

Announcing the TI Programmable 88!



Texas Instruments, inventor of the integrated circuit and one of the largest manufacturers of programmable calculators in the world, brings a new perspective to hand-held computing with the introduction of the TI Programmable 88. Whether you're an engineer, scientist, educator, or businessman, you can solve problems easier than ever before using the new TI-88 with Texas Instruments' unique alphanumeric display capability and *Solid State Software*TM.

The TI-88 is more than a programmable calculator; it is a new world of portable programming convenience. A variety of special features and accessory peripheral devices offers problem-solving power unmatched by any other hand-held programmable calculator.

The TI-88's two module ports provide the user with the unprecedented capability of installing up to **30,000 steps** of preprogrammed *Solid State Software*, or, by installing TI's new *Constant Memory*TM expansion modules, over **2,000 program steps** or nearly **300 data registers** can be added for use in program development.

The **new user-response keys** [YES], [NO], [UNK], [ENT], and [CONT] offer a convenience afforded previously only by sophisticated large-scale computers. By selecting the

system prompting option, the TI-88 can greet you with the message "MAY I HELP YOU?" Responding by pressing the [YES] key leads to a series of alphanumeric prompts designed to assist you in running *Solid State Software* programs and in setting the calculator's time, date, and alarm options.

By adding the PC-800 Printer Accessory, a printed copy can provide an instant record of all calculations. With the optional CA-800 Cassette Interface Accessory and a cassette recorder connected to the calculator, you can permanently record programs and data on standard audio cassette tapes for later retrieval, providing virtually unlimited data storage.

The TI-88 can communicate directly with other devices using the built-in input/output port on the calculator and a **rechargeable 150-hour battery** ensures total portability.

Timekeeping circuitry can act as an alarm and update the year, date, day, hour, and second continuously even when the calculator is off. The time can be accessed through program control for added convenience in record-keeping and calculations involving time.

Several tone instructions allow the options of beep on keypress, prompt, or error. Programs can be fully 'traced' in the display without a printer. The key buffering feature allows

up to 15 key presses to be made while the calculator is busy. The calculator processes each key press as it finishes the last task.

These features coupled with a reputation that's second to none in the electronics industry, makes the TI-88 a leader among programmable calculators.



ALPHANUMERIC DISPLAY

The ultimate has finally arrived for alphanumeric hand-held calculators. The TI-88 has a 16 character Liquid Crystal Display. Each of the **128 available characters** is represented by a 5 X 7 dot matrix. The LCD dot matrix is better defined than the segmented display format used by other programmable calculators, and the TI-88's new styling includes a tilted display for ease of viewing.

The ability to display messages provides unprecedented built-in software conveniences. Upper and lower case letters, punctuation, superscripts, common Greek letters, and other special characters greatly increase the flexibility and applicability of the already high performance computing device. A special Alpha Mode is provided to aid in the entry of characters into the display or for use in programs.

The advantages of this new capability are endless. Prompting messages guide the user through applications programs. System error messages are displayed using plain English. Program execution can be traced in the display. Current calculator status, special functions and their definitions are available with only a few keystrokes.

Program development takes place in the dramatically improved Learn Mode where every instruction is represented by English abbreviations. These meaningful abbreviations can be interpreted more easily than previous numeric code systems. The instructions are scrolled from right to left as they are keyed in. Several instructions are displayed at one time making it easy to examine your own programs for errors.

ENHANCED AOS™ SOLVES PROBLEMS EASIER

The TI-88 has all of the features which has made the TI-59 famous for ease of use, plus much more. As you key in a problem, each keystroke is echoed in the display. Since the last keystroke is usually visible, fewer missed key sequences occur, and the possibility of multiple entries is lessened.

The TI-88 is equipped with an enhanced version of Texas

Instruments' Algebraic Operating System (AOS™). Most problems are solved by entering them into the calculator in the order written. Answers are obtained simply and directly—no awkward transpositions, intermediate calculations, or misleading key sequences are required. Now, **implied multiplication** is recognized by the AOS and the square root, logarithmic, and trigonometric functions can be followed by their arguments as when working with pencil and paper.

