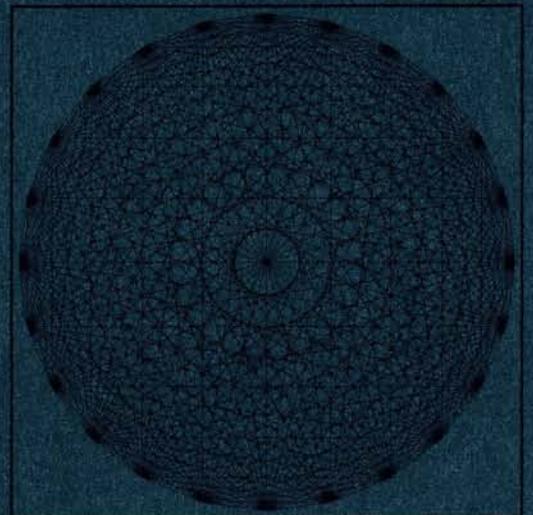


# GRAPHIC DISPLAY SYSTEMS



THE GERBER SCIENTIFIC INSTRUMENT COMPANY



# CONTROL SYSTEMS

The Gerber Scientific Instrument Company has pioneered the development of integrated graphic display systems, from numerical control verification units to complex on-line computer systems. Today, Gerber offers a complete line of control system hardware and software — each with a distinct degree of capability — to be custom tailored to meet user requirements.

The first step in selecting the right Gerber Graphic Display System is in the choice of control capability. Basic application analysis will determine whether linear, circular, parabolic, or higher order interpolations are needed; and whether incremental or absolute command position data will be used. Gerber controls offer each of these capabilities, individually or in combination, to meet a variety of needs in converting digital data into graphic display. Gerber controls can also perform the converse function of converting graphic data into digital form with Gerber digitizing accessories.

The Series 600 provides a straightforward, economical control unit. The Series 800 adds a degree of versatility in input data handling and computation capability. The Series 1000 offer such standard features as core, memory storage and buffer, offset, scaling, and absolute encoder feedback enabling all computations to be made in terms of absolute table positions. The Series 2000 makes a distinct departure from traditional control approaches, utilizing stored, rather than wired-in, programming and digital computer input/output approaches which offer the user complete freedom of input, computation and program control.

Each of these controls detailed in the following pages offers a unique solution to problems ranging in complexity from routine automatic drafting, to original computer-aided design and graphic display. Each, when mated with the table best suited to an application, offers the user labor saving, cost saving, time saving, and accuracies which are impossible with any other method.

To facilitate selection of the right control unit to be married to a selected table or *multiple* tables, the pages opposite this section turn independently, enabling you to directly relate tables to the control system you are evaluating to custom tailor a complete graphic display system to suit your needs.

## SERIES 600 OPTIONAL CAPABILITIES

**High Speed Photoelectric Tape Reader and Handler** — To increase input speed, this reader and 8" reel handler provides input reading speed of 300 characters per second. A 10½" reel handler is optional.

**Punched Card Input** — The Series 600 is available with capability of accepting data from punched cards in standard IBM Hollerith code and EIA variable block word address format. Standard IBM units can be adapted.

**Manual Input Keyboard** — A parallel entry keyboard for data input is available in addition to any other input. This enables movement of the drawing tool any known distance from the least bit increment to the full input capability of the control. A symbol keyboard is available for manual annotation of drawings using the 72 symbol print head and/or the drawn symbol generator accessory.

**Magnetic Tape Input** — Accepts tape compatible with IBM 727, 729, and 7330 tape units. Coding is in accordance with IBM BCD alphanumeric 7 channel code; NAS 968 code also available. Tape format is word address variable block per EIA standard RS 274A.

THE INCREMENTAL READER does not need an additional input buffer; the commands from the magnetic tape are entered block by block directly into the input section exactly as those from punched paper tape at a rate of up to 600 cps. Density is 200 bpi. No record length restrictions are imposed.

THE BUFFERED READER consists of a tape transport, a core memory for temporary storage of one record up to 1022 characters long, and solid state logic for control, code translation, and interface. Available in dual density (200-556 bpi) and triple density (200-556-800 bpi). Speed: 30 ips, with lateral and longitudinal parity checks. Switch selected record search or file search with two-digit display is included.

**On-Line Computer Operation** — Any Gerber system is capable of operating on line with a digital computer to meet user requirements.

**Additional Input Range** — To simplify programming and to enable the user to traverse the entire length of the selected drawing surface in one single command, input range is supplemented by adding one or two digits to the left or right of the decimal in the standard 9.999 format, up to 999.9999.

**Command Position Display** — In line decimal displays are available for monitoring actual tool holder position with respect to starting point. Displays  $\pm 99.999$  for each axis. (Also available with increased range option to  $\pm 999.999$  for each axis.)

**Sequence Number Display and Search** — To identify a drawing, piece of work, a section of input data, or tape block, a three-digit lampbank on the operator control panel continuously displays the sequence number. A manual search feature allows the operator to search for a sequence number by monitoring the displays while input tape is being read without carriage motion.

**Symbol Generator** — As an aid to annotating, titling, dimensioning, or drawing repetitious patterns, a separate punched paper tape reader internal to the control can be supplied equipped with a tape loop containing pre-programmed symbols. A single symbol address command from the input selects and draws any one of the available symbols or patterns pre-programmed on the tape loop. Unity, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 16 times scaling of these symbols is included.

**Dash Line Generator** — To generate dash lines as well as solid lines under input or manual control. Standard line lengths are ¼" and ⅛", space lengths are ⅛" and ¼"; switch selected, with  $\pm 20\%$  tolerance.

**Additional Axis Recognition** — Standard two of three axes recognition capability may be expanded to select two of five axes.

**Additional Operating Options** — (All switch selected) Block Delete Recognition option enables all blocks on the input tape preceded by a "delete" code to be skipped. Optional Stop can be provided to stop the system when an optional "stop" code is recognized. Additional lampbank displays and/or audible warnings for feed rate, spindle speed, and tool number are available.

## SERIES 600 STANDARD SPECIFICATIONS

### Type

Solid state all digital logic, linear interpolating, incremental command input system with automatic acceleration and deceleration, and one word input buffer.

### Input

Standard: Punched paper tape, 60 cps, EIA RS-2424 code  
Optional: Magnetic tape, punched cards, high speed punched paper tape and manual keyboard.

### Input Program Formats

Standard: Word address variable block EIA RS-274A  
8 channel punched paper tape  
Optional: Tab sequential, Fixed block, etc.

### Input Command Size

Up to 9.999" (1-3)

### Input Data Requirements

X and Y incremental coordinate data and tool up/down data. Feed rate is not required.

### Controls

Power on/off	Logic clear
Axis selector	Program stop indicator
Speed override	Tool control
X and Y symmetry	Manual up/down,
Continuous/single step	Automatic
Start	Omit leading/
Stop	trailing zeroes
	Scale size

### Multiple Axis Recognition

Standard: Two of three  
Optional: Two of five

### Symmetry Switching

Axis inversion switches for X and Y axes

### Scale Factor

½, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 16 times unity.

### Reliability

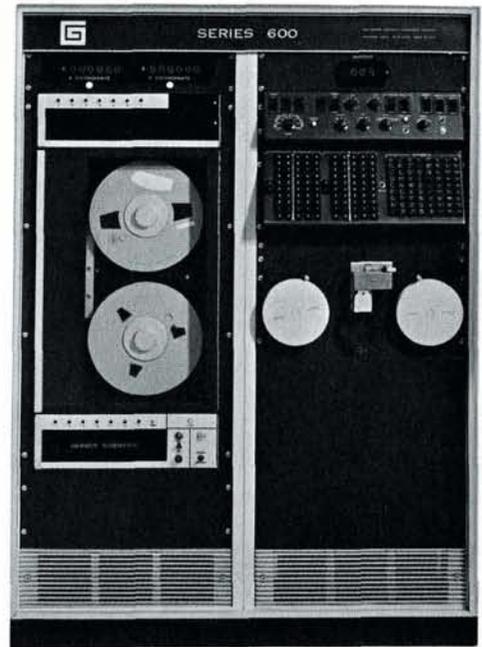
Computer logic plug-in modules and components. Rugged mechanical design.

### Dimensions & Weight

60" high, 21" wide, 26" deep, 400 pounds

### Power Requirements

110 VAC  $\pm 10\%$  single phase, 60 cycles, with third wire ground, 15 amperes, exclusive of the table.



## SERIES 600 CONTROL

### DESCRIPTION

The Gerber Series 600 graphic display system control provides a simple, economical method for converting digital information into graphic presentation. Graphic display of data is achieved at speeds and accuracies impossible manually—at the lowest possible cost—when this control is used as the basic system element.

All forms of digital data can be input to the Series 600 — on-line directly from computers, or via paper tape, punched cards, manual keyboard, or magnetic tape. A variety of manual controls allow the operator to regulate and monitor system performance.

Functionally, the Series 600 control is a linear interpolating system which generates positioning commands to the drawing table. Standard input for the Series 600 is punched paper tape programmed in variable block word address format. Standard one word input buffer enables overlap of reading/drawing functions to achieve more rapid transfer of data from the input media. Acceleration and deceleration rates are computed internally, enabling the unit to ignore programmed feed rates and drive the table with optimized traverse commands up to 600 inches per minute, depending upon the drawing table capability. This internal computation capability enables the standard Series 600 to accept incremental input commands up to 9.999". Input position commands up to 999.9999" can be optionally accommodated. To modify the size of a graphic presentation, scaling of the input data is supplied, switch selected, for 1/2, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 16 times unity.

Operator control panel provides selection of any two of three axes from the input media to allow orthographic projection and verification of three-axis tapes; selection of each input position command in single step fashion to monitor input block by

block, or continuous reading mode; and variation of maximum speed between 10% and 100% of table capability. Standard operator controls also include slewing, to position the drawing tool holder on or off the work surface, and manual or automatic positioning of tool up or down. Operator symmetry switching control provides mirror image drawings to be made from the same input data. Programming is simplified by operator controlled omission of either leading or trailing zeros.

### APPLICATION

The ability to accept digital information in standard input formats economically and without special post-processing or data conversion gives the Series 600 an ease of use and working flexibility in either on-line or off-line installations. Internal feed rate computation with linear interpolation, adequate manual control, and console monitoring features combine to provide a complete but economical system that can be integrated with any of the three drawing table models to satisfy the widest range of speed, accuracy, and working area requirements.

These primary capabilities make the Series 600 particularly applicable in such straightforward problem solving areas as machine tool cutter path verification, data plotting, mapping, and general drafting.

