numbers. Once entered, the FILE, STORE operation is completed and the worksheet file is saved with that password. To remove password protection, store the file by entering the filename followed by a space and the letter "p". When prompted for the password, simply press [ENTER].

When retrieving a password protected file, AS-EASY-AS will prompt for the password prior to loading the worksheet. If the proper password is not entered, an error message will be displayed, and the user will be returned to the Ready Mode.

The password must be entered EXACTLY as when the file was saved. Upper and lower case characters are NOT the same. For example, the password "Test" is NOT the same as "TEST".

CAUTION: Once a file is saved with Password Protection, you MUST know the password in order to retrieve it. If you forget the password, you will NOT be able to retrieve the file.

UPLINK (/fu) Refreshes the internal link table storing links between the current worksheet and other worksheets referenced using the @LINK function.

XPORT (/fx) Extract the specified range of the worksheet and save as a .WKS file. Values, text, and formulas are extracted and stored in the new file.

DBIII (/fxd) This command allows you to export data directly from AS-EASY-AS to a dBASE data file (with .DBF extension). You are prompted for the file name, and a data range to export.

In exporting a data range, the following rules apply:

1. The first row of the exported data range must contain the field names for the dBASE file.
2. The format of the first row determines the format of each of the fields in the dBASE file.
3. A maximum of 64 fields may be exported.

COMMA (/fxc) Creates a comma separated ASCII file of the selected range. Data is copied cell by cell, row by row, starting at the top left cell of the range. The contents of the cells are separated by commas. Each row of data ends with a carriage return and line feed.

The formatted appearance of a cell, not its contents, will be exported. That is, the results of any formulas will be exported, rather than the formulas themselves. Blank cells will be represented by „. Cell prefix characters (`, `", and `^) are stripped from the exported file.

For example, performing /fxc A1..H7 on the spreadsheet below:

[A ]	.....A*	.....B*	.....C*	.....D*	E.*	....F*	...G*	...H*
1*	FIRST	LAST	ADDRESS	CITY	ST	ZIP	QTY	TOTAL
2*	John	Smith	405 Main St.	N. Andover	MA	01845	3	3.99
3*	Steve	Jones	P.O. Box 2	Boston	MA	02110	4	5.32
4*	Kermitt	Frog	Sesame St.	New York	NY	10272	2	2.66
5*	Cher			Hollywood	CA	90078		0
6*	T	"I"	Street	Washington	DC	20332	5	6.65
7*	Mike	O'Flynn	RR2, Box 4	Carson	CO	80610	10	13.3

Will create the following ASCII file:

```
FIRST, LAST, ADDRESS, CITY, ST, ZIP, QTY, TOTAL
John, Smith, 405 Main St., N. Andover, MA, 01845, 3, 3.99
Steve, Jones, P.O. Box 2, Boston, MA, 02110, 4, 5.32
Kermitt, Frog, Sesame St., New York, NY, 10272, 2, 2.66
Cher, , , Hollywood, CA, 90078, , 0
, T, "I" Street, Washington, DC, 20332, 5, 6.65
Mike, O'Flynn, RR2, Box 4, Carson, CO, 80610, 10, 13.3
```

Quoted (/fxq) Creates a quote delimited, comma separated ASCII file of the selected range. Data is copied cell by cell, row by row, starting at the top left cell of the range. The content of each cell is surrounded by double quotation marks and each cell is separated by a comma. Each row of data ends with a carriage return and line feed.

The formatted appearance of a cell, not its contents, will be exported. That is, the results of any formulas will be exported, rather than the formulas themselves. Blank cells will be represented by ,"". Cell prefix characters (, " , and ^) are stripped from the exported file. Leading and trailing spaces will be trimmed from the output.

For example, performing /fxq A1..H7 on the spreadsheet below:

```
[ A ].....A*.....B*.....C*.....D*E*...F*...G*...H*
' 1*FIRST      LAST      ADDRESS      CITY      ST ZIP      QTY TOTAL
' 2*John       Smith    405 Main St. N. Andover MA 01845    3 3.99
' 3*Steve      Jones    P.O. Box 2   Boston    MA 02110   4 5.32
' 4*Kermitt    Frog     Sesame St.   New York  NY 10272   2 2.66
' 5*Cher      ""       ""           ""        CA 90078   "" 0
' 6*          T        "I" Street   Washington DC 20332   5 6.65
' 7*Mike      O'Flynn  RR2, Box 4   Carson    CO 80610  10 13.3
```

Will create the following ASCII file:

```
"FIRST", "LAST", "ADDRESS", "CITY", "ST", "ZIP", "QTY", "TOTAL"
"John", "Smith", "405 Main St.", "N. Andover", "MA", "01845", "3", "3.99"
"Steve", "Jones", "P.O. Box 2", "Boston", "MA", "02110", "4", "5.32"
"Kermitt", "Frog", "Sesame St.", "New York", "NY", "10272", "2", "2.66"
"Cher", "", "", "Hollywood", "CA", "90078", "", "0"
"", "T", "", "I" Street", "Washington", "DC", "20332", "5", "6.65"
"Mike", "O'Flynn", "RR2, Box 4", "Carson", "CO", "80610", "10", "13.3"
```

NOTE: Exporting already quoted text such as row 6, "I" Street, may affect the way the file is treated by other programs which import the ASCII file. See the resulting 6th line in the ASCII file output.

Wks (/fxw) This command allows you to export data directly from AS-EASY-AS to a worksheet data file (with .WKS extension).

10.8 PRINTTO (/p) Prior to entering the main print menu, select from one of four different printing modes.

APPEND (/pa) Attach the new print data to the end of print file specified by the user.

FILE (/pf) Send output to a disk file (ASCII file).

NOTE: If an extension is not specified, the program will assume an extension of .PRN. However another extension can be specified by typing the entire filename with an alternate extension, i.e., SAMPLE.DOC.

GRAPHIC (/pg) Allows you to print text and graphics on the same worksheet. (See / Graphics Name Insert)

PRINTER (/pp) Send output to selected output port (see /User Install Device).

Adjust Top (/ppa) Reset line counter to top of page. If this is not performed, you might end up with odd looking printout, eg., page ejects happening in the middle of a printed page.

Border (/ppb) Set print column(s) and row(s).

Columns (/ppbc) Prints specified column(s) on every page of the output, to the left of the range you are printing. Do not include the columns you specified as borders in the print range or you will get two copies of the same information.

None (/ppbn) This command cancels any row or column selections set with the Border, Row or Column commands.

Rows (/ppbr) Prints specified row(s) on every page of the output, above the range you are printing. Do not include the rows you specified as borders in the print range or you will get two copies of the same information.

Go Print (/ppg) Start printing the spreadsheet to the selected device i.e., the printer or a disk.

NOTE: You must define the print range before issuing this command or an error message will be displayed.

Line Feed (/ppl) Advance printer one line.

Options (/ppo) Sets the different options for the printer. Refer to the Printing Section for the different formatting options available for page headers (eg., page number, date, etc.).

Header (/ppoh) Set a single line for header message which will appear at the top of each printed page.

Footer (/ppof) Set a single line for footer message which will appear at the bottom of each printed page.

Margins (/ppom) Set the print margins.

Bottom (/ppomb) Sets the bottom margin (number of lines)

Left (/ppoml) Sets the left margin, (0 - 240 spaces)

PgLength (/ppomp) Sets the number of lines in a page.

