SATURN-CALC

USER'S MANUAL

SATURNO

Table of Contents

organization

Besides the Table of Contents, this manual has 10 sections, separated by numbered tab dividers. This section explains the manual's organization and contents. The others are described below.

The **Introduction** provides an overview of electronic spreadsheets in general and explains some of the special features of Saturn-Calc.

The **Tutorial** lets you learn the basics of Saturn-Calc by using it. A simple spreadsheet has been created to demonstrate how to move the cursor, make entries, and use several options like storage and printing. This section is especially useful if you have never used an electronic spreadsheet.

The rest of the manual consists of reference material and examples:

Getting Started explains how to access Saturn-Calc, how to create and store spreadsheets and how to use the Directory to maintain files.

Moving the Cursor explains how to move about the spreadsheet.

Entries describes the three types of information you can put on a spreadsheet: text, numbers, and formulas.

Built-In Functions explains the use and syntax of the more than 50 pre-programmed formulas available in Saturn-Calc.

Commands explains the features that enable you to make changes to the appearance of the spreadsheet and perform other operations like printing and storing.

The **Glossary** defines technical terms that apply to spreadsheets in general and Saturn-Calc in particular.

The **Index** indicates on which pages various features are described.

quick reference

This manual provides complete instructions for all Saturn-Calc operations. Before delving into such detailed information you may want to gain an overview of the system's capabilities. The chart in the pocket of the front cover provides complete lists of Saturn-Calc command options, built-in functions and cursor movement and special character keys.

special symbols

The following symbols are used throughout this manual:

n – represents an unspecified number.

< > – enclose abbreviations for special keys on your terminal:

<CR> = carriage return
<LF> = line feed
<TAB> = tab
<DEL> = delete
<SP> = space bar
<CTRL> = control

⇒ ⇐ ⇑ ⇓ represent the cursor keys

software performance report

At the end of this section is a supply of Software Performance Reports. Use these to report any bugs or deficiencies in Saturn-Calc.

user reaction report

Also at the end of this section is a supply of User Reaction Reports. Please use these to let us know what you think about the Saturn-Calc documentation.

WHAT IS A SPREADSHEET?

A spreadsheet is nothing more than a form used for organizing and calculating numeric information. If you have balanced a checkbook, kept score at a baseball game, or filed a tax return, you have used a spreadsheet.

Until recently, spreadsheets were created and maintained with pencil, paper, and brain power or electronic calculators. While effective, this sytem had two major drawbacks. First, there was always the possibility of mistakes; brain power is not infallible, and even copying figures from the calculator to the spreadsheet could result in undetectable errors. Second, changes in data required time-consuming recalculation. You had to remember the relationships between the various entries and make sure to change every affected figure.

enter the computer

Computers have revolutionized the keeping of spreadsheets by eliminating these limitations. Pencil and paper are no longer necessary, and computers never make errors in computation. (Well, almost never.) And best of all is the ease with which one can change data; an electronic spreadsheet remembers which formulas are affected and provides the answer almost instantly. This has spawned what has come to be known as the 'what if' function of spreadsheets. What if the cost of materials rises ten per cent? How would this affect the price of the finished product and consequently sales and gross profit? On a paper spreadsheet, analyzing this problem would require manual recalculation of several complex formulas. On an electronic spreadsheet all you do is enter the new materials cost, and the computer does all the figuring for you.

An electronic spreadsheet has three basic features.

1. It provides a rectangular grid of rows and columns on which you can enter data. The grid often has more rows or columns than can be displayed on your terminal screen, but it can be 'scrolled,' so that you can look at any portion of the spreadsheet that you wish.
2. It has built-in functions that help you manipulate data. These make it easy to obtain sums, averages, and many other calculations for the data you enter.
3. It accepts 'commands' that can change the appearance of spreadhseets or data and can store or print them.

WHAT MAKES SATURN-CALC UNIQUE?

These three features are common to all electronic spreadsheets. What sets Saturn-Calc apart from the others are its design and range of capabilities.

easy to use

Even though it can perform many sophisticated operations, Saturn-Calc is easy to use. The first letter of each command is the same as the key used to implement it: 'p' for printing, 'd' for deleting, and so on. There are system messages, called prompts, that remind you what to do every step of the way. And you can even look at on-screen 'help text' that provides detailed explanations for all of the system's capabilities.

assembly language

Saturn-Calc was written in assembly language. This is a highly efficient language similar to the one your computer uses in performing calculations. It provides rapid computations while using a minimum of valuable computer storage space.

ASCII file structure

ASCII is a code many computer programs, including Saturn-Calc, use to represent the various characters and functions of the keyboard. Programs that use this code can share data, enabling them to perform operations that they cannot do individually:

A Saturn-Calc spreadsheet can be turned into an ASCII word processing file which can be edited, reformatted, and merged into a formal report.

Data entry and numeric files can be loaded into Saturn-Calc for processing. For example, an inventory maintained on your data entry program can be transferred to Saturn-Calc to determine quantities to order.

You can tell Saturn-Calc to take its next instructions from an ASCII file, rather than from the keyboard. This means that you can create a large file of data and commands on your word processor and then use it repeatedly on Saturn-Calc by invoking a single command.

reorganization of data

There is no need to alphabetize or numerically sort data before entering it onto a spreadsheet; Saturn-Calc can do it for you! For example, a list of outstanding invoices, entered randomly, can be organized by customer, date due, amount owed, or any other way you want. This can be especially helpful for organizing information loaded in from a data entry file.

spreadsheet interface

One Saturn-Calc feature enables you to copy information from one spreadsheet to another — as, for example, when you want to move formulas, formats, or values from an existing spreadsheet to a new one which you are creating. A second feature allows the current spreadsheet to retrieve values from a stored spreadsheet. Thus, statistics developed on one spreadsheet can be easily used in another.

size of spreadsheets

A spreadsheet can have as many as 16,384 cells and up to 65,000 characters of text. The maximum number of columns is 446 (A-QD). The maximum number of rows is 16,384 rows (1-16,384). The amount of memory space available to you determines the speed with which recalculations will be done; it does not affect the maximum potential size of a spreadsheet. Saturn-Calc automatically will make use of space on your disk when available memory is insufficient for a particular spreadsheet.

A spreadsheet, then, can be much larger than the terminal screen. The BUDGET spreadsheet actually has 13 columns. In a moment you will learn how to display parts of the spreadsheet not currently visible.

everything you always wanted

Individually variable column widths . . . formula copying . . . split-screen display . . . a variety of numeric display options . . . hidden cells and columns . . . protection of data . . . forward referencing . . . title locking . . . 'if' statements . . . logical names . . . business functions . . . trigonometric functions . . . graphics . . . Most electronic spreadsheet programs have some of these features, but Saturn-Calc has them all, and many more!

Saturn-Calc is a very flexible program. There is no predetermined way to accomplish what you want; **you** design each spreadsheet to meet your needs. The purpose of this tutorial is not to teach you everything you can do with Saturn-Calc; no manual can do that. This tutorial does give you an overview of how to operate the program. It uses a sample spreadsheet to demonstrate how to get the program started, make entries, move the cursor, and modify the spreadsheet.

In this tutorial you will learn how to:

1. Gain access to Saturn-Calc
2. Move the cursor and use the "goto" command
3. Make three kinds of entries - text, numbers, and formulas
4. Type over existing entries and blank cells
5. Use Title Lock
6. Add a new column
7. Change the visual spreadsheet display
8 Duplicate a formula
9. Blank a cell
10. Store a spreadsheet
11. Print a spreadsheet
12. Exit the Saturn-Calc program.

correcting mistakes

Soon you will be typing information onto a spreadsheet. Typographical errors are easy to correct. When you notice a mistake while you are typing, press the delete key, labeled 'rub' or 'rubout' on some keyboards. The cursor backs up one space and erases the character in that space. Then, retype the correct characters(s). Example:

you mistype "time":	tije
press <DEL> twice, which leaves:	ti
type "me", which makes:	time

backing out

You can cancel a command at any point before responding to its final prompt by pressing <U> while holding down the <CTRL> key, or by pressing the <PF2> key. This causes the system to 'back up' to the previous prompt. Repeat this action as often as is needed to display the prompt you want.

log on

Before you can use Saturn-Calc you must log on to your computer. To log on is to type coded messages that verify you are authorized to use the computer. Ask your systems manager for assistance if you do not know how to do this. And while you're at it, find out the name of your operating system.

getting started

To gain access to Saturn-Calc,

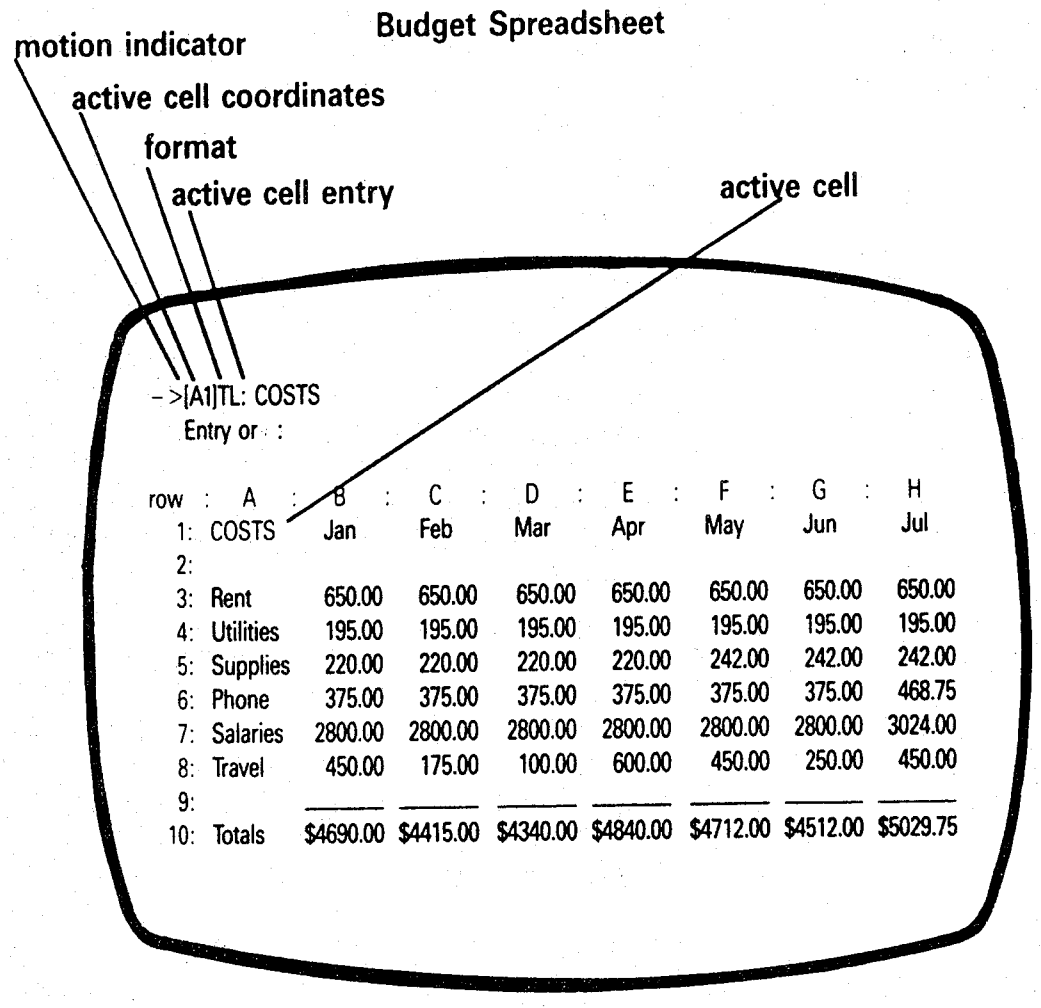
SELECT: **Option 5-Spreadsheet** from the SATURN Main Menu (you can access the Main Menu by typing **SAT** if your operating system is RSTS, RSX, OR VMS, or **R SAT** if on RT-11 or TSX-Plus or by selecting it from the PRO-350 options menu)

RECEIVE: **Name of spreadsheet to read [none]:**

In a prompt, a word in brackets [] indicates the default value, assigned by pressing <CR>.

You can create a new spreadsheet (the default option) or access an existing one. For this lesson we will use an existing spreadsheet.

TYPE: BUDGET <CR>
RECEIVE: the spreadsheet called Budget.



motion indicator - indicates the last direction in which the cursor was moved.

active cell coordinates - displays the column letter(s) and the row number.

format - indicates the display characteristics of values.
Options: decimal (default), exponential, dollars and cents, text. (See Format Command, p. 8-14).

active cell entry - shows the entry as it was typed.

GETTING TO KNOW THE SPREADSHEET

The spreadsheet is a grid of rows (horizontal) and columns (vertical), much like a standard ledger sheet. Rows are labeled with numbers; columns with letters. The intersection of a row and a column is a cell. Data can be entered only into the active cell, which is highlighted by the cursor. Cell A1 is the active cell now.

At the top of the spreadsheet is the header area. It has two lines:

status line - with the information described below the Budget Spreadsheet example on page 3-3.

prompt/edit line - where cell entries are entered and edited, and where system messages are sent and received.

Right now the prompt **Entry or** / is at the top of the screen. There are five things you can do:

1. Access the on-screen help text, which provides explanations for all Saturn-Calc operations.
2. Move the cursor to another cell.
3. Make an entry in cell A1.
4. Signal the spreadsheet to recalculate.
5. Go into the command mode to change the spreadsheet in some way.

These options are described in the five sections following.

HELP TEXT

Saturn-Calc has built-in explanations of all its features, called help text. To access the help text, press <?> when you see **Entry or** / or a question mark on the status line. Information related to the operation you are performing is displayed on the screen. The help text has prompts that tell you how to return to the spreadsheet. See page 8-4 (Help Command) for how to access specific help text topics.

CURSOR MOVEMENT

Most operations require that the cursor be on the cell you want to change. There are four ways to move the cursor:

with the cursor (arrow) keys. Pressing a cursor key moves the cursor one cell in the direction indicated. When the cursor is on the edge of the screen, pressing a cursor key scrolls the screen one column or row in that direction.

by pressing <=> and the cell coordinates, then <CR>. This is called the 'goto' command. It places the cursor on the indicated cell immediately, causing the screen to scroll if necessary.

by completing an entry with a cursor key instead of <CR>. Pressing the cursor key will complete the entry and move the cursor one cell in the indicated direction.

In addition, Saturn-Calc allows automatic cursor motion. This saves a keystroke when you are making several consecutive entries. The direction changes every time you press a cursor key. An arrow on the status line next to the memory indicator shows the direction of the motion.

For a new spreadsheet, automatic cursor motion is enabled by default and that option was enabled when the 'BUDGET' spreadsheet was stored.

Try moving the cursor around the spreadsheet. When you are done, make sure that column A is on the screen.

ENTRIES

An entry is a unit of information; it may be text (December), a number (500), or a formula (A1+A2). If the entry is text or a number, it is displayed in the cell and on the status line when that cell is active. If it is a formula, the calculated value is displayed in the cell, while the formula is shown on the status line when that cell is active.

No "computerese" is required to make an entry; you type it just as you would write it with pencil and paper.

Pressing <DEL> erases the character just typed.
Pressing <CR> concludes an entry.
Pressing a cursor key concludes the entry and moves the cursor one cell in the indicated direction.

The characteristics of text, numbers, and formulas are explained below.

text

Usually, text must be preceded by a quotation mark to distinguish it from a number or formula. A single quotation mark produces left-justified text, and a double quotation

mark produces text that lines up against the right edge of the cell.

An option of the Format command (explained later in this lesson) eliminates the need for quotation marks. This is helpful when entering text into several adjacent cells, as in column A of Budget.

numbers

Numbers consist of numerals and may include a decimal point (period) for fractional amounts and a minus sign (hyphen) for negative values. They are displayed according to the format assigned to the cell. For example, if you type the number 15 in a cell with one-decimal-place format, it will be displayed as 15.0. If you type 15.392 in the same cell, it will be displayed as 15.4. But if you change the format later to two decimal places, it will be displayed as 15.39. The default format is two decimal places.

When the system calculates, it uses the number you typed, regardless of the format displayed.

formulas

A formula is an entry that requires the system to calculate. It may include simple arithmetic operators like + (addition), – (subtraction), * (multiplication), or / (division). Or, it may include any of more than forty built-in functions like sum, if, average, or standard deviation.

