DAC-512

THE DEEP THINKER OF THE DESK TOP COMPUTER SET

dac DATA ACQUISITION CORPORATION

so easy to operate

The **DAC-512**, manufactured by DATA ACQUISITION CORPORATION, represents an entirely new concept in digital computing. A compact, self-contained unit, **it places flexible, programmable computing power right in the office or laboratory of the user**. Tedious or repetitive problems can now be solved rapidly and efficiently . . . at nominal cost. The scientist, engineer, or businessman with a **DAC-512** at his desk no longer has to wait days or weeks to solve relatively simple problems on expensive, centralized computers.

operating the DAC-512

With only a brief introduction, the **DAC-512** is as easy to use as an ordinary adding machine. Programs for frequently encountered computations can be stored in the computer's memory. Once the variables for a particular problem are entered, the answer appears at the touch of a button as a numerical display of nine decimal digits. New programs either can be entered into memory from a program library supplied by DATA ACQUISITION CORPORATION or can be generated by the operator. Since the programming language used is essentially algebra, most users will be able to program simple statements after minutes of instruction.

The DAC-512 offers much more than any calculator.

This sophisticated digital computer features:

- Millisecond computing times
- Random access memory
- Internally stored programs
- Decision making capability
- Sub-routine capability
- Indirect addressing capability

typical applications

Science

Statistical computations such as:
Standard Deviation
Variance
Arithmetic Mean
(up to 9 equations with 9 unknowns)
Matrix problems
Solutions of simultaneous equations
Exponentiation of variables
Integration of arbitrary continuous functions
Solution of arbitrary continuous functions for real roots
Reduction of determinants (up to 9 x 9) to a diagonal
Least squares fit of data to a power series (up to eighth order)
Computation of correlation coefficients
x^r evaluation on observed data

Engineering

Civil Engineering
Traverse and closure problems
Triangulation problems
Stress and strain calculations
Moments of inertia

Mechanical Engineering
Heat flow calculations
Pressure and Velocity calculations
Tension and Compression problems
Gear calculations

Electrical Engineering
RLC circuit problems
Ladder networks
Transfer function computations
Fourier series evaluation
Power series evaluation

Aerospace Engineering
Ballistic studies
Orbital calculations
Rocket thrust calculations

Business

Price extension calculations
Interest rate calculations
Mortgage balance problems
Re-discount computations
Actuarial computations
Computation of insurance commutation columns
Computation of stock and bond yields
Cash flow projections

Education

Studies involving:
Ordinary algebra
Boolean algebra
Trigonometry
Computer programming
Calculus

functions

Some typical functions available in the DAC program library include:

Powers and roots	e^x, $\sqrt[n]{x}$, a^n, etc.
Factorials	N!
Transcendental functions	sin x, cos x sinh x, cosh x $\tan^{-1}x$, etc.
Evaluation of power series	$f_x = a_o + a_1 x + \ldots + a_n x^n$
Roots of the general equations	$ax^3 + bx + c = 0$ $x^4 + ax^3 + bx^2 + cx + d = 0$
Evaluation of integrals	$\int_a^b f(x)\,dx$
Evaluation from stored mortality tables	D_x, N_x, C_x, M_x, etc.
Least squares fit of data to	$y = ax + b$, plus other polynomials up to eighth order.

detailed example of loading and using a program

The following program evaluates the general polynomial $F(x) = A_o + A_1x + A_2x^2 + \ldots + A_nx^n$.

The program calls for A_o to be loaded into register 11, A_1 to be loaded into register 12, etc. Also, n (the highest order of x) must be loaded into register 10. The program is arranged so that the variable x is accepted by the computer and stored in register 9, the polynomial is evaluated, and the answer displayed in the accumulator register. A program loop exists between instructions 16 and 40; instruction 16 is the entrance point to the loop and instruction 41 is the exit point. The detailed step-by-step programming procedure is as follows:

Program for evaluating

$F(x) = A_o + A_1x + A_2x^2 + \ldots + A_nx^n$

Step 1 Preload constants A_i in registers 11 + i

Step 2 Preload highest order n in register 10

Step 3 Set mode switch to "LEARN" position

Step 4 Touch appropriate Program Location Key (1 thru 8)

