

## DIGITAL COMPUTER TRAINER AND LOGIC DEMONSTRATOR

The Digital Computer Trainer and Logic Demonstrator is an integrated training system developed by Computer Control Company, Inc. for the Naval Training Device Center (NTDC), Port Washington, New York.

Designated "Device 6B4" by NTDC, the trainer fulfills a military requirement for a multipurpose classroom demonstrator. The 6B4 is a valuable training device for demonstrating digital programming principles, troubleshooting strategy, information flow, and organization of a basic general purpose digital computer using the techniques most representative of those used in large-scale digital computers. The instructor has the capability for set up and execution of actual computer programs. A selection of typical classroom presentations is included in the 3-volume instruction manual provided with each device.

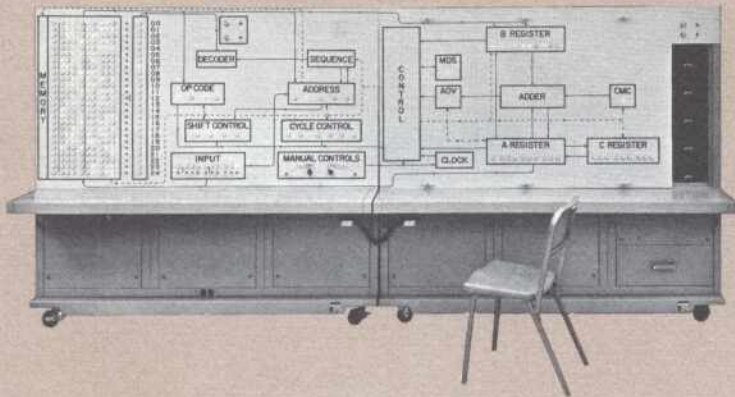
The 6B4 actually consists of two training devices combined in a single unit: (1) A realistic small-scale digital computer, and (2) a flexible logic demonstrator which employs a wide selection of individual digital logic modules.

The unit is designed to military specifications for classroom viewing at 30 feet and employs MIL standard logic symbols.



## THE DIGITAL COMPUTER TRAINER AND LOGIC DEMONSTRATOR PROVIDES TWO MAJOR MODES OF INSTRUCTION:

### DIGITAL COMPUTER TRAINER

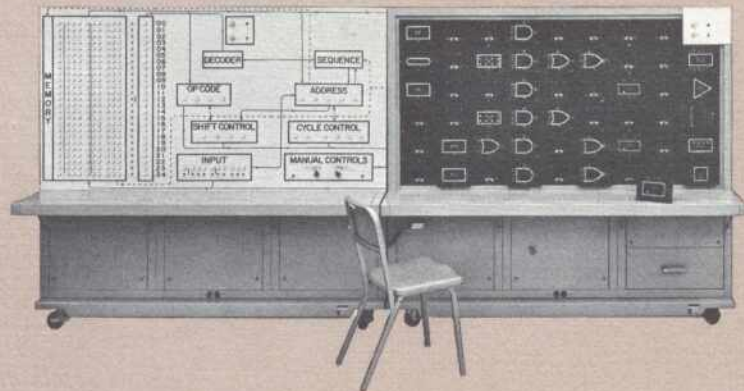


The entire twelve foot face of the system is used to display in flow diagram form the operation of a small-scale general purpose computer.

Employing techniques most representative of today's working computer systems, the Computer Trainer operates in parallel and uses a ten bit binary word. A repertoire of thirteen commonly used instructions is provided.

The contents of the special 25 word memory as well as all major elements of the Computer Trainer are displayed continuously on the front-panel flow diagram.

### DIGITAL LOGIC DEMONSTRATOR



The trainer converts quickly to a detailed logic demonstrator. The removal of three of the Computer Trainer's display panels exposes a mounting panel which can accommodate up to 53 independent logic demonstrator modules.

Specially developed by Computer Control Company for classroom use, the demonstrator modules have large MIL standard logic symbols imprinted on their 5 x 7 inch faces. Each module performs a single logic function.

By simple patchcord wiring between these modules, students can be introduced to the basic logic functions of flip-flops, gates, delays, etc., and can learn to synthesize such logic operations as counters, shift registers, and decoders.

The function and characteristics of every block or subassembly on the flow diagram panels can be easily explained by actually building these subassemblies with the appropriate logic modules.

