



**Automatic Transformer Test System  
3250  
User's Manual**

Edition  
July 2003  
P/N A11 000872

# Legal Notices

The information in this document is subject to change without notice.

Chroma ATE INC. makes no warranty of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Chroma ATE INC. shall not be held liable for errors contained herein or direct, indirect, special, incidental or consequential damages in connection with the furnishing, performance, or use of this material.

**CHROMA ATE INC.** 43 Wu-Chuan Road, Wu-Ku Industrial Park, Wu-Ku, Taipei, Taiwan

Copyright Notices. Copyright 2003 Chroma ATE INC., all rights reserved. Reproduction, adaptation, or translation of this document without prior written permission is prohibited, except as allowed under the copyright laws.

# Warranty

All Chroma instruments are warranted against defects in material and workmanship for a period of one year after date of shipment. Chroma agrees to repair or replace any assembly or component found to be defective, under normal use during this period. Chroma's obligation under this warranty is limited solely to repairing any such instrument, which in Chroma's sole opinion proves to be defective within the scope of the warranty when returned to the factory or to an authorized service center. Transportation to the factory or service center is to be prepaid by purchaser. Shipment should not be made without prior authorization by Chroma.

This warranty does not apply to any products repaired or altered by persons not authorized by Chroma, or not in accordance with instructions furnished by Chroma. If the instrument is defective as a result of misuse, improper repair, or abnormal conditions or operations, repairs will be billed at cost.

Chroma assumes no responsibility for its product being used in a hazardous or dangerous manner either alone or in conjunction with other equipment. High voltage used in some instruments may be dangerous if misused. Special disclaimers apply to these instruments. Chroma assumes no liability for secondary charges or consequential damages and in any event, Chroma's liability for breach of warranty under any contract or otherwise, shall not exceed the purchase price of the specific instrument shipped and against which a claim is made.

Any recommendations made by Chroma for use of its products are based upon tests believed to be reliable, but Chroma makes no warranty of the results to be obtained. This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for Chroma any liability in connection with the sale of our products other than set forth herein.

## **CHROMA ATE INC.**

43 Wu-Chuan Road, Wu-Ku Industrial Park,  
Wu-Ku, Taipei Hsien, Taiwan  
Tel: 886 -2-2298-3855  
Fax: 886-2-2298-3596  
[http: //www.chromaate.com](http://www.chromaate.com)



# Table of Contents

|  |            |
|--|------------|
| <b>1. Introduction .....</b>                                       | <b>1-1</b> |
| 1.1 General .....  | 1-1        |
| 1.2 Brief Specifications .....                                     | 1-2        |
| 1.3 Incoming Inspection .....                                      | 1-3        |
| <b>2. Specifications (15°C ~ 35°C   RH ≤ 75%) .....</b>            | <b>2-1</b> |
| 2.1 Measurement Functions .....                                    | 2-1        |
| 2.2 Test Signals .....   | 2-2        |
| 2.3 Measurement Range .....  | 2-2        |
| 2.4 Measurement Accuracy .....                                     | 2-2        |
| 2.5 Accuracy .....   | 2-3        |
| 2.6 Correction Functions .....                                     | 2-5        |
| 2.7 Interfaces .....   | 2-6        |
| 2.8 Others .....   | 2-6        |
| <b>3. Installation.....</b>  | <b>3-1</b> |
| 3.1 Ambient Environment .....                                      | 3-1        |
| 3.2 Power-Line Connection .....                                    | 3-1        |
| 3.3 Fuse .....   | 3-1        |
| 3.4 Power Regulation .....   | 3-2        |
| 3.5 Connecting Unknown .....                                       | 3-2        |
| 3.6 The Contrast of LCD Display .....                              | 3-2        |
| <b>4. Panel Description.....</b>                                   | <b>4-1</b> |
| 4.1 Front Panel Description .....                                  | 4-1        |
| 4.2 Rear Panel Description .....                                   | 4-4        |
| 4.3 System Parameters Setting Description .....                    | 4-5        |
| 4.3.1 System Configuration .....                                   | 4-5        |
| 4.3.2 System Time Setting Description .....                        | 4-10       |
| 4.3.3 Recall The Data From The Memory .....                        | 4-11       |
| 4.3.4 Store The Data Into Memory .....                             | 4-11       |
| 4.3.5 Memory Management Instruction .....                          | 4-12       |
| 4.3.6 User Password Setting .....                                  | 4-12       |
| 4.3.7 Scan Test Box (Box Test) .....                               | 4-13       |
| 4.3.8 Memory Card Management Function .....                        | 4-13       |
| 4.3.9 Print Testing .....  | 4-14       |
| 4.3.10 RS-232 Setup .....  | 4-14       |
| 4.4 Operation Instruction .....                                    | 4-14       |
| 4.4.1 Open Test .....  | 4-14       |
| 4.4.2 Short Test .....   | 4-16       |
| 4.4.3 Single Transformer Test .....                                | 4-18       |
| 4.4.4 Test Fixture (Scan Box) Operation .....                      | 4-22       |
| 4.4.5 Test Procedure Description .....                             | 4-33       |
| 4.4.6 Different Frequency Setting In The Different Windings: ..... | 4-33       |
| 4.4.7 ACR Setting Description .....                                | 4-34       |
| 4.4.8 Zx. Setting Description .....                                | 4-35       |
| 4.4.9 Pins Parallel Test Description .....                         | 4-36       |
| 4.4.10 Pins Series Test Description .....                          | 4-36       |
| 4.4.11 How To Set Up "DEVIATION" Function .....                    | 4-37       |
| 4.4.12 3250 Fast Function Keys (Help Function) .....               | 4-38       |
| 4.4.13 325X DCA New Additional Function & Operation (Option) ..... | 4-38       |

|           |   |            |
|-----------|---|------------|
| 4.5       | Low Impedance Measurement Application.....            | 4-39       |
| 4.6       | Bias Current Source Connecting.....                   | 4-40       |
| 4.7       | Test Application.....                                 | 4-40       |
| 4.7.1     | Large Inductance Measurement .....                    | 4-40       |
| 4.7.2     | Low Coupling Coefficient Turn Ratio Measurement.....  | 4-40       |
| 4.7.3     | Bias Current Connecting .....                         | 4-40       |
| 4.7.4     | Nonlinear Inductor, Transformer Measurement .....     | 4-40       |
| <b>5.</b> | <b>Application of Interface .....</b>                 | <b>5-1</b> |
| 5.1       | Transformer Automatic Scan Interface (Scan Box) ..... | 5-1        |
| 5.1.1     | Description The Test Function .....                   | 5-1        |
| 5.1.2     | Notice before Using .....                             | 5-1        |
| 5.1.3     | Scan Box Front Panel Description .....                | 5-2        |
| 5.1.4     | Scan Box Rear Panel Description .....                 | 5-4        |
| 5.1.5     | Scan box Description .....                            | 5-5        |
| 5.1.6     | Test Fixture (Scan Box) Description .....             | 5-6        |
| <b>6.</b> | <b>PRINT Operational Procedure .....</b>              | <b>6-1</b> |
| <b>7.</b> | <b>Handler Interface (Option).....</b>                | <b>7-1</b> |
| 7.1       | General .....   | 7-1        |
| 7.2       | Timing .....  | 7-2        |
| <b>8.</b> | <b>RS-232C Control Interface.....</b>                 | <b>8-1</b> |
| 8.1       | Overview .....  | 8-1        |
| 8.2       | RS-232C Specification.....                            | 8-1        |
| 8.2.1     | RS-232C Interface Connector .....                     | 8-1        |
| 8.2.2     | Table of RS-232C Signal Line and Pin .....            | 8-1        |
| 8.3       | Setting 325X RS-232C Interface.....                   | 8-1        |
| 8.3.1     | Setting BAUD RATE .....                               | 8-2        |
| 8.3.2     | Setting PARITY CHECK .....                            | 8-2        |
| 8.3.3     | Setting WORD LENGTH .....                             | 8-2        |
| 8.3.4     | Setting of DEFAULT.....                               | 8-2        |
| 8.3.5     | RS-232 ON/OFF .....                                   | 8-2        |
| 8.4       | Setting 325X RS-232C Interface.....                   | 8-2        |
| 8.5       | Data Output Format for 325X .....                     | 8-3        |
| 8.5.1     | Transformer Output Format .....                       | 8-3        |
| 8.6       | Example Programs of RS-232C Interface Control.....    | 8-4        |
| <b>9.</b> | <b>Additional Description of Memory Card .....</b>    | <b>9-1</b> |

# 1. Introduction

## 1.1 General

The **3250 Automatic Transformer Test System** is an automatic instrument which used for testing and analyzing components. The main goal of design this unit is to solve the problems of low labor efficiency and product quality which have occurred since the electronic career flourishing. The model 3250 is to enhance the working efficiency and products quality based on decade's experience.

The testing functions including in this unit are: L, C, R, Z, DCR, PH, Turn-ratio, Lk, Ps and BALANCE which supplied the perfect functions to the production line and Quality Control.

By using the internal microprocessor, the unit may supply fast, high accuracy and reliable testing under low cost. The functions are following: Hi or Lo-limit comparator, testing frequency, selector of testing voltage, upload calibration, multi-frequency scan testing, data saved and recall and single unit scan testing. Also, the unit may be full function scan testing by combining with scan box.

Memory card is using for recalling and saving data. The RS-232 interface is using for data transfer and statistic analysis. The printer interface is to print out the testing result. The unit may send the testing result to external for responding the component by Handler interface.

It also has provided a BIAS Current ( $I \leq 1A$ ) generator, can be cooperated with BIAS Current generator to measure coils inductance value.

The multi-function testing device, humanization key board design, guidable panel operation, extra large LCD, Locked key and password protection are making the 325X unit easy to be operate and ensure the high accuracy.

The accuracy is 0.1%. The measurement device (optional) may perform the calibration by key-in the measuring parameter. The calibration procedure can finish easily by offering OPEN and SHORT.

If the unit require the external or expend testing, please be aware the 4 connection points should be correct, and in high frequency measuring need to consider of the high frequency response.

## 1.2 Brief Specifications

### ■ Measurement Parameter:

First test parameters -- L, C, R,  $|Z|$ ,  $\Delta$ ,  $\Delta\%$ , DCR, Turn-Ratio

Second test parameters -- Q, D, R,  $\theta$

### ■ Basic Accuracy : Basic 0.1% (1kHz/1V rms)

|                     |          |   |                |                    |
|---------------------|----------|---|----------------|--------------------|
| ■ Measurement Range | L        | – | .0001uH        | ~ 9999.9H          |
|                     | C        | – | .001pF         | ~ 999.99mF         |
|                     | R        | – | .0001 $\Omega$ | ~ 999.99M $\Omega$ |
|                     | $ Z $    | – | .0001 $\Omega$ | ~ 999.99M $\Omega$ |
|                     | Q        | – | .0001          | ~ 99999            |
|                     | D        | – | .0001          | ~ 99999            |
|                     | $\theta$ | – | –90.00°        | ~ +90.00°          |
|                     | DCR      | – | .01m $\Omega$  | ~ 99.999K $\Omega$ |
|                     | Np       | – | .01            | ~ 999.9Turn        |
|                     | Ns       | – | .01            | ~ 999.9Turn (+,–)  |

### ■ Measurement Frequency: 20Hz to 200kHz

### ■ Measurement Voltage : 10mV to 2Vrms, each step 10mV

### ■ Equivalent Circuit : Series, Parallel

### ■ Zeroing Calibration : Open, Short

### ■ Turn - Ratio : 1kHz to 200kHz, 0.1V to 10Vrms

---

#### Notice

The maximum input voltage of this instrument is 10Vpeak. Be sure that the secondary voltage is below 10Vpeak.

---

### ■ Scan Test : Harmonize with scan control can test 20 points of transformer scan test.

### ■ Interfaces : Memory Card, Scanner Interface. RS-232 interface, Printer Interface, Handler interface. DCA control interface (Option)

|      | RS-232 | Printer | Handler | Memory Card | Scanner | DCA Bias |
|------|--------|---------|---------|-------------|---------|----------|
| 3250 | ✓      | ✓       | ✓       | ✓           | ✓       | Option   |

Table 1-1 Interface equipment



## 1.3 Incoming Inspection

Upon receipt of this instrument, please check the following items:

- (1) Any damages or scratches on the surface of the product.
- (2) Listed of Table 1-2 and 1-3 are accessories for this instrument.

If you have found any damages or accessories less, please contact our company, branches, or agents for prompt service.

| Item                    | Part No.   | Quantity | Remark                         |
|-------------------------|------------|----------|--------------------------------|
| Power Cord              | W12 010130 | 1        | Power Cable                    |
| Adaptor                 | N31 000039 | 1        | for change power plug 3P to 2P |
| Test Cable (4-Terminal) | 9 11020999 | 1        | for clip of DUT                |
| Test Cable (2-Terminal) | W38 001630 | 1        | for clip of Turn-Ratio         |
| Power fuse slow 2A      | A21 018700 | 2        | AC 115V used                   |
| Power fuse slow 1A      | A21 016600 | 2        | AC 220V used                   |
| Operation Manual        | A11 000872 | 1        | English                        |
| Ground lead             | W38 001660 | 1        | 80cm length                    |

**Table 1-2 Standard Accessories**

| Item                      | Part No.   | Quantity | Remark                           |
|---------------------------|------------|----------|----------------------------------|
| Test box (1)              | 9 11000199 | 1        | Test box                         |
| Test box (3)              | 9 11000399 | 1        | Test box                         |
| SMD Test cable            | 9 13300399 | 1        | SMD Test cable                   |
| SMD Test box              | 9 13300499 | 1        | SMD Test box                     |
| RS232 link cable          | W38 000420 | 1        | RS232 link cable                 |
| BIAS current device       | 9 13300699 | 1set     | Current Max. to 1A               |
| Expanded memory interface | 9 11080199 | 1set     | Expanded memory storage function |
| Memory card               | A92 000002 | 1        | 4M SRAM CARD                     |
| Scan Box 3001A            | 9 13250199 | 1        | 20 pin scan box                  |

**Table 1-3 Optional Accessories**

*Note:* To get the missing or purchasing accessories, just name Part No. to us.



## 2. Specifications (15°C ~ 35°C RH ≤ 75%)

### 2.1 Measurement Functions

#### ■ Measurement Parameters:

|            |                                      |
|------------|--------------------------------------|
| Z          | : Absolute value of impedance        |
| Y          | : Absolute value of admittance       |
| L          | : Inductance                         |
| C          | : Capacitance                        |
| R          | : Resistance                         |
| D          | : Dissipation factor                 |
| Q          | : Quality factor                     |
| Rs         | : Equivalent series resistance       |
| Rp         | : Parallel resistance                |
| X          | : Reactance                          |
| $\theta$   | : Phase angle                        |
| $\Delta$   | : Deviation of L/C/R/   Z            |
| $\Delta\%$ | : Deviation percentage of L/C/R/   Z |
| DCR        | : DC Resistance                      |
| Np/Ns      | : Turn-Ratio                         |
| Vp/Vs      | : Volt-Ratio                         |
| Ns         | : Turn                               |
| Vs         | : Voltage                            |

#### ■ Combinations:

| Z  ,   Y                        | L, C          | R     |
|---------------------------------|---------------|-------|
| $\theta$ (deg) / $\theta$ (rad) | D, Q, Rs, Rp, | Q, X, |

#### ■ Deviation Function:

The deviation and the Percent of Deviation of measurement values from a programmable reference value.

#### ■ Equivalent Measurement Circuit : Parallel and Series

#### ■ Ranging : Auto and Manual (Hold/Up/Down)

#### ■ Trigger mode : Internal, Manual and External (RS-232, Handler Interface).

#### ■ Measurement terminals : Four-terminal pair for L, C, R, | Z |, DCR. Six-terminal pair for Turn-Ratio.

#### ■ Integration Time : Fast, Medium and Slow.

## 2.2 Test Signals

- **Frequency** :  
 3250 : 20 ~ 200kHz  
 Accuracy :  $\pm (0.01\% \pm 0.01\text{Hz})$

- **Signal Level:**

|         | Range            | Setting Accuracy             |
|---------|------------------|------------------------------|
| Voltage | 10mVrms to 2Vrms | $\pm (10\% + 1\text{mVrms})$ |

- **Output Impedance:**  $100\Omega$ ,  $\pm 3\%$  (CONST Rsou.: 320X)

- **Test Signal Level Monitor:**

| Mode                 | Range            | Accuracy   |
|----------------------|------------------|--|
| Voltage <sup>1</sup> | 10mVrms to 2Vrms | $\pm (3\% \text{ of reading} + 0.5\text{mVrms})$ |

<sup>1</sup>: Add the impedance measurement accuracy (%) to the voltage level monitor accuracy when the DUT's impedance is  $< 100\Omega$ .

## 2.3 Measurement Range

| Parameter  | Range                                |
|------------|--------------------------------------|
| Z  , R, X  | 0.1 m $\Omega$ to 999.999 M $\Omega$ |
| Y          | 0.1 nS to 99.9999 S                  |
| C          | 0.001 pF to 999.99 mF                |
| L          | 0.1 nH to 9.9999 kH                  |
| D          | 0.0001 to 99999                      |
| Q          | 0.0001 to 99999                      |
| $\theta$   | -90.00 ° to 90.00 °                  |
| $\Delta\%$ | -100.00% to 100.00 %                 |
| DCR        | 0.01 m $\Omega$ to 99.999 k $\Omega$ |
| Np/Ns      | 100 : 1                              |
| Vs         | 10V max                              |

## 2.4 Measurement Accuracy

Measurement accuracy is specified when all of the following conditions are satisfied:

- (1) Warm-up time :  $\geq 30$  minutes
- (2) OPEN and SHORT corrections have been performed.

## 2.5 Accuracy

- Within 1 year after factor calibration.
- Temperature :  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$
- Relative humidity : 80% maximum
- Warm up : 30 minutes minimum.
- Zero calibrated under conditions above.

### 1. $|Z| - \theta$ Accuracy

The basic accuracy is listed in table 2-1

- For Fast rate, on all range, the accuracy must be doubled.

### 2. L, C, R Accuracy

For  $Q \geq 10$  ( $D \leq 0.1$ ), correspond to accuracy of  $|Z|$ , where

$$|Z_L| = |2\pi fL|$$

$$|Z_C| = |1 / (2\pi fC)|$$

Refer to conversion chart between LC and  $|Z|$  in Figure 2-1.

If  $Q < 10$  ( $D > 0.1$ ), multiply L accuracy by  $(1 + 1/Q)$  and multiply C accuracy by  $(1 + D)$ .

### 3. D, Q, R Accuracy

For all D value

$$\text{Accuracy of } D = \pm [\tan\theta_e \cdot (1 + D^2)] / [1 - D \cdot \tan\theta_e]$$

For  $Q \geq 10$

$$\text{Accuracy of } Q = \pm [\tan\theta_e \cdot (1 + Q^2)] / [1 - Q \cdot \tan\theta_e]$$

If  $Q < 10$ , multiply accuracy Q by  $(1 + 1/Q)$

< Where  $\theta_e$  is accuracy error of phase angle  $\theta$  >

**Table 2-1  $|Z|$ - $\theta$  Accuracy**

|                       |      |                                 |                                  |                                |                              |
|-----------------------|------|---------------------------------|----------------------------------|--------------------------------|------------------------------|
| $ Z $<br>( $\Omega$ ) | 10M  | $\pm 2\%$<br>$\pm 13^\circ$     | $\pm 0.5\%$<br>$\pm 0.4^\circ$   |                                |                              |
|                       | 1M   | $\pm 0.5\%$<br>$\pm 0.3^\circ$  | $\pm 0.15\%$<br>$\pm 0.09^\circ$ | $\pm 2.0\%$<br>$\pm 1.2^\circ$ |                              |
|                       | 100K | $\pm 0.35\%$<br>$\pm 0.2^\circ$ | $\pm 0.15\%$<br>$\pm 0.08^\circ$ | $\pm 1.5\%$<br>$\pm 0.8^\circ$ |                              |
|                       | 10K  |                                 |                                  |                                |                              |
|                       | 1K   | $\pm 0.3\%$<br>$\pm 0.2^\circ$  | $\pm 0.1\%$<br>$\pm 0.04^\circ$  | $\pm 1.5\%$<br>$\pm 0.3^\circ$ | $\pm 2\%$<br>$\pm 2.0^\circ$ |
|                       | 100  |                                 |                                  |                                |                              |
|                       | 10   |                                 |                                  |                                |                              |
|                       | 1    |                                 |                                  |                                |                              |
|                       | 100m | $\pm 1.8\%$<br>$\pm 1.1^\circ$  | $\pm 0.8\%$<br>$\pm 0.5^\circ$   | $\pm 5.5\%$<br>$\pm 3.0^\circ$ | $\pm 6\%$<br>$\pm 4.0^\circ$ |
|                       |      | 20                              | 100                              | 1K                             | 10K                          |
|                       |      |                                 |                                  | 100K                           | 200K                         |

Frequency (Hz)

On boundary line apply the better value.

#### 4. R (ESR, EPR) Accuracy

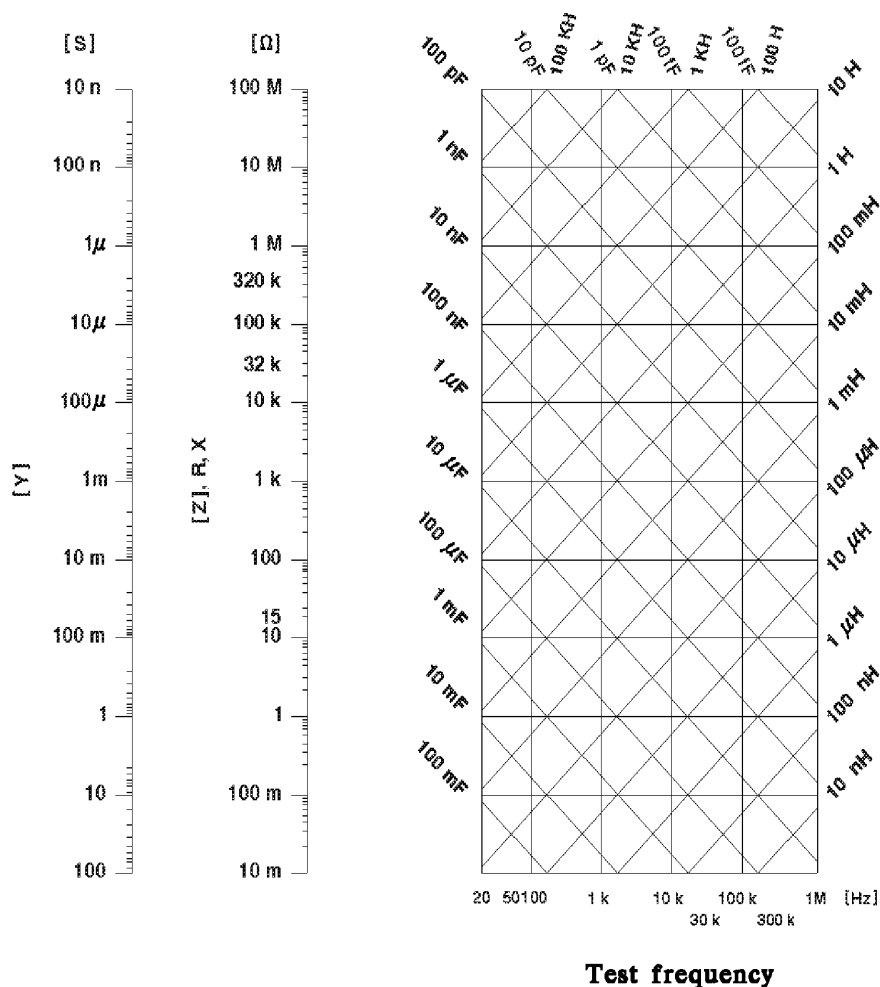
For  $Q \leq 0.1$

Accuracy of R = Accuracy of  $|Z|$

If  $Q \geq 0.1$ , multiply accuracy by  $(1+Q)$

**5. DCR Accuracy** :  $\pm (0.5\% + 0.2\text{m}\Omega) > 10\text{m}\Omega$   
 $\pm (1\% + 0.2\text{m}\Omega) < 10\text{m}\Omega$

**6. Turn-Ratio Accuracy** :  $\pm (0.5\% + 0.2T)$



**Figure 2-1 L.C.Z conversion**

On boundary line apply the better value.

## 2.6 Correction Functions

### ■ Zero open:

Eliminates measurement errors due to parasitic stray impedances of the test fixture.

### ■ Zero short:

Eliminates measurement errors due to parasitic residual impedances of the test fixture.

### ■ Load:

Improves the measurement accuracy by using a working standard (calibrated device) as a reference.

## 2.7 Interfaces

- **Printer Interface** : Standard Printer Interface.
- **RS-232 Interface** : Standard RS-232 Interface.
- **Handler Interface** : PASS/FAIL/Ext Trig.

## 2.8 Others

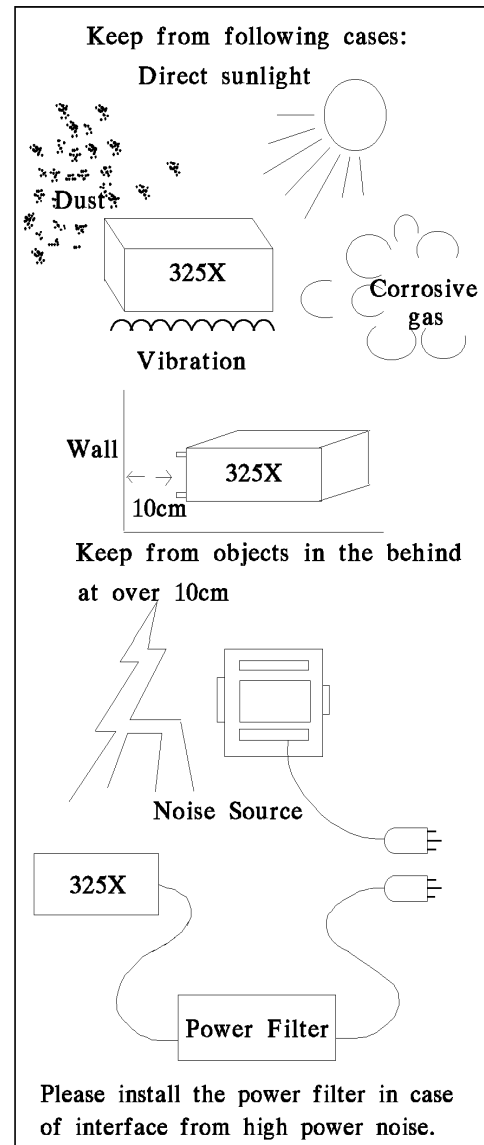
- **Display** : 320x240 Graphic LCD Display.
- **Power** : 100V~120V AC, 50Hz/60Hz. Power consumption is 140VA, maximum.  
220V~240V AC, 50Hz/60Hz. Power consumption is 140VA, maximum.
- **Environment** : Operating-- 0°C to 40°C, 10 to 85% relative humidity.  
Storage -- -10°C to 50°C, 10 to 90% relative humidity.
- **Dimensions** : 430 (W) x 177 (H) x 300 (D)
- **Weight** : 8.5Kg.



## 3. Installation

### 3.1 Ambient Environment

- (1) Don't use the meter in a dusty or vibrating location. Don't expose it under sunlight, or corrosive gas. Be sure that the ambient temperature is 0~40°C and that the relative humidity is below 85%.
- (2) The meter is equipped in the back panel with a fan-out cooling fan to keep from internal temperature increase. Make sure of good ventilation. The meter should be located at over 10cm distance from any object or wall in the behind. Don't block the left and right ventilation holes to keep the meter in good precision.
- (3) The meter has been carefully designed to reduce the noise from the AC power source. However, it should be used in anise environment as low as possible. If the noise is inevitable, please install some power filter.
- (4) The meter should be stored within the temperature range -25°C ~ + 70°C. In case it is not to be in use for a long time, please store it in the original or similar package, and keep it from direct sunlight and humidity, to ensure a good condition for later use.



### 3.2 Power-Line Connection

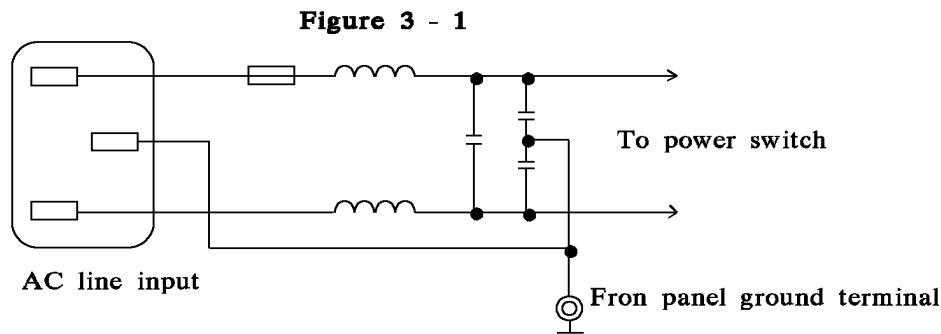
Before plug in power cord, make sure power is off state, and the voltage in rear panel is meet required voltage. The power supply frequency please uses the 50 Hz or 60Hz.

### 3.3 Fuse

It has one fuse installed in rear panel, replace the fuse and please watch for.

- (1) Please turn off power and pull off power cord.
- (2) Fuse spec. AC 100V~120V → T2A 250V  
AC 220V~240V → T1A 250V

For the reason of safety and noise, it must use the power card with figure 3-1:



### 3.4 Power Regulation

As this instrument is belong to precision electronically test device, so the accuracy is passable to be influenced lower by input power unstable after testing. There is  $\pm 10\%$  changeable power even in the laboratory, so we suggest that use the regulator in power and test devices the only one way to avoid the reasons that cause by power unstable.