This is a basic control element. With the appropriate table, the Series 600 can be used for making comparator charts, patterns and templates, loft drawings, and printed circuit artwork masters. For more exotic applications, when such needs as circular and parabolic interpolation can be achieved on existing computer installations, the Series 600 can also prove the most economical solution.

## SERIES 800 OPTIONAL CAPABILITIES

**Punched Card Input** — The Series 800 is available with capability of accepting data from punched cards in standard IBM Hollerith code and EIA variable block word address format. Standard IBM units can be adapted.

**Symbol Keyboard** — A symbol keyboard is available, in addition to the standard manual entry keyboard, for manual annotation of drawings when used with the 72 symbol print head and/or the drawn symbol generator accessory.

**Magnetic Tape Input** — Accepts tape compatible with IBM 727, 729, and 7330 tape units. Coding is in accordance with IBM BCD alphanumeric 7 channel code; NAS 968 code also available. Tape format is word address variable block per EIA standard RS 274A.

THE INCREMENTAL READER does not need an additional input buffer; the commands from the magnetic tape are entered block by block directly into the input section exactly as those from punched paper tape at a rate of up to 600 cps. Density is 200 bpi. No record length restrictions are imposed.

THE BUFFERED READER consists of a tape transport, a core memory for temporary storage of one record up to 1022 characters long, and solid state logic for control, code translation, and interface. Available in dual density (200-556 bpi) and triple density (200-556-800 bpi). Speed: 30 ips, with lateral and longitudinal parity checks. Switch selected record search or file search with two-digit display is included.

**On-Line Computer Operation** — Any Gerber system is capable of operating on line with a digital computer to meet user requirements.

**Actual Position Display** — In-line decimal displays are available for monitoring actual tool holder position with respect to starting point. Displays  $\pm 99.999$  for each axis. (Also available with increased range option to  $\pm 999.999$  for each axis.)

**Preset Feature** — Enables the user to insert a starting position value up to 999.999" at any point on the table, accommodating input data working from known station lines or datum points. (Position display option required.)

**Sequence Number Display and Search** — To identify a drawing, piece of work, a section of input data, or tape block, a three-digit lampbank on the operator control panel continuously displays the sequence number. A manual search feature allows the operator to search for a sequence number by monitoring the displays while input tape is being read without carriage motion. The three-digit sequence number display can be supplemented by a search feature which enables the operator to preset the desired number and search forward automatically.

**Symbol Generator** — As an aid to annotating, titling, dimensioning, or drawing repetitious patterns, a separate punched paper tape reader internal to the control can be supplied equipped with a tape loop containing pre-programmed symbols. A single symbol address command from the input selects and draws any one of the available symbols or patterns pre-programmed on the tape loop. Unity, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 16 times scaling of these symbols is included.

**Encoder Feedback** — An encoder feedback system is available which prevents loss of tool holder position if the carriage is forcibly stopped. This feedback system "remembers" the difference between the programmed end point and the actual end point locations, and adds this difference to the next input command, restoring the tool holder to its true position. Incremental encoders are attached to the X and Y drive systems to indicate tool holder position. (Position display option required.)

**Dash Line Generator** — To generate dash lines as well as solid lines under input or manual control. Standard line lengths are  $\frac{1}{4}$ " and  $\frac{1}{8}$ ", space lengths are  $\frac{1}{8}$ " and  $\frac{1}{16}$ "; switch selected, with  $\pm 20\%$  tolerance.

**Additional Axis Recognition** — Standard two of three axes recognition capability may be expanded to select two of five axes.

**Additional Operating Options** — (All switch selected) Block Delete Recognition option enables all blocks on the input tape preceded by a "delete" code to be skipped. Optional Stop can be provided to halt the system when an optional "stop" code is recognized on the input. A similar switch is also available to cause the system to ignore program stop codes. An automatic re-wind option is also available whereby recognition of an "automatic re-wind" code on input causes the paper tape handler to re-wind automatically until a "re-wind stop" code is detected. Additional lampbank displays and/or audible warnings for feed rate, spindle speed, and tool number are available.

## SERIES 800 STANDARD SPECIFICATIONS

### Type

Solid state all digital logic, linear interpolating, incremental or absolute command input system with automatic acceleration and deceleration, and one word input buffer.

### Input

Standard: High speed photoelectric punched paper tape, 300 cps, EIA RS-244 code  
Manual keyboard  
Optional: Magnetic tape, punched cards

### Input Program Formats

Standard: Word address variable block EIA RS-274A  
8 channel punched paper tape  
Optional: Tab sequential, Fixed block, etc.

### Input Command Size

Up to 999.9999 (3-4)

### Input Data Requirements

X and Y coordinate data and tool up/down data. Feed rate is not required.

### Controls

Power on/off	Program stop indicator
Axis selector	Mode select
Speed override	Absolute
X and Y symmetry	Incremental
Start	Input select
Continuous/single step	Tape
Stop	Keyboard
Halt	Format
Logic clear	Tool control
Scale factor	Manual up/down
Parallel entry keyboard	Automatic
Omit leading/trailing zeros	

### Multiple Axis Recognition

Standard: Two of three  
Optional: Two of five

### Symmetry Switching

Axis inversion switches for X and Y axes

### Scale Factor

0.000001 to 9.999999 (separate for each axis)

### Zero Preset Feature

000.000 to  $\pm 999.999$  (optional)

### Reliability

Computer logic plug-in modules and components. Rugged mechanical design.

### Dimensions & Weight

60" high, 42" wide, 26" deep, 600 pounds

### Power Requirements

110 VAC  $\pm 10\%$  single phase, 60 cycle, with third wire ground. 20 amperes, exclusive of the table.



## SERIES 800 CONTROL

### DESCRIPTION

The Gerber Series 800 graphic display system control is able to accept absolute input information, as well as incremental input position data for graphic display. Like other Gerber controls, the versatile Series 800 accepts all forms of digital data — via punched paper tape, manual keyboard, optional punched cards, magnetic tape, or on-line directly from a computer. A standard one word input buffer enables overlap of reading/drawing functions to achieve more rapid transfer of data from the input media. A complete manual entry keyboard is standard, providing coordinate position control of the tool holder.

The Series 800 is capable of linear interpolation of input data. Acceleration and deceleration rates are computed internally, permitting tape programmed feed rates to be ignored and allowing the control to direct the drawing tool holder at optimum speeds up to 750 inches per minute, depending upon drawing table capability selected.

Full decimal scaling of input data under operator control from 0.000001 to 9.999999 times input command is provided for precision scaling operations. Incremental or absolute command inputs up to 999.9999" enable traversing the full length of the table with a single command. Standard input programming is variable block word address format.

Standard data input is via high speed photoelectric punched paper tape reader or manual keyboard. Selection of any two axes from three-axis input tapes allows for orthographic projection and verification of three-axis tapes. Position commands

can be acted upon in either a single step or continuous reading mode and speed can be regulated between 10% and 100% of maximum. The console control panel provides for symmetry switching for mirror image drawing from the same input data. Manual or automatic position of tool up or down are standard. Slewing control, to position the drawing tool holder on or off the work surface, is optional.

### APPLICATION

Absolute input positioning and expanded computation capability allow the Series 800 to adapt to both on-line and off-line applications in such complex graphic problem areas as high speed data plotting, tracking, and map making (where input data is in absolute positioning terms), high speed grid line drawing, and lofting in the shipbuilding, automotive and aircraft industries, or where scaled loft drawings are prepared directly from digital computer outputs. An exclusive preset feature available with the Series 800 allows the user to assign any desired value as the starting point from which all input data will be displayed. Position values up to 999.999", at any point on the table, can be preset into the system to be interpreted as the starting point in all programmed calculations. In addition, closed loop feedback between control and table can be achieved with shaft position encoders which provide table position data for system comparison with programmed position commands. The Series 800 incorporates some of the sophistication of more exotic controls at prices more in line with economical systems.

## SERIES 1000 OPTIONAL CAPABILITIES

**Punched Card Input** — The Series 1000 is available with capability of accepting data from punched cards in standard IBM Hollerith code and EIA variable block word address format. Standard IBM units can be adapted.

**Magnetic Tape Input** — Accepts tape compatible with IBM 727, 729, and 7330 tape units. Coding is in accordance with IBM BCD alphanumeric 7 channel code; NAS 968 code also available. Tape format is word address variable block per EIA standard RS 274A.

THE BUFFERED READER consists of a tape transport, a core memory for temporary storage of one record up to 1022 characters long, and solid state logic for control, code translation, and interface. Available in dual density (200-556 bpi) and triple density (200-556-800 bpi). Speed: 30 ips, with lateral and longitudinal parity checks. Switch selected record search or file search with two-digit display is included.

**On-Line Computer Operation** — Any Gerber system is capable of operating on line with a digital computer to meet user requirements.

**Actual or Command Position Display** — Switch selected actual or command position displays are available using single lampbank readouts. Display of command position is standard.

**Sequence Number Display and Search** — To identify a drawing, piece of work, a section of input data, or tape block, a three-digit lampbank on the operator control panel continuously displays the sequence number. A manual search feature allows the operator to search for a sequence number by monitoring the displays while input tape is being read without carriage motion. The three-digit sequence number display can be supplemented by a search feature which enables the operator to preset the desired number and search forward automatically.

**Circular Interpolation** — For flexibility of application and reduced program preparation time, the Series 1000 can be equipped to perform circular interpolation. After receiving the appropriately programmed input command, the system draws a highly accurate arc in a clockwise or counterclockwise direction within any single quadrant. Input coding is EIA standard RS-274A. Circular interpolation is also available in the symbol drawing mode.

**Symbol Generator** — Complete drawn symbols are selected from the core memory by single input commands or from the operator keyboard. As many as 90 separate symbols can be produced by the Series 1000 with all tool commands supplied by the internal buffer memory. Subroutines are loaded into the non-destructive memory via the input paper tapes. A scaling feature allows the symbols to be generated in five different sizes in the horizontal plane or to be rotated 90° counterclockwise. A six-position symbol scale switch allows symbols to be drawn 2, 4, 8, and 16 times unity scale, or to provide automatic scaling via the input program. A symbol symmetry switch allows the operator to choose whether or not X and Y symmetry switches will invert symbols as well as the program drawing. The memory storage contains storage of 415 strokes for symbol generation. 2048-word, 4096-word, and even larger memory storage capacities are also available. The larger the memory, of course, the more complex and varied are the symbols which can be stored in and drawn from the symbol generator. Symbols may easily be added to, changed, or deleted from the storage memory at any time via the input media. Symbol circular interpolation allows more numerous and varied symbols to be stored in the core memory by considerably reducing the number of commands needed for each symbol. In making circles, only 90° arcs may be generated. To draw a complete circle, only four arcs need be programmed.

