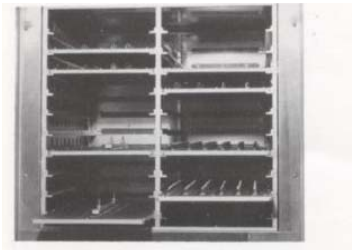
Series 2000
Capacitor Burn-In and Life Test

APPLICATION
This data sheet introduces the Series 2000 family of test systems from Micro Instrument Company. Although the systems may be used to test other product types, they are specifically designed for capacitor burn-in and life test. If you need more information than is provided here, please ask for a quote or a more detailed description.

DESCRIPTION
A complete system includes: a fixtured elevated temperature test chamber, bias supplies to provide stress voltages to the devices under test, device test cards, serious load cards, and in some instances, logic supplies.

The test chamber assembly includes the primary power control and distribution circuits, safety interlock systems, and card-level bias supply distribution circuits which allow system operators to assign each test card to a bias supply. These assignments may be changed as required prior beginning tests.



The interior of the chamber is fixtured with a 20-position card rack. Device test cards are available for a wide variety of device package types.

The interior of the chamber is fixtured with a 20-position card rack arranged in two vertical side-by-side columns of ten cards each. The card rack supports and guides device test cards that plug into the elevated temperature end of 20 through-wall connector assemblies mounted in the rear wall of the chamber.

An ambient temperature load card enclosure is mounted to the outside rear surface of the test chamber. This enclosure includes a card rack arranged in two vertical side-by-side columns. This provides an ambient temperature card position for each card position inside the test chamber.

The ambient temperature connector of each through-wall assembly is mounted in the outside surface of the rear wall of the chamber. Each connector accepts a series load card.

The load card provides fixturing for series loading components, such as fuses or resistors, in series with each DUT fixtured on the device test card inside the test chamber. When the test requires it, monitoring circuitry and/or computer interface circuitry are included on the load card.

DEVICE TEST CARDS
Device test cards are available for a variety of device packages, including chip, axial lead, radial lead, DIP, lead frame, and surface mount. Cards are usually available in an 80-position configuration. If parametric testing is a requirement (Cap & DF), 20-position cards featuring four-wire Kelvin circuitry are available.

BIAS SUPPLIES
Bias power supplies are used to apply power to the devices under test. Standard systems may be provided with up to six supplies depending on the specific needs of the system user. To conserve floor space and increase user convenience, bias supplies are mounted in the floor stand portion of the system.

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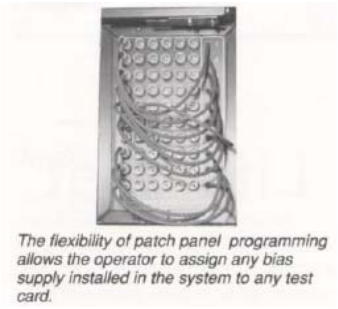
BIAS SUPPLY DISTRIBUTION



The flexibility of patch panel programming allows the operator to assign any bias supply installed in the system to any test card.

A patch panel is included for each column of device test cards. This panel allows the operator to connect any of the installed bias supplies to any test card level. This flexibility allows changes in bias supply assignments, as may be required when testing to several specifications or by different test lots.

Charge/Discharge Module

This is an optional, plug-in, switching panel providing a switch for each card position. This panel allows the operator to slowly charge the DUT's. After a sufficient charge time, the operator may then place the switch in the Run position. When a card must be removed, the Discharge position connects all DUT's on the selected card to ground through a resistor. (This option is not necessary in computer controlled versions)

Manual Scanning Unit

This unit is a manually operated switch used to interface external measurement equipment to individual devices under test (DUT's) fixtured on device test cards inside the chamber. To use this unit, the system must contain the optional Scan Mode Module.

50 Hz Input Power

Allows use of the Series 2000 systems in areas where only 50 Hz power is available.

