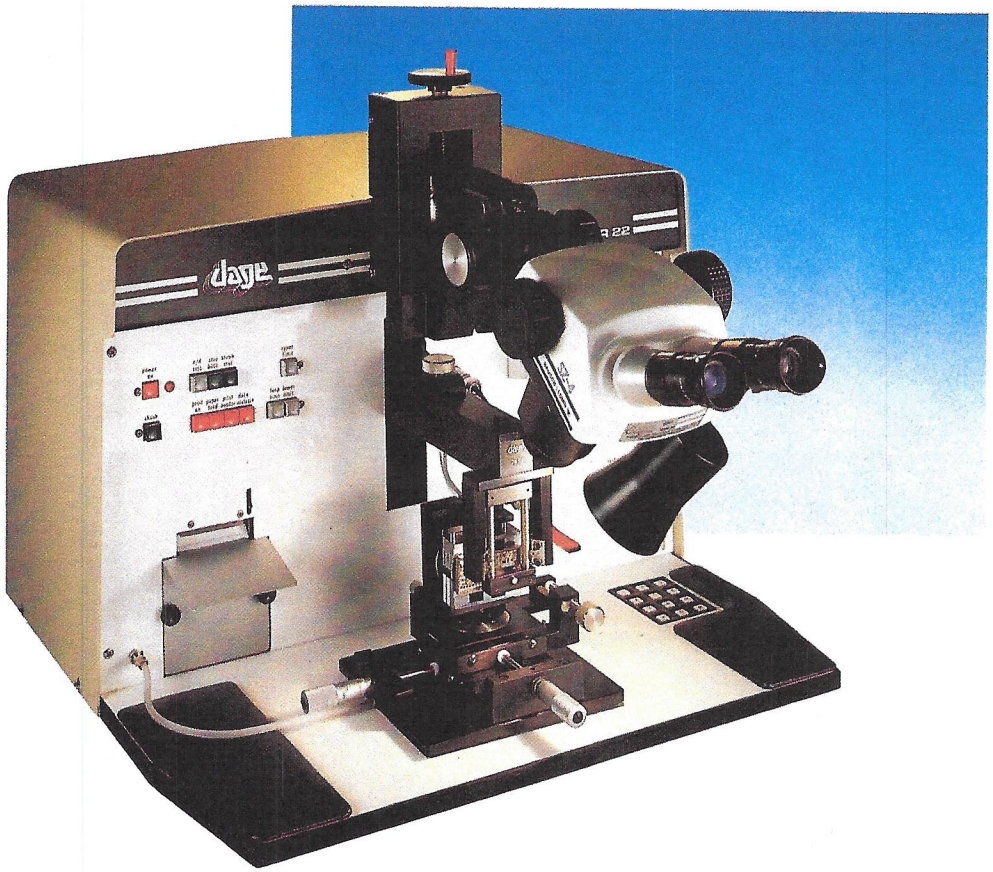
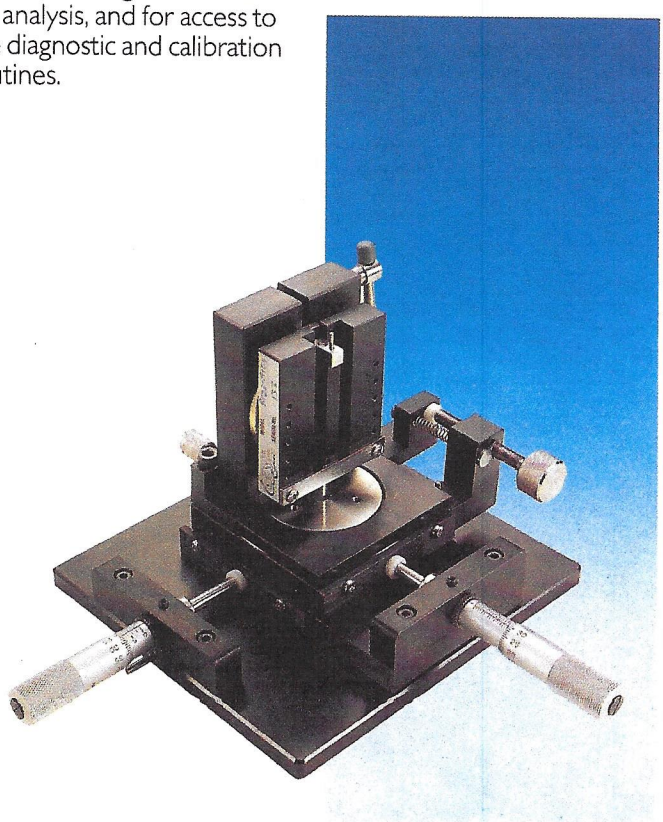
# THE SYSTEM