Step 5 Push following keys, in order:

No.	Instruction Key	Explanation	
1	= S	Store in	← Set up initial conditions
2	9	Register 9	
3	C	Recall contents of	
4	10	Register 10	
5	+	Add	
6	C	Contents of	
7	0	Register 0	
8	+	Add	
9	= S	Increment and store in	
10	7	Register 7	
11	−	Subtract	
12	C	Contents of	
13	7	Register 7	
14	= S	Equate and store in	
15	8	Register	←
16	C	Recall contents of	← Program loop
17	C	Contents of	
18	7	Register 7	
19	+	Add	
20	C	Contents of	
21	9	Register 9	
22	X	Multiply by	
23	C	Contents of	
24	8	Register 8	
25	= S	Equate and store in	
26	8	Register 8	
27	C	Recall contents of	
28	7	Register 7	
29	−	Subtract	
30	= S	Decrement and store in	
31	7	Register 7	
32	C	Recall contents of	
33	0	Register 0	
34	−	Subtract	
35	C	Contents of	
36	7	Register 7	
37	=	Equate result and place in accumulator	
38	IF −	Test result (IF − advance to next instruction, IF + skip next two instructions)	
39	P	Branch to program point	
40	0	Zero (within the program)	←
41	C	Recall contents of	
42	8	Register 8	
43	=	Equate and place in accumulator	
44	END	Stop	

Step 6 Return mode switch to "NORMAL" position. (The program is now stored in the computer's memory. It will remain stored even if power to the computer is turned off.)

Step 7 To use the program, touch program location key.

Step 8 Index a value of x.

Step 9 Touch "START" key; the answer will appear on the console display (accumulator register).

features

Stored Programs

In addition to performing the usual add, subtract, multiply and divide functions, the **DAC-512** can learn and recall as many as eight stored programs. Each program may contain up to 64 commands or instructions. If a very complex and lengthy problem is to be solved, the program storage locations can be used in tandem to write longer programs, up to 512 total instructions. Programs are inserted or changed by actuating buttons on the keyboard. To check a program, the operator may visually examine each coded instruction and its location, step by step, on the display.

Sub-Routines and Programmed Operators

When writing new programs, the operator can use sub-routines and programmed operators. This means that simple programs can be used repeatedly to write more complicated programs. Thus, as newer more complex problems arise, the operator can use his basic library of relatively simple programs to build larger, more sophisticated programs to solve these new problems. This ability to handle sub-routines or sub programs as building blocks for larger programs, greatly enhances the power and usefulness of the **DAC-512.**

Storage Registers

In addition to stored program capability, the **DAC-512** contains 120 memory registers for storing numbers. Data in these storage registers can be recalled either manually, or automatically via an appropriate program. This generous storage capacity is extremely useful for storing tables of numbers for later automatic look-up, extraction, modification, etc.

Indirect Addressing

One storage register may specify the "address" of another register. This allows convenient scanning of tables, lists, matrices, etc. This feature is used in the sample program for evaluating a general polynomial, where it controls access to the various constants needed. The indirect addressing feature allows this program to be used for any order polynomial.

Display

All information is displayed as a 12-character number on large, easy-to-read indicators. The decimal point is automatically located in the display.

Program Library

A basic program library is supplied to all **DAC-512** customers. This library contains programming instructions for many commonly used functions such as $\sqrt{X}$, A^x, N!, e^x, sin X, cos X etc. As proficiency and experience increase, every **512** customer will create his own particular programs and add them to his basic library. Periodically, DATA ACQUISITION CORPORATION will supply new supplementary programs.

Process Control Applications

The Model **DAC-512X** computer is available for applications involving the control and operation of external equipment. This version provides and accepts signals necessary to communicate with printers, tape readers, tape punches, and other external electronic devices. All information regarding signal levels, timing, synchronization, etc. is supplied to the user at no additional charge. The Model **DAC-512** (normal version) can easily be retro-fitted, at nominal cost, to become a **DAC-512X** version at a later date. For additional information regarding on-line applications contact: Applications Department, Data Acquisition Corporation.

specifications

Storage Registers:

120, with 12 character capacity consisting of 9 decimal digits, sign, and 2 digits for exponent of ten.