### 3.5 Connecting Unknown

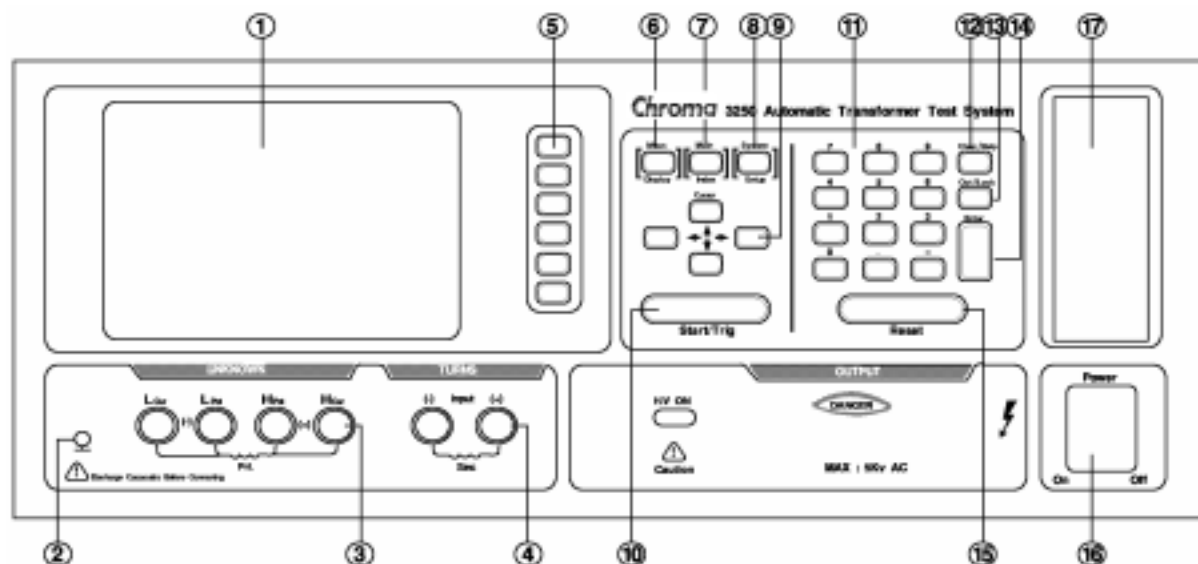
For connecting 325X LCZ to D.U.T (Unknown device) can through the BNC connector that marks  $H_{CUR}$ ,  $H_{POT}$ ,  $L_{POT}$ ,  $L_{CUR}$ . (If want to measure the PH and Turn Ratio of transformer must use the terminator of Sec (+) and Sec (-), so usually need external test device. Notice the  $L_{CUR}$  and  $L_{POT}$  connect to DUT should be at the same terminal,  $H_{CUR}$  and  $H_{POT}$  connect to another terminal, when test transformer, the  $L_{CUR}$  and  $L_{POT}$  connect to the  $N_p$ -side of transformer,  $H_{CUR}$  and  $H_{POT}$  connect  $N_p$  + side, Sec (+) connects to  $N_s$  +side and Sec (-) to  $N_s$ -side.

### 3.6 The Contrast of LCD Display

To adjust the comparison of LCD can be used by the system configuration this function, but be careful that the adjusting should be depended on personal acceptable brightness.

## 4. Panel Description

### 4.1 Front Panel Description



#### (1) LCD Display

The resolution of this instrument display is 320x240 Graphic mode LCD, and including "cold CRT" back-light adjusting, so all the measurements and setting values can be shown clearly, and the functions of back-light and comparison can fit all different environments.

#### (2) Guard

This guard terminal directly connects the cover of test instrument, and then connects to the isolation of this unknown component. By doing this is to avoid the atmosphere or exterior signal obstructing accuracy.

#### (3) Unknown measurement connectors

Four individual BNC sockets connect an external test device or wire for unknown testing.

H<sub>CUR</sub> : Current drive terminal, high.

H<sub>POT</sub> : Potential detector terminal, high.

L<sub>POT</sub> : Potential detector terminal, low.

L<sub>CUR</sub> : Current drive terminal, low

#### ① Notice

That "high" terminals for (+) and "low" terminals for (–) polarity as marked on the front panel while polarized component is under test.

#### ⚡ Beware

Please discharge the unit before measure the pole components to avoid shock the instrument.

**(4) Secondary Turn-Ratio and Phase appropriate terminal**

2 individual BNC sockets, in testing PH and turn ratio period connect an external test device or wire to transformer secondary side for unknown measurement.

Sec (+) : voltage inspector terminal, high voltage.

Sec (–) : voltage inspector terminal, low voltage.

**(5) Selective key**

The major function is to show the different conditions of each function or other options, which need to be selected according to the user's requirement.

**(6) The functions of measure display (3302/3252/3312 only)**

After press this key then the instrument is in basic component measure & analysis condition. Under this screen each test parameter can be changed directly and the value can be read out. For example, test voltage, parameter, speedy, series or parallel...etc.

**(7) Main function key**

Press this key for entering the main index screen. In this screen you may select what you want to test, for example, transformer test function, the analysis of unknown test result, statistic of unknown test result, multi-frequencies scan test, open test, short test, ...and so on.

**(8) System parameter setup key**

Press this key for entering the main system parameters setup; each system parameters can be changed directly under this screen. For example, the function of calibration in this instrument, set the store data function, set the data recall function, set the system data and time function, select and set the each system reveal able parameter and measure parameter (the function of calibration entrance need password)

**(9) Cursor key**

There are up, down, left, right four keys, these keys are for display in difference kinds condition, to control cursor can be useful to input each parameter, can also be selective keys, for example, change value like setting frequency or voltage.

**(10) Start/Trig key**

Start to test the unknown, when the measure condition of instrument is external trigger or manual trigger, press this key to measure.

**(11) Numbers and symbol key (0...9. -)**

These numbers and symbols are for each setting condition that needs to input value and symbol.

**(12) Clear/Help key**

Clear setting value key is to clear the values beside cursor. In the main function chart, help key is to assist user to select the fast functions key, for easy operation.

**(13) OPT/LOCK key**

This key is for special option, original special function is to lock the keys of the panel, when press this key on the top-right side of screen shows that keys are being locked, and if want to cancel this condition just press this key again. (If the user-password function

has been operated, till input password then can work, if the password has been input wrongly by three times, the instrument will be reset). When Hard copy function is on, press this key can direct print out the present display from the printer.

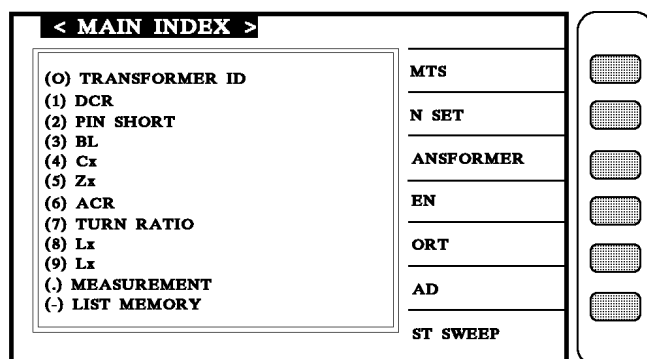
**(14) ENTER (confirm) key**

Its function is to check the value setting or condition selected and parameters setting are finished.

**(15) RESET**

Its function is to reset each index condition setting and external trigger, condition.

RESET key is a fast function key, press this key LCD indicator would display 0~9, . , - etc 12 kinds of functions. By selecting the proper number, user can direct into the test items of transformer test.



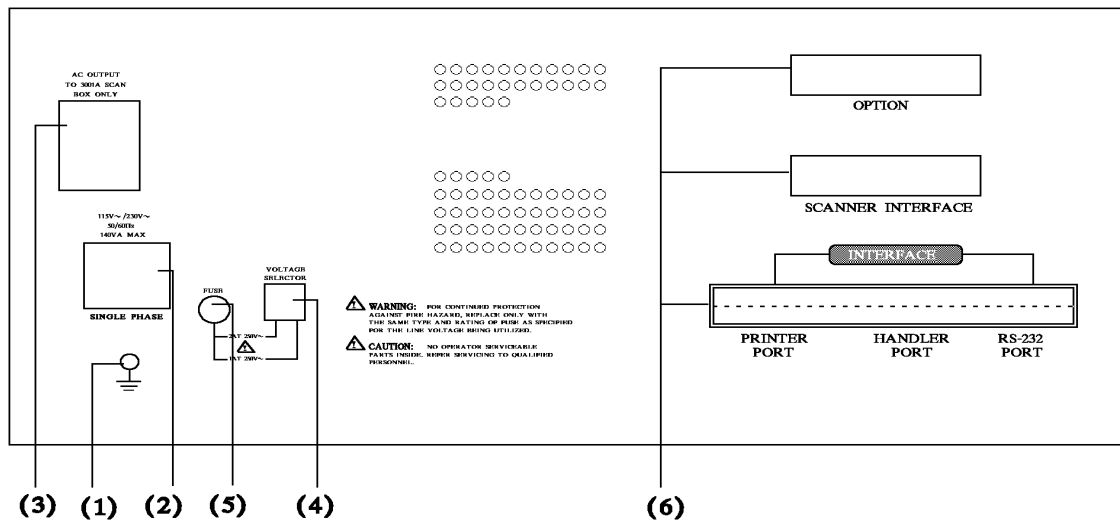
**(16) POWER switch**

Switching power switch, press [O] is off, press [ | ] is on.

**(17) Memory card slot**

This slot is for extending the option function like memory. By using this function, the memory group can be extended up to 160 items. Also, it may be change to extend memory space.

## 4.2 Rear Panel Description



### (1) Ground Terminal:

This terminal connects the cover of this instrument directly, then connect to the ground to avoid exterior obstruction that makes instrument connection uncompleted and influenced the safety.

### (2) AC Line Socket:

This socket is approved by (International Electrotechnics Commission) three line of socket 320, please use the proper wire like Belden SPH-386 or similar wire (#W12 010130).

### (3) AC Output Line (for scan box):

This socket is appropriate for Model 3001A scan fixture only, the output source is identical to the voltage of input source point.

### (4) Power Voltage Switch:

Using screwdriver to switch, be sure the power is off, then switch to require voltage position.

### (5) Power Fuse:

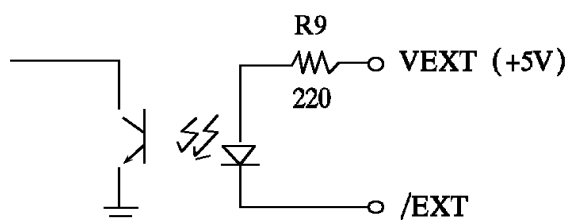
Power protection fuse. Spec and precaution replacement please (*refer* [3. 3]).

### (6) Slot for interface:

There are 5 signal controlled interface cards as following:

- a. Scan Interface Card
- b. Handler Interface Card:

Handler interface control signal as table 4-1 shown, when signal action, from open remit driver signal transmit to make Handle signal is Low, when not action is High. External lead signal max to 30V, positive voltage to start, and has enough rising resistance to limit the action signal (LOW), VEXT = +5V the max current 16mA. If VEXT is greater +15V, the R9 would be replace by other proper resistor to meet the specification.



When input signal action, it has to additional VEXT, Low signal voltage must less than 0.4V, can't be a negative value. High signal voltage must greater than 2.5V, can't higher than MAX 5V, output current 1mA.

c. Printer Interface Card

d. RS-232 Interface Card (with CPK software use for test data statistic analysis purpose)

| Signal Name | Pin No | Function   |
|-------------|--------|--|
| VEXT        | 1      | Add in polarity voltage, loading current is limited in 16mA. |
| /EOT        | 3      | "Test ending", judge signal effective.                       |
| /PASS       | 4      | L/C/R/   Z   Good.   |
| /FAIL       | 5      | L/C/R/   Z   NO-Good.  |
| /ACQ        | 6      | "Data collection finished", DUT can be moved.                |
| /EXT        | 7      | External trigger.  |
| GND         | 8, 15  | Ground   |

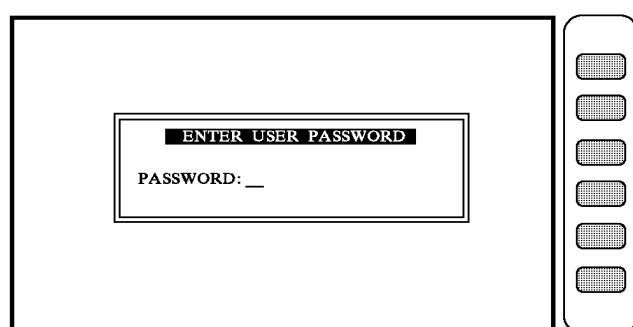
**Table 4-1 Handler interface signal control form**

e. DCA Control Interface

## 4.3 System Parameters Setting Description

### 4.3.1 System Configuration

- The display shows **Chroma's** name, phone no., fax no., model no., and programming version (Around 2 sec.) after the main power of the unit is switch ON.



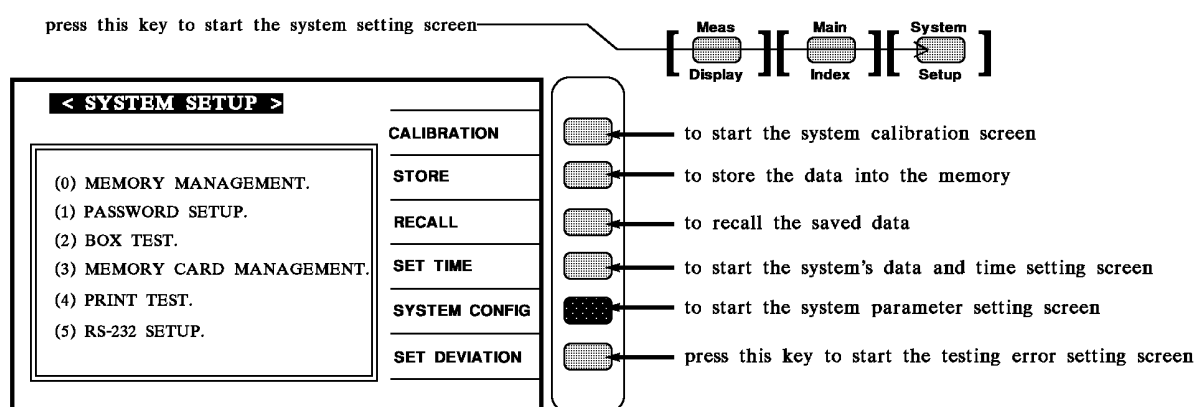
At this stage, just key-in the model no and press [Enter]. For example: it is model 3250, press [3][2][5][0][Enter].

2. If the user desired to set the parameters, please press [SYSTEM/SETUP] after turn the unit on.

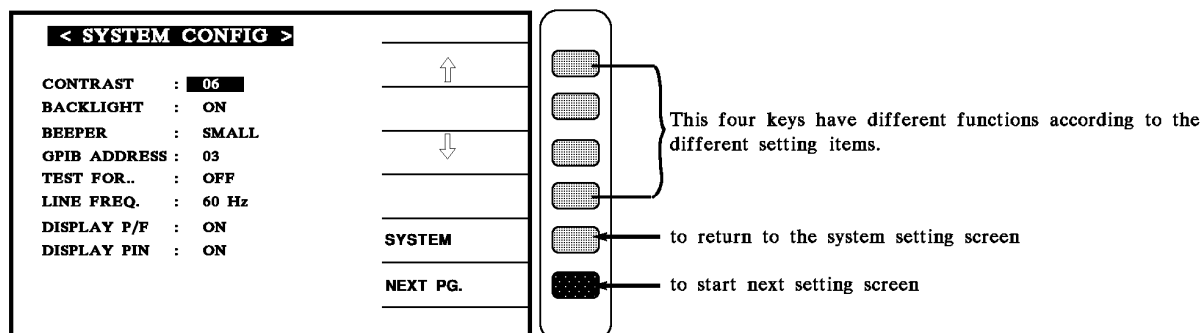


At this stage, just key-in the model no and press [Enter]. For example: it is model 3250, press [3][2][5][0][Enter]. The display is like below:

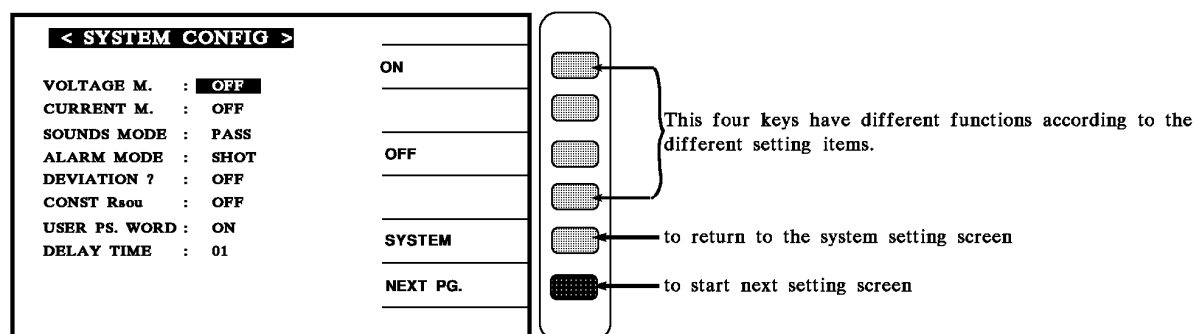
press this key to start the system setting screen



Press [SYSTEM CONFIG] to start the system parameter setting screen as shown below:

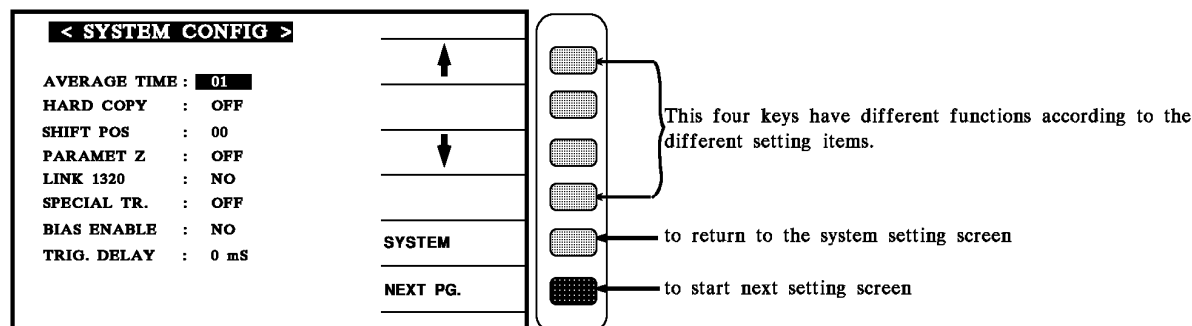


Press [NEXT PAGE.] to start the system parameter setting screen as shown below:





Press [NEXT PAGE.] to start the system parameter setting screen as shown below:



The display parameter described as following:

### CONTRAST:

It's to adjust the light or dark of the display. The value is being set on "07" and the selector is "00~13". The procedure is to move the cursor to the right of the CONTRAST by pressing and adjust the value by pressing [] and [].

### BACKLIGHT:

To select the backbite of the display. The value is being set "ON". The range is "ON/OFF". The procedure is to move the cursor to the right of the BACKLIGHT by pressing and adjust it by pressing [ON] and [OFF].

### BEEPER:

It's to select the volume of the buzzer. The value is being set on "SMALL ". The selectors are "L (large) " and "S (small) ". The procedure is to move the cursor to the right of BEEPER by pressing and adjust it by pressing [L], [S] and [OFF].

### GPIB ADDRESS: (Reserved function)

It's to select the GPIB address. The value is being set on "03". The range is from "00~30". The procedure is to move the cursor to the right of the GPIB ADDRESS by pressing and adjust it by pressing [] and [].


### TEST FOR:

To select the automatic scan test whether measure the value of each set windings, because in the automatic scan test function, if the user just set the pins of transformer every windings, but not set every winding standard, then will not measure the windings those have not set standard value, but if set this "TEST FOR" function, then just set the pins of windings, then automatic measure the windings. The initial value is "OFF", and then the range is ON/OFF two choices, use the keys cursor to select, the black area will move to right side the "TEST FOR" press key [ON] and [OFF] which beside the screen to change.


### LINE FREQ:

Select the correct AC frequency 50Hz or 60Hz. To select the correct frequency will be helpful the exact measurement and accuracy. The initial value is 60 Hz, the range of control is "50Hz/60Hz/NA" three choices. Use the keys cursor to select, the block area will move to right side the "LINE FREQ", then press the keys [50Hz], [60Hz] and [NA] to change. As the NA is not considerable frequency of input power, so the speed of test will be faster.


### DISPLAY P/F:

To select the scan test result of transformer if use "PASS/NG MODE" for big screen display. The default setting is "ON". There are "ON/OFF/SEC./SPC." four ranges for selection. Use the 4 buttons  to move the highlight area to the [ON], [SEC.], [OFF], [SPC] keys at the right of DISPLAY PIN for selection. The [SEC.] parameter indicates the scan and test are done at one time. PASS/FAIL screen will disappear after prompted. (The prompt screen does not affect the test data for observation.) The [SPC.] parameter indicates the prompt screen of failure is the test parameter with highlight display after the test is completed.


### DISPLAY PIN:

To select whether the transformer's pin position shows on the display of transformer scan testing. The value is being set on "ON". The selector is "ON/OFF". The procedure is to move the cursor to the right of the DISPLAY PIN by pressing  and adjust it by pressing [ON] and [OFF].


### VOLTAGE M.: (3302/3252/3312 only)

To select whether the output voltage is shown on MEAS. Display of LCR testing. The value is being set on "OFF". The selector is "ON/OFF". The procedure is to move the cursor to the right of the VOLTAGE M. by pressing  and adjust it by pressing [ON] and [OFF].


### CURRENT M.: (3302/3252/3312 only)

To select whether the output voltage is shown on MEAS. Display of LCR testing. The value is being set on "OFF". The selector is "ON/OFF". The procedure is to move the cursor to the right of the CURRENT M. by pressing  and adjust it by pressing [ON] and [OFF].




### SOUNDS MODE: (3302/3252/3312 only)

To select whether the buzzer is working for good (PASS) or no-good (NG) product under high or low limit judgment on MEAS. DISPLAY of LCR testing. The value is being set on "PASS". The selector is "PASS/NG". The procedure is to move the cursor to the right of the SOUNDS MODE by pressing  and adjust it by pressing [PASS] and [NG].

### ALARM MODE: (3302/3252/3312 only)

To select whether the alarm is warning for SHOT or LEVEL under high or low limit judgment on MEAS. DISPLAY of LCR testing. The value is being set on "SHORT". The selector is "SHOT/LEVEL". The procedure is to move the cursor to the right of the ALARM MODE by pressing  and adjust it by pressing [SHOT] and [LEV.].

### DEVIATION:

To select whether the equivalent error minus function is switch on between the unit and other testers. The value is being set on "200%". The selector is "5%~EVER". The procedure is to move the cursor to the right of the DEVIATION? By pressing  and adjust it by pressing [  ] and [  ].


Note: Ex. set 100%, as test value/Actual value > 2 x Actual value, it will give up DEVIATION action.

### CONST Rsou. :

In LCR measure condition, the output impedance of test terminal is fixed. The application of this function is suitable for the DUT, which the variable of measurement is too large. So use this function will not let the measurement variable influence accuracy. The initial value



is "OFF". The range of control are OFF, 320X, 106X, 1072 four choices. The control method is to select the keys beside the Cursor, move it from the block to Const and Rsou. press selection key to set Const mode in LCD right side.

#### **USER PS. WORD:**

To select whether the user password needed to key in after the unit is switch on or the user wish to alter the setting parameter. The value is being set on "OFF" The selector is "ON/OFF". The procedure is to move the cursor to the right of the USER PS. WORD by pressing  and adjust it by pressing [ON] and [OFF].




#### **DELAY TIME:**

To choose after the tome needed from delay to next test after DCR testing. After DCR testing, the emerge will be remained in the transformer, it maybe influence the next test. So this delay function is needed to eliminate. The range of control is 00 to 9999. Each resolution is 10ms.


The initial value is "00". There are 10000 choices. The way to control is to use the key beside the cursor, move it from the block to "delay time". Then press [  ] and [  ] to change it. Normally, the value of L transformers is not large, so set this parameter "00" is enough, except over 100mH then need to adjust.

When measure DCR of inductance, if inductance value is 100mH~200mH, than DELAY TIME need to be set to "01", if inductance value is 200mH~300mH, than DELAY TIME set to "02", as follow this, if inductance value less than 100mH, than DELAY TIME set to "00", then the measured value of DCR is correct.




#### **AVERAGE TIME:**

By choosing the average setting such as "01", the program would take the average in each time of measurement. If the setting is "02", the program would take average in two times of measurements. Following vest can be deduced accordingly. The standard setting is "01", which means the control range is 01~10. By moving the cursor  key to right hand side of AVERAGE TIME and changes the range with [  ] and [  ] keys.


#### **HARD COPY:**

It can be set up to directly print by choosing, one of three different choices ON/INV./OFF. INV. means to print the stuff that be highlighted. It can move cursor  key to right hand side of HARD COPY and set up different function of [ON], [INV] and [OFF].


#### **SHIFT POS:**

By choosing the printing result position, it can be set from "00" to "100". The range of control is "00" ~ "250". It can be chose the range by moving the cursor  key to right hand side of SHIFT POS and change with [  ] and [  ] keys or direcuy choose from PROGRAM menu.


#### **PARAMETER Z: (3302/3252/3312 only)**

To measure L.C.R, it also indicates the functions of Z and Q value. By moving the cursor  key to right hand side of PARAMETER Z, it will display [ON] and [OFF] function and choose one of them.

**LINK 1320: (3302/3252/3312 only)**

If intend to link with 1320, If test-objected, is a larger inductance ( $L_x > 10\text{mH}$ ), the tester has to do open zero first. By moving the Cursor  key to right hand side of LINK 1320, it will display [ON] and [OFF] function and choose one of them.

**SPECIAL TR:**

When in measuring turns-ratio, if "Related ( $-\mu\text{r}$ )" value of coil less than 100, there's leaking magnetic phenomenon occurred at secondary. Then, by moving the Cursor  key to right hand side of SPECIAL TR, it will display [ON] and [OFF] function and choose one of them. Only at Scan Box can be used.

**BIAS ENABLE:**

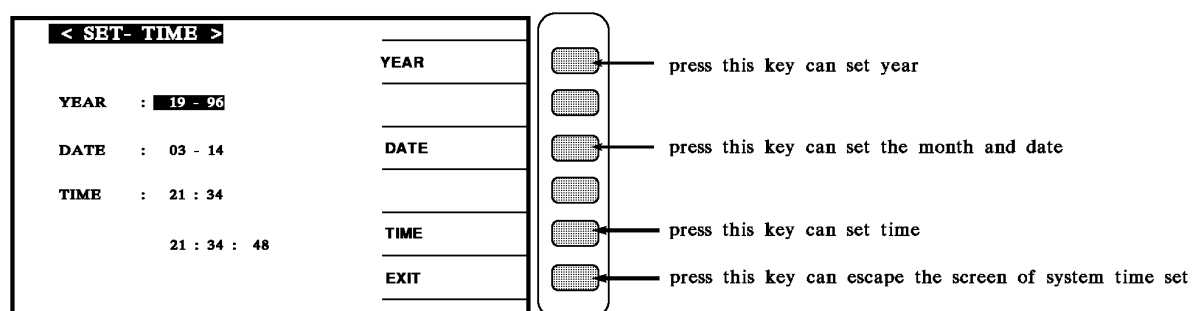
System has installed 1A bias current (option), if under the BIN SET mode for testing, it needs to switch BIAS ENABLE to "YES" status. Then BIN SET function will accord to setup current for testing.

**TRIG. DELAY:**

When use with auto machinery, external trigger EXT will need to adjust trigger timing because of measuring speed and auto machinery ON speed must be matching. to adjust TRIG, DELAY time, and control range is "00~9999"mS.

## 4.3.2 System Time Setting Description

In the SYSTEM SETUP condition press [SET TIME] then enter the system setup index. As following:



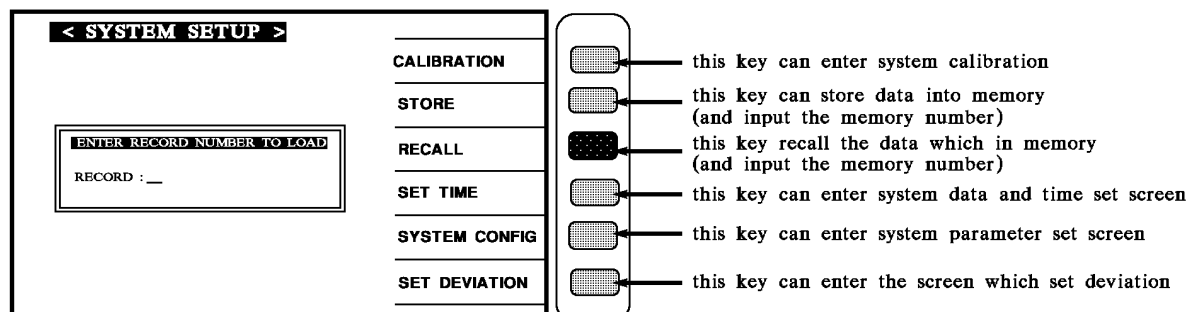
There are show parameter as following:

|      |                       |      |              |
|------|-----------------------|------|--------------|
| YEAR | : the year shows 19XX | DATE | : month-date |
| TIME | : hour-min            | EXIT | : for esc.   |

When enter this screen then into the system time setup, the screen shows system year, month, date hour, min, sec. currently, to change and item press the keys [YEAR] [DATE] [TIME] beside the display, then block area move to that area, the one of number in that area will flash continually, this position of number is cursor, input any number that we intent then it changes immediately. Press the [EXIT] key can escape from this screen.

### 4.3.3 Recall The Data From The Memory

In the SYSTEM SETUP condition press [RECALL] to enter that recall the data which store in memory to use, now screen shows as below:



When enter this screen then into the "RECALL MEMORY", at this time just press number key to input which item then press [Enter].

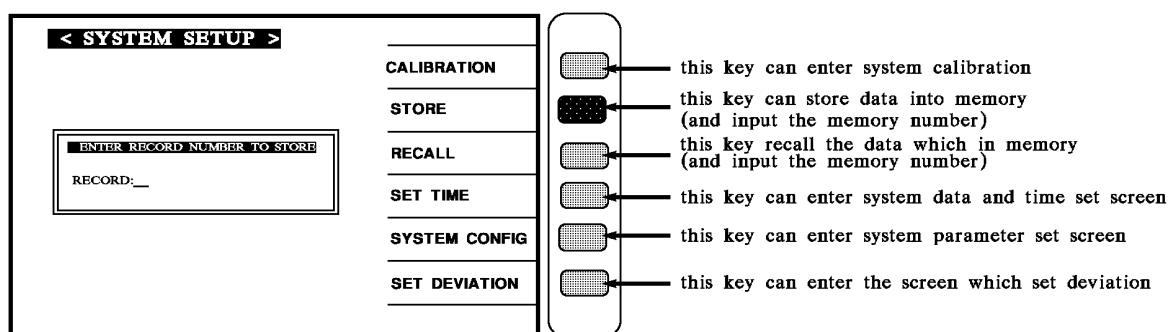
All the items are number, the range is from 0~159, 160 items, but inside 0~20 items are interior memory of instrument, 26~159 are the data from external memory card.

If the recall data successfully, then screen will show **RECALL: 1?**. But if has not data in the memory which we chose, then the screen shows the words and pause the screen "NO DATA TO LOAD".

Exterior memory card can boundless extend, each memory can store 135 items data, exterior memory card is option.

### 4.3.4 Store The Data Into Memory

In SYSTEM SETUP condition press [STORE] key can set the function that store data into the memory, the screen shows below:



When enter this screen into "DATA STORE MEMORY" function, press number keys and input the item number which we intend to input then screen will show **STORE: 1?**

All the items are number, the range is from 0~159, 160 items, but inside 0~20 items are interior memory of instrument, 26~159 are the data from external memory card.