Formulas often include a range of cells. This is accomplished by typing the cell coordinates. Individual cells must be set off by commas; a contiguous block of cells is defined by typing one or more dots (or a colon) between the first and last cells. Examples:

sum(a1, b15) – sum of those two cells
sum(a1..a8) – sum of cells a1, a2, a3...a8
sum(a1.m1) – sum of cells a1, b1, c1...m1
sum(a1:b2) – sum of cells a1, a2, b1, and b2

making an entry

Entries can be made in an occupied or in a blank cell. For example, to change COSTS to EXPENSES:

Put the cursor in cell A1.
TYPE: EXPENSES <CR>
RECEIVE: EXPENSES in cell A1, and the **Entry or** / prompt.

RECALCULATION

You can signal the spreadsheet to recalculate whenever you wish by pressing < , > or < ! >. This won't be necessary in using the BUDGET spreadsheet, as it has been set for auto-recalculation; that is, it automatically will recalculate each time you complete an entry. When you create a new spreadsheet, though, it will be set for manual recalculation (recalculating **only** when you signal it to) until you explicitly command it to reset for auto-recalculate (see page 8-21).

COMMANDS

Commands are system functions that can change the format of entries, modify the size or arrangement of the spreadsheet, and perform system operations like storage and printing.

To go into the command mode:

TYPE: /
RECEIVE: **Command (A,B,C,D,E,F,G,I,M,N,O,P,S,T,V,W,X,Z,?):**

These letters represent the command options. They are:

A Apply formula to a range
B Blank cell(s)
C Copy formulas or formats
D Delete rows or columns
E Edit current entry
F Format a cell
G Global changes
I Insert rows or columns
M Move entries from one spreadsheet to another
N add, delete, or list logical Name assignments
O re-Order entries in a row
P Print the spreadsheet
S Store the spreadsheet
T Title Lock - freeze titles on the screen
V display spreadsheet Values
W Window - see two sections of the spreadsheet
X Exit from Saturn-Calc
Z Zap - clear the spreadsheet
? Help - consult Help text

When you select a command option, the system prompts for specific action. It lists the alternatives and indicates the default condition when applicable.

If you make a mistake, press <U> while holding down <CTRL>. This causes the system to 'back up' to the previous prompt and can be repeated until the prompt you want is displayed.

TYPE: <CTRL><U>
RECEIVE: EXPENSES in cell A1, and the **Entry or /** prompt.

In this lesson, you will learn to use Title Lock, Insert, Format, Copy, Blank, Store, Print, and Exit.

title lock

Let's assume that you want to look at the year-end figures. Because the screen is not wide enough to see both the December column and the category labels, you might forget what the figures represent. The Title Lock command solves the problem.

Put the cursor in column B.
TYPE: /T <CR>
RECEIVE: **Title lock (C,R,B,N,?)**

C locks all columns to the left of the cursor.
R locks all rows above the cursor.
B (Both) combines the actions of C and R.
N (Negate) cancels all title looking.

TYPE: C <CR>

If your terminal has reverse-video capability the title-locked rows or columns will appear in reverse-video. Otherwise the screen display does not change until you move the cursor to a cell not on the screen. To display the last three months:

TYPE: =
RECEIVE: **goto:**
TYPE: K1 <CR>

The screen now displays October, November, and December, with the category labels still visible in column A.

insert

Now assume that you would like to calculate yearly totals for each category. First it will be necessary to add a column for those totals.

Put the cursor in column M.
TYPE: /I <CR>
RECEIVE: **Insert column or row (C,R,?)**
TYPE: C <CR>
RECEIVE: **Insert at end? [No]**
TYPE: Y <CR> (to indicate 'Yes')
RECEIVE: **Insert how many [1]:**
TYPE: <CR>
RECEIVE: a new column, N, to the right of December.

entering text

The first order of business is to label the new column.

Put the cursor in cell N1.
TYPE: 'TOTALS <CR>

The quotation mark alerts the system that the entry is text.

RECEIVE: TOTALS in cell N1.

entering a formula

Now you need to enter formulas that will calculate the category totals.

Put the cursor in cell N3.
TYPE: sum(B3..M3) <CR>
RECEIVE: 7800.00, the yearly total for rent.

format

The total is displayed in the spreadsheet's default format (two decimal places). For a formal report, you may want the totals displayed in a dollars and cents format. You can do this with the Format command.

Put the cursor back in cell N3.
TYPE: /F <CR>
RECEIVE: **Format ($,%,C,D,E,F,G,H,J,M,P,T,U,?)**

These are the options:

$ — dollars and cents notation
% — percent format (multiply value by 100 before displaying and display a percent sign)
C — change the width of a column
D — assign the default format to a cell
E — exponential notation
F — decimal notation (with a leading minus sign)
G — format cell for histogram graphics
H — value in cell hidden from display
M — money format (same as '$', except the dollar sign is fixed at the left of the column
P — protect a cell against modification
T — designate a cell to accept text only
U — unprotect a cell (cancel the P format)
? — consult the help text

For a dollars and cents format:

TYPE: 2$ <CR>
RECEIVE: **Cells to format [current]:**
TYPE: <CR>
RECEIVE: $7800.00 in cell N3.

The number preceding the $ indicates the number of decimal places you want. You may omit the number if you want no decimal places, or specify any whole number 1-15.

copy

It is not necessary to re-enter a similar formula in the other rows. The Copy command does that for you. It copies the formula into other cells and changes the cell references automatically.

TYPE: /C <CR>
RECEIVE: **Cells to copy from?**
TYPE: N3 <CR> (the cell with the data you want to copy)
RECEIVE: **Cells to copy to?**
TYPE: N4..N10 <CR> (the cells where you want to put the data)
RECEIVE: **Copy what (A,B,E,F,J,P,T,V) [All] ?**

- A (for 'All') copies the value, format, protected status, and jump status. If the entry is a formula, the formula is copied and cell references in it are adjusted automatically.
- B copies 'blank cell' status.
- E copies math expressions (formulas) only.
- F copies the format only.
- J copies the jump status only.
- P copies the protected status only. Entries in protected cells cannot be changed.
- T copies text only.
- V copies calculated values only.

More than one option from this list may be selected.

TYPE: <CR>
RECEIVE: yearly totals in dollars and cents format for the other categories.

Move the cursor down Column N one cell at a time. As you can see on the status line, Saturn-Calc has modified the original formula to provide the correct totals for each row.

There are times when you will want to copy a formula without changing its cell references. See "maintaining cell references" in the introduction to the Commands section (page 8-3).

blank

Cell N9 displays $.00 because the Copy command put in the formula sum (B9..M9). This does not affect the grand total, but it just does not look right. The Blank command can erase this entry.

TYPE: /B <CR>
RECEIVE: **Blank range:**
TYPE: N9 <CR>

$.00 and the formula that caused it are removed from the cell.

store

That concludes the changes you will make to the spreadsheet. Now it is time to store and print it.

Because Saturn-Calc is frequently used for planning or experimentation, you may not want a permanent copy of every spreadsheet you create or modify. For this reason, the system requires a specific command to store a spreadsheet on the disk. Once stored, a spreadsheet cannot be modified unless you request that action; when accessed again, Saturn-Calc provides a copy which can be changed and stored without affecting the original. To store a spreadsheet:

TYPE: /S <CR>
RECEIVE: **Storage (W,R,C,O,L,G,A,?)**

- W writes the spreadsheet onto the disk.
- R reads another spreadsheet onto the screen but does not store the current sheet.
- C allows input of a command file.
- O outputs a command file to a word processing file, which can be used to recreate all or part of the current spreadsheet.
- L loads a data entry or numeric file into the spreadsheet.
- G allows output of a graph.

A auto-consolidates entries from several separate spreadsheets

Only the Write option is demonstrated in this lesson.

TYPE: W <CR>
RECEIVE: **Name of spreadsheet to write [BUDGET]:**

You can now store the sheet in either of two ways. To **replace** the original BUDGET spreadsheet with the modified version:

TYPE: <CR>
RECEIVE: **File exists — replace it [Yes]?**
TYPE: <CR>

Whenever you call up the BUDGET spreadsheet from now on, you will receive the new version you've just created. The old version no longer exists.

To retain **both** the original and the revised versions of BUDGET:

TYPE: a new filename, then <CR>. If you receive the message **File exists — replace it [Yes]?**, press <N> and select another name.

On RT-11 and TSX, names can have six characters or less; other operating systems allow up to nine characters. <SP>, punctuation marks, and special characters are not allowed.

RECEIVE: **Description for new file:**
TYPE: Up to 50 characters to describe the file in Saturn's directory for spreadsheet files. Any displaying characters may be typed.

print

In addition to storing your spreadsheet, you can print it. Make sure your printer is ready before proceeding.

TYPE: /P <CR>
RECEIVE: **Print to [LP]:**

LP: is the default hard copy printer name. Check with your systems manager to see if you use a different printer.

TYPE: <CR> or type the name of the printer you should use.
RECEIVE: **Print headings and formulas [No] ?**

Headings are Saturn-Calc's own row and column labels, not the text you enter. Formulas are printed below the spreadsheet. This option is helpful when you want to examine the way a spreadsheet is constructed.

TYPE: Y (for Yes) <CR>
RECEIVE: **Printer width [132] ?**

The number determines how many characters can be printed on each line. Any width that your printer handles can be specified.

TYPE: <CR> (assigns the default value of 132)
RECEIVE: **Printer page length [0]:**

This option allows you to have the printout fit on forms having a special length, such as invoices or statements. Also, it allows labels to be repeated at the top of each page of the printout.

TYPE: <CR> (assigns the default value of no pagination)
RECEIVE: **Columns to print [all]**

This option allows you to print desired columns in any order you want. For this exercise:

TYPE: <CR> if the paper in your printer can accept 132 characters per line, or
TYPE: A..G,N <CR> if you have narrower paper.
RECEIVE: **Rows to print [all]:**
TYPE: <CR>
TYPE: **Entry or /**

The spreadsheet as you modified it will now print, and all the formulas used will be printed below it.

exit

You did it! To conclude this lesson:

TYPE: /X <CR>
RECEIVE: **EXIT [No]:**

This prompt is a safeguard; when you exit, the system does not store a copy of the spreadsheet.

TYPE: Y <CR>. This ends the Saturn-Calc program and returns you to the monitor of your operating system.

SUMMARY

This lesson has introduced you to the basics of Saturn-Calc. Mastery of all its features will require study, practice, and experimentation. Here is what you have done so far:

1. Gained access to Saturn-Calc by logging on to the computer and selecting Option 5 from the Saturn Main Menu.
2. Moved the cursor around the spreadsheet with the cursor keys and the "goto" command.
3. Learned about the three different kinds of entries - text, numbers, and formulas.
4. Made a new entry by typing over an existing entry, and by typing in a blank cell.
5. Used the Title Lock command to freeze category labels on the screen while looking at columns not normally on the same screen as the labels.
6. Added a new column with the Insert command.
7. Changed the visual display of an entry with the Format command.
8. Duplicated a formula from one cell into several other cells with the Copy command.
9. Removed an unwanted entry with the Blank command.
10. Made a permanent copy of the modified spreadsheet with the Store command.
11. Produced a hard copy of the spreadsheet with the Print command.
12. Completed the session with the Exit command.

log on

Before you can use Saturn-Calc you must log on to the computer. To log on is to type coded messages that verify you are authorized to use the computer. Ask your systems manager for assistance if you do not know how to do this. And while you're at it, find out the name of your operating system.

If you are a single user with an RT-11 operating system, it may not be necessary to log on.

running Saturn-Calc

After you log on, you must tell the computer to run the Saturn-Calc program. First access the Saturn Main Menu.

TYPE: **r sat** <CR> (if on RT-11 or TSX-Plus) or **sat** if on RSTS, RSX, or VMS or select Saturn Menu from Pro 350 menu.
SELECT: **Option 5-Spreadsheet** from the Saturn Main Menu.
RECEIVE: the Saturn-Calc program and the prompt **Name of spreadsheet to read [none]:**

In a prompt, a word in brackets indicates the default value, assigned by pressing <CR>.

naming spreadsheets

Every spreadsheet that you want to use more than once will have a unique name. You assign the name when you have finished creating the spreadsheet and want to save it for later use.

Names may be six characters or less on RT-11 and TSX-Plus, nine characters or less on RSX, RTS, and VMS. <SP>, punctuation marks, and special characters are not allowed. Also, names may not resemble cell references. For example, D5 is not a valid spreadsheet name.

Names also include a suffix, or extension, to distinguish spreadsheets from word processing or other kinds of files. Saturn-Calc automatically adds the extension '.cal' to each spreadsheet name.

You may override the automatic .cal extension by typing a dot and any three letters you want. To read in that spreadsheet you must type the full name, including the extension you added.

new spreadsheets

To create a new spreadsheet:

PRESS:<CR>
RECEIVE: **Initial # of columns [6] :**
TYPE: the number desired, then <CR>. A <CR> by itself gives the default value (shown in brackets) of six columns.
RECEIVE: **Initial # of rows (n max) [20] :**

A spreadsheet can have as many as 16,384 cells and up to 65,000 characters of text. The maximum number of columns is 446 (A-QD). The maximum number of rows is 16,384 rows (1-16,384). The amount of memory space available to you does not affect the maximum potential size of a spreadsheet. Saturn-Calc automatically will make use of space on your disk when available memory is insufficient for a particular spreadsheet. However, the amount of available memory does limit the speed with which recalculations will be done. When you are working in a spreadsheet the /V command shows the memory available for the current sheet.

TYPE: the number desired, then <CR>. A <CR> by itself gives the default value of 20 rows.
RECEIVE: a blank spreadsheet with the dimensions you specified.

existing spreadsheets

To read in an existing spreadsheet:

TYPE: the name of the spreadsheet.
RECEIVE: a copy of the spreadsheet. The system keeps the original on a storage disk. Changes you make to the copy do not affect the original.

storing

It is a good idea to store a spreadsheet every fifteen or twenty minutes while you are creating or changing it. This assures that you will not lose your work due to a power failure or computer malfunction. See Storage in the Commands section (page 8-29).

USING THE DIRECTORY OPTIONS

The three Directory options found on the Master Menu (Directory, Print Directory and Directory Utilities)

- let you instantly find any single file or group of related files;
- provide you with hard copy alphabetical listings of filenames;
- keep running inventories of the numbers and types of files you have in your account;
- allow you to quickly and painlessly eliminate outdated or unwanted files.

The key to the Directory's organizational abilities is a flexible system of grouping files according to file types. Files are said to be of the same type if they are either all created in the same program (e.g., Saturn-Calc spreadsheets, Word Processing or Data Entry files), or if you have defined them as such for your own organzational purposes.

Each file's type is identified by its filename extension, a three-character code separated from the filename by a period. Saturn automatically assigns extensions that identify the programs in which the files were created (.CAL for spreadsheets; .WPS for Word Processing files; .DEF for Data Entry files, and so on).

When you name a file, though, you can substitute any 3-character extension of your own to help you identify groups of related files (spreadsheets for different customers, for instance). These can then be given their own separate listing in the Directory, which organizes all files according to their filename extensions.

the directory

The directory provides alphabetical lists of all the files sharing each filename extension. When you select the Directory option, it presents a list of available file types (up to 10 different file types can be listed in the Directory; use Directory Utilities to select which file types will be listed). Once you select which of the displayed file-types you want to see, it alphabetically lists all the files sharing that filename extension, giving each file's name, description and size.

A file's size is measured in "blocks," a unit of computer storage equal to 512 characters. A file's description is a statement, up to 50 characters long, that you may assign to each file the first time you store it. The description is purely for your own use, not the system's; it serves to remind you or other users of the file's contents or purpose.

While in the Directory, you can change any file's description, delete any unwanted files or select a file to use (in which case you're returned to the Master Menu, where that filename will be displayed as the Selected File).

print directory

Print Directory generates a hard copy or disk (ASCII) file of the directory listings for any or all types of files in the directory.