**Dash Line Generator** — To generate dash lines as well as solid lines under input or manual control. Standard line lengths are 1/4" and 1/8", space lengths are 1/8" and 1/16"; switch selected, with ±20% tolerance.

**Additional Axis Recognition** — Standard two of three axes recognition capability may be expanded to select two of five axes.

**Additional Operating Options** — (All switch selected) Block Delete Recognition option enables all blocks on the input tape preceded by a "delete" code to be skipped. Optional Stop can be provided to stop the system when an optional "stop" code is recognized. Additional lampbank displays and/or audible warnings for feed rate, spindle speed, and tool number are available.

## SERIES 1000 STANDARD SPECIFICATIONS

### Type

Solid state, core memory, all digital logic, linear interpolating, incremental and absolute command input system with internal computation of acceleration and deceleration and internal computation of true command position using shaft position encoder feedback and absolute table position as a basis of calculations.

### Input

- Standard: 300 cps high speed photoelectric punched paper tape, EIA RS-244 code (Bi-directional, with automatic rewind).  
Manual keyboard (including symbol keyboard)
- Optional: Magnetic tape and punched cards

### Input Program Format

- Standard: Word address variable block EIA RS-274A  
8 channel punched paper tape
- Optional: Tab sequential, Fixed block, etc.

### Input Command Size

- Up to 999.99999 (3-5)

### Input Data Requirements

X and Y coordinate data and tool up/down data. Feed rate is not required.

### Multiple Axis Recognition

- Standard: Two of three
- Optional: Two of five

### Symmetry Switching

Axis inversion switches for X and Y axes, and symbol generator symmetry switching.

### Scale Factor

- 0.000000 to 9.999999 (separate for each axis)

### Controls

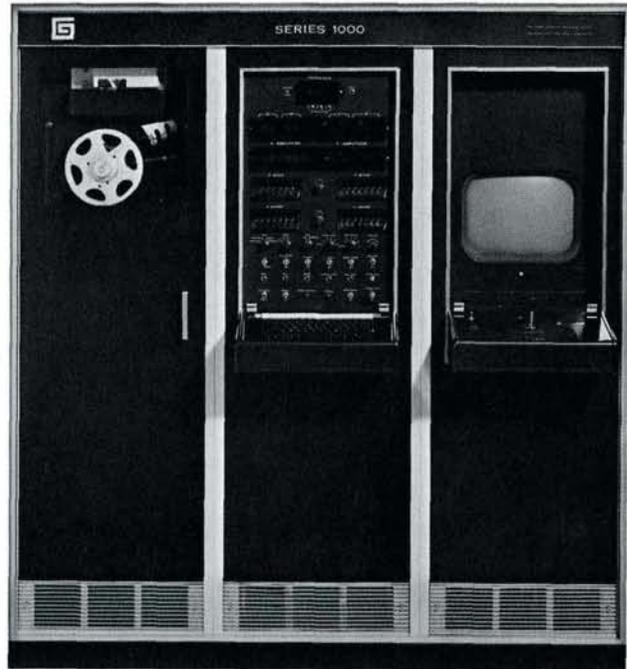
Input selector	Power on/off
Absolute	Continuous/single step
Incremental	Rewind
Input Format	Auto rewind
Axis selector	Stop
Speed override	Offscale clear
X and Y symmetry	Clear
Start	Manual plot

### Dimensions & Weight

- 60" high, 42" wide, 26" deep, 800 pounds

### Power Requirements

110 VAC ±10% single phase, 60 cycles, with third wire ground. 30 amperes, exclusive of the table.



## SERIES 1000 CONTROL

### DESCRIPTION

Circular as well as linear interpolation, magnetic core memory input storage and buffer, zero offset, and absolute encoder feedback from the table enabling all computations to be made in terms of absolute table position, are design features of the Gerber Series 1000 graphic display system control. Added to these features, linear interpolation, incremental and absolute input, manual keyboard including keyboard for print head and/or symbol generator, full decimal scaling, and offset capabilities make the Series 1000 the most comprehensive control available in terms of hardware.

Functionally, the Series 1000 acts upon input received via a standard photoelectric punched paper tape reader and generates commands for the drawing table. Either absolute or incremental data can be input to the Series 1000. All commands, even when using incremental input data, are computed in absolute terms for the table, using feedback data from shaft position encoders located on the X and Y table axes. Circular interpolation capability permits up to a 90° arc of a circle to be generated in one command, rather than using a series of straight line commands. The Series 1000 uses a magnetic core memory to buffer input data and store repetitious programs used in the optional symbol

generator which draws complete alphanumeric characters from single input commands.

Additional features standard with the Series 1000 include position display for both X and Y axes, and decimal offset to allow the operator to shift the starting point to any position on or off the drawing table. Decimal scaling on the Series 1000 is infinitely variable, from 0.000001 to 9.999999 times size. Input commands up to 999.99999" enable traversing the full length of the table with a single command. Standard input programming is variable block word address format.

### APPLICATION

The Series 1000 Control, with such program step saving features as circular interpolation and magnetic core memory storage, is uniquely applicable in graphic display systems required to draw data involving the most complex and repetitive detail. On line, the Series 1000 is able to accept computer output as generated, store it, and convert it into table position commands. The Series 1000 is particularly applicable in such areas as real time missile tracking, display of strategic military information, lofting, printed circuit artwork master generation, comparator charts, data plotting, mapping and graphic display of computer generated designs.

## SERIES 2000 OPTIONAL CAPABILITIES

**Punched Card Input** — The Series 2000 control can be equipped with punched card reader capability, either in addition to or in place of punched paper tape. The punched card reader option includes a 100-card-per-minute reader and associated controls with provisions to select either Hollerith or binary coded information from 80-column cards. (Punched card units are also optionally available for both input and output operation with the Series 2000.)

**Magnetic Tape Input** — Accepts tape compatible with IBM 727, 729, and 7330 tape units. Coding is in accordance with IBM BCD alphanumeric 7 channel code. NAS 968 code also available. Tape format is word address variable block per EIA standard RS 274A.

THE BUFFERED READER consists of a tape transport, a core memory for temporary storage of one record up to 1022 characters long, and solid state logic for control, code translation, and interface. Available in dual density (200-556 bpi) and triple density (200-556-800 bpi). Speed: 30 ips, with lateral and longitudinal parity checks. Switch selected record search or file search with two-digit display is included.

**On-Line Computer Operation** — The Gerber Series 2000 is capable of operating on line with other digital computers. (Specific requirements will be thoroughly investigated by Gerber engineers.)

**Displays** — Series 2000 displays optionally available in addition to standard I/O unit readout include actual position display for each axis and 3-digit sequence display.

**Expanded Memory** — Memory expansion by 4096-word modules up to a total capacity of 32,768 words is available to increase computer capability.

**Medium Speed Line Printer and Adapter** — Prints 300 lines per minute, 120 characters per line, 10 characters per inch, 64 characters per drum revolution.

**High Speed Paper Tape Punch** — Capable of punching one inch, 8 channel paper tape at rates up to 110 characters per second. Available in addition to standard I/O teletypewriter output punch.

**Digitizer** — Storage of strategic military mapping data for continuous updating, sectioning, and display is economically practical; garment patterns can be generated from designer's sketch, sized, and templates or control tapes produced for actual fabric or pattern cutting operations. To meet sophisticated demands in computer-aided design systems, Gerber 3-axes digitizers are available for use with the 2000.

## SERIES 2000 STANDARD FEATURES

Standard operating features of the Series 2000 include completely flexible multi-axis input, internal symbol generation in circular as well as linear mode, scaling from zero to 1000 times unity to 5-place accuracy, zero offset to any position on or off the drawing table, and programmed automatic dash line generation. Standard input formats are variable block word address or tab sequential, absolute and incremental commands up to 999.99999.

Standard I/O unit provides readout of command position and sequence number. Automatic sequence number search capability is standard. Auxiliary displays are included for feed rate (3 digits), spindle (2 digits), and tool (2 digits), via I/O typewriter. A closed loop encoder feedback system provides communication of actual position to the control. Power failure protection is a standard feature of the system memory.

## SERIES 2000 STANDARD SPECIFICATIONS

### Type

Binary, 8192 word core memory, parallel, single address with indexing and indirect addressing.

### Computation Speeds

Memory cycle:	1.7 microseconds
Add:	3.4 microseconds
Subtract:	3.4 microseconds
Multiply:	9.5 microseconds
Divide:	17.9 microseconds

### Input/Output Unit

Punched paper tape input via 300 cps high speed reader. (ASC II and EIA RS-244 code.) Teletypewriter input-output providing capability for reading paper tape at 10 cps, punching paper tape at 10 cps, printing at 10 cps, keyboard input, and off-line paper tape preparation and listing. (ASC II)

### Input Program Format

Word address variable block EIA RS-274A or tab sequential. (Other formats can be accommodated on request)

### Input Command Size

Up to 999.99999 (3-5)

### Input Data Requirements

X and Y coordinate data and tool up/down data. Feed rate is not required.

### Multiple Axis Recognition

2 of 5.

### I/O Control, Programmable

Axis selection	Scaling
Symbol/print head control	Zero offset
Symmetry switching	Dash line sizes

### Manual Controls

Manual data entry and display of all registers, operational controls, maintenance panel for detection of system malfunction. Also:

Power on/off	
Start	Clear
Stop	Re-wind

### Programming Aids

FORTRAN IV (per ASA standards), Symbolic assembler, Compiler, Utility routines, and Service routines.

### Power Requirements

110 volts  $\pm 10\%$  single phase, 60 cycles, with third wire ground. 30 amperes, exclusive of the table. Regulated power supplies are provided to meet input power fluctuations.



## SERIES 2000 CONTROL

### DESCRIPTION

The Gerber Series 2000 control offers distinct capabilities not possible with other control equipment. Because it is a stored program control, basic operating capabilities can be completely changed to meet severe performance demands without costly changes in hardware configuration. This flexible programming advantage, as well as an extremely versatile input/output capability, allows the user complete freedom of input source and format and the ability to perform computations utilizing high speed multiply and divide, for input tape preparation or other general purpose uses. This expanded computation capability makes it possible to perform linear, circular, and parabolic interpolation.

Although drawing speed is a factor of table specifications, the Series 2000, with unique "look ahead" capability, is able to attain significantly higher average speed. Input to the control is processed and converted into tool holder positioning commands under the direction of stored, rather than wired-in, programs. After positioning commands are stored in the control, they are analyzed and optimum speeds are calculated by the computer. This "look ahead" programming results in a higher overall average speed and a greater percentage of work accomplished.