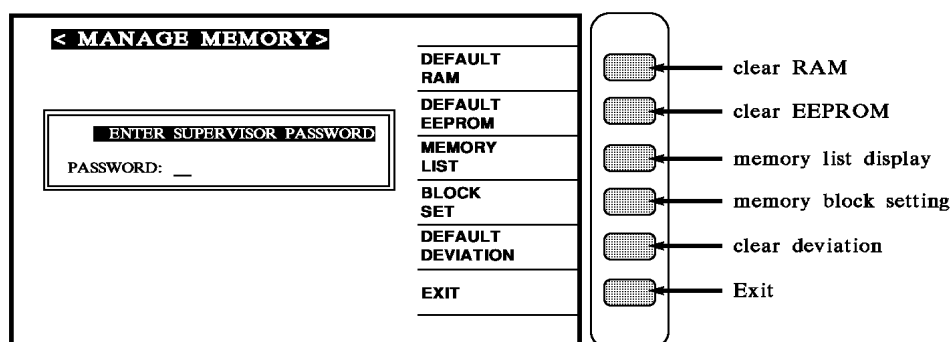
**① Beware**

The data of store is cover method, so input the item number then the original memory in that item will be covered by new data.

---

### 4.3.5 Memory Management Instruction

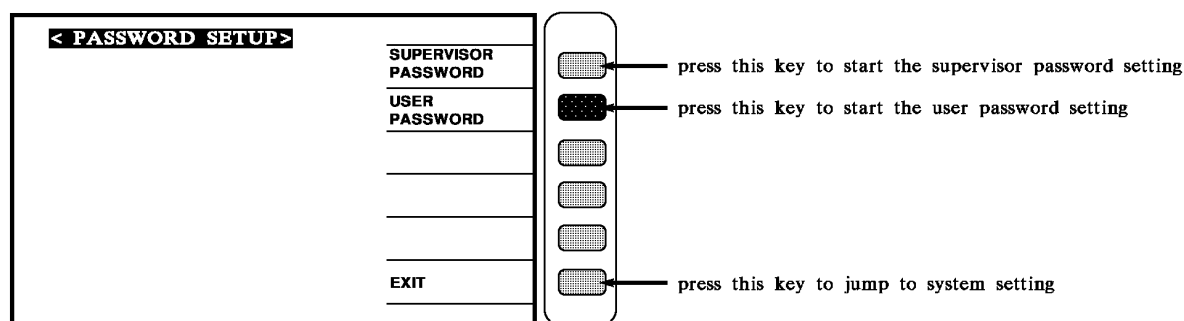
At SYSTEM SETUP status, press number key [0] key to enter < MEMORY MANAGEMENT > menu as shown:



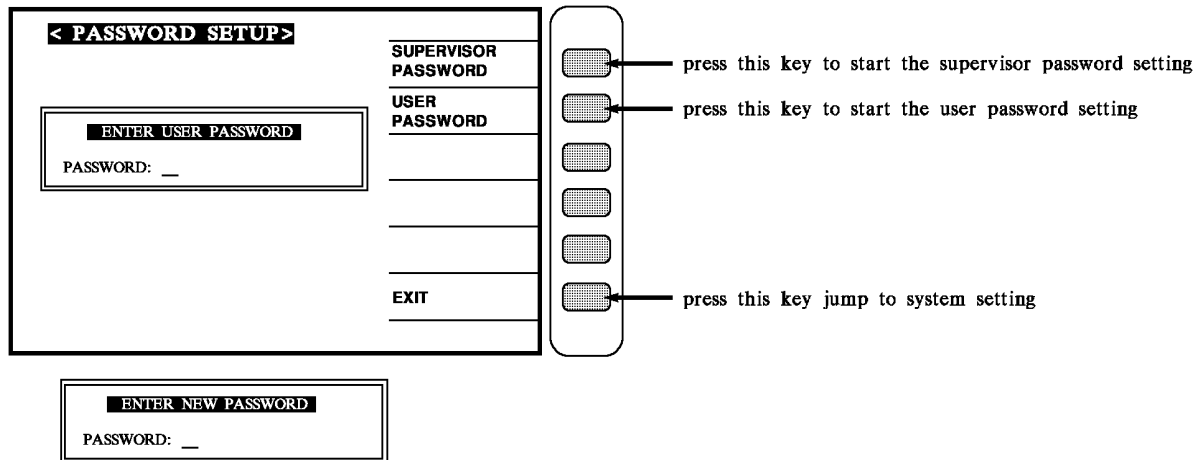
First at all, it needs to enter user's password, then it can enter memory management instruction.

### 4.3.6 User Password Setting

When the above screen is shown, pressing [1] to key in PASS WORD. The screen is as follows:



Press [USER PASSWORD] key to start the user password setting. The screen is as below:



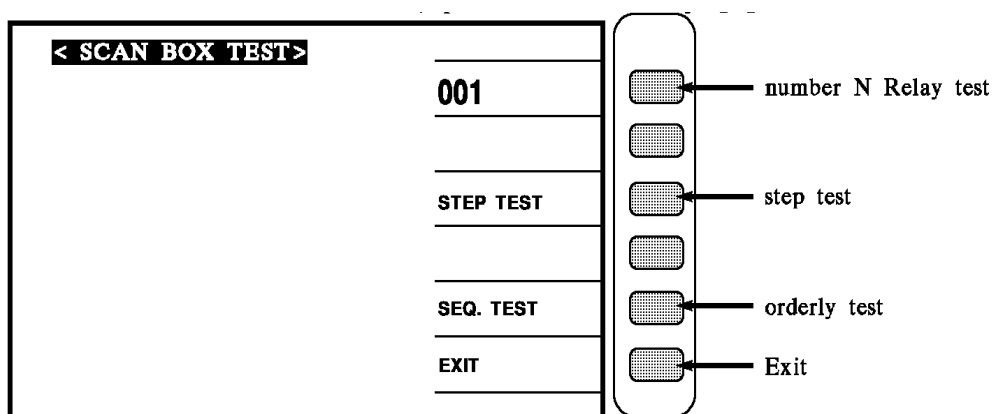
When the display shows the following screen, please key in new supervisor password (max. 10 digital). Then press [Enter].



The display will show the screen for confirming new set password. Please key in the new supervisor password and press [Enter] to finish the setting. Press the [EXIT] key can escape from this screen.

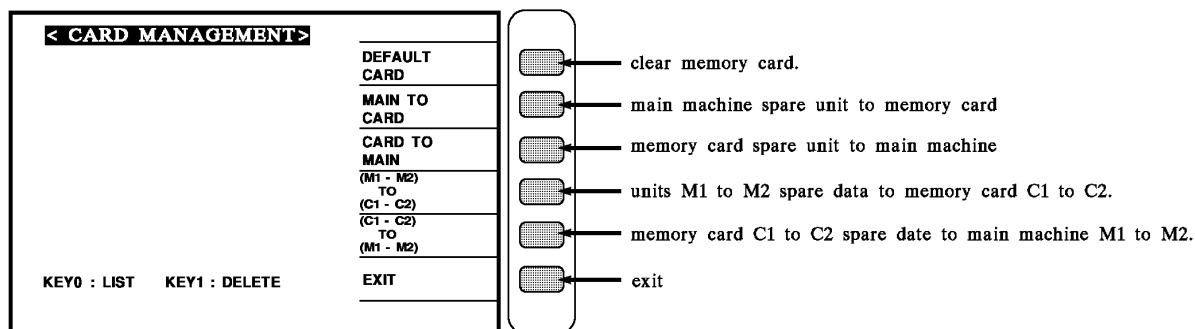
### 4.3.7 Scan Test Box (Box Test)

At SYSTEM SETUP status, press number key [2] to enter <BOX TEST> display, as show:



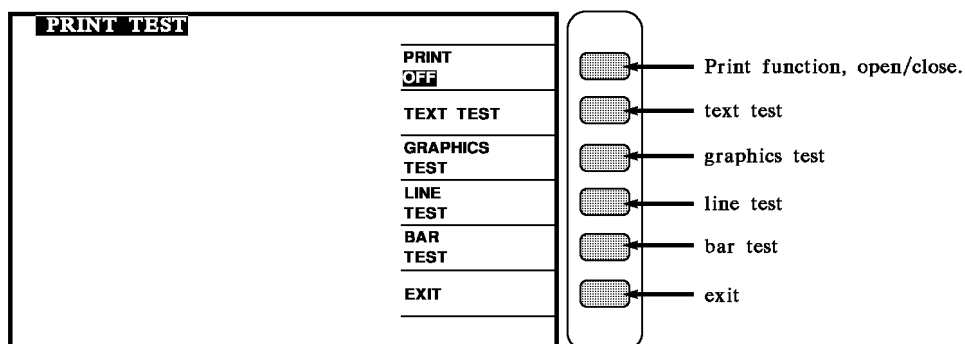
### 4.3.8 Memory Card Management Function

At SYSTEM SETUP status, press number key [3] to enter <CARD MANAGEMENT> display, as show:



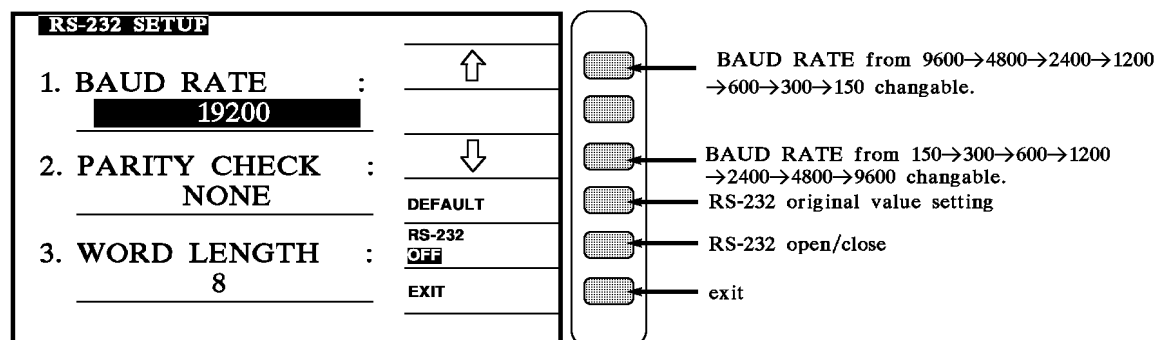
### 4.3.9 Print Testing

At SYSTEM SETUP status, press number key [4 ] to enter <PRINT TEST> display, as show:



### 4.3.10 RS-232 Setup

At SYSTEM SETUP status, press number key [5] to enter <RS-232 SETUP> display, as show:

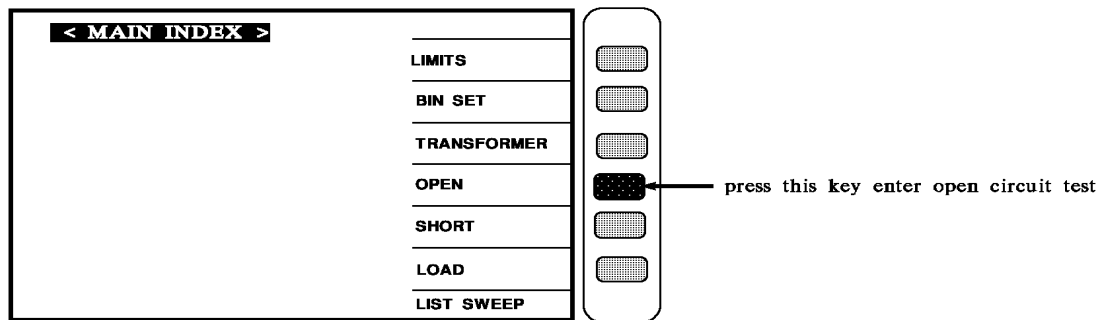


## 4.4 Operation Instruction

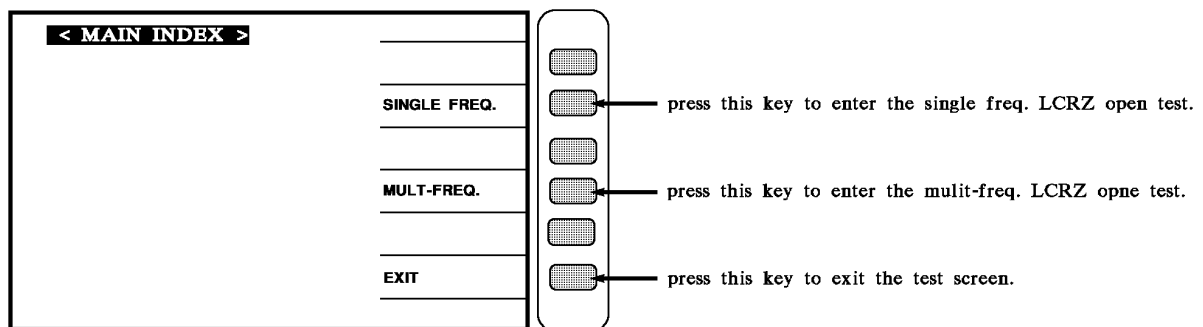
### 4.4.1 Open Test

After turn the instrument on and show every event is ok, press [Main Index] to enter main index, then press the key shows "OPEN" on the screen, as below:

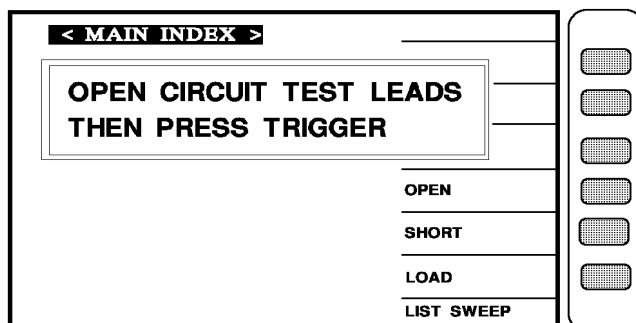




When press [OPEN], the screen shows as below:



After select the open test then screen shows as below:



As above is to tell user, it is testing of open test, please prepare test cable and press [Trig] then start to test, use the one of the accessory that be carried with instrument; 4 lines cable, and connect the test cable, and connect the test cable as open as below:

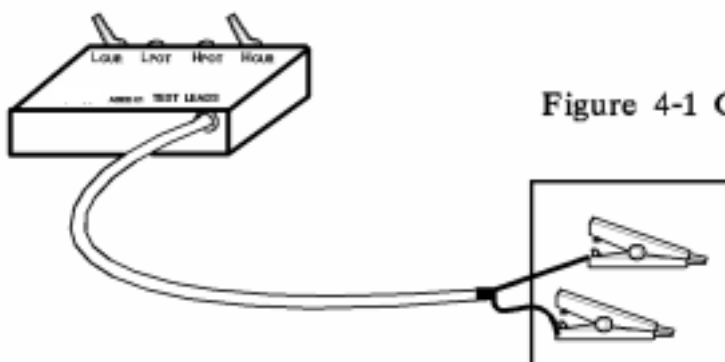
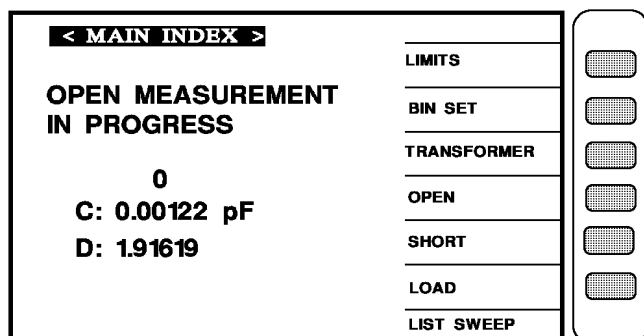
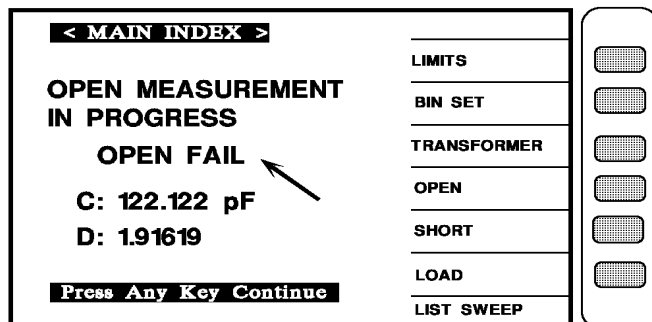


Figure 4-1 Open test

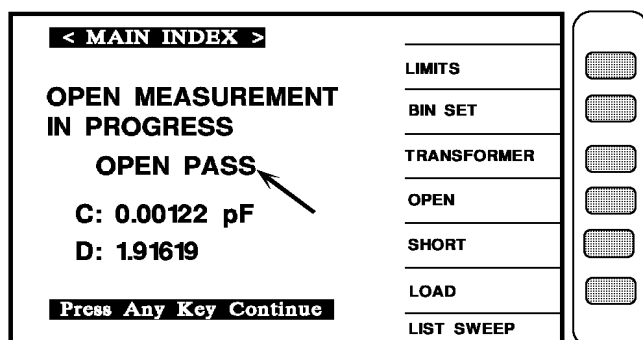
After finish the cable connecting, press [Trig] to start open test, it will show the condition of open test on the screen as below:



If there is any wrong, the screen will show [OPEN FAIL], it mean the procedure of open test wrong, please check any break on the test cable or clips touch no good, after checking then operate it again as below the arrow head pointing:

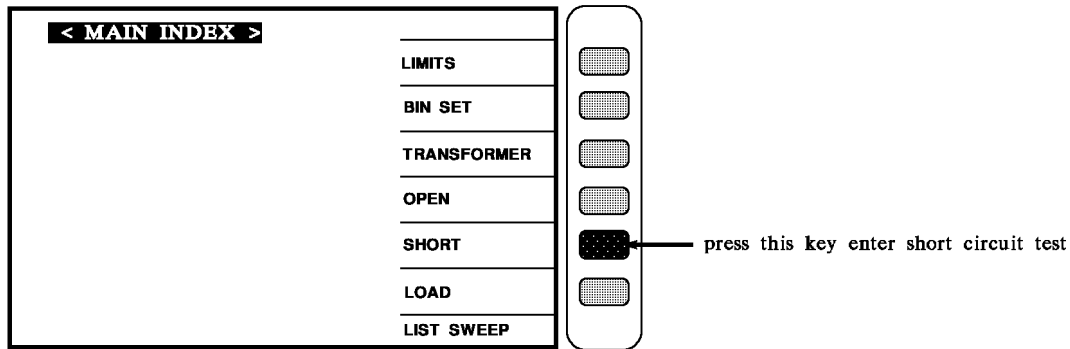


When open test is current, the screen will shows [OPEN PASS], the mean is open test finished, press any key will escape to another index as below the arrow head pointing:

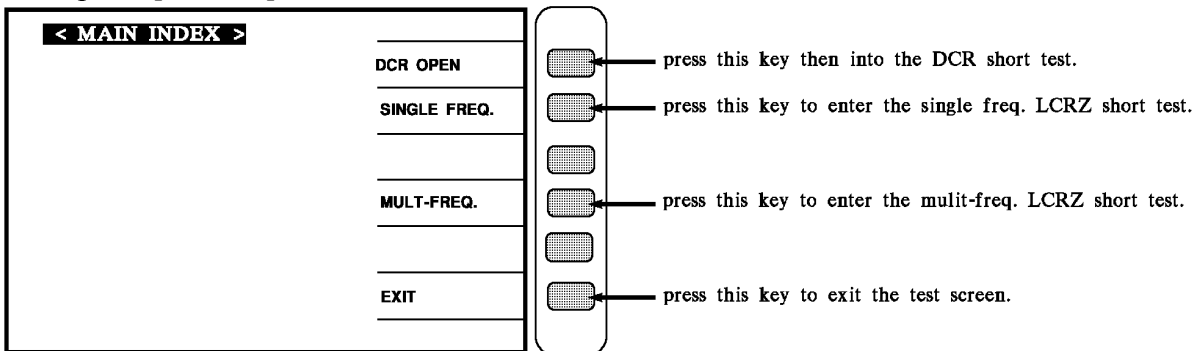


## 4.4.2 Short Test

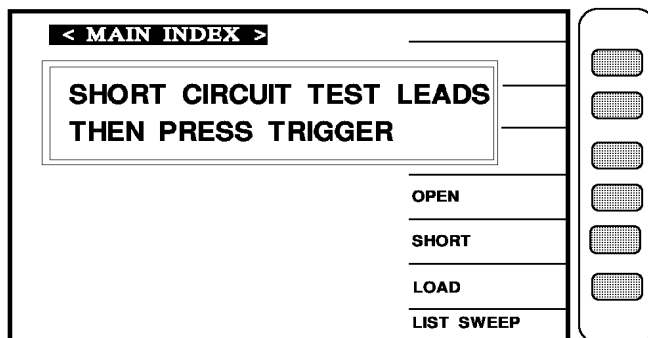
After turn the instrument on and show every event is ok, press [Main Index] to enter main index, then press the key shows "SHORT" on the screen, as below:



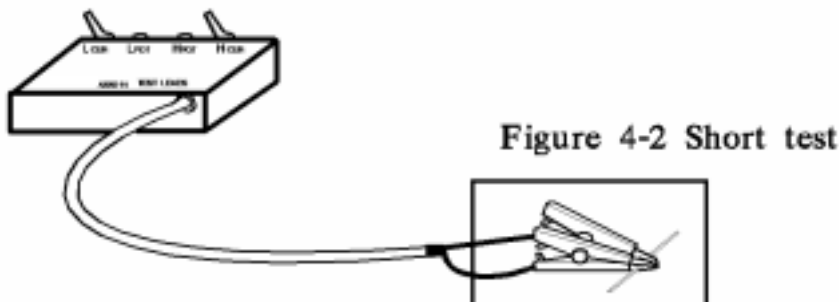
When press [SHORT], the screen shows as below:



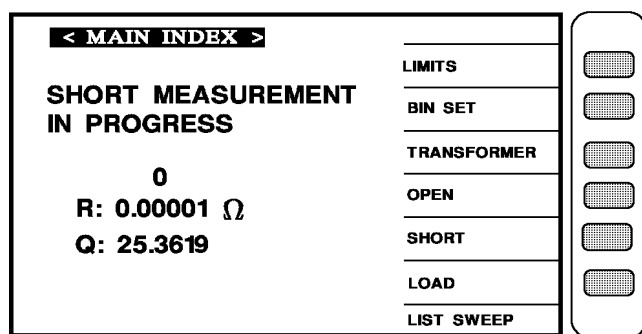
After select the short test then screen shows as below:



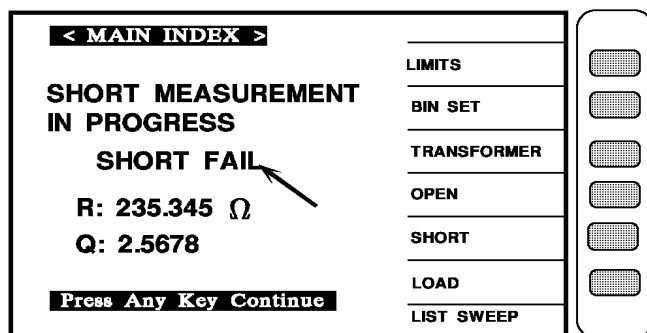
As above is to tell user, it is testing of short test, please prepare test cable and press [Trig] then start to test, use the one of the accessory that be carried with instrument; 4 lines cable, and connect the test cable as short below:



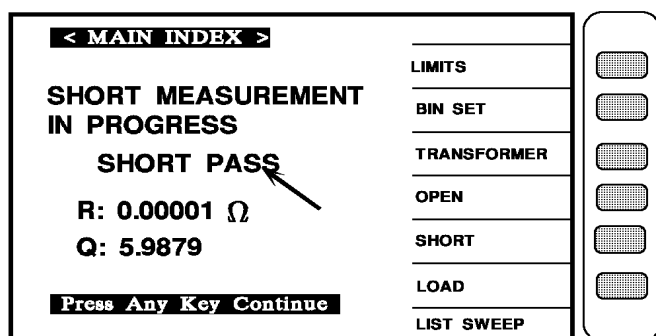
After finish the cable connecting, press [Trig] to start short test, it will show the condition of short test on the screen as below:



If there is any wrong, the screen will show [SHORT FAIL], it mean the procedure of short test wrong, please check any break on the test cable or clips touch no good, after checking then operate it again as below the arrow head pointing:

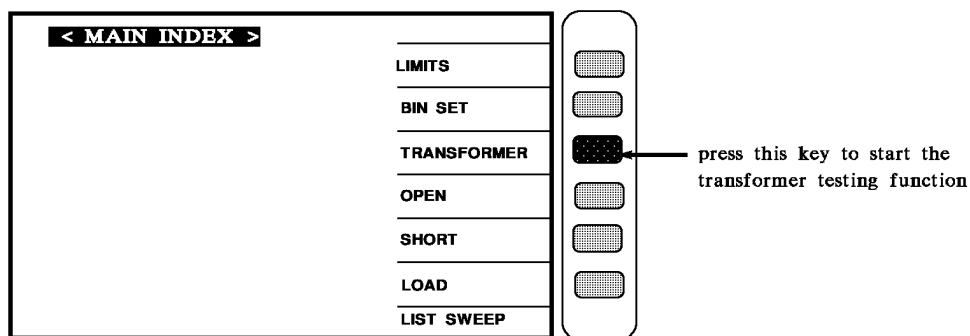


When short test is current, the screen will shows [SHORT PASS], the mean is short test finished, press any key will escape to another index as below the arrow head pointing:

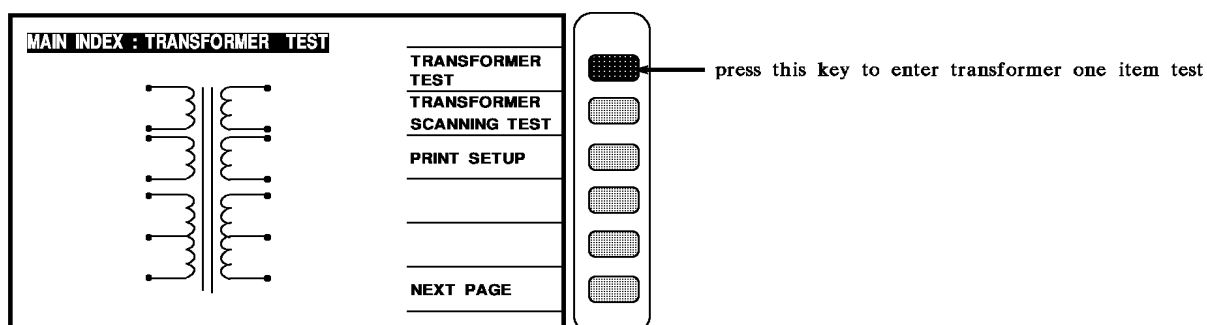


### 4.4.3 Single Transformer Test

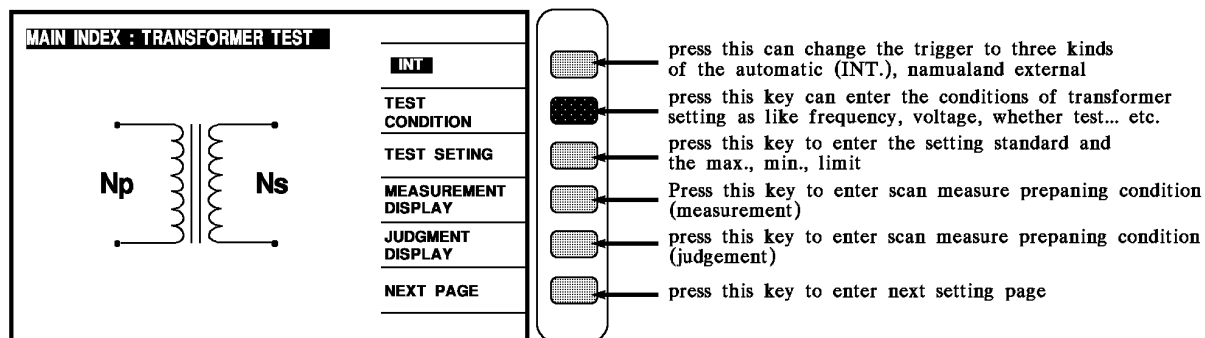
1. The display shows **Chroma's** name, phone no., fax no., model no., and programming version (around 2 seconds) after the main power of the unit is switch ON.



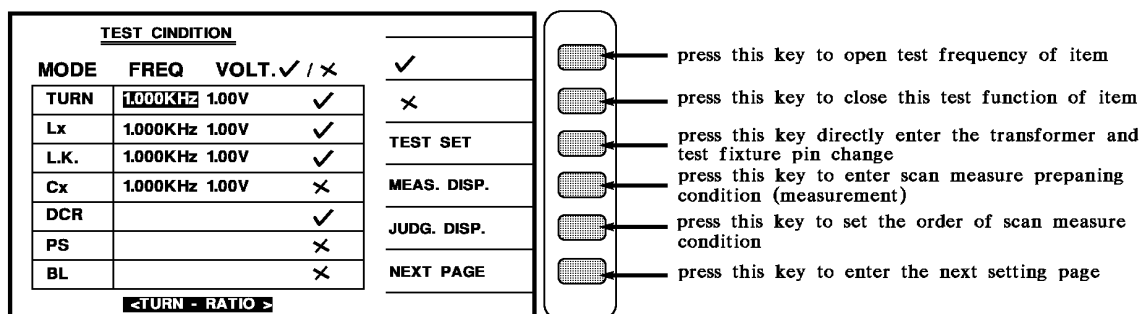
- After turn the instrument on and show every event is ok, press [Main Index] to enter main index, then press the transformer testing function key shows "TRANSFORMER", it will show the screen as below:



- Press the key [TRANSFORMER TEST] that pointed by arrow head as above to enter the function set screen of single transformer, the screen will show as below:



- When into this screen, press [TEST CONDITION] to enter the test setting screen, set each parameter are as below:



There are some parameters as following:


TURN : transformer turn ratio and phase test  
Lk : transformer leakage inductance test

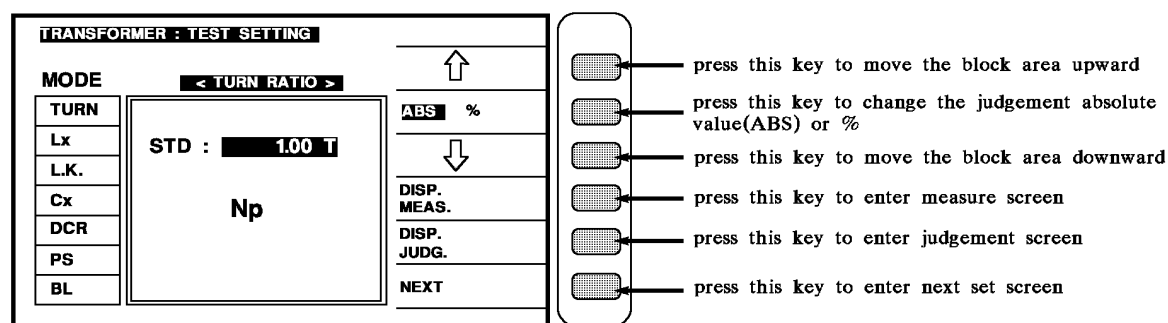
Lx : transformer inductance test  
DCR: transformer DC resistance

### ① Notice

In single transformer testing do not offer BL, PS, Cx functions, just offer in transformer scan test, the Q value is to refer not for judgment.