EQUATION ENTRY SYSTEM

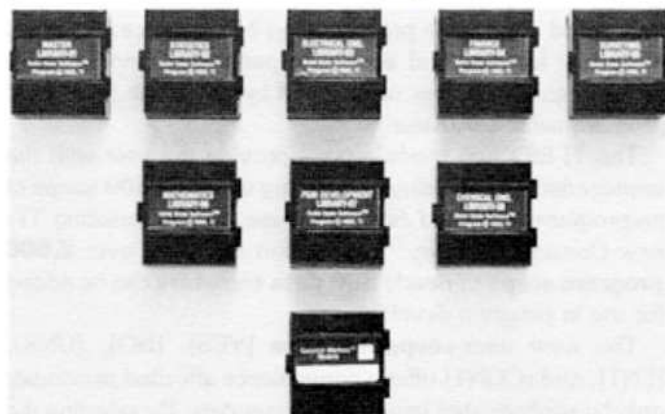
To further aid in solving equations, the TI-88 incorporates a special Equation Entry System. This amazing feature allows entry of an equation directly into memory for later evaluation. As the equation is entered, the function is scrolled across the display for easy verification. When the equation has been keyed in, evaluation is accomplished repeatedly by simply pressing the [EVAL] key.

By placing easy-to-use instructions in front of the equation, the calculator can prompt the user to enter the value of each variable defined in the equation. A total of 88 instructions can be entered into the Equation Entry System's special dedicated memory. Combined with the *Constant Memory* feature which retains the equation even when turned off, the power of the calculator for solving problems becomes truly remarkable.

CONSTANT MEMORY™ EXPANSION MODULES

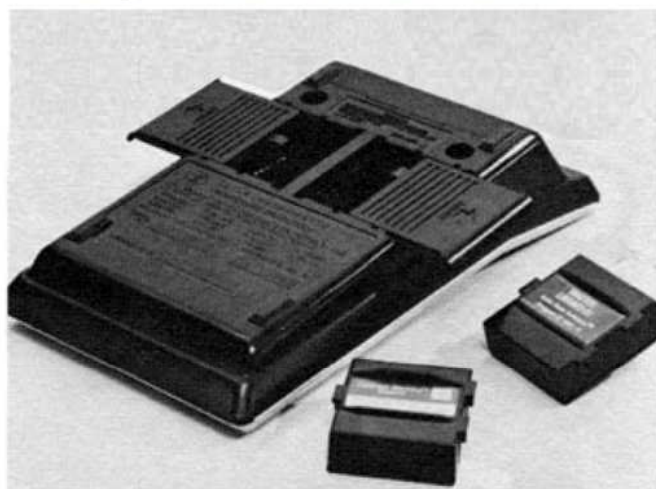
The memory capacity and problem-solving capability of the calculator can be greatly enhanced by installing optional *Constant Memory* expansion modules in one or both of the ports in the TI-88. Installing a *Constant Memory* module expands memory capacity to 268 data memories or 2,144 program steps. Installing a second *Constant Memory* module boosts maximum memory capacity to **416 data memories** or **3,328 program steps**.

You can also create your own customized program modules by assigning an "identification number" to any *Constant Memory* module. These modules can be **protected** from user examination of program content. After being "numbered," a *Constant Memory* module has 1,160 program steps and can store as many as **ten programs**. Since each module contains its own battery, it can be removed from the calculator without clearing or changing its contents. When you wish to access the programs stored in the module, simply reinstall the module in the calculator. Programs stored in *Constant Memory* modules may be executed in the same manner as *Solid State Software* programs from the keyboard, from other programs, or, through the



Main Prompting Sequence.

The battery contained in a *Constant Memory* module maintains all information stored in the module for an estimated **lifetime of five years**. Since modules are solid state devices, they do not wear or degrade with use and are **fully compatible** from one calculator to another.



