The **1114 X-Y IN-CIRCUIT HiTESTER** has inherited the function for detection of IC lead poor contact using four-terminal measuring that the **HIOKI 1111** and **1112** models introduced. In addition to featuring four arms designed to reduce inspection time, this fixture-less mounted board inspection equipment also boosts an improved man-machine interface. Even though the standard configuration comprises an automatic position compensation function, a loading system and a four-terminal measuring function, this system is still a low cost solution.
Four arms for even faster inspection

Enhancing the capacities of mounted board inspection systems has become a key factor for increasing production efficiency of electrical machinery as the rapid advances in SMT technology have accelerated the trends towards fine pitch boards and diversified small-quantity production. With the 1114 X-Y IN-CIRCUIT HiTESTER, HIOKI has succeeded in manufacturing a highly reliable piece of equipment for testing mounted boards that wedss HIOKI's extensive experience in measuring technology with stable high-precision mechanisms.

◆ Reduces running costs
As fixture is not necessary, running costs can be reduced. A great advantage for diversified small-quantity production.

◆ Quick response to changes in design
Changes in pattern designs are coped with fast and easily by merely changing the test data. The equipment can therefore be applied already at the experimental stages.

◆ Reduces the need for visual inspection
Greatly reducing the need for visual inspection, the Simple Visual Test Function takes care of parts where electrical testing is impossible to conduct.

◆ Setup time reduced
Setup time is reduced as model changes are dealt with by merely changing the test data and fixture replacement is not required.

◆ Prepared for automatic inspection
A loading system is part of the standard equipment and makes it easy to establish an automatic inspection system for reducing personnel costs.
Ease of use coupled with high accuracy

Main features

- **High speed measuring**
The maximum 0.05 sec/step high-speed measuring rate reduces test time.

- **Handles fine pitch**
The minimum probe interval pitch is 0.2 mm (0.5 mm in the four-terminal probe mode). This allows inspection of fine-pitch boards that jig type probing cannot cope with.

- **Automatic position compensation function is a standard feature**
Added to the high-precision mechanism, the position compensation enables probing with even higher accuracy. Using a CCD camera for teaching coordinate data makes debugging and offset settings precise and simple to perform.

- **A wealth of options**
A large assortment of optional accessories is available. An optimum system can easily be constructed as options can be selected to match individual usage.

- **Simple Visual Test Function**
This greatly reduces the need for visual inspection as the function can determine whether there are parts that escape electrical inspection and also test polarities and displacement.

- **Loading system is standard outfit**
The board loading function is part of the standard outfit that makes it simple to establish an automatic inspection system. Interface for **HIOKI** standard equipment is also provided as standard outfit.

- **Wide inspection area**
Inspection of large board sizes measuring from 50 × 50 mm to 500 × 400 mm is possible.

- **High probing accuracy**
The probing accuracy is ±100 µm and the movement repeatability accuracy is as high as ±50 µm. This is sufficient for testing fine pitch boards for both short circuits and open circuits.

- **Two keyboard heights**
The keyboard can be placed at two heights to accommodate both standing and sitting working postures.

- **User-friendly interface**
The employed user interface is a color display running on Windows NT4.0. Multiple windows can be used for creating two sets of data simultaneously or teaching while consulting net lists, etc. This interface contributes to a comfortable user environment.

*Windows NT4.0 is a U.S. registered trademark of Microsoft Corporation.*
Testing of IC leads for poor contact

Detection of both IC lead float and poor contact with electrical conductivity

Contact resistance between IC leads and patterns can be measured with high accuracy using the four-terminal resistance measuring method and judgment performed by comparison with data for conforming articles. The electrical detection method guarantees a highly reliable test process.

- **Precision probe for four-terminal measuring**
  IC lead testing is conducted using a four-terminal probe that is not susceptible to contact resistance or wiring resistance. This method can also be employed for component testing.

![Non-defective, Lead float, Poor contact images]

Simple Visual Test function

The position compensation CCD camera (standard outfit) enables inspection of components that defeat electrical testing. This greatly reduces the burden of visual inspections.

The visual mode allows inspection of chip component presence and polarity test, and the alignment mode can be used for displacement inspection in addition to component presence and polarity test. Adding an optional component compensation camera allows inspection of components other than integrated circuits and other chip components.

- **Coordinate data teaching**
  The camera can be used for simple and accurate coordinate data input and data revision for debugging.

- **Bad mark detection**
  The camera can also be used for detection of inspection marks used for multiple-sample boards as well as inspection only involving the step of image detection of marks.