Enter this screen is in the parameter setting test, please follow the screen guide with block area and number to input that parameter then press [Enter] will automatically change to next setting item, as this method to set the last item then press [Enter] can automatically change to next parameter setting screen as below.

If the user desire to change the setting on each backlight, the values may change by pressing the  key which under the Cursor.



When enter this screen is in the measurement parameter judgment setting, please follow the block area on the screen to input number and requirement of parameter testing value then press [Enter] to automatically change to next setting item.

Beware the judgment is ABS or % when input judgment high/low limit, the method of change is to press the key beside screen [ABS%], to change the ABS to block area if want to use ABS, % is the same.

In the block area  and  keys are to move the block area upward or downward to the setting value, it meant is to move and modify the value of STD, HIGH, LOW.

The [DISP. MEAS.] and [DISP. JUDG.] in show area are fast keys, press these two keys will directly enter the measurement screen, after modify one of the test can easy enter test screen, [DISP. MEAS.] is to show measurement screen, [DISP. JUDG.] is to show judgment result screen.

### Example:

Input parameter setting:

There are spec, and unknown parameter of one transformer as following:

|             | Np      | Ns     | Lx       | L.k.     | DCR      |
|-------------|---------|--------|----------|----------|----------|
| <b>STD.</b> | 100.0 T | 10.0 T | 9.800 mH | 120.0 uH | 120.0 mΩ |
| <b>HIGH</b> |         | 10.2 T | +5%      | 150.0 uH | 150.0 mΩ |
| <b>LOW</b>  |         | 9.8 T  | -5%      | 0.0 uH   | 100.0 mΩ |

After enter the setting screen of measure judge parameter, the first setting item is Np of TURN RATIO, the method of input is [1] [0] [0] [.] [0] [Enter]

The finished screen is as right figure, make sure all current then press [Enter] to enter next setting.

The screenshot shows the 'TRANSFORMER : TEST SETTING' screen. The 'MODE' is set to '< TURN RATIO >'. On the left, a list of parameters includes Np, Lx, L.K., Cx, DCR, PS, and BL, with Np highlighted. The main display area shows 'STD : 100.00 T' and 'Np'. On the right, there are navigation buttons: an up arrow, 'ABS %', a down arrow, 'DISP. MEAS.', 'DISP. JUDG.', and 'NEXT'.

This setting item is to set the Ns parameter of TURN-RATIO; the method of input is as below:

**STD.** : [1] [0] [.] [0] [Enter]  
**HIGH** : [1] [0] [.] [2] [Enter]  
**LOW** : [9] [.] [8] [Enter]

The finished screen is as right figure, make sure all current then press [Enter] to enter next setting.

The screenshot shows the 'TRANSFORMER : TEST SETTING' screen. The 'MODE' is set to '< TURN RATIO >'. On the left, a list of parameters includes TURN, Lx, L.K., Cx, DCR, PS, and BL, with TURN highlighted. The main display area shows 'STD : 10.00 T', 'HIGH : 10.20 T', and 'LOW : 9.80 T'. On the right, there are navigation buttons: an up arrow, 'ABS %', a down arrow, 'DISP. MEAS.', 'DISP. JUDG.', and 'NEXT'.

This setting item is to set the Lx parameter of on primary inductance; the method of input is as below:

[ABS %]  
**STD.** : [9] [.] [8] [mH] [Enter]  
**HIGH** : [5] [Enter]  
**LOW** : [-] [5] [Enter]

The finished screen is as right figure, make sure all current then press [Enter] to enter next setting

The screenshot shows the 'TRANSFORMER : TEST SETTING' screen. The 'MODE' is set to '< INDUCTANCE >'. On the left, a list of parameters includes TURN, Lx, L.K., Cx, DCR, PS, and BL, with Lx highlighted. The main display area shows 'STD : 9.800 mH', 'HIGH : 5.00 %', and 'LOW : - 5.00 %'. On the right, there are navigation buttons: an up arrow, 'ABS %', a down arrow, 'DISP. MEAS.', 'DISP. JUDG.', and 'NEXT'.

This setting item is to set the primary Leakage inductance parameter; the method of input is as below:

[ABS %]  
**STD.** : [1] [2] [0] [uH] [Enter]  
**HIGH** : [1] [5] [0] [uH] [Enter]  
**LOW** : [0] [Enter]

The finished screen is as right figure, make sure all correct then press [Enter] to enter next setting.

The screenshot shows the 'TRANSFORMER : TEST SETTING' screen. The 'MODE' is set to '< LEAKAGE INDUCTANCE >'. On the left, a list of parameters includes TURN, Lx, L.K., Cx, DCR, PS, and BL, with L.K. highlighted. The main display area shows 'STD : 120.00 uH', 'HIGH : 150.00 uH', and 'LOW : 0.000 uH'. On the right, there are navigation buttons: an up arrow, 'ABS %', a down arrow, 'DISP. MEAS.', 'DISP. JUDG.', and 'NEXT'.

This setting item is to set the primary parameter of the DCR; the method of input is as below:

STD. : [1] [2] [0] [mΩ] [Enter]  
 HIGH : [1] [5] [0] [mΩ] [Enter]  
 LOW : [1] [0] [0] [mΩ] [Enter]

The finished screen is as right figure, make sure all correct then press [NEXT] to enter measure screen as below:

| TRANSFORMER : TEST SETTING |                  |
|----------------------------|------------------|
| MODE                       | < DCR >          |
| TURN                       |                  |
| Lx                         | STD : 120.00 mΩ  |
| LK.                        | HIGH : 150.00 mΩ |
| Cx                         | LOW : 100.00 mΩ  |
| DCR                        |                  |
| PS                         |                  |
| BL                         |                  |
|                            | ↑                |
|                            | ABS %            |
|                            | ↓                |
|                            | DISP. MEAS.      |
|                            | DISP. JUDG.      |
|                            | NEXT             |

| TRANSFORMER TEST : MEAS. DISPLAY |           |
|----------------------------------|-----------|
| TURN : 10.00 T                   | INT       |
| Lx : 9.800 mH                    |           |
| LK. : 120.00 uH                  | SPEED : F |
| DCR : 120.00 mΩ                  | SETTING   |
| PH : +                           | DISP JUDG |
| PS : OFF                         |           |
| Q : 100.00                       | NEXT PAGE |

- press this key can change the trigger to three kinds of the automatic (INT.), manual, and external
- press this key to change the test speed slow, middle and fast
- press this key can directly enter the screen of parameter setting
- press this key can change to measure judgement screen
- press this key to enter next setting screen

Press the key [DIST. JUDG.] to enter the measure judgment screen as below:

| TRANSFORMER TEST : JUDGMENT DISPLAY |           |
|-------------------------------------|-----------|
| TURN : PASS                         | INT       |
| Lx : PASS                           |           |
| LK. : PASS                          | SPEED : F |
| DCR : PASS                          | SETTING   |
| PH : +                              | DISP MEAS |
| PS : OFF                            |           |
| Q : 100.00                          | NEXT PAGE |

- press this key can change the trigger to three kinds of the automatic (INT.), manual, and external
- press this key to change the test speed slow, middle and fast
- press this key can directly enter the screen of parameter setting
- press this key can change to measure judgement screen
- press this key to enter next setting screen

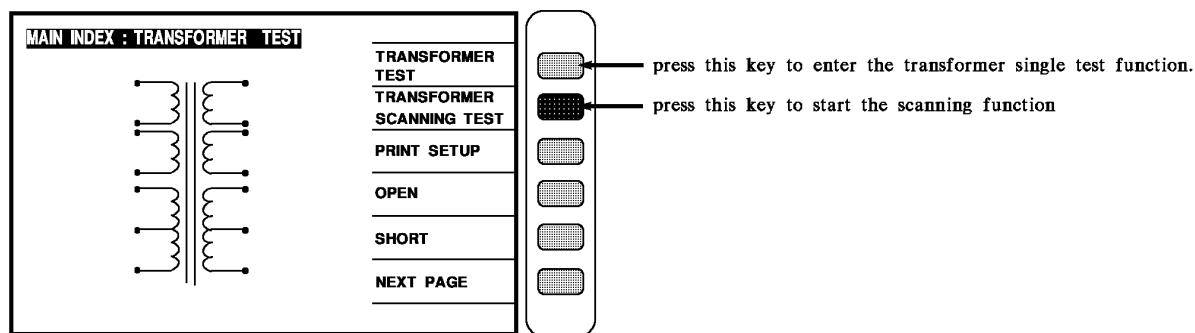
#### 4.4.4 Test Fixture (Scan Box) Operation

- The display shows **Chroma's** name, phone no., fax no., model no., and programming version (around 2 seconds) after the main power of the unit is switch ON.

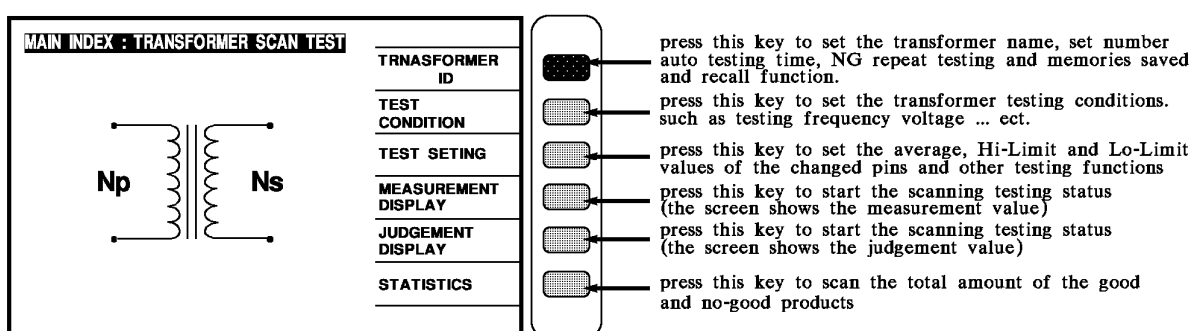
| < MAIN INDEX > |  |
|----------------|--|
| LIMITS         |  |
| BIN SET        |  |
| TRANSFORMER    | press this key to start the transformer testing function |
| OPEN           |  |
| SHORT          |  |
| LOAD           |  |
| LIST SWEEP     |  |

- The testing function menu is as follows:

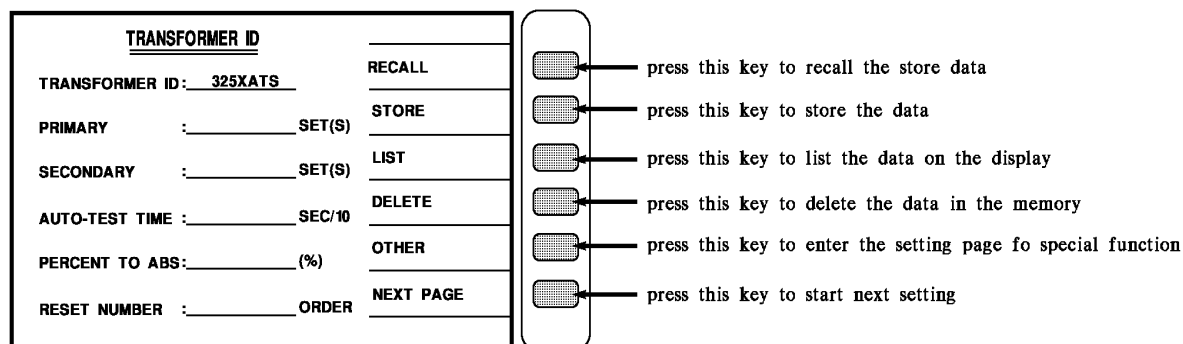




3. The scanning function menu is as following:



4. Meanwhile the unit is on guidable operation, to start the first main menu by pressing [Enter]



The above operations are described as following:

**TRANSFORMER ID:** \_\_\_\_\_...

Key in the DUT number. (the no., is the same as the saved no.). To key in the English letter by pressing [← →] and [Start]. Then key in the numeric [0...9][-][.] and press [Enter] to confirm it and exit to the next test setting page automatically.

*Note:* Use "Start" key to select English letter after transformer ID is OK. Then press "Enter"

**PRIMARY** : \_\_\_\_\_...

Key in the transformer tested set each time. To key in the numeric (1~4) and press [Enter] to confirm it and exit to the next test setting page automatically.

**SECONDARY** : \_\_\_\_\_...

Key in the transformer tested set twice. To key in the numeric (1~9) and press [Enter] to confirm it and exit to the next test setting page automatically.

**AUTO-TEST TIME** : \_\_\_\_\_...

Key in the automatic test time in between. To key in the numeric (0~99, 0 is OFF) and press [Enter] to confirm it and exit to the next test setting page automatically.








**PERCENT TO ABS** : \_\_\_\_\_...

Key in the percentage of entirety deviation range. To key in the deviation percentage and press [Enter] to confirm it and exit to the next test setting page automatically.

**RETEST NUMBER** : \_\_\_\_\_...

Key in the repeating test time for unqualified. To key in the numeric (1~10, 0 is OFF. >11 means continually testing) and press [Enter] to confirm it and exit to testing item setting automatically.

| TEST CONDITION |          |        |       |   |             |
|----------------|----------|--------|-------|---|-------------|
| MODE           | FREQ     | VOLT.  | ✓ / ✕ | ✓ |             |
| TURN           | 1.000KHz | 1.00V  | ✓     | ✓ |             |
| Lx             | 1.000KHz | 1.00V  | ✓     | ✕ |             |
| L.K.           | 1.000KHz | 1.00V  | ✓     |   | TEST SET    |
| Cx             | 1.000KHz | 1.00V  | ✕     |   | MEAS. DISP. |
| Zx             | 1.000KHz | 1.00V  | ✓     |   | STEP SEQ.   |
| ACR            | 1.000KHz | 1.00V  | ✕     |   |             |
| DCR            |          |        | ✕     |   | N.P.        |
| PS (X)         | BL (X)   | HP (X) |       |   | [F] FREQ    |

-  press this key to open the testing function
-  press this key to close the testing function
-  press this key to start the setting window of transformer and test fixture exchanged pins
-  press this key to start the scan testing perparation status
-  press this key to set the step sequence of each testing
-  press this key to start next setting screen
-  press [ - ] key to enter multi-frequency setting screen.

The above parameters are described as following:

TURN : Turn ratio & phase detector of transformer

Lx : Inductance testing of transformer

Lk : Leakage inductance testing of transformer

Cx : Pin stray capacity current testing of transformer

Zx : The transformer's AC absolute resistance test


ACR : AC resistance testing of transformer

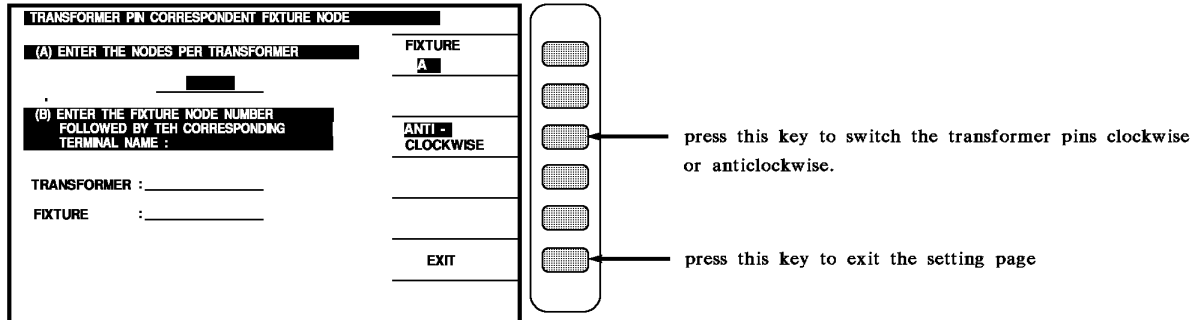
DCR : DC resistance testing of transformer

PS : Pin short testing of transformer

BL : Any two sets testing balance of transformer

HV : The transformer's high voltage test

The following screen is for measuring parameters setting. It is still a guidable operation what just following the method of the display to key in the testing parameter and to finish it by pressing [Enter] to jump to next testing item. As above, by pressing [Enter] of the last item on each screen, the unit will jump to the next setting screen automatically. If the user desire to change the setting on each backlight, the values may change by pressing the  key which under the Cursor.



The input is according to the cursor pointing the correct data, the description is as following:

#### (A) ENTER THE NODES PER TRANSFORMER

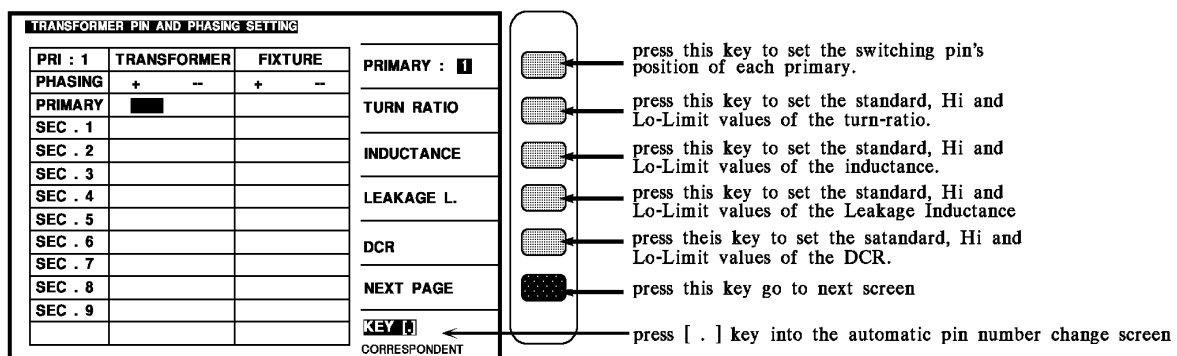
Please input the pin number of the transformer, including the pin that not in using.

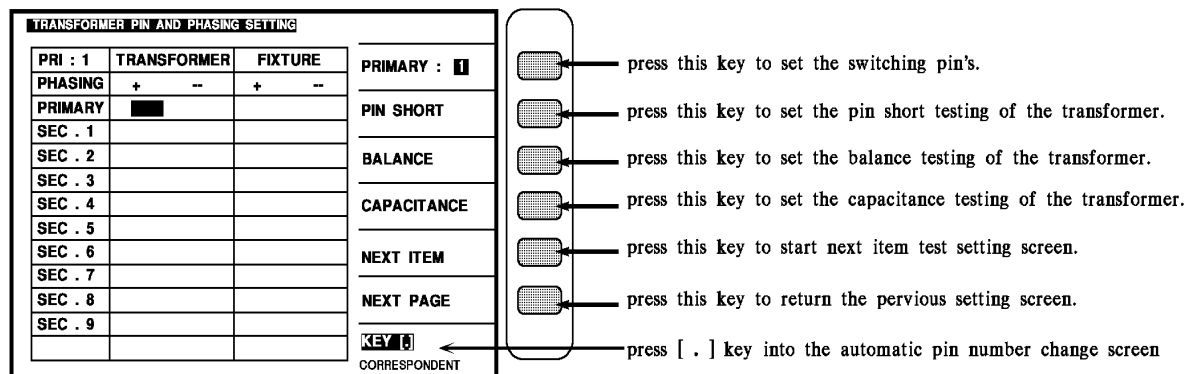
#### (B) ENTER THE FIXTURE NODE NUMBER, FOLLOWED BY THE CORRESPONDING

TERMINAL NAME : \_\_\_\_\_  
 TRANSFORMER : \_\_\_\_\_  
 FIXTURE : \_\_\_\_\_

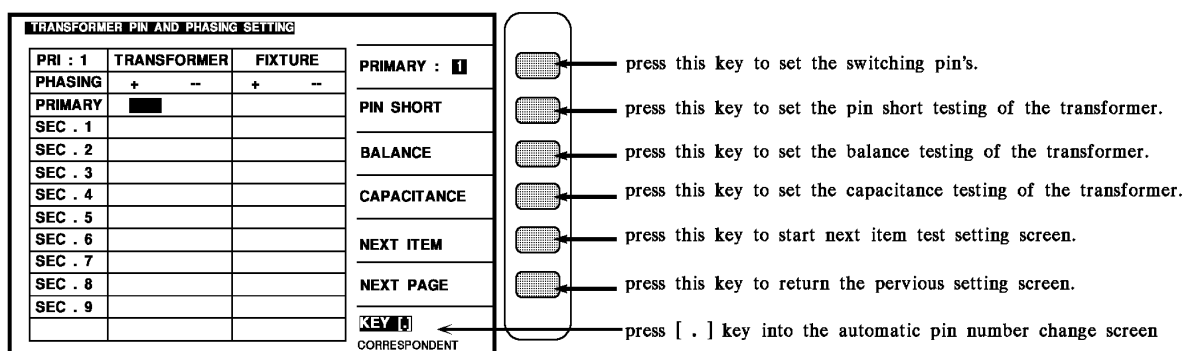
Please input the any pins under (TRANSFORMER: .....), then input the first pin that locates in the test fixture (FIXTURE: .....).

After input the each data, then press [EXIT] key to exit the setting page and finish the automatic pins conversion.






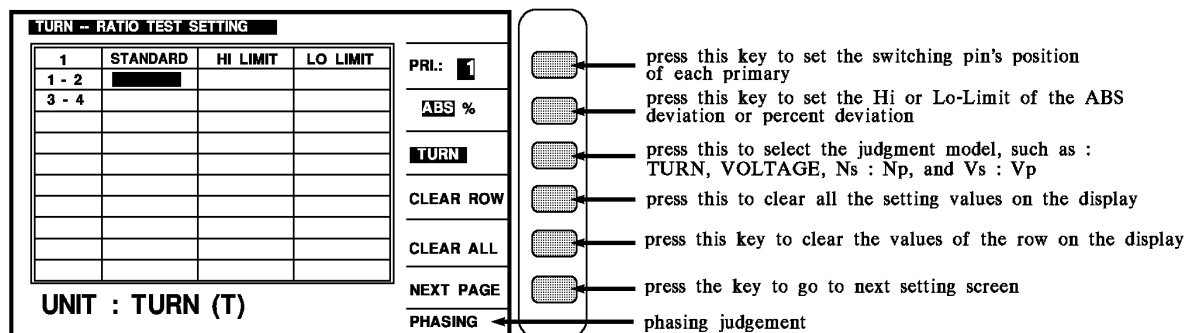
The display shows as following by pressing [NEXT PAGE] on previous screen.



The above parameters are described as following:


- PRI : 1 : The first level pin setting.
- TRANSFORMER : Pin position of the transformer
- FIXTURE. : The pin of transformer on the fixture
- PHASING : The indicator of the pin phasing on the transformer
- PRIMARY : The primary level pin position of the transformer
- SEC : 1...9 : The pin positions of each secondary level


The following screen is setting for the correspondence of transformer pin with fixture to the fixture. It is still a guidable operation what just following the method of the display to key in the testing parameter and to finish it by pressing [Enter] to jump to next testing item. As above, by pressing [Enter] of the last item on each screen, the unit will jump to next setting screen automatic. If the user desire to change the setting on each backlight, the value may change by pressing the  key which under the Cursor.

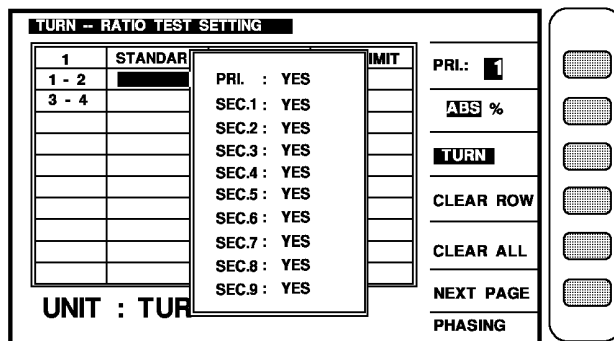


The above parameters are described as following:

- 1 – 2 : The primary turn
- 3 – 4 : 1...9 the secondary turn
- STANDARD : The standard value of each turn
- HI LIMIT. : The judgment of the Hi-Limit value
- LO LIMIT : The judgment of the Lo-Limit value

The following screen is for setting the TURN RATIO JUDGMENT of the transformer. It is still a guidable operation what just following the method of the display to key in the testing parameter and to finish it by pressing [Enter] to jump to next testing item. As above, by pressing [Enter] of the last item on each screen the unit will jump to next setting screen automatic. If the user desire to change the setting on each backlight, the values may change by pressing the  key which under the Cursor.

If the screen initiate 1 – 2 and 3 – 4 as above is obvious pin, then show pin which are set. If want to move the block randomly, can use the  keys under cursor to forward way to move.



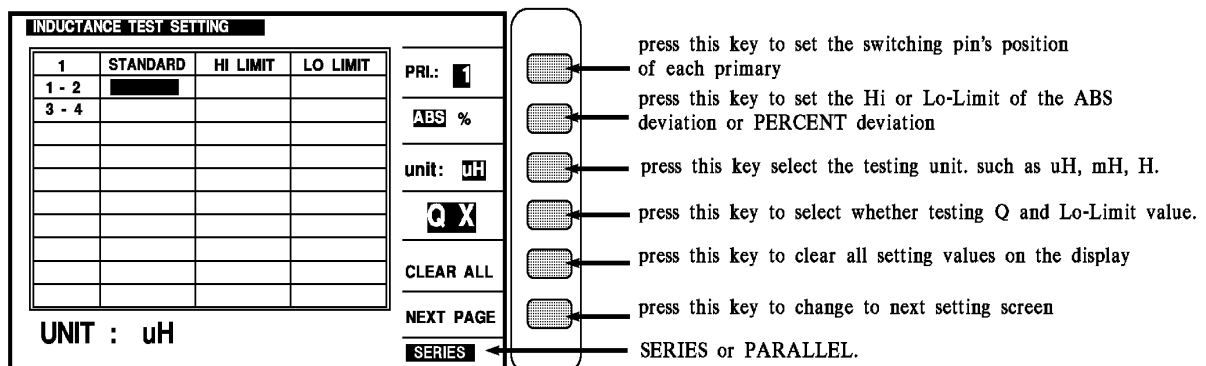
The screen displays a table for setting turn ratios. The table has columns for '1', 'STANDARD', and 'LIMIT'. The first row is for '1 - 2' and the second for '3 - 4'. To the right of the table, there are labels for 'PRI.: 1', 'ABS %', 'TURN', 'CLEAR ROW', 'CLEAR ALL', 'NEXT PAGE', and 'PHASING'. A vertical column of buttons is on the right side of the screen.

| 1     | STANDARD | LIMIT |
|-------|----------|-------|
| 1 - 2 |          |       |
| 3 - 4 |          |       |
|       |          |       |
|       |          |       |
|       |          |       |
|       |          |       |
|       |          |       |
|       |          |       |
|       |          |       |
|       |          |       |

PRI.: 1  
ABS %  
TURN  
CLEAR ROW  
CLEAR ALL  
NEXT PAGE  
PHASING

UNIT : TUR

The following screen is for setting the. For ignoring any set in 9 sets of secondary, just change YES to NO.



The screen displays a table for setting inductance test parameters. The table has columns for '1', 'STANDARD', 'HI LIMIT', and 'LO LIMIT'. The first row is for '1 - 2' and the second for '3 - 4'. To the right of the table, there are labels for 'PRI.: 1', 'ABS %', 'unit: uH', 'Q X', 'CLEAR ALL', 'NEXT PAGE', and 'SERIES'. A vertical column of buttons is on the right side of the screen. Arrows point from the buttons to descriptive text on the right.

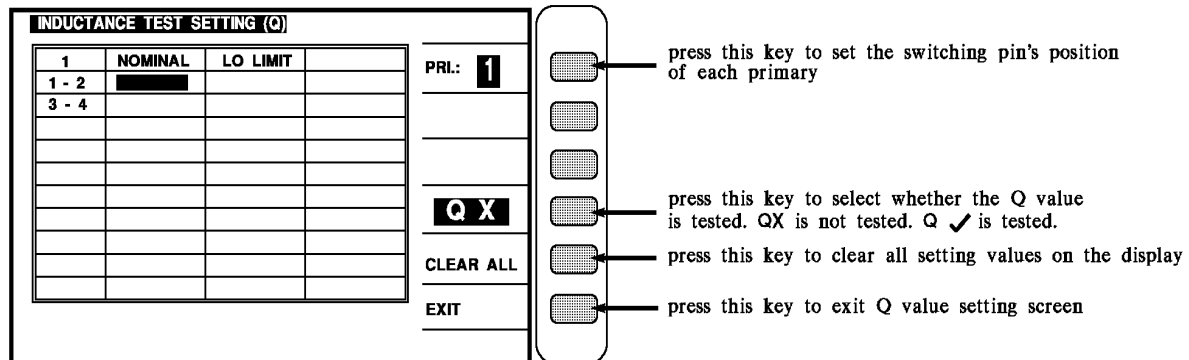
| 1     | STANDARD | HI LIMIT | LO LIMIT |
|-------|----------|----------|----------|
| 1 - 2 |          |          |          |
| 3 - 4 |          |          |          |
|       |          |          |          |
|       |          |          |          |
|       |          |          |          |
|       |          |          |          |
|       |          |          |          |
|       |          |          |          |
|       |          |          |          |

PRI.: 1  
ABS %  
unit: uH  
Q X  
CLEAR ALL  
NEXT PAGE  
SERIES

UNIT : uH

- press this key to set the switching pin's position of each primary
- press this key to set the Hi or Lo-Limit of the ABS deviation or PERCENT deviation
- press this key select the testing unit. such as uH, mH, H.
- press this key to select whether testing Q and Lo-Limit value.
- press this key to clear all setting values on the display
- press this key to change to next setting screen
- SERIES or PARALLEL.


As the above, display the new screen by pressing [QX]



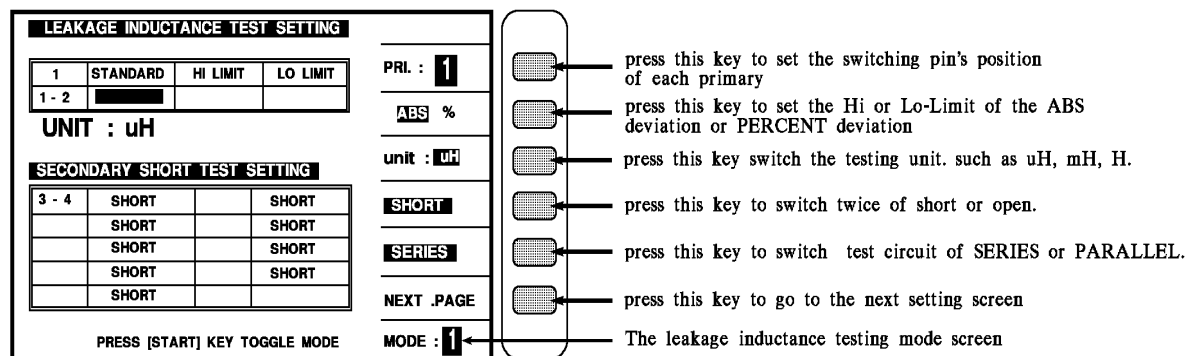
Above parameters are described as following:

- 1 - 2 : The first level pin setting
- 3 - 4 : The secondary turn of the transformer
- STANDARD : The standard value of the each turn
- HI LIMIT. : The judgment of the Hi-Limit value
- LO LIMIT : The judgment of the Lo-Limit value
- Q LO LIMIT : Q Lo Limit value
- NOMINAL : Normal of Q value

The following screen is for setting the INDUCTANCE and Q value of the transformer. It is still a guidable operation what just following the method of the display to key in the testing parameter and to finish it by pressing [Enter] to jump to next testing item. As above, by pressing [Enter] of the last item on each screen, the unit will jump to next setting screen automatic.