When you select this option, you receive a list of file types and instructions on how to select the ones you want to print. Once you've chosen the listings to be printed, you enter the name of the printer or file that will receive the data. When the printing is done, the system returns to the Master Menu.

directory utilities

Directory Utilities provides a variety of operations that help you maintain files:

directory statistics
Directory statistics lists the number of each type of file, the directory size (total number of files allowed), the total number of existing files, and the date of the last directory check.

check directory against account
In addition to the Saturn directory, the operating system of your computer also maintains a directory of your files. This option compares the two directories, insuring that newly created files or files loaded in from someone else's account will appear in your Saturn directory. Merely entering the option number initiates the check and returns you to the Directory Utilities menu.

change file types
Use this option to add file types to, or delete file types from, the Saturn directory. When you select this option, you'll receive a list of the file types in your directory and

instructions for adding or deleting types. All files—and only those files—whose filename extensions are listed here are included in the Saturn directory.

enlarge directory size
The directory size defines the total number of files allowed. When your directory is full, and you exit from a new document or file, you will receive the message **Directory full, please enlarge.** Select this option from the Directory Utilities menu; the procedure is explained on-screen.

This chapter describes the various ways of moving the cursor: from cell to cell, from one screen to another, and to any particular cell on the spreadsheet.

from cell to cell

Most terminals have cursor, or arrow, keys for moving the cursor one cell at a time. The <TAB> and <LF> keys serve the same purpose.

⇒ and <TAB> move the cursor one cell to the right.

⇐ moves the cursor one cell to the left.

⇑ moves the cursor up one cell.

⇓ and <LF> move the cursor down one cell.

All of these keys may be used at the **Entry or** / prompt. They can also conclude an entry and simultaneously move the cursor to the next cell in the indicated direction.

When the cursor is at the edge of the screen, pressing one of these keys scrolls the spreadsheet one column or row in the direction indicated.

from screen to screen

A second group of cursor commands allows you to move the spreadsheet a screen at a time. A screen is the part of the spreadsheet you can see at any one time. The commands are activated by pressing <CTRL>, **keeping it depressed** while also pressing <A>, and then releasing both and pressing the desired cursor key.

Screen Right

<CTRL><A> ⇒

Screen Left

<CTRL><A> ⇐

Screen Up

<CTRL><A> ⇑

Screen Down

<CTRL><A> ⇓

to a specific cell

You can move the cursor to any cell on the spreadsheet, whether or not that cell is on the screen. The command used is called 'goto'; it is activated with the 'equals' key.

TYPE: =
RECEIVE: **goto:**
TYPE: the cell coordinates desired, then <CR>. The cursor moves to that cell. If the cell was not on the screen, the screen is redrawn to show that cell.

If you specify a cell that does not exist on the spreadsheet, the system displays the message **Cell reference out of range**. Enter a valid cell reference.

A logical name can be used with 'goto' if the name is assigned to a cell (rather than just to a row or column).

A variation of the goto command moves the cursor from the current row to column A of the next row. For example, if the cursor is in a cell in row 3, pressing <=> <CR> moves the cursor to column A, row 4.

An entry is a unit of information that you enter onto the spreadsheet. No 'computerese' is necessary; you type the information just as you would write it on a paper spreadsheet. Characters appear on the prompt/edit line as you type them; when you conclude an entry the system transfers it to the active cell, which is highlighted by the cursor. The active cell's entry is also displayed on the status line.

Entries may be a maximum of 142 characters. If an entry is too long to fit in a cell or on the status line, its display is truncated. For example, if an entry with 15 characters is entered in a cell with a column width of 12, only the first 12 characters will be displayed in the cell. However, entries appear in full on the prompt/edit line as you type them and when you use the Edit command (page 8-13).

A blinking square of light (or a small line on some terminals), called a 'cue', indicates where characters will appear as you type them. The following functions keys may be used when typing entries:

<DEL>	erases the character to the left of the cue.
<CTRL><U>	or <PF2> erases all the characters to the left of the cue.
<CR>	concludes an entry. If automatic motion is in effect, the cursor moves one cell in the direction indicated (See the Global automatic motion command, page 8-18). Otherwise, the cursor stays in the active cell.
<LF>	concludes an entry and moves the cursor down one cell.
<TAB>	concludes an entry and moves the cursor one cell to the right.
CURSOR KEYS	Conclude an entry and move the cursor one cell in the indicated direction.
<CTRL><W>	repeated twice repaints the display. This is useful when employing virtual lines to examine several spreadsheets.

There are four kinds of entries:

Text - like 'July' or 'net profit'. Text is used to label the rows and columns of numeric entries.

Numbers - like 43 or 6.52. Numbers consist of numerals and may include a decimal point or minus sign, if needed.

Cell References - like A1 or B7. Cell references can consist of a logical name, an explicit cell reference involving a fixed column and row (such as H18), or a computed reference using a formula.

Formulas - like sum(A1 . . . A5) or B5—B4. Formulas enable you to do a variety of mathematical operations with the numbers you have entered. Together, numbers and formulas are referred to as 'values'; they are the entries that Saturn-Calc uses in computations.

Each of these kinds of entries is described on the following pages. Information on text begins on page 6-3, numbers on 6-4, cell references on 6-6 and formulas on 6-8.

The way in which Saturn-Calc displays entries is dependent on the format of a particular cell. Saturn-Calc provides a wide variety of display options, all defined by the Format command (pages 8-14 to 8-17). You may wish to review this command before reading about entries.

TEXT

Text is an entry that identifies the values on the spreadsheet. Typically, most text is entered in the top row and the left-most column of a spreadsheet. No mathematical computations are done on text.

Any printable character may be used as text. You must specify that an entry is text so that Saturn-Calc can tell it apart from values. There are two ways to do this:

Precede the entry with a single <'> or double <"> quotation mark or an accent grave <`> mark for, respectively, left-justified, right-justified or centered text. This method is recommended when you want to put text in only one or two cells.

Change the format of the cell so that it accepts whatever you type as text. This is done with the Format command. Entries made in a cell with text format do not need a preceding quotation mark, and can be formatted to left-justify, right-justify or center text. This method is recommended when you want to put text in several adjacent cells. The Format command will prompt for a range of cells to format.

Examples of text entries:

JANUARY
1983
****

projected increase
02/09/79

errors

If you enter text in a non-text formatted cell, and do not precede it with a quotation mark, the cell will display 'err.' You can correct the entry using the Edit command (page 8-13).

long text strings

Normally, if a text entry is too long to fit in a cell, it is truncated. However, if the cell to the right has no entry, the text will spill over into that cell, regardless of its format.

Up to 80 characters are displayed on the status line when that cell is active, and the entire entry is displayed on the prompt/edit line when you use the Edit command.

repeating text strings

Text that repeats across an entire row can be specified by preceding the text with \ or \". This must be entered in a cell that does not have a text format. \ by itself forces an uninterrupted display of the text string; \" leaves a blank space between each column. This feature is helpful for drawing a line above a 'totals' row, for example.

Another method of repeating text across a row is to assign a text format to the cell where you want the entry to start. Then fill that cell with the desired text string and use the Copy command to put the string in the rest of the cells in the row.

NUMBERS

There are only three types of characters that may be used when entering numbers:

- the numerals 0-9
- a minus sign (hyphen) for negative values. This must be typed in before the number, but it can be displayed as leading or trailing or as parentheses, depending on the format used.
- a decimal point (period) for fractional amounts

display characteristics

By default, Saturn-Calc displays numbers with two decimal places. For example, if you enter the number 14, Saturn-Calc displays 14.00. If you enter 1.9999, the system rounds it up to 2.00. This is a display feature only, and does not affect calculations. When calculating, the system uses 15 significant digits (see below).

The Format command provides several alternatives to the default format. It allows you to specify the number of decimal places displayed as well as options like dollars and cents notation ($14.00), scientific notation (1.4E+01), commas after every third digit (1,000,000), and many others. You never type any of these special characters as part of a number; once specified by the Format command, they are added automatically by Saturn-Calc.

Numbers are displayed on the status line in the same format as that assigned to the cell. If you enter a number like 4.997 in a cell with two decimal place notation, the number will be rounded up and displayed as 5.00. If you later change the format to three decimal place notation, the original entry will be restored.

number of digits

By default, Saturn-Calc uses 15 digits when performing calculations, regardless of how many digits are in the number you enter. For reasons of speed, efficiency and accuracy, your numbers are internally stored as 4-word binary number representations having 15 significant digits of accuracy (this is a DEC standard, and is also how numbers are stored in a FORTRAN or BASIC program). This can cause extremely minor discrepancies. For example, if you are adding a column of 75 whole numbers, the sum may include the fractional amounts inherent in the computer's method of calculating.

Fortunately, Saturn-Calc provides a solution to this problem. The Scale function (page 7-14) allows you to define the number of significant digits used in single cell calculations, while the Global scale command (page 8-22) provides that feature for the entire spreadsheet.

If a number has more digits than will fit in a cell, the system truncates the entry in the cell. You will probably want to widen the column width (page 8-19) in those circumstances.

CELL REFERENCES

The simplest type of cell reference includes both the column letter(s) and row number, stated explicitly (such as A4, D11, QB2, etc.)

logical names

Logical names of up to 8 alphanumeric characters (including underline and space) can be assigned to a cell, column, or row by using the Names command (p. 8-25). Up to 40 logical names can be assigned per spreadsheet.

Logical names then can be used to define either all or part of the cell reference in the following manner:

{colname}row
col{rowname}
{colname}{rowname} or {colname,rowname}
{cellname}

where 'colname' represents a logical name for a column, where 'rowname' represents a logical name for a row, and where 'cellname' represents a logical name for a particular cell.

For example, if the logical name 'LEFT' represents column A and the logical name 'TOP' represents row 1, then cell A1 could be referenced as:

{LEFT}1
A{TOP}
{LEFT}{TOP}
{LEFT,TOP}

Or if the logical name 'RATE' represented cell A5, then the expression {RATE} would refer to that cell.

Logical names can be used in the 'goto' command (=) and in any function. You can refer to logical names in a stored spreadsheet by using the GET function.

The references associated with logical names are always shifted after inserting or deleting rows or columns (that is, the @ symbol has no effect on that portion of a cell reference involving a logical name).

computed references

A computed reference allows use of a value to determine the appropriate column (using 1 for A, 2 for B . . . 26 for Z, 27 for AA, etc.), the appropriate row or both the column and row. Note that this value could be a number, a cell reference (in which case the value contained in the specified cell is used) or a formula.

Computed references then can be used to define either all or part of the cell reference in the following manner:

[colexpr]row
col[rowexpr]
[colexpr,rowexpr]

Where 'colexpr' is the formula for the column value and where 'rowexpr' is the formula for the row value.

Notice that this is very similar to the manner in which logical names are used, except that square brackets replace the braces.

The following examples may help to illustrate the use of computed cell references:

[A5]6 would use the value in cell A5 to determine the column reference. If A5 had a value of 2, cell B6 would be referenced.

C[2*B7] would use twice the value in cell B7 to determine the row reference. If B7 had a value of 4, cell C8 would be referenced.

NOTE: Previous versions of Saturn-Calc used braces and a pound symbol ({#}) to designate computed cell references. The current version **will** still accept these, so that you needn't reformat existing spreadsheets (if you wish, you **can** do so easily by writing the sheet out to a command file, then performing global replaces). We think you'll find the square brackets much easier to use, though, in creating new sheets.

FORMULAS

Formulas are the most powerful feature of Saturn-Calc. They allow you to perform a wide variety of mathematical and relational operations to the numbers you enter on a spreadsheet.

Formulas are entered in the same manner as text and numbers, but they are not displayed on the spreadsheet. Instead, their calculated value is displayed (An option of the Print command provides a printout of all formulas on the spreadsheet; see page 8-27). Each formula is displayed on the status line when the cursor rests on its cell.

In automatic-recalculation mode, as soon as you enter a formula, Saturn-Calc calculates it and displays its value in the cell. If you later change an entry, Saturn-Calc recalculates the formula and displays the updated value.

There are four components that can be used in constructing formulas:

- numbers (25, 13.3, -788, etc.)
- cell references, including logical names and computed cell references (A4, D11, CX42, {RATE}, CX[Row+10], etc.)
- arithmetic and relational operators (+ for addition, * for multiplication, < for 'less than', etc.)
- functions (sum, average, square root, etc.). These are built in to Saturn-Calc to save you the time and effort of constructing them yourself.

A note about the built-in functions supplied by Saturn-Calc: Some of these are used by scientists, engineers and other experts for highly specialized applications. While this manual can show you how to enter such functions, only your own experience as a scientist or engineer could teach you **when** to use them.

At the same time, many of our functions allow even spreadsheet novices to perform very sophisticated operations. Our demonstration spreadsheets are a good introduction to such applications, and many books and articles have been written to describe similarly imaginative uses for electronic spreadsheets. Again, though, you'll ultimately have to rely on your own experience and imagination to teach you when a given function best suits a particular application.

commands affecting formulas

The information presented in this section makes reference to several commands that affect formulas. The ones mentioned and several others are summarized below.

command	pages	use
Copy	8-7 to 8-11	Copies formula from one cell into other cells, adjusting cell references automatically
Delete	8-12	Adjusts cell references after deleting columns or rows
Edit	8-13	Allows changes to formulas without complete retyping.
Format (Protect)	8-17	Allows protection of formulas against accidental changes.
Global (Order)	8-20 to 8-21	Changes recalculation order to allow forward references.
Global (Recalculation)	8-21	Sets automatic or manual recalculation
Global (Scale)	8-22	Defines the number of significant digits used in calculations.
Insert	8-23	Adjusts cell references after inserting columns or rows
Move	8-24	Copies formula from a stored spreadsheet into cells in the active spreadsheet, adjusting cell references automatically.
Print	8-27 to 8-28	Allows printing of formulas.

contents

A formula may be as simple or complex as you want. The only limitation is size; like any entry, a formula can have at most 160 characters.

errors

If you make a mistake in entering a formula, Saturn-Calc displays 'err' in the cell. The entry as you typed it remains on the status line so that you can find the error and correct it using the Edit command.

ranges

Formulas often include reference to a range of cells. A range can be part or all of a column or row, or it may be a rectangular section of the spreadsheet, called a block. You define a range by typing the first cell, one or more dots (or a colon), and the last cell. Examples:

(column)	A1.A4	cells A1, A2, A3, A4
(row)	A1..D1	cells A1, B1, C1, D1
(block)	A1:D4	cells A1-A4, B1-B4, C1-C4, D1-D4

recalculating

On small spreadsheets with a few formulas, recalculation occurs at the blink of an eye; but a very large spreadsheet with complex formulas can take several seconds to recalculate. Consequently, Saturn-Calc has two features that save you from waiting for recalculation to occur:

By default, recalculation for a new spreadsheet occurs only at your explicit request. Also, even for an existing spreadsheet, the Global recalculation mode command can stop automatic recalculation of all formulas.

Preceding a formula with a per cent sign (%) stops that one formula from being recalculated.

In both cases, you can force recalculation whenever you want it by pressing the exclamation point (!) or the comma (,).

operators

Operators are symbols that represent the various arithmetic and relational operations you can perform on Saturn-Calc. Most of them are the same symbols you would use if entering a formula on a paper spreadsheet.

Arithmetic Operators

Operator	Action
^	Exponentiation
*	Multiplication
/	Division
+	Addition
-	Subtraction

Relational Operators

Operator	Action
<	Less than
<=	Less than or equal to
>	Greater than
>=	Greater than or equal to
=	Equal to
<>	Not equal to
OR	Logical inclusive OR
AND	Logical AND

(OR and AND must be typed in capital letters.)

precedence

The operators are shown in order of precedence; those at the top of the list are performed before those below. For example, 2+2*3=8, not 12, because multiplication takes precedence over addition.

Formulas with more than one expression of equal precedence are evaluated from left to right.

The order of precedence can be changed by enclosing parts of a formula within parentheses. For example, (2+2)*3=12, not 8, because the parentheses override the normal order of precedence. If there is more than one parenthetical expression, the innermost one is calculated first.

boolean expressions

A Boolean expression is one containing relational operators and which can be verified as true or false (e.g., "2 >1" is true; 4=5 is false). Boolean expressions display '0' if they are false and '1' if they are true. For example, the formula H5<20 returns the value '0' if cell H5 has a value equal to or greater than 20, and it returns the value '1' if the value is less than 20.

prompt/edit line as calculator

The prompt/edit line can be used like a conventional electronic calculator:

Type: a formula as if you would be entering it in a cell. Then, at the end of the formula, type # followed by a <CR>.

Receive: the calculated value in decimal format. Saturn-Calc goes into the edit mode.

Type: <CR> to enter the value into the active cell, or
Type: <CTRL> and <U> simultaneously to get out of the edit mode.

dates

Dates can be entered several ways:

For purposes of ordering rows in the simplest fashion, dates can be entered as numbers or text in the format yymmdd.

