

WARRANTY

Global Specialties Corporation warrants this device to be free from defective material or workmanship for a period of one full year from date of original purchase.

Global Specialties Corporation under this warranty is limited to repairing the defective device when returned to the factory, shipping charges prepaid, within one full year from date of original purchase.

Units returned to Global Specialties Corporation that have been subject to abuse, misuse, damage or accident; have been connected, installed or adjusted contrary to the instructions furnished by Global Specialties Corporation or repaired by unauthorized persons will not be covered by this warranty.

Global Specialties Corporation reserves the right to discontinue models; change specifications, price or design of this device at any time without notice and without incurring any obligation whatsoever.

The purchaser agrees to assume all liabilities for any damages and/or bodily injury which may result from the use or misuse of this device by the purchaser, his employees, or agents.

Global Specialties Corporation shall not be liable in any way for consequential damages resulting from use of this device.

This warranty is in lieu of all other representations or warranties expressed or implied and no agent or representative of Global Specialties Corporation is authorized to assume any other obligation in connection with the sale and purchase of this device.

FACTORY SERVICE AND REPAIR

Global Specialties Corporation will service and repair this instrument free of charge for a period of one full year (see Warranty). Please return it, shipping charges prepaid, in its original box with a copy of sales slip or original invoice to:

GLOBAL SPECIALTIES CORPORATION
70 FULTON TERRACE
P.O. BOX 1942
NEW HAVEN, CONNECTICUT 06509
ATTENTION: SERVICE DEPARTMENT

Your instrument will be repaired, retested and promptly returned to you. If it needs servicing and is out of warranty, follow the above instructions and enclose \$35.00 for Factory Service. This amount covers most routine repairs; if damage to your unit is more extensive, we will advise you of additional costs before proceeding.

GLOBAL SPECIALTIES CORPORATION

70 Fulton Terrace, New Haven, CT 06509
351 California Street, San Francisco, CA 94104
Shire Hill Industrial Estate, Units 1 and 2, Saffron Waldon, Essex, CB 11 3Q

GLOBAL SPECIALTIES

LOGIC MONITOR LM-1

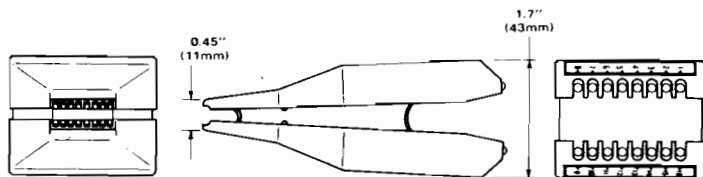
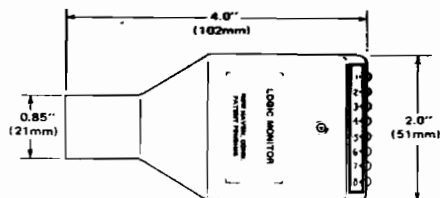
INSTRUCTION, OPERATION and APPLICATION MANUAL

CONGRATULATIONS!

Welcome to the growing family of Global Specialties Corporation test equipment owners. You have selected a versatile and unique piece of equipment designed for full professional performance. To get the most out of this instrument, please read this manual carefully.

SPECIFICATIONS

Input Threshold	2.0 ± 0.2 VDC
Input Impedance	100,000 Ohms
Input Voltage Range	4 volts minimum 15 volts maximum across any two or more input leads.
Maximum Current Drain	200 ma @ 10 volts
Operating Temperature Range	5-45°C
Weight	3 ounces (85 grams)
Maximum Dimensions	LxWxD 4.0x2.0x1.5 inches 102x51x38 mm



INTRODUCTION

Global Specialties' Logic Monitor, LM-1, simultaneously displays the static and dynamic logic states of DTL, TTL, HTL or CMOS 14-pin and 16-pin digital DIP ICs.

The voltage at each IC lead is measured by one of 16 independent binary/optical voltmeters. When one of the input voltages exceeds the 2 volt threshold the LED corresponding to the activated input pin is turned on. Inputs below the threshold or uncommitted (floating) do not activate their corresponding LEDs. A built-in power seeking gating network locates the most positive and negative voltages applied to the IC under test. It then feeds them to the internal buffered amplifiers and LED drivers.

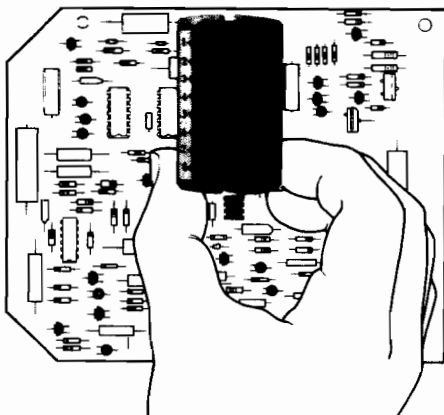
Just clip the LM-1 to any digital IC up to 16 pins. Precision plastic guides and flexible plastic web* insure positive connections between nickel silver contacts and IC leads. Static and dynamic logic levels appear instantly on 16 (.125" diameter) LEDs.

*Patent Pending

OPERATING INSTRUCTIONS

Simply squeeze the top end of the Logic Monitor so it will slip over the IC to be investigated. Once in place, the Logic Monitor does the rest. The Vcc or the most positive IC terminal will be indicated by a continuously lighted LED. The least positive; uncommitted and Logic 0 IC terminals will appear as unlighted LEDs.