![Position compensation and visual test image data display]
Convenient features

■ Self diagnostic function
When the 1114 starts up, it automatically conducts a self-test. This prevents erroneous judgements and facilitates maintenance.

■ Statistical data
Test results can be statistically processed, displayed and printed out. Data can be obtained in various ways, according to group, module, test step, in the order of high off-spec ratio, etc. and used for pre-process feedback and quality inspection.

■ Function for re-test
This feature prevents erroneous judgement caused by improper probe contact, flux or pattern displacement. Both a function for re-test of off-spec steps only and a retry function are available.

■ NG map display
Allows map display of off-spec positions and printing via a printer for fast search for off-spec components when repairs are undertaken.

■ Module and group divisions
Continuous test steps can be arranged according to modules or groups. The ability to make judgements and settings according to module and group units can be efficiently utilized in the case of multiple sample boards.

■ Support pin teaching
Setting of support pins is easy as the set support pin positions for each board can be retained as data.

Multiple re-test functions
- Retry
- Up-down retry
- Polarity reversal retry
- Open retry prohibited
- Retry prohibited
- Moving retry
- Re-test

Accurate probe contact

■ Soft landing
The speed of the probe's descent is controlled. The speed is decelerated just before the probe contacts the board to decrease the impact force and prevent damage to the board. The speed can be set for test steps, groups, the entire process.

■ Appropriate probe angle
The L and R probes allow probing with little slipping and from all directions of the component. They are maintained at an appropriate angle of 10° X direction, 5° in Y direction and 11.1° in total (the ML and MR probes are vertically oriented). When probes are mounted at a large angle, slipping occurs easily and board warping will greatly affect the probing position.

■ Optimum probe stroke
The optimum Z-axis stroke length can be set to accommodate the height of mounted components. The up/down speed can also be set to maintain an appropriate inspection pace.

■ Contact check
In the four-terminal probe mode, contact failures due to flux or displacement can be automatically detected. This further enhances inspection reliability.
Supports high inspection ratio
Speedy and accurate data creation

To accommodate different needs, test data can be gathered in two ways: step XY where both edges of each component are probed and pattern XY where one point in one pattern is probed. Various input methods are also available.

- Coordinate data creation methods
  - Teaching using CCD camera.
  - Input via digitizer
  - CAD linking software (request price quotation)
  - Loading of HIOKI X-Y IN-CIRCUIT HITESTER data. (MS-DOS format)

MS-DOS is a U.S. registered trademark of Microsoft Corporation.

- Test order optimization
To reduce the travel distance of the probe, the test order is automatically arranged. This eliminates the need for considering the test order when data are created and ensures an efficient measuring process.

Create refined data quickly
- CAD-ATE link software
  Allows creation of test data by conversion of data from the customer's CAD system. Please consult us on this software option that also enables efficient use of the data of existing equipment such as chip mounters, etc.

High Inspection Ratio

- LCR separated measurement
Parallel circuits are split up into L, C and R elements for measurement to achieve an inspection with even higher detection ratio.

- Guarding
By employing guarding the mounting value of each component can be measured in a condition that corresponds to when the component is independent of the peripheral circuits. Guarding with maximum 2 points per step is possible.

  (1) No guarding
  The current Ir from the peripheral circuit affects the measuring.

  (2) Guarding applied
  As \[ E = 0, \] \[ I_r = 0 \]. This means that \( I_x \) can be measured alone.

- ATG function
Based on the input test data, the optimum settings for measuring mode, ranges, guard points, etc. are automatically performed. Stray capacitance amount or wiring resistance can also be absorbed.

- Function for automatic backup of test data
To ensure that data are not lost due to power outages or other problems, data are periodically saved during inspection and editing.

- Password protection function
Setting a password can prevent unauthorized personnel from inadvertently altering test data.

- File merge
Two types of data can be joined into one type.

- CAD-ATE link software
  Allows creation of test data by conversion of data from the customer's CAD system. Please consult us on this software option that also enables efficient use of the data of existing equipment such as chip mounters, etc.

High Inspection Ratio

- Photo couplers and digital transistors can also be inspected
NG or OK status of a photo coupler can be judged in its mounted condition. Testing of digital transistors (resistance input transistor) is also possible.

- Testing of aluminum electrolytic capacitors for reversed insertion
A function is available for testing mounted aluminum electrolytic capacitors for reversed insertion. Please consult us for this as the probing specifications are special.
Fulfills miscellaneous needs

A system to fulfill special needs can easily be constructed as options can be selected to match individual usage.