But when the screen is Q value setting must press [EXIT] key to escape to inductance setting. If the users want to change the setting on each backlight, the values may change by pressing the  key the which under the Cursor.

If the system initiate 1 - 2 and 3 - 4 as above is obvious pin, then show the pin which are set.



Above screen is for single set testing of leakage inductance mode. For multi-sets, please press [Start] and the screen is as following:

**LEAKAGE INDUCTANCE TEST SETTING**

| 1     | STANDARD | HI LIMIT | LO LIMIT |
|-------|----------|----------|----------|
| LK. 1 |          |          |          |

**TRANSFORMER FIXTURE**

| LK. 1 |  |  |       |
|-------|--|--|-------|
| 1.    |  |  | SHORT |
| 2.    |  |  | SHORT |
| 3.    |  |  | SHORT |
| 4.    |  |  | SHORT |
| 5.    |  |  | SHORT |
| 6.    |  |  | SHORT |
| 7.    |  |  | SHORT |
| 8.    |  |  | SHORT |
| 9.    |  |  | SHORT |

LK : **1**

ABS %

unit : **mH**

**SHORT**

CLEAR ALL

NEXT PAGE


MODE : **2**

- press this key to switch to multi-set leakage inductance. The max. is 9sets
- press this key to set the Hi or Lo-Limit of the ABS deviation or PERCENT deviation
- press this key to switch the testing unit. such as uH, mH, H.
- press this key to switch twice of short or open.
- clear all data.
- press this key to go to the next setting screen
- The leakage inductance testing mode screen

Above is multi-sets testing. Press [Start] to return to single set testing.

Above parameters are described as following:

- 1 – 2 : The first level pin setting
- 3 – 4 : The secondary turn of the transformer
- STANDARD : The standard value of each turn
- HI LIMIT : The judgment of the Hi-Limit value
- LO LIMIT : The judgment of the Lo-Limit value
- LK. 1...9 : The testing set of the leakage inductance
- TRANSFORMER : Pin position of the transformer
- FIXTURE : The pin on transformer reflects to the fixture

The following screen is setting for JUDGMENT OF LEAKAGE INDUCTANCE of the transformer. It is still a guidable operation what just following the method of the display to key in the testing parameter and to finish it by pressing [Enter] to jump to next testing item. As above, by pressing [Enter] of the last item on each screen, the unit will jump to next setting screen automatic. The positions of 1 – 2, 3 – 4 as above figure, if the system setting is shown pins, then show the pins set. If the user desire to change the setting on each backlight, the values may change by pressing the  key which under the Cursor.

**DCR TEST SETTING**

| 1     | STANDARD | HI LIMIT | LO LIMIT |
|-------|----------|----------|----------|
| 1 - 2 |          |          |          |
| 3 - 4 |          |          |          |
|       |          |          |          |
|       |          |          |          |
|       |          |          |          |
|       |          |          |          |
|       |          |          |          |
|       |          |          |          |

PRI.: **1**

ABS %

unit : **mΩ**

CLEAR ROW

CLEAR ALL


NEXT PAGE

UNIT : mΩ

- press this key to set the switching pin's position of each primary
- press this key to set the Hi or Lo-Limit of the ABS deviation or PERCENT deviation
- press this key to switch the testing unit. as mΩ, Ω, kΩ
- press this key to clear all the setting values on the display
- press this key to clear the values on the backbite row
- press this key to go to the next setting screen





Above parameters are described as following:

- 1 – 2 : The first level pin setting.
- 3 – 4 : The secondary turns of the transformer
- STANDARD : The standard value of each turn
- HI LIMIT : The judgment of the Hi-Limit value
- LO LIMIT : The judgment of the Lo-Limit value

The screen below is for setting the DC CURRENT RESISTANCE judgment of the transformer. It is still a guidable operation what just following the method of the display to key in the testing parameter and to finish it by pressing [Enter] to jump to next testing item. As above, by pressing [Enter] of the last item on each screen, the unit will jump to next setting screen automatically. If the user desire to change the setting on each backlight, the values may change by pressing the  key which under the Cursor.

| TRANSFORMER : PIN SHORT SETTING |             |         |
|---------------------------------|-------------|---------|
| PRI : 1                         | TRANSFORMER | FIXTURE |
| PHASING                         | + --        | + --    |
| SHORT 0                         |             |         |
| SHORT 1                         |             |         |
| SHORT 2                         |             |         |
| SHORT 3                         |             |         |
| SHORT 4                         |             |         |
| SHORT 5                         |             |         |
| SHORT 6                         |             |         |
| SHORT 7                         |             |         |
| SHORT 8                         |             |         |
| SHORT 9                         |             |         |
| SHORT 10                        |             |         |

PRIMARY : 1  
  
  
  
  
 MEASUREMENT  
DISPLAY  
JUDGMENT  
DISPLAY  
NEXT PAGE

press this key to set the switching pin's position of each primary

press this key to start the scanning testing status(the screen shows the measurement value)


press this key to start the scanning testing status(the screen shows the judgment value)

press this key to go to the next setting screen

Above parameters are described as following:





PRI : The first level pin setting  
 SEC 1...9 : The secondary turns of the transformer  
 TRANSFORMER : Pin position of the transformer  
 FIXTURE : Pin position of the fixture

The screen below is for setting the PIN SHORT judgment of the transformer. It is still a guidable operation what just following the method of the display to key in the testing parameter and to finish it by pressing [Enter] to jump to next testing item. As above, by pressing [Enter] of the last item on each screen, the unit will jump to next setting screen automatically.

If the user desire to change the setting on each backlight, the values may change by pressing the  key which under CURSOR.

| TRANSFORMER : BALANCE SETTING               |                        |
|---|------------------------|
| NOMINAL VALUE : <input type="text"/>        | BL : 1                 |
| BALANCE -- -- L1 : PRI.                     | ABS %                  |
| BALANCE -- -- L2 : PRI.                     | unit : OH              |
| ABS(L1 -- -- L2) < <input type="text"/> (%) | Lx.                    |
|   | MEASUREMENT<br>DISPLAY |
|   | NEXT PAGE              |

BL : 1  
ABS %  
unit : OH  
Lx.  
MEASUREMENT  
DISPLAY  
NEXT PAGE

press this key to select the sets of the balance testing. The max. 5 sets

press this key to alter the judgment of the ABS deviation or PERCENT deviation

press key to alter the testing unit

press this key to select whether the balance testing is Lx. or DCR.

press the key to start the scan testing status (the measurement display)


press this key to go to next setting screen

Above parameters are described as following:

NOMINAL VALUE : The standard of the balance testing  
 BALANCE -- -- L1 : The primary turn for balance testing.  
 BALANCE -- -- L2 : The secondary turn for balance testing  
 ABS (L1 – L2) <. : The Hi-Limit of percent deviation on balance testing.




The screen below is for setting the **RESISTANCE BALANCE** judgment of the transformer. It is still a guidable operation what just following the method of the display to key in the testing parameter and to finish it by pressing [Enter] to jump to next testing item. As above by pressing [Enter] of the last item on each screen, the unit will jump to next setting screen automatic.

If the user desire to change the setting on each backlight, the values may change by pressing the  key which under Cursor.

| CAPACITANCE TEST SETTING |          |          |          |
|--------------------------|----------|----------|----------|
| 1                        | STANDARD | HI LIMIT | LO LIMIT |
| Cx.1                     |          |          |          |
| T : (+ -) F : (+ -)      |          |          |          |
| Cx.1                     |          |          |          |
| 1.                       |          |          | (HI,+)   |
| 2.                       |          |          |          |
| 3.                       |          |          |          |
| 4.                       |          |          |          |
| 1.                       |          |          | (LO,-)   |
| 2.                       |          |          |          |
| 3.                       |          |          |          |
| 4.                       |          |          |          |

Cx. : 1


ABS 


unit : pF


PARALLEL


CLEAR ALL


NEXT PAGE


 press this key to set the switching pin's multi-set inter-winding capacitance test. The max. 9 sets

 press this key to set the Hi or Lo-Limit of the ABC deviation or PERSENT deviation

 press this key to switch the testing unit such as pF, nF, uF.

 press this key to switch the parallel or series testing

 press this key to clear all the setting values on the display

 press key to go to next setting screen

Above parameters are described as following:

STANDARD : The standard value of each turn

HI LIMIT. : The judgment of the Hi-Limit value

LO LIMIT : The judgment of the Lo-Limit value

Cx.1...9 : The stray capacity inductance testing set


TRANSFORMER : Pin position of the transformer

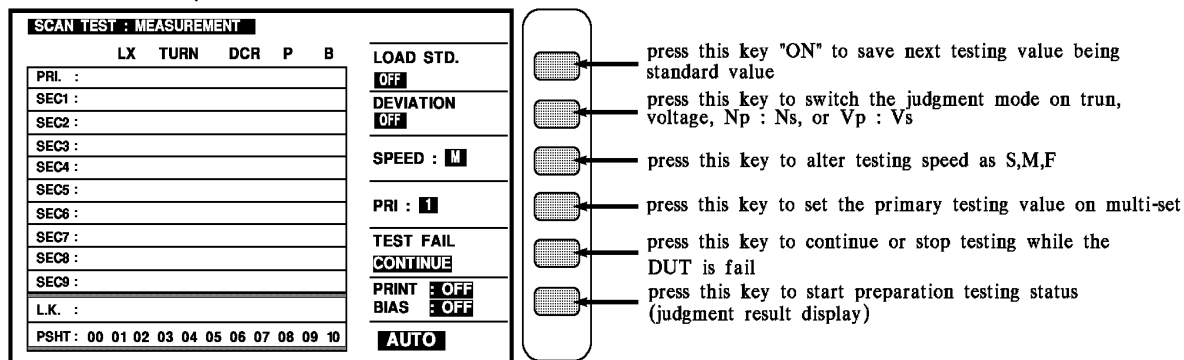
FIXTURE : The Pin on transformer reflects to the fixture

HI TERMINAL SHORT SETTING: The Hi terminal short pin setting on stray capacity inductance testing

LO TERMINAL SHORT SETTING: The Lo terminal short pin setting on stray capacity inductance testing

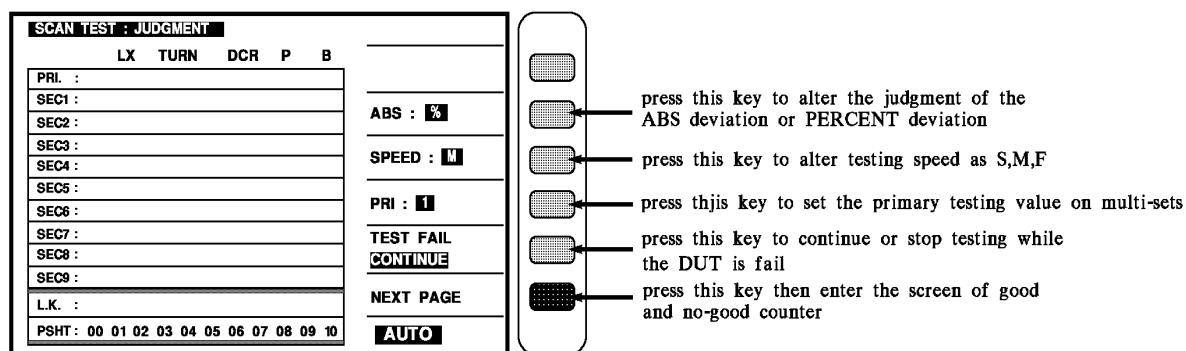
The screen below is for setting the stray capacity INDUCTANCE WITHIN TWO TURNS judgment of the transformer. It is still a guidable operation what just following the method of the display to key in the testing parameter and to finish it by pressing [Enter] to jump to next testing item. As above, by pressing [Enter] of the last item on each screen, the unit will jump to next setting screen automatic.

If the user desire to change the setting on each backlight, the values may change by pressing the  key which under Cursor.



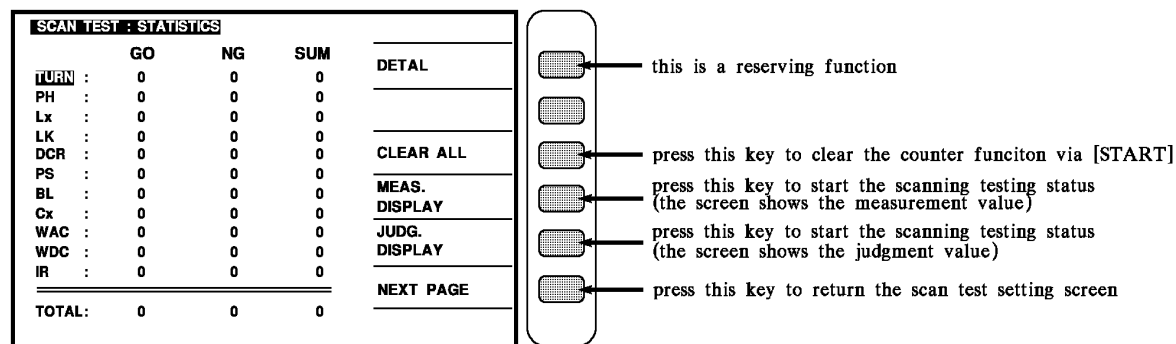
When the display shows this screen, it means which means the unit is under testing. For starting the testing, just put the DUT on the Fixture and press the [Start] key on the SCAN BOX. The testing value shows on the display and the value will be backlight if the DUT is no-good. The testing mode failed may known by the result on the SCAN BOX.

If only want to display the judge result (PASS/FAIL), as above figure, press down direction key enter to judge result display as follow figure.



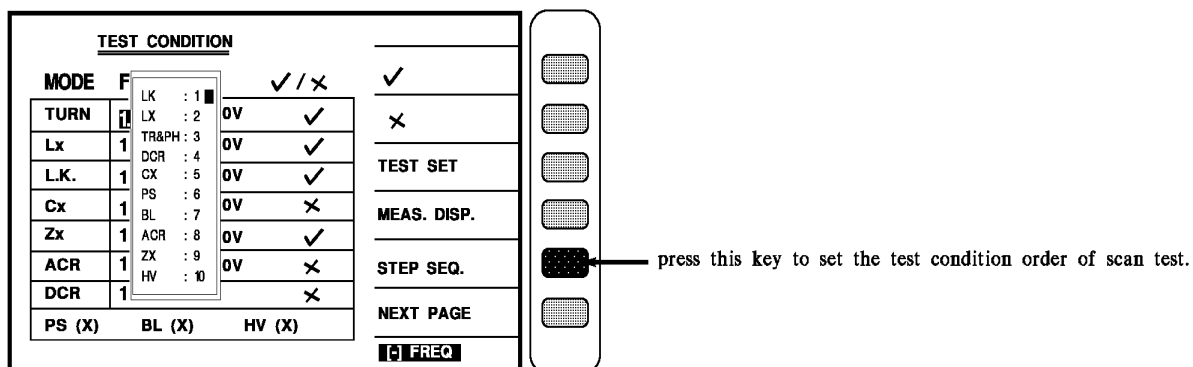
When the display shows this screen, it meanswhich means the unit is under testing. For starting the testing, just put the DUT on the Fixture and press the [Start] key on the SCAN BOX. The PASS means the DUT is good. The HIGH or LOW indicates the result of DUT and the value will be backlight. The testing mode failed may known by the result on the SCAN BOX.

Press [NEXT PAGE] to get the statistic screen of each testing result.



### 4.4.5 Test Procedure Description

The test condition setting of transformer automatic scan is under the TEST CONDITION screen that is the STEP SEQ. key which located at the right side of display



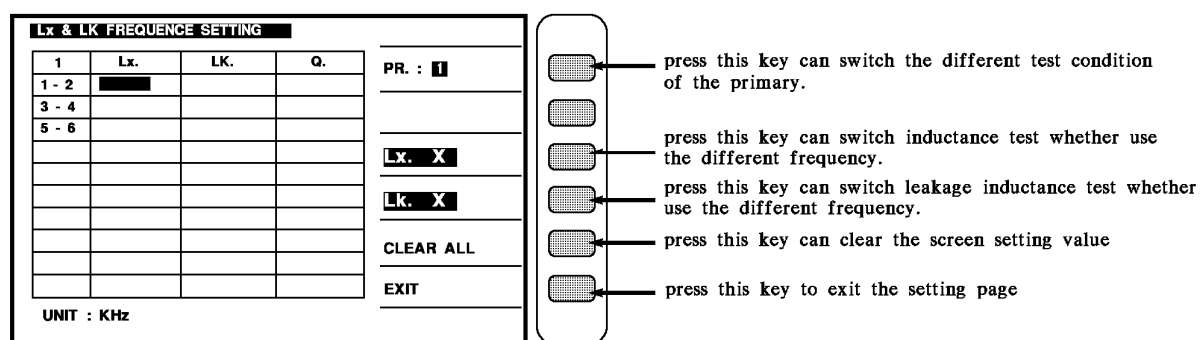
The above is this instrument default value from the factory, recommend not to change the value while general test, when want to change just move the cursor to modify order.

#### ① Notice

Do not repeat the test no., order, and when any test item has not been opened yet, the test order will automatic skip to next test item.

### 4.4.6 Different Frequency Setting In The Different Windings:

The multi-frequency scan test setting of transformer automatic scan is under the test condition screen that is the number key [-] which located at the bottom-right side of display, when press this key, the screen shows as below:



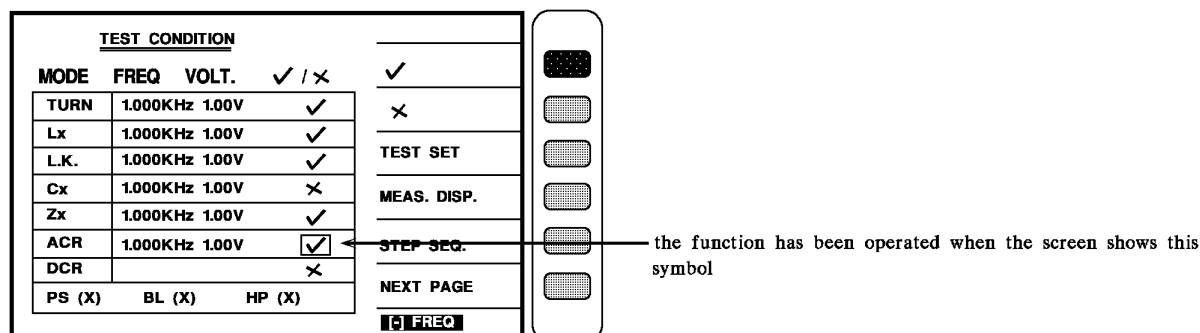
The above is this instrument default value from the factory, when want to change just move the cursor to modify.

#### ① Notice

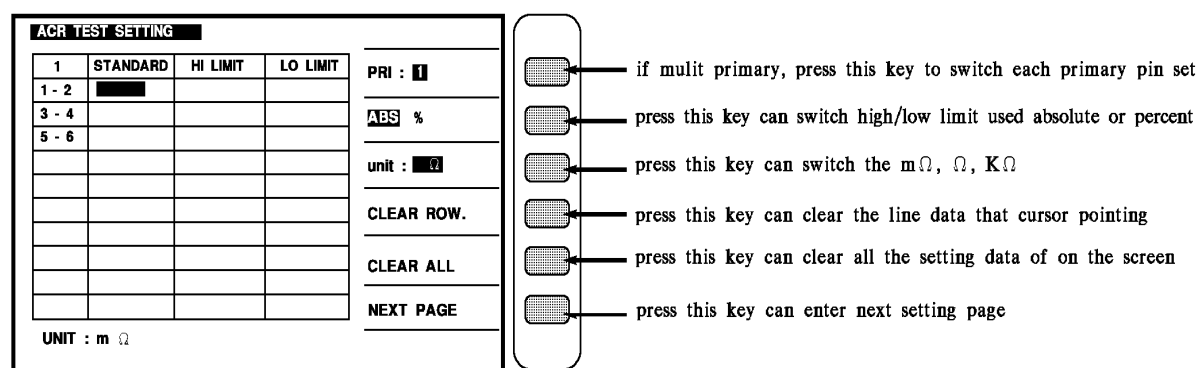
This function can be used under Lx, Lk, Q testing, addition on to input the test conditions, the Lx, Lk, Q should be opened then can test.

### 4.4.7 ACR Setting Description

Under the test condition setting input the ACR test voltage and freq., then open this function.



When this function has been opened, then the guidable operation will automatic enter each setting screen that we have set already, and while enter ACR setting screen, the screen is as below:



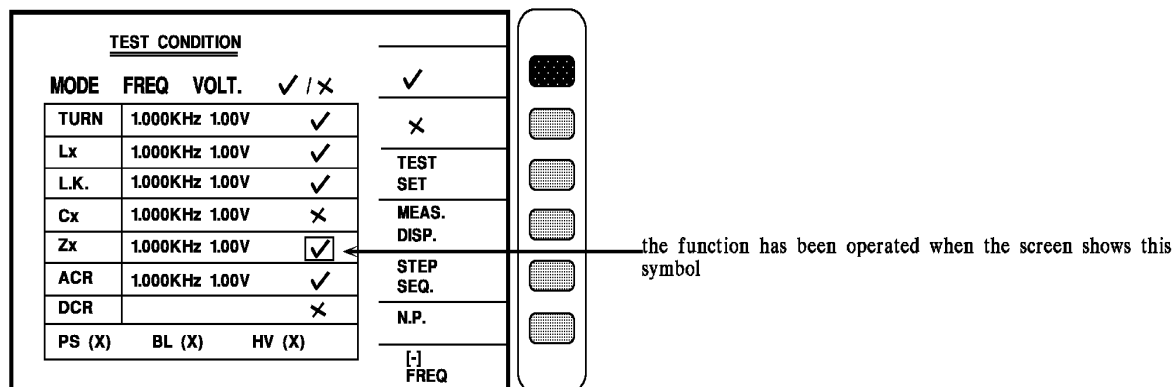
The description of each visible parameter are as following:

- PRI : The first level pin setting
- 1-2, 3-4, 5-6 : The secondary turns of the transformer
- STANDARD : The standard value of each turn
- HI LIMIT. : The judgment of the Hi-limit value
- LO LIMIT : The judgment of the Lo-limit value

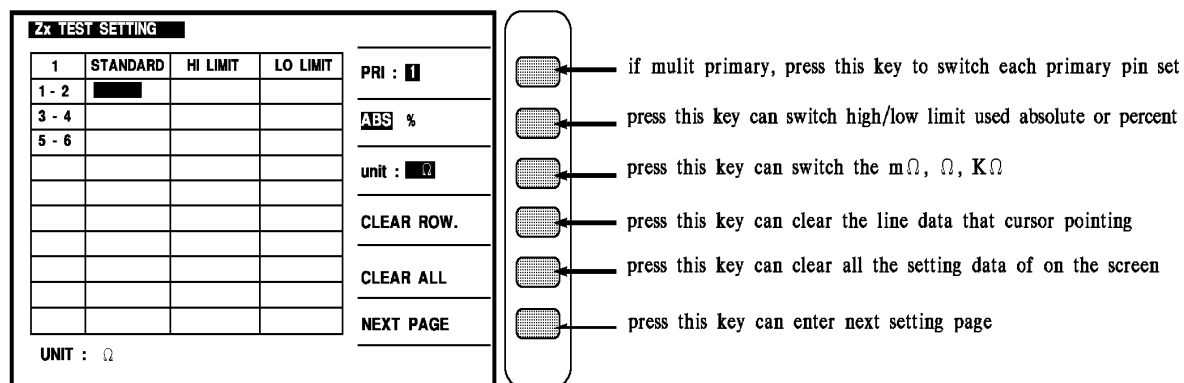
When enter this screen then into the transformer ACR judgment setting, the same as above is the guidable operation, just according screen block-light with number keys to input the value then press [Enter] then automatic skip to next setting item, use this method to set till the last item (the set secondary) then press [Enter] to change to the next parameter setting screen. If want to change setting on the block-light, use the four keys under cursor to move.

## 4.4.8 Zx. Setting Description

Under the test condition setting input the Zx test voltage and freq., then open this function



When this function has been opened, then the guidable operation will automatic enter each setting screen that we have set already, and while enter Zx setting screen, the screen is as below:



The description of each visible parameter are as following:

- PRI : The first level pin setting
- 1-2, 3-4, 5-6 : The secondary turns of the transformer
- STANDARD : The standard value of each turn
- HI LIMIT. : The judgment of the Hi-limit value
- LO LIMIT : The judgment of the Lo-limit value

When enter this screen then into the transformer Zx judgment setting, the same as above is the guidable operation, just according screen block-light with number keys to input the value then press [Enter] then automatic skip to next setting item, use this method to set till the last item (the set secondary) then press [Enter] to change to the next parameter setting screen. If want to change setting on the block-light, use the four keys under cursor to move.

### 4.4.9 Pins Parallel Test Description

Want to test the transformer Pin and Phasing setting must be under the test condition screen of the PIN AND PHASING SETTING, the setting is to move the cursor to the pins which need to be tested the multi-parallel test.

| TRANSFORMER PIN AND PHASING SETTING |             |         |
|-------------------------------------|-------------|---------|
| PRI : 1                             | TRANSFORMER | FIXTURE |
| PHASING                             | + --        | + --    |
| PRIMARY                             | 1 ← 2       |         |
| SEC : 1                             | 3 4         |         |
| SEC : 2                             | 5 6         |         |
| SEC : 3                             | 7 8         |         |
| SEC : 4                             | 9 10        |         |

| APPEND SHORT PIN |   |
|------------------|---|
| TRANSFORMER +    |   |
| PRI :            | ← |

|               |  |
|---------------|--|
| PRIMARY : 1   |  |
| TURN RATIO    |  |
| INDUCTANCE    |  |
| LEAKAGE L.    |  |
| DCR           |  |
| NEXT PAGE     |  |
| KEY 0         |  |
| CORRESPONDENT |  |

Above figure description

APPEND SHORT PIN (TRANSFORMER +) the meaning is the input pin position is parallel test set up and transformer is positive phase (TRANSFORMER +, cursor A show pin position), short parallel, parallel pins max. can enter to 5 PIN, enter method is at cursor B known pin position input the intend to parallel test than press [Enter] key, for exit set up screen only press down [Reset] key, and back to transformer pin set up screen, because cursor A position TRANSFORMER +, so the display and transformer + phase short parallel set up, if cursor A position at TRANSFORMER–, it display for transformer–phase short parallel set up.

### 4.4.10 Pins Series Test Description

Want to test this function must be under the setting screen of the PIN AND PHASING SETTING, the setting is that press the key [Meas / Display] then shows the pins setting as below:

| SERIES SHORT PIN SETTING |             |         |
|--------------------------|-------------|---------|
| Lx                       | TRANSFORMER | FIXTURE |
| PHASING                  | + --        | + --    |
| PRIMARY                  |             |         |
| SEC : 1                  |             |         |
| SEC : 2                  |             |         |
| SEC : 3                  |             |         |
| SEC : 4                  |             |         |
| SEC : 5                  |             |         |
| SEC : 6                  |             |         |
| SEC : 7                  |             |         |
| SEC : 8                  |             |         |
| SEC : 9                  |             |         |

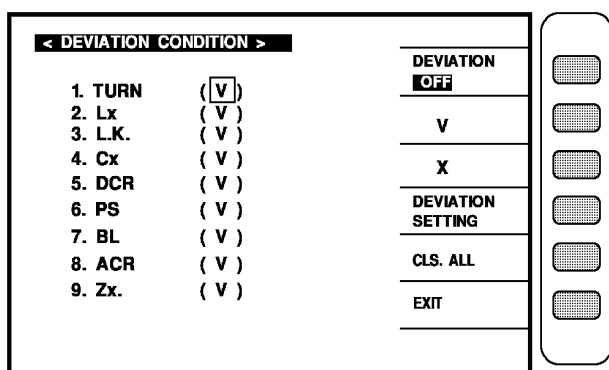
|           |
|-----------|
| Lx        |
|           |
|           |
|           |
| CLEAR ALL |
| EXIT      |

Pin series testing can according to test items and set up the series position, set up method is selected the test item, than according to the series pin need to be set to the winding, for exit the display, only press exit key. If has users only have to set up transformer pins for pins auto correspond function, only set up transformer pins.

### 4.4.11 How To Set Up "DEVIATION" Function

When users have their sample transformer to be a standard, the sample must has done the test of each test parameter data before to be a measured standard, then users can use deviation to error compensation function, the set up procedure as following:

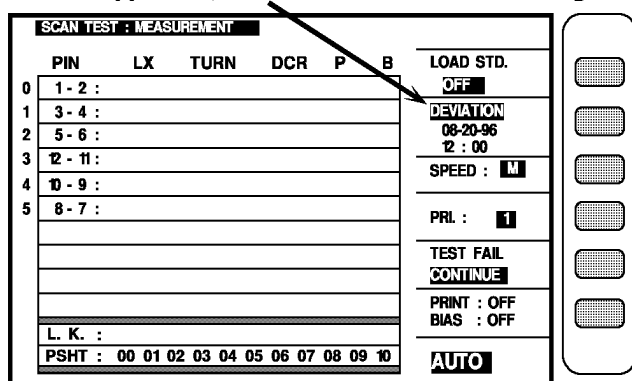
- According to above method, the screen show testing display after each parameter is set up.
- Press "DEVIATION CONDITION" key to ON state on the front panel, the display will be as follow:



- First of all, press "DEVIATION OFF" key, the display shows "DEVIATION ON".
- Make selection of deviation item by tick "V" & cross "X" key.
- Press "DEVIATION SETTING" key to confirm the function is ON.
- Press EXIT key to enter <SCAN TEST: MEASUREMENT> for transformer scanning automatically. Under this state, "DEVIATION" will become highlight shown as the following figure.

(Date show underneath of DEVIATION is what the time users have used this function.)

Arrow appointed, the area would become backlighted, after the test, it will return to the original.



- Put the standard transformer on the test fixture and press the key [Start], in first measuring, it will display standard transformer measured value, and DEVIATION highlighted will be disappear, it means the deviation error compensation is done.
- Press [Start] key on test fixture, then the measured value of display is the same as the standard value.

#### 4.4.12 3250 Fast Function Keys (Help Function)

Press [Main Index] key to enter main function menu, during this time if press Clear / Help, the LCD will display fast function keys of transformer testing, as shown as below. Selecting setting function number, LCD can immediacy display setting window.