**Demonstrates:**

Binary number system  
Binary arithmetic  
Octal notation  
Computer system organization  
Computer operation  
Basic programming  
Program flow charting  
Program debugging  
Diagnostic programming  
Trouble shooting

**Demonstrates:**

Fundamentals of Boolean Algebra  
Basic logic devices  
Logical implementation of adders,  
counters, shift registers, etc.  
Computer Trainers's logic organization  
Military logic symbology

**SPECIAL FEATURES**

**PORTABILITY**

The system consists of two separate cabinets, each mounted on wheels, which can be moved about independently and pass through standard size doorways.

**EASE OF SET-UP**

It is necessary only to connect the two cabinets by means of a single cable before power can be applied and operation begun.

No special power wiring is required, as the trainer draws a maximum of nine amperes of conventional 115 volt line power.

The system converts quickly from a Computer Trainer to Logic Demonstrator simply by the removal of three front panels.

**SELF-CONTAINED**

Provisions are made within the system for orderly storage of all components, including the panels which convert the unit from Computer Trainer to Logic Demonstrator, as well as a full complement of logic modules, wiring leads, spare parts, etc.

**FLEXIBLE CONTROLS**

Operating controls can be easily understood.

Program routines can be run continuously, sequenced through one instruction at a time, or each instruction may be executed in a series of sequential steps.

**HIGH VISIBILITY DISPLAYS**

All diagrams and displays are designed to meet military specifications for classroom viewing at distances of up to 30 feet. When used as a Logic Demonstrator, the output states of all modules can be displayed.

When set up as a Computer Trainer, the contents, or state of each major functional area is indicated at all times, enabling program operation or system organization to be taught step by step to a large class.

The entire contents of the memory may be displayed continuously, or may be masked from class view at the instructor's discretion.

**RELIABILITY**

The trainer is constructed of Computer Control Company's S-PAC printed circuit digital logic modules and S-PAC based circuits.

The S-PAC product line is widely recognized for its high standards of quality and reliability, as well as ease of use, proven through several million hours of operation.

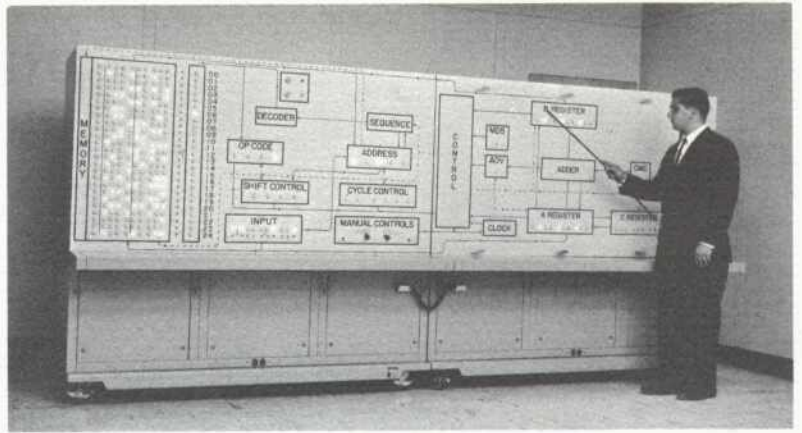
A rigid inspection, testing, and overall quality assurance program is an integral part of the S-PAC manufacturing process. The continuing S-PAC life test program at Computer Control Company has passed 955,800 PAC-hours without a single failure.

**MAINTENANCE**

Included within the trainer is a facility for testing circuit packages. A full complement of spare parts is readily available.

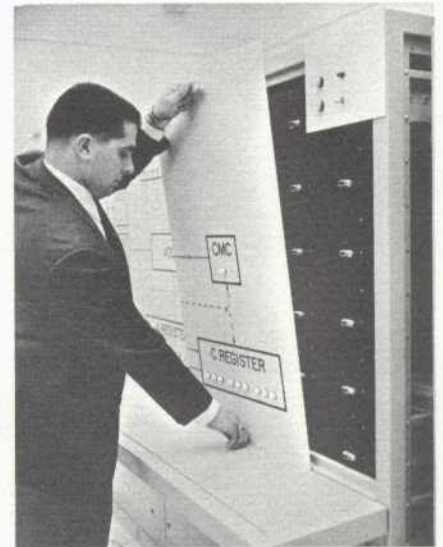
**COMPUTER CONTROL COMPANY, INC.**

USE AS  
A COMPUTER TRAINER



When operating as a computer trainer, the entire 12-foot unit is used to demonstrate in block diagram form the organization and operation of a small-scale, general purpose computer.