Right (/ppomr) Sets the right margin (0 - 240 spaces, i.e. you can print up to 240 characters per line).

NOTE: If the print range is wider than the right margin, text outside the margins will be printed on new pages. For example, if the right margin is set to 40 and the print range is 100 characters wide, then the first portion of the printout will contain the first 40 characters, the second portion will contain characters 41 to 80 and the last portion will contain characters 81 to 100.

Top (/ppomt) Sets the top margin (number of lines).

Pitch (/ppop) Sets the print pitch, or number of characters per inch, for the output. You must have selected an appropriate printer, (see / User Install Printers).

Condensed (/ppopc) Sets the characters per inch to 16.6.

Elite (/ppope) Sets the characters per inch to 12.

None (/ppopn) Disable the pitch control codes.

Pica (/ppopp) Sets the characters per inch to 10.

Setup (/ppos) Specify control codes used to set your printer in a different mode. Each code must be separated by the backslash character "\".

Example Setup codes for Epson printers:

\027\069 Emphasized text

\015 Condensed text

See also "embedded" control codes in the worksheet.

Type (/ppot)

As-Seen (/ppota) This command prints the selected range in spreadsheet format as it is seen on the monitor with any header or footer information. Two lines provide a page break at perforations.

Contents (/ppotc) This command prints the contents of non-blank cells in the selected range. The cell reference, along with its contents (labels, values, or formulas) is printed in columnar format.

Noform (/ppotn) This command prints the selected range without any header or footer information and suppresses page breaks.

Eject (/ppote) Automatically issues a page eject command after a range has been printed, causing the printer to automatically eject the page even if the print range is less than a full page. This option is especially useful on laserjet and other "page" printers which do not begin printing until a complete page of information has been sent to the printer or a form feed/eject command has been received.

Page Advance (/ppp) Advance printer to top of next page and set line counter to 1.

Quit (/ppq) Exit to Ready mode.

Range (/ppr) Define range of spreadsheet to be printed. This must be specified before any portions of the spreadsheet can be printed. If a print range is not defined and the program is instructed to print (/PPG), an error message will be displayed.

View (/ppv) Preview the selected range in graphics mode one page at a time. The current page number is displayed in the lower right of the display. The following keys are active when in the preview mode:

[F1] Display a half page of output. Has the effect of doubling the image size.

[F2] Display a full page of output. Has the effect of halving the image size.

[F3] Display horizontal grid lines every one inch.

PgUp View previous page.

PgDn View next page.

Esc Exit View mode.

NOTE: For greatest display resolution, ensure that your video card has been properly auto detected. The detected video mode will be listed under /Sheet Status.

10.9 GRAPHICS (/g) Enter the graphics menu.

Create high-quality 2- and 3-dimensional graphs from spreadsheet data. Hardcopy output can be generated on dot matrix, inkjet, and laserjet printers. Output may also be saved to a file for use with word processing and graphics programs.

Samples of various graph types are included in Chapter 5.

FORMAT (/gf) Sets the format for the graph for each of the data ranges. You can either select Graph, which assigns the same setting for each range, or define each data range separately.

Graph (/gfg) or (/gfabcdef)

Both (/gfgb) Identify data points with symbols and connect points with lines.

Depth (/gfgd) Toggle 3-D type display for Bar, Line, Strip, and Wall graphs.

No Display flat bars.

Yes Display 3-D bars.

NOTE: Depth will default to flat bars if too many data points have been assigned to the graph.

Lines (/gfgl) Connect data points with lines only. No identification symbols will be displayed.

NOTE: Only Y range data points that are contiguous will be connected with lines. Any skips in Y range data will result in display of line segments between contiguous data points.

Symbols (/gfgs) Identify data points with symbols only. Symbols are automatically assigned to each curve may be user-specified (see Options Marks).

NOTE: Disable this option to inhibit placement of HLOC value labeling.

None (/gfgn) Do not plot lines or symbols. Permits selective disabling of a specific range.

LABELS (/gl) Define a range of labels to mark each of the data points on the specified graph range.

A [B,C,D,E,F] Specify the Y-ordinate data label ranges A through F.

ABOVE The labels are to be placed above each of the data points.

BELOW Labels are to be placed below each data point.

LEFT Labels are to be placed to the left of each data point.

RIGHT Labels are to be placed to the right of each data point.

NONE Cancel data labels previously defined for the selected graph range.

RESET Clear all label ranges specified.

METRICS (/gm) Displays information regarding the current graph data ranges, scale settings, line styles, labels, legends, titles, print device and settings, etc.

NAME (/gn) Allows multiple graphs to be defined in a single worksheet. Named graphs may be superimposed on the main graph, displayed as two separate graphs, one above the other, or inserted into the worksheet.

Create (/gnc) Create a name for the current graph settings or save any changes to a named graph. Up to 50 named graphs may be created per worksheet.

Delete (/gnd) Delete one of the previously defined (named) graph settings.

Insert (/gni) Place the Main or a named graph into the worksheet. The formatted range appears in a highlighted color.

The upper left cell of the range contains the graph name and the size of the display in columns and rows. For example, "MAIN:2,7" will display the main (or current) graph in a range 2 columns wide and 7 rows deep. The cell may be edited to change the name and size of the graph if desired. To remove an inserted graph, erase the upper left cell of the inserted range.

The graph may be viewed on-screen by placing AS-EASY-AS in one of its graphics display modes (User Install Video). The graph will appear on the screen only if it can be completely displayed without clipping. To update the graph after changing graphed data, you must manually recalc the spreadsheet by pressing the [F9] function key.

The graph will also appear when previewing the page containing the graph (PrintTo, Printer, View) prior to printing. To print combined worksheet text and graphics see Section 4.7, Printing Text and Graphics.

Merge (/gmm) Merge a named graph and the currently defined MAIN graph. The named graph will be scaled on the right side of the graph and with its own set of scaling factors, limits, formats, etc. Care must be used not to merge dissimilar graph types such as pie and line.

Reset (/gnr) Cancels Split and Merge options, only the MAIN graph is displayed.

Split (/gns) Show two separate graphs on the same screen. The top graph is the currently defined MAIN graph. The second, named graph, is displayed on the bottom half of the screen.

Use (/gnu) Select a previously named graph and make it the current graph. All current settings are replaced with the named graph settings.

OPTIONS (/go) Set the graph position, size, orientation, grid, and titles.

Custom (/goc) Customize the colors of the graph. Pick from 256 colors from a selection window using a mouse or the cursor keys.

A B C D E F Select foreground and background colors for ranges A-F.

INNER Specify the display colors inside the horizontal and vertical axes.

OUTER Specify the display colors outside the horizontal and vertical axes.

TITLE Specify the color of the title text.

VALUE Specify the color of the X- and Y-Axis scale labels.

NOTE: Lines will utilize the first 16 colors only. Fill patterns are defined with foreground and background colors.

Grid (/gog) Control the display of horizontal/vertical grid lines.

Both (/gogb) Draw a horizontal line at each scale division of the Y-axis, and a vertical line at each division of the X-axis.

Clear (/gogc) Clear Grids. No grid lines will be displayed.

Dot (/gogd) Specify dotted grid lines. This is usually preferable since it does not visually interfere with the solid lines of the actual graphs.

Horizontal (/gogh) Draw a horizontal line at each scale division of the Y-axis.