##### TRANSFORMER TEST

|          |                            |
|----------|----------------------------|
| <b>1</b> | <b>TEST CONDITION</b>      |
| <b>2</b> | <b>TEST SETTING</b>        |
| <b>3</b> | <b>MEASUREMENT DISPLAY</b> |
| <b>4</b> | <b>JUDGMENT DISPLAY</b>    |

##### TRANSFORMER SCANNING TEST

|          |                            |
|----------|----------------------------|
| <b>5</b> | <b>TRANSFORMER ID.</b>     |
| <b>6</b> | <b>TEST CONDITION</b>      |
| <b>7</b> | <b>TEST SETTING</b>        |
| <b>8</b> | <b>MEASUREMENT DISPLAY</b> |
| <b>9</b> | <b>JUDGMENT DISPLAY</b>    |

#### 4.4.13 325X DCA New Additional Function & Operation (Option)

| TRANSFORMER ID                |           |
|-------------------------------|-----------|
| TRANSFORMER ID: _____         | RECALL    |
| PRIMARY : _____ SET(S)        | STORE     |
| SECONDARY : _____ SET(S)      | LIST      |
| AUTO-TEST TIME : _____ SEC/10 | DELETE    |
| PERCENT TO ABS: _____ (%)     | OTHER     |
| RESET NUMBER : _____ ORDER    | NEXT PAGE |

press this key to enter the specialized function setting screen

| OTHER OPTION SETTING               |                          |
|------------------------------------|--------------------------|
| TEST WAIT TIME : <u>0</u> (SEC/10) | 2nd VALVE <u>OFF</u>     |
| BIAS CURRET : <u>0.0</u> (mA)      | CURRENT SETTING <u>A</u> |
| DUAL FIXTURE : <u>A FIXTURE</u>    | <u>Lx</u>                |
| SELECT BIAS : <u>Lx</u>            | EXIT                     |

set second valve ON or OFF.

press this key to enter the Bias Current setting.

press this key to select A and B singly or dualy. (test fixture option)

press this key to select Lx and Zx singly or dualy. (current test model option)

press this key to exit the specialized function setting screen.

The above diagram operate description is as following:

TEST WAIT TIME : \_\_\_\_\_ ... The test wait time for each transformer.


BIAS CURRET : \_\_\_\_\_ ... DCA setting

1. If Current Setting not set, DCA will use the result for testing value.
2. If Current Setting does set, DCA will use the current setting for testing value.



**DUAL FIXTURE** : This setting is use for specialized fixture. All general setting is ranged in A Fixture.







**SELECT BIAS** : It can selecting DCA to add with Lx and Zx singly or dually.

Press  it to enter next screen  
CURRENT  
SETTING

| PIN   | Lx  | Zx  |  |
|-------|-----|-----|--|
| 0 - 0 | OFF | OFF |  |
| 0 - 0 | OFF | OFF |  |
| 0 - 0 | OFF | OFF |  |
|       |     |     |  |
|       |     |     |  |
|       |     |     |  |
|       |     |     |  |
|       |     |     |  |
|       |     |     |  |
|       |     |     |  |
|       |     |     |  |

CLEAR ALL

NEXT PAGE

Press this key to clear all setting value.

Press this key to enter the previous screen.

## 4.5 Low Impedance Measurement Application

What is low impedance? When DUT is low L in low freq. or high capacity in high freq. meanwhile the impedance are XL or XC, as XL or XC less than 100mΩ, there are low impedance, now the measurement must be noted two points:

### (1) Correct way to short

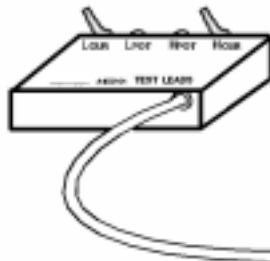
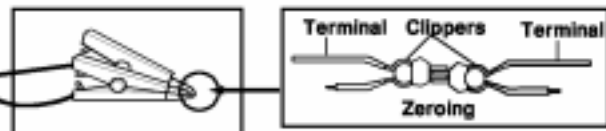


Figure 4 - 3 Short Connection



### (2) Use 4 wires testing

## 4.6 Bias Current Source Connecting

It can be connected with 1320, and control the current volume and ON/OFF, connection please refer to 1320 manual of 5.3.3.

## 4.7 Test Application

### 4.7.1 Large Inductance Measurement

When measuring large L, after test DCR, transformer will remain some energy need to be clear, otherwise it will affect to next (Lx) test value, Therefore it needs to set delay time, operation please *refer to page 4-9 "DELAY TIME"* function.

### 4.7.2 Low Coupling Coefficient Turn Ratio Measurement

As Coil relative permeability ( $\mu_r$ ) value less than 100, there is a leaking magnet phenomenon in secondary, it will cause turns ratio difference. Please *refer to page 4-10 "SPECIAL TR"* function.

### 4.7.3 Bias Current Connecting

When it uses with 1320 if DUT is a large inductance, it will need to do zeroing, please *refer to page 4-10 "LINK 1320"* function.

### 4.7.4 Nonlinear Inductor, Transformer Measurement

When measuring nonlinear inductor, transformer, often get different value that cause by different output impedance, therefore it has 4 output impedance modes for selecting, which 320X output impedance mode is  $100\Omega$  (same as HP4284A), 106X mode is  $50\Omega / 10\Omega$  (same as WK3245), 107X is  $25\Omega$  (same as GR1689).

## 5. Application of Interface

### 5.1 Transformer Automatic Scan Interface (Scan Box)

#### 5.1.1 Description The Test Function

About the application of transformer automatic scan test interface, must be with 3001A scan box use in automatic scan test fixture then can work perfect.

This instrument can offer the test items LX, LK, Q, TURN-RATIO, VOLTAGE-RATIO, PHASING, CX, DCR, LX-BALANCE, DCR-BALANCE, PIN-SHORT....etc.

This instrument can offer the functions pin of transformer and test fixture automatic change, automatic time setting, multi-primaries test, multi-leakage inductance test, measurement deviation, statistic the good and no-good amount, test parameter stored and recall memory, repeatedly test no good item....etc.

So, use 325X with 3001A can show perfect test function, to offer fast, convenient, precision test.

#### 5.1.2 Notice before Using

AC input line of the model 3001A test fixture (scan box) is offered an appropriate output from 325X rear panel, do not use the other AC source, on the other hand, the signal control lines and test cable should be connected with 325X, the connecting is as below:

##### Notice

Before connecting the cable or any control line, turn off the power of 325X.

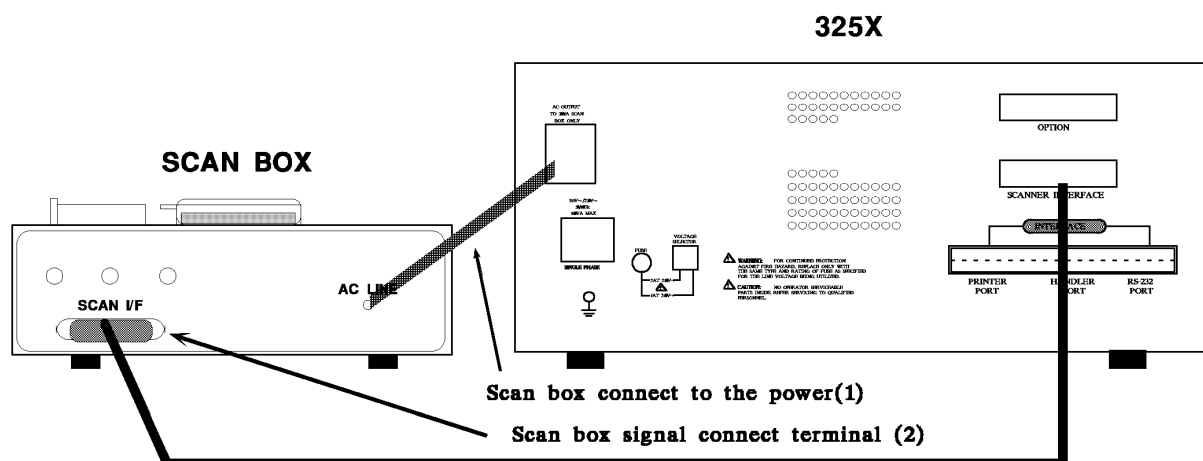


Figure 5 - 1

- a. Connecting the power cord of 3001A to the AC output of 325X rear panel as figure 5-1 (1) the arrow head pointed, do not connect to other terminal.
- b. Connecting the 36 pin twin head cable of the accessory to the 325X rear panel (scan I/F) socket, another side connect to 3001A rear panel (scan I/F) socket as figure 5-1 the arrow head pointed.
- c. Connecting the test fixture 3001A to the front panel of Model 325X and lock tight, as below:
- d. If the piston is used to push the test fixture, please connect the air tube.

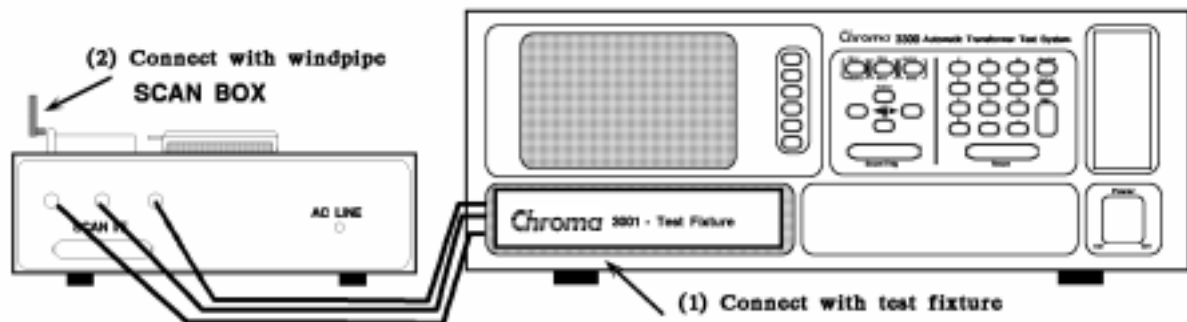
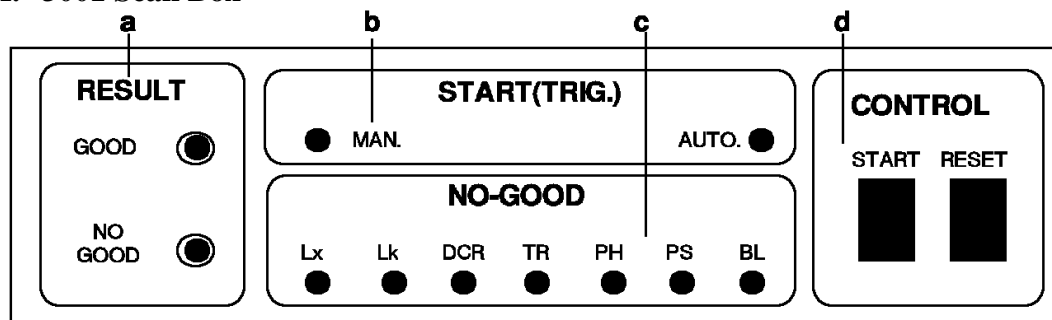


Figure 5-2

### 5.1.3 Scan Box Front Panel Description

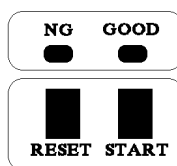
#### A. 3001 Scan Box



- a. **RESULT** : The led of the test result  
**GOOD** : Indicative light of the good, when every test item result are good, the LED lights mean is that unknown is good.  
**NO GOOD** : Indicative light of the no good, when one of the test items is no good, the light will light and indicate that unknown is no good.
- b. **START (TRIG.)** : The trigger model of test indicative light.  
**AUTO** : Automatic trigger model, when set parameter and set test differ time it means automatic trigger model, so this light will light when start to test.

- MANUAL** : Manual trigger model, when set parameter and no set test differ time, it means manual trigger model, so this light will light when start to test.
- c. **NO-GOOD** : Indicate the item of no-good
- Lx** : Inductance no-good, in the procedure of test, the inductance measurement is over or under then judge no-good, this light will light.
- Lk** : Leakage no-good, in the procedure of test, the leakage inductance measurement is over or under then judge no-good, this light will light.
- TURN** : Turn-ratio and phase no-good, in the procedure of test, the turn-ratio measurement is over or under then judge no-good, this light will light.
- DCR** : DCR no good, in the procedure of test, the DCR measurement is over or under then judge no-good, this light will light.
- Cx** : The capacity of transformer no-good, in the procedure of test, the capacity measurement is over or under then judge no-good, this light will light.
- PS** : Pin short, in the procedure of test, if there is any short is tested then the judge no-good, this light will light.
- BL** : Balance no-good, in the procedure of balance test, if there is any over high limit the judge no-good, this light will light.
- d. **CONTROL** : Control area
- START** : Trigger control key, when press this key then operate the test acting.
- RESET** : Reset the trigger control key, when press this key then stop all the test to return original preparing test condition.

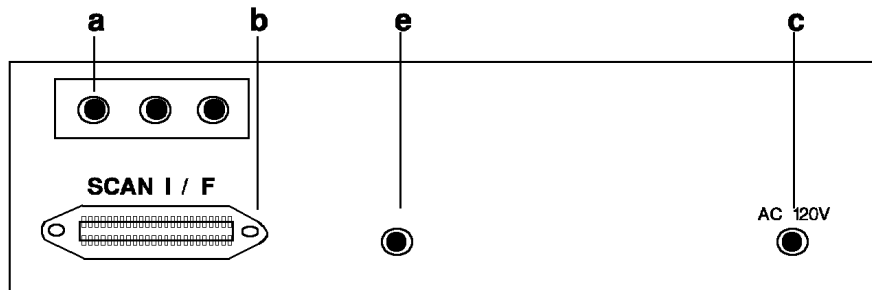
## B. 3001A Scan Box



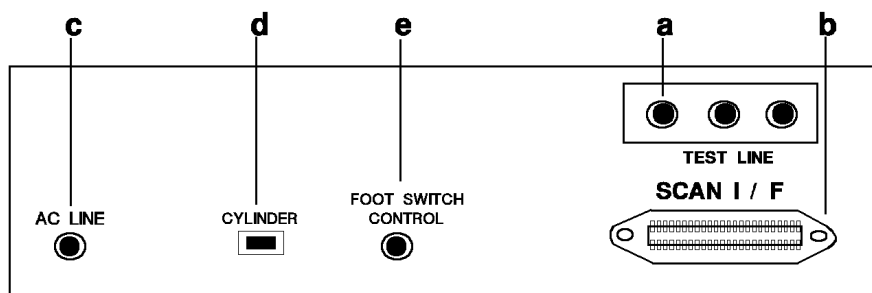
- START** : Trigger control key, when press this key then operate the test acting.
- RESET** : Reset the trigger control key, when press this key then stop all the test to return original preparing test condition.
- GOOD** : Indicative light of the good, when every test item result are good, the LED lights mean is that unknown is good.
- NO GOOD** : Indicative light of the no good, when one of the test items is no good, the light will light and indicate that unknown is no good.

## 5.1.4 Scan Box Rear Panel Description

### A. 3001 Scan Box



### B. 3001A Scan Box



#### a. TEST CABLE INPUT TERMINAL

This test cable connects to the test point of the model 325X.

#### b. SCAN I/F

To control the signal transfer wire of the scan test socket, this socket is through one line connecting to rear panel.

#### c. POWER CORD (AC 120V)

This power cord can be used only for the rear panel of scan box AC 120V of model 325X, because 3001A use interior power source 120AC, so do not use others.

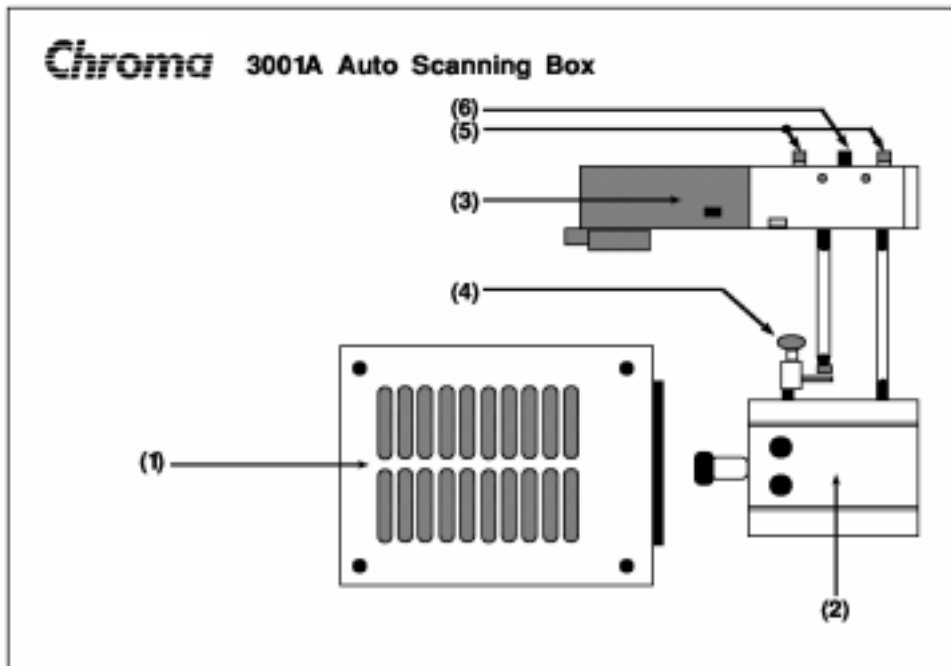
#### d. Air control line socket (CYLINDER)

This socket is to offer and control the air switch power, please connect the power cord of air switch to this socket.

#### e. Foot switch socket (FOOT SWITCH CONTROL)

It is a socket that controls the scan box in the different way, please connect the power cord to this socket.

### 5.1.5 Scan box Description



#### (1) TEST FIXTURE

This test fixture is reversible, if want to change the fixture of difference pin length just need to take apart four screws then install the fixture that you intent to use, but be careful the correct position of pin length and screw holes.

#### (2) CYLINDER

The main push power of this test fixture.

#### (3) PISTON CONTROLLER

To control how much the cylinder in and output air, the power is DC24V.

#### Notice

- A. Please add the water filter before the vantage of the piston to extend the life of cylinder and piston.
- B. The atmospheric pressure specification of this air valve is limited to be used in 5- 6.5 kg/cm<sup>2</sup>

#### (4) ADJUSTING SPEED KNOB

This knob is for adjusting the speed of the piston, can made cushiony to avoid shake, but not for long time, inside the plastic screw is for adjusting speed, external iron screw is for fixative.

**(5) STOP AIR KNOB**

This knob is for quiet and to avoid dusty.

*Note:* The function of the two screw caps which are at front of the cylinder is to adjust the gap between head of piston and test fixture, the front of screw cap is for adjusting, the rear of screw cap is for fixative.

*Note:* This test fixture is an equipment that use frequently, so should be noticed the maintenance to keep the measurement correct.

**(6) PISTON**

Connected to air compressor, for providing air pressure.

**5.1.6 Test Fixture (Scan Box) Description****① Notice**

Read the instruction before using 5.1.2

**The sample for setting:**

The spec. and pin of the transformer are following:

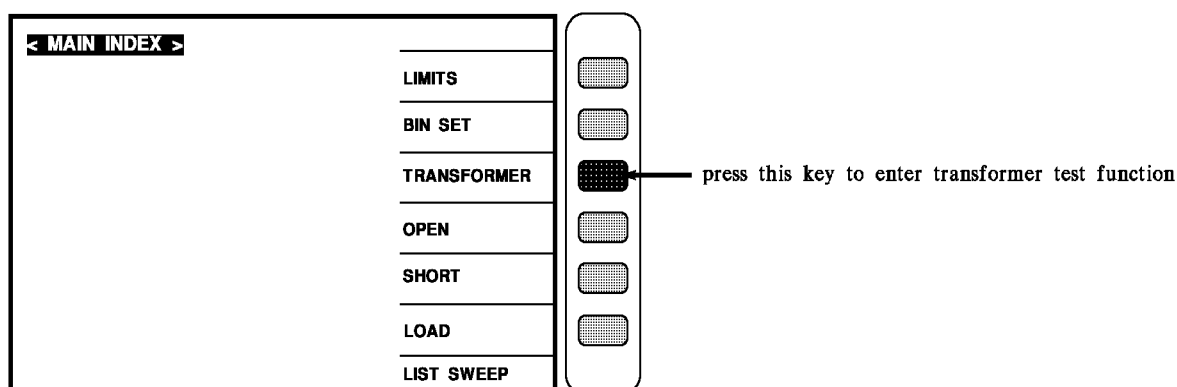
| ET-45273-001 |    | PIN No. | TURN    | Lx   | DCR      |
|--------------|----|---------|---------|------|----------|
| 1            | 12 | Np      | 1 - 2   | 48 T | 1.750 mH |
| 2            | 11 | N1      | 3 - 4   | 48 T | 1.750 mH |
| 3            | 10 | N2      | 5 - 6   | 5 T  | 65 mΩ    |
| 4            | 9  | N3      | 12 - 11 | 12 T | 120 mΩ   |
| 5            | 8  | N4      | 10 - 9  | 24 T | 0.320 Ω  |
| 6            | 7  | N5      | 8 - 7   | 2 T  | 10 mΩ    |

TURN: 20KHz, Lx: 1KHz, LK: 20KHz, Cx: 1KHz

|     | PIN No. | LK           | SHORT PIN           |
|-----|---------|--------------|---------------------|
| LK1 | 1 - 2   | 120 uH       | 5,6,7,8,9,10,11,12, |
| LK2 | 3 - 4   | 120 uH       | 5,6,7,8,9,10,11,12, |
|     | Cx.     | HI PIN No.   | LO PIN No.          |
| Cx1 | 75pF    | 1,2,3,4,5,6, | 7,8,9,10,11,12,     |

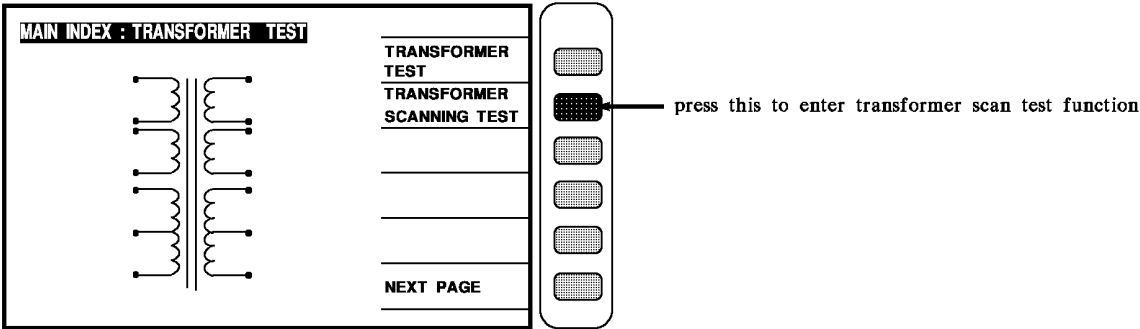
BL : 1 - 2 / 3 - 4 < 1%

Press the key [Main Index] then show the screen as below.

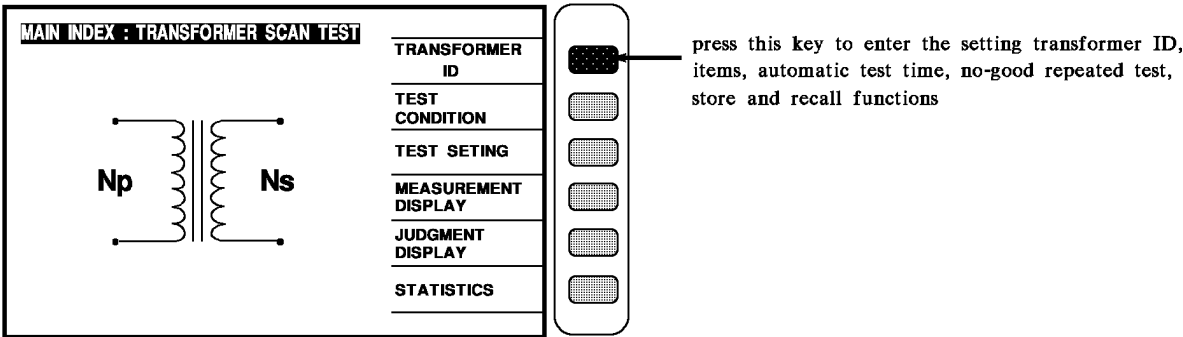




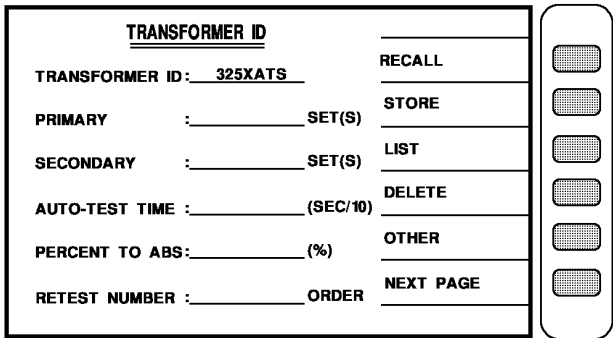
Press the key as above to enter the transformer automatic test function as below.



Press the key as above to enter the transformer scan test function setting as below.



When into this screen is entrance to the guidable setting operation, just press [Enter] then enter the setting of first item as below.



The operation of above figure describes as below:

**TRANSFORMER ID** : \_\_\_\_\_... Enter the transformer model name, max to 12 letters (this name is also for store number), the method of input is use left right key [← →] and key [Start] to choose the English letters and numeric keys to input, then press [Enter] to confirm and will auto jump to next set up item.

Ex.: The number of transformer is ET-45273-001, the input is as following:

[← →] E [Start] [← →] T [Start] [-] [4] [5] [2] [7] [3] [-] [0] [0] [1] [Enter]

**PRIMARY** : \_\_\_\_\_ ... Enter the transformer primary winding number.

The method of input is that press the number key (range 1~4), then press [Enter] to make sure and automatically change to next test item.

Ex: there is just one winding in the primary, the input is as below: [1] [Enter]

**SECONDARY** : \_\_\_\_\_ ... Enter the transformer secondary winding number.

The method of input is that press the number key (range 1~9), then press [Enter] to make sure and automatically change to next test item.

Ex: there are five winding in the secondary, the input is as below: [5] [Enter]

**AUTO-TEST TIME** : \_\_\_\_\_ ... Enter the interval time between each test.

The method of input is that press the number keys (0~99, 0 is off), then press [Enter] to make sure and automatically change to next test item.

Ex: if not use the interval time between each test, the set is below: [0] [Enter]

**PERCENT TO ABS** : \_\_\_\_\_ ... Input the whole the present of deviation range.

The method of input is that press the number keys to input the percent of deviation, then press [Enter] to make sure and automatically change to next test item. (0 is off).

Ex: if not use the percent of deviation, the set is below: [0] [Enter]

**RETEST NUMBER** : \_\_\_\_\_ ... Input the no-good repeated test times.

The method of input is that press the number keys (range 1~10, 0 is off), then press [Enter] to make sure, then press [Enter] again to automatically change to the test parameter setting.

Ex: if not use the no-good repeated test, the set is below: [0] [Enter]

When finish the input, the screen is below:

| <b>TRANSFORMER ID</b>                |           |
|--------------------------------------|-----------|
| TRANSFORMER ID: <u>ET-45273-001</u>  | RECALL    |
| PRIMARY : <u>1</u> SET(S)            | STORE     |
| SECONDARY : <u>5</u> SET(S)          | LIST      |
| AUTO-TEST TIME : <u>OFF</u> (SEC/10) | DELETE    |
| PERCENT TO ABS: <u>OFF</u> (%)       | OTHER     |
| RETEST NUMBER : <u>OFF</u> ORDER     | NEXT PAGE |

Then press [Enter] to enter next setting screen as below: (test frequency and voltage).

| TEST CONDITION |          |             |   |
|----------------|----------|-------------|---|
| MODE           | FREQ     | VOLT. ✓ / ✕ |   |
| TURN           | 1.000KHz | 1.00V       | ✓ |
| Lx             | 1.000KHz | 1.00V       | ✓ |
| L.K.           | 1.000KHz | 1.00V       | ✓ |
| Cx             | 1.000KHz | 1.00V       | ✕ |
| Zx             | 1.000KHz | 1.00V       | ✓ |
| ACR            | 1.000KHz | 1.00V       | ✕ |
| DCR            |          |             | ✕ |
| PS (X)         | BL (X)   | HV (X)      |   |

✓  
FREQ

When into this screen is entrance to the setting of test parameter the same is still guidable operation, just according the block area on the screen and number keys to input the test parameter, press [Enter] then automatically change to next setting item, use the same method till the last item on the same screen, press [Enter] then automatically change to next the setting screen of parameter.

Ex: the test conditions of transformer are following:

TR: 20KHz /1V                      Lx: 1KHz /1V                      DCR: need to test

LK: 20KHz /1V                      Cx: 1KHz /1V                      PS : need to test

BL: need to test

The input is following:

TURN : [20] [ENTER] [1] [ENTER] [✓] [ENTER]

LX : [1] [ENTER] [1] [ENTER] [✓] [ENTER]

LK : [20] [ENTER] [1] [ENTER] [✓] [ENTER]

CX : [1] [ENTER] [1] [ENTER] [✓] [ENTER]

ACR : [X] [ENTER] [ENTER]

Zx : [X] [ENTER]

DCR : [✓] [ENTER] [ENTER]

PS : [✓] [ENTER]

BL : [✓] [ENTER]

HV : [X] [ENTER]

After finish the input, the screen is as below:

| TEST CONDITION |           |             |   |
|----------------|-----------|-------------|---|
| MODE           | FREQ      | VOLT. ✓ / ✕ |   |
| TURN           | 20.000KHz | 1.00V       | ✓ |
| Lx             | 1.000KHz  | 1.00V       | ✓ |
| L.K.           | 20.000KHz | 1.00V       | ✓ |
| Cx             | 1.000KHz  | 1.00V       | ✕ |
| Zx             | 20.000KHz | 1.00V       | ✕ |
| ACR            | 20.000KHz | 1.00V       | ✕ |
| DCR            |           |             | ✕ |
| PS (X)         | BL (X)    | HV (X)      |   |

✓  
FREQ

Then press [Enter] to enter next setting screen as below: (pin set)

| TRANSFORMER PIN AND PHASING SETTING |             |    |         |
|-------------------------------------|-------------|----|---------|
| PRI : 1                             | TRANSFORMER |    | FIXTURE |
| PHASING                             | +           | -- | + --    |
| PRIMARY                             | [ ]         |    |         |
| SEC : 1                             |             |    |         |
| SEC : 2                             |             |    |         |
| SEC : 3                             |             |    |         |
| SEC : 4                             |             |    |         |
| SEC : 5                             |             |    |         |
| SEC : 6                             |             |    |         |
| SEC : 7                             |             |    |         |
| SEC : 8                             |             |    |         |
| SEC : 9                             |             |    |         |
| FLYLINE                             |             |    |         |

|               |
|---------------|
| PRIMARY : 1   |
| TURN RATIO    |
| INDUCTANCE    |
| LEAKAGE L.    |
| DCR           |
| NEXT PAGE     |
| KEY [.]       |
| CORRESPONDENT |

When into this screen is entrance to the pin of transformer and test fixture setting, the same is still guidable operation just according the block area on the screen and number keys to input the pin number, press [Enter] then automatically change to next pin setting item. Use the same method till the last item of pin number on the same screen, press [Enter] then automatically change to next the setting screen of parameter.