## Flexibility

The flexibility of the Series 22 has made it the first choice for semiconductor and hybrid assemblers. There is a wide selection of load cartridges, workholders for different test types, and adaptor plates to suit almost all military and commercial semiconductor packages. The Series 22 is easily configured for such applications as wire pull, die shear, ball shear, and CERDIP torque tests. Changing from one type of testing to another requires no skill and takes less than two minutes.

Designed for ease of use, the 40-character alphanumeric display provides plain-English prompts and messages, keeping the operator informed of the system status. The integral printer records all test values and statistical analyses. The keyboard is used for coding test failures for analysis, and for access to the diagnostic and calibration routines.



## Cost-effectiveness

The Series 22 does the work of several different dedicated testers. While a single-purpose test system might be hard to cost-justify, the high utilisation of the versatile Series 22 makes it much more cost-effective.

The Series 22 can be purchased with just the accessories needed to perform the primary test function — wire pull testing for example. Additional accessories to perform less frequently required tests, such as die shear, can be added later.

The Series 22 is easy to use, and so operators need no special skills. It is also very productive: test speeds of up to 1000 bonds/hour are achievable.

## Statistical analysis

Complex statistical analyses are produced at the press of a button. A permanent record, acceptable to military testing requirements, is produced by the integral printer.

**The output includes:**

Date and time of analysis
Device and batch ID
Raw test results (sequentially numbered)
Results by failure code (codes assigned by operator)
Max and min load
Mean load
Standard deviation
Low limit (99.8% confidence) ($\bar{x} - 3 \times$ Std. Dev.)
Overheight loop failures
Over-range tests

# SERIES 22 MICROTESTER

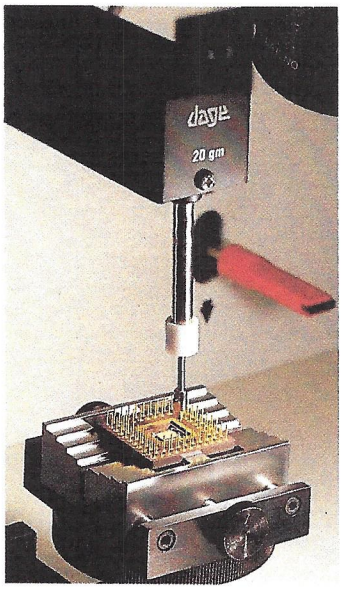
**Designed to exceed the requirements of military specifications, the Series 22 microtester is a flexible micro-mechanical test system that combines accuracy and ease of operation with versatility and comprehensive data analysis.**

Established in the early 1960s, and located in 4 strategic centres in the U.S. and Europe. Dage micro-mechanical test systems, developed and manufactured in-house, are used throughout the semiconductor and hybrid industries — both for quality control and research investigations. In particular the Dage Series 22 microtester is highly regarded as the industry standard system.