Minor (/gogm) Draw minor grid lines between the scale divisions. This is only active when Scale, [X,Y,Z] DIV has been set to a non-zero value.

Solid (/gogs) Specify solid grid lines.

Vertical (/gogv) Draw a vertical line at each scale division of the X-axis.

Font (/gof) Set the font type and size for graph text.

Type (/goft) Specify the font type.

BitMap Use bitmapped font for graph text.

Stroked Use scalable stroked (vector) fonts contained in the file ASEASY.FNT for graph text.

Size (/gofs) Select the relative size of the font used in the main title, second title, x-axis, y-axis, legend, values, and labels.

Legend (/gol) Set the graph legend and its location.

Line (/goll) The graph legends appear in a line at the bottom of the screen.

None (/goln) Suppress the display of the graph legend.

Table (/golt) The graph legends appear to the right of the graph in a box with the identifications of each range arranged vertically.

Marks (/gom) Customize the symbols of the graph series. Choose from 12 symbols (triangles, boxes, crosses, etc.) for each data range.

NOTE: Graphics, Format must be set to Symbols or Both for symbols to be displayed.

Pattern (/gop) Customize the fill patterns of the graph series. Choose from 15 fill pattern styles or 11 gray scales.

A-F (/gopa - gopf) Select the fill pattern for the Y-data range.

Sides (/gops) Select the side pattern for graph bars.

Top (/gopt) Select the top pattern for graph bars.

Style (/gos) Customize the line style of the graph series. Choose from 6 line styles (dotted, dashed, solid, etc.) to connect the data points.

NOTE: Graphics, Format must be set to Lines or Both for lines to be displayed.

Titles (/got) Specify title information for the graph.

Main (/gotm) Define main title text on graph.

Second (/gots) Define second title text on graph.

X-Axis (/gotx) Define the x-axis title.

Y-Axis (/gotm) Define the y-axis title.

3-D GRAPHICS (/g3) Define data to display and plot 3-dimensional graphs.

Type (/g3t) Select the type of 3-D graph desired. The graphics types are:

Bars (/g3tb) Data points are represented by 3-dimensional vertical bars

Surface (/g3ts) Data points are connected by lines forming a surface mesh

Poles (/g3tp) Data points are represented by vertical lines

Pyramid (/g3ty) Data points are represented by 3-dimensional pyramids

X-Y-Z (/g3tx) Data points are represented by a series of connect-the-dot lines.

Contour (/g3tc) Similar to Surface 3-D, data points are represented by a surface mesh which is sub-divided vertically into color bands based on value. The result is similar to a relief map which shows elevation changes by use of different colors.

Range (/g3r) Specify the X, Y, and Z data ranges.

The data range can be specified either by the pointing or typing method, or by using a predefined range name. The X, Y, and Z data range is specified by a single range or block of data. The top row of the range is taken to be the X-range, the left column is taken to be the Z-range, and the remaining cells are taken to be the Y-range.

For the X-Y-Z graph type, the first column of data is the X-range, the second column is the Y-range, and the third column is the Z-range.

Scale (/g3s) Specify the way the X-, Y-, and Z- axes are displayed.

Auto (/g3sa) AS-EASY-AS will select the values of the lower and upper scale limits automatically based on the minimum and maximum values present in the range.

Manual (/g3sm) Scaling of the selected axis is specified by the user. If selected, the the UPPER and LOWER limits must be specified, which default to 0.0.

Upper (/g3su) Specify the axis upper value limit.

Lower (/g3sl) Specify the axis lower value limit.

Format (/g3sf) Specify the format assigned to values displayed along the Y-axis. See the /Range, Format command for a description of format choices. The format of the values displayed in the X- and Z-axes are controlled by the format of the cell containing the first X and first Z values (first row values and first column values) in the selected data.

Div (/g3sd) Specify the number of minor divisions to be used for each step on the axis.

Bands (/g3sb) Specify the number of color band divisions for Surface and Contour graphs. The colors displayed will be one less than the BANDS value.

X-skip (/g3sx) Control the labeling of X-axis divisions. If X-Skip is set to 2, every 2nd X-axis division will be labeled. If X-Skip is set to 1, every division is labeled.

Z-skip (/g3sz) Control the labeling of Z-axis divisions. If Z-Skip is set to 3, every 3rd Z-axis division will be labeled.

Options (/g3o) Set the graph position, size, orientation, grid, and titles.

POSITION (/g3op) Set the 3D graph frame position options by entering X,Y values directly. To display the graph frame and adjust the frame position real time, see the /GRAPHICS, 3D-GRAPHS, ADJUST command.

X (/g3opx) Set the relative location of the X-axis center point.

Y (/g3opy) Set the relative location of the Y-axis center point.

Scale (/g3ops) Set scale factor which controls the size of the graph.

Yaw (/g3opa) Set the yaw angle of the graph frame.

Roll (/g3opr) Set the roll angle of the graph frame.

Tilt (/g3opt) Set the tilt angle of the graph frame.

GRID (/g3og) Toggle the horizontal and vertical grid display attributes for the left, right, and bottom graph faces on or off.

Left (/g3ogl) Toggle the left side grid display attributes on and off.

Right (/g3ogr) Toggle the right side grid display attributes on or off.

Bottom (/g3ogb) Toggle the base face grid display attributes on or off.

Face (/g3ogf) Toggle the front face line display attributes on or off.

TITLES (/g3ot) Specify text for main, X- and Z-axis titles.

Main (/g3otm) Specify text for main graph title.

X-axis (/g3otx) Specify text for the X-axis title.

Z-axis (/g3otz) Specify text for the Z-axis title.

SIZE (/g3os) Specify the width and depth of the 3D graph bars.

Xwidth (/g3osx) Specify the width of the 3D graph bar as a function of the X-axis divisions (default is 0.5).

Zwidth (/g3osz) Specify the depth of the 3D graph bar as a function of the Z-axis divisions (default is 0.5).

Adjust (/g3a) Set the 3-D graph position, size, and orientation. The graph may be modified by visibly adjusting a 3D-graph frame on the screen. To set the positions manually (by entering values), see the **OPTIONS, POSITION** command above.

Once selected, the 3D-graph frame is displayed and the following keys are active. To return to the menu, press [ESC] or one of the keys not listed below.

Initialize (/g3ai) Reset the 3D-graph position settings to their default values.

Yaw (/g3ay) Adjust the yaw angle of the 3D-graph frame. Pressing the Y key adjusts the yaw angle between 0 and 90 degrees. The default value is 30 degrees.

Roll (/g3ar) Adjust the roll angle of the 3D-graph frame. Pressing the R key adjusts the roll angle between 0 and 90 degrees. The default value is 15 degrees.

Tilt (/g3a) Adjust the tilt angle of the 3D-graph frame. Pressing the T key adjusts the tilt angle between ± 90 degrees. The default value is 0 degrees.

+ * [LEFT ARROW] [RIGHT ARROW] Adjust the position of the 3D-graph frame to the left or right.

, - [UP ARROW] [DOWN ARROW] Adjust the position of the 3D-graph frame up or down.

[PG UP] [PG DN] [Page Up] [Page Down] Increase/decrease the size of the 3D-graph frame.

A Dynamically adjust the width of the X-axis.

B Dynamically adjust the width of the Y-axis.

C Dynamically adjust the width of the Z-axis.