For ordering rows plus a more pleasing display, dates can be entered using a sequence of entries across several columns. For example, a date expressed as mm/dd/yy (or as dd/mm/yy) could be represented in 5 successive columns having widths of 2, 1, 2, 1, and 2 characters, respectively. The month, day, and year values could be formatted as text or as numbers. The cells for the '/' (or'-') would be formatted as text for ease of entry.

One of the key advantages of electronic spreadsheets over conventional ledgers is that they let you enter formulas rather than just numbers into cells, while the spreadsheet itself calculates and displays the numeric results of those formulas.

Most electronic spreadsheets also offer a certain number of built-in functions: preprogrammed, ready to use formulas. If you've used electronic spreadsheets before, you already know that the ease of use and the variety and sophistication of such built-in functions are perhaps **the** most important tests of that software's usefulness to you.

what they do

At their simplest level, built-in functions are just a convenient shorthand. If, for example, you wanted to total a column of figures that were in cells A1 through A6, SaturnCalc's built-in SUM function lets you type **SUM(A1.A6)** rather than "creating" the formula **A1+A2+A3+A4+A5+A6.**

This "convenience" becomes more important as the formulas these functions replace become more complex. If, for instance, you wanted to find the standard variance rather than just the sum of those same six cells, you could type **VAR(A1.A6)** rather than typing

$$(A1^2+A2^2+A3^2+A4^2+A5^2+A6^2)/6-[(A1+A2+A3+A4+A5+A6)/6]^2$$

But the most valuable built-in functions let you do things that would otherwise be impossible! A few quick examples:

GET automatically retrieves values from other spreadsheets to use in calculations in the present spreadsheet;

ADDVAL applies a single formula to each cell in a range and adds together the results of these calculations;

WHILE repeatedly performs a specified calculation until a given condition ceases to be true, then returns the result of its calculations up to that point.

Moreover, you can nest functions within one another, giving you even greater control over the data you have at hand.

Without such functions, a spreadsheet can only show a single, isolated part of a larger picture at a single point in time: you can see this month's budget or last year's profit and loss figures. But **with** such functions, a single spreadsheet can show you how the parts of a financial or statistical picture affect one another, how they change over time, how they **might** change if certain conditions came into play.

combining functions

The power of each Saturn-Calc built-in function is greatly multiplied when you combine it with other built-in functions into complex formulas. For example, a single formula combining GET, IF and LOOKUP functions could perform the following tasks: IF the income level found by using the GET function is greater than X, then LOOKUP the interest rate for this loan from table 1; otherwise LOOKUP the interest rate from table 2.

The ways in which the various functions can be combined are limited only by your own imagination and expertise, and we strongly recommend you take the time to experiment with the Saturn-Calc demonstration files (which depend on such complex formulas to carry out their tasks) and to create experimental spreadsheets of your own.

It may help your experiments to realize that there are many functions which can **only** be used in combination with other functions—or which are almost always used in such combinations. This is true of virtually all the Register and Referential functions, as well as ERR, VALUE, PUT and PUTV, FINDC and FINDR, PI, VALUE and SCALE.

For instance, PUT and PUTV are almost always used with DO, WHILE or ADDVAL functions: these looping functions carry out a series of calculations, and the PUT functions "put" the results of each separate calculation into a different cell.

function syntax

A function's syntax is the specific information needed, and the order and way it must be stated, for you to perform that function. All function formats begin with a name-code ("IF," " PUT," "SCALE," "LOOKUP," etc.); any other information needed is then supplied within parentheses.

That information may consist of cell references, values or other formulas or functions. The order in which these are

listed tells the system how to use each piece of information. Thus, if the syntax is wrong it will be misinterpreted, causing miscalculations.

function lists

The remainder of this chapter lists all current Saturn-Calc built-in functions, together with their syntax and explanations of the calculations they perform. There is first an alphabetical listing of all functions, followed by separate lists of the various categories of functions, which provide more detailed information about each function.

NOTE: In the descriptions for each category, (V) refers to a value, which may be a number, a formula, or a cell reference.

There are examples at the end of the chapter for those functions marked with an asterisk (*). A more complete picture of these and other functions is offered by the Saturn-Calc Demonstration Files you received with your distribution.

You can also find complete lists of available functions in your on-screen help text, or in the reference guide found inside the front cover of this manual.

BUILT-IN FUNCTIONS — Alphabetical Listing

FUNCTION	SECTION	DESCRIPTION
ABS	ARITHMETIC	Absolute value.
ADDR	REGISTER	Adds a specified value to existing register value.
ADDVAL	LOOPING	Returns the sum of the results of applying a formula to each cell in a range.
ATAN	ARITHMETIC	Arc tangent.
AVG	STATISTICAL	Returns the average of the values in the range.
CC	REFERENTIAL	Returns column number on which cursor currently resides.
CIAPI	BUSINESS	Returns the amount paid as interest over a period.
CIFV	BUSINESS	Returns the future value of a compound interest loan.
CLRR	REGISTER	Clears all registers to 0.
COL	REFERENTIAL	Returns number of column currently being evaluated.
COS	ARITHMETIC	Cosine.
COUNT	STATISTICAL	Returns the number of non-blank cells in a range or ranges.
CR	REFERENTIAL	Returns row number on which cursor currently resides.
DDB	BUSINESS	Returns declining balance depreciation for given period and rate.
DO	LOOPING	Performs series of separate calculations, returning 0 to current cell.
DSL	BUSINESS	Returns straight line depreciation value for given period.
DSYD	BUSINESS	Returns sum of years' digits depreciation value for given period.
ERR	LOGICAL	Puts value of 'err' in a cell.
EXP	ARITHMETIC	Exponential value.
FACT	ARITHMETIC	Factorial value.
FINDC	LOGICAL	Returns the number of the column in a specified range at which a boolean expression becomes true.
FINDR	LOGICAL	Returns the number of the row in a specified range at which a boolean expression becomes true.
FV	BUSINESS	Returns the future value of a loan having a given present value, interest rate and period.
GET	REFERENTIAL	Performs one of 3 functions: retrieves a value from a stored spreadsheet; retrieves a value from current spreadsheet; retrieves the sum of the values from spreadsheets designated by the /SA command.

IF	LOGICAL	Calculates and returns one of two values, based on truth value of Boolean expression.
INT	ARITHMETIC	Integer value.
LN	ARITHMETIC	Natural logarithm.
LOAD	REGISTER	Loads a value into a specified register.
LOG	ARITHMETIC	Logarithm in base 10.
LOOKUP	REFERENTIAL	Returns value from a table, using both comparisons with a specified expression and spatial relationships within the table.
LRP	BUSINESS	Monthly loan payment for a direct reduction loan.
LRPW	BUSINESS	Present worth of a direct reduction loan.
MAX	STATISTICAL	Largest value in the range.
MIN	STATISTICAL	Smallest value in the range.
NCOL	REFERENTIAL	Returns the number of columns in the current spreadsheet.
NROW	REFERENTIAL	Returns the number of rows in the current spreadsheet.
PI	ARITHMETIC	Value of pi (3.14159265358979).
PROJ	STATISTICAL	Returns the projected value of a given point on a line having a given slope and intercept.
PUT	REFERENTIAL	Puts value in a cell specified by a computed cell reference and in the current cell.
PUTV	REFERENTIAL	Puts value in the indicated cell and in the current cell.
PV	BUSINESS	Returns the present value of a loan having a given future value, interest rate and period.
ROW	REFERENTIAL	Returns number of row currently being evaluated.
SCALE	ARITHMETIC	Defines the number of significant digits used in calculations.
SEL	LOGICAL	Selects from among 'n' values to return, based on the current value of a specified expression.
SFP	BUSINESS	Required monthly payment to obtain the desired sinking fund future value.
SFFV	BUSINESS	Returns future value for a sinking fund at 'n' months.
SIN	ARITHMETIC	Sine.
SLOPE	STATISTICAL	Performs a linear regression, returning the best fit line for a given set of data values.
SQRT	ARITHMETIC	Square root.
STD	STATISTICAL	Standard deviation of the values in the range.
STDE	STATISTICAL	Standard error of the values in the range.
SUM	STATISTICAL	Totals the values in the range.
UNLOAD	REGISTER	Returns the value from a specified register.
VALUE	REFERENTIAL	Returns the value of the cell currently being evaluated.
VAR	STATISTICAL	Variance of the values in the range.
WHILE	LOOPING	Returns a specified value so long as a given condition remains true.

Referential Functions

These reference other cells in the current or in stored spreadsheets. They may return either values found in those cells, or the locations of cells containing specified values. The latter lets you perform calculations based upon relationships among different types of data if your spreadsheet first assigns each type a unique location. They are most often used with looping functions or in computed cell references. See the GRAPH2 and MEASUR sample spreadsheets for examples of their uses.

CC

Returns the number of the column (A=1, B=2, C=3, etc.) on which the cursor resides at the time recalculation occurs.

COL

Returns the number of the column (such that A=1, B=2, C=3, etc.) in which the COL function resides (e.g., a COL function in cell C5 would return a 3).

When used with ADDVAL, FINDC or FINDR, the COL function assumes the column number of each cell in the specified range as that cell is being evaluated (e.g., in a looping function addressing the range A1:C1, COL assumes a value of 1 as A1 is evaluated, 2 for B1 and 3 for C1).

CR

Returns the number of the row on which the cursor resides at the time recalculation occurs.

***GET (V,spreadsheet)**

Retrieves the value V from the spreadsheet named and calculates it on the current spreadsheet.

Note that V can be a cell reference, such as C3. Or V can be a complex formula, such as sum(A1:B4). V even can be a logical name or a formula which includes another GET function, such as GET(A1+GET(B4,TRAIL),BUDGET).

GET(V)

Returns value V from the current spreadsheet. When nested within another GET, this allows calculations using values from both the current and stored spreadsheets.

GET(V,#) This is used once you have implemented the Storage Auto-consolidate (SA) command (see p. 8-42). It retrieves V from **each** of the spreadsheets assigned by that command and returns the **sum** of those values.

***LOOKUP(V,range)** This finds the first cell in the specified range whose value is **greater** than V. It then returns the value from the cell that is below and to the left of that cell, if the range is a row, or above and to the right of that cell, if the range is a column.

If no value in the range is greater than V, it returns the value from the cell below (if the range is a row) or to the right (if the range is a column) of the last cell in the range.

NOTE: FINDC and FINDR (see p. 7-8) can also be used to perform much the same tasks as LOOKUP.

PUT(V,column,row) This places a value V (usually the result of a calculation) into a specified cell and into the cell in which the function appears. You specify the cell as you would for a computed cell reference, separating the formulas or values which assign column and row numbers by a comma.

PUTV(V,cellref) This is identical to PUT, except that you use standard cell references (A1, C12, D14, etc.) to specify which cell receives V.

NOTE: Both PUT and PUTV can put a value into a cell in a remote (stored) spreadsheet if nested within a GET function.

ROW Returns the number of the row in which it resides (e.g., a ROW function in cell C5 would return a 5).

When used within looping functions such as ADDVAL, ROW assumes the row number of each cell in the specified range as that cell is being evaluated (e.g., in a looping function addressing the range A1:A3, ROW assumes a value of 1 as A1 is evaluated, 2 for A2 and 3 for A3).

VALUE Returns the value contained in the cell currently being evaluated. When used within looping functions such as ADDVAL, VALUE assumes the value contained in each cell in the specified range as that cell is being evaluated.

Logical Functions

These are functions which depend upon the truth value of an expression to determine which of two or more alternative values to calculate. In the explanations below, "Boolean expressions" are those containing relational operators (p.6-12), whose truth value can be tested (e.g., "A1>3," "B4 OR B5 OR B6 < C7+C8," etc.).

ERR — Places the message **err** in a cell (usually used in an IF statement to signal that a given condition is now false).

FINDC(V,range) — Returns the number of the column (such that A=1, B=2, C=3, etc.) in the specified range at which the Boolean expression V becomes true. If no such column exists, it returns a value of zero. Note that, when used with FINDC or FINDR, the COL, ROW and VALUE functions assume the values appropriate to each cell in the specified range as that cell is being evaluated.

FINDR(V,range) — Returns the number of the row in the specified range at which the Boolean expression V becomes true. If no such row exists, it returns a value of zero. Note that, when used with FINDC or FINDR, the COL, ROW and VALUE functions assume the values appropriate to each cell in the specified range as that cell is being evaluated.

IF(V,V_t,V_f) — This returns the value of V_t if the Boolean expression V is true and returns the value of V_f if V is false.

***SEL (V,v_1,v_2, . . . v_n)** — This selects from among the values in the list (v_1 . . . v_n) according to the following principle: it returns the value of the first item in the list (v_1) if V=1, the value of the second item in that list (v_2) if V=2 and so on. It returns a value of zero if V is greater than v_n or if V is less than or equal to zero.

WHILE(V,V_t) — See Looping functions (p. 7-9) for explanation of WHILE function.

Looping Functions

These are functions which perform a series of separate actions, either repeating a single calculation over a range of cells, performing a single calculation repeatedly for the same cell or carrying out several different calculations.

ADDVAL(V,range) or ADD(V,range) The ADDVAL function repeats a calculation (V) over a designated range of cells. The result of each calculation is added to the final result, which is displayed in the current cell. Note that, when used with ADDVAL, the COL, ROW and VALUE functions assume the values appropriate to each cell in the specified range as that cell is being evaluated.

(Note: PUT functions can be used to place the results of ADDVAL's calculations in separate cells, while the final result, if not needed, can be placed in a hidden cell. See GRAPH2.CAL for an example of this use of ADDVAL.)

DO(V_1,V_2, . . . V_n) The DO function carries out a series of separate calculations (V_1, V_2, . . . V_n) in the order they are listed. It returns a value of zero to the cell in which it resides. By attaching PUT functions to these separate calculations, their separate results can be placed in other cells, while the result of any larger formula to which the DO function is attached remains unaffected.

WHILE(V,V_t) This function will repeatedly perform calculation V_t as long as V, a Boolean expression, remains true. Note that V_t **must** increase or decrease the values referenced by V; otherwise the WHILE function will either do nothing or become caught in an infinite loop. Practically speaking, V_t will thus always use either a PUT or PUTV function or, if using registers (see p. 7-7), an ADDR function.

Register Functions

Registers give you someplace other than spreadsheet cells in which to store values. There are 10 registers, numbered 0-9. They can be used for **temporary** storage of data or for an intermediate calculation.

Data remains in a register until it is cleared, or until another value is loaded into that register. Recalculation does not clear registers. However, storing a spreadsheet does not store the values in the registers.

ADDR(register#,V) Adds value V to the contents already in the register, placing this new result in the register and in the cell containing the function.

CLRR This clears all registers to 0 and returns 0 to the cell containing the CLRR function.

LOAD(register#,V) This function places the value V into both the register named and the cell containing the LOAD function.

UNLOAD(register#) **or UNL(register#)** This returns the value in the specified register. Note that unloading that value does **not** clear it from the register.

Business Functions

For ease of explication, a different notation is used to indicate the parameters in the spreadsheet's business functions. All parameters are values in the usual sense (numbers, cell references, or formulas). However, the following abbreviations are used to represent specific parameters:

A - amount of each monthly payment
F - future value
I_a - annual interest rate (expressed as a decimal fraction (e.g. 0.18)
I_m - monthly interest rate (I_a/12)
N - number of periodic monthly payments or payment number, depending on the context
P - principal
PV -present value

In calculating depreciation rates:
C - current period to report on
L - number of periods in asset life
R - depreciation rate for declining balance (integer)
1.0 - simple declining method
1.5 - 150% declining balance method
2.0 - double declining balance method
S - salvage value of asset
V - original value of asset

CIAPI(P, I_a, N) Calculates the amount paid as interest thru N months.
Equivalent to the formula:
$P * [(1+I_m)^{N-1}]$

CIFV(P, I_a, N) Calculates the future value of a compound interest loan.
Equivalent to the formula:
$P * [(1+I_m)^{N}]$

DDB(C,V,L,R) Calculates the declining balance depreciation value for the given period at the given rate (rate **must** be 1.0, 1.5 or 2.0 to avoid error).
Equivalent to the formula:
$V * R/L * (1-R/L)^{(P-1)}$

DSL (C,V,L,S) Calculates the straight line depreciation (book) value for the given period.
Equivalent to the formula:
(V – S) L (current period must be less than asset life)

DSYD(C,V,L,S) Calculates the sum-of-years'-digits depreciation value for the given period.
Equivalent to the formula:
$2 * (V - S) * (L - C + 1)/[L * (L + 1)]$

FV(PV,I_m,N) Calculates the future value of a loan having a given present value, interest rate and number of periodic payments.