SOLID STATE SOFTWARE™

Most people who need software don't have the time or desire to design all of the programs they require. To take the worry out of programming, Texas Instruments offers software for the TI-59 in the form of inexpensive, pre-programmed, 5,000 step modules. These modules are used to great advantage by doctors, lawyers, engineers, and businessmen within their professional discipline, and students around the world have found that learning is more exciting when repetitive work is eliminated with the use of a hand-held device. Continuing this tradition, the TI-88 is supported by quality software in 15,000 step modules which will help provide professional solutions to professional problems.

The use of the programs within *Solid State Software* modules is greatly enhanced by the calculator's response keys. The [YES], [NO], [UNK], [ENT], and [CONT] keys provide a truly **user-friendly** environment. No training or knowledge of programming is needed to answer the prompted messages which guide you to the solution of your particular problem. Some TI-88 applications modules even offer prompting in other languages such as German and French.

Master Library

Included with each TI-88 is the Master Library Module which contains 12 professionally written, easy-to-use programs chosen to serve a broad range of interests and to provide an overview of the calculator's capabilities. The 12 programs require no programming knowledge or experience to use, and allow you to begin immediately taking advantage of the programming power of your calculator.

The **Table of Contents** program is provided as a quick alphanumeric reference to the contents of the library.

A **Diagnostic** program tests the TI-88's functions, memory (including installed memory expansion modules), and display.

The **Finance** program calculates compound interest, computes ordinary annuities and annuities due, and prepares amortization schedules (with periodic totals and subtotals selectable by the user) for ordinary annuity/present value situations.

Computing moving averages is quick and easy with the **Moving Averages** program.

Find all real roots of a function using the **Root Finder** program.

Numeric integration is handled using the Romberg method in the **Integration** Program.

The **Matrices** program can handle up to a 9 by 9 matrix (15 by 15 with a TI memory expansion module installed). Linear algebraic operations such as addition, multiplication, inversion, determinants, and solution of simultaneous equations are executed quickly and accurately.

The **Linear Regression** program can estimate the coefficients of a model with as many as 9 predictors (13 with a TI memory expansion module installed). A correlation matrix and additional statistical information can also be compiled.

The **Random Number Generator** program produces sequences of uniformly or normally distributed random numbers.

Guess a four-digit number while playing **Codebreaker**, an all-time favorite calculator game.

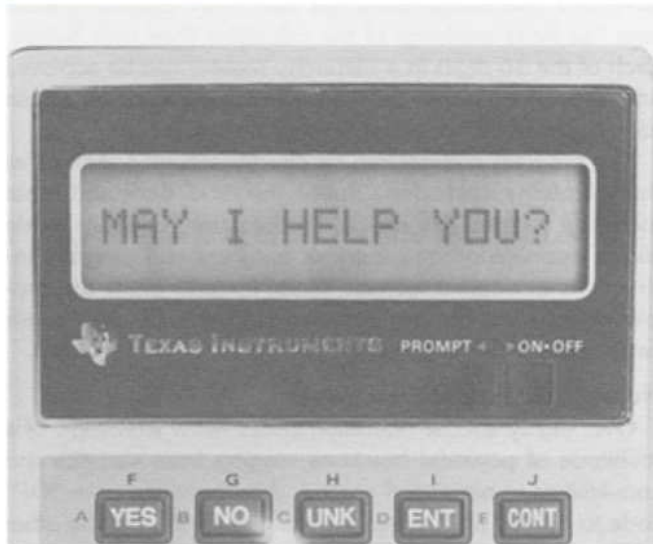
The **Sorting** program uses the efficient partition-exchange algorithm to order numeric lists.

The **Function Evaluator** program computes the value of a function at selected points and prints simple plots when used with the optional PC-800 printer.

Applications Modules

Applications modules will be available for the TI-88 in a variety of fields including Math, Statistics, Engineering, Games, and Business.

A Program Development Module will be available* to translate a TI-59 program and leave it resident in program memory ready to run on the TI-88. This will allow an easy transition for TI-59 owners wanting to upgrade to a more powerful calculator.