+ - [+] [-] Distort the 3D-graph frame. [+] causes the back of the frame to appear to be pushed further away from the view point, and causes the sides to move in closer towards the middle. [-] causes the back of the frame to appear to be move closer to the view point, and causes the sides to move away from the middle.

View (/g3v) View the 3-D graph on the screen. The data range must be defined first, or an error message will be displayed.

Plot (/g3p) Create a hardcopy of the 3-D graph or send plot information to a file.

Image (/g3pi) Specify the height and width for the graph in inches.

High (/g3pih) Specify the vertical dimension of the graph to be generated on the printer.

Wide (/g3piw) Specify the horizontal dimension width of the graph to be generated on the printer.

- NOTES:**
1. To adjust the left margin, which is the distance between the left side of the paper and the X-scale title, use /PrintTo Printer Options Margin Left.
 2. To create a top margin, you must use /PrintTo Printer and select Line Feed several times until the desired top margin has been created.

Portrait (/g3pip) Print graph oriented at zero degrees.

Landscape (/g3pil) Rotate output of the graph 90 degrees.

Draft (/g3pid) Specify single pass or low density mode for the printer. Recommended for plotting draft graphs as the printing speed is about twice as fast as NLQ.

NLQ (/g3pin) Specify a high resolution print option. NLQ will produce a dark, high quality graph.

PLOT (/gp) Produce a hard copy of the current graph on a printer or create a file.

Device (/gpd) Plot to LPT1, LPT2, or a file (default is LPT1).

Go (/gpg) Start printing the graph according to the options specified. Printing of the graph can be stopped at any time by pressing the [ESC] key.

Output (/gpo) Direct output to a printer or create a formatted file.

PRINT Send the output to the selected printer (See User Install Printer for printer types).

PIC Send the output to a .PIC formatted file (Lotus 1-2-3 graphics format).

PCX Send the output to a .PCX formatted file (PC-Publisher graphics format).

PSP Send the output to a .PSP formatted file (Postscript printer format).

PLT Send the output to a .PLT HP-GL (Hewlett Packard Graphics Language) formatted file.

Image (/gpi) Specify the height, width and print quality for the graph.

Draft (/gpid) Specify single pass normal density for the printer. Select this option to generat draft quality graphs quickly (twice as fast as NLQ density).

High (/gpih) Specify the vertical height, in inches, of the graph to be generated on the printer.

Landscape (/gpil) This option allows you to rotate the plot of the your graph by 90 degrees, or in sideways orientation.

NLQ (/gpin) Specify high resolution print option. Selecting this option is recommended when presentation quality graphs are desired.

Portrait (/gpip) This option allows you to plot your graph in normal, or 0 degrees orientation.

Wide (/gpiw) Specify the horizontal width, in inches, of the graph to be generated on the printer.

RANGE (/gr) Specify the X- and individual Y-Range series data ranges.

A (/gra) Define first Y - ordinate data range. The data range can be defined by either specifying the start..end cells or by specifying a range name.

B (/grb) Define second Y - ordinate data range.

C (/grc) Define third Y - ordinate data range.

D (/grd) Define fourth Y - ordinate data range.

E (/gre) Define fifth Y - ordinate data range.

F (/grf) Define sixth Y - ordinate data range.

X (/grx) Define X - ordinate data range to be plotted. There should be a one-to-one correspondence between the elements of the X-range and Y-range(s).

SCALE (/gs) Set the scale settings for the X-, Y-, and Z-Axes.

X,Y,Z Scale (/gs[x,y,z]) Select the X-axis, Y-Axis, or the Z-Axis.

Auto (/gs[x,y,z]a) Scaling of the selected axis will be done automatically by the program.

Div (/gs[x,y,z]d) Specify the number of minor subdivisions on the axis steps. This value is used to skip labeling when a Line, Bar, Stacked Bar or other non-numeric X-Scale graph has been selected.

Exp (/gs[x,y,z]e) If this option is selected, the corresponding axis will be exponential (cancels normal linear scaling). This option is used to generate Semi-Log and Log-Log graphs.

Format (/gs[x,y,z]f) Specify the value/label format to be used in displaying the values for the selected axis. The choices are the same as those for the /Range, Format command.

Lower (/gs[x,y,z]l) Specify the lower value (limit) that will be used in drawing the selected axis.

Manual (/gs[x,y,z]m) Scaling of the selected axis performed as specified by the Upper and Lower values as limits.

Normal (/gs [x,y,z]n) Select linear arithmetic scaling (cancel exponential scaling) for the selected axis.

Step (/gs [x,y,z]s) Specify the number of intervals to be used between the upper and lower values selected for the axis. When a number greater than 10 is entered, it results in two level labeling.

Upper (/gs [x,y,z]u) Specify the upper value (limit) that will be used in drawing the selected axis.

TYPE (/gt) Sets the type of 2-D graph to be generated. Samples of the various graph types are shown in Chapter 5.

Area (/gta) An Area Graph is similar to a Stacked Bar Graph transformed into a line graph. It uses lines to plot one defined Y range on top of the next, with the area between the lines filled with a pattern. The last defined Y range will be plotted on the bottom, proceeding upwards, from F to A.

An Area Graph could be used as an alternative to the Stacked Bar Graph for showing the relative values of each part to the total for a series.

Bar (/gtb) Vertical bars equal to the magnitude of the Y-values extend upward from the X-axis. A bar graph is similar to the line graph in that the Y range must be values and the X range is treated as labels. X-Axis data with more than 10 steps force a two tiered or staggered labeling system.

The bar widths are automatically determined by AS-EASY-AS. The greater the number of Y values being plotted, the narrower the bars. To differentiate the Y ranges, AS-EASY-AS assigns a unique bar shading to each ranges.

The Bar Graph may be used for comparing data for specific periods of time. Bar Graphs should be used to represent a limited number of data. If too many points are selected, the comparison loses impact.

CoNt (/gtn) A Contour Graph. This unique graph uses a different type of data range definition. When requested for the X-Range, you need to specify a block of data (i.e., more than one row or column). Each row of data is displayed as a contour of relative data, using a different color and fill pattern.

NOTE: The Z-Scale Step parameter sets the number and range of contour lines.

Cume (/gtc) The cumulative value of the Y-range is plotted as a function of the X-range. A Cumulative Graph is similar to the X-Y Graph in that both the X- and Y-ranges must be values.

A Cumulative Graph is useful in depicting increasing functions and their cumulative values.

Delta (/gtd) The Y values are plotted as step functions with symbols, lines, or both. A Delta Graph is similar to the X-Y graph in that both the X- and Y-ranges must be values.

A Delta Graph is best for showing functions that occur in discrete steps as a function of X.

Hloc (/gth) The High-Low-Open-Close graph is a type of Line Graph in which vertical lines connect the Y values for a given X value. Tick marks on the vertical lines represent the high (A range), low (B range), open (C range), and close (D range) values. The X range is treated as labels.

The spacing along the X-axis will be equal. AS-EASY-AS automatically generates a Y scale based on the maximum value in the Y range.

The HLOC Graph was developed to graphically display stock price trends over time.

Line (/gtl) In the Line Graph, the Y values are plotted along the vertical axis using lines, symbols, or both. The X range data are treated as labels, whether numbers or text.

The spacing along the X-axis will be equal. AS-EASY-AS automatically generates a Y scale based on the maximum value in the Y range.

The Line Graph is best suited for displaying data trends over a period of time.