LRP(P, I_a, N) Calculates the monthly loan payment for a direct reduction loan.
Equivalent to the formula:
$P * \{I_m/[1 - (1 - I_m)^{-N}]\}$

LRPW(A, I_a, N) Calculates the present worth of a direct reduction loan.
Equivalent to the formula:
$A * [1 - (1 + I_m)^{-N}]/I_m$

PV(F,I_m,N) Calculates the present value of a loan having a given future value, interest rate and number of periodic payments.

SFP(F, I_a, N) Calculates the required monthly payment to obtain the desired sinking fund future value at the end of N months.
Equivalent to the formula:
$F * \{I_m/[(I_m + 1)^{N-1}]\}$

SFFV(A, I_a, N) Calculates the future value for a sinking fund.
Equivalent to the formula:
$A * \{[(I_m + 1)^{N-1}]/I_m\}$

Statistical Functions

In the formulas used below to describe certain statistical functions, 'n' represents the number of cells in the range.

AVG(range) Calculates the average of the values in the range. Text and blank cells are ignored.

COUNT (r_1,r_2, . . . r^n) Calculates the number of non-blank cells (including cells containing a value of zero) in a specified range (r_1) or ranges. Note that single cell references will always be counted.

MAX(range) Calculates the largest value in the range.

MIN(range) Calculates the smallest value in the range. Text and blank cells are ignored.

PROJ(S,P,Y) Calculates the projected value at the given point P on a line defined as having a slope of S and a y-intercept of Y as its starting point.

SLOPE(range) Performs a linear regression, returning the slope of the best fit line for the given range of data values.

STD(range) Calculates the standard deviation of the values in the range. Equivalent to the formula:
$SQRT\{[V_1^2 + V_2^2 + \ldots V_n^2]/n - [(V_1 + V_2 + \ldots V_n)/n]^2\}$

STDE(range) Calculates the standard error of the values in the range. Equivalent to the formula: STD/SQRT(n)

SUM(range) Calculates the sum of the values in the range.

VAR(range) Calculates the standard variance of the values in the range. Equivalent to the formula:
$(V_1^2 + V_2^2 + \ldots V_n^2)/n - [(V_1 + V_2 + \ldots V_n)/n]^2$

Arithmetic Functions

ABS(V) Calculates the absolute value of V.

ATAN(V) Calculates the arc tangent of V in radians.

COS(V) Calculates the cosine of V in radians.

EXP(V) Calculates the exponential value of V.

FACT(V) Calculates the factorial value of V.

INT(V) Calculates the integer value of V by dropping any fractional amount.

LN(V) Calculates the natural logarithm of V.

LOG(V) Calculates the logarithm of V in base 10.

PI Calculates the value of pi (3.14159265358979).

SCALE(V,n) Defines the number of significant digits that the system uses in calculations for this cell. 'V' is the value to be scaled. 'n' (any integer 1-9) determines the number of significant digits used. If the digits number in the n + 1 position is equal to or greater than 5, 'V' is rounded up. This function is equivalent to the formula: INT(n * 10^n + .5)/10^n. For information on the benefits of this function, see page 6-6.

SIN(V) Calculates the sine of V in radians.

SQRT(V) Calculates the square root of V.

other trigonometric functions Tangent, arc sine, and arc cosine formulas are not built in to Saturn-Calc. If you want to use them, type the formulas as shown below.

For:	Type:
tan(V)	1/ATAN(V)
arc sine (V)	ATAN[V/SQRT(1-V^2)]
arc cosine(V)	PI-ATAN[V/SQRT(1-V^2)]

EXAMPLES

Following are examples of selected Saturn-Calc built-in functions. To see a variety of functions in practical applications, you can also turn to the demonstration .CAL files included in your distribution.

get

GET(cell, spreadsheet) retrieves a value from a stored spreadsheet, but it does not cause that spreadsheet to recalculate. Thus, you can use Get to retrieve a Get from another spreadsheet, but whenever a value changes you must recalculate and store all spreadsheets involved to get accurate results. Example:

Worksheet P	**Worksheet Q**	**Worksheet R**
row : A	row : A	row : A
1: 1.00	1: 1.00	1: 1.00
	A1: get(a1,p)	A1: get(a1,q)

Suppose you change the value in spreadsheet P to 2.00, then store. When you read in Q it will display the old value of 1.00 because reading in a spreadsheet does not cause recalculation. Pressing <!> or <,> (the commands for recalculation) will cause the system to display the new value, 2.00.

Worksheet P new value	**Worksheet Q** before recalculation	**Worksheet Q** after recalculation <!> or <,>
row : A	row : A	row : A
1: 2.00	1: 1.00	1: 2.00
	A1: get(a1,p)	A1: get(a1,p)

Then you must store Q. When you read in spreadsheet R you must again command the system to recalculate before R will show the new value.

If you change a value in P and want to see the result in R, you must first recalculate and store both P and Q.

This process can be made painless if you have an ASCII word processor or text editor to create a command file (page 8-32). Substitute the names of your spreadsheets for P, Q, and R in the command file below.

command	meaning
/swp <CR>	store the spreadsheet; name it 'p'
y <CR>	yes - replace the original version of 'p'
/srq <CR>	read in spreadsheet 'q'
! <CR>	recalculate
/swq <CR>	store the spreadsheet; name it 'q'
y <CR>	yes - replace the original version of 'q'
/srr <CR>	read in spreadsheet 'r'
! <CR>	recalculate
/swr <CR>	store the spreadsheet; name it 'r'
y <CR>	yes - replace the original version of 'r'

lookup

LOOKUP(V, range) is frequently used to determine tax rates. In the example below, column B shows various income levels and column C shows the tax rate applicable to each income level. Cell A4 has an individual's annual income, and cell A5 shows the value selected by the Lookup formula.

row	A	B	C
1:	personal	income	tax rate
2:	income	levels	
3:			
4:	34333.00	16000.00	.30
5:	.37	18000.00	.30
6:		20000.00	.34
7:		25000.00	.35
8:		30000.00	.37
9:		40000.00	.40

A5: lookup(A4,B4:B9)

select

SEL (V,v_1,v_2,v_n) example: assume that cell A1 has a number representing the current month - 1 if January, 2 if February, and so on. With SEL, another cell can automatically display the number of days in whatever month happens to be in cell A1. The SEL formula would be:

sel(A1,31,28,31,30,31,30,31,31,30,31,30,31)

Commands are system functions that can change the format of entries, modify the size or arrangement of the spreadsheet, and perform operations like storage and printing.

Typing </> at the **Entry or /** prompt puts Saturn-Calc in the command mode. The system responds by displaying the first letters of the command options. Typing the desired letter and pressing <CR> causes a prompt to appear which requests specific action.

The information below applies to commands in general; specific instructions for each command begin on page 7-4.

backing out

You can cancel a command at any point before responding to its final prompt by pressing <U> while holding down the <CTRL> key or by pressing the <PF2> key. This causes the system to 'back up' to the previous prompt. Repeat this action as often as is needed to display the prompt you want.

default values

Many of the command prompts include a value in brackets: for example, [all]. This indicates the default value, assigned if you respond with a <CR>. To assign a different value, type that value, then <CR>.

stringing commands

Once you learn how Saturn-Calc commands are structured you can speed up their implementation by specifying all options without pressing <CR> at each step. Example:

prompted way:

TYPE: /G <CR>
RECEIVE: **Global (A,B,C,F,O,R,S,W,?)**
TYPE: O <CR>
RECEIVE: **Recalculation order (R,C,N,?)**
TYPE: N <CR>
RECEIVE: Natural order recalculation

stringing commands:

TYPE: /GON <CR>
RECEIVE: Natural order recalculation

This procedure works for the following commands:

Blank	Store (W, R, C and G only)
Delete	Title Lock
Format	Window
Global	Exit
Insert	

ranges

The commands Blank, Copy, Move, and Order require you to specify a range of cells to be affected. A range can be part or all of a column or row, or it may be a rectangular section of the spreadsheet. You define a range by typing the first cell, one or more dots (or a colon), and the last cell. Examples:

A1.A4 cells A1, A2, A3, and A4
A1..D1 cells A1, B1, C1, and D1
A1:D4 cells A1-A4, B1-B4, C1-C4, and D1-D4

changing cell references

Saturn-Calc automatically adjusts cell references in formulas after you delete or insert a column or row. It changes references in rows below and columns to the right of the deletion or insertion, as shown in the figure below.

Before Inserting Row or Column

row :	A :	B
1:	1.00	2.00
2:	1.00	2.00
3:	2.00	4.00

A3: sum(A1:A2)
B3: sum(B1:B2)

Row Inserted
cursor in row 2
/IR1

row	: A	: B
1:	1.00	2.00
2:		
3:	1.00	2.00
4:	2.00	4.00

A4: sum(A1:A3)
B4: sum(B1:B3)

Column Inserted
cursor in col B
/IC2

row :	A :	B : C
1:	1.00	2.00
2:	1.00	2.00
3:	2.00	4.00

A3: sum(A1:A2)
C3: sum(C1:C2)

The system adds one row (e.g. 2 to 3) or column (e.g. B to C) for every one inserted or subtracts one column or row position for every column or row deleted.

Care must be taken that the system can indeed adjust cell references in this fashion. The deletion shown below produces an error message because the system cannot adjust a column A reference 'downward'.

Spreadsheet X
original

row :	A	: B
1:	1.00	2.00
2:	1.00	2.00
3:		6.00

B3: sum(A1:B2)

Spreadsheet Y
cursor in col A
/DC1

row :	A	: B
1:	2.00	
2:	2.00	
3:	err	

A3: sum(@1:A2)

The same cell reference adjustments occur with the Copy and Move commands. Example:

Spreadsheet X

row :	A	: B
1:	1.00	
2:	2.00	
3:	3.00	

A3: sum(A1:A2)

Spreadsheet Y
/M
File: X
From: A1:A3
To: B1
What: all

row :	A	: B
1:		1.00
2:		2.00
3:		3.00

B3: sum(B1:B2)

maintaining cell references

Some formulas may contain a cell reference that needs to remain constant. Typing an 'at' sign (@) in front of the column letter (@A1), row number (A@1), or both (@A@1) overrides Saturn-Calc's automatic cell reference adjustment when you Copy, Move, Insert, or Delete.

HELP

The help command allows display of information about any of Saturn-Calc's commands.

COMMAND: /?
RECEIVE: A display listing all the commands and instructions how to receive information about any command.

This is only one of several different help text topics that you can access by typing <?>. Which of the following topics you receive depends upon which prompt is currently on the entry line.

Type <?> from the **Entry or** / prompt to receive a menu of 8 help text topics; select as many of these as you wish before returning to the spreadsheet.

Type <?> from the **Command** prompt to receive a list of all Saturn-Calc commands; select help text explaining any or all of these.

Type <?> after you've initiated a command to receive help text explaining that specific command.

Type <?> after you've selected one of a command's sub-options (for example, the Global command's Scale option) to receive help text explaining that option.

All help text includes prompts telling you how to return to the spreadsheet and how to access further help text.

NOTE: Due to the turn-around times involved in printing manuals, the help text is occasionally more up to date than the manual. It's therefore worthwhile to browse through the help text (and especially the list of built-in functions) for possible additional information, even if you aren't in search of specific items.

APPLY FORMULA

Apply formula replaces the value from a range of cells with calculated values. Typically it would be used to make occasional changes to an entire table of values, such as a price list.

COMMAND: /A <CR>
RECEIVE: **Range to apply to:**
TYPE: the range, then <CR>
RECEIVE: **Formula to apply:**
TYPE: the formula, then <CR>. Examples:

A1.B30
1.05*VALUE increases each value in the range by 5%

B10.B20
VALUE+2.35 increases each value in the range by 2.35

BLANK

Blank removes the entry from one or a range of cells. It does not affect formats.

COMMAND: /B
RECEIVE: **Blank range:**
TYPE: the range, then <CR>. Examples:

<CR>	blanks the active cell.
A1..A12	blanks cells A1, A2, A3...A12.
A1..G1	blanks cells A1, B1, C1...G1.
A1..B3	blanks cells A1, A2, A3, B1, B2, B3.

COPY

Copy is a time-saving command for entering the same number in several cells, for entering several formulas identical except for cell references, and for setting a format for an entire row or column.

For example, a spreadsheet may have four columns, three of which contain numbers, with the fourth for sums. Every 'sum' cell would need a formula identical except for the row numbers. Cell D1 would need sum(A1..C1), D2 would need sum(A2..C2), and so on.

On Saturn-Calc, it is necessary to enter the formula only once. Copy can repeat the formula in other specified cells, changing the cell references automatically (except for cell references which include «; see page 8-3). In the above example, it would be necessary to enter the 'sum' formula only in cell D1, then use Copy to put similar formulas in cells D2, D3, and D4.

The command sequence has three prompts:

Copy from: the cell(s) with the data you want to copy.
<CR> = the acitve cell

Copy to: the cell(s) where you want to put the data. Note that "compound copies" are allowed; that is, you can list several cells or ranges, separated by commas.
Again, <CR> = the active cell

Copy what: specifies copying of values, formulas, formats, text, jump, protection or blank status, or any combination of those aspects.
<CR> = copying all those aspects

from to options

In the examples below, the 'from' cells are highlighted.

from one cell to one other cell (from A1 to B1)

row :	A	:	B	:	C	:	D
1:	10.00		10.00				
2:							
3:							
4:							

from one cell to a row or column (from A1 to A2..A4)

row :	A	:	B	:	C	:	D
1:	10.00						
2:	10.00						
3:	10.00						
4:	10.00						

from one cell to a block (from A1 to A1..B4)

row :	A	:	B	:	C	:	D
1:	10.00		10.00				
2:	10.00		10.00				
3:	10.00		10.00				
4:	10.00		10.00				

from row to row (from A1..D1 to A2)

row :	A	:	B	:	C	:	D
1:	10.00		20.00		30.00		40.00
2:	10.00		20.00		30.00		40.00
3:							
4:							

from/to options

from column to column (from A1..A4 to B1)

row	A	B	C	D
1:	10.00	10.00		
2:	20.00	20.00		
3:	30.00	30.00		
4:	40.00	40.00		

from one range of cells to several ranges (from A1 . . . A4 to B1,D1)

row	A	B	C	D
1:	10.00	10.00		10.00
2:	20.00	20.00		20.00
3:	30.00	30.00		30.00
4:	40.00	40.00		40.00

from a row to a column of rows (from A1..D1 to A2..D4)

row	A	B	C	D
1:	10.00	20.00	30.00	40.00
2:	10.00	20.00	30.00	40.00
3:	10.00	20.00	30.00	40.00
4:	10.00	20.00	30.00	40.00

from a column to a row of columns (from A1..A4 to B1..D1)

row	A	B	C	D
1:	10.00	10.00	10.00	10.00
2:	20.00	20.00	20.00	20.00
3:	30.00	30.00	30.00	30.00
4:	40.00	40.00	40.00	40.00

from one block to another block of equal size (from A1..B4 to C1)

row	A	B	C	D
1:	10.00	50.00	10.00	50.00
2:	20.00	60.00	20.00	60.00
3:	30.00	70.00	30.00	70.00
4:	40.00	80.00	40.00	80.00

values/formats options

After you specify the cell(s) to copy from and to, the system prompts **Copy what (A,B,E,F,J,P,T,V,?) [all]**:

A — All (combines actions of B,E,F,J,P,T,V).
B — copies "blank cell" status only.
E — copies math expressions (that is, formulas) only; cell references are adjusted automatically.
F — copies the format only.
J — copies the jump status only.
P — copies the protected status only.
T — copies text (not formulas) only.
V — copies numbers or calculated values of formulas only.