CONVERT TO  
LOGIC DEMONSTRATOR

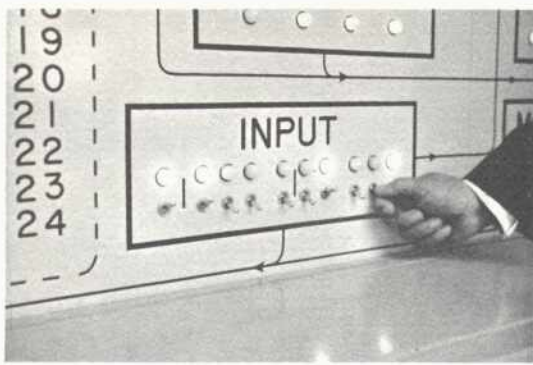


Removal of three front panels quickly converts the right-hand side of the computer trainer to a logic demonstrator, exposing power connections and module mounting brackets.

USE AS  
A LOGIC DEMONSTRATOR

This view shows the 6B4 set up as a logic demonstrator. The mounting board accommodates up to 53 independent logic modules.

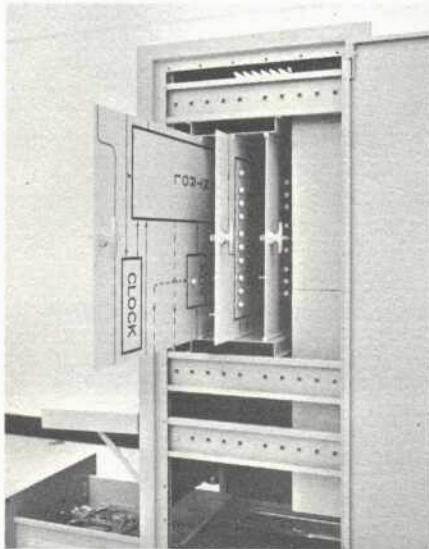




The computer demonstrator operates in parallel and uses a ten bit binary word. The bit positions are grouped from left to right in the following manner: The first bit is for sign — the next four bits indicate the particular OP code — the last five bits indicate the memory location.



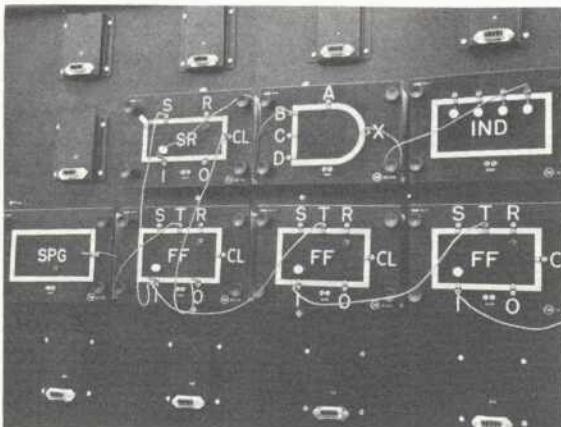
The manual control on the right enables the instructor to insert data into any particular memory location or to load the entire memory in sequential address order. The left control enables the instructor to select one of four run modes. A switch is also provided to enable the instructor to execute the program from a remote location.



End view shows storage locations of the computer trainer panels. All panels, logic modules, patchcords and accessories are stored within the trainer when not in use.



The trainer has a complement of 82 logic modules which can be stored in the rear of the logic demonstrator section. This provides a sufficient quantity and variety of modules to set up complex logic functions.



By simple patchcord wiring the instructor can synthesize a wide variety of logic operations, such as counter, shift register, decoders, and adders. The modules are designed for ease of installation, can be placed anywhere on the matrix of power connectors. The trainer is designed for classroom viewing from distances up to 30 feet.



The function and characteristics of every block or subassembly on the flow diagram panels can be easily explained by actually building these subassemblies with the appropriate logic modules.