Series 2000 16-bit word length offers the programmer an efficient, straightforward instruction addressing scheme: 1024 words can be addressed by a single word instruction. (The 16-bit word is directly compatible with ASCII 8-bit character code.)

In addition, users are supplied with a comprehensive program software package including FORTRAN IV, symbolic assembler, compiler, utility, and service routines.

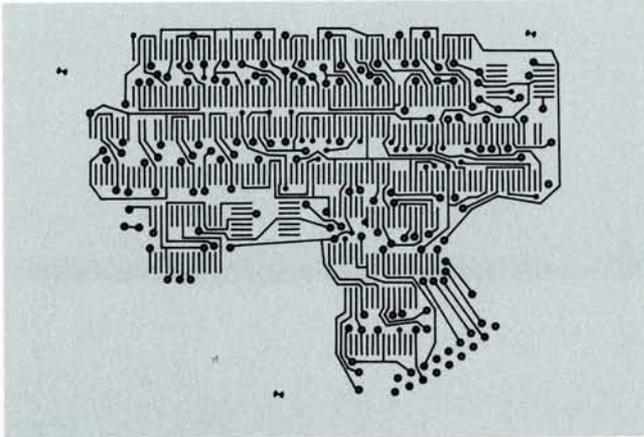
Series 2000 input/output (I/O) unit features a punched paper

tape reader and I/O teletypewriter with paper tape punch. Programs can be entered for storage and plotting via the high speed punched paper tape reader, the I/O reader, or manually through the I/O unit keyboard. Program parameters such as decimal scaling, offset, symmetry switching, absolute or incremental mode selection, tool control, and symbol drawing/printing are entered through the typewriter (or prepared input tape), rather than conventional switches. Operator control of the Series 2000 is achieved through the I/O typewriter — also allowing for printout of display data, insertion of commands, and program monitoring or modification.

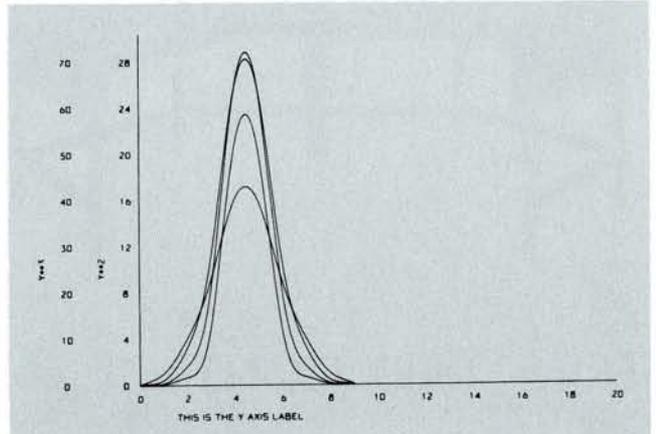
### APPLICATION

With the advent of high speed digital computers and their growing application to problems in engineering design, process and production control, manufacturing and scientific research, a completely new set of performance parameters has been created for graphic display systems. Control systems are being used not only to control drawing tables, but to accept directly computer language, perform conversions, and generate table instructions based on widely differing and rapidly changing program parameters. In addition, the high cost of computer operation time has created demands for self-contained computer and control capability within graphic display facilities. The Series 2000 meets these demands in such applications as graphic display of the more complex parabolic and hyperbolic geometric patterns, high speed contouring, curve fitting, and new techniques in numerical control; while performing general purpose computer tasks as an integral function. In the printed circuit industry, the design and production of printed circuit artwork masters generated from engineering schematics is now a reality.