Chart Recorder

For a permanent record of chamber temperature, a circular chart recorder is available.

End of Test Timer

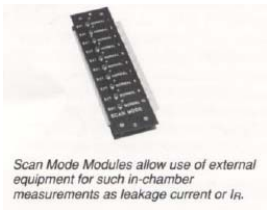
End of test timers allow the operator to set the length of the test. At the end of the pre-set test time, the system is automatically shut down.

Power Supply Monitor

A power supply monitoring and interrupt system is available. If monitored voltages vary from the set values by 5% in either direction, the errant supply is automatically interrupted.

OPTIONS

Scan Mode Module



Scan Mode Modules allow use of external equipment for such in-chamber measurements as leakage current or I_R.

This is an optional plug-in module providing a switch for each test card position. This switch removes the bias lines from the test card, allowing the use of external equipment for such in-chamber parametric measurements of leakage current or I_R.

Polarity Switching Module

An optional plug-in switch panel allows the operator to invert the bias polarity applied to individual test cards. One switch is provided for each card position. This option is not available on computer controlled systems.

Manual Scanning Units allow the operator to connect the devices under test inside the test chamber to external test equipment.

Specifications	
Test chamber	Blue-M Model ESP-400
Maximum test temperature	To 200°C
Bias supplies	Up to six supplies installed in floor stand
Bias supply assignments	Via patch panel programming
Temperature rating of device test (device fixturing) cards	Three ranges available 150°C, 175°C, and 200°C.
Number of test card positions	20
DUT positions	1,600 per chamber using 80-position device test cards. 400 per chamber using 20-position 4-wire Kelvin cards.

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Basic System Model 2010

The building block system of the Series 2000 family of capacitor burn-in and life test systems is the Model 2010. It includes a fixtured test chamber and a floor stand unit to hold bias supplies. Device test cards and load cards are available for a variety of device package types. The system options described on page 2 of this brochure are available.

This system is completely manual. All test parameters must be set by the operator via front panel controls. No monitoring or time keeping options are offered. This system is best suited to those test situations where tests are started and not monitored until the required test time has elapsed.

Bias supplies are included as required by the system specifier. Manual safety interlock circuits are provided. A key-actuated interlock bypass circuit is provided to allow qualified service personnel access to system components while bias voltage is applied.

LED Monitored Model 2021

The next step toward monitoring capability in the Series 2000 systems is the powered load card. Powered load cards include digital circuitry to monitor the status of the series load element. Power to operate the monitoring circuitry comes from a set of system supplies added to the rear of the chamber and is applied to each load card through an interface cable. The cable plugs into a connector at the rear edge of the card.

This intermediate monitoring capability lies between the basic system, Model 2010, and the fully computerized systems such as the Model 2051 or 2052. The powered load/monitor cards of the Model 2021 include circuitry to monitor the condition of each series load element and failure LED's to indicate the location of the failed device under test. Time-keeping circuitry is not included on the Model 2021.

By making scheduled periodic observations of the rear of the chamber, the operator may log the number of failures that have occurred between the previous observation and the present one.

Because the failure LED's are arranged in a logical grid, the operator also knows at a glance which devices have failed.

Each device test card provides appropriate fixturing for 80 devices, for a system total of 1,600 DUTs. Cards are available for all standard device package types, as listed elsewhere in this document. Standard temperature ratings for device test cards are 150ºC, 175ºC, and 200ºC. The system user must specify the temperature rating required at the time of ordering.

The Model 2021 is equipped with two 0 to 600 VDC bias supplies. More supplies, or supplies of a different rating are available as options

The Model 2021 has been successfully used to fill a variety of testing requirements where the number of failures occurring during the test's duration must be easily determined but where the exact time of the failure is of less importance.