# TECHNICAL DATA

## Computer Trainer

- TYPE: Single address parallel operation digital computer with manual information entry and incandescent lamp display of all major logic areas.
- WORD STRUCTURE: 10 bit binary
- DATA WORD: 9 data bits plus sign
- INSTRUCTION WORD: 4 bit OP code and 5 bit address
- MAXIMUM OPERATING FREQUENCY: 100 kc
- INSTRUCTION REPERTOIRE:
- |                     |                          |
|---------------------|--------------------------|
| Clear and Add       | Shift Left End Around    |
| Add                 | Store                    |
| Subtract            | Transfer Unconditionally |
| Multiply            | Transfer on Zero         |
| Divide              | Transfer on Positive     |
| Shift Left or Right | Transfer on Overflow     |
|                     | Halt                     |
- MEMORY: 25 word capacity  
Special Dynaquad circuits allow entire contents of memory to be displayed continuously.  
Front panel switches disconnect individual word displays to mask memory contents from class view.
- INFORMATION ENTER MODES:
- Normal — Information not being loaded.
  - Load Address Only — For inserting address into address register.
  - Load Information Only — For loading data at a single memory address.
  - Load Information and Increment — For loading memory in sequential address order.
- RUN MODES:
- Continuous — Computer runs at 100 kilocycle rate until a Halt instruction is reached.
  - Single Instruction — Each time the Start button is pressed, all steps concerned with one instruction are sequenced through and the next instruction is extracted from memory, then computer halts.
  - Single Cycle — With each depression of the Start button, one of the cycles or steps which make up an instruction is executed.
  - Mul/Div Cycle — Permits detailed examination of the iterative steps in a multiply or a divide operation. Each time the Start button is pressed, the computer runs until the next multiply or divide operation is reached, then halts to permit the iterative steps to be sequenced through one at a time.

## Logic Demonstrator

**DISPLAY AREA:** Mounting brackets are provided for simultaneous display of up to 53 logic demonstrator modules.  
Power connections are an integral part of the mounting bracket, and are made automatically as the modules are slipped into place.  
Any logic module may be mounted on any bracket as power connectors are standard.

**DEMONSTRATOR MODULE TYPES:**

AND Gate	Pulse Amplifier
OR Gate	Single Pulse Generator
NOR Gate	Variable Low Frequency
Flip-Flop	Pulse Generator
One Shot	High Frequency Pulse
Passive Delay	Generator
Adder	Level Switch
Shift Register	Indicator
	Emitter Follower
	S-PAC Tester

**MODULE PHYSICAL CHARACTERISTICS:** Each module presents a 5 x 7 inch face to the class, on which is printed a color-coded MIL standard logic symbol.  
Logic inputs and outputs are wired directly between the module front panels.  
Logic symbols and wiring are visible at 30 feet.

**MODULE ELECTRICAL CHARACTERISTICS:** Each module performs a single logic function.  
Module circuits are based on 3C S-PAC printed circuit digital logic modules.

**PHYSICAL CHARACTERISTICS:** The system is completely self-contained in two cabinets, each 72 inches long by 68½ inches high by 27¼ inches deep.  
A folding shelf runs the full length of each unit, providing a place to lay modules, notes, etc.

**POWER REQUIREMENTS:** Operates from standard 115 volts ( $\pm 10\%$ ) 60 cycle AC line power.  
Maximum power consumption for both units is 1,000 watts.

**OPERATING ENVIRONMENT:** No air conditioning or special cooling is required.

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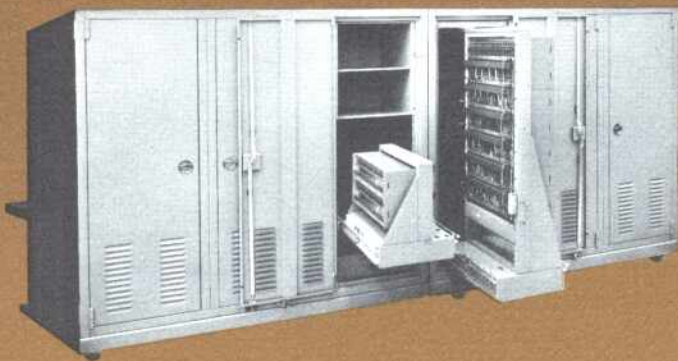
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