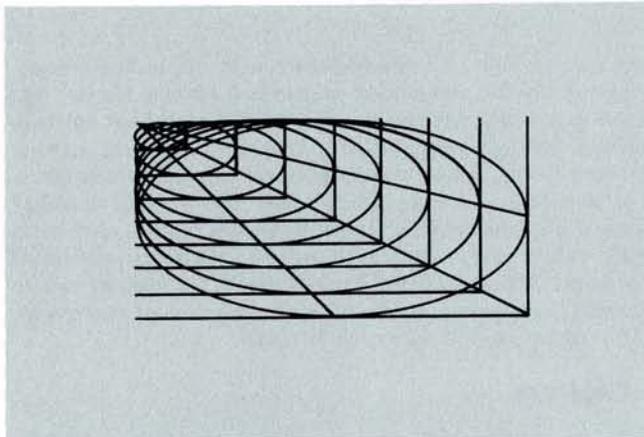
# TYPICAL WORK SAMPLES



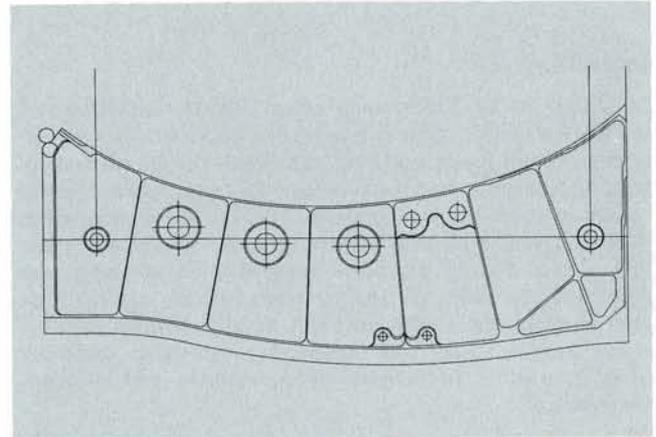
Printed Circuit Master



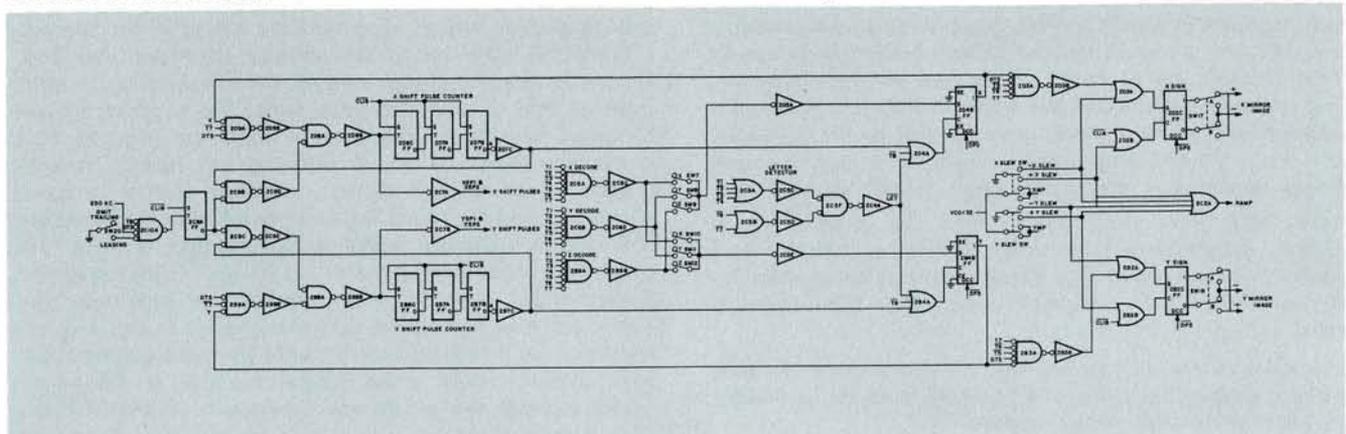
Data Chart



Geometric Test Pattern



Part Drawing

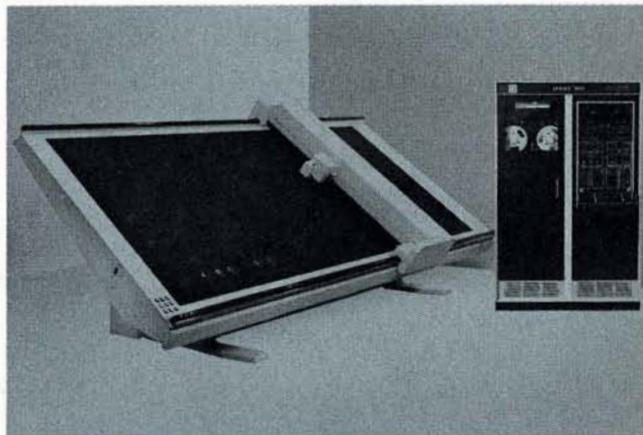


Logic Diagram

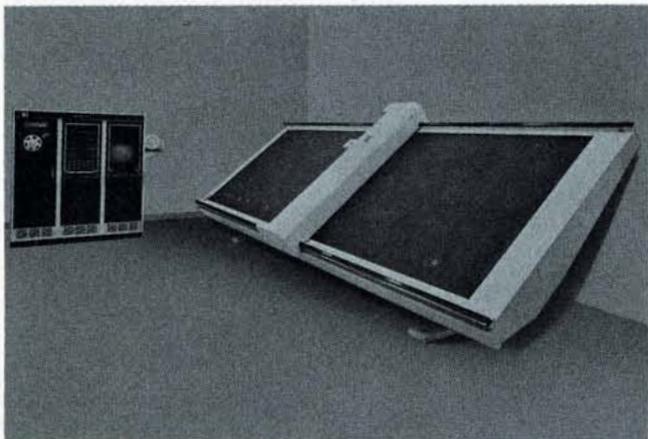
# TYPICAL SYSTEMS



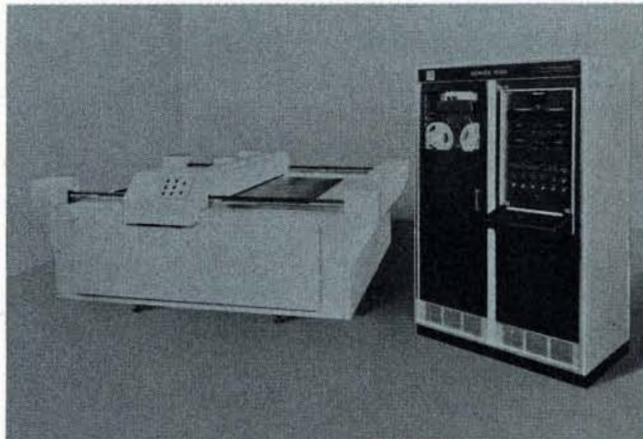
Series 600 Control with Model 22 Table



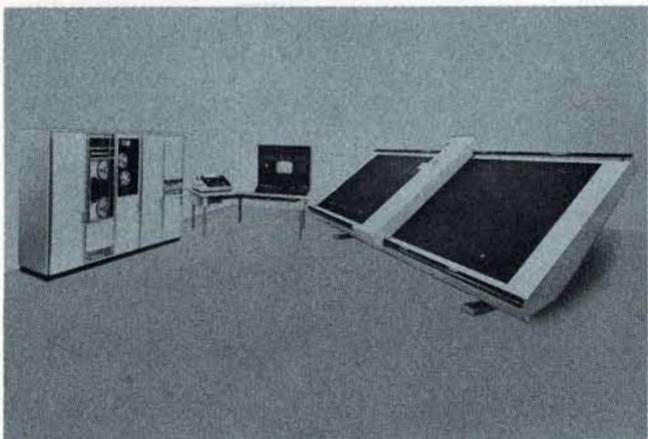
Series 800 Control with Model 75 Table



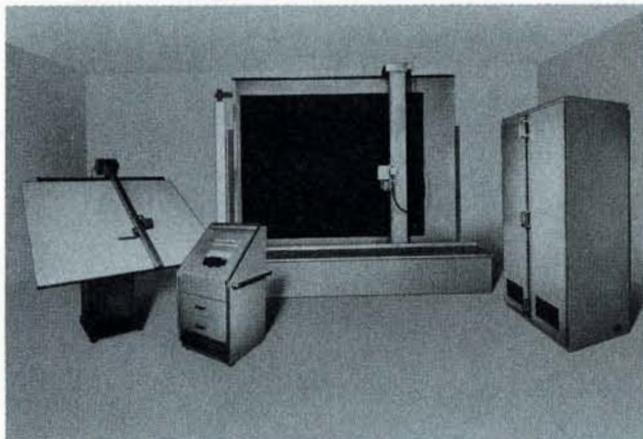
Series 1000 Control with Model 75 Table



Series 1000 Control with Model 32 Table

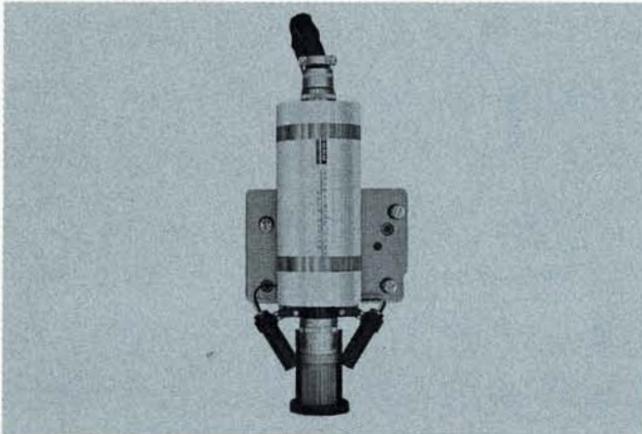


Series 2000 Control with Model 75 Table

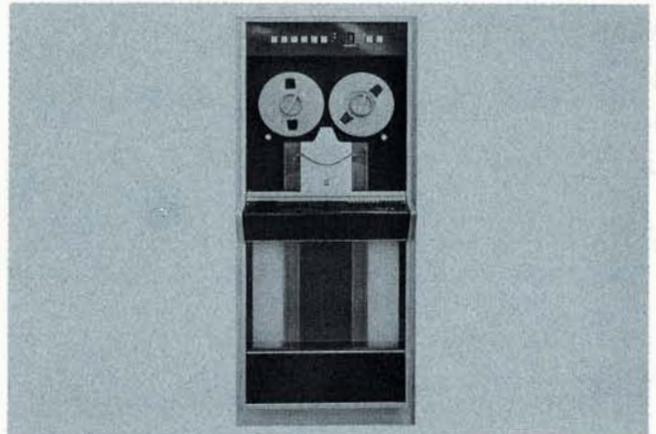


Typical Military Installation

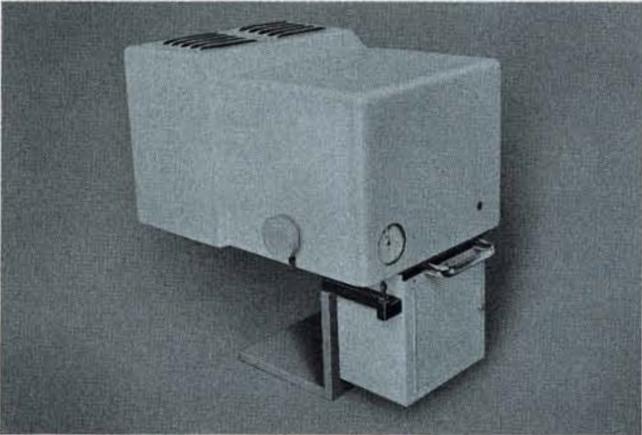
# ACCESSORIES



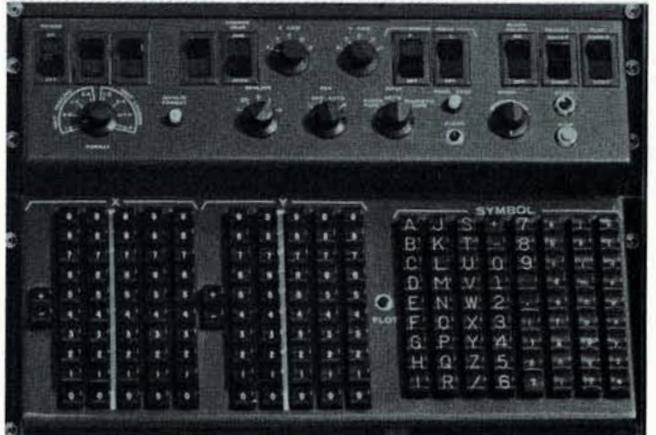
Television Camera Head



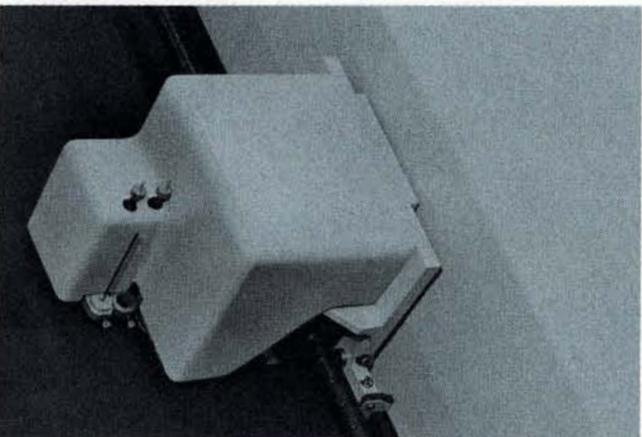
Magnetic Tape Input



Optical Exposure Head



Operator Keyboard



72 Symbol Print Head



Six-Position Pen Turret

# DRAWING TABLES



The Gerber Scientific Instrument Company is also a leading supplier of precision digital line drawing equipment. This table design and construction experience rounds out Gerber's complete graphic display system capability, and offers the user a wide selection of table specifications engineered to meet well defined needs.

In selecting a graphic display table, the user's application requirements — in terms of work area size, accuracy, and speed — should be the first factors considered. Each Gerber table is discussed in the following pages. Complete specifications are detailed to help relate table performance to user needs. In addition, there is another, perhaps less obvious, yet key set of factors referenced with each model as Table Accessories. Ranging from simple pen holders through optical exposure heads to automatic line following and digitizing heads. Combinations are available to maximize effectiveness of graphic display systems configuration. Although any table can be married to any control unit, it is in compromises involving control, tables, and accessories where final systems configuration should be resolved. No other manufacturer of graphic display systems offers the selection of table capabilities outlined in this document.

Table Model 22 is a versatile, mobile, electrically tiltable flat bed unit offering basic size, speed, and accuracy specifications. Model 32 is a high precision fixed horizontal table providing the most accurate drawing or photo exposing capability. Model 75 combines both speed and accuracy with large working surface advantages.

To facilitate selection of the right table or *multiple* tables and related options to be correlated to a specific control, the control portfolio pages opposite this section turn independently, enabling you to directly relate controls to the table you are evaluating. Using this portfolio, a unique solution can be tailored to your display problem, no matter how routine or complex that problem.

Gerber graphic display systems specialists are available at your convenience to assist you in the analysis of your graphic display problems, and to recommend solutions consistent with the economic factors governing your decision.

## MODEL 22 TABLE STANDARD SPECIFICATIONS

### Type

Flat bed, electrically tiltable

### Active Working Surface

50" Y, 60" X

### Drive Mechanism

X axis: rack and pinion

Y axis: one helical lead screw

### Carriage Positioning

Gerber digital step motor system

### Table Positioning

Standard electric motor; from full horizontal to full vertical

### Installation

4 double wheel ballbearing casters

### Output

Standard: Solid lines

Optional: Dash lines and printed symbols

### Output Mechanism:

Standard: Ball pen

Wet pen

Scribing tool

Optional: 72 symbol print head

6 pen turret

2 pen holder

### Drawing Material Hold-Down

Optional: Vacuum pump manifolded to rubber platen drawing surface. (No sectioning required.)

### Dimension

Vertical: 82" long, 37" deep, 79½" high

Horizontal: 82" long, 68½" deep, 40¾" high

### Weight

1500 pounds

### Construction

Table top is cast aluminum with steel carriage ways. Base is welded aluminum plate, with cast aluminum end legs.

### Power Requirements

220 VAC  $\pm 10\%$ , single phase, 60 cycles, with third wire ground. 40 amperes.

## MODEL 22 TABLE OPTIONAL ACCESSORIES

**Vacuum Chuck** — A vacuum system for securing drawing materials to the drawing table surface can be supplied as an integral part of the Model 22 table. The unit consists of a vacuum pump, motor, inlet air filter, and outlet muffler, and is installed in an isolated compartment in the table base. All controls are located on the side of the table. A rubber vacuum platen for the drawing surface, providing a firm but resilient work area, is included.

**Two-Position Tool Holder** — A two-position tool holder, for adding a second color pen, second width scribing tool, etc., is available. The second tool is mounted beside the standard tool at a fixed offset. Tools can be commanded by the control program and positioned up and down independently. Manual control is also provided. Tool offset is compensated for via the input media.