Specifications	
Bias supplies	2 each 600 VDC
Bias supply adjustment	Manual
Bias supply assignments	Via patch panel programming
Dut positions	1,600
Failure logging	Manual
Temperature control	Analog setting, digital display via chamber controls
Test parameter setup	Manual via front panel controls

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Production Burn-in and Voltage Conditioning, Model 2030

The Model 2030 meets the voltage conditioning requirements of MIL-C-39014, MIL-C-123, and MIL-C-55681. It meets all test circuit requirements of voltage monitoring and interruption. Time-keeping and displays are provided for each mother tray. The system provides device fixturing for 14,400 ceramic chips. Other device fixturing is optional.

Bias Supplies

The system includes three power supplies: 0 to 150 VDC, 0 to 300 VDC, and 0 to 600 VDC. Other supplies up to 1,000 VDC, are optional. A maximum of 6 supplies may be installed in the system. Patch panel programming allows the operator to assign any installed bias supply to any device test card position.

Device Fixturing

Daughter Cards

Devices are fixtured on daughter cards. Daughter cards plug into a mother tray. Several types of daughter cards are available.

The MIC 2702 chip daughter card provides fixturing for 80 ceramic chips in any size from 0504 to 1812. Each chip rests on a nickel plated pad which is wired to a PC connector finger on the card edge. The chips are held vertically over the pad by a sizer plate. Sizer plates are strips of epoxy with holes of an appropriate size and shape to position the device.

The top of the chips are contacted in parallel by an assembly featuring an individual spring contact for each chip. This contactor assembly is connected to a common bias line. To improve leakage current or I_R measurements, a guard circuit is used.

Because the daughter card provides individual circuits for each DUT, I_R or leakage current measurements may be made at room ambient or elevated temperature while the devices remain fixtured on the card. The daughter card circuit also allows the operator to identify failed capacitors. The key feature of the daughter card, then, is reduced handling and labor.

A 30-position chip daughter card fixtures larger size devices such as 1825, 2220, and 2225. Daughter cards are also available for 2-pin DIP capacitors.

Mother Trays

The mother tray, MIC1027D-MTR-A-9, provides fixturing for nine daughter cards. When inserted into the mother tray, all capacitors on the daughter card are connected as one parallel group. The Model 2030 provides fixturing for 20 mother trays.

Load Monitor Card

Load monitor cards provide a current-limiting resistor and voltage monitor for each daughter card (test group) installed on the mother tray and also provide a time keeping function.

If the monitored voltage across a group (daughter card) drops 5%, a failure LED identifies the daughter card containing the failure. The bias voltage is also removed from the mother tray (all nine groups), and the tray-level elapsed time meter is stopped until an operator clears the fault and resumes the test.

The test is resumed, the elapsed time meter resumes counting. Test status may be assessed at any time by simply looking at the load monitor card displays.

Specifications	
Bias supplies	1 each 150 VDC 1 each 300 VDC 1 each 600 VDC
Bias supply adjustment	Manual
Bias supply assignments	Via patch panel programming
Dut positions	14,400 chips or a lesser number of other package types
Failure logging	LED's indentify the daughter card containing the failure. Elapsed time read-out incremented hourly.
Temperature control	Analog setting, digital display via chamber controls
Test parameter setup	Manual via front panel controls

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HALT Testing Model 2051

HALT is an acronym for Highly Accelerated Life Test. The Model 2051 is computer controlled and monitored and is designed specifically for HALT testing of ceramic capacitors. The computer control and close-division time keeping capability required for HALT specifications make this system ideal for any test where failure data accuracy and simple system operation are desired. The system includes a fixtured chamber described on page 1 and 2 of this brochure and two ore more 600 volt bias supplies. The system's maximum voltage rating is 1,000 volts. Because the system is computer monitored and controlled, the critical data is provides is consistently reliable.

Computer System

The system controlled is an IBM compatible desk-top computer system including a printer and color monitor. It sets the test parameters, runs the tests, and log time-of-failure data.

The software package to accomplish this includes Micro Instrument Company HALT test programs and commercial packages for graphs and tables, all operating under the Windows® environment.