- **1940-01 POSITION COMPENSATION CAMERA for R ARM**
- **1940-02 POSITION COMPENSATION CAMERA for L ARM**
- **1940-11 POSITION COMPENSATION CAMERA for MR ARM**
- **1940-21 COMPONENT POSITION COMPENSATION CAMERA for MR ARM**
- **1940-22 COMPONENT POSITION COMPENSATION CAMERA for ML ARM**

Probing with high accuracy can be achieved by mounting a position compensation camera on each arm. **Component position compensation** compensates for the displacement of components following mounting. Used when direct contact with component leads is employed. Up to three of the cameras mentioned above can be mounted simultaneously. (A position compensation camera is attached to the ML arm as standard equipment.)

- **1941-01 STAMP UNIT for R ARM**
- **1941-02 STAMP UNIT for L ARM**

A stamp can be imprinted on boards following inspection. Stamps can be set to be imprinted in accordance with all the test data, such as modules and groups. This helps to prevent off-spec or untested items from being mixed with non-defective items.

- **1942-01 LOADING RAILS**

A single board to be inspected can be placed on the loading rails. When the 1114 is used in the stand-alone mode (no pre- or postprocessing equipment), the operator can use the loading rails to facilitate loading and unloading of boards.

- **1942-02 PUSHER UNIT**

When unloading inspected boards onto the rack-type pusher unit, the boards can be loaded directly into the next processing unit.

- **1942-03 AUTOMATIC WIDTH ADJUSTMENT FUNCTION**

The width of the loading rails can be adjusted automatically based on the board width data. Simplifies switch to accommodate new types of test items.

- **1943-01 BOARD WARP COMPENSATION FUNCTION**

A vacuum pad applied to the underside of boards compensates for board warp when boards are bending upward. (The 1355 VACUUM PUMP is required.)

- **1944-01 EXTENSION I/O BOARD**

Allows input and output of all the kinds of signals involved in the status I/O output, estimated I/O output and programmable I/O functions. Up to three boards can be mounted.

- **1944-02 AUTO SCANNER CHANGE**

Switches automatically to the spare board in case irregularities in the scanner board are detected during self-diagnosis. This eliminates loss time. The spare board is provided with the 1944-02.

Various special specification items are also available. Please feel free to consult us in case of special requirements.

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**External dimensions**

[Diagram showing external dimensions]
## Specifications

<table>
<thead>
<tr>
<th>Number of arms</th>
<th>4 arms (L, R, ML, MR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test steps</td>
<td>20,000 steps (maximum)</td>
</tr>
<tr>
<td>Coordinate specification methods</td>
<td>Step XY/ pattern XY (test in either mode)</td>
</tr>
<tr>
<td>Measurement ranges</td>
<td>Resistance: 400 µΩ to 40 Ω</td>
</tr>
<tr>
<td></td>
<td>Capacitance: 1 pF to 400 nF</td>
</tr>
<tr>
<td></td>
<td>Inductance: 1 µH to 100 H</td>
</tr>
<tr>
<td></td>
<td>Diodes: 0 to 25 V</td>
</tr>
<tr>
<td></td>
<td>Zener diodes: 0 to 25 V</td>
</tr>
<tr>
<td></td>
<td>Digital transistors: 0 to 25 V</td>
</tr>
<tr>
<td></td>
<td>Photo couplers: 0 to 25 V</td>
</tr>
<tr>
<td></td>
<td>Short circuit: 0.4 Ω to 40 Ω</td>
</tr>
<tr>
<td></td>
<td>Open circuit: 4 Ω to 4 MΩ</td>
</tr>
<tr>
<td></td>
<td>DC voltage measurement: 0 to 25 V</td>
</tr>
<tr>
<td>Test signals</td>
<td>DC constant voltage: 100 mV/400 mV (two ranges)</td>
</tr>
<tr>
<td></td>
<td>DC constant current: 200 nA to 200 mA (thirteen ranges)</td>
</tr>
<tr>
<td></td>
<td>AC constant voltage: 0.1 V rms. (one range)</td>
</tr>
<tr>
<td>Measurement units</td>
<td>DC voltmeter: 800 µV to 25 V (eight ranges)</td>
</tr>
<tr>
<td></td>
<td>AC ammeter: 10 µA to 10 mA (four ranges)</td>
</tr>
<tr>
<td>Criterion range</td>
<td>-99.9% to +999.9% or absolute value</td>
</tr>
<tr>
<td>Guarding</td>
<td>2 points/step and down probe channel guard specification</td>
</tr>
<tr>
<td>Measurement time</td>
<td>From 0.05 sec/step (X: 2.3 mm travel, Z height 5 mm, 2-step simultaneous probing, S/O measuring mode)</td>
</tr>
<tr>
<td>Probing accuracy</td>
<td>Each arm within ±100 µm (both X and Y directions)</td>
</tr>
<tr>
<td>Probing accuracy</td>
<td>Within ±50 µm (probing position)</td>
</tr>
<tr>
<td>Minimum travel resolution</td>
<td>X: 1.25 µm/pulse</td>
</tr>
<tr>
<td></td>
<td>Z: 60.00 µm/pulse</td>
</tr>
<tr>
<td>Probe interval pitch</td>
<td>Minimum 0.2 mm (needle probe mode)</td>
</tr>
<tr>
<td></td>
<td>Minimum 0.5 mm (four-terminal probe mode)</td>
</tr>
<tr>
<td>Probe work area</td>
<td>500 W × 400 D mm</td>
</tr>
<tr>
<td>Applicable test board dimensions</td>
<td>Thickness: 0.6 to 3.2 mm</td>
</tr>
<tr>
<td></td>
<td>External form: Min. 50 × 30 mm, Max. 500 × 400 mm</td>
</tr>
<tr>
<td>Applicable test board weight</td>
<td>2.0 kgf or less</td>
</tr>
</tbody>
</table>