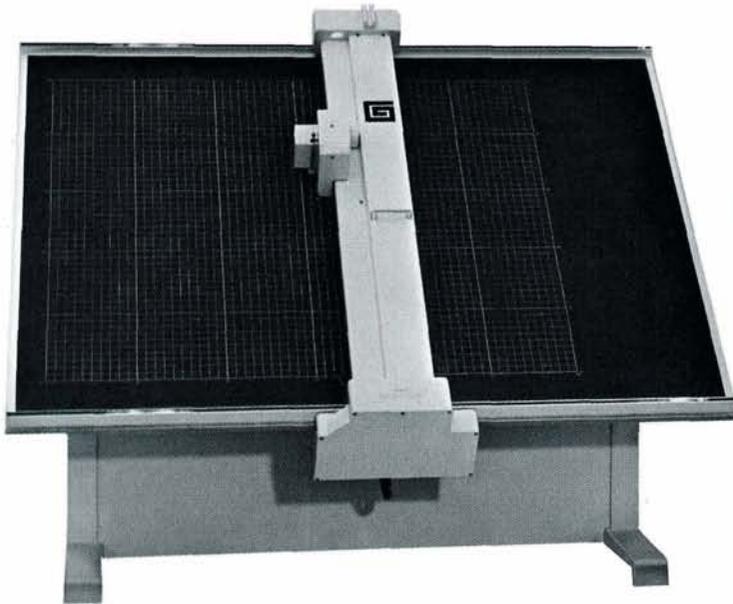
**Six-Position Turret** — A drawing head with six turret positions is available for equipping the Model 22 table to provide automatic selection from six different drawing tools. Wet ink cartridges, ball point pens, or scribing devices can be positioned manually or with program control to distinguish graphic data by varying color and/or line width.

**72 Symbol Printing/Drawing Head** — Combined capabilities of a drawing head and symbol printing device are available for high speed alphanumeric annotating and titling of plots as they are drawn. One or two pens or inking cartridges can be placed adjacent to the printing device for normal drawing purposes. The print head consists of a wheel fitted with 72 symbols spaced around its circumference. Upon program or manual command, the symbol is selected and struck to imprint on the drawing material at a speed up to 100 characters per minute. With keyboard control, the symbols can be manually selected and printed by the operator. Automatic print and space mode is also available.

**Manual Roll Feed** — A manual roll feed device provides for drawing or scribing material storage and take-up. Roll holders and axles are located on each end of the drawing table and can be adjusted to accommodate any drawing material size up to the full width of the table's active drawing surface.

**Gear Changes** — Fixed table speed can be altered to provide multiple speeds, rather than the standard specified speed for high or low speed contouring and special scribing operations.

**Optical Magnifier** — A magnifying reticle, used for visual alignment of scribing material, provides an enlarging capability of three times normal size.



## MODEL 22 TABLE

### DESCRIPTION

The Gerber Model 22 graphic display table is a completely self-contained unit for inking, scribing, or other tool positioning. All X and Y axes positioning commands, acceleration/deceleration instructions, and tool control signals are received directly from Gerber controls without additional interface.

The Model 22 features a 50" x 60" active drawing surface and is electrically tiltable for operation in any position from full horizontal to full vertical. Drawing speeds up to 600 inches per minute and accuracies up to  $\pm 0.007$  inches are achieved. Single drawing tool holder is standard.

Mechanically, the Model 22 is rigidly constructed with precision ways for the X carriage which spans the table surface. Positioning along the X axis is achieved by a precision rack drive system adjacent to the precision table ways. The Y carriage — which is the basic tool holder — is positioned along the X carriage by a precision helical lead screw. Highly reliable digital step motors are used in the basic drive system of both axes. Motor driver, power supplies, and electric motor tilt mechanism, are housed in the Model 22 table base. Unique dust covers protect the X axis precision racks at all times. Precise squareness is mechanically fixed; not held by electrical means. Slew controls can be provided, either on the control system con-

sole or on the table's X axis carriage, for manually positioning (or parking) the X and Y carriages.

Ball point pens, wet pens, and a diamond scribing tool capable of scribing clean, distinct lines on coated Mylar or sheet metal are available as standard equipment.

This standard unit offers the user a versatile, ruggedly designed tool for graphic display, capable of fast and accurate response to complex input commands. A wide variety of optional accessories are available to further tailor the Model 22 to meet overall system requirements.

### MODEL 22 TABLE SPEEDS AND ACCURACIES

Control	Speed*	Accuracy	Repeatability
600, 800,	150 ipm	$\pm 0.007$	$\pm 0.0035$
1000, and	300 ipm	$\pm 0.009$	$\pm 0.0045$
2000	300 ipm	$\pm 0.007$	$\pm 0.0035$
	600 ipm	$\pm 0.009$	$\pm 0.0045$

\*Speed is reduced by 20% when table is operated in vertical position.

## MODEL 32 TABLE STANDARD SPECIFICATIONS

### Type

Flat bed, fixed horizontal

### Active Working Surface

48" Y, 60" X (6 standard vacuum areas)

### Drive Mechanism

X axis: Two precision pre-loaded recirculating ball screws  
Y axis: One precision pre-loaded recirculating ball screw

### Carriage Positioning

Gerber digital step motor system

### Installation

Precision leveling pads on each of four legs

### Output

Standard: Solid lines  
Optional: Dash lines, printed symbols, photo exposure

### Output Mechanism

Standard: Ball pen  
Wet pen  
Scribing tool  
Optional: 72 symbol print head with 1 or 2 pens  
Optical exposure head  
6 pen turret

### Drawing Material Hold-Down

Vacuum pump manifolded to rubber platen drawing surface

### Dimensions

103" long, 96" deep, 45" high

### Weight

4,000 pounds

### Construction

Table top is steel plate and waffle pattern support webbing and hardened steel ways. Base is welded steel.

### Power Requirements

220 VAC  $\pm 10\%$ , single phase, 60 cycles, with third wire ground. 50 amperes.

## MODEL 32 TABLE OPTIONAL ACCESSORIES

**Six-Position Turret** — A drawing head with six turret positions is available for equipping the Model 32 table to provide automatic selection from six different drawing tools. Wet ink cartridges, ball point pens, or scribing devices can be positioned manually or under program control to distinguish graphic data by varying color and/or line width.

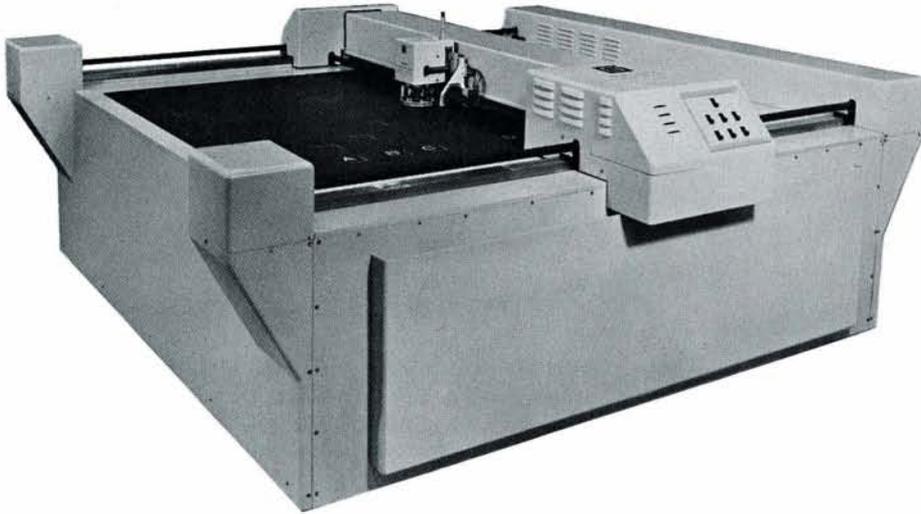
**Optical Exposure Head** — The production of plots on light-sensitive material for offset printing of business forms and printed circuit manufacturing has been a difficult and time consuming process. Preparation of masters with ink drawings are subject to line fuzziness as the ink spreads. Scribing is subject to the danger of tearing the material. Now, through the marriage of a precision optical exposure head with the precision Model 32 drawing table, it is possible to work directly on light sensitive glass or film to increase precision and uniformity. The optical exposure head provides a means whereby various widths of lines may be drawn and specific images may be exposed accurately and rapidly on photosensitive materials.

Light intensity is automatically controlled in order that the exposure head acceleration and deceleration does not affect the quality of the finished artwork. This arrangement yields line width or image size tolerances up to  $\pm .0002$  inch on line sizes from .002 to .187 ( $\frac{3}{16}$ ) inch. Selection of line widths and images is provided by a 24-station aperture turret. The system will operate in whatever degree of darkness or semi-darkness required for handling each sensitized material. The optical exposure head, mounted on the Y carriage, is readily interchangeable with drawing, scribing, and routing heads.

**Symbol Printing/Drawing Head** — Combined capabilities of a drawing head and symbol printing device are available for high speed alphanumeric annotating and titling of plots as they are drawn. One or two pens or inking cartridges can be placed adjacent to the printing device for normal drawing purposes. The print head consists of a wheel fitted with 72 symbols spaced around its circumference. Upon program or manual command, the symbol is selected and struck to imprint on the drawing material at a speed up to 100 characters per minute. With keyboard control, the symbols can be manually selected and printed by the operator. Automatic print and space mode is available.

**Gear Changes** — Fixed table speed can be altered to provide multiple speeds, rather than the standard specified speed for high or low speed contouring and special scribing operations.

**Optical Magnifier** — A magnifying reticle, used for visual alignment of scribing material. Several magnifications are available.



## MODEL 32 TABLE

### DESCRIPTION

Extremely high accuracy to  $\pm 0.0008$  inch with exact repeatability to  $\pm 0.0004$  inch is guaranteed on the Gerber Model 32 graphic display table; with a fixed horizontal 4' x 5' drawing surface and vacuum hold-down platen as standard design features.

Located along the front and rear of the table are precision machined slots in which are mounted hardened steel ways that extend the full width of the table. The X carriage, supported at each end by roller bearings, rolls on these ways, driven by two precision ball screws. The Y carriage, also driven by a precision ball screw, is carried on a full-length steel way incorporated in the X carriage. The table structure consists of a one-piece steel top plate reinforced by a framework of steel plates welded in a waffle pattern for maximum rigidity. Precise squareness is mechanically fixed; not held by electrical means. Standard vacuum hold-down of the drawing material is facilitated by small holes through the precision-ground neoprene rubber platen. These holes are manifolded into the vacuum system.

Drawing tools for inking, scribing, and optical exposure of light sensitive material can be mounted on the Y carriage and positioned by direct command from the graphic display control unit. Single drawing tool holder is standard. Slew controls can be provided, either on the control system console or on the table's X carriage, for manually positioning (or parking) the X and Y carriages.

High accuracy and rugged design specifications enhance the

Model 32 application potential in such critical processes as integrated circuit artwork generation and production of printed circuit masters on film for use in actual manufacturing, or design and layout of offset printing masters for business forms. Whenever several passes over the same drawing are required, in such applications as comparator charts and precision display of strategic military mapping information, the exact repeatability specification makes the Model 32 uniquely applicable.