By reducing the system or IC input signal rate to 10 Hz or less, you will be able to see each Logic state of the IC under investigation. Trouble shooting with the Logic Monitor requires a knowledge of the IC logic pin outs. For example: Consider a quad and gate configuration. If the output pin of one of the gates is constantly low (LED off) and the gate inputs are not simultaneously high, either the gate output is shorted to ground internally or a short exists on the lines fed by the gate output.



WARNING

Do not connect LM-1 to any IC that has more than 15V across any two pins. The LM-1 is a two level monitoring device. ICs with three supplies, -12, ground and +5V, are **NOT** compatible with the LM-1.

APPLICATIONS

During the design, breadboarding and testing phases of a new logic system the designer usually has full control of the system variables (clock, power supplies, input/output transducers, etc.) and can easily isolate ICs for detailed investigation with the Logic Monitor.

When a logic block needs an additional gate, inverter, flip flop, register, etc. the Logic Monitor can quickly "show" the designer where unused logic elements are located within his system. Nonfunctioning components can easily be located and replaced.

Long-term testing of individual modules can be implemented by merely clipping the LM-1 onto the questionable IC.

Since the entire IC can be monitored simultaneously, direct fast visual correlation of IC inputs and outputs simplifies and expedites signal tracing data transfer and system fault-finding operations.

System and IC reactions to power supply changes, noise and limited temperature* testing are other application areas that make the LM-1 an almost indispensable design tool.

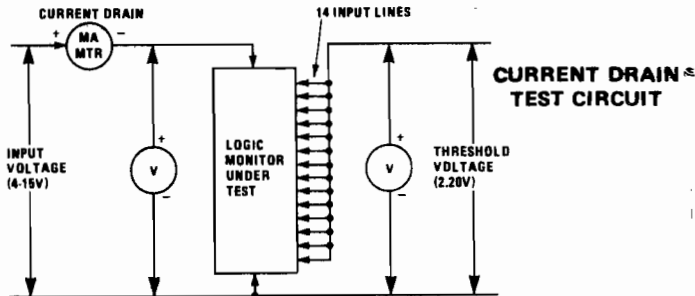
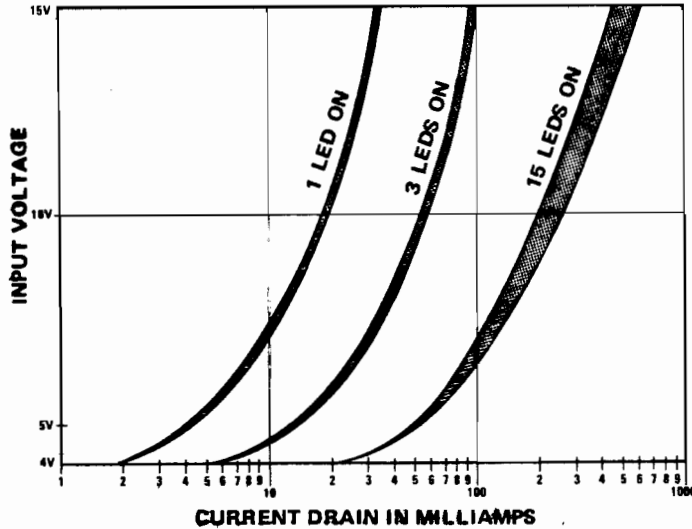
Mixed logic design DTL, TTL, HTL, CMOS, where designers take advantage of individual logic family characteristics: i.e., DTL input, CMOS signal processing and TTL or HTL outputs, are naturals for the LM-1.

When dealing with multiple PC board systems, again the LM-1 displays its utility. One LM-1 on the inputs or outputs of the driving/receiving board and one on the board under test enable the designer to visually observe the results of any modification or stimulation on one board while his full attention can be directed to the focal point of his investigation.

*See LM-1 Spec.

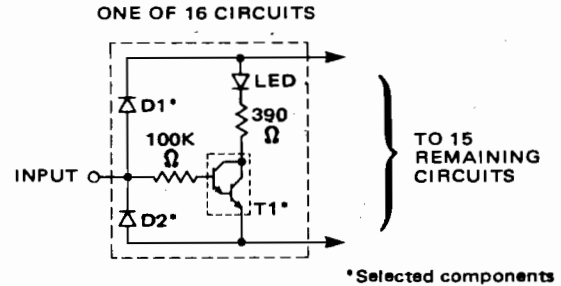
CAUTION

Be sure the system power supply is capable of providing sufficient current (up to 200 ma @ 10 volts) to drive the Logic Monitor. In most applications only 25% to 50% (four to eight) LEDs are activated and the Logic Monitor supply drain is only 5 to 100 ma depending on the supply voltage. See curves and test diagram below.

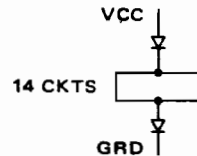


CIRCUIT DESCRIPTION

All of the 16 LM-1 circuits are identical and act as buffer amplifiers, comparators and LED drivers. Selected diode and Darlington transistors insure the device threshold level and LED drive capacity. Each LM-1 is tested for a minimum of twelve hours by an automatic input exerciser (special purpose computer) to insure it meets specifications.



Assuming one of the 16 input points is connected to V_{CC} and a second input point is connected to ground, the circuit configuration shown below would be produced.



When any of the remaining fourteen input points is connected to a signal source that exceeds 2 volts the Darlington transistor (selected for β and $V_{BE(sat)}$) conducts and turns on the LED in its collector.

The 100 K resistor in series with the base of each transistor prevents loading of the circuit under test. The 390 ohm collector resistor limits the LED and LM-1 current drain from the IC under test power lines.