REAL PROGRAMMING POWER

In addition to improving TI's *Algebraic Operating System*, the TI engineers designed the most efficient and easy-to-use language that has ever been implemented on a programmable calculator. Combined with increased memory size, the TI-88 has programming power to reduce the most formidable of programming tasks previously handled only by large-scale computers to a hand-held solution.

New Register Addressing

The first 26 data registers in the calculator can be addressed numerically or by a new short-form addressing technique in which the register contents are accessed by an alphabetic address from A to Z. Combined with implied multiplication and the enhanced AOS, this addressing mode makes possible the recall of variables by simply mentioning their names. Expressions such as $A \sin B - CD^2$ are entered into the Learn Mode exactly as written.

Versatile Branching Instructions

In addition to transferring program execution directly to specific program addresses, branching can take place to any of 26 alpha labels and 100 numeric labels. Replacing keytop labels used by the TI-59 with numeric labels allows the TI-88 to expand its indirect addressing capabilities to include indirect transfers to label addresses. Relative addressing, another new branching feature, can be used in creating programs which are easily relocated in program memory without fear of affecting branching locations.

Powerful Decision-Making Instructions

The new decision-making instructions allow the conditional execution of any TI-88 instruction; not just branching instructions. All six mathematical comparisons are available and can now be made against any data register instead of requiring a dedicated test register. The new user-response instructions allow interactive decision-making by the use of the [YES], [NO], [UNK], [ENT], and [CONT] keys. The TI-88 also has 24 user-defined flags and four system flags for use in decision-making. Decision-making instructions can be concatenated to produce highly sophisticated decision-making structures.

New Advanced Instructions

Access to the 63 hierarchy registers and the presence of advanced instructions allow the user more intimate control over the inner workings of the calculator than ever before. Each of the 16 digits in a hierarchy register can be accessed with recall and store digit commands and each bit within each digit can be set, reset, flipped, or tested.

The program counter can be directly accessed, as well as the subroutine stack, the display, the AOS stack and other hierarchy registers. A special "unformatted" display mode allows examination and entry of numbers and program instructions in internal format. These features allow the programmer to use his own creative resources in ways never before possible.

Numerous Special Functions

Over eighty special operation codes allow execution of a multitude of powerful functions ranging from statistics and conversions to peripheral control. Also provided is an "OP" code to display (in English) the definitions of all of the other "OP" codes. These operations provide the professional with the extra edge he needs to quickly and accurately determine solutions to important problems in today's fast-paced world.

PRINTER CONTROL

An important feature of the calculator is its capability to control an optional printer accessory. With a printer connected to the calculator, you can perform the following operations:

- Print the contents of the display at any time.
- Print alphanumeric prompts, operating instructions, and messages.
- Print program input and output.
- Print the contents of program or data memory.
- Print all labels used in a program.
- Print OP code and flag definitions, calculator settings, and alpha entry positions.
- Print tracings of keyboard calculations and program execution showing each function executed with its result.



CASSETTE CONTROL

With the optional CA-800 Cassette Interface accessory and a cassette recorder connected to the calculator, you can record programs and data on standard audio cassette tapes for later retrieval and use. Four types of file recordings can be made:

- You can record all of calculator memory on tape. This type of file allows the contents of program and data memory to be saved together.
- You can record programs on tape. Program files may range in size from a minimum of eight program steps to all of program memory. When needed again, a program file can be read into any part of program memory.
- You can record data on tape. Data files are useful primarily for storing large quantities of information, but may be as short as one data register. When needed again, a data file can be read into any part of data memory.
- You can record the contents of a numbered *Constant Memory* module on tape, freeing the module for other use. When needed again, a module file can be read into a numbered or unnumbered *Constant Memory* module.

SHARE PROGRAMS THROUGH PPX

There may be times when you need a complex specialty program, and you would like the convenience of having a ready-made program that is not a bother to obtain. This is where TI's Professional Program Exchange (PPX) can be of help.

Your yearly PPX membership will open the door to discovery of the many interesting programs written by others in your profession. As an active member, you are a part of a network designed to exchange TI programmable calculator programs within all professions. Using PPX as a vehicle to contribute and obtain programs, you can broaden your professional base while you increase your productivity.