### MODEL 32 TABLE SPEEDS AND ACCURACIES

<i>Control</i>	<i>Speed*</i>	<i>Accuracy</i>	<i>Repeatability</i>
600	60 ipm	$\pm 0.0009$	$\pm 0.0005$
	120 ipm	$\pm 0.0015$	$\pm 0.0008$
	200 ipm	$\pm 0.0025$	$\pm 0.0013$
800, 1000, and 2000	70 ipm	$\pm 0.0009$	$\pm 0.0005$
	140 ipm	$\pm 0.0015$	$\pm 0.0008$
	225 ipm	$\pm 0.0025$	$\pm 0.0013$

\*Multiple speeds optionally available on Model 32 table

Note: Optical exposure head not to be run over 180 ipm, except with 600 control which is limited to 60 ipm. Higher speeds are for scribing and inking.

## MODEL 75 TABLE STANDARD SPECIFICATIONS

### Type

Flat bed, electrically tiltable from full vertical to full horizontal. (Fixed horizontal model optionally available less tilt mechanism.)

### Active Working Surface

- 5' x 8' ( 7 vacuum areas)
- 5' x 12' (10 vacuum areas)
- 5' x 16' (11 vacuum areas)
- 5' x 20' (12 vacuum areas)
- 5' x 24' (13 vacuum areas)

### Drive Mechanism

- X Axis: Rack and pinion
- Y Axis: One precision pre-loaded recirculating ball screw

### Carriage Positioning

- Gerber digital step motor system

### Installation

- Precision leveling pads on each of four legs

### Output

- Standard: Solid lines
- Optional: Dash lines, printed symbols

### Output Mechanism

- Standard: Ball pen
- Wet pen
- Scribing tool
- Optional: 72 symbol print head with 1 or 2 pens
- Routing head
- 6 pen turret

### Drawing Material Hold-Down

- Optional: Vacuum pump manifolded to rubber platen drawing surface

### Dimensions

- 140, 187, 234, 281, or 328 long, 96 deep, 43 high (horizontal)

### Weight

- 4400, 5000, 5500, 6000, or 6500 pounds

### Construction

Top is a precision manufactured aluminum plate structure fastened to a box and rib configuration secured to two rigid trunion points. Racks and ways are steel.

### Power Requirements

208 VAC  $\pm 10\%$ , 3 phase, 4 wire WYE standard. 220/440 3 phase or 220 single phase optional.

## MODEL 75 TABLE OPTIONAL ACCESSORIES

**Vacuum Chuck** — A vacuum system for securing drawing materials to the drawing table surface can be supplied as an integral part of the Model 75 table. The unit consists of a vacuum pump, motor, inlet air filter, and outlet muffler, and is installed in an isolated compartment in the table base. All controls are located on the side of the table. A rubber vacuum platen for the drawing surface is included, providing a firm but resilient work area.

**Slew Control** — Slew controls can be installed, either within the operator's console or on the X axis carriage, for use in manually positioning (or parking) the X and Y carriages.

**Six-Position Turret** — A drawing head with six turret positions plus seventh station for magnifying reticle is available for equipping the Model 75 table to provide automatic selection from six different drawing tools. Wet ink cartridges, ball point pens, or scribing devices can be positioned manually or under program control to distinguish graphic data by varying color and/or line width. (With the Series 2000, a linear tool holder is provided, featuring the same capabilities as the turret.)

**72 Symbol Printing/Drawing Head** — Combined capabilities of a drawing head and symbol printing device are available for high speed alphanumeric annotating and titling of plots as they are drawn. One or two pens or inking cartridges can be placed adjacent to the printing device for normal drawing purposes. The print head consists of a wheel fitted with 72 symbols spaced around its circumference. Upon program or manual command, the symbol is selected and struck to imprint on the drawing material at a speed up to 100 characters per minute. With keyboard control, the symbols can be manually selected and printed by the operator. Automatic print and space mode is also available.

**Manual Roll Feed** — A manual roll feed device provides for drawing or scribing material storage and take-up. Roll holders and axles are located at one end of the drawing table and can be adjusted to accommodate any drawing surface.

**Gear Changes** — Fixed table speed can be altered to provide multiple speeds, rather than the standard specified speed, for high or low speed contouring and special scribing operations.

**Optical Magnifier** — A magnifying reticle, used for visual alignment of scribing material. Several magnifications are available.



## MODEL 75 TABLE

### DESCRIPTION

Large area drawing capability up to 5' x 24' is the foremost design feature of the Gerber Model 75 graphic display table. Basically, the table consists of (1) the drawing surface with rubber platen and dust protected carriage racks (2) digital step motors for carriage drives; (3) an X carriage which spans the width of the table top and travels lengthwise on steel ways; (4) a Y carriage which travels on steel ways mounted within the X carriage; (5) a table base section which supports the top and houses the vacuum unit and table elevation mechanism and motor driver power supplies, (Model 75 is adjustable for operation from full horizontal to full vertical); and (6) an optional vacuum hold-down system.

The Model 75 table is a completely self-contained unit for inking, scribing, or other tool positioning. All positioning commands, acceleration and deceleration instructions, and tool control signals are received directly from Gerber controls without additional interface. Precise squareness is mechanically fixed; not held by electrical means.

Slew controls can be provided, either on the control system console or on the table's X axis carriage, for manually positioning (or parking) the X and Y carriages.

Size, speed, and accuracy advantages imply strong application

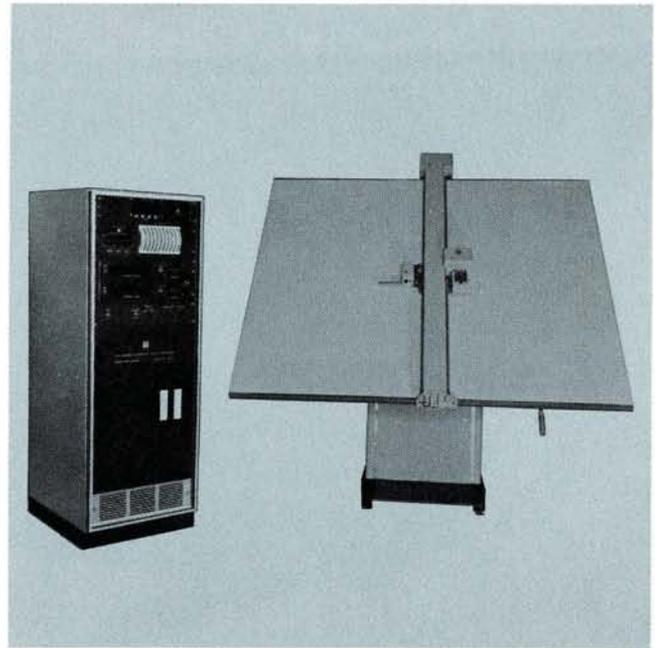
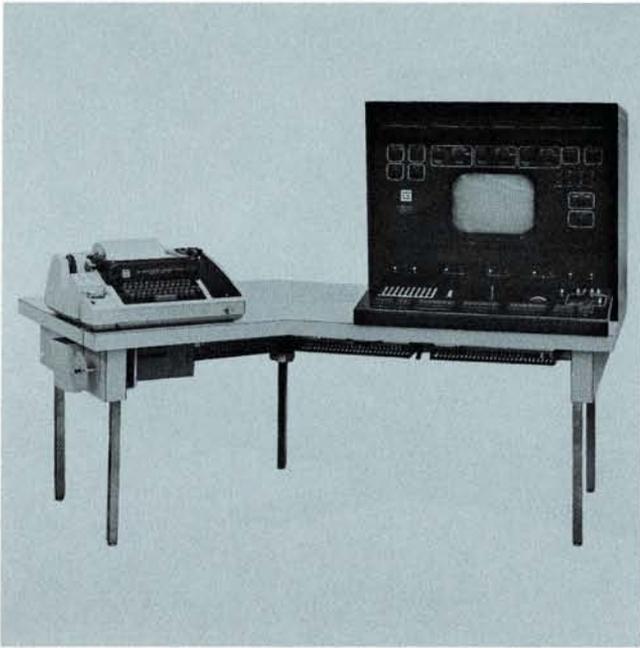
potential for the Model 75. In the automotive, aircraft, and marine industries, scaled loft drawings of almost any length can be achieved when this table is directed by a control with decimal scaling and zero offset capability. More generally, wherever data volume reaches a magnitude requiring large area graphics presented accurately and at high speeds, the Model 75 offers efficient solutions.

### MODEL 75 TABLE SPEEDS AND ACCURACIES

Control	Speed*	Accuracy	Repeatability
600, 800,	300 ipm	± 0.005	± 0.003
1000, and 2000	600 ipm	± 0.009	± 0.005
2000 (only)	500 ipm	± 0.005	± 0.003
	750 ipm	± 0.009	± 0.005

\*Speeds are reduced by 20% when table is operated in the vertical position.

\*Multiple speeds optionally available on Model 75 table.



### SERIES 2000 DIGITIZER ACCESSORIES

With the Series 2000 graphic display system, the user is able to take advantage of the control's flexibility to convert graphic information into digital output. Three distinct capabilities are offered: standard two-axis digitizer, three-axis digitizer, and automatic line follower.

**Two-Axis Digitizer** — Like the Series 800 and 1000 digitizers, this system utilizes closed circuit television for positioning the cross hair reading reticle over the graphic being read and projects an enlarged image of the viewing area to the remote monitor. The operator uses conventional handwheels for fine positioning, joystick or pushbuttons for slewing and coarse positioning, and the standard series 2000 I/O typewriter for set up and insertion of additional data. An added feature called punch and vector advance gives the 2000 digitizer still greater ease of operation and efficiency. Internal computation automatically directs the reading head toward the next point to be read, based upon previous readings. The operator need only correct for fine positioning. Output is to high speed paper tape punch. Same format flexibility as 2000 input programming, allowing output to reflect scale and offset factors. Additional data is inserted via the I/O unit.

**Three-Axis Digitizer** — The Series 2000 can also be equipped to digitize graphic data and provide a three-axis output tape. Working with conventional two-axis digitizer controls, this accessory system utilizes a two-axis tape fed back through the control to position the reading camera along one axis. While the operator controls one axis, the system incorporates the first tape (two-axis) into the output to provide a three-axis tape suitable for machine control or computer processing.

The digitizer control houses nixie displays for  $n$ ,  $g$ ,  $f$ ,  $d$ , and  $m$ , which are thumbwheel selected rather than loaded via the system I/O. The conventional  $x$ ,  $y$ , and  $z$  displays are also supplied. All units can be set up to read out and record the incremental distance from the last point or to read out the absolute  $X$  and  $Y$  coordinates.