### Component mounting range
- **Upper surface**: Max. 30 mm (including board thickness) |
- **Lower surface**: Max. 100 mm |
- 3 mm from both sides of board are excluded (required for transport)

### Safety devices
- Emergency stop button, safety cover, and software for prevention of arms colliding

### Alarm devices
- Signal tower (three colors), buzzer

### Display unit
- 17-inch color display

### Power supply
- AC 200 V ±10% (single phase) 50/60 Hz |
- Power consumption: 3 kVA

### Pneumatic system
- Primary pressure: 0.5 to 0.99 MPa (dry air) |
- Setting pressure (secondary side): 0.5 ±0.1 MPa

### Compressed air consumption
- Max. 0.3 Nl/min

### Operating environment
- Temperature: 23 °C ±10°C |
- Humidity: 75% RH maximum (no condensation)
- Atmosphere: Avoid use in an atmosphere where dust, vibrations, corrosive gases, etc. may occur.
- Floor strength: 500 kg/m² or higher

### Accessory
- Contact probes (4), four-terminal probes (4), one-way clutch, thermal mini-printer, printer cable, ball-point driver, hexagon wrench, grease, grease gun, keyboard, PS2 mouse, PC accessories, setup disk, leveling jacks (4), color display (17 inches), power cord, spare fuse, marking sheet

### Main unit dimensions
- Approx. 1260 (W) × 1287 (H) × 1058 (D) mm

### Mass
- Approx. 1000 kg

### [Loader unit]
- **Conveyor belt**: Double-sided flat belt (anti-static specifications) |
- **Conveyor width standard**: Width on front side |
- **Loading height**: 900 ±15 mm |
- **Conveyor speed**: Max. 40 m/min (non-load) |
- **Flow direction**: Right → left or left → right (specify when ordering)

### Height of components on board
- **Upper surface**: 30 mm |
- **Lower surface**: 100 mm

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### 1114 X-Y IN-CIRCUIT HITESTER

#### Factory options
- **1941-01 STAMP UNIT for R ARM** |
- **1941-02 STAMP UNIT for L ARM** |

#### Options
- **1134-02 IMPRESSION SHEETS (176 sets of two sheets)** |
- **1164-02 ONE-WAY CLUTCH** |
- **1164-52 SUPPORT PIN** |
- **1172-17 CONTACT PROBE** |
- **1172-41 4-TERMINAL PROBE** |
- **1196 RECORDING PAPER (25m, 10 rolls)** |
- **1330 MEASUREMENT SECTION CALIBRATION UNIT** |
- **1350 OFFSET BOARD** |
- **1355 VACUUM PUMP** |
- **1356 MAINTENANCE TOOL SET** |
- **1139 1114 DATE COMPOSITION SOFTWARE**

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**DISTRIBUTED BY**

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**Internet HIOKI website**: [http://www.hioki.co.jp/](http://www.hioki.co.jp/)

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