

The background of the cover is a detailed, embossed circuit board pattern. It features a complex network of lines representing traces, with various components like resistors, capacitors, and integrated circuits indicated by small symbols and shapes. The pattern is rendered in a light, textured grey against a slightly darker background, creating a technical and industrial aesthetic.

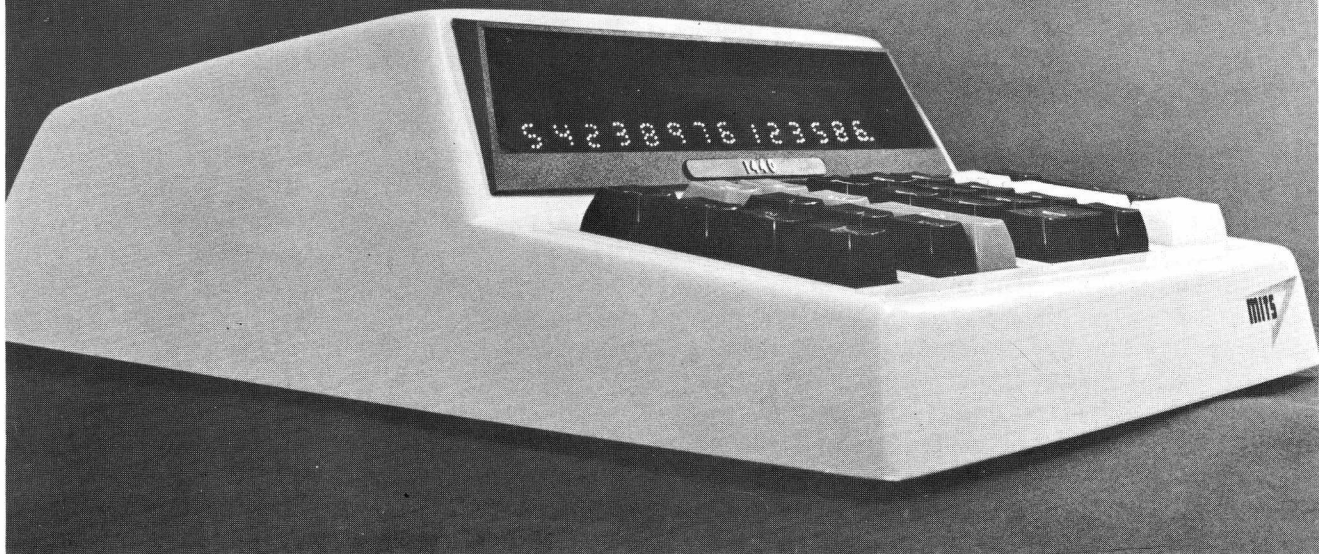
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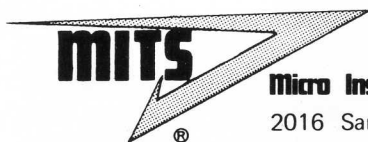
**1440 MANUAL**

**\$3.00**

# 1440 MANUAL



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## INTRODUCTION

The MITS Model 1440 Calculator is the finest low-cost, six-function electronic calculator available today. The few short hours you spend assembling your kit will result in the satisfaction of owning a quality instrument which will serve you a lifetime.

Many convenient features of the 1440 calculator simplify its operational capacity while still allowing an outstanding range of flexibility. The square, square root, and memory keys distinguish the 1440 from any other unit with a comparable price; while a constant capability, a simplified "math" entry system, fifteen highly legible light-emitting diode readouts, and a powerful computed decimal system all combine to provide the 1440 owner with the highest quality performance attainable by the modern calculator industry.

The calculator has two internal provisions which allow for growth. A fully electronic programming unit may be added to the basic module (through built-in interfacing) to provide computer capability at a small additional cost, and the combination of its equally compatible printer gives the user a full range output capacity.

The central computational portion of the 1440 contains six large-scale integrated (LSI) circuits. Each IC plugs into its high-quality, low-profile socket to ease construction complexity and increase maintainability. The printed circuit boards used in the calculator are the finest manufactured in the United States and can be easily soldered by someone with no prior soldering experience, while one normal and three regulated power supplies allow operation of the unit under even under the most adverse voltage variations.

Rigid engineering standards, small size, and light weight construction make the unit truly portable, and the modern, streamlined styling will grace any decor.

The technical introductory section which immediately follows, provides the most comprehensive data on Theory of Operation (with complete schematics and logic diagrams) covering the electronic principles of the 1440's design.

Using reasonable care, the Step-by-Step Assembly instructions (Section II) will permit even the most inexperienced kit builder to construct the 1440 without difficulty; and the final section, covering Applications, will familiarize the owner with the usage of the 1440 through typical problems and examples.

Before beginning construction, please read the accompanying booklet entitled "Assembly Hints", for information on components, tools, soldering and service, paying particular attention to the section on soldering, as 90% of all service repairs are due to poor soldering techniques, then check your kit against the parts list enclosed and begin the actual assembly.

## GENERAL DESCRIPTION

The Model 1440 Calculator uses state-of-the-art MOS/LSI (Metal oxides substrate/large scale integration, MSI (medium scale integration, SSI (small scale integration), and discrete semiconductor circuitry. The calculator consists of three major areas: input, central processing unit (CPU), and output.

The input consists of an array of switches housed in the keyboard. Closing one of the switches causes a "Start" signal to be generated, and the unit responds accordingly.

The Central Processing Unit consists of 6 MOS/LSI chips, which are the heart of the calculator. These chips store the data and the internal control programs, make the calculations, and provide the output section with results.

The output section receives the data from the CPU, changes its format, and shifts the level of the signals to one suitable for driving the display.

The following sections provide more extensive details on each of these functions.

## KEYBOARD

The keyboard consists of an X-Y matrix of normally open single-pole, single-throw switches. The switch is designed for minimum bounce with a contact resistance less than 1 k ohm. The X-Y matrix consists of 4X lines and 8Y lines giving a maximum possible combination of 32 functions (the 1440 uses 24 positions).

The "CLEAR", "CLEAR ENTRY", and "decimal set" switches are not in the matrix, but are level indicating switches.

The constant multiplier/divisor switch is the single-pole single-throw mechanical latching type, and it is also a level indicating switch.

## CENTRAL PROCESSING UNIT

### INPUT CHIP - 7014 IC

The Input Chip receives figures and command inputs from the keyboard by scanning an input switch matrix to detect keyboard activity and generates a suitable time delay to eliminate contact bounce. A six bit control ROM address for the initial instruction of a microprogrammed sequence is transmitted serially to the Control Chip. The Input Chip retains the BCD figure during entry until it is transferred by instruction to the Register Chip. The Input Chip locks out new keyboard inputs when the Control ROM is busy.

### REGISTER CHIP - 5001 IC2

The Register Chip is composed of three 16 digit shift registers, one auxiliary 4 bit shift register, and selection gating logic (SEL gates). The three 16 digit registers are (1) the Accumulator Register - A REG., (2) the Input Register - I REG., and (3) the Multiplier/Quotient Register - Q REG. Each of these registers has individual clear capability and right or left shift capability. The Input Register is used to receive keyboard figures and is one input to the adder on the Arithmetic Chip while