**Automatic Line Following** — The most advanced digitizing accessory developed by Gerber is an automatic line following capability. This unit will generate a two-axis output at a rate of 100 inches per minute with accuracy of  $\pm 0.003''$  in addition to the table accuracy. The sensor element locks on the line to be followed and produces automatic readouts at a fixed incremental rate, or a rate based on chordal deviation.

This automatic system is operator monitored by closed circuit television. The optical line following device incorporates a look ahead feature which transmits advance information about the line it is following back to the Series 2000. Speed of the sensing element is modified to meet new conditions prior to the time that the measuring element reaches a critical decision area. This dual computation feature of the system allows the sensor data to direct the course of the automatic line follower along the center (or edge) of the line it is following.

When tangents are sighted ahead, the unit will follow the line until the point is encountered by the sensor. The line follower will then either (a.) stop for operator instructions, or (b.) make its own decision based upon preprogrammed instructions. This occurs at intersections, tees, or closely spaced parallel lines.

In following lines, the output increments are adjusted automatically by the computer as defined by the line's deviation from a straight line so that output readings stay within a preset chordal deviation.

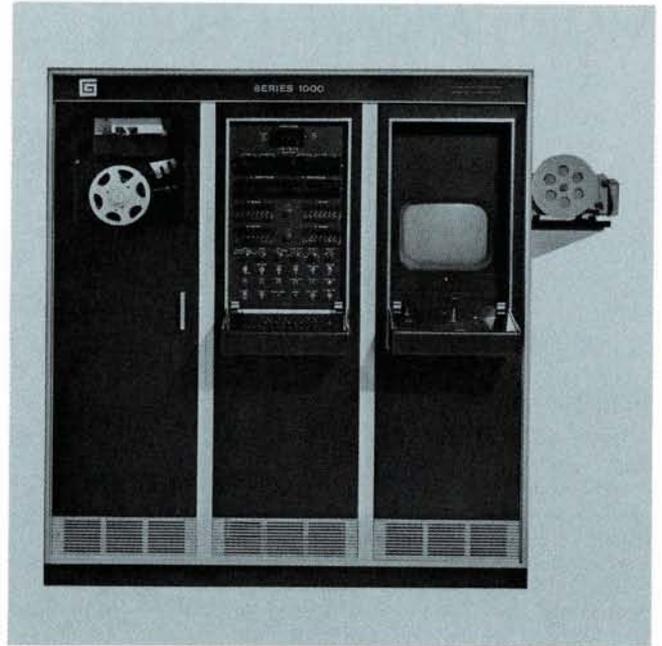
### SEPARATE DIGITIZING CAPABILITY

For digitizing operations only, or to provide digitizing capability without tying up the graphic display system, Gerber offers special purpose digitizing controls for use with the Gerber Model 75 table. These controls contain only those elements needed for digitizing:

1. Drive motors for positioning the reading device.
2. Control console which houses the closed circuit television monitor and positioning controls. Output device may be located adjacent to this module.
3. Logic circuitry, as required, for converting the data to desired format and for operating standard  $X$  and  $Y$  displays.

All controls can be adapted to meet a variety of user requirements. Gerber engineers are available to help in evaluating digitizing problems and to recommend standard of specialized solutions.

**The Gerber Large Area Coordinate Digitizer** — For digitizing maps, graphs, layouts, drawings, or other graphic coordinate data for computer input, Gerber offers a complete, economical graphic to digital data conversion system. The GLACD is ideal for converting rough sketches into digital data for direct input to graphic display systems. Working surface is 48" x 60"; resolution 1,000 counts per inch; machine accuracy,  $\pm .005''$  over the entire reading surface. Manual controls allow data insertion. Output to punched tape, cards, or typewriter is programmable.



## GRAPHIC TO DIGITAL DATA CONVERSION

Basic to the preparation of graphic displays, machine tool control input tapes, and design data processing is the availability of accurate, compatible, digital data. Where direct computer generated information is not available, Gerber has designed a complete range of graphic to digital data conversion accessories to provide a fast and convenient method of data reduction. These accessory systems provide a means of digitizing graphics and allow the operator to inspect, add or delete information, and insert control instructions while generating machine tool control tapes, or preparing input for computer data processing.

In general, these digitizer systems consist of (1.) a reading device which is interchangeable with drawing, or scribing; tools on the graphic display table; (2.) a digitizer control which may be a part of the graphic display control or a separate unit; and (3.) an output device.

When a graphic display system user devotes a portion of time to generating digital data, the digitizer accessory offers an efficient method for time sharing which minimizes investment in digitizing equipment. Where workloads are heavy, separate digitizing systems can be supplied to allow the user to perform both functions simultaneously.

### APPLICATION

Digitizing of part and assembly drawings can produce data for computer processing of such outputs as weights, centers of gravity, volumes, surface areas, curve lengths, moments of inertia, and stress analysis, both tensile and dynamic.

The reading device used is able to simulate actual cutting tools and generate machine tool control tapes ready for production processing. In the apparel industry, patterns can be digitized to produce scaled up or scaled down pattern templates for a full range of sizes. As an integral operation, the digitizer accessory generates tapes for use in numerical control

of production equipment. This pattern to production concept is also applicable in such industries as shipbuilding, pre-fabricated housing, automotive assembly and aircraft construction.

Where more exotic control capabilities are available, input in any format on magnetic tape, punched tape or cards may be used to draw the graphics, compare and verify machine tool paths, and produce output tapes in any format for machine control with one basic operation.

### SERIES 800 AND 1000 DIGITIZER ACCESSORY

The Series 800 and 1000 graphic display system, utilizing the Gerber Model 32 or 75 tables, can be equipped with remote station digitizing capability with readout resolution to .001". Closed circuit television for greater ease of operation in positioning from the main control station is included.

Manual controls include handwheels for fine positioning along the X and Y axes and systems can be supplied with joystick or pushbuttons for slewing and coarse positioning. Rotary thumb-wheel switches are included for set up and insertion of additional data such as codes for feed rate, tool select, photo expose, symbol select, mode select, etc. Readout pushbuttons are used to control the program and to release data to the output unit.

The reading head for the Series 800 or 1000 consists of a television camera mounted on the Y carriage. The reading element consists of a finely calibrated cross hair reticle superimposed on the curve or line to be read, and viewed by the television camera. A television monitor in the main control console magnifies the reticle area to either 8" or 14", allowing the operator to position the readout with precise control.

Output is to standard paper tape punch. Magnetic tape, punched cards, or flexo-writer output can also be supplied in in word address format. The organization of the data may be controlled by a programmable patchboard.

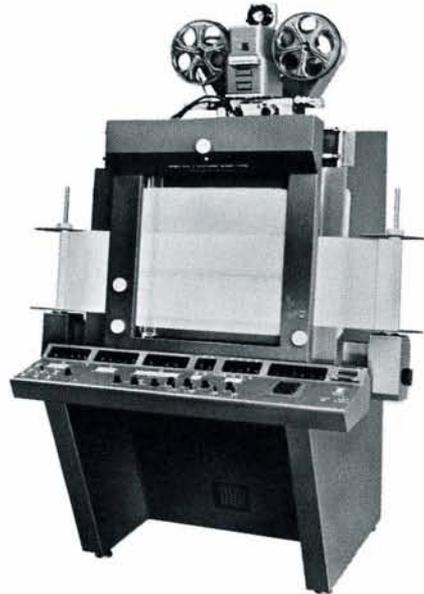
# MORE ABOUT GERBER

## INTRODUCTION

The Gerber Scientific Instrument Company is a leading designer and supplier of graphic data processing equipment — from integrated graphic display systems to data reduction systems to manual reading and calculating devices. The equipment produced by Gerber is designed to remove the tedium and improve the accuracy of everyday engineering and scientific developmental activities. Relatively little training is required for the successful operation of the equipment, and, in most cases, the function of the equipment obviates the need for further calculations.

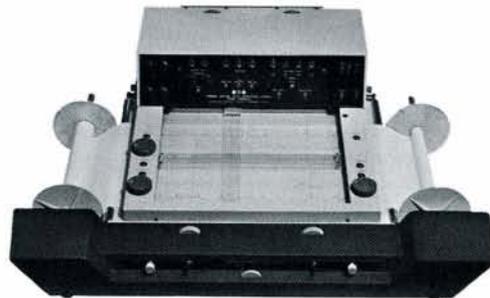
In addition, Gerber instruments have been designed from a modular approach — systems may be easily expanded or adapted to meet increased requirements. Combinations of instruments and special designs are available to satisfy unique applications or to perform additional functions.

Gerber engineers and system designers are available to evaluate and solve user problems with custom designed or modified systems. These special systems capabilities range from simple program format changes to complex installations utilizing militarized data gathering, processing, and display equipment to meet highly specialized requirements.

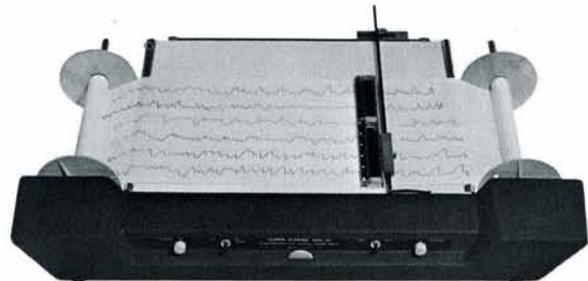


## DATA REDUCTION SYSTEMS

**Filmed Data Reader** — Versatile, rapid system for projection and reduction of filmed data such as theodolite motion study, or ballistic information. Image rotation allows angular readout. System accepts 16, 35, or 70 mm film with precision pin registered or flow motion movement. Other film projection and reduction systems available with standard Gerber reading systems.



**Digital Data Reader** — Reduces almost any X and Y recorded graphic data to digital form at over 10,000 tabulations per day. Output to punched cards, punched tape, or typewriter. A channel counter and time line counter included. Keyboard allows operator to insert additional data. Other models available for semi-automatic tabulating of graphic records. Automatic digitizing systems are available with variable resolution to 1,000 counts per inch.



**Chart Scanner** — Electrically driven Model S-2 transport for handling graphs and charts. Variable speed to 500 feet per minute. 24-inch long table handles data records to 16 inches wide. Free standing, 66-inch long Model S-10 is also available.

## SMALL INSTRUMENTS

**Variable Scale** — To read curves, graphs, frequencies directly, multiply by scale factors; plot with correction factors or other constants included; or normalize curves. Scale expands to 10" in standard model; 20" also available. Other Gerber instruments include the Graphanalogue, for plotting and reading nonlinear curves utilizing more fixed reference scales than the variable scale; the Derivimeter, for the direct reading of the slope of any given curve; and the Equameter, for reducing and analyzing curve and graph data.





THE GERBER SCIENTIFIC INSTRUMENT COMPANY

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