Multiple copy options **are** allowed. For example, you could select E and J, thus copying the formula contained in that cell and the cell's jump status. Individual options are demonstrated below.

	original entries	Protected status	Values, Blank, Protection	Format, Expressions	Jump status, Text	All
row :	A :	B :	C :	D :	E :	F
1:	RESULTS				RESULTS	RESULTS
2:	1.0		1.00			1.0
3:	2.0		2.00			2.0
4:	3.0		3.00			3.0
5:	4.0		4.00			4.0
6:	10.0		10.00			10.0
7:						

C	C	C	C	C
from:A2	from:A2:A6	from:A2	from:A2:A6	from:A1:A6
to:B2:B6	to:C2	to:D2:D6	to:E2	to:F1
what:P	what:V	what:F	what:J	what:A

C	C	C
from:A7	from:A6	from:A1
to:C7	to:D6	to:E1
what:B,P	what:E	what:T

A6: sum(A2:A5)
D6: sum(D2:D5)
F6: sum(F2:F5)

Column A has the original entries and a format of P1FJ, or protected and jump status, one decimal place notation. Note that A1 is not formatted for text; preceding the text

entry with quotation or accent marks (here, an accent mark to center text) allows it to be entered into cells not formatted for text.

Column B shows the Copy P (Protect) option. No values are copied; the column retains the default format and is protected against modification. This option also works to unprotect cells assigned a protected status.

Column C shows two separate Copy options:

The Copy V (Values) option copies the calculated values from cells A2:A6. Note that only the value, **not** the formula, in cell A6 is copied. The column retains the default format of two decimal places.

The Copy B,P (Blank and Protected status) is an example of a multiple copy option. Here, A7's Blank and Protected status are copied, so that C7 is blank and will remain blank (will not accept entries) unless protection is removed.

Column D shows two separate Copy options:

The Copy F (Format) option copies only Column A's format of 1F, **not** the values in Column A's cells, nor their protected or jump status.

The Copy E (Expressions) option copies only the formula from A6 (with cell references automatically adjusted), **not** the result of that formula (10.0).

Column E shows two separate Copy options:

The Copy J (Jump) option copies only Column A's jump status; **no** values are copied.

The Copy T (Text) option copies A1's text-string. Note that if A1 has been formatted for text, then its format **must** also be copied; since in this case text was entered into A1 without reformatting that cell, it can be copied regardless of E1's format.

Column F shows the Copy A (All) option. The values, formulas, text, jump status, and protection status are copied. The new column format is P1FJ.

DELETE

Delete removes rows or columns. The row and column labels for the rest of the spreadsheet are adjusted, and cell references in formulas are changed accordingly. By default, the system deletes one row or column; if you specify more than that, rows below the cursor or columns to the right are deleted.

Put the cursor in the first row or column you want to delete.
COMMAND: /D <CR>
RECEIVE: **Delete column or row (C,R,?):**

C <CR> specifies the column containing the cursor.
R <CR> specifies the row containing the cursor.
? <CR> displays the Delete help text.

RECEIVE: **Delete how many [1]:**
TYPE: <CR> to delete the active row or column, or
TYPE: n <CR> to delete 'n' rows or columns.

EDIT

Edit allows you to modify the active cell's entry. This command is especially useful for making minor changes to a long text string or formula. Short entries are more easily changed by typing a new entry in that cell.

Editing is performed on the prompt/edit line. A blinking square (or a small line on some terminals), called a 'cue', indicates where an insertion or deletion will occur.

Characters typed are added to the entry, moving existing characters to the right. Other editing functions are performed by the following special keys:

⇒ ⇐ move the cue without affecting the entry.
<DEL> erases the character under the cue and shifts the remaining characters to the left.
<CR> concludes the edit (and moves the cursor if Global automatic motion is in effect).
<LF> concludes the edit and moves the cursor to the cell below.
<TAB> concludes the edit and moves the cursor one cell to the right.
<CTRL><U> cancels the edit, leaving the entry unchanged.

To edit an entry, put the cursor on the cell you want to edit.

COMMAND: E <CR>
RECEIVE: the cell's entry on the prompt/edit line.
TYPE: the desired changes, the <CR>, <LF>, or <TAB>.

FORMAT

Format performs four distinct functions. It defines individual column width, protects a cell against modification, designates a cell to accept text only, and defines the display characteristics of values.

Put the cursor on the cell you want to format.
COMMAND: /F <CR>
RECEIVE: **Format ($,%,C,D,E,F,G,H,J,M,P,T,U,?) :**

$ — dollars and cents notation
% — percent display
C — column width
D — default format
E — exponential format
F — decimal notation
G — histogram format
H — hidden value
J — jump switch
M — dollars and cents notation with '$' fixed at left
P — protected
T — text format
U — unprotected
? — help text

Of these, $,%,D,E,F,G,H,M,T are basic format types, which define the display characteristics of a cell. The remaining symbols—C,J,P,U—are status types, which determine the status, rather than the format, of a cell or group of cells.

We'll look first at each of the format types and how they are used:

format types

dollars and cents notation

n$ displays values with a leading floating dollar sign, 'n' decimal places and a trailing minus sign if the value is negative. The comma may be used as a modifier. The dollar sign is always immediately to the left of the most significant digit (unlike nM format, below).

percent format

n% displays values after multiplication by 100, with a trailing percent sign.

default format

D assigns the default format to the cell. Saturn-Calc's default format of 2F can be changed with the 'F' option of the Global command.

exponential notation

nE is exponential, or scientific, notation. 'n' (optional, any integer 1-15) sets the number of decimal places.

decimal notation **nF** is decimal notation. For example, a value of 0.35 would be displayed as .4 for using a format of '1F'. The comma may be used as for the n$ option.

graphics format **G** is graphics notation. The cell then serves as a histogram, displaying an asterisk for each integer unit in the cell's value. For example, a graphics cell having a value of six would have six asterisks displayed.

hidden values **H** is hidden value, which is always numeric. Nothing will be displayed for this cell, although its value is available for calculations. Hidden value cells are useful for storing intermediate results from calculations or for storing constants which are used in many calculations and which might best be varied discretely. P and U are the only modifiers which can be used with H format.

money format **nM** displays values with a leading, fixed dollar sign, 'n' decimal places, and a trailing minus sign if the value is negative. The comma may be used as a modifier. This format is identical to n$ except that the dollar sign for nM is at the left-most position in the cell, regardless of the size of the value being displayed.

text display **T** sets up a cell to accept whatever you type as text. Left justification is default; type TC for centered text or TR for right justification. This command makes it unnecessary to precede text with quotation or accent marks.

format modifiers

By combining these basic format types with strings of format modifiers, you can define complex cell characteristics.

For example, the basic format type '$', indicating dollars and cents notation, can become part of the string '0$,' in which '0' indicates that no decimal places (and so no decimal point) will be displayed, and the ',' indicates that a comma will separate each group of three digits. The three characters '2$,' would indicate the same format, but with two digits displayed after the decimal point.

There are two types of modifiers used in these strings: *numeric modifiers and text modifiers.*

modifiers for numeric formats

n 'n', any positive integer 1-15, sets the number of decimal places for numeric values. Omit 'n' to display values as whole numbers. If used, 'n' must precede the basic format indicator (for example '2$', not '$2')

– (minus sign) displays a trailing minus sign for negative values.
(places negative values in parentheses.
, inserts a comma after every third digit.
Z instructs the system to leave blank a cell whose value is 0 (zero). The value still will be displayed on the status line.

modifiers for text or numeric formats

_ (underscore) sets up underlining for the cell's value when printed
L displays values using left justification (the default format).
R displays values using right justification.
C centers displayed values.

Format Examples

Enter:	**47**	**1/2**	**11.98**	**-54.2**	**1000000**
Format:	Receive:				
2F	47.00	.50	11.98	-54.20	1000000.00
0%	4700%	50%	1198%	-5420%	100000000%
3E	4.700E+01	5.000E-01	1.198E+01	-5.420E+01	1.000E+06
2$	$47.00	$.50	$11.98	$54.20-	$1000000.00
2M(	$ 47.00	$ .50	$ 11.98	$(54.20)	$1000000.00
1f,-	47.0	.5	12.0	54.2-	1,000,000.0

status types

These can be entered wih the /F option to indicate a change in the status of the active cell (or column). This change in status does not affect the format already assigned that cell:

C changes the width of the active column. The system prompts for the desired width. The smallest allowable width is one. On an 80 character wide screen, the maximum column width is 73; on an 132 character wide screen, the maximum width is 125.

Numbers with more digits than will fit in a column are truncated in the cell; they are displayed in full on the status line. Long text strings are also truncated unless the cell to the right is blank, in which case the text flows over into that cell.

J sets (and unsets) jump status for a cell. When jump status is set, upon conclusion of an entry, the cursor moves from one jump cell to the next. This switch functions as a 'toggle'; that is, to turn it on or off, depending in its current setting for the cell, type /FJ. When the active cell is a jump cell, a 'J' will be displayed next to the cell coordinates on the status line.

This feature works only when /GAJ is in effect (See the Global command, page 8-18).

P protects the active cell against modification and displays a P next to the cell coordinates on the status line. This is especially helpful when you use the same spreadsheet (for example, a weekly sales report) for different sets of data.

U unprotects the active cell and removes the P from the status line.

GLOBAL

Global comprises several command options that affect the default values of the spreadsheet.

COMMAND: /G <CR>
RECEIVE: **Global Command (A,B,C,F,O,R,S,W,?):**

A — automatic motion	O — recalculation order
B — between column spacing	R — recalculation mode
C — column width	S — scale
F — format	W — screen width
	? — help text

automatic motion

A controls the automatic motion option, which causes the cursor to move at the conclusion of each entry, even when the entry is concluded with <CR> rather than a cursor key. You can have the cursor move one cell at a time or 'jump' to a specified cell anywhere on the spreadsheet.

COMMAND: /GA <CR>
RECEIVE: **Auto motion (A,J,N,?):**

A sets 'one cell at a time' automatic motion. (This is a default condition and can be cancelled by selecting the 'N' option, below.) Direction of the motion changes whenever you press a cursor key at the Entry or / prompt, and when you conclude an entry with a cursor key. The direction is displayed on the status line.

J sets 'jump' motion. This causes the cursor to move from one jump cell to the next. (Jump cells are specified with the Format command.) The direction of the motion is left to right; if cells A1, A2, and D1 are jump cells, the cursor will jump from A1 to D1 to A2. When Jump is in effect, a 'J' appears on the status line to the left of the cell coordinates.

N cancels both types of automatic motion.

between column spacing

B defines the number of spaces between columns. The default value is zero; the maximum number allowed is 5. The current number of spaces between columns is displayed in the values display (see Values Command, p. 8-45).

COMMAND: **/GB <CR>**
RECEIVE: **Between column spacing (0-5,?):**
TYPE: **n <CR>**

You also have the option of displaying a character at the right-hand border of the space. Any character (including numerals) is allowed, but the vertical bar (|) or exclamatin point (!) are most often used to insert vertical lines between columns.

RECEIVE: **Optional between column character [ ]:**
TYPE: any character you wish, followed by <CR>; to omit character, type <CR>.

column width

C defines a new default column width. The smallest allowable width is one. On an 80 character wide screen, the maximum column width is 73; on a 132 character wide screen, the maximum width is 125. Any individual column whose width has been changed by a Format command is not changed by this command. The default column width is displayed in the values display.

Numbers with more digits than will fit in a cell are truncated, but they are displayed in full on the status line when the cursor is on that cell. Long text strings are also truncated unless the cell to the right is blank, in which case the text flows over into that cell.

COMMAND: /GC <CR>
RECEIVE: **Global column width [12]:**
TYPE: n <CR>

format

F sets display characteristics of values, as in the Format commands %, $, E, F, M and T. The format specified becomes the default format for the entire spreadsheet. However, any cell already assigned a different format will not be changed. When the cursor is in a cell with the default format, the status line displays a 'D' in front of the format.

COMMAND: /GF <CR>
RECEIVE: **Global Format (%,$,E,F,M,T,?):**

Those format options and the valid modifiers are described above in the section on the Format command (see pages 8-14 thru 8-17) (Status modifiers such as J, P, and U cannot be specified in Global Formats).

recalculation order

O determines the order in which formulas are calculated. The default recalculation order is by rows (/GOR), from left to right starting at cell A1; however, certain cell references in formulas require you to assign a different order. The recalculation order is displayed on the status line.

This option also lets you specify a range of cells as the only cells to be recalculated. In a large spreadsheet in which all calculations are controlled by formulas in a few cells, limiting the calculation range to those cells can greatly reduce recalculation time. The current recalculation order and recalculation range are both displayed in the Values display (see Values Command, p. 8-45).

COMMAND: /GO <CR>
RECEIVE: **Recalculation order (R,C,N,?):**

R is calculation across rows (A1 to ZZ1, then A2 to ZZ2, and so on).
C is calculation down columns (A1 to A999, then B1 to B999, and so on).
N is natural calculation, which calculates according to the cell references in the values.

You specify the range of cells to be recalculated at the same time you indicate recalculation order. After typing R, C, or N, skip a space and then type the desired range. For example, typing **R A1:C5** would mean that each time the system recalculates (regardless of whether it is by manual or auto-recalculation), it will recalculate **only** the following cells and in the following order:

A1:C1, then
A2:C2, then
A3:C3, then
A4:C4, then
A5:C5.

NOTE: There is no prompt for specifying the recalculation range; it is an optional part of your response to the prompt for recalculation order.

When selecting the recalculation order, be aware of the following:

To get accurate results with row order recalculation, you must be sure that no formulas refer to cells below or to the right of them (called 'forward references'). For example, cell A5 must not have a formula that refers to any cell in row 5 or below.

The 'forward references' rule also applies to column order recalculation. Thus, cell A5 must not refer to cells A6...An or any cells in columns B, C, D....

Natural order recalculation allows for forward references. With this option, the system determines the order in which cells must be recalculated before performing the calculations. This takes a little longer, but it provides more flexibility in designing spreadsheets.

It is not necessary to add or change an entry or force recalculation. You can command Saturn-Calc to recalculate by pressing the exclamation point <!> or the comma <,> at the **Entry or /** prompt. If you have forward references and row or column order recalculation, pressing <!> or <,> after an automatic recalculation will produce accurate results.

A spreadsheet must never have 'circular references'. The example below demonstrates a circular reference. Cell B3 has a formula that computes profit sharing, determined from net profit, while cell B5 computes net profit, which is affected by profit sharing. The system returns incorrect values (not an error message) for those cells.

```
row :      A      :          B
  1: gross profit             66850.00
  2:
  3: profit sharing      680564733841
  4:
  5: net profit          170141183460

B3: B5/25
B5: B1-B3
```

recalculation mode

R sets the recalculation mode. The options are automatic, which causes Saturn-Calc to recalculate whenever an entry changes, and manual (default), which causes recalculation only when you command it. Manual recalculation is desirable on large spreadsheets that have

lots of formulas. It allows you to change entries without waiting for the system to recalculate. The recalculation mode is displayed in the values display.

COMMAND: /GR <CR>
RECEIVE: **Recalculation mode (M,A,?) :**

M is manual. The system calculates only after an exclamation point <!> or comma <,> is pressed.
A is automatic. The system recalculates every time an entry changes.

scale

Sn sets the number of significant digits that the system will use in calculating. Saturn-Calc normally uses 15 digits when performing calculations, regardless of how many digits are in the number you enter. When calculating fractional amounts and displaying less than 15 digits, minor differences can appear in seemingly identical formulas. With the Global scale function, you can define the number of digits used and eliminate those minor differences. The global number of significant digits is displayed in the values display.

COMMAND: /GS <CR>
RECEIVE: **Scale factor (0-9, A=auto, N=none, ?) :**
TYPE: n <CR>, where 'n' represents the number of digits from zero to nine you want to use, or
TYPE: A <CR> to have each cell calculated using the number of digits displayed in that particular cell, or
TYPE: N <CR> to return to 15 digit calculating.

If the number in the n+1 position of the calculated value is equal to or greater than 5, "n" will be rounded up.

The scale function allows you to force less precision for a calculation than prescribed by the global scale value. The amount of precision will be the lower of the global and scale function arguments.

screen width

W displays a 132 character wide screen, if your terminal has that capability.

COMMAND: /GW <CR>
RECEIVE: a 132 character wide screen

If you store the spreadsheet in 132 character wide screen format, it will automatically appear that way each time you call up the spreadsheet.

To restore an 80 character wide screen, command /GW again.

INSERT

Insert adds rows or columns to the spreadsheet. The row and column labels for the rest of the spreadsheet are adjusted, and all cell references in values are changed accordingly. By default, the system inserts one row or column; if you specify more than that, rows above the cursor or columns to the left are inserted.

Put the cursor where you want to make the insertion.
COMMAND: /I <CR>
RECEIVE: **Insert column or row (C,R):**

C adds a column to the left of the cursor.
R adds a row below the cursor.
? displays the Insert help text.