Ex: The relation of transformer windings and pin are following:

Np: 1 – 2                  N1: 3 – 4                  N2: 5 – 6  
 N3: 12 – 11              N4: 10 – 9              N5: 8 – 7

The input is following:

PRIMARY : [1] [Start] [2] [Start]  
 SEC.1 : [3] [Start] [4] [Start]  
 SEC.2 : [5] [Start] [6] [Start]  
 SEC.3 : [1] [2] [Start] [1] [1] [Start]  
 SEC.4 : [1] [0] [Start] [9] [Start]  
 SEC.5 : [8] [Start] [7] [Start]

After finish the pin numbers input, the screen is as below:

| TRANSFORMER PIN AND PHASING SETTING |             |    |         |
|-------------------------------------|-------------|----|---------|
| PRI : 1                             | TRANSFORMER |    | FIXTURE |
| PHASING                             | +           | -- | + --    |
| PRIMARY                             | 1           | 2  |         |
| SEC : 1                             | 3           | 4  |         |
| SEC : 2                             | 5           | 6  |         |
| SEC : 3                             | 12          | 11 |         |
| SEC : 4                             | 10          | 9  |         |
| SEC : 5                             | 8           | 7  | [ ]     |
| SEC : 6                             |             |    |         |
| SEC : 7                             |             |    |         |
| SEC : 8                             |             |    |         |
| SEC : 9                             |             |    |         |
| FLYLINE                             |             |    |         |

|               |
|---------------|
| PRIMARY : 1   |
| TURN RATIO    |
| INDUCTANCE    |
| LEAKAGE L.    |
| DCR           |
| NEXT PAGE     |
| KEY [8]       |
| CORRESPONDENT |

Then press [Enter] to enter next setting screen as below: (TURN RATIO)

| TURN - RATIO TEST SETTING |          |          |          |
|---------------------------|----------|----------|----------|
| 1                         | STANDARD | HI LIMIT | LO LIMIT |
| 1 - 2                     | 0.00     |          |          |
| 3 - 4                     |          |          |          |
| 5 - 6                     |          |          |          |
| 12 - 11                   |          |          |          |
| 10 - 9                    |          |          |          |
| 8 - 7                     |          |          |          |
|                           |          |          |          |
|                           |          |          |          |
|                           |          |          |          |
|                           |          |          |          |

UNIT : TURN (T)

PRIMARY : 1

ABS %

TURN

CLEAR ROW.

CLEAR ALL

NEXT PAGE

When into this screen is entrance to the judgment setting of transformer turn-ratio and phase, the same is still guidable operation, just according the block area on the screen and number keys to input the pin number, press [Enter] then automatically change to next pin setting item use the same method till the last item of pin number on the same screen, press [Enter] then automatically change to next the setting screen of parameter.

Ex: The turns of each winding of transformer are following:

$$N_p (1 - 2) = 48T$$

$$N_1 (2 - 3) = 48T \pm 0.3 T, N_2 (5 - 6) = 5T \pm 0.3T$$

$$N_3 (12 - 11) = 12T \pm 0.3 T, N_4 (10 - 9) = 24T \pm 0.3T$$

$$N_5 (8 - 7) = 2T \pm 0.3 T$$

Then the input is following:

Press the key [ABS%] beside the screen to make the [ABS] to the backlight.

1 - 2 : [4] [8] [Enter]

3 - 4 : [4] [8] [Enter] [4] [8] [.] [3] [Enter] [4] [7] [.] [7] [Enter]

5 - 6 : [5] [Enter] [5] [.] [3] [Enter] [4] [.] [7] [Enter]

12-11 : [1] [2] [Enter] [1] [2] [.] [3] [Enter] [1] [1] [.] [7] [Enter]

10-9 : [2] [4] [Enter] [2] [4] [.] [3] [Enter] [2] [3] [.] [7] [Enter]

8 - 7 : [2] [Enter] [2] [.] [3] [Enter] [1] [.] [7] [Enter]

After input the turns of each winding and high/low limit, the screen is below:

| TURN - RATIO TEST SETTING |          |          |          |
|---------------------------|----------|----------|----------|
| 1                         | STANDARD | HI LIMIT | LO LIMIT |
| 1 - 2                     | 48.00    |          |          |
| 3 - 4                     | 48.00    | 48.30    | 47.70    |
| 5 - 6                     | 5.00     | 5.30     | 4.70     |
| 12 - 11                   | 12.00    | 12.30    | 11.70    |
| 10 - 9                    | 24.00    | 24.30    | 23.70    |
| 8 - 7                     | 2.00     | 2.30     | 1.70     |
|                           |          |          |          |
|                           |          |          |          |
|                           |          |          |          |
|                           |          |          |          |

UNIT : TURN (T)

PRIMARY : 1

ABS %

TURN

CLEAR ROW.

CLEAR ALL

NEXT PAGE

PHASING

Then press [Enter] then enter next setting screen as below: (INDUCTANCE)

| INDUCTANCE TEST SETTING |          |          |          |
|-------------------------|----------|----------|----------|
| 1                       | STANDARD | HI LIMIT | LO LIMIT |
| 1 - 2                   |          |          |          |
| 3 - 4                   |          |          |          |
| 5 - 6                   |          |          |          |
| 12 - 11                 |          |          |          |
| 10 - 9                  |          |          |          |
| 8 - 7                   |          |          |          |
|                         |          |          |          |
|                         |          |          |          |
|                         |          |          |          |
|                         |          |          |          |

UNIT : uH

PRIMARY : 1

ABS %

unit : uH

Q X

CLEAR ALL

NEXT PAGE

SERIES

When into this screen is entrance to the judgment setting of transformer inductance and Q value, it is also guidable operation just according the block area on the screen and number keys to input the pin number, press [Enter] then automatically change to next pin setting item, use the same method till the last item of pin number on the same screen, press [Enter] then automatically change to next the setting screen of parameter.

If want to test the Q value then in the last figure press [QX] to let the [QX] on the screen turn into [QV] as below:

| INDUCTANCE TEST SETTING(Q) |         |          |  |
|----------------------------|---------|----------|--|
| 1                          | NOMINAL | LO LIMIT |  |
| 1 - 2                      |         |          |  |
| 3 - 4                      |         |          |  |
| 5 - 6                      |         |          |  |
| 12 - 11                    |         |          |  |
| 10 - 9                     |         |          |  |
| 8 - 7                      |         |          |  |
|                            |         |          |  |
|                            |         |          |  |
|                            |         |          |  |
|                            |         |          |  |

PRI : 1

Q ✓

CLEAR ALL

EXIT

The setting of Q value is the same as above.

Ex.: The Q value on each winding of transformer are as following:

$N_p (1 - 2) = 70$ , Min 50,  $N_1 (2 - 3) = 70$ , Min 50.

the others do not test, then the input is as following:

1 - 2 : [7] [0] [Enter] [5] [0] [Enter]

3 - 4 : [7] [0] [Enter] [5] [0] [Enter]

5 - 6 : [Enter]

12-11 : [Enter]

10- 9 : [Enter]

8 - 7 : [Enter]

After set the every windings and high/low limit, the screen is as below:

| INDUCTANCE TEST SETTING |         |          |  |
|-------------------------|---------|----------|--|
| 1                       | NOMINAL | LO LIMIT |  |
| 1 - 2                   | 70.0000 | 50.0000  |  |
| 3 - 4                   | 70.0000 | 50.0000  |  |
| 5 - 6                   |         |          |  |
| 12 - 11                 |         |          |  |
| 10 - 9                  |         |          |  |
| 8 - 7                   |         |          |  |
|                         |         |          |  |
|                         |         |          |  |
|                         |         |          |  |
|                         |         |          |  |

PRI : 1

☒

CLEAR ALL

EXIT

Press the [EXIT] key on the above figure then return the setting screen of inductance.

Ex. : the inductance value of each winding of transformer is as following:

$N_p (1 - 2) = 1.750 \text{ mH} \pm 10\%$ ,  $N_1 (2 - 3) = 1.750 \text{ mH} \pm 10\%$ .

Test loop : series equivalence loop

The other do not test then the input is as following:

Press the key [ABS%] beside the screen to make [%] change to backlight.

Press the unit key [unit : uH] beside the screen to change the unit to the mH.

Press [START] to make the word “series” of the [SERIES/PARALLEL] on the screen change to back-light.

1 - 2 : [1] [7] [5] [Enter] [1] [0] [Enter] [-] [1] [0] [Enter]

3 - 4 : [1] [7] [5] [Enter] [1] [0] [Enter] [-] [1] [0] [Enter]

5 - 6 : [Enter]

12 - 11 : [Enter]

10 - 9 : [Enter]

8 - 7 : [Enter]

After set the inductance of every windings and high/low limit, the screen is as below:

| INDUCTANCE TEST SETTING |           |          |          |
|-------------------------|-----------|----------|----------|
| 1                       | STANDARD  | HI LIMIT | LO LIMIT |
| 1 - 2                   | 175.000mH | 10.000%  | -10.000% |
| 3 - 4                   | 175.000mH | 10.000%  | -10.000% |
| 5 - 6                   |           | 10.000%  | -10.000% |
| 12 - 11                 |           | 10.000%  | -10.000% |
| 10 - 9                  |           | 10.000%  | -10.000% |
| 8 - 7                   |           | 10.000%  | -10.000% |
|                         |           |          |          |
|                         |           |          |          |
|                         |           |          |          |
|                         |           |          |          |

PRIMARY : 1

ABS %

unit : mH

☒ V

CLEAR ALL

NEXT PAGE

SERIES

UNIT : mH

Then press [ENTER] to into next setting screen as below : (LEAKAGE INDUCTANCE)

| LEAKAGE INDUCTANCE TEST SETTING |          |           |          |
|---------------------------------|----------|-----------|----------|
| 1                               | STANDARD | HI LIMIT  | LO LIMIT |
| 1 - 2                           |          |           |          |
| UNIT : mH                       |          |           |          |
| LEAKAGE INDUCTANCE SETTING      |          |           |          |
| 3 - 4                           | SHORT    | 5 - 6     | SHORT    |
| 12 - 11                         | SHORT    | 10 - 9    | SHORT    |
| 8 - 7                           | SHORT    |           | SHORT    |
|                                 | SHORT    |           | SHORT    |
|                                 | SHORT    |           | SHORT    |
| PRESS [START] KEY TOGGLE MODE   |          |           |          |
| PRI : 1                         |          | ABS %     |          |
| unit : mH                       |          | SHORT     |          |
| SERIES                          |          | NEXT PAGE |          |
| MODE : 1                        |          |           |          |

The above figure is the leakage first test (single), but the leakage test of this instrument is multi-test, so should use second test (multi) press [START] then show the screen as below:

| LEAKAGE INDUCTANCE TEST SETTING |          |           |          |
|---------------------------------|----------|-----------|----------|
| 1                               | STANDARD | HI LIMIT  | LO LIMIT |
| LK.1                            |          |           |          |
| TRANSFORMER FIXTURE             |          |           |          |
| LK.1                            |          |           |          |
| 1.                              |          |           | SHORT    |
| 2.                              |          |           | SHORT    |
| 3.                              |          |           | SHORT    |
| 4.                              |          |           | SHORT    |
| 5.                              |          |           | SHORT    |
| 6.                              |          |           | SHORT    |
| 7.                              |          |           | SHORT    |
| 8.                              |          |           | SHORT    |
| 9.                              |          |           | SHORT    |
| LK. : 1                         |          | ABS %     |          |
| unit : mH                       |          | SHORT     |          |
| CLEAR ALL                       |          | NEXT PAGE |          |
| MODE : 2                        |          |           |          |

When into this screen is entrance to the judgment setting of transformer leakage, it is also guidable operation, just according the block area on the screen and number keys to input the pin number, press [ENTER] then automatically change to next pin setting item, use the same method till the last item of pin number on the same screen, press [ENTER] then automatically change to next the setting screen of parameter.

Ex.: The leakage inductance value of each winding of transformer is as following:

LK1 (1 - 2) = 120 uH  $\pm$  10%, PIN 5,6,7,8,9,10,11,12, SHORT.

LK2 (3 - 4) = 120 uH  $\pm$  10%, PIN 5,6,7,8,9,10,11,12, SHORT.

Test loop : series equivalence loop.

Then the input is as below:

Press the key [ABS%] beside the screen to make the [%] change to backlight.

Press the unit key [unit : uH ] beside the screen to change the unit to the mH.

Press [START] to make the word "SERIES" of the [SERIES/PARALLEL] on the screen change to back-light.

LK1 (1 - 2) : [1] [2] [0] [Enter] [1] [0] [Enter] [-] [1] [0] [Enter]  
[1] [Enter] [2] [Enter]

Use the forward key to move the block area to the pin input box of the transformer (1).  
and input : [5] [Enter] [6] [Enter]



Use the forward key to move the block area to the pin input box of the transformer (2).  
and input : [7] [Enter] [8] [Enter]

Use the forward key to move the block area to the pin input box of the transformer (3).  
and input : [9] [Enter] [1] [0] [Enter]

Use the forward key to move the block area to the pin input box of the transformer (4).  
and input : [1] [1] [Enter] [1] [2] [Enter]

After input the Lk1 value, the screen is as below:

| LEAKAGE INDUCTANCE TEST SETTING |           |          |          |
|---------------------------------|-----------|----------|----------|
| 1                               | STANDARD  | HI LIMIT | LO LIMIT |
| LK.1                            | 120.000uH | 10.000%  | -10.000% |
| TRANSFORMER FIXTURE             |           |          |          |
| LK.1                            | 1 2       |          |          |
| 1.                              | 5 6       |          | SHORT    |
| 2.                              | 7 8       |          | SHORT    |
| 3.                              | 9 10      |          | SHORT    |
| 4.                              | 11 12     |          | SHORT    |
| 5.                              |           |          | SHORT    |
| 6.                              |           |          | SHORT    |
| 7.                              |           |          | SHORT    |
| 8.                              |           |          | SHORT    |
| 9.                              |           |          | SHORT    |

LK. : 1

ABS %

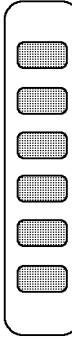
unit : uH

SHORT

CLEAR ALL

NEXT PAGE

MODE : 2



Press the key shows [LK: 1] beside the screen, it will change to next item leakage inductance value setting.

LK2 (3 – 4) : [1] [2] [0] [Enter] [1] [0] [Enter] [-] [1] [0] [Enter]  
[3] [Enter] [4] [Enter]

Use the forward key to move the block area to the pin input box of the transformer (1).  
and input : [5] [Enter] [6] [Enter]

Use the forward key to move the block area to the pin input box of the transformer (2).  
and input : [7] [Enter] [8] [Enter]

Use the forward key to move the block area to the pin input box of the transformer (3).  
and input : [9] [Enter] [1] [0] [Enter]

Use the forward key to move the block area to the pin input box of the transformer (4).  
and input : [1] [1] [Enter] [1] [2] [Enter]

After input the Lk2 value, the screen is as below:

| LEAKAGE INDUCTANCE TEST SETTING |           |          |          |
|---------------------------------|-----------|----------|----------|
| 2                               | STANDARD  | HI LIMIT | LO LIMIT |
| LK.2                            | 120.000uH | 10.000%  | -10.000% |
| TRANSFORMER FIXTURE             |           |          |          |
| LK.2                            | 3 4       |          |          |
| 1.                              | 5 6       |          | SHORT    |
| 2.                              | 7 8       |          | SHORT    |
| 3.                              | 9 10      |          | SHORT    |
| 4.                              | 11 12     |          | SHORT    |
| 5.                              |           |          | SHORT    |
| 6.                              |           |          | SHORT    |
| 7.                              |           |          | SHORT    |
| 8.                              |           |          | SHORT    |
| 9.                              |           |          | SHORT    |

LK. : 2

ABS %

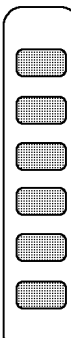
unit : uH

SHORT

CLEAR ALL

NEXT PAGE

MODE : 2



Then press [ENTER] to enter next setting screen as below: (DCR)

| DCR TEST SETTING |          |          |          |
|------------------|----------|----------|----------|
| 1                | STANDARD | HI LIMIT | LO LIMIT |
| 1 - 2            |          |          |          |
| 3 - 4            |          |          |          |
| 5 - 6            |          |          |          |
| 12 - 11          |          |          |          |
| 10 - 9           |          |          |          |
| 8 - 7            |          |          |          |
|                  |          |          |          |
|                  |          |          |          |
|                  |          |          |          |
|                  |          |          |          |

UNIT : m  $\Omega$

PRI : 1  
 ABS %  
 unit : m  $\Omega$   
 CLEAR ROW  
 CLEAR ALL  
 NEXT PAGE

When into this screen is entrance to the judgment setting of transformer DC resistance, it is also still guidable operation, just according the block area on the screen and number keys to input the pin number, press [ENTER] then automatically change to next pin setting item, use the same method till the last item of pin number on the same screen, press [ENTER] then automatically change to next the setting screen of parameter.

Ex.: The transformer DCR and high/low limit of the each winding are as following:

| Pin       | Standard       | High-limit     | Low-limit      |
|-----------|----------------|----------------|----------------|
| ( 1 - 2 ) | 750 m $\Omega$ | 800 m $\Omega$ | 700 m $\Omega$ |
| ( 3 - 4 ) | 750 m $\Omega$ | 800 m $\Omega$ | 700 m $\Omega$ |
| ( 5 - 6 ) | 65 m $\Omega$  | 70 m $\Omega$  | 60 m $\Omega$  |
| (12-11)   | 120 m $\Omega$ | 130 m $\Omega$ | 110 m $\Omega$ |
| (10- 9)   | 320 m $\Omega$ | 340 m $\Omega$ | 300 m $\Omega$ |
| ( 8 - 7 ) | 10 m $\Omega$  | 12 m $\Omega$  | 8 m $\Omega$   |

The input is as following:

Press the key [ABS%] beside the screen to make [%] change to backlight.

Press the unit key [unit :  $\Omega$ ] beside the screen to change the unit to the m $\Omega$  in back-light.

1 - 2 : [7] [5] [0] [Enter] [8] [0] [0] [Enter] [7] [0] [0] [Enter]  
 3 - 4 : [7] [5] [0] [Enter] [8] [0] [0] [Enter] [7] [0] [0] [Enter]  
 5 - 6 : [6] [5] [Enter] [7] [0] [Enter] [6] [0] [Enter]  
 12-11 : [1] [2] [0] [Enter] [1] [3] [0] [Enter] [1] [1] [0] [Enter]  
 10- 9 : [3] [2] [0] [Enter] [3] [4] [0] [Enter] [3] [0] [0] [Enter]  
 8 - 7 : [1] [0] [Enter] [1] [2] [Enter] [8] [Enter]

After input the test data of every items, the screen is as below:

| DCR TEST SETTING |                    |                    |                    |
|------------------|--------------------|--------------------|--------------------|
| 1                | STANDARD           | HI LIMIT           | LO LIMIT           |
| 1 - 2            | 0.750 $\Omega$     | 0.800 $\Omega$     | 0.700 $\Omega$     |
| 3 - 4            | 0.750 $\Omega$     | 0.800 $\Omega$     | 0.700 $\Omega$     |
| 5 - 6            | 65.000 m $\Omega$  | 70.000 m $\Omega$  | 60.000 m $\Omega$  |
| 12 - 11          | 120.000 m $\Omega$ | 130.000 m $\Omega$ | 110.000 m $\Omega$ |
| 10 - 9           | 0.320 $\Omega$     | 0.340 $\Omega$     | 0.300 $\Omega$     |
| 8 - 7            | 10.000 m $\Omega$  | 12.000 m $\Omega$  | 8.000 m $\Omega$   |
|                  |                    |                    |                    |
|                  |                    |                    |                    |
|                  |                    |                    |                    |
|                  |                    |                    |                    |

UNIT : m  $\Omega$

PRI : 1  
 ABS %  
 unit : m  $\Omega$   
 CLEAR ROW  
 CLEAR ALL  
 NEXT PAGE

Press [ENTER] then enter next setting screen as below: (PIN SHORT)

| TRANSFORMER : PIN SHORT SETTING |             |   |         |
|---------------------------------|-------------|---|---------|
| PRI : 1                         | TRANSFORMER |   | FIXTURE |
| PHASING                         | +           | - | + -     |
| SHORT 0                         | ■■■■        |   |         |
| SHORT 1                         |             |   |         |
| SHORT 2                         |             |   |         |
| SHORT 3                         |             |   |         |
| SHORT 4                         |             |   |         |
| SHORT 5                         |             |   |         |
| SHORT 6                         |             |   |         |
| SHORT 7                         |             |   |         |
| SHORT 8                         |             |   |         |
| SHORT 9                         |             |   |         |
| SHORT 10                        |             |   |         |

PRIMARY : 1

---

MEASUREMENT  
DISPLAY

JUDGMENT  
DISPLAY

NEXT PAGE

When into this screen is entrance to the judgment setting of transformer pin short, it is also guidable operation, just according the block area on the screen and number keys to input the pin number, press [ENTER] then automatically change to next pin setting item, use the same method till the last item of pin number on the same screen, press [ENTER] then automatically change to next the setting screen of parameter.

Ex.: The pin for testing the pin short of transformer are as following:  
PIN 2 – 3, PIN 4 – 5, PIN 8 – 9, PIN 10 – 11.

Then the input is as below:

Use the forward key to move the block area to the pin input box of the transformer (Short 0) and input : [2] [Enter] [3] [Enter]

Use the forward key to move the block area to the pin input box of the transformer (Short 1) and input : [4] [Enter] [5] [Enter]

Use the forward key to move the block area to the pin input box of the transformer (Short 2) and input : [8] [Enter] [9] [Enter]

Use the forward key to move the block area to the pin input box of the transformer (Short 3) and input : [1] [0] [Enter] [1] [1] [Enter]

After input whether the pin short setting, the screen is as below:

| TRANSFORMER : PIN SHORT SETTING |             |    |         |
|---------------------------------|-------------|----|---------|
| PRI : 1                         | TRANSFORMER |    | FIXTURE |
| PHASING                         | +           | -  | + -     |
| SHORT 0                         | 2           | 3  |         |
| SHORT 1                         | 4           | 5  |         |
| SHORT 2                         | 8           | 9  |         |
| SHORT 3                         | 10          | 11 | ■■■■    |
| SHORT 4                         |             |    |         |
| SHORT 5                         |             |    |         |
| SHORT 6                         |             |    |         |
| SHORT 7                         |             |    |         |
| SHORT 8                         |             |    |         |
| SHORT 9                         |             |    |         |
| SHORT 10                        |             |    |         |

PRIMARY : 1

---

MEASUREMENT  
DISPLAY

JUDGMENT  
DISPLAY

NEXT PAGE

Press [ENTER] again then enter next setting screen as below: (BALANCE)

| TRANSFORMER : BALANCE SETTING        |                  |
|--------------------------------------|------------------|
| NOMINAL VALUE : <input type="text"/> | BL : <b>1</b>    |
| BALANCE -- L1 : <b>PRI.</b>          | ABS %            |
| BALANCE -- L2 : <b>PRI.</b>          | unit : <b>uH</b> |
| ABS(L1 -- L2) < <input type="text"/> | <b>Lx.</b>       |
|                                      | PRI : <b>1</b>   |
|                                      | NEXT PAGE        |

When into this screen is entrance to the judgment setting of transformer balance, it is also guidable operation, just according the block area on the screen and number keys to input the pin number, press [ENTER] then automatically change to next pin setting item, use the same method till the last item of pin number on the same screen, press [ENTER] then automatically change to next the setting screen of parameter.

Ex.: The specifications of transformer balance for two items are as following:

L1 (PIN 1 – 2) = 1.750 mH,      L2 (PIN 3 – 4) = 1.750 mH  
 Standard      = 1.750 mH,      ABS (L1 – L2) < 1%

Then the input is as below:

Press the unit key [unit : uH] beside the screen to change the unit to The mH in back-light.

NOMINAL VALUE : [1] [.] [7] [5] [Enter]

BALANCE – L1 : [0] [Enter]

BALANCE – L2 : [1] [Enter]

ABS (L1 - L2) < : [1] [Enter]

After finish the input all the parameter, the screen is as below:

| TRANSFORMER : BALANCE SETTING   |                  |
|---------------------------------|------------------|
| NOMINAL VALUE : <b>1.750 mH</b> | BL : <b>1</b>    |
| BALANCE -- L1 : <b>PRI.</b>     | ABS <b>1%</b>    |
| BALANCE -- L2 : <b>SEC.1</b>    | unit : <b>mH</b> |
| ABS(L1 -- L2) < <b>1.000 %</b>  | <b>Lx.</b>       |
|                                 | PRI : <b>1</b>   |
|                                 | NEXT PAGE        |

Press [ENTER] again then enter next setting screen as below : (CAPACITANCE)

| CAPACITANCE TEST SETTING |          |          |          |
|--------------------------|----------|----------|----------|
| 1                        | STANDARD | HI LIMIT | LO LIMIT |
| Cx. 1                    |          |          |          |
| T : ( + - ) F : ( + - )  |          |          |          |
| Cx. 1                    |          |          |          |
| 1.                       |          |          |          |
| 2.                       |          |          |          |
| 3.                       |          |          |          |
| 4.                       |          |          | (HI + )  |
| 1.                       |          |          |          |
| 2.                       |          |          |          |
| 3.                       |          |          |          |
| 4.                       |          |          | (LO - )  |

Cx. : 1

ABS %

unit : pF

SERIES

CLEAR ALL

NEXT PAGE

When into this screen is entrance to the judgment setting of transformer two items capacitance, it is also guidable operation, just according the block area on the screen and number keys to input the pin number, press [ENTER] then automatically change to next pin setting item, use the same method till the last item of pin number on the same screen, press [ENTER] then automatically change to next the setting screen of parameter.

Ex.: The spec. of the testing transformer capacitance are following:

Cx1 (PIN 1,2,3,4,5,6 – 7,8,9,10,11,12,) = 75 pF

HI LIMIT = 100pF, LO LIMIT = 50 pF.

Then the input is as below:

Press the key [ABS%] beside the screen to make [ABS] change to back-light.

Press the unit key [unit : pF] beside the screen to change the unit to The pF is back-light.

Cx.1 STANDARD : [7] [5] [Enter] [1] [0] [0] [Enter] [5] [0] [Enter]

Cx.1 TERMINAL : [1] [Enter] [1] [2] [Enter]

Use the forward key to move the block area to the pin input box of the Hi terminal transformer (1.) and input : HI TERMINAL 1. : [2] [Enter] [3] [Enter]

Use the forward key to move the block area to the pin input box of the Hi terminal transformer (2.) and input : HI TERMINAL 2. : [4] [Enter] [5] [Enter]

Use the forward key to move the block area to the pin input box of the Hi terminal transformer (3.) and input : HI TERMINAL 3. : [6] [Enter]

Use the forward key to move the block area to the pin input box of the Lo terminal transformer (1.) and input : LO TERMINAL 1. : [7] [Enter] [8] [Enter]

Use the forward key to move the block area to the pin input box of the Lo terminal transformer (2.) and input : LO TERMINAL 2. : [9] [Enter] [1] [0] [Enter]

Use the forward key to move the block area to the pin input box of the Lo terminal transformer (3.) and input : LO TERMINAL 3. : [1] [1] [Enter]

After finish the input all the parameter, the screen is as below:

| CAPACITANCE TEST SETTING |           |            |           |
|--------------------------|-----------|------------|-----------|
| 1                        | STANDARD  | HI LIMIT   | LO LIMIT  |
| Cx. 1                    | 75.000 pF | 100.000 pF | 50.000 pF |

T : ( + - ) F : ( + - )

| Cx. 1 | 1 | 2 |  |
|-------|---|---|--|
| 1.    | 2 | 3 |  |
| 2.    | 4 | 5 |  |
| 3.    | 6 |   |  |
| 4.    |   |   |  |

(HI + )

| 1. | 7  | 8  |  |
|----|----|----|--|
| 2. | 9  | 10 |  |
| 3. | 11 |    |  |
| 4. |    |    |  |

(LO - )

Cx. : 1

ABS %

unit : pF

SERIES

CLEAR ALL

NEXT PAGE

When set till here is finished, but on more the most important parameter has not been set yet, it is the automatic pin number change, please press [MAIN INDEX] to return the scan test setting screen, press [TEST SETTING] key to into the transformer pin setting screen, then press [.] key to enter the automatic pin change screen as below:

| TRANSFORMER PIN CORRESPONDENT FIXTURE NODE                                      |                |
|---|----------------|
| (A) ENTER THE NODES PER TRANSFORMER   | FIXTURE A      |
| (B) ENTER THE FIXTURE NODE NUMBER FOLLOWED BY THE CORRESPONDING TERMINAL NAME : | ANTI-CLOCKWISE |
| TRANSFORMER : _____   |                |
| FIXTURE : _____   |                |
|   | EXIT           |

press this key to switch the transformer pins clockwise or anticlockwise.

press this key can escape from the automatic pin change screen

Ex. : The correspondence of transformer pin number to test fixture are as following :

There are 12 pin in this transformer

The pin of the transformer inserts the pin2 of the test fixture, then the input is:

(A) : [1] [2] [ENTER]

(B) TRANSFORMER : [1] [ENTER]

FIXTURE : [2] [ENTER]

After finish the input, the screen is as below :

| TRANSFORMER PIN CORRESPONDENT FIXTURE NODE                                      |                |
|---|----------------|
| (A) ENTER THE NODES PER TRANSFORMER   | FIXTURE A      |
| (B) ENTER THE FIXTURE NODE NUMBER FOLLOWED BY THE CORRESPONDING TERMINAL NAME : | ANTI-CLOCKWISE |
| TRANSFORMER : 1   |                |
| FIXTURE : 2   |                |
|   | EXIT           |

In the above figure, press the key [EXIT] beside the screen to return the test setting screen, then press [MAIN INDEX] to return the scan test setting first screen, press [MEASUREMENT DISPLAY] key to enter the preparing test condition as below:

|                          |         |    |      |     |    |    |             |    |    |
|--------------------------|---------|----|------|-----|----|----|-------------|----|----|
| <b>ID :</b> ET-45273-001 |         |    |      |     |    |    |             |    |    |
|                          | PIN     | LX | TURN | DCR | P  | B  | LOAD STD.   |    |    |
| 0                        | 1 - 2 : |    |      |     |    |    | OFF         |    |    |
| 1                        | 3 - 4 : |    |      |     |    |    | DEVIATION   |    |    |
| 2                        | 5 - 6 : |    |      |     |    |    | OFF         |    |    |
| 3                        | 7 - 8 : |    |      |     |    |    | SPEED :     | M  |    |
| 4                        | 9 - 0 : |    |      |     |    |    | PRL :       | 1  |    |
| 5                        | 1 - 2 : |    |      |     |    |    | TEST FAIL   |    |    |
|                          |         |    |      |     |    |    | CONTINUE    |    |    |
|                          |         |    |      |     |    |    | PRINT : OFF |    |    |
|                          |         |    |      |     |    |    | BOAS : OFF  |    |    |
|                          | L. K. : |    |      |     |    |    | AUTO        |    |    |
|                          | PSHT :  | 00 | 01   | 02  | 03 | 04 | 05          | 06 | 07 |
|                          |         | 08 | 09   | 10  |    |    |             |    |    |

When the instrument shows this screen, that means the instrument is ready to test, just put the unknown on the test fixture and press the key [START] on the scan box, then start to scan test, the measurement will be shown on the screen, if no-good value, the measurement will be in the block area, the result of scan test can know through the indication light on the scan box.