Pie (/gtp) A Pie Graph shows the relative value relationships for a single Y range (the A range) with each data item represented as a slice of the pie. The X range will be used as labels for each pie slice. AS-EASY-AS will calculate and display the fraction of the pie represented by each slice.

Since the Pie Graph has no axes, X- and Y-axes titles are not used, as well as the grid and format options.

To display the pie slice fractions as percentages, select /Graphics Scale Y-Scale Format Percent and specify the number of decimal places.

The Pie Graph is useful for depicting the relative contribution made by each data item to the whole.

AS-EASY-AS also has the ability to create and display an "exploding" Pie Graph, where selected slices can be separated from the pie.

To explode a slice, the distance in pixels for that slice must be specified in the B range. You may wish to start with a pixel value of 10 and experiment until you find a value that is satisfactory.

Polar (/gto) The X range is the radial bearing in radians measured counter-clockwise from a horizontal vector to the right. The allowable range for X is from 0 to 2π (about 6.28). X values greater than 2π will be plotted as though 2π or multiples of 2π were subtracted until the remainder is less than 2π .

The Y ranges will be plotted as the relative distance from the origin for the corresponding bearing. All data points for a given Y range will be connected by a line with the resulting polygon shaded. The range marks (concentric circles) will be automatically scaled according to the Y range values.

The Polar Graph is best suited to graphically present mathematics polar-type functions.

Radar (/gtr) The X range is the radial bearing in radians measured clockwise from a vertical line upwards. The allowable range for X is from 0 to 2π (about 6.28). X values greater than 2π will be plotted as though 2π or multiples of 2π were subtracted until the remainder is less than 2π .

The Y ranges will be plotted as the relative distance from the origin for the corresponding bearing. All data points for a given Y range will be connected by a line with the resulting polygon shaded. The range marks (concentric circles) will be automatically scaled according to the Y range values.

The Radar Graph is best suited to graphically present radar-type functions.

Stack (/gts) A Stacked Bar Graph is similar to the Bar Graph. However, the vertical bars represent the cumulative value of the Y values, with each Y value having a shaded height equal to its magnitude. The last defined Y-range will be plotted on the bottom of the bars, proceeding upwards from F to A.

A Stacked Bar Graph is best for showing the relative values of each part to the total for a series that varies with time.

STrip (/gtt) A Strip Graph is a 3-dimensional type graph, similar to the Line Graph, it displays a ribbon-type curve for each data range defined.

In a Strip Graph, the Y values are plotted along the vertical axis using a ribbon-type curve. The X range data are treated as labels, whether numbers or text.

The spacing along the X-axis will be equal. AS-EASY-AS automatically generates a Y scale based on the maximum value in the Y range.

The strip type graph is best suited to graphically present data trends that vary with time.

Wall (/gtw) A 3-dimensional graph which displays a wall-type curve for each data range defined.

A Wall Graph is similar to a Strip Graph. In a Wall Graph, the Y values are plotted along the vertical axis using a strip-type curve, however, the area under the curve is filled in with a default or user-selected fill pattern.

The X range data are treated as labels, whether numbers or text. The spacing along the X-axis will be equal. AS-EASY-AS automatically generates a Y scale based on the maximum value in the Y range.

The wall type graph is best suited to graphically present data trends that vary with time.

X-Y (/gtx) In an X-Y Graph, the Y-range values are presented as a function of X, i.e., $y=f(x)$. Both ranges must contain values, and there must be a 1 to 1 correlation between the X- and Y-range elements.

NOTE: If the X-range contains labels and you attempt to display an X-Y Graph, the Y values will all be plotted at $X=0$ since the value of a label is zero.

VIEW (/gv) View the currently defined graph.

10.10 USER (/u)

INSTALL (/ui) Enter the Installation Menu and modify default settings.

Modifications to options made through this menu do not become permanent unless they are saved (/USER INSTALL SAVE CONFIG). Once saved, they become the new defaults until you either erase the configuration file (ASEASY.CFG) file or re-install and save new defaults. If the options are not saved, they are canceled as soon as you exit AS-EASY-AS.

Remember, if you don't want the new settings to be lost, save them before you exit AS-EASY-AS.

CMdStr (/uim) Specify default command line switches to be used whenever the program is started, (e.g., /VM/E/NT).

NOTE: Command line switches specified when starting the program from DOS are ignored if a CMdStr string has been defined. The exception is the /CFG command line switch (which is ignored if it is placed in the CMdStr parameter string).

Colors (/uic) Customizes screen colors. When a color option is selected, a matrix of colors appears with the current color settings highlighted by the cursor. The panel area displays the item you are changing (e.g., text, menu, border, etc.) and the current color value.

As the cursor is moved around, the color value for the combination selected is displayed in the command panel area. When the desired combination is displayed, press [ENTER] to select the desired color. As soon as the selection is made, the appropriate color changes take effect.

Alternatively, you can enter the color number directly in the command panel area (e.g., 23 = blue background and white foreground).

Backgnd (/uica) Sets the background color that appears under a resized view window.

Border (/uicb) Sets the view border color. This color change affects the row and column borders (i.e., the line displaying the column letter headings and the left border displaying the row number).

BOttom (/uico) Sets the bottom status line color. This is the line displaying the amount of free RAM, the recalculation mode, the current time, etc.

Cursor (/uicc) Sets the screen cursor color. Notice that the cursor color is not dependent on the color selected for Text, i.e., it does not automatically become reversed text color.

Fn-Line (/uicf) Sets the color of the row displaying function keys.

Label (/uicl) Sets the color to be used for cells which contain labels.

MenuBk (/uicm) Sets the background color to be used for the pull-down menus. This color applies to the whole menu box, with the exception of the current menu selection (see MenuFr for the current selection color), the status indicator (on the bottom line) and the current file name display area (on the third line from the bottom).

MENUFR (/uice) Sets the highlight color to be used for the pull-down menus. This color modification applies to the current menu selection (highlight) only.

Neg (/uicn) Sets the color to be used for cells containing negative values.

NOTE: This selection does not take affect if the /Sheet, General, Negative, No option is active.

Pointer (/uicp) Sets the border pointers color. (That is the color for the indicators on the left side and top of the screen, showing the current row and column location of the cursor).

Quit (/uicq) Exit the Color Installation Menu.

CAUTION: Remember to save the config file if you don't want your color changes to be lost when you exit AS-EASY-AS.

Scroll (/uics) Sets the scroll bar color.

UnPro (/uicu) Sets the color to be used for cells that have been unprotected by the user using the /Range, Lock, No command.

Value (/uicv) Sets the color to be used for cells which contain value results.

Device (/uid) Select a printing device; LPT1, LPT2, or send to a file.

Dimension (/uii) Divide the worksheet into a number of pages (up to 100), thus simulating a third dimension (depth).

Each of the pages is identified by a letter A, B, C..., which appears on the top left corner of the worksheet, above the row numbers. When the Dimensions command has been invoked and more than one page is specified, reference to cells in each of the pages is made with the addition of the page letter.

For example, the top left cell on the first panel is A:A1 rather than A1. Cell FF1 on the 29th panel would be AC:FF1.

Each generated page is 256 columns wide and 8192/N rows long, where N is the number of pages specified.

When the multidimension option is canceled, the information contained in all pages is retained in their relative positions in the worksheet.