TYPE: <CR> to insert one row or column, or
TYPE: n <CR> where 'n' represents the number of rows or columns you want to insert.

If the cursor is at the bottom or far right of the spreadsheet,
RECEIVE: **Insert at end [No] ?**
TYPE: <CR> for no, or
TYPE: Y <CR> for yes.

Saturn-Calc automatically assigns formats to the inserted cells according to the following rules:

if inserting a row, formats from the row directly above the insertion are used;

if inserting a column, formats from the column directly to the left of the insertion are used;

if inserting a column in front of column 1 or a row above row 1, formats from the original column 1 or row 1 are used.

MOVE

Move copies one or a range of cells from a spreadsheet on the disk and puts it on the active spreadsheet. Cell references are adjusted automatically.

COMMAND: /M <CR>
RECEIVE: **File to move from?**
TYPE: the filename, then <CR>
RECEIVE: **Move from?**

From this point on, Move works exactly like Copy (including your ability to designate multiple ranges of cells to be moved). See the from/to examples and values/formats examples for that command (pages 8-8 to 8-11). Logical names can be used in referring to cells for either the stored or the active spreadsheets.

NAMES

Names allows you to add, delete, or list logical names for cells, rows, or columns (see page 6-6).

COMMAND:/N <CR>
RECEIVE: **Enter name options (A, D, L, ?):**

To **add** a logical name,

TYPE: A <CR>
RECEIVE: **Name assignment to add (ref = name):**

Type the cell reference to be associated with the logical name (cell, row, or column), an equals sign, and a logical name of up to 8 alphanumeric characters (including space and underline), as illustrated in the following examples:

TYPE: A1 = TOP LEFT <CR> to define TOP LEFT as indicating cell A1.
TYPE: 1 = TOP <CR> to define TOP as indicating row 1.
TYPE: A = LEFT <CR> to define LEFT as indicating column A.

To **delete** a logical name,

TYPE: D <CR>
RECEIVE: **Name assignment to delete (name only):**

Type the logical name to be deleted followed by <CR>.

To **list** the defined logical names,

TYPE: L <CR>
RECEIVE: **The logical name assignment list.**

ORDER

Order treats each row as a set of data, or record, to be sorted. It arranges entire rows according to the values of entries in the column(s) you specify. This command is especially helpful for organizing files read in by the Storage Load command.

COMMAND: O <CR>
RECEIVE: **Order what range of rows [all]:**

Your response specifies which rows will be re-ordered. The options are:

- n.. – from row 'n' to the last row
- ..n – from row 1 to row 'n'
- n..m – from row 'n' to row 'm'
- <CR> – all rows

TYPE: the range desired, then <CR>
RECEIVE: **Order by what column priority [A,B, . . .]**

Your response specifies which column(s) the system will analyze to perform the sort, whether the sort will be in ascending or descending order, and whether the sort will be numerical or alphabetical. The syntax of the command is Col1/dt, Col2/dt,..., where 'Col' represents a column letter (e.g., A), 'd' (optional) specifies descending order, and 't' (optional) specifies an alphabetical sort.

The options are:

- <CR> – sort in ascending numerical order by the values in column A.
- Col – sort in ascending numerical order.
- Col/d – sort in descending numerical order.
- Col/t – sort in ascending alphabetical order.
- Col/dt – sort in descending alphabetical order.

Blank cells are given lowest priority; they sort to the top (ascending) or bottom (descending) of the column. Text has the next lowest priority in a numerical sort, while values have the next lowest priority in an alphabetical sort.

When only one column is specified and there are two or more equal values in that column, Saturn-Calc uses the values in the column to the right to break the tie(s).

Order priority examples:

- A/d – sort by column A as descending values.
- A/t, B – sort by column A as ascending text, then by column B as ascending values.
- C/dt, A – sort by column C as descending text, then by column A as ascending values.

PRINT

Print creates a hard copy or an ASCII word processing file of a spreadsheet. Saturn-Calc prints the active spreadsheet, but it does not store it. This command has several prompts, with the default values shown in brackets. After all prompts have been answered, the system returns to the **Entry or /** mode.

COMMAND: /P <CR>

RECEIVE: the following prompts:

Print to [LP:] :

LP: is the default hard copy name. Check with your systems manager to find out the name of the printer you use.

Typing a filename (six characters maximum, RT-11 and TSX; nine on other operating systems) creates a word processing file with a .wps filename extension. (See the Getting Started section for an explanation of filenames.) The WP file may be edited or reformatted without affecting the Saturn-Calc version of the spreadsheet.

Print headings and formulas [No] ?

Headings are Saturn-Calc's column (A,B,C . . .) and row (1,2,3 . . .) designations, not the labels entered.

Formulas are printed beneath the spreadsheet.

Printer width [132] ?

Any other width available on your printer may be specified. If you try to print a row that has more character spaces than the printer can put on one line, part of that row will print on the next line. This problem can be avoided by printing only as many columns as your printer can handle. See the columns prompt.

Printer page length [0] :

Any other page length may be specified. If you specify zero length or type <CR>, Saturn-Calc will not cause breaks between pages, and the next prompt will be skipped.

Report header rows :

One or more rows may be specified as indicating header information which is to appear at the top of each page. Examples:

B..C would use rows B and C for page headers.

Columns to print [all] :

One or more columns may be specified. If desired, columns may be printed out of alphabetical order. Examples:

A..D would print columns A through D.
A, C, D, B would print those columns in that order.

Rows to print [all] :

1..4 would print rows 1 through 4.
1, 3, 2, 4 would print those rows in that order.
4 would print row 4 only.

STORAGE

Storage has seven functions. It can read in four types of stored data:

— a new spreadsheet — a command file
— a data entry file — data consolidated from several spreadsheets

And it can store data from the current spreadsheet in three ways:

— write the spreadsheet to the computer disk
— create a command file
— create graphic displays of spreadsheet data (when used with Saturn-Graph).

(NOTE: you can also use the Print command to store a facsimile or reproduction of the current spreadsheet in a word processing file; see page 8-27.)

COMMAND: **/S** <**CR**>
RECEIVE: **Storage option (W,R,C,O,L,G,A,?)** :

The options represented by each of these letters are explained below:

write

W (Write) saves a copy of the active spreadsheet. The term 'write' is used because the system writes the spreadsheet on the computer's storage disk.

It is when you select this option that you actually name a spreadsheet. (See Section 4—Getting Started for an explanation of filenames.)

Each file must have its own unique name. If you give a spreadsheet a name already assigned an existing sheet, the new file will **replace** the older one (as you may **want** it to; for instance, when you update or correct a spreadsheet). To save **both** files, give the new spreadsheet a new name. As a safeguard, a prompt will warn you whenever you select a previously-assigned name.

The exact sequence of prompts and responses depends on whether the current spreadsheet has already been stored and whether you are replacing an existing spreadsheet.

COMMAND: **/SW** <**CR**>

If the current spreadsheet has never been stored (and has thus never been named):

RECEIVE: **Name of spreadsheet to write :**
TYPE: a name, then <CR>.
See Getting Started, page 4-1, for rules governing file name selection.
RECEIVE: **Description for new file:**
TYPE: a description of the file, up to 50 characters long, which will be stored in Saturn's directory.

If you have previously stored the current spreadsheet:

RECEIVE:
Name of spreadsheet to write [current filename]:
That is, the name already assigned this spreadsheet will appear as the default for this prompt.

To **replace** the original with the current version of the spreadsheet:

TYPE: <CR>
RECEIVE: **File exists — replace [Y] ?**
This prompt is a safeguard to make sure that you do not accidentally destroy an existing spreadsheet.

NOTE: the default for this prompt is the **opposite** of its default value in previous versions of Saturn-Calc (the new default is the most common response to this prompt). If you have used previous versions, be careful not to lose a spreadsheet to old habits!

TYPE: <CR>

To store the current version and still **keep** the original:

TYPE: a new filename, then <CR>

If another spreadsheet has already been assigned the name you've just chosen, you'll again receive the above safeguard prompt warning you that a file of that name exists.

encryption

Whenever you write a spreadsheet, you can provide an encryption code of from 5 to 142 alphanumeric characters. As the file is stored, that code will be used to transform all the data in the file, so that it cannot be read in again unless the same encryption code is given. When you write out the spreadsheet, give the encryption code after a backslash (\), following the file name:

RECEIVE: **Name of spreadsheet to write**:
TYPE: filename \ encryption code CR

For example, you might type
MYFILE \ MYPASSWORD CR .

Spaces and case of characters in encryption codes are ignored by Saturn-Calc. Codes longer than 5 characters are no more secure than codes of that length, except that real words, phrases, or sentences may be easier to remember than some short codes.

It is vital that you remember the encryption codes you use. The encryption algorithm functions effectively, and Saturn Systems could not help recover an encrypted spreadsheet should you forget its code.

read

R (Read) erases the active spreadsheet and displays a different spreadsheet. The term 'read' is used because the system reads the computer's storage disk until it locates the spreadsheet you requested, then displays it on the screen.

Changes made to the active spreadsheet are not saved; you must first use the Storage Write command to do that.

COMMAND: SR <CR>
RECEIVE: **Name of spreadsheet to read** :
TYPE: the spreadsheet name, then <CR>
RECEIVE: the spreadsheet

If the spreadsheet was written with an encryption key, then after you type the name of the spreadsheet to read, the following sequence occurs:

RECEIVE: **Decryption Key** :
TYPE: the key given when the file was encrypted (You do remember it, don't you!).

If you do not give the correct encryption decryption key, an error message is given and you can try again, and again, and again.

Alternately, when entering the name of the file, you can type backslash (\), followed by the encryption code, bypassing the request for a decryption key.

command file read-in

C (Command file read-in) executes a command file. A command file is an ASCII file that consists of Saturn-Calc commands and entries; when you read in such a file, these commands are carried out on the active spreadsheet, as though you were initiating them from the terminal.

You must have Saturn-WP or another ASCII word processor or text editor to use this feature. You can create the command file in Saturn-WP or by using Saturn-Calc's **/SO** command (see p. 8-33); the file can then be edited using the word processor. Such files are an extremely efficient way to store spreadsheets, are a convenient means of editing or fixing corrupted spreadsheets and are perfect for templates.

Make sure the format of each cell is set up for the type of entry you want to make (text or values), either by formatting the spreadsheet beforehand, or by including formatting commands in the command file. Nested command files are not allowed. For cursor motion, the following special characters are recognized:

~U – cursor up
~D – cursor down
~L – cursor left
~R – cursor right
~C – carriage return; <CR> also works
~F – line feed
~T – tab
~Q – sets quiet mode of command processing (does not echo command file lines on the terminal)
~N – sets non-quiet mode (the default)
~? – input one line from the terminal. Execution of the command file is interrupted and the appropriate prompt is displayed. After you enter a response and press <CR>, execution of the command file resumes. This allows you to change a command or entry each time you implement the command file.

These affect automatic cursor motion just like the keys they represent. See the Global command, option A.

COMMAND: /SC <CR>
RECEIVE: **Name of command file to read** :
TYPE: filename <CR>

RECEIVE: the data you entered into the command file. Prompts are displayed on the prompt/edit line as the file is being executed. If there is a mistake in the command file, execution halts. An error message appears on the status line, and Saturn-Calc prompts for a valid response.

A command file is used in the example for the /SL command below (see pages 8-38 to 8-41).

output to a command file

O (Output to a command file) works as a write-out counterpart to the /SC command (which reads in ASCII command files). That is, it copies all or selected portions of your spreadsheet into a WP command file . . . that can then be read back into Saturn-Calc using the /SC command. The command file can be easily edited using Saturn-WP. And, by choosing to write out only selected aspects of the spreadsheet, you can instantly create templates.

COMMAND: **/SO <CR>**
RECEIVE: **Output what (A,D,F,J,P,T,V,?)-list all desired [All]**
These options are
A list all
D list only default and setup information
F list only formats for each cell
J list only jump status
P list only protection (if any)
T list only text & formula for each cell
V list only numeric values

You may string together several options to write out whichever elements of your spreadsheet you wish.

TYPE: any combination of the above letters, then <CR>
RECEIVE: **Filename to output to:**
TYPE: a filename (a .WPS extension is assumed).

The command file you have now created can be entered and edited using Saturn-WP (or other ASCII editor) and can be read back into spreadsheet form using Saturn-Calc's /SC command.

load

L (Load) loads ASCII or binary, fixed length record files—such as Saturn-WP Data Entry Files—into a spreadsheet. This feature, by merging data entry and numeric files with spreadsheets, allows you to perform calculations on data from invoice, inventory or similar files.

In converting the file into spreadsheet format, each field is assigned a column, each record a row. To prepare the spreadsheet for the file, do the following **before** using the load command:

I. Examine the file to be loaded. You'll need to know:

   A. which fields you want to load and in what order you want them to appear;

   B. the type of data contained in each field (alphanumeric, numbers, signed DIBOL numbers, etc.);

   C. the length of each field to be loaded.

II. Create the spreadsheet that will receive the file: it must have at least as many rows as there are records to bring in and at least as many columns as there are fields to bring in.

   A. Determine which column each field will be assigned, and adjust that column's width and cell formats (using **/F** commands) to accept data of the type and length that will be loaded. (e.g., a field consisting of company names up to 25 characters long will need a column at least 25 spaces wide, whose cells are all formatted to accept text.)

Now you're ready to begin the load. Put the cursor in the cell where you want the first record and field to appear.

COMMAND: **/SL** <CR>
RECEIVE: **Load file to read :**
TYPE: the filename, then <CR>

Saturn-Calc assumes that you want to load a Saturn-WP data entry file, which has a .DEF filename extension.

If you are loading a different file, type its name **and extension,** then respond to these prompts:

RECEIVE: **Load binary record length or A for ASCII ?**
TYPE: the record length or 'A' if ASCII, then <CR>

If the file is ASCII, records may be of variable length and are terminated by CR LF.

If the file is binary:

RECEIVE: **Load file header size in bytes (if any) [0]** :
TYPE: CR if there is no header, or
TYPE: n CR, where 'n' is the number of bytes in the header. This causes the system to omit the header record when it loads the file.

All files receive the following prompts:

RECEIVE: **Load record to start at [1]** :
TYPE: CR to start with record 1, or
TYPE: n CR, where 'n' is the starting record number.
RECEIVE: **Load record to end with [last]** :
TYPE: CR to load all records, or
TYPE: n CR, where 'n' is the last record you want to load

Saturn-Calc will load all the records specified, assuming you've assigned the spreadsheet enough rows.

load record description

RECEIVE: **Load record description ?**

Your response will consist of a string of codes, each separated from the next by a comma. There will be one code per field, each designating the type of data contained in that field (and, where appropriate, its length) and assigning that field to a column.

Saturn-Calc assumes that your first code describes field 1, the second code describes field 2, and so on. The order in which the fields appear on the spreadsheet is determined by the column-assignments you make, **not** by the order in which you list the fields.

You can omit selected fields by insertng <**Sn**> between field descriptions (again, separated by a comma). This instructs the system to skip
'n' fields (if loading a .DEF file),
'n' characters (if an ASCII file), or
'n' bytes (if a binary file).
This and column assignments let you list any fields in any order you wish.

The syntax of each code entry is:

data-type column-letter

The following data-types can be loaded:

An - alphanumeric, 'n' characters long
Nn - numbers, 'n' characters long. N will correctly load either ASCII integer numbers or ASCII real numbers which have an explicit decimal point
Dn.p - signed DIBOL number 'n' characters long with 'p' implicit decimal places
F - 4 word double precision floating point
F2 - 2 word single precision floating point
I - 1 word integer
B - 1 byte (0-255) unsigned integer

You do not need the 'n' qualifier for .DEF files since Saturn-Calc automatically knows the length of each field (**you** need to know the field-lengths in order to assign appropriate column-widths, though).

ASCII and .DEF files accept only data types A, N, and D. All data types are valid for binary fields having fixed record lengths.

examples

Assume you want to load the following 3 fields for the first 20 records of a .DEF file containing 30 records:
field 1 - company name (alphanumeric, 25 characters long)
field 2 - invoice number (alphanumeric, 8 characters)
field 6 - purchase amount (numeric, 12 characters)
and that you want field 2 in the first column, field 1 in the second column and field 6 in the fourth column (you plan on entering figures manually into the third column later).

I. First, you must create the spreadsheet.

A. It will need to be at least 20 rows long to accommodate all 20 records (though you may want it longer, for titles or to show totals or other calculations you want to perform on this data), and at least 4 columns wide.