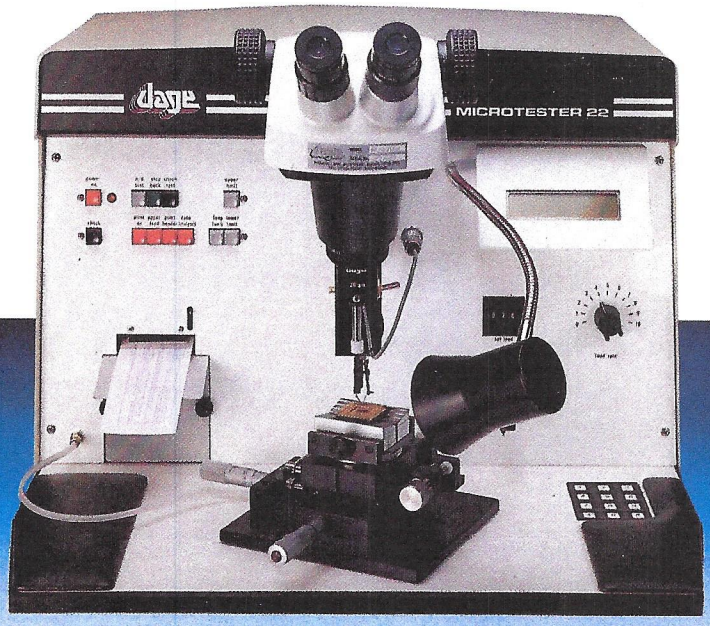
The successful development team responds to customer requests and is continually introducing enhancements to meet evolving user needs.

## Bond Strength Testing

Bond strength testing is essential to semiconductor process investigation and quality control. Monitoring and controlling wire and die bond processes help to ensure product quality during assembly. The same test procedures may be used in a research environment to determine the performance of new process techniques and new materials.




- **Flexibility**
  The Series 22 performs wire pull, die shear, ball shear, and many related tests on semiconductors and hybrids.
- **Cost-effectiveness**
  Configurable to meet your needs exactly, without wasteful over-specification.
- **Statistical analysis**
  Resident software provides full data analysis.
- **Microprocessor controlled**
  System performance, accuracy, repeatability and ease of use are assured by microprocessor control.
- **Destruct/Non-destruct**
  Non-destruct or Destruct mode testing can be selected from the front panel.
- **IEEE488 interface**
  The optional IEEE card allows test data to be transferred to a host system.



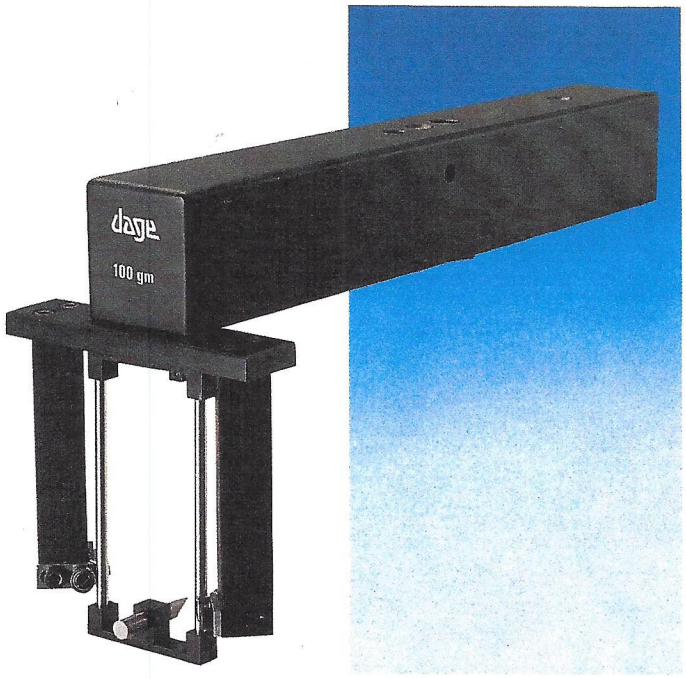
# THE SYSTEM

## Microprocessor controlled

Microprocessor control allows a high degree of sophistication while maintaining simplicity of system operation. It also eliminates the inaccuracies and performance deviations associated with mechanical systems.

The load cartridge output is digitised to one part in 1,000 — giving resolution and accuracy far in excess of Military Specification requirements.