Movement from page to page can be accomplished by:

1. Using the [F5] Function Key (GOTO) and the cell address.
2. With the arrow and the PgUp, PgDn keys. (The first row of panel B follows the last row of panel A, etc.)
3. Using the combination of the [Ctrl] (control) and [PgUp], [PgDn] keys. [Ctrl] [PgDn] moves you to the next page, and [Ctrl] [PgUp] moves you to the previous page.

The following example will help you understand the organization of the information in the pages.

Let us assume that two panels, or pages, were selected (A and B). Since the worksheet has a total of 8,192 rows, each page is 4,096 rows long. If an entry is made in cell A1 of page B, this is equivalent to an entry in cell A4097 when the spreadsheet has only a single dimension. When the page option is canceled, cell A4097 indeed contains the entry that was made in cell A1 of panel B.

FORMAT (/uif) Permits the user to define customized cell formats. Up to 8 user formats may be defined. Remember to save the configuration file after the user formats are created. Otherwise, the format definitions will be lost when the program is exited.

Create (/uifc) Create display formats which control the display of values (not labels) through use of a template. The display formats are specified for use by the /User, Install, Format command.

In defining the format, the "?" and "_" (underscore) characters are used to indicate a digit position. They automatically adjust to accommodate a value which occupies less positions than the defined format. The "0" (zero) character, on the other hand, is used to explicitly reserve a position pre-filled with a zero.

For example, a user-defined format template of (???) ???-???? would display the value 9819828282 as (981) 982-8282, i.e. a US telephone number format, and the number 1234567 as 123-4567.

A user-defined format template of 00000-0000 would display the number 123456789 as 12345-6789, i.e., Zip+4, and the number 12345678 as 01234-5678, i.e., preserving the first zero of the template since the entered value was not large enough to override it.

Delete (/uifd) Delete a user defined format.

Modify (/uifm) Edit an existing user defined format.

Printers (/uip) Select output device for text and graphics. Select from a listing of popular printers. If your printer is not listed, refer to your printer user manual to see which of the listed printers you should select.

If an HP LaserJet or DeskJet printer driver is selected, the page length is automatically set to 60 lines, which is the typical default for laserjets. This default may be changed by selecting /PrintTo Printer Options Margins Pglen, and entering a different value.

Some of the printers listed include (Clr) as part of the printer name. These color printer drivers will print only 2-D and 3-D graphics in color. Spreadsheet data will not be printed in color.

Punctuation (/uiu) Enters the Punctuation Installation menu. Through this menu, the user can set the ASCII characters to be used for separating decimals, the thousands delimiter, separating function arguments, prefacing currency values, etc.

Argument (/uiua) Sets the default character to be used to separate arguments in @function statements. The default character is the comma (,) but it can be changed to any valid ASCII character.

Examples:	<u>Default (,)</u>	<u>Using (;) to Punctuate</u>
	@STR(Num,Dec)	@STR(Num;Dec)
	@PMT(Prin,Int,Term)	@PMT(Prin;Int;Term)

BackGnd (/uiub) Sets the background fill pattern to be used in the column heading line. The default character is the "!" (ASCII 176).

Currency (/uiuc) Sets the character to be used as the currency prefix. The currency string may be up to 5 characters long.

Decimal (/uiud) Sets the default character to use in separating decimal values. The default character is the period (.), but it can be changed to any valid ASCII character.

For example, the number 320.25 will be displayed as 320,25 if the comma (,) is used as the decimal punctuation symbol.

DOTLine (/uiuo) Sets the character to be used in the column heading line. The default character is the ".". Similar in function to the /TP command line switch.

HScroll (/uiuh) Sets the character to be used in the horizontal scroll bar.

MenuKey (/uium) Sets an additional main menu activation key. The default activation key "/" will remain operational, but the user may specify an additional key.

Point (/uiup) Sets the point mark character to be used on the horizontal and vertical scroll bars. The diamond (É) is the default character. This mark indicates your relative position in the worksheet.

Quit (/uiuq) Exit the Install, Punctuate menu and return to the Main Install menu.

CAUTION: Do not forget to save the punctuation options, or they will be lost when you exit AS-EASY-AS.

Separator (/uius) Sets the column separating character to be used in the column heading line. The default character is the "*".

Thousand (/uiut) Sets the default character to use in separating thousands in currency and , (comma) display formats. The default character is the comma, but it can be changed to any valid ASCII character.

Examples:	<u>Default (,)</u>	<u>Using (.) to Punctuate decimals and (.) to Punctuate thousands</u>
	\$99,122.50	\$99.122,50
	\$1,982.50	£1.982,50

VScroll (/uiuv) Sets the character to be used in the vertical scroll bar.

Save Config (/uis) Save the defaults set through the Install menu in a file called ASEASY.CFG. When AS-EASY-AS is first started, it looks for this file in the current directory. If the file is not found, it uses the internal defaults for the various options.

Video (/uiv) This menu allows the user to specify the video mode to be used by AS-EASY-AS. Note that in order for a video mode to become active, it has to be supported by the user's hardware, i.e., the video adapter and monitor. The designation **Text** or **Graphics** next to each mode below, refers to the main spreadsheet mode, not the mode when a graph is displayed.

A:[Def 25x80]:Text Set the default text video mode, 25 lines by 80 columns. Selecting one of the other special modes might result in a scrambled display (if the selected mode is not compatible with the hardware). If that happens, then you may immediately select this option to reset the video mode.

B:[EVGA 43/50]:Text Depending on your video adapter/monitor combination, this option will set the monitor to 43 lines (EGA), or 50 lines (VGA).

C:[CGA 25x40]:Text Set the 40 column by 25 rows CGA video mode. When displaying graphs, only two colors (foreground and background) are available, since the high CGA resolution mode is used.

This mode is can be useful for individuals with visual impairment because of the very large characters used.

D:[X-USER SUPPLIED]:Graphics This is a special graphics mode that requires some input from the user. Note that in order to use this mode, you have to be familiar with the various modes available for your hardware, i.e., you need to consult your video adapter card's user manual. When this option is selected, the user is asked to supply the hexadecimal value that the AX register needs to contain when the interrupt \$10 call is made (consult your adapter's manual).

Once the value is supplied, the user is asked to specify the number of rows and columns for this mode. Note that such special modes might not be available on your hardware combination.

E:[EGA 25x80]:Graphics Set the 25 row, 80 column EGA graphics mode (640x350). If your video adapter has at least 256K of RAM, then up to 16 different colors are supported in this mode when displaying graphs.

F:[EGA 43x80]:Graphics Set the 43 row, 80 column EGA graphics mode (640x350). If your video adapter has at least 256K of RAM, then up to 16 different colors are supported in this mode when displaying graphs.

G:[VGA 60x80]:Graphics Set the 60 line by 80 column VGA graphics mode. If your video adapter card contains at least 512K, then up to 16 colors are available when displaying graphs.

H:[HER 25x90]:Graphics Sets the 25 row by 90 column graphics mode for a Hercules monitor and video adapter combination.

I:[HER 43x90]:Graphics Sets the 43 row by 90 column graphics mode for a Hercules monitor and video adapter combination.

J:[MGA 25x80]:Graphics Set the 25 row by 80 column monochrome EGA graphics mode (640x350).

K:[MGA 43x80]:Graphics Set the 43 row by 80 column monochrome EGA graphics mode (640x480).

L:[SVGA 50x100]:Graphics Set the 50 row by 100 column Super VGA graphics display mode (800x600) resolution. The default screen colors are set automatically when this mode is selected.