B. The following column-widths will be needed (use the Format command):
Column A = 8 spaces Column B 25 spaces
Column D = 12 spaces
Column C's width will depend on the sort of calculations you plan for it.

C. The following cell-formats must be assigned (use the Format command):
Column A's (since invoice numbers aren't calculated) and Column B's cells should be formatted for text.
Column C's format will depend on the sort of calculations you plan for it.
Column D will need dollars and cents notation with 2 decimal places.

II. Initiate the Storage Load command:
COMMAND: /**SL** <**CR**>
RECEIVE: **Load file to read :**
TYPE: the filename (.DEF extension will be assumed)<CR>
RECEIVE: **Load record to start at [1] :**
TYPE: <CR>
RECEIVE: **Load record to end with [last] :**
TYPE: 20<CR>
RECEIVE: **Load record description ?**
TYPE: **A25 = B, A8 = A, S3, N12 = D <CR>**
which issues the following instructions:
field 1 has 25 alphanumeric characters and is assigned to column B,
field 2 has 8 alphanumeric characters and is assigned to column A,
skip the next three fields (fields 3, 4 and 5),
field 6 has 12 numeric characterrs and is assigned to column D.

NOTE: Since this is a .DEF file, the field-length numbers are **not** needed in the above response; they've been included here simply to make the example clearer.

The following example shows an advanced application for the SL command, one which involves using the SC command as well. In this example, a data entry file has been created to maintain records of past due accounts; fields 1, 2, 3, and 6 are loaded from this .DEF file.

Next, a spreadsheet was made that coincides with the data entry file. Finally, a command file was created to read in the spreadsheet, load the data entry file, create a word processing file of the spreadsheet, and exit from Saturn-Calc.

Once all these files have been created, monthly maintenance consists only of updating the data entry file, reading the command file onto a blank spreadsheet, and printing the word processing file.

The data entry file is shown to demonstrate its relationship to the spreadsheet; the type of data file you use may be entirely different. The important thing to remember is that the cell formats and column widths of the spreadsheet must correspond to the information in the data file, both with respect to size (column width) and format:

In the example, Columns A, B, and C of the spreadsheet have the same number of character spaces as fields 1, 2, and 3 of the data entry file. All three columns have been assigned a text format. (Even though numbers are entered in columns A and B, they are used for reference only and are not calculated.)

Column D has the same number of character spaces as field 5 of the data entry file. It has a two decimal place format.

The elements of the command file are explained as follows. In all cases, <CR> is a command to proceed to the next command or prompt.

/SRINVOIC <CR>	Read in the spreadsheet named Invoic.
=A6 <CR>	goto cell A6
/SLINVOIC <CR>	Load the Saturn-WP data entry file named Invoic.
1 <CR>	Start the load at record 1.
<CR>	End the load at the end of the file.
A=A, A=B, A=C, S2, N=D <CR>	Load field 1 in column A, field 2 in column B, field 3 in column C, skip fields 4 and 5, and load field 6 in column D. (Fields 1, 2, and 3 have Alphanumeric characters; field 6 has Numbers.)
/P <CR>	Start the Print command.
OWED <CR>	Print a disk copy of a word processing file; name it 'OWED'.
<CR>	
<CR>	
<CR>	These five carriage returns select the default values for the Print options.
<CR>	
<CR>	
<CR>	
/XY <CR>	Exit from Saturn-Calc.

Invoic.def (data entry file)

```
Invoice No. _____
Due Date    _____
Company     _____________________
Address-1   _____________________
Address-2   _____________________
Amount      _____
```

Invoic.cal (spreadsheet)

```
row :  A      :  B      :  C                          :  D
 1:                          Outstanding Invoices
 2:
 3:   Number   Date        Company                      Amount
 4:   ======   ========   ===========================  ======
 5:
 6:
```

Invoic.wps (command file)

```
/SRINVOIC <CR>
=A6 <CR>
/SLINVOIC <CR>
1 <CR>
<CR>
A=A, A=B, A=C, S2,
 N=D <CR>
/P <CR>
OWED <CR>
<CR>
<CR>
<CR>
<CR>
<CR>
XY <CR>
```

The final step of this process is to access the word processor and print the 'OWED' file. The figure below shows the finished product.

OWED.wps

row	A	B	C	D
1:			Outstanding Invoices	
2:				
3:	Number	Date	Company	Amount
4:				
5:				
6:	20812A	20912	Tuscaloosa Dental Associates	900.00
7:	20816C	20916	Analog Equipment Corporation	100.00
8:	21008A	21108	Internal Business Machinations	400.00
9:	21012C	21112	Citizens For a Clean Las Vegas	100.00
10:	21012H	21112	Dynamic Products of Des Moines	900.00
11:	21019A	21119	Webster's Pig Farm	29.35
12:	21021G	21121	Pleuresy Prevention Society	200.00

graphs

G (Graph) is used to create graphs from Saturn-Calc by means of Saturn-Graph, a separate software product. Assuming you have both Saturn-Calc and Saturn-Graph, this option translates spreadsheet data directly into

Pie Charts — displays up to 12 segments; negative values show as exploded segments;
Line Charts — displays up to 20 data points for each of up to 4 lines;
Bar Charts — displays up to 20 groupings, each comparing up to 4 items;
United States Demographic Maps — displays all 50 states;

You create the charts by answering prompts to select
type of chart;
output device (printer, plotter or CRT);
chart title (in any of 4 typefaces);
the spreadsheet cells which contain the relevant labels and data.

A user-controllable default file selects segment colors, patterns and densities, and which of seven types of bar charts and ten types of line charts will be drawn.

Detailed instructions for using this option are contained in the "Calc-Graphics" chapter of the Saturn-Graph Manual.

auto-consolidate

A (Automatic Consolidation) retrieves and totals (consolidates) data from up to twenty different stored spreadsheets. You can, for instance, reference several monthly budget spreadsheets to insert automatically the sum-totals for given items in a new spreadsheet, or create a yearly budget spreadsheet in which each cell is the sum of the equivalent cells from all your monthly statements.

It involves a four-step process:

1. Create a word processing file listing each of the spreadsheets you wish to consolidate; it should contain no formatting commands, only filenames and carriage returns. Each filename must appear on a separate line. The file may contain up to 20 spreadsheet filenames or up to 100 characters. The system assumes the .CAL extension for each file unless you indicate otherwise.

   You can create this file using Saturn-WP, another ASCII text editor or the Print (**/P**) command in Saturn-Calc.

   If using the Print command, first format a column of cells to accept text, insert the filenames, one per cell, then initiate the **/P** command.

   Respond to the **Print to [LP:]**: prompt with a filename. Select the default values (type <CR>) for the next 3 prompts, then respond to the **Columns to print [all]**: and **Rows to print [all]**: prompts by designating the column (one only) and rows containing filenames (do not include any other rows or columns).

2. In the new spreadsheet, place in each cell you want consolidated a GET function (See page 7-6, Referential Functions) of the format

GET(V,#)

where **V** is a value that may be either a cell reference or a formula. Once the **/SA** command has been initiated, this will retrieve **V** from **each** of the spreadsheets you have listed in the word processing file, then total those values and return the result of that calculation to the cell in which it appears.

For example, if your word processing file lists spreadsheets TEST1.CAL, TEST2.CAL and TEST3.CAL, then
GET(A1*B1,#) would be the equivalent of
GET(A1*B1,TEST1) +
GET(A1*B1,TEST2) +
GET(A1*B1,TEST3)

NOTE: any item you're consolidating **must** have the **identical cell reference** in each spreadsheet being added.

3. COMMAND: **/SA <CR>**
RECEIVE: **Name of file containing consolidation list:**
TYPE: the name of the word processing file listing the spreadsheets to consolidate, then <CR>.

This need only be done once per session; thereafter the "#" in any GET formula of the above format will be interpreted as the name of the word processing file you've provided.

4. Instruct the system to recalculate.

Once you've placed a GET formula in any one cell, you could then use the Copy command to copy it into the rest of the cells, creating an entire consolidated spreadsheet. Or, the /SA command could also provide consolidated values just for specific cells.

TITLE LOCK

Title Lock freezes specified rows and columns on the screen no matter what part of the spreadsheet is being displayed. Columns to the left of the cursor or rows above the cursor are locked.

The title-locked rows and or columns will appear in reverse video if your terminal has that capability. Otherwise, the effects of the command will not be apparent until you begin scrolling the spreadsheet.

Put the cursor to the right of (column) or below (row) the cells you want to lock.
COMMAND: /T <CR>
RECEIVE: **Title lock (C,R,B,N,?):**

C locks all columns to the left of the cursor.
R locks all rows above the cursor.
B (Both) combines the action of C and R.
N (Negate) cancels all title locking.
? displays the Title Lock help text.

You cannot move the cursor into a locked cell. If the goto command names a locked cell, the cursor goes to the closest unlocked cell.

Title locks are maintained on stored spreadsheets.

VALUES

Values uses a separate display to indicate the value of several important parameters for the current spreadsheet.

To inspect the current values for the spreadsheet,

COMMAND: /V <CR>
RECEIVE: Values display.

The following values are displayed:

- The name of the current spreadsheet (if it has previously been stored named) (see p. 4-1).
- The number of columns (and the letter code for the last column).
- The number of rows.
- The recalculation mode (see p. 8-21).
- The calculation order (see p. 8-20).
- The recalculation range (see p. 8-20).
- The amount of remaining space available for text (in bytes).
- The number of cells available (for inserting rows or columns).
- The default column width (see p. 8-19).
- The width of the active column.
- The number of spaces between columns (see p. 8-18)
- The size of the current file (in blocks).
- The size of the current work file (in blocks).
- The global numeric scaling factor (see p. 8-22).
- The number of buffers in memory available for this job (generally, recalculation proceeds faster with more buffers).

To return to the spreadsheet, type <CR>.

WINDOW

Window splits the screen to allow viewing of sections of the spreadsheet that are normally too far apart to be seen at the same time. Once Window is in effect, you can scroll each window independently or both windows together.

Put the cursor in the column or row where you want to split the screen.

COMMAND: W <CR>
RECEIVE: **Window type (C,R,?):**

- C splits the screen vertically at the point of the cursor and adds a new set of row headings.
- R splits the screen horizontally at the point of the cursor and adds a new set of column headings.
- ? displays the Window help text.

Column split

row	A	B	C	D	row	R	S
1					1		
2					2		
3					3		
4					4		
5					5		
6					6		
7					7		
8					8		
9					9		

Row split

row	A	B	C	D	E	F
1						
2						
3						
4						
5						
6						
7						
row	A	B	C	D	E	F
33						
34						
35						
36						
37						
38						
39						

Pressing the semicolon <;> moves the cursor from one window to the other. The cursor goes to the cell it last occupied in the other window.

Once Window is in effect, you can scroll each window independently or both windows together, or bring back a single window display.

COMMAND: /W <CR>
RECEIVE: **Window sync (1,S,U,?):**

1 returns the screen to a single window.

S provides synchronized scrolling of the windows. If the screen is split vertically, you can scroll rows when both windows display the same columns. If the screen is split horizontally, you can scroll columns when both windows display the same rows.

U stops synchronized scrolling.

? displays the Window help text.

EXIT

Exit ends the Saturn-Calc program and returns you to the Saturn Main Menu. If you want to save the changes made to the active spreadsheet, use the Storage Write command before you Exit.

COMMAND: X <CR>
RECEIVE: **Exit [No]** :
TYPE: Y <CR> to implement the command, or
TYPE: <CR> to cancel the command.

ZAP

Zap clears the active spreadsheet from the screen and displays a new, blank spreadsheet. If you want to save the changes on the active spreadsheet, use the Storage Write command before you Zap.

COMMAND: /Z <CR>
RECEIVE: **Zap [No]** :
TYPE: Y <CR> to implement the command, or
TYPE: <CR> to cancel the command.

If you type 'Y', Saturn-Calc proceeds as if you were creating an entirely new spreadsheet:

RECEIVE: **Initial number of columns [6]**:
TYPE: <CR> for six columns, or
TYPE: n <CR> for 'n' columns.
RECEIVE: **Initial number of rows (n max) [20]**:

The maximum number of rows depends on the number of columns specified.

TYPE: <CR> for 20 rows or n <CR> for 'n' rows.

active cell	The cell in which an entry can currently be made (the cursor rests on the active cell; its coordinates appear on the status line).
active spreadsheet	The spreadsheet displayed on the screen; also referred to as the current spreadsheet.
active window	When the screen is split into two windows, the window in which the cursor rests.
ASCII	American Standard Code for Information Interchange. A set of computer codes used by Saturn-Calc and many other programs for the various characters and function keys on the keyboard. Example: when you type the letter a, Saturn-Calc sends ASCII code 1100001 to the computer. Using ASCII enables exchange of date between spreadsheets, data entry files, and word processing files.
block	a) On the spreadsheet, a rectangular group of cells. b) A unit of disk storage space; the Values display gives the size of the current spreadsheet and work file in blocks.
bug	A mistake in the design or execution of a program.
cell	The intersection of a row and a column.
circular reference	A situation in which two formulas refer to each other. Results in incorrect values for both formulas.
commands	Instructions you send to the system to change the display characteristics of the spreadsheet or its cells or to store the spreadsheet in various ways. Initiate by typing < > at the **Entry or** / prompt.
command file	An ASCII file listing a series of commands and entries which, when read into a spreadsheet, are performed as though initiated by you from the terminal.
computed cell reference	A cell designation used in formulas in which the cell's row and column numbers are derived from mathematical expressions.

coordinates	The column letter and row number designating a cell. Examples: A5, G23.
cue	A highliighted box on the prompt edit line indicating where characters types will appear.
current column	The column in which the cursor rests.
current row	The row in which the cursor rests.
cursor	A highlighted box that indicates the active cell (in VT52-type terminals the active cell is marked by an asterisk).
default	A value or condition assigned by Saturn-Calc when none is specified by the user. Prompts list command options' default values in brackets [ ].
display characteristics	The way in which entries are shown in cells (includes number of decimal places used, how negative values are displayed, etc.).
entry	A unit of information assigned to a cell. An entry may be text, a number, a cell reference or a formula.
filename	A unique designation for each spreadsheet stored. A filename consists of six (RT-11, TSX-Plus and RSTS) or nine characters assigned by the user and a three character extension assigned by default by the program. The default extension used by Saturn-Calc is .CAL.
format	The display characteristics used by a given cell.
formula	A mathematical expression that instructs Saturn-Calc to do something to the values on the spreadsheet.
forward reference	A situation in which one formula refers to another below or to the right. Requires natural order recalculation (/GON) or multiple recalculations for accurate results.
function	A formula built into Saturn-Calc. Eliminates development time and repetitive typing by the user, and performs tasks with and between spreadsheets that would otherwise be impossible.

global	Any of several commands that affect the default values of the spreadsheet.
hard copy	A printed copy of a spreadsheet.
help text	On-screen explanations of Saturn-Calc operations. Accessed by typing a question mark at the **Entry or** / prompt or whenever ? appears in a prompt.
left justification	A display characteristic in which the first character of an entry appears in the left margin of a cell. Cells formatted for text are left-justified by default.
logical name	An alphanumeric label for a cell, row, or column. A logical name can be used in entries instead of an explicit cell reference.
monitor	An operating system program that enables the user to communicate with the computer.
operator	A symbol that represents a mathematical operation (e.g., + [addition], * [multiplication]) or a mathematical relationship (e.g., > [greater than], = [equal to]).
precedence	The order in which operators are acted on when Saturn-Calc calculates formulas. The order can be changed by placing parts of a formula within parentheses.
prompt/edit line	The area at the top of the screen where system messages are displayed, commands are given, and entries are typed and edited.
range	A contiguous group of cells. Examples: A1..A8, B1..G1, A1..G8.
read	An operation in which Saturn-Calc locates a spreadsheet in the computer storage area and displays it on the screen.

recalculation	The process in which Saturn-Calc computes the formulas on the spreadsheet. By default, recalculation occurs only on command; use /**GR** to switch to automatic recalculation.
right justification	A display characteristic in which the last character of an entry appears on the right margin of a cell.
status line	The area at the top of the screen that displays information about the spreadsheet in general and the active cell in particular.
value	A number or formula entered into a cell.
window	The part of the spreadsheet displayed on the terminal screen.
write	An operation in which Saturn-Calc stores a spreadsheet in the computer disk storage area.