System Operation

Because the system is computer controlled, system operation is a simple matter. The operator determines which of the bias supplies will provide bias voltage for each device test card and makes these assignments at a programming patch panel. The operator then installs device test cards, and the load/monitoring cards. When the computer system is switched on, it boots into the operating environment.

Computer controlled systems are available for HALT testing. The computer controller can operate up to three chambers.

Test parameters are set in a database through on-screen test parameter forms. Forms may be completed by entering new parameters, or by calling up a previously filled in parameter form and using it or modifying it.

All device test cards assigned to a supply are considered as one test group. Simultaneous tests on multiple test groups may be run in each test chamber. Test temperature is the only test parameter that must be identical on all simultaneous tests in a specific test chamber. The system software operates up to three chambers.

The computer monitors and controls the tests via the interface cables connected to the load monitor cards. Test data are stored to the computer in a test directory.

On-screen test status is available at any time during the test. An on-screen color code allows the operator to know test status of each chamber, or test card, or each DUT at a glance. Test data may be printed or viewed as tables or graphs.

Specifications	
Bias supplies	2 each 600 VDC
Bias supply adjustment	Computer controlled
Bias supply assignments	Via patch panel programming
Computer controller	IBM Compatible
Software package	Windows®, data base management, graphics, and Micro Instrument Company HALT test program
Failure logging	Via computer
Temperature control	Analog setting, digital display via chamber controls, computer control is optional
Test parameter setup	Through on-screen form
DUT positions	1,600 (400 using Kelvin boards)

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Weibull Testing Model 2052

Application

The Model 2052 is designed specifically for reliability tests on tantalum capacitors and therefore follows the guidelines of MIL-39003 and MIL-55365. It gathers the time-of-failure data necessary to perform the Weibull calculations used in projecting component life-times. Device fixturing is provided for 1,600 devices. If Kelvin circuitry is required the device count becomes 400. Because the system is computer monitored and controlled, the critical data it provides to engineering is consistently reliable.

Computer System

The system controlled is an IBM compatible desk-top computer system including a printer and color monitor. It sets the test parameters, runs the tests, and log time-of-failure data.

The software package to accomplish this includes Micro Instrument Company Weibull test programs and commercial packages for graphs and tables, all operating under the Windows® environment.

System Operation

Because the system is computer controlled, system operation is a simple matter. The operator determines which of the bias supplies will provide bias voltage for each device test card and makes these assignments at a programming patch panel. The operator then installs device test cards, and the load/monitoring cards.

When the computer system is switched on, it boots into the operating environment.

The computer controller system includes Micro Instrument Company Weibull Testing programs and programs for graphs and charts.

Test parameters are set in a database through on-screen test parameter forms. Forms may be completed by entering new parameters, or by calling up a previously filled in parameter form and using it or modifying it.

The operator then activates the test program and is prompted for such information as test lot name, which chamber is in use, and which device test cards inside the chamber are to be included in the test.

Because there are five bias supplies installed in the system, up to five different voltage level tests may be run simultaneously in each test chamber. Test temperature is the only test parameter that must be identical on all simultaneous tests in a specific test chamber. The system software operates up to three chambers.

The computer monitors and controls the tests via the interface cables via the interface cables connected to the load monitor cards. Test data are stored to the computer in a test directory.

On-screen color code allows the operator to know (at any time) the test status of each chamber, or test card, or each DUT at a glance. Test data may be printed or viewed as tables or graphs.

Specifications	
Bias supplies	4 each 80 VDC, 7.5 amps 1 each 150 VDC, 7.0 amps
Bias supply adjustment	Computer controlled
Bias supply assignments	Via patch panel programming
Computer controller	IBM Compatible
Software package	Windows®, data base management, graphics, and Micro Instrument Company Weibull test program
Failure logging	Via computer
Temperature control	Analog setting of digital display via chamber controls, computer control optional
Test parameter setup	Through on-screen form

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