Shell (/us) This command allows you to temporarily exit to DOS while AS-EASY-AS remains resident in memory.

When the command is executed, another copy of the command processor (COMMAND.COM) is loaded, and the system behaves as if it was just booted up, with the exception that a portion of RAM is occupied by AS-EASY-AS.

The amount of RAM retained by AS-EASY-AS depends on the amount of information in the current worksheet.

The user can return to AS-EASY-AS by typing "EXIT" (no quotes) and pressing [ENTER] at the DOS prompt.

NOTE: Although AS-EASY-AS can in no way harm your data or your system while you have shelled to DOS, the programs you execute during that time might. We recommend that you save your data before you use the /User Shell command. This way, even if the programs you run while in the shell crash your system, you will not lose any of your valuable AS-EASY-AS data.

CAUTION: If AS-EASY-AS was started with the /VM command line switch, you will see a file named ASEASY.TMP upon shelling to DOS. **DO NOT DELETE THIS FILE. Deleting the temporary file will destroy your spreadsheet data.**

10.11 EXIT (/e) Exit the spreadsheet and return to DOS.

NO You can change your mind and return to the spreadsheet.

YES Your exit is irrevocable.

ERROR MESSAGES

ARRAY SIZE > 30x30 - The size of an array (matrix) defined for one of the array operations exceeds the row/column size limitations of 30x30.

Break! CellNumber - An illegal macro command was encountered during macro execution at cell 'CellNumber'.

Cells in Bottom Row - The specified Sheet, Insert, Row cannot be completed because the bottom row of the worksheet contains information. Please note that if a cell is formatted it is not considered blank, so a formatted (empty) cell on the last row would result in the above message.

Cells in Last Column - The specified Sheet, Insert, Column cannot be completed because the rightmost column of the worksheet contains information. Please note that if a cell is formatted it is not considered blank, so a formatted (empty) cell on the rightmost column would result in the above message.

Copy Error - The current copy command could not be completed because the resulting worksheet would not fit in RAM.

Define X-Y Ranges - The Graphics, View or Graphics, Plot, Go Printer command was invoked without having defined the X and Y ranges. The X range and at least one of the Y ranges need to be defined before these commands become available.

Disk Error - An error occurred while trying to retrieve a file from the disk or write a file to the disk. (It could be a damaged diskette, an unformatted diskette, an open disk drive door, etc.)

File Not Found - The file specified for a Retrieve/Merge operation is not on the current disk and/or current file directory. Most common reason for this error is forgetting to change the file directory when AS-EASY-AS is started.

Max Names Exceeded - The maximum number of range names per worksheet has been exceeded. Unused range names can be deleted to make room for new ones.

Max Views Exceeded - The maximum number of views per worksheet has been exceeded.

Named Graphs >50 - The maximum numbers of named graphs in a worksheet (50) has been reached. Named graphs that are not needed any more should be deleted to make room for the new ones.

Out of Memory - The computer's RAM limit has been reached.

Print Range Undefined - A PrintTo, Printer, Go Printer command was executed without having defined a print range.

Printer I/O Error - The printer does not respond to the AS-EASY-AS print commands. It could be turned OFF, Out of Paper, Off-Line, etc. Correct the error and repeat the command(s).

Protected Cell - An attempt was made to modify a protected cell. To do so, first you need to turn the worksheet protection OFF using the Sheet, General, Protect, Disable command.

Range not Large Enough, Expand It! - If the specified Sheet, Text, Justify command was executed, some of the information would be lost. Expand the Justification range to include more blank rows/columns and repeat the commands.

Subroutine Nesting >20 - Only up to 20 nested macro {CALL} statements are allowed. You need to revise the execution flow of the macro commands to reduce the {CALL}'s required.

Unable to Close File, Out of Disk Space - The currently specified disk does not have enough free space to store the specified information. You have to either specify a new directory, change the current diskette or delete some files to make some room.

Unable to Erase File - The specified file cannot be erased (most likely because the DOS Attributes will not permit it.)

Unable to Open Print File - The command PrintTo, File was issued and an error occurred when the specified file was being opened for output (due to DOS attributes, write-protect diskettes, etc.)

Unable to Return, Level <1 - A {RET} macro command was encountered without a corresponding {CALL} command for execution to return to.

Unable to Solve, Pivot Error - Unable to complete the selected Array, Invert operation. Check to see if the element [n,n] is zero.

Unable to Write - The currently selected disk/directory is protected and the specified information cannot be written to it.

MOVEMENT KEYS

MOVEMENT KEYS IN READY MODE

KEY	MOVEMENT
Left arrow	Move cursor left one cell
Right arrow	Move cursor right one cell
Up arrow	Move cursor up one cell
Down arrow	Move cursor down one cell
End-Left arrow	If the current cell is blank, move left to the first non-blank cell. If the current cell is not blank, move left to the next nonblank cell which is followed by a blank cell.
End-Right arrow	If the current cell is blank, move right to the first non-blank cell. If the current cell is not blank, move right to the next nonblank cell which is followed by a blank cell.
End-Up arrow	If the current cell is blank, move up to the first non-blank cell. If the current cell is not blank, move up to the next nonblank cell which is followed by a blank cell.
End-Down arrow	If the current cell is blank, move down to the first non-blank cell. If the current cell is not blank, move down to the next nonblank cell which is followed by a blank cell.
PgUp	Move cursor up one screen.
PgDn	Move cursor down one screen.
Ctrl-PgUp	If more than one panel has been selected, move cursor to the previous panel (up). No effect if no panels have been specified.
Ctrl-PgDn	If more than one panel has been selected, move cursor to the next panel (down). No effect if no panels have been specified.
Tab	Move cursor one page (screen) to the right.
Shift-Tab	Move cursor one page (screen) to the left.
F5 - GoTo	Move cursor directly to specified cell.

MOVEMENT KEYS IN EDIT MODE

<u>KEY</u>	<u>MOVEMENT</u>
Enter	Accept any modifications made to the cell and return to the Ready mode.
Esc	Discard any modifications made to the cell and return to the ready mode.
Left arrow	Move cursor one character to the left.
Right arrow	Move cursor one character to the right.
Del	Delete character above cursor.
Backspace	Delete character to the left of cursor.
Tab	Move cursor 8 characters to the right.
Shift-Tab	Move cursor 8 characters to the left.
End	Move character to the last character.
Home	Move cursor to first character of cell.
Ins	Toggle between the insert and overwrite modes. (The cursor thickness changes to remind user).
[F9] (Calc)	Converts formula to equivalent value or string.
Ctrl-Right arrow	Same as the Tab key above.
Ctrl-Left arrow	Same as the Shift-Tab key above.