If the judgment of result are shown (pass/fail) as above figure, press [NEXT PAGE] then enter the screen of judgment result as below:

|                          |         |    |      |     |    |    |           |    |    |
|--------------------------|---------|----|------|-----|----|----|-----------|----|----|
| <b>ID :</b> ET-45273-001 |         |    |      |     |    |    |           |    |    |
|                          | PIN     | LX | TURN | DCR | P  | B  |           |    |    |
| 0                        | 1 - 2 : |    |      |     |    |    |           |    |    |
| 1                        | 3 - 4 : |    |      |     |    |    | ABS       | %  |    |
| 2                        | 5 - 6 : |    |      |     |    |    | SPEED :   | M  |    |
| 3                        | 7 - 8 : |    |      |     |    |    | PRL :     | 1  |    |
| 4                        | 9 - 0 : |    |      |     |    |    | TEST FAIL |    |    |
| 5                        | 1 - 2 : |    |      |     |    |    | CONTINUE  |    |    |
|                          |         |    |      |     |    |    | NEXT PAGE |    |    |
|                          | L. K. : |    |      |     |    |    | AUTO      |    |    |
|                          | PSHT :  | 00 | 01   | 02  | 03 | 04 | 05        | 06 | 07 |
|                          |         | 08 | 09   | 10  |    |    |           |    |    |

The unknown on the test fixture and press the key [START] on the scan box, then start to scan test, if the good will show "PASS", the no-good will show high or low depend on over or less, and the high or low will be shown by back-light.

The result of scan test can be indicated by the scan box indication light.

Check all the result can use statistic screen then press [NEXT PAGE] to enter as below:

|                               |    |    |     |           |
|-------------------------------|----|----|-----|-----------|
| <b>SCAN TEST : STATISTICS</b> |    |    |     |           |
|                               | GO | NG | SUM | DETAIL    |
| TURN :                        | 0  | 0  | 0   |           |
| PH :                          | 0  | 0  | 0   |           |
| Lx :                          | 0  | 0  | 0   |           |
| Lk :                          | 0  | 0  | 0   |           |
| DCR :                         | 0  | 0  | 0   | CLEAR ALL |
| PS :                          | 0  | 0  | 0   | MEAS      |
| BL :                          | 0  | 0  | 0   | DISPLAY   |
| Cx :                          | 0  | 0  | 0   | JUDG.     |
| WAC :                         | 0  | 0  | 0   | DISPLAY   |
| WDC :                         | 0  | 0  | 0   | NEXT PAGE |
| IR :                          | 0  | 0  | 0   |           |
| TOTAL :                       | 0  | 0  | 0   |           |

After all the setting parameter finished, press the key [MAIN INDEX] can store data and into the first setting screen then press [TRANSFORMER ID] to enter the screen of transformer number setting, press [STORE] to enter the data stored screen as below:


The image shows a terminal screen titled "TRANSFORMER ID". At the top, it displays "01-14-2000 16:28". Below this is a list of 9 items, each with a number followed by a dashed line for input. To the right of the list, there are labels "L", "E", and "PAGE". At the bottom, it says "PRESS [ENTER] KEY TO STORE". To the right of the screen is a vertical column of 9 buttons, each corresponding to a number in the list.

| TRANSFORMER ID             |       |      |
|----------------------------|-------|------|
| 01-14-2000                 | 16:28 |      |
| 1.                         | ----- | L    |
| 2.                         | ----- |      |
| 3.                         | ----- |      |
| 4.                         | ----- |      |
| 5.                         | ----- | E    |
| 6.                         | ----- |      |
| 7.                         | ----- |      |
| 8.                         | ----- |      |
| 9.                         | ----- | PAGE |
| PRESS [ENTER] KEY TO STORE |       |      |

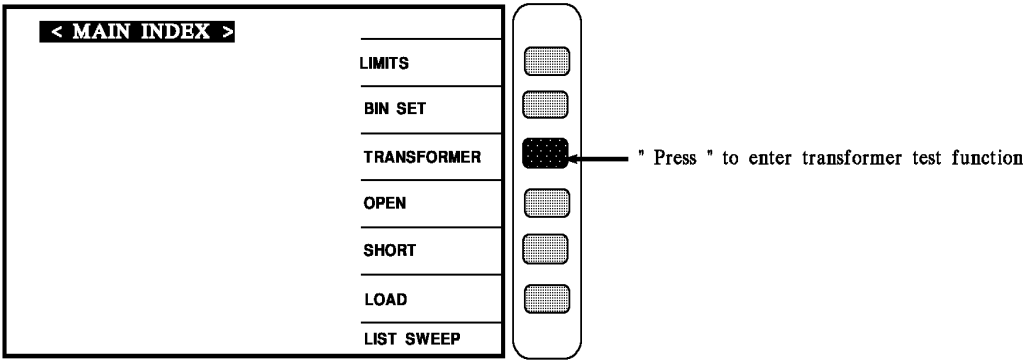
Press [ENTER] key then store finished.



## 6. PRINT Operational Procedure

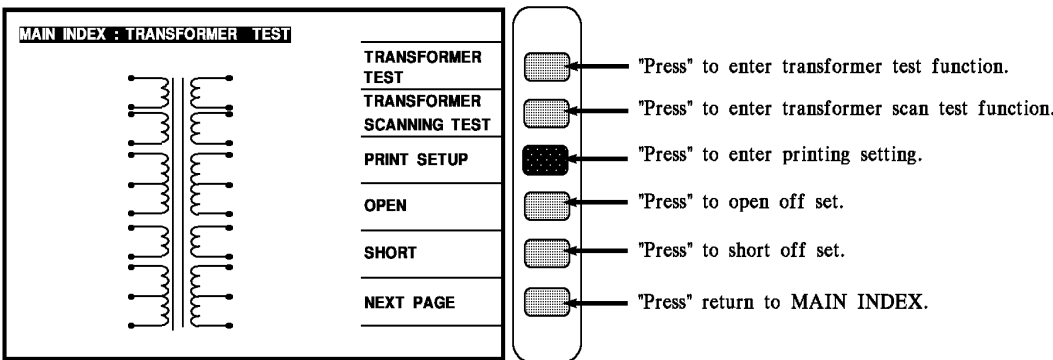
Key in → [  ] key

Display →



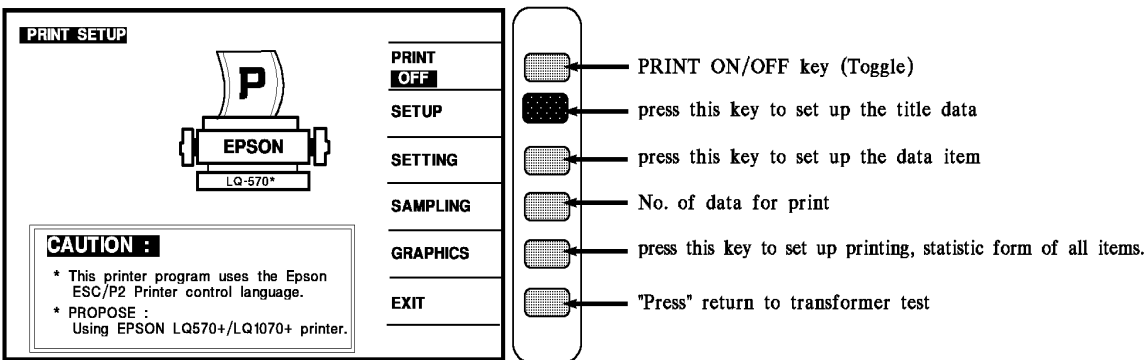
Key in → [TRANSFORMER] key

Display →



Key in → [PRINT SETUP] key

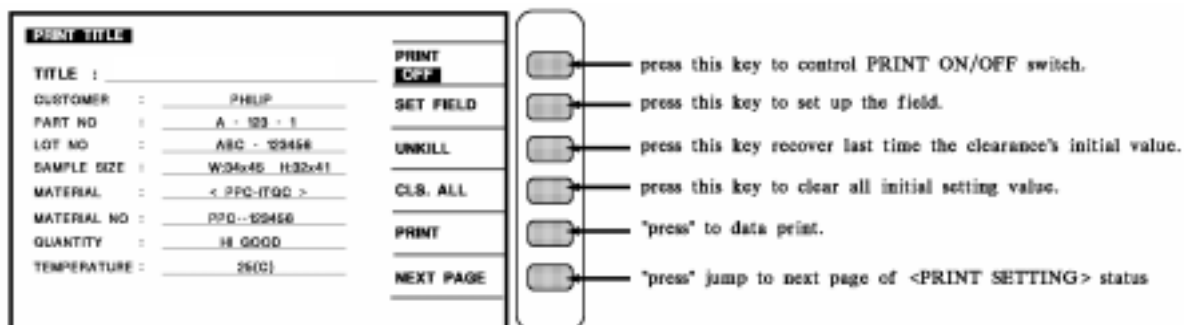
Display →



PS: At PRINT SETUP status, press Enter key to enter SETUP → SETTING → SAMPLING → GRAPHICS setting content. User can change the setting step by step or change the setting directly from right hand side of 6 keys on the screen.

Key in → [SET UP] key

Display →

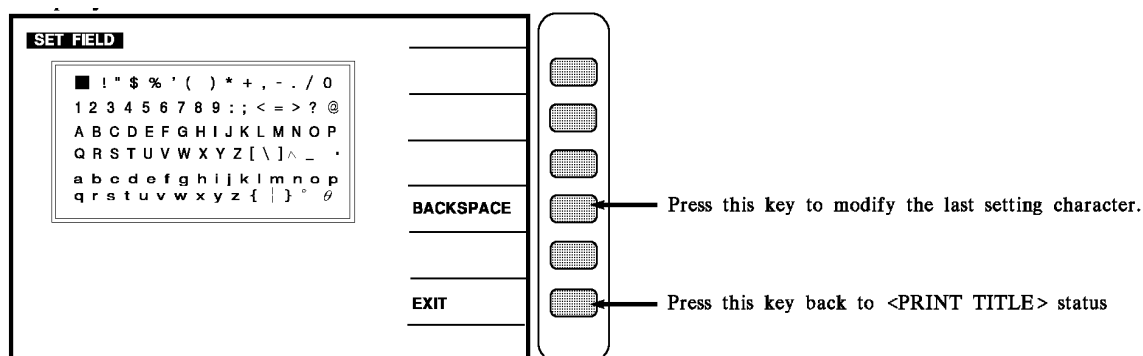


More the CURSOR key select the setting data then key in **SET FIELD**

Explanation :

(1) When "SET FIELD" key was pressed, the unit will display as follows:

Display →



Use CURSOR key to select the character which need to change.

"TRIG" to ensure the selected characters where valid.

"BACKSPACE" to modify the characters which entered.

"CLEAR" to clear the word which selected.

Use **ENTER** key to make sure the setting characters are correct (max. 30 characters)

(2) When the "PRINT" status at on position, then the following table should be print while the "PRINT" key was pressed.

| TRANSFORMER SCAN TEST REPORT |                 |             |                |
|------------------------------|-----------------|-------------|----------------|
| CUSTOMER                     | : PHILIP        | INSTRUMENT  | : 320x A.C.A   |
| TRANS. ID                    | : S00XAT8       | MATERIAL    | : < PPC-ITGQ > |
| PART NO                      | : A - 123 - 1   | MATERIAL NO | : PPC-123456   |
| LOT NO                       | : ABC - 123456  | QUANTITY    | : HE GOOD      |
| SAMPLE SIZE                  | : W34x45 H32x41 | TEMPERATURE | : 25(C)        |
| DATE                         | : 09/25/98      | TIME        | : 11 : 20      |

For INSTRUMENT, DATA, TIME, they are fixed values so user can't change them.  
Other then that, user can change under TRANS. ID and TRNASFORMER ID menu.

Key in → [SETTING]

Display →

| PRINT SETTING |           |
|---------------|-----------|
| 1. TURN ( X ) | PRINT OFF |
| 2. Lx ( X )   | ✓         |
| 3. L.k. ( X ) | ×         |
| 4. Cx ( X )   | CONDITION |
| 5. DCR ( X )  | ×         |
| 6. PS ( X )   | PRINT     |
| 7. BL ( X )   | NEXT PAGE |
| 8. HP ( X )   |           |

PRINT ON/OFF toggle sw.

item print active

item not print

base freq. voltage print select ✓ for print × for no print

start print function

swap to " PRINT SAMPLING"

PRINT ON/OFF toggle sw.

item print active

item not print

base freq. voltage print select ✓ for print × for no print

start print function

swap to " PRINT SAMPLING"

Items that need to be printed out can only be chosen under TEST CONDITION. Under PRINT SETTING, it can be chosen whether the items want to be printed or not. Applied the cursor key to select the items then using ☒ to enable it.

Key in → [PRINT SAMPLING] key

Display →

| PRINT SAMPLING       |            |
|----------------------|------------|
| 1. SAMPLING NUMBER : | PRINT OFF  |
| 0                    | PROGRAM    |
| 2. PRINT COUNT :     | MEMORY OFF |
| 0                    | OUTPUT ALL |
| 3. PRINT MODE :      | MODE : 1   |
| DATA ONLY            | NEXT PAGE  |

PRINT ON/OFF toggle sw.

to modify the contents which point by cursor.

MEMORY CARD enable key.

GO/NG judgment select key.

print mode select key.

press this key jump to print statistics graphics screen.

PRINT ON/OFF toggle sw.

to modify the contents which point by cursor.

MEMORY CARD enable key.

GO/NG judgment select key.

print mode select key.

press this key jump to print statistics graphics screen.

1. SAMPLING NUMBER : The sampling quantity while in statistics process.
2. 2PRINT COUNT : The printing count.
3. PRINT MODE
  - (1) DATA ONLY
  - (2) DATA & STA
  - (3) STATISTICS

Key in → [MEMORY]

Display →

| DATA STORE TO MEMORY CARD |            |
|---------------------------|------------|
| 1.( 30 SETS )             |            |
| 0 1 2 3 4 5               |            |
| 2.( 100 SETS )            |            |
| 6 7 8                     |            |
| 3.( 3600 SETS )           |            |
| 9                         |            |
| STORE TO : 0              | MEMORY OFF |
| TO LIST : 0               | LIST       |
|                           | STORE TO   |
|                           | EXIT       |

data store to MEMORY CARD select

On: enable Off: ditto

to view the contents which already stored.

address to store.

return to <PRINT SAMPLING>

data store to MEMORY CARD select

On: enable Off: ditto

to view the contents which already stored.

address to store.

return to <PRINT SAMPLING>

Address : 0~5 : 30sets for each address.  
           6.7.8. : 100 sets for each address.  
           9 : 3600 sets for each address.

When key in [GRAPHICS] key, the following message will be display as follow.  
 Display →

| PRINT STATISTICS GRAPHICS |   |   |   |   |   |   |   |   |   |   |           |  |  |  |  |
|---------------------------|---|---|---|---|---|---|---|---|---|---|-----------|--|--|--|--|
| TR :                      | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | PRINT     |  |  |  |  |
| Lx :                      | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | OFF       |  |  |  |  |
| LK :                      | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |           |  |  |  |  |
| Cx :                      | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |           |  |  |  |  |
| DCR :                     | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | BAR       |  |  |  |  |
| PS :                      | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | CHART     |  |  |  |  |
| BL :                      | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | PRINT     |  |  |  |  |
| HV :                      |   |   |   |   |   |   |   |   |   |   | NEXT PAGE |  |  |  |  |

printer ON/OFF control

graphics mode select.

print the selected statistics data

jump to " print setup "

☐ BAR / CHART key, when BAR is highlighted, it will show bar testing graph.  
 When CHART is highlighted, it will show line testing graph.

Use CURSOR   key to choose the statistics graphs, that wants to be printed.  
 Use 0 ~ 9 number to choose the analytic set numbers.  
 0 indicates PRI.1 ~ 9 indicates SEC.1 ~ SEC.9

| ID: 33XXATS         |  |  |  |  |  |  |  |  |  |             |  |  |  |  |
|---------------------|--|--|--|--|--|--|--|--|--|-------------|--|--|--|--|
| PIN LX TURN DCR P B |  |  |  |  |  |  |  |  |  | LOAD STD.   |  |  |  |  |
| 0                   | 0-0 :                                  |  |  |  |  |  |  |  |  | OFF         |  |  |  |  |
| 1                   | 0-0 :                                  |  |  |  |  |  |  |  |  | DEVIATION   |  |  |  |  |
| 2                   | 0-0 :                                  |  |  |  |  |  |  |  |  | OFF         |  |  |  |  |
|                     |  |  |  |  |  |  |  |  |  | SPEED : M   |  |  |  |  |
|                     |  |  |  |  |  |  |  |  |  | PRI. 1      |  |  |  |  |
|                     |  |  |  |  |  |  |  |  |  | TEST FAIL   |  |  |  |  |
|                     |  |  |  |  |  |  |  |  |  | CONTINUE    |  |  |  |  |
|                     | L.K. :                                 |  |  |  |  |  |  |  |  | PRINT : OFF |  |  |  |  |
|                     | PSHT: 00 01 02 03 04 05 06 07 08 09 10 |  |  |  |  |  |  |  |  | BIAS : OFF  |  |  |  |  |
|                     |  |  |  |  |  |  |  |  |  | AUTO        |  |  |  |  |

PRINT ON/OFF.

When "PRINT SETTING" and "PRINT SAMPLING" modes were selected, the printer will print the data at real time meanwhile the "PRINT STATUS" set is on.

When "PRINT TITLE" and "PRINT STATISTICS GRAPHICS" modes were selected, the printer only active while the "PRINT" status is on.

## 7. Handler Interface (Option)

### 7.1 General

If you have the HANDLER INTERFACE option, connect from the HANDLER INTERFACE on the rear panel to a handler. Connect the control lines to the handler. See Table 7-1. As indicated in the specifications at the front of this manual. The output signal come from open-collector drivers that pull each signal line to a low voltage when that signal is active and let it float when inactive. Each external circuit must be powered by a positive voltage, up to 30V (max), with sufficient impedance (pull-up resistors) to limit the active-signal (logic-low) current to 16mA (max).

#### ⚡ Caution

Each relay or other inductive load requires a CLAMPING DIODE (rectifier) across it (cathode connected to the power-supply end of the load) typically.

| Signal Name | Pin No. | Function (All signal "active low")  |
|-------------|---------|---|
| START       | 25      | Initiates measurement (External Trigger).   |
| EOM         | 8       | "End of measurement"; judgment signals are valid.                                       |
| ACQ over    | 27      | "Data acquisition over"; DUT removal OK   |
| BIN 0       | 19      | Q / D / R /  Z  No-Good   |
| BIN 1       | 2       | L / C / R /  Z  Good  |
| BIN 2       | 20      | L / C / R /  Z  Good  |
| BIN 3       | 3       | L / C / R /  Z  Good  |
| BIN 4       | 21      | L / C / R /  Z  Good  |
| BIN 5       | 4       | L / C / R /  Z  Good  |
| BIN 6       | 22      | L / C / R /  Z  Good  |
| BIN 7       | 5       | L / C / R /  Z  Good  |
| BIN 8       | 23      | L / C / R /  Z  Good  |
| BIN 9       | 6       | L / C / R /  Z  No-Good   |
|             | 1,7     | Ground connection   |
|             | 9       | DC bus (+5V) available; commonly for (opto-couplers).<br>Limit the load to 25mA (max.). |

**Table 7-1 Handler Interface Key**

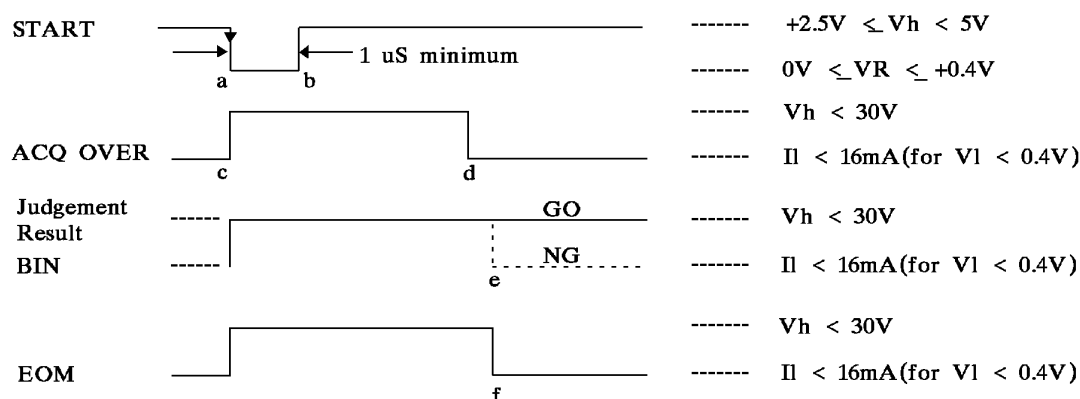
The input signal is also active low and also requires a positive-voltage external circuit, which must pull the signal line down below 0.4V, but not less than 0V, i.e., not negative. The logic-low current is 0.4mA (max.). For the inactive state (logic high) the external circuit must pull the signal line above +2.5V, but no above +5V.

## 7.2 Timing

### ① Note

The meter requires that a non-zero value be entered for "nominal value" and the principal parameter is matched to enable the Handler outputs.

Refer to the following figure for timing guideline. Notice the START must have a duration of 1  $\mu$ s (minimum) in each state (high and low). If START is provided by a mechanical switch without denounce circuitry, the instrument may make many false starts.



**Figure 7-1 Handler interface timing diagram**

Measurement starts at time C, which is essentially the same as time a; measurement is completed at f. (The START signals are expanded for clarity.) Interval a-b, during which the DUT must remain connected for data acquisition, is considerable shorter than the total measurement time a-f. The DUT can be changed after d ("indexing on ACQ", to save time) or after f ("indexing on EOM", for a simpler measurement setup), as explained below.

After the calculation interval d-e, measurement results are available for judgment and active lines goes low. A few usec later, EOM goes low (can be used to latch holding the result assignment). ACQ OVER, the active result lines, and EOM the stay low until the next start command.

Set up the handler either of two ways: index on EOM or index on ACQ, as follows the handler muse supply a signal to initiate measurement when it has completed connection of the DUT to the test fixture.

#### (1) Indexing on EOM.

Set up the handler to respond to the EOM signal from the instrument, which occurs at the "end of measurement", when the judgment result is available. Set up the meter to receive its START signal from the handler's "start measurement" signal. This setup is simpler than one below.

#### (2) Indexing on ACQ.

Set up the handler to respond to the ACQ OVER signal from the instrument, which occur when the "data acquisition" is complete. The handler can then remove the DUT from the test fixture and replace it with another DUT, while the meter is calculating the result. This setup results in higher measurement rate than indexing on EOM.

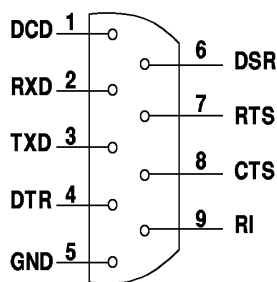
## 8. RS-232C Control Interface

### 8.1 Overview

The RS-232C interface used in this system is the standard defined by Electronic Industries Association in the United States. It is widely applied in microcomputer system, which can be used to control or transfer data.

### 8.2 RS-232C Specification

#### 8.2.1 RS-232C Interface Connector



#### 8.2.2 Table of RS-232C Signal Line and Pin

| Pin | Name | Description       |
|-----|------|-------------------|
| 5   | GND  | Grounding wire    |
| 3   | /TxD | Transmitting data |
| 2   | /RxD | Receiving data    |

### 8.3 Setting 325X RS-232C Interface

In System Setup mode, press the numeric key [5] to enter into the <RS-232C SETUP> menu as shown below:

| RS-232C SETUP     |         |
|-------------------|---------|
| 1. BAUD RATE :    | ↑       |
| 19200             |         |
| 2. PARITY CHECK : | ↓       |
| NONE              |         |
| 3. WORD LENGTH :  | DEFAULT |
| 8                 | RS-232  |
|                   | OFF     |
|                   | EXIT    |

### 8.3.1 Setting BAUD RATE

Move the arrow keys to BAUD RATE and press the  $\uparrow \downarrow$  keys shown on LCD to change it. There are 150, 300, 600, 1200, 2400, 4800, 9600, and 19200 for selection with the default set to 19200 when shipped.

---

**① Notice**

The baud rate setting should be same as the RS-232C interface card, or there may have data transmission problem.

---

### 8.3.2 Setting PARITY CHECK

Move the arrow keys to PARITY CHECK and press the  $\uparrow \downarrow$  keys shown on LCD to change it. There are NONE, EVEN, and ODD for selection with the default set to NONE.

### 8.3.3 Setting WORD LENGTH

The WORD LENGTH of 325X is fixed to 8, which is same as ASCII code.

### 8.3.4 Setting of DEFAULT

Press this key will reset the RS-232 settings of 325X to its default value, which the BAUD RATE is 19200 and PARITY CHECK is NONE.

### 8.3.5 RS-232 ON/OFF

To connect the RS-232C interface with computer, this function has to be ON. It can be turned on by computer commands.

## 8.4 Setting 325X RS-232C Interface

When connecting the 325X with computer, it can be controlled by computer commands. The commands contain Transformer Test (Table 8-3).

| Command | Function                             | Note      |
|---------|--------------------------------------|-----------|
| *IDN    | Inquiry the 325X model name          |           |
| I1      | Turn on the RS-232 on-line function  |           |
| I0      | Turn off the RS-232 on-line function |           |
| Rn      | Read the setting of set <i>n</i>     | n = 0~159 |
| Sn      | Write the setting of set <i>n</i>    | n = 0~159 |
| T1      | Enable the measurement cycle         |           |
| T0      | Disable the measurement cycle        |           |

**Table 8-3 325X Transformer Test Commands**

*Note:* Every command has to use RedDrAgOn (ASCII) as the end character code.



## 8.5 Data Output Format for 325X

### 8.5.1 Transformer Output Format

The measurement value of transformer has 509 Bytes and 325X will output it automatically after a measurement cycle is completed. The output format is shown in Table 8-4.

| Byte    | Parameter                            | Meaning  |
|---------|--------------------------------------|--|
| 0~39    | TR1~TR10                             | Turn ratio and phase degree test. 4 bytes per data with format in floating point.                    |
| 40~79   | Lx1~Lx10                             | The inductance quantity. 4 bytes per data with format in floating point and unit in [H].             |
| 80~119  | Lk1~Lk10                             | The leakage inductance. 4 bytes per data with format in floating point and unit in [H].              |
| 120~159 | Cx1~Cx10                             | Pin stray capacitance. 4 bytes per data with format in floating point and unit in [F].               |
| 160~199 | DCR1~DCR10                           | DC resistance. 4 bytes per data with format in floating point and unit in [ $\Omega$ ].              |
| 200~239 | Q1~Q10                               | Quality factor. 4 bytes per data with format in floating point.                                      |
| 240~279 | ACR1~ACR10                           | AC resistance. 4 bytes per data with format in floating point and unit in [ $\Omega$ ].              |
| 280~319 | Zx1~Zx10                             | AC absolute impedance. 4 bytes per data with format in floating point and unit in [ $\Omega$ ].      |
| 320~359 |                                      | Reserved.  |
| 360~399 | PS1~PS10                             | Pin short-circuit test. 4 bytes per data with format in floating point.                              |
| 400~409 | Turn ratio and phase degree judgment | 0: GO, 1: NG   |
| 410~419 | Inductance judgment                  | 0: GO, 1: NG   |
| 420~429 | Leakage inductance judgment          | 0: GO, 1: NG   |
| 430~439 | Pin stray capacitance judgment       | 0: GO, 1: NG   |
| 440~449 | DC resistance judgment               | 0: GO, 1: NG   |
| 450~459 | Quality factor judgment              | 0: GO, 1: NG   |
| 460~469 | AC resistance judgment               | 0: GO, 1: NG   |
| 470~479 | AC absolute impedance judgment       | 0: GO, 1: NG   |
| 480~84  | Winding balance test judgment        | 0: NO TEST, 1: GO, 2: NG   |
| 485~488 |                                      | Reserved   |
| 489     | Low voltage/High voltage             | 0: Low voltage only, 2: High voltage only, 3: From high to low voltage, 4: From low to high voltage. |
| 490~499 | Pin short-circuit judgment           | 0: NO TEST, 1: GO, 2: NG   |
| 500~508 | End character code                   | RedDrAgOn (ASCII)  |

**Table 8-4 Output Format for Low Voltage Parameter Measurement**

*Note:* The floating point used in this table is in INTEL format.

## **8.6 Example Programs of RS-232C Interface Control**

The following two example programs are written in QBASIC. Example program is for transformer test. Before controlling, this system has to be connected with the RS-232 interface, and set the 325X RS-232 SETUP to BAUD RATE = 9600, PARITY CHECK = NONE, WORD LENGTH = 8 for on-line control successfully.

### **Example program:**

```
100      OPEN "COM2: 9600,N, 8,1" FOR RANDOM AS #1
110      PRINT #1, "I1RedDrAgOn"
120      FOR I = 1 TO 5000 STEP 1
130      NEXT I
140      PRINT #1, "T1RedDrAgOn"
150      END
```

Result: The 325X will start test after the RS-232 is ON.

### **Description:**

```
100      Set the computer COM2 BAUD RATE = 9600, parity check to NONE
          with word length to 8, also set COM2 to random access mode.
110      Set the RS-232 of 325X to on-line.
120, 130 Set the DELAY TIME
140      Send the command to start test.
150      End of program.
```

## 9. Additional Description of Memory Card

### ■ Additional description of data recall/save function in MEMORY CARD

As the main memory on the main board is increased from 512K-Byte to 1M-Byte, the data recall and save in the memory card is varied as described below:

Table 1: The sets available for recall/save for the MAIN BOARD in different MEMORY SIZE with different MEMORY CARD.

|           | Main memory sets<br>(memory card not<br>included ) | Available sets for 2<br>MB Memory Card | Available sets for 4<br>MB Memory Card | Notes |
|-----------|--|--|--|-------|
| 512K-Byte | 0~15<br>(16~24 system<br>used)                     | 25~159                                 | 25~295                                 | (A)   |
| 1M-Byte   | 0~24   | 50~184                                 | 50~320                                 | (B)   |

#### Note (A)

When using the MEMORY CARD of 512K-Byte main board to save the 100<sup>th</sup> set of data and recall it from a 1M-Byte main board, the data would not be found in the 100<sup>th</sup> set but in the 125<sup>th</sup> set instead. (Set 0 to 15 are not restricted.)

#### Note (B)

If 2MB MEMORY CARD is used in 1MB-Byte main board for saving the 16<sup>th</sup> – 25<sup>th</sup> sets of data, the data cannot be recalled from a 512K-Byte main board.