The system automatically performs self-diagnostic routines during start-up, and additional diagnostic and calibration sequences can be initiated from the keyboard when required.




## Destruct/Non-destruct

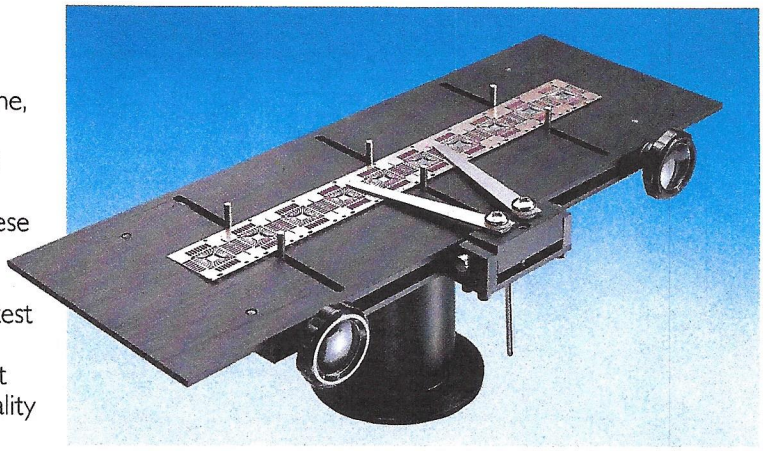
For Destruct testing, load is applied until a failure occurs or the load cartridge limit is reached. Results are analysed with reference to a threshold value set on the thumbwheel digi-switches (number of failures above and below the threshold).

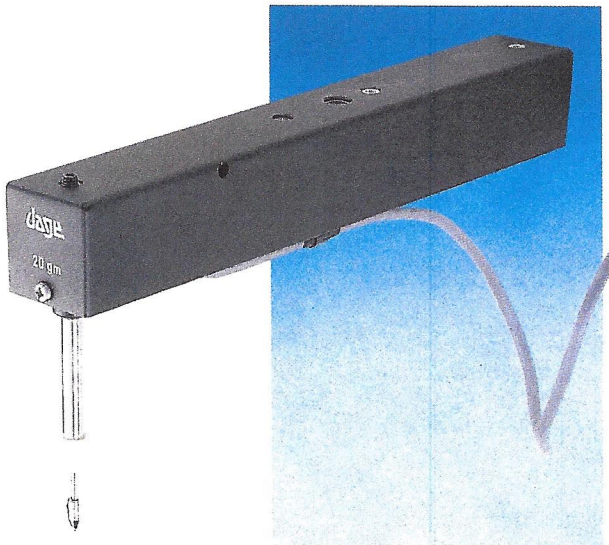
In Non-Destruct mode, the applied load is limited to the value set on the digi-switches. Bonds that pass this limit are recorded as OK, and failures are recorded at the break value.

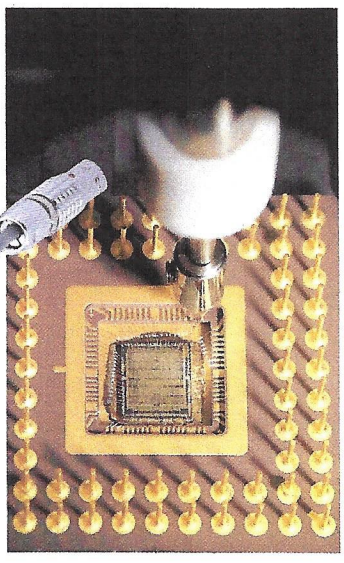
The time for which the non-destruct load is applied can be pre-set as required.

## IEEE488 interface

Data manipulation, data traceability, and time-to-time, line-to-line and batch-to-batch analysis are powerful tools for statistical quality control (SQC). To meet these needs the Series 22 can be supplied with an optional IEEE 488 card. This allows test engineers to transfer data from the Series 22 to a host computer for statistical quality control (SQC) analysis.