DEFAULT AS-EASY-AS SETTINGS

<u>PARAMETER</u>	<u>DEFAULT SETTING</u>
Column Width	9
Currency Prefix	\$
Punctuation	
Decimal Point	.
Argument Separator	,
Thousands Separator	,
Cell Format	Free
Label Alignment	' (Left)
Zero Display	Yes
ASEASY Directory	Current
Data Directory	Current or Set with /DIR =
Autoload File	AUTOEXEC.WKS or set with /AUTO =
Autoexec Macro	\0
Calculation Mode	Auto
Colors	
Text	7 (White)
Menu Background	23 (Blue)
Menu Foreground	7 (White)
Cursor	71 (Red)
Pointer	31 (Blue)
Border	112 (White)
Bottom Line	113 (Blue)
Negative Numbers	12 (Red)
Unprotected Cells	2 (Green)

COLOR VALUE ASSIGNMENTS

The color assignment on a color monitor is as follows:

<u>VALUE</u>	<u>COLOR</u>
0	Black
1	Blue
2	Green
3	Cyan
4	Red
5	Magenta
6	Brown
7	Grey
8	Smoke
9	Royal Blue
10	Lime
11	Sky Blue
12	Scarlet
13	Purple
14	Yellow
15	White

DISPLAY FORMATS

<u>FORMAT</u>	<u>DESCRIPTION</u>	<u>EXAMPLE</u>	<u>CODE</u>
Fixed	Display a specified number of decimal places.	50. 36.30	F0 F2
Scientific	Display scientific notation. Only one digit is allowed in the integer portion of the value. The number of decimal places is specified by the user.	2.15E+01 8.05E-12	S2 S2
Text	Display formulas rather than the calculated results.	B3*N8 @SIN(A1)	T T
Hide	Do not display the contents of the cell.		H
+/-	Display "+"s or "-"s equal to the value in the cell.	++++	+
Percent	Display value in cell in percent format. User specified decimal places.	10.0%	%1
General	Default format. Trailing decimal digits not displayed.	50 36.3	G G
Date	Display the cell contents in a date format (specified by user).	12/4/96	D4
, (comma)	Separate by thousands with commas. Negative numbers are enclosed in parentheses.	1,234,567.89 (3,876.00)	,2 ,2

D-2 APPENDIX D: DISPLAY FORMATS

<u>FORMAT</u>	<u>DESCRIPTION</u>	<u>EXAMPLE</u>	<u>CODE</u>
Currency	Display cell value using comma format (above) preceded by the user-defined currency symbol (e.g., \$).	\$1,234,567.89	C2
Eng	Display cell value using engineering suffix.	2.42k 5.33u	e2 e2
Label	Force input to a label. Once a value has been entered into a cell which has been formatted as a label, it becomes a label with a value of 0.	'12345	L
Box	Use "intelligent" lines to create a table. Will only place lines in empty cells.		X
Graphic	Embedded named graph. Graph will be displayed when /PrintTo Graphics View has been selected, or when one of the graphics video modes is active.		V

ASCII CODES

<u>Dec</u>	<u>Hex</u>	<u>Char</u>	<u>Dec</u>	<u>Hex</u>	<u>Char</u>	<u>Dec</u>	<u>Hex</u>	<u>Char</u>	<u>Dec</u>	<u>Hex</u>	<u>Char</u>
0	0		32	20		64	40	@	96	60	`
1	1	fl	33	21	!	65	41	A	97	61	a
2	2	ł	34	22	"	66	42	B	98	62	b
3	3	É	35	23	#	67	43	C	99	63	c
4	4	Ë	36	24	\$	68	44	D	100	64	d
5	5	Ç	37	25	%	69	45	E	101	65	e
6	6	Ê	38	26	&	70	46	F	102	66	f
7	7	●	39	27	'	71	47	G	103	67	g
8	8	'	40	28	(	72	48	H	104	68	h
9	9	o	41	29	)	73	49	I	105	69	i
10	A	(	42	2A	*	74	4A	J	106	6A	j
11	B	ı	43	2B	+	75	4B	K	107	6B	k
12	C	/	44	2C	,	76	4C	L	108	6C	l
13	D	ı	45	2D	-	77	4D	M	109	6D	m
14	E	Ž	46	2E	.	78	4E	N	110	6E	n
15	F	fi	47	2F	/	79	4F	O	111	6F	o
16	10	O	48	30	0	80	50	P	112	70	p
17	11	1	49	31	1	81	51	Q	113	71	q
18	12	/	50	32	2	82	52	R	114	72	r
19	13	"	51	33	3	83	53	S	115	73	s
20	14	¶	52	34	4	84	54	T	116	74	t
21	15	§	53	35	5	85	55	U	117	75	u
22	16	ž	54	36	6	86	56	V	118	76	v
23	17	\$	55	37	7	87	57	W	119	77	w
24	18	,	56	38	8	88	58	X	120	78	x
25	19	-	57	39	9	89	59	Y	121	79	y
26	1A	*	58	3A	:	90	5A	Z	122	7A	z
27	1B	+	59	3B	;	91	5B	[	123	7B	{
28	1C	&	60	3C	<	92	5C	\	124	7C	|
29	1D	.	61	3D	=	93	5D	]	125	7D	}
30	1E	2	62	3E	>	94	5E	^	126	7E	~
31	1F	3	63	3F	?	95	5F	_	127	7F	!

E-2 APPENDIX E: ASCII CODES

<u>Dec</u>	<u>Hex</u>	<u>Char</u>	<u>Dec</u>	<u>Hex</u>	<u>Char</u>	<u>Dec</u>	<u>Hex</u>	<u>Char</u>	<u>Dec</u>	<u>Hex</u>	<u>Char</u>
128	80	Ç	160	A0	á	192	C0	.	224	E0	α
129	81	ü	161	A1	í	193	C1	2	225	E1	β
130	82	é	162	A2	ó	194	C2	0	226	E2	Γ
131	83	â	163	A3	ú	195	C3	/	227	E3	π
132	84	ä	164	A4	ñ	196	C4	)	228	E4	Σ
133	85	à	165	A5	Ñ	197	C5	3	229	E5	σ
134	86	å	166	A6	ª	198	C6	G	230	E6	μ
135	87	ç	167	A7	º	199	C7	K	231	E7	τ
136	88	ê	168	A8	¿	200	C8	9	232	E8	Φ
137	89	ë	169	A9	%	201	C9	6	233	E9	Θ
138	8A	è	170	AA	¬	202	CA	=	234	EA	Ω
139	8B	ï	171	AB	½	203	CB	;	235	EB	δ
140	8C	î	172	AC	¼	204	CC	:	236	EC	(
141	8D	ì	173	AD	¡	205	CD	4	237	ED	ø
142	8E	Ã	174	AE	«	206	CE	>	238	EE	ε
143	8F	Å	175	AF	»	207	CF	N	239	EF	%
144	90	É	176	B0	!	208	D0	J	240	F0	#
145	91	æ	177	B1	"	209	D1	L	241	F1	±
146	92	Æ	178	B2	#	210	D2	H	242	F2	\$
147	93	ô	179	B3	*	211	D3	F	243	F3	#
148	94	ö	180	B4	1	212	D4	B	244	F4	°
149	95	ò	181	B5	|	213	D5	?	245	F5	ˆ
150	96	û	182	B6	M	214	D6	C	246	F6	÷
151	97	ù	183	B7	D	215	D7	0	247	F7	"
152	98	ÿ	184	B8	@	216	D8	P	248	F8	9
153	99	Ö	185	B9	<	217	D9	-	249	F9	4
154	9A	Ü	186	BA	5	218	DA	+	250	FA	·
155	9B	ç	187	BB	7	219	DB	\$	251	FB	%
156	9C	£	188	BC	8	220	DC	(	252	FC	ª
157	9D	¥	189	BD	E	221	DD	%	253	FD	²
158	9E	₣	190	BE	A	222	DE	'	254	FE	■
159	9F	f	191	BF	,	223	DF	&	255	FF	

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*	3-3	@COMB	6-25
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^	3-3	@COSH	6-12
<	3-3	@COUNT	6-26
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