Program Storage:

Eight programs of 64 instructions each, or 512 total instructions.

Accumulator Register:

13 characters, consisting of 9 decimal digits, sign, overflow, and 2 digit exponent.

Machine Language:

Algebra (similar to simplified Fortran).

Number Capacity:

Smallest, 1×10^{-99} (decimal point followed by 48 zeros and a one); largest, $0.999{,}999{,}999 \times 10^{99}$ (or nine 9's followed by 40 zeros).

Arithmetic:

Floating decimal point

Weight:

Approximately 60 pounds

Power Requirements:

115 volts, 60 cps, 100 watts.

Operating Temperature:

Normal room temperatures. No air conditioning needed.

dac DATA ACQUISITION CORPORATION

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Hamden, Connecticut 06518
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The DAC 512: the programmable calculator/computer that doesn't need a programmer.

PICKER NUCLEAR

The Picker Nuclear DAC 512 is a desktop calculator/computer that speaks your language.

(And boasts a capacity of 512 program steps and 120 data storage registers.)

A Practical In-lab Computer

Practical because it's easy to program and use

The DAC 512 is a desk top general purpose computer which bridges the gap between a desk calculator and a large computer. Designed with the engineer, physicist and biologist in mind, the DAC 512 can be used either as a decimal or algebraic calculator or can be easily programmed for a variety of simple or complex mathematical computations. The DAC 512 solves complicated algebraic functions quickly, operates on tables of data, estimates a solution, analyzes statistical data, experiments with a set of variables, fits a curve. In your own office or laboratory you can compute immediate answers without the cost and turn around time of larger computer facilities.

Because the DAC 512 speaks algebra you can talk to it directly. Because it is as easy to manipulate as an adding machine your secretary will be able to process data for you.

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Typical Applications

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Solutions of up to 9 simultaneous equations
Exponentation of variables
Integration of arbitrary continuous functions
Solution of arbitrary continuous functions for real roots
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Activation analysis
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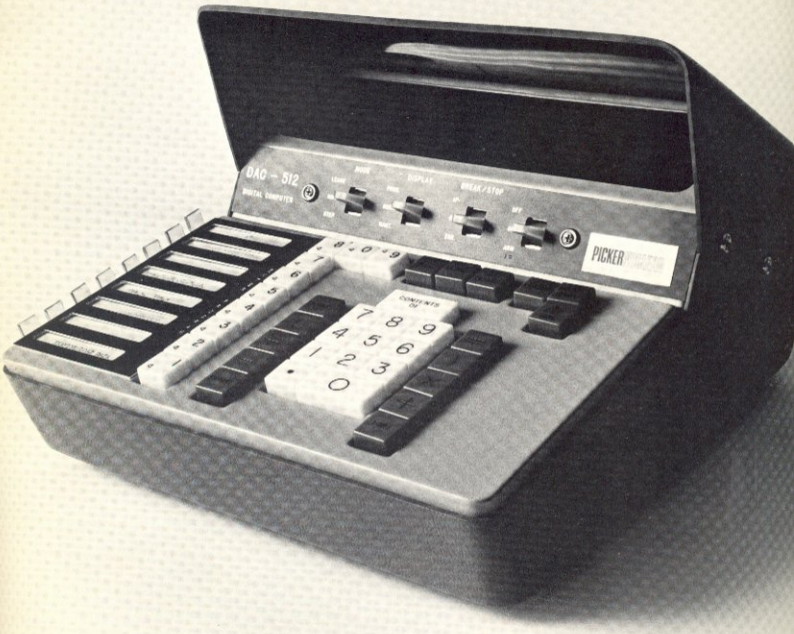
DAC — 512
DIGITAL COMPUTER
PICKER

Statistical Analysis Program

PICKER NUCLEAR
1275 Mamaroneck Avenue
White Plains, N. Y. 10605

Standard Deviation Program

Chi Square Program

Linear Regression Program

Curve Fitting Program (a)

Curve Fitting Program (b)

Exponential Sub-program

Logarithmic Sub-program