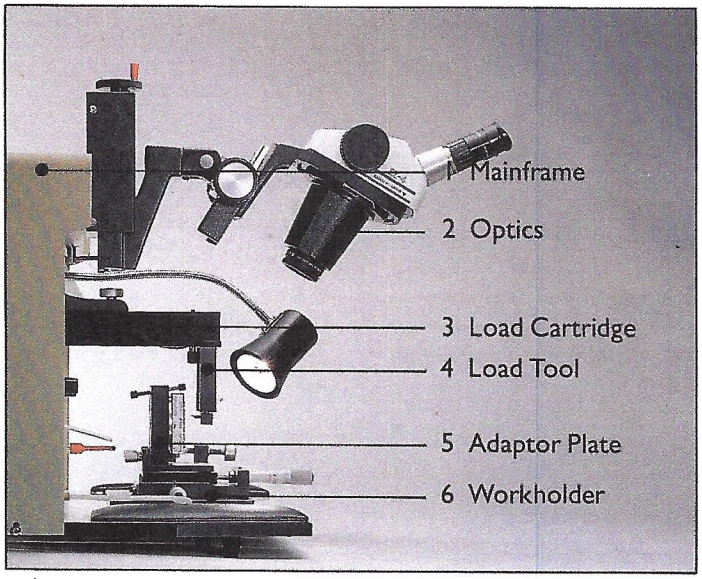



Whichever type of test is selected, all the operator has to do is to align the work with the hook, and then press the proportional Z-paddle to move the tool into position. Testing is initiated by pressing the button conveniently located in the tip of the Z-paddle.

# CONFIGURATION

## System configuration

To accommodate the different test types and the large variety of package formats, a comprehensive range of workholders, adaptor plates and load cartridges is available for the Series 22. The six basic elements of a Series 22 system, and the accessories, are shown below.




### 1 Mainframe

The microtester mainframe is common to all Series 22 test systems and supports all options listed.

### 2 Optics

The optical system is based on a range of high quality industrial microscopes.

### 3 Load Cartridge

Cartridges are available to suit the test type to be undertaken: Wire Pull, Shear, and Other. A range of values is available for each type.

### 4 Load Tool

Load tools are shaped to suit the test to be undertaken: Wire Pull, Shear, and Other. For each tool type, a range of sizes is available to suit the workpiece.

### 5 Adaptor Plate

The adaptor plate is chosen to suit the package style under test. With few exceptions, any adaptor plate can be used with any workholder.

### 6 Workholder

The workholder is the basic test fixture to which package-specific adaptor plates are attached. They are available in a range of styles to suit the type of test to be undertaken.

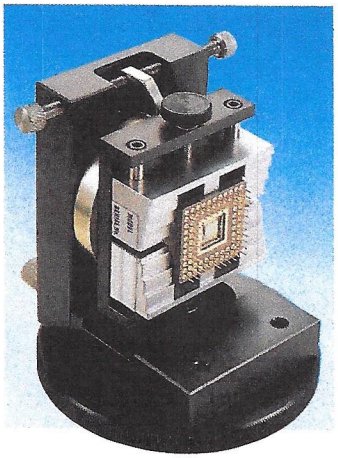
### Using the system

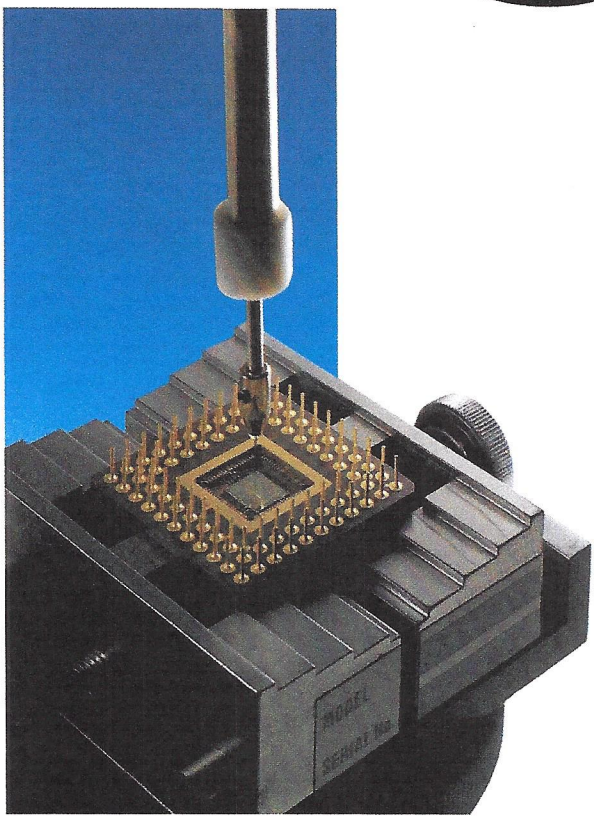
Fitting the load cartridge simply requires locating it on its dowel peg, tightening the thumbscrew, and attaching the connector to the front panel socket.

The appropriate adaptor plate is attached to the workholder, and the latter is secured to the test table: it has a vacuum base operated by a front panel button.

The load tool position, controlled by the Z-paddle, can be limited by pressing the Upper Limit and Lower Limit buttons. This allows rapid tool positioning without the risk of damage to the device or the tool.

**For full ordering information and a complete list of accessories, please see the separate Series 22 Ordering Information sheet available from Dage.**





# ACCESSORIES

## Ordering information

**Please refer to the Dage Series 22 Ordering Information sheet for a detailed accessory listing.**

## Load cartridges

A selection of precision calibrated load cartridges is available to suit different applications. The cartridge fitted is automatically detected and nulled by the Series 22 software.

**Type selection:**

**Standard pull:** for conventional wire-pull testing, available with ranges from 0–5g to 0–20kg.

**Rotating hook (pull):** for conventional wire-pull testing where access is restricted. Available with ranges from 0–20g to 0–1000g.

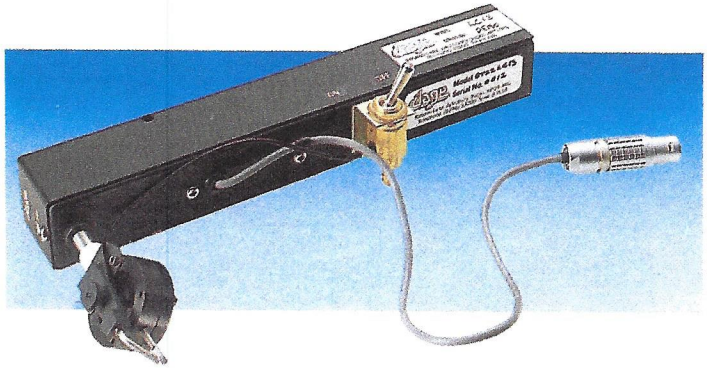
**Tweezer grip (pull):** for TAB shear and pull testing, beam-lead devices, and True Tensile tests. Available with ranges from 0–50g to 0–300g.

**Ball shear:** for ball shear, small component shear, and TAB bump shear. Available with ranges from 0–100g to 0–500g.

**Die shear:** for die shear and component shear applications. Available with ranges from 0–1000g to 0–20kg.

**Range selection:**

To ensure optimum accuracy without going over-range, choose a cartridge with a maximum load value of twice the expected failure value.



## Customer specials

Special variants of all Series 22 accessories can be engineered to meet customer requirements, for example to suit specific device geometries and package formats.

## Load tools

**Wire pull:** a range of load tool sizes is available and the following information is presented as a guide to selection.

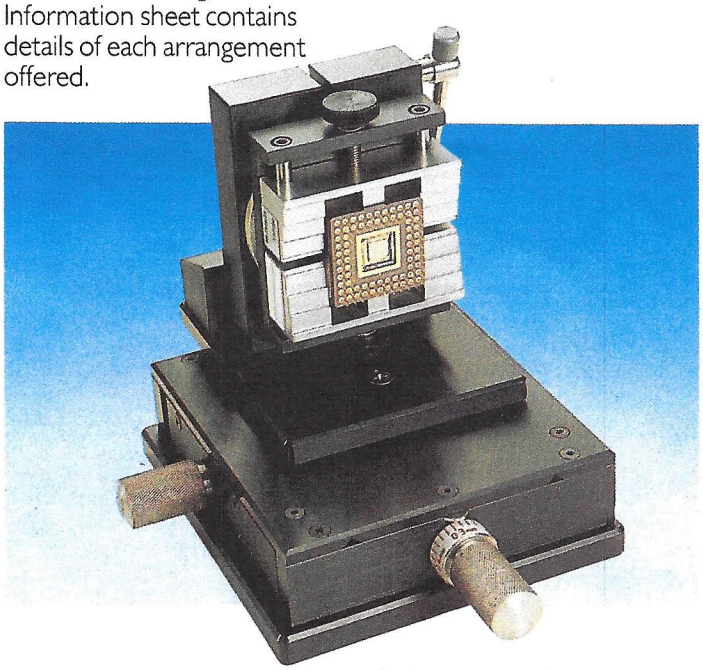
**Die shear:** twelve standard tool options are available, in sizes ranging from 1.25 to 10mm face width. The tool should be chosen so that it fully supports the edge of the die under test.

**Lead pull:** The LT10 assembly is a mechanical tweezer grip which is useful for testing the lead integrity of plastic packages.

| Diameter of wire under test | Hook diameter |
|---|---|
| less than 50 microns | 2.0 × wire diameter |
| 50 to 125 microns | 1.5 × wire diameter |
| more than 125 microns | 1.0 × wire diameter |

## Workholders

The choice of workholder is dependent on the type of test to be performed. The Dage Series 22 Ordering Information sheet contains details of each arrangement offered.



## Optics

A range of stereo-zoom microscopes and optical accessories are offered, with magnifications from X3.5 to X70.

For wire pull and die shear testing, magnifications between X3.5 and X30 are recommended. For ball shear testing and other applications where precise viewing of fine detail is needed, up to X70 is used.

## Adaptor plates

The range of standard adaptor plates will accommodate the vast majority of commercial and military package forms, including DIL, leadframe, CERDIP, PGA, hybrid, and substrate.

# SPECIFICATION

| | | |
|---|---|---|
| Size (W × L × H) | 540 × 510 × 390mm (21 × 20 × 15in) | |
| Weight | 40kg (88lb) | |
| Power supply | 110V AC 2A or 220-240V AC 1A, 50/60Hz | |
| Vacuum supply | 500mm (20in) Hg min | |
| Load application rate | Variable up to 50% of max rated cartridge load per second | |
| Load cartridge resolution | 62mm (2.44in) | |
| Raise/Lower | Variable up to 6mm/s (0.25in/s) | |
| Printer | 20 column thermal | |
| Display | 40 character LCD | |
| Display output | **Self tests**<br>Load during test<br>Z paddle function<br>Strain gauge output<br>NDT hold delay value<br>Load rate value<br>Display check<br>Time/Date check<br>Overheight loop calibration | **Operator information**<br>No test recorded<br>Grade last test<br>Re-grade last test<br>Erase last test<br>No load cartridge<br>Faulty load cartridge<br>Load detected before start of test<br>Obstruction<br>Reached top stop<br>Non-destruct test limit set too high |
| Destruct/Non-destruct | Mode selection by push-button switch | |
| Destruct code entry | From keyboard, codes 0 to 9 | |
| Non-destruct hold time | Variable up to 2s | |
| Auto step-back | Return to preset height after test | |
| Height accuracy | Better than ±25 micron (±0.001in) | |
| Travel limits | Set by push-buttons | |
| Non-destruct preset | Thumbwheel switches | |
| Minimum pass preset | Thumbwheel switches | |
| Interface